

## Rotational Absolute Magnetic Encoder Version 12 mm HP Position Sensor


**FEATURES**

- Hall effect principle
- High precision (HP), high resolution
- Especially dedicated to harsh conditions (vibrations, shocks, CEM, ...)
- Not sensitive to external magnetic fields and temperature
- Plug and play
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**LINKS TO ADDITIONAL RESOURCES**


3D Models

QUICK REFERENCE DATA	
Sensor type	ROTATIONAL, magnetic technology
Output type	Wires
Market appliance	Industrial
Dimensions	Diameter 12.7 mm

ELECTRICAL SPECIFICATIONS	
PARAMETER	
Voltage supply	5 V ± 0.25 V
Current supply	≤ 100 mA at 5 V
Output	SSI
Connection	Twisted wires AWG 28
Useful electrical angle	360°
Absolute accuracy at 25 °C	± 0.15° (11.23 bits)
Absolute accuracy at -40 °C to +105 °C	± 0.30° (10.23 bits)
Resolution	≈ 0.022° (14 bits, 16 384 points)
Startup time	≤ 20 ms
Refresh time	≤ 100 μs
Latency time	≤ 200 μs
Sampling rate	2.5 kHz ± 10 %

MECHANICAL SPECIFICATIONS	
PARAMETER	
Mechanical angle	360°
Maximum speed rotation	See "Speed vs. Accuracy" chart
Weight	About 11 g without wires
Endurance life	50 x 10 <sup>6</sup> rotations
Starting / running torque	≤ 10 cNcm
Axial and radial play	≤ 50 μm under ± 2.5 N on shaft
Axial and radial customer load at the end of the shaft	< 5 N

SAP PART NUMBERING GUIDELINES									
TYPE	MODEL	DESIGN	SIZE (mm)	TYPE	FUNCTION	ACCURACY (BITS)	RESOLUTION (BITS)	OUTPUT	PACKAGING
R = rotational	AM	E = encoder with housing	012	M	1	11	14	J = SSI CCW	B = box

PERFORMANCE	
PARAMETER	
Operating temperature range	-40 °C to +105 °C
Storage temperature range	-45 °C to +125 °C
Acceleration	Constant acceleration: Axis X: 6.3 g (2 min in each direction) Axis Y: 2.65 g (2 min in each direction) Axis Z: 2.65 g (2 min in each direction)
Vibration (three major axis)	<b>Vibration 1:</b> Frequency range: 5 Hz to 500 Hz Axis X: 0.95 $g_{RMS}$ , specific PSD <sup>(1)</sup> , 75 min at each axis Axis Y: 2.32 $g_{RMS}$ , specific PSD <sup>(1)</sup> , 75 min at each axis Axis Z: 2.32 $g_{RMS}$ , specific PSD <sup>(1)</sup> , 75 min at each axis
	<b>Vibration 2:</b> Frequency range: 5 Hz to 2000 Hz Axis X: 3.01 $g_{RMS}$ , specific PSD <sup>(1)</sup> , 1 min at each axis Axis Y: 2.50 $g_{RMS}$ , specific PSD <sup>(1)</sup> , 1 min at each axis Axis Z: 2.50 $g_{RMS}$ , specific PSD <sup>(1)</sup> , 1 min at each axis
Mechanical shock	Non-functional test conditions: half sine pulse: 20 $g_{peak}$ x 5 ms, 3 shocks in every direction
Humidity	95 % HR, 20 days, temperature cycling (total time at 60 °C: 120 h and at 30 °C: 160 h)

**Note**

<sup>(1)</sup> To contact Vishay for details

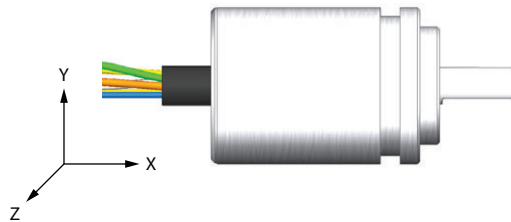
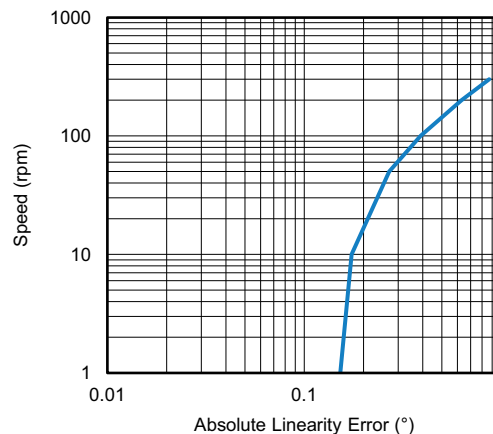
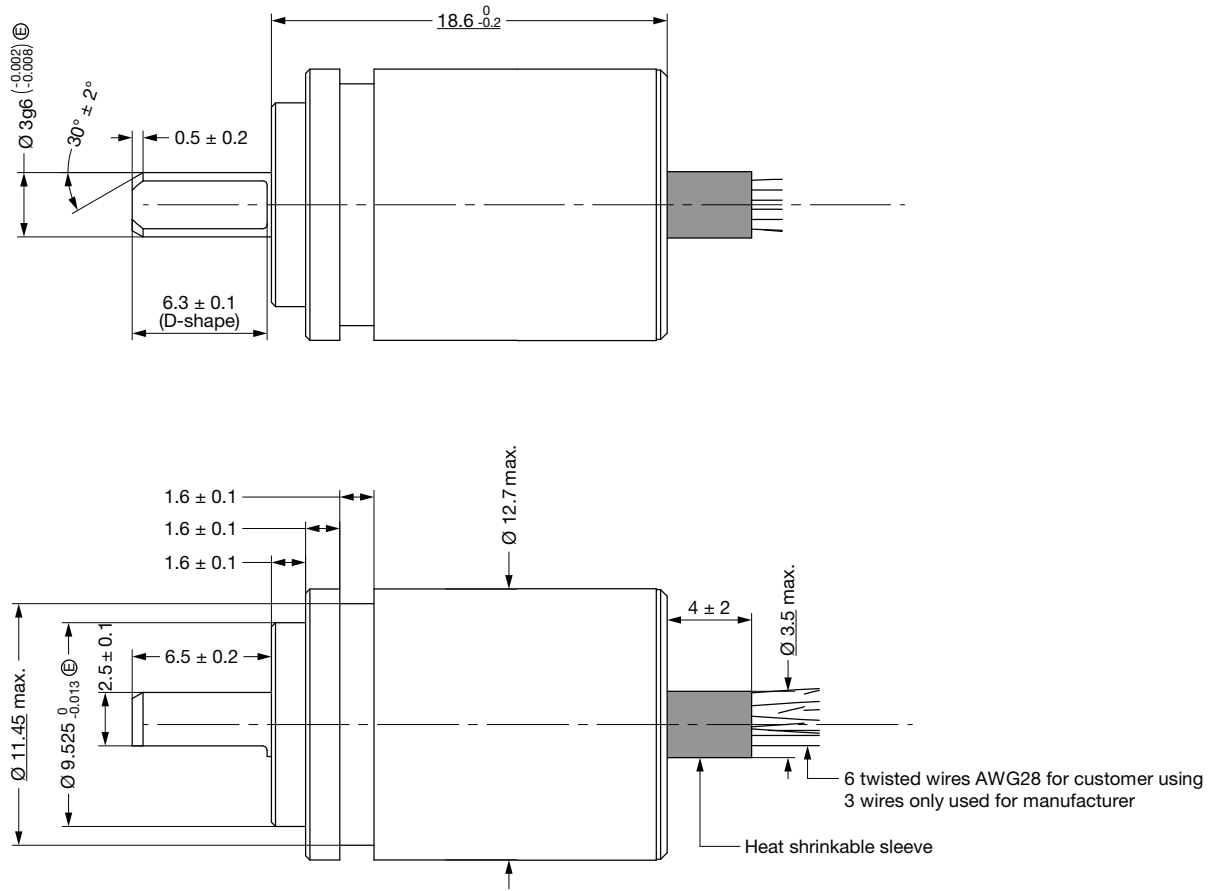


Fig. 1 - Encoder Axis System

**SPEED VS. ABSOLUTE LINEARITY ERROR (at 2500 sample/s at room temperature)**

**Note**

- Latency time excluded

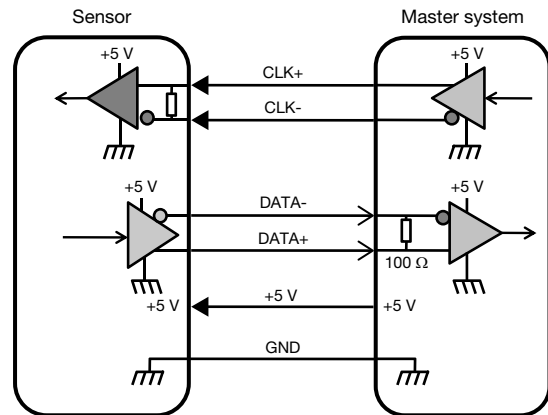
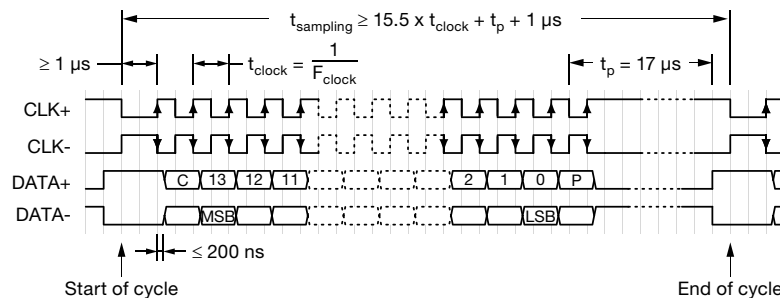
**DIMENSIONS** in millimeters



**ELECTRICAL INTERFACE DESCRIPTION - SSI INTERFACE**

<b>6 WIRES CONNECTION</b> (according to MIL-22759/32)		
NAME	WIRE COLOR	WIRE SIZE
GND	Black	28 AWG
+5 V	Red	28 AWG
CLK-	Orange	28 AWG
CLK+	White	28 AWG
DATA+	Yellow	28 AWG
DATA-	Green	28 AWG

<b>SSI PARAMETERS</b>	
Output code	Binary
Data differential interface	RS422 according to EIA-RS422
CLK differential interface	RS422 according to EIA-RS422
Minimum clock frequency	100 kHz
Maximum clock frequency	4 MHz
Data bit (n)	16 bits
C: consistency of magnetic cell output	Bit "C": 0 → compliant / 1 → not compliant
13-0: angle	Bit "13-0": angle value
P: parity of this bits "C" to "0"	Bit "P": 0 → pair sum / 1 → impair sum


**Timing Diagram**

**OTHER INFORMATION**

**OPTIONS**

- Other design on request (mechanical interfaces, electrical interfaces, ...)



## **Disclaimer**

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.