Rotational Absolute Magnetic Kit Encoder Version 27 mm HP Position Sensor
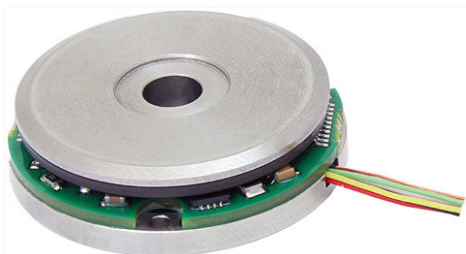
FEATURES

- Hall effect principle

- High precision (HP), high resolution

- Especially dedicated to harsh conditions (vibrations, shocks, CEM, ...)

- Not sensitive to external magnetic fields and temperature

- Not sensitive to moisture and pollution

- Plug and play

- Material categorization: for definitions of compliance please see 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 27.3 mm

ELECTRICAL SPECIFICATIONS

PARAMETER	
Voltage supply	5 V ± 0.25 V
Current supply	≤ 130 mA at 5 V
Output	SSI
Connection	Ultra-flex AWG32 wires (shielded cable and connector on request)
Useful electrical angle	360°
Absolute accuracy at 25 °C	± 0.03° > 13 bits
Absolute accuracy at -40 °C to +105 °C	± 0.05° ~ 13 bits
Resolution	≈ 0.0028° (17 bits, 131 072 points) over 360°
Startup time	≤ 20 ms
Refresh time	≤ 110 μs
Latency time	100 μs ≤ latency time ≤ 200 μs
Sampling rate	10 kHz ± 5 %

MECHANICAL SPECIFICATIONS

PARAMETER	
Mechanical angle	360°
Maximum speed rotation	50 rpm (up to 1000 rpm with decreasing of accuracy, see "Maximum Speed vs. Accuracy" chart)
Weight	Rotor: 6.7 g ± 0.5 g; stator: 7 g ± 1 g
Coating	On the two sides of PCB

SAP PART NUMBERING GUIDELINES

TYPE	MODEL	DESIGN	SIZE (mm)	TYPE	FUNCTION	ACCURACY (BITS)	RESOLUTION (BITS)	OUTPUT	PACKAGING	3 DIGITS
R = rotational	AM	K = kit	027	M	1	13	16	J	B = box	To consult Vishay for dedicated 3 digits

PERFORMANCE
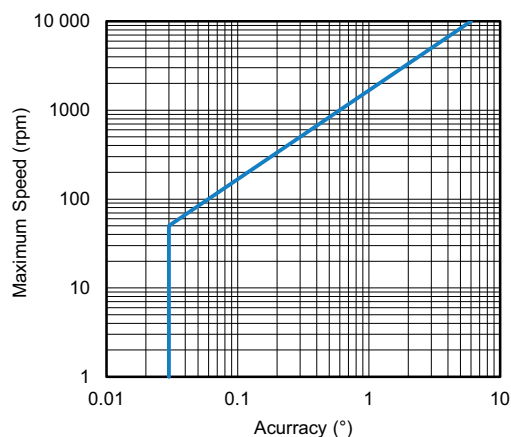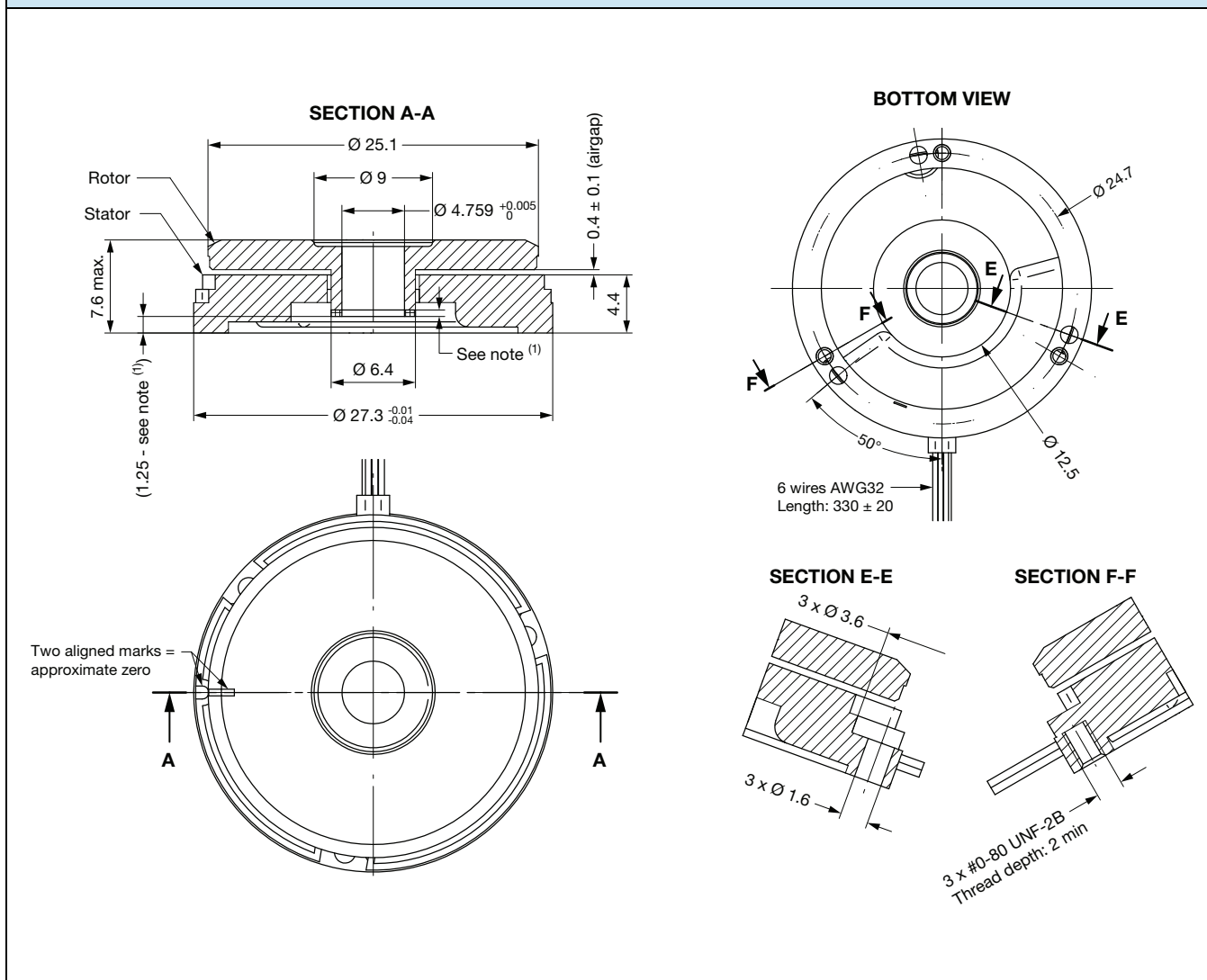
PARAMETER	
Operating temperature range	-40 °C to +105 °C
Storage temperature range	-45 °C to +105 °C
Acceleration	100 g for 1 s
Vibration	0.05 g^2/Hz, 20 Hz to 2000 Hz for 1 h along the three major axis
Shock	180 g, 14 ms, 1/2 sine
EMC	According to MIL-STD-461F: - RE101: radiated emissions, magnetic field, 30 Hz to 100 kHz - limit for all navy applications to figure RE101-2 - RE102: radiated emissions, electric field, (10 kHz to 18 GHz) - curve for fixed wing external and helicopters at 2 MHz to 18 GHz, according to figure RE102-3 [1] - RS101: radiated susceptibility, magnetic field, 30 Hz to 100 kHz - limit for all navy applications according to figure RS101-1 - RS103: radiated susceptibility, electric field, (2 MHz to 40 GHz) - 200 V/m, according to Table XI, aircraft external
Humidity	HR ≤ 88 % (non-condensing) operating 48 hours

Note

[1] For the test setup, the RAMK027 metallic support for the stator is directly bonded with a braid to the ground plane and additional connection of the cable shielding to the ground plane

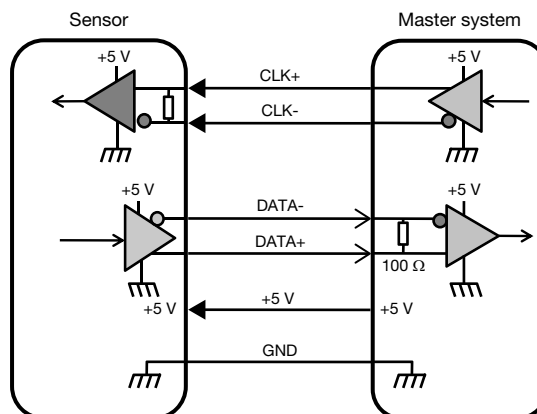## MAXIMUM SPEED VS. ACCURACY CHART (latency time excluded)

DIMENSIONS in millimeters

SECTION A-A

Ø 25.1
Ø 9
Ø 4.759 $^{+0.005}_{0}$
0.4 ± 0.1 (airgap)
Rotor
Stator
7.6 max.
4.4
Ø 6.4
See note [1]
(1.25 - see note [1])
Ø 27.3 $^{-0.01}_{-0.04}$

Two aligned marks = approximate zero

A   A

BOTTOM VIEW

Ø 24.7
E
F
F
E
50°
Ø 12.5
6 wires AWG32
Length: 330 ± 20

SECTION E-E
3 x Ø 3.6
3 x Ø 1.6

SECTION F-F
3 x #0-80 UNF-2B
Thread depth: 2 min

Note

[1] The washer to set the airgap with respect to distance between stator and rotor reference of 1.25 is not the supplied.
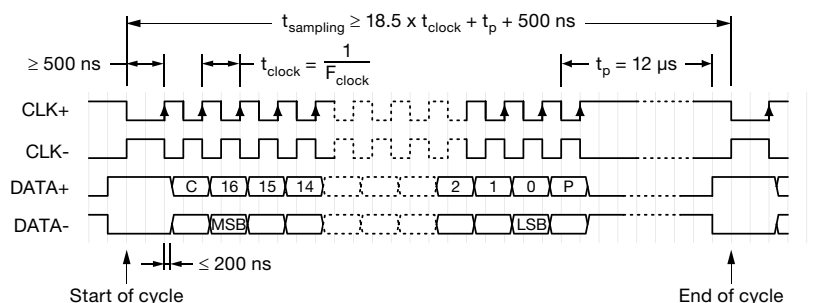Only its thickness is supplied with the encoder

ELECTRICAL INTERFACE DESCRIPTION - SSI INTERFACE

6 WIRES CONNECTIONS

NAME	WIRE COLOR
GND	Black
+5 V	Red
CLK+	White
CLK-	Clear
DATA+	Yellow
DATA-	Green

SSI PARAMETERS

Output code	Binary
Data differential interface	RS422 according to EIA-RS422
CLK differential interface	RS422 according to EIA-RS422
Minimum clock frequency	300 kHz
Maximum clock frequency	4 MHz
Data bit (n)	19 bits
C: consistency of all internal magnetic cells outputs	Bit "C": 0 → compliant / 1 → not compliant
16-0: angle	Bit "16-0": angle value
P: parity of this bits "C" to "16"	Bit "P": 0 → pair sum / 1 → impair sum

Timing Diagram

$$t_{sampling} \geq 18.5 \times t_{clock} + t_p + 500 \text{ ns}$$

≥ 500 ns

$t_{clock} = \dfrac{1}{F_{clock}}$

$t_p = 12 \text{ }\mu s$

CLK+

CLK-

DATA+: C, 16, 15, 14, 2, 1, 0, P

DATA-: MSB, LSB

≤ 200 ns

Start of cycle

End of cycle

OPTIONS

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

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