



DSM9H & DSM9X 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. DSM9H & DSM9X models include 11 mm or 12 mm shaft options. The encoder body is 90mm in diameter, available in aluminum or stainless steel.



DSM9H



DSM9X

Features

- Usable up to SIL3 and Cat.4 / PLe according IEC 61508 / EN ISO 13849
- Suitable for safe motor feedback according to IEC 61800-5-2
- Especially designed for heavy-duty (steel, paper, wood, mills, cranes...). Compact and robust conception. Excellent resistance to shocks/vibrations
- Aluminium (DSM9H) or stainless steel (DSM9X) version available
- 90mm diameter encoder, 11 mm or 12 mm solid shaft
- High temperature performance - 20°C to +85°C
- Power supply 5Vdc or 11/30Vdc
- Digital TTL/RS422 or HTL Push-pull or sine/cosine 1Vpp output
- Available resolution up to 2048 ppr
- Connector or cable output – side or end orientation

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

	DSM9H	DSM9X
Material	Cover: powder coated aluminum Body: aluminum Shaft: AISI 303 stainless steel	Cover: AISI 303 stainless steel Body: AISI 303 stainless steel Shaft: AISI 303 stainless steel
Bearings	6100 series - sealed	
Maximum Loads	Axial: 100 N Radial: 200 N	
Shaft Inertia	< 23,500 g.mm ²	
Shaft Seal	Double lips	
Static/Dynamic torque DSM9H	20 / 150 mN.m	
Static/Dynamic torque DSM9X	40 / 200 mN.m	
Permissible max. speed	9,000 RPM	

Continuous max. speed ^(A)	6,000 RPM	
Theoretical mechanical lifetime L_{10h} ^(A)	7.25 X 10 ⁹ turns / 20,147 hours	
Encoder weight (approx.)	1.0 kg	2.0 kg

^(A) **Continuous max. speed – ½ max. load – according to ISO 281: 1990, L₁₀**

Temperature Conditions

Operating temperature	- 20 ... + 85 °C (encoder T°)
Storage temperature	- 20 ... + 85 °C

Electrical Characteristics / Functional Safety Parameters ^(B)

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	5V +/-5% ^(C) --- 250mA	100mA with no load	40mA	Yes	Yes	7.51E-05	8.58E-10	1331	HIGH
5G2	RS422	11-30V ^(C) --- 250mA			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% ^(C) --- 250mA	70mA with no load	10mA	Yes		4.29E-05	4.90E-10	2328	
5WT		11-30V ^(C) --- 250mA			Not to +V		6.60E-05	7.53E-10	1515	

^(B) **Safety mission time: 20 years**

^(C) **UL listed: Device must be supplied by a Class 2, LPS or SELV limited energy source.**

Standards Conformity

Protection(EN 60529)	IP65 - Option IP66
Humidity (EN 60068-2-38)	93% @ 65°C
Shock (EN60068-2-27)	≤ 500 g (during 6 ms)
Vibration (EN60068-2-6)	≤ 200 g (55 ... 2,000 Hz)
EMC Immunity Test	EN 61000-6-2, increased levels
EMC Emission Test	EN 61000-6-4, increased levels
Isolation	1000 Veff
Salt Spray (EN 60068-2-11 part 2)	96h (Aluminum), 168h (Stainless Steel)
Functional safety	IEC 61508
	IEC 62061
	ISO 13849-1
	IEC 61800-5-2
Encoders usable up to SIL3 / PLe with external specific requirements, see safety user manual for details.	
Z and Z/ are not safety signals.	

Electrical Connections

		0V	+V	A or S	B or C	Z	A/ or S/	B/ or C/	Z/	Ground
G6	M23 - 12 pins CW	1	2	3	4	5	6	7	8	Connector body
G8	M23 - 12 pins CCW	10 + 11	2 + 12	8	5	3	1	6	4	Connector body
G3	PVC cable 8 wires 8230/020	WH white	BN brown	GN green	YE yellow	GY grey	PK pink	BU blue	RD red	General shielding
GP	PUR cable 12 wires 8230/050	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
U3	PVC cable 8 wires	WH	BN	GN	YE	GY	PK	BU	RD	General shield
GC	PUR cable	BK	RD	GN	BN	VT	YE	OG	BU	General shield
GM	M12 8 pins	1	2	3	4	5	6	7	8	Connector body

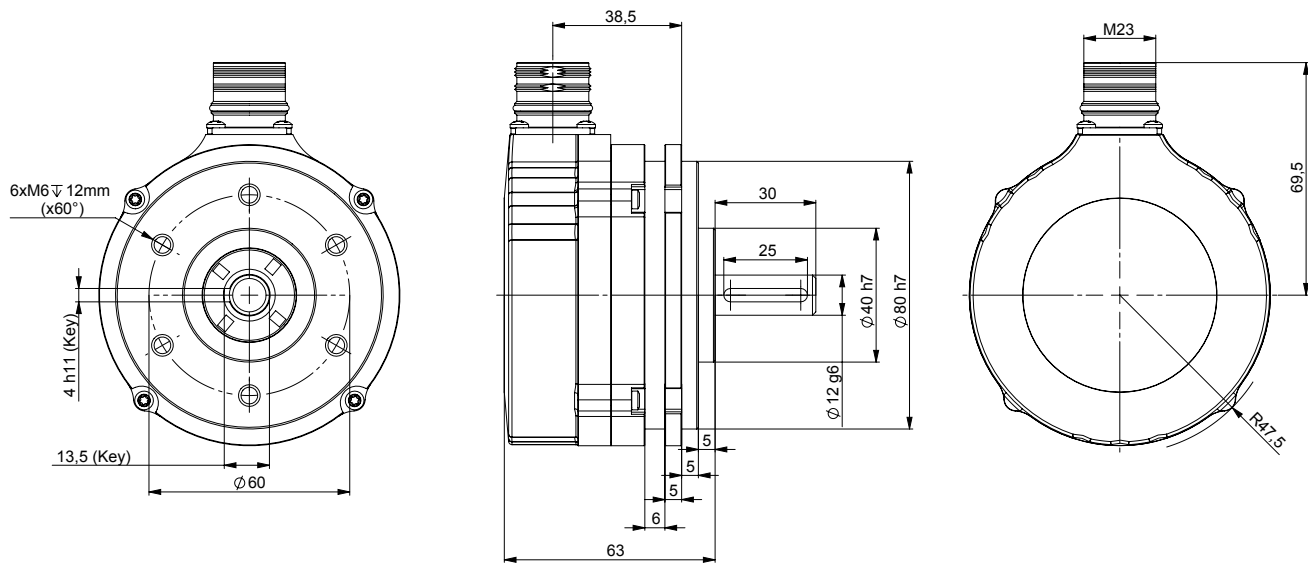
Note: All connections are UL certified, except G3 and GP

RESOLUTIONS

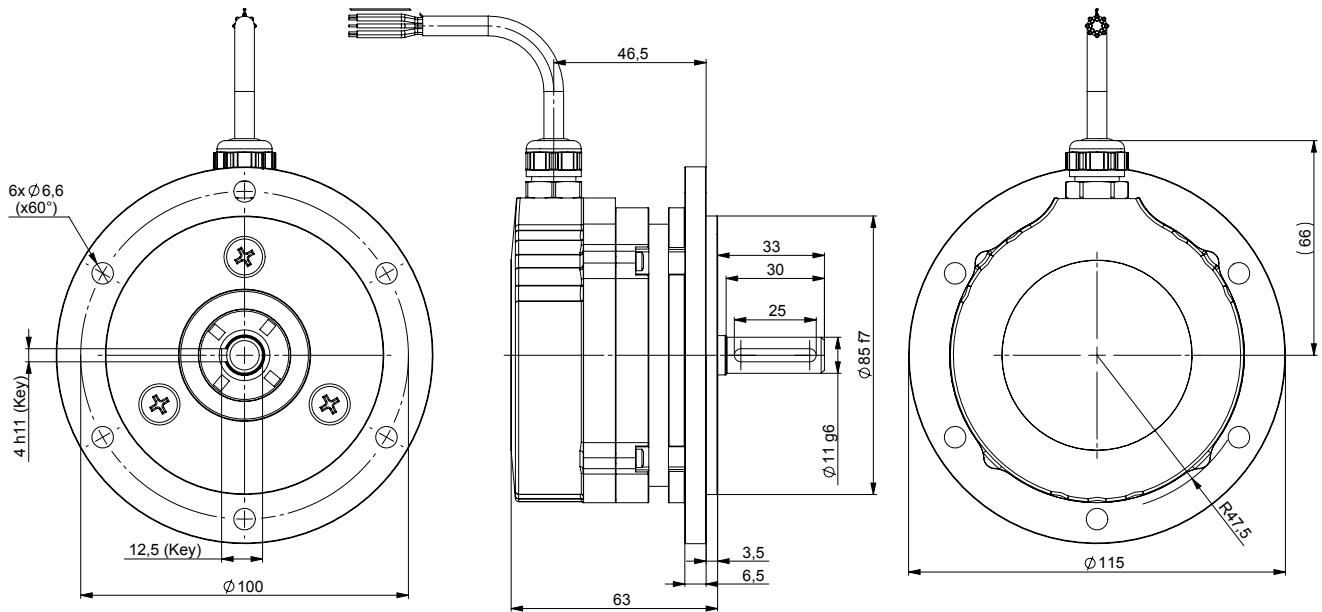
1024 2048

DIMENSIONS

DSM9H / DSM9X – radial M23 connector



DSM9H / DSM9X radial cable - with 115mm flange



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.



ORDERING OPTIONS

Example : DSM9X11 / 01 / 5G29 // 01024 // GP R 050 // CSA5**

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

	DSM9X	11	01	5G2	9	01024	GP	R	050	CSA5**
Family										
DSM9H: Aluminum bearings housing										
DSM9X: Stainless steel version										
Shaft										
11: 11mm										
12: 12mm										
IP										
Left blank: IP65 standard (DSM9H)										
01: IP66 (DSM9X)										
Voltage Output										
2G2: 5Vdc, TTL RS422										
5G2: 11- 30Vdc, TTL RS422										
5G5: 11- 30Vdc, HTL										
2WT: 5Vdc, Sine 1 Vpp (analog)										
5WT: 11- 30Vdc, Sine 1 Vpp (analog)										
Channels										
9: Digital electronics AA/ BB/ ZZ/ B before A, CW viewed from flange side Z gated A&B										
N: Analog electronics SS/ CC/ ZZ/ C before S, CW viewed from flange side Z un gated Contact factory for other configurations										
Resolution										
1024, 2048										
Output Termination										
G6: M23 12 pins CW										
G8: M23 12 pins CCW										
GM: M12 8 pins (Not available in combination with DSM9X model)										
GP: PUR cable 12 wires										
G3: PVC cable 8 wires										
U3: PVC Cable 8 wires (Not available in combination with DSM9X model)										
GC: PUR cable 8 wires (Not available in combination with DSM9X model)										
Output Orientation										
R: Radial										
A: Axial										
Cable Length										
xxx: Cable Length (ex.: 020 = 2 Meters)										
Blank: No Cable										
Accessories*										
CS****: Positive lock by key without flange										
CSA4**: Positive lock by key with aluminum 115mm flange										
CSA5**: Positive lock by key with stainless steel 115mm flange										



AGENCY APPROVALS & CERTIFICATIONS

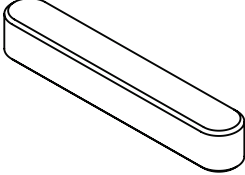
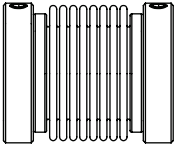
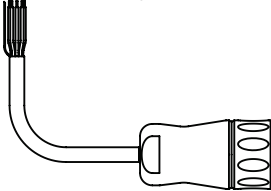


BEI Sensors SAS

Espace Européen de l'Entreprise
9, rue de Copenhague
B.P. 70044 Schiltigheim
F 67013 Strasbourg Cedex

Tél : +33 (0)3 88 20 80 80
Fax : +33 (0)3 88 20 87 87
Mail : info@beisensors.com
Web: www.beisensors.com



Description	Part Number
<p>Metal shaft key 4mm square by 25mm long</p> 	<p>9435/001</p>
<p>Safety Bellows Couplings For 11mm, 12mm shaft</p> 	<p>9404/S/11-11 9404/S/12-12</p>
<p>Standard Mating Connector 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> <p>Extension cords compatible with GM connection option: RAL-020-039 = M12 overmolded, PUR cable, 2m RAL-050-052 = M12 overmolded, PUR cable, 5m RAL-100-050 = M12 overmolded, PUR cable, 10m</p>

Made in France

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

CONTACT US

Americas

+1 (800) 350 2727
sensators@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