# Rotational Absolute Magnetic Encoder Version 30 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 | Cable |
| Market appliance | Industrial |
| Dimensions | Diameter 30 mm |

| ELECTRICAL SPECIFICATIONS | |
|---|---|
| **PARAMETER** | |
| Voltage supply | 5 V ± 0.25 V |
| Current supply | ≤ 130 mA at 5 V |
| Output | SSI |
| Connection | Shielded cable |
| 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 | 51 g ± 5 g |

| SAP PART NUMBERING GUIDELINES | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| TYPE | MODEL | DESIGN | SIZE (mm) | TYPE | FUNCTION | ACCURACY (BITS) | RESOLUTION (BITS) | OUTPUT | PACKAGING |
| R = rotational | AM | E = encoder with housing | 030 | M | 1 | 13 | 17 | J = SSI CCW | B = box |

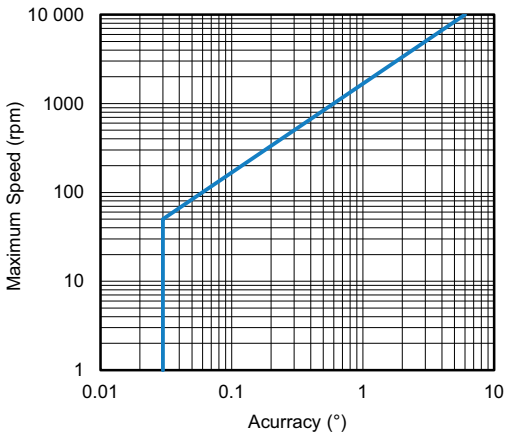
| PERFORMANCE | |
|---|---|
| PARAMETER | |
| Operating temperature range | -40 °C to +105 °C |
| Storage temperature range | -45 °C to +105 °C |
| Acceleration (2) | 100 *g* for 1 s |
| Vibration (three major axis) (2) | Vibration profile 1: 0.05 $g^2$/Hz, 20 Hz to 2000 Hz for 1 h along<br>Vibration profile 2: see figure 1 - tested according "Endurance" profile<br>Vibration profile 3: see figure 2 - tested according "Endurance" profile<br>Vibration profile 4: see figure 3 - tested according "Endurance" profile<br>Vibration profile 5: see figure 4 - tested according "Endurance" profile |
| Shock (2) | 180 *g*, 14 ms, 1/2 sine |
| EMC (2) | According to MIL-STD-461F:<br>- RE101: radiated emissions, magnetic field, 30 Hz to 100 kHz - limit for all navy applications to figure RE101-2<br>- 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)<br>- RS101: radiated susceptibility, magnetic field, 30 Hz to 100 kHz - limit for all navy applications according to figure RS101-1<br>- RS103: radiated susceptibility, electric field, (2 MHz to 40 GHz) - 200 V/m, according to Table XI, aircraft external |
| Humidity (2) | HR ≤ 88 % (non-condensing) operating 48 hours |

**Notes**

(1) For the test setup, the metallic support of the electronic support is directly bonded with a braid to the ground plane and additional connection of the cable shielding to the ground plane

(2) Tests have been performed on electronic board and magnet without the mechanical housing of the encoder

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



## VIBRATION PROFILES

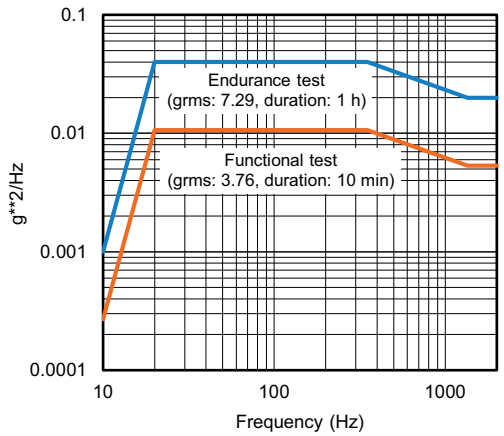



Fig. 1 - Vibration Profile 2

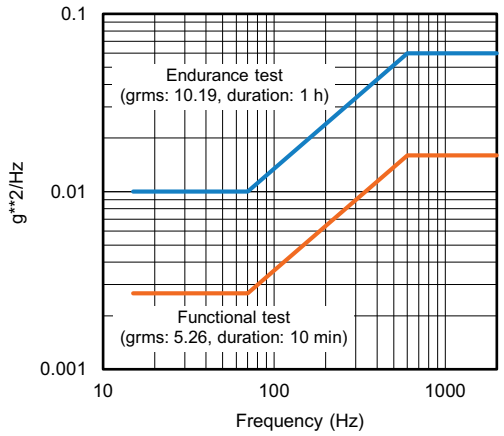



Fig. 2 - Vibration Profile 3

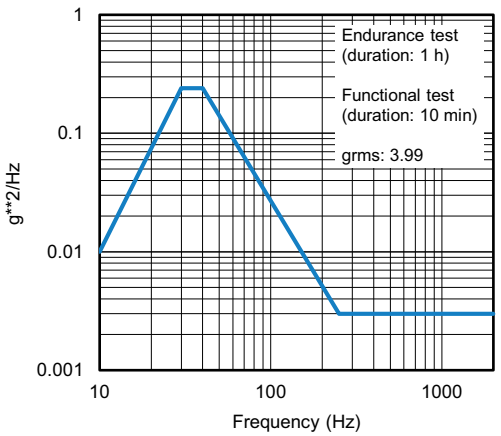



Fig. 3 - Vibration Profile 4

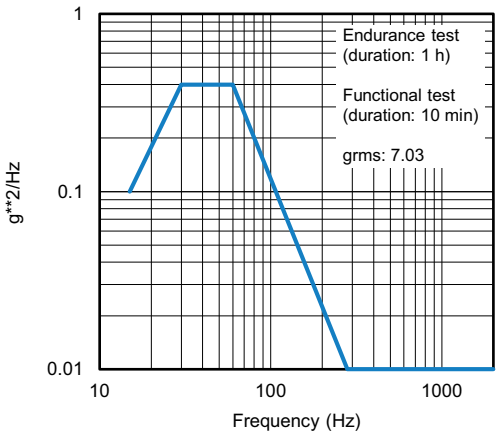
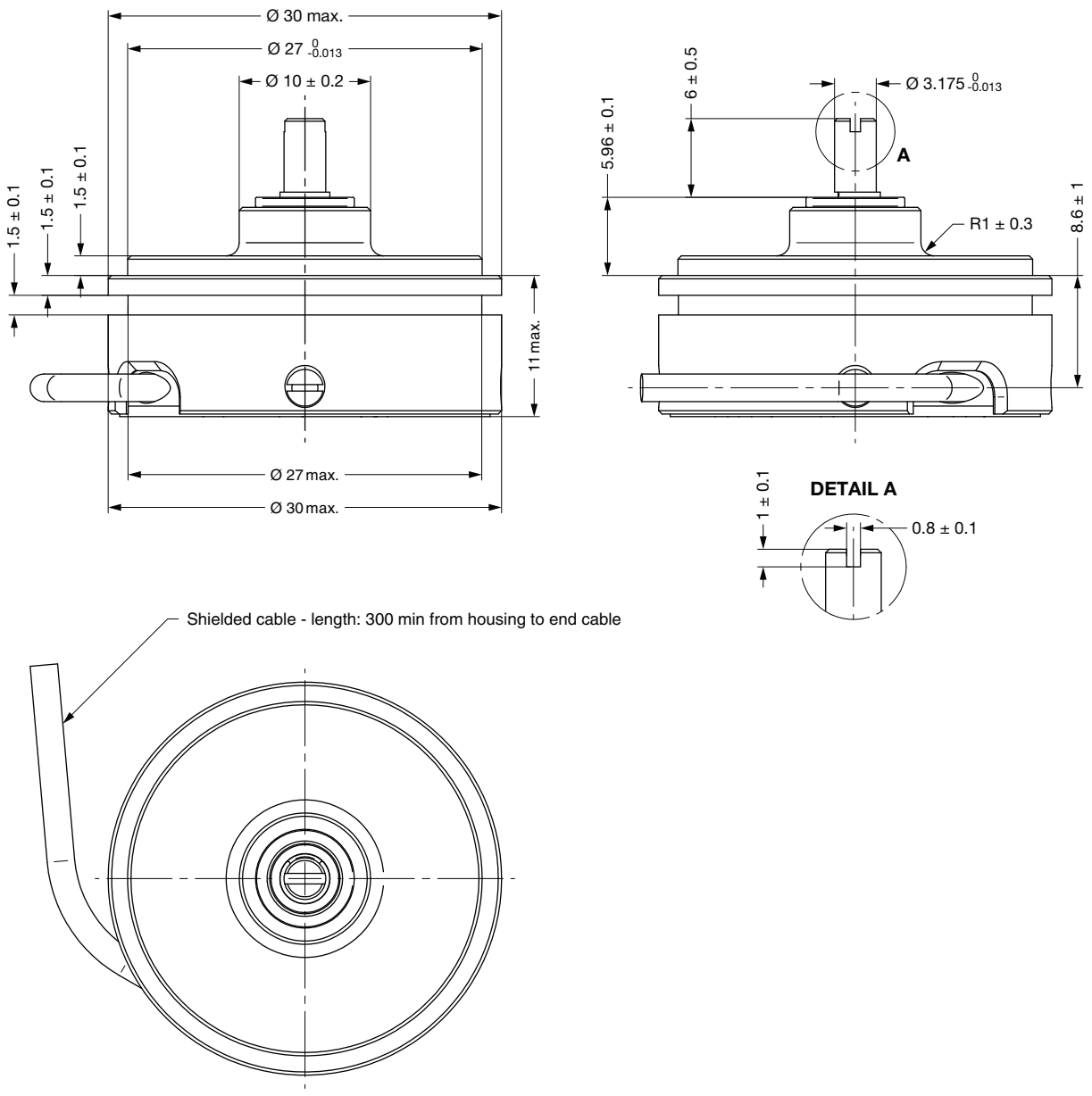


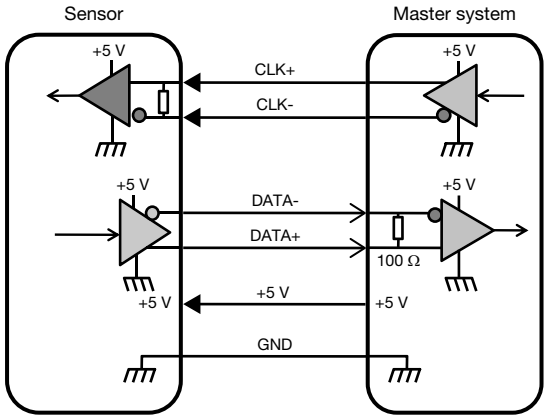

Fig. 4 - Vibration Profile 5

## **DIMENSIONS** in millimeters



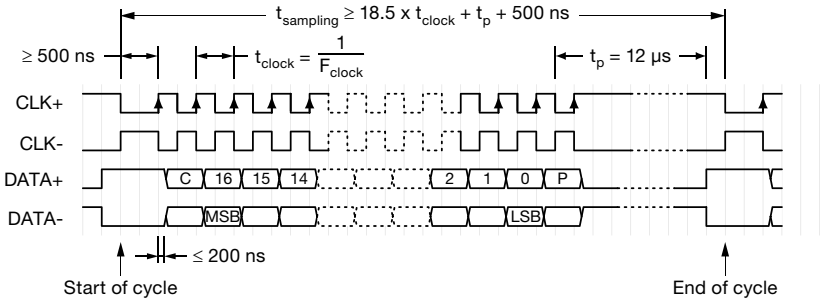
## ELECTRICAL INTERFACE DESCRIPTION - SSI INTERFACE

| 6 WIRES CONNECTION | | |
|---|---|---|
| NAME | WIRE COLOR | WIRE SIZE |
| GND | Black | 32 AWG |
| +5 V | Red | 32 AWG |
| CLK+ | White | 32 AWG |
| CLK- | Blue | 32 AWG |
| DATA+ | Yellow | 32 AWG |
| DATA- | Green | 32 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 | 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 |

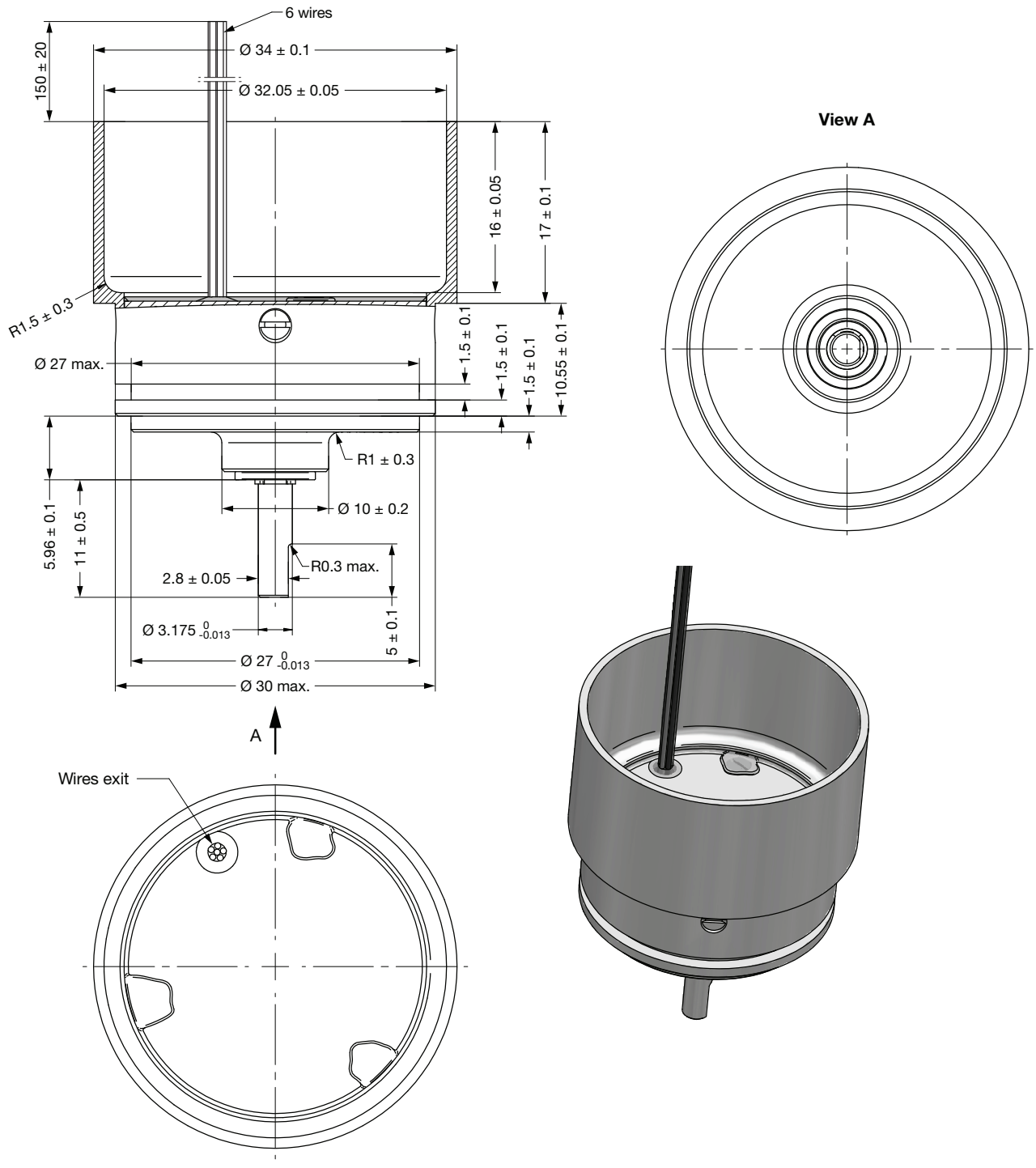
### Timing Diagram




## OPTIONS

- Other design on request (mechanical interfaces, electrical interfaces, ...)
- On request: axial output wires (see upcoming Dimensions table for details)

## **DIMENSIONS** in millimeters



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