#### Revision: 22-Jul-2021

1 For technical questions, contact: <u>mcbprecisionpot@vishay.com</u>

## 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 <u>www.vishay.com/doc?99912</u>

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	$\leq$ 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	$\leq$ 50 $\mu m$ under ± 2.5 N on shaft		
Axial and radial customer load at the end of the shaft	< 5 N		



www.vishay.com

### LINKS TO ADDITIONAL RESOURCES



ISHA



## **RAME012**

Vishay MCB



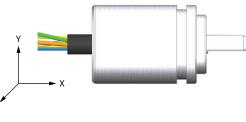
Vishay MCB

SAP PART NUMBERING GUIDELINES									
ТҮРЕ	MODEL	DESIGN	SIZE (mm)	TYPE	FUNCTION	ACCURACY (BITS)	RESOLUTION (BITS)	OUTPUT	PACKAGING
R = rotational	AM	E = encoder with housing	012	М	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)	<u>Vibration 1:</u> Frequency range: 5 Hz to 500 Hz Axis X: 0.95 g <sub>RMS</sub> , specific PSD <sup>(1)</sup> , 75 min at each axis Axis Y: 2.32 g <sub>RMS</sub> , specific PSD <sup>(1)</sup> , 75 min at each axis Axis Z: 2.32 g <sub>RMS</sub> , specific PSD <sup>(1)</sup> , 75 min at each axis		
	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$		
Mechanical shock	Non-functional test conditions: half sine pulse: 20 g <sub>peak</sub> 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

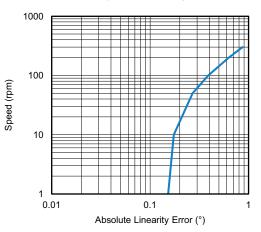
<sup>(1)</sup> To contact Vishay for details





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

Ζ



#### Note

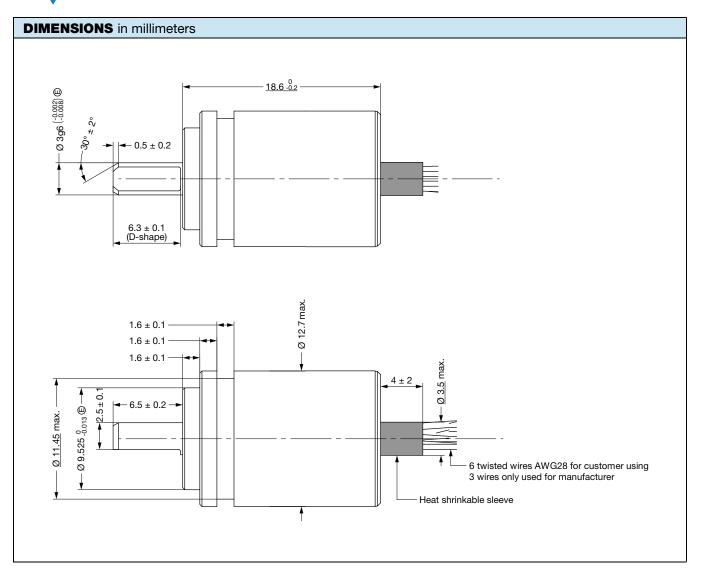
• Latency time excluded



www.vishay.com

# **RAME012**

Vishay MCB





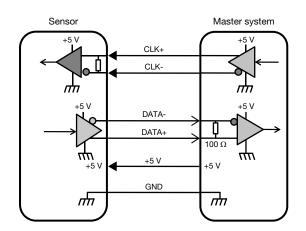
RAME012

Vishay MCB

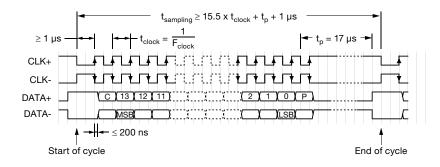
#### **ELECTRICAL INTERFACE DESCRIPTION - SSI INTERFACE**

6 WIRES CONNECTION (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		

SSI PARAMETERS			
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": $0 \rightarrow \text{compliant} / 1 \rightarrow \text{not compliant}$		
13-0: angle	Bit "13-0": angle value		
P: parity of this bits "C" to "0"	Bit "P": $0 \rightarrow \text{pair sum } / 1 \rightarrow \text{impair sum}$		



#### **Timing Diagram**



#### **OTHER INFORMATION**



#### **OPTIONS**

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



Vishay

## 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.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. 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.