Data sheet



# DBS60E-RBAAD1024

## DBS60

INCREMENTAL ENCODERS

SICK
Sensor Intelligence.



Illustration may differ

## Ordering information

| Type | part no. |
|---|---|
| DBS60E-RBAAD1024 | 1096135 |

Other models and accessories ➜ www.sick.com/DBS60

## Detailed technical data

### Safety-related parameters

| | |
|---|---|
| **$MTTF_D$ (mean time to dangerous failure)** | 500 years (EN ISO 13849-1) [1] |

[1] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

### Performance

| | |
|---|---|
| **Pulses per revolution** | 1,024 |
| **Measuring step** | ≤ 90°, electric/pulses per revolution |
| **Measuring step deviation** | ± 18° / pulses per revolution |
| **Error limits** | Measuring step deviation x 3 |
| **Duty cycle** | ≤ 0.5 ± 5 % |

### Interfaces

| | |
|---|---|
| **Communication interface** | Incremental |
| **Communication Interface detail** | TTL / RS-422 |
| **Number of signal channels** | 6-channel |
| **Initialization time** | < 5 ms [1] |
| **Output frequency** | + 300 kHz [2] |
| **Load current** | ≤ 30 mA, per channel |
| **Operating current** | ≤ 50 mA (without load) |

[1] Valid signals can be read once this time has elapsed.
[2] Up to 450 kHz on request.

### Electronics

| | |
|---|---|
| **Connection type** | Male connector, M23, 12-pin, radial |

[1] Short-circuit opposite to another channel or GND permissible for max. 60 s. No protection signal against $U_S$.

| | |
|---|---|
| **Supply voltage** | 4.5 ... 5.5 V |
| **Reference signal, number** | 1 |
| **Reference signal, position** | 90°, electric, logically gated with A and B |
| **Reverse polarity protection** | ✓ |
| **Short-circuit protection of the outputs** | ✓ [1] |

[1] Short-circuit opposite to another channel or GND permissible for max. 60 s. No protection signal against $U_S$.

## Mechanics

| | |
|---|---|
| **Mechanical design** | Through hollow shaft, rear clamping |
| **Shaft diameter** | 8 mm |
| **Flange type / stator coupling** | 1-sided stator coupling, slot, screw hole circle radius 31.5–48.5 mm |
| **Weight** | + 0.25 kg [1] |
| **Shaft material** | Stainless steel |
| **Flange material** | Aluminum |
| **Housing material** | Aluminum |
| **Start up torque** | + 0.5 Ncm (+20 °C) |
| **Operating torque** | 0.4 Ncm (+20 °C) |
| **Permissible movement static** | ± 0.3 mm (radial)<br>± 0.5 mm (axial) [2] |
| **Permissible movement dynamic** | ± 0.1 mm (radial)<br>± 0.2 mm (axial) [2] |
| **Operating speed** | 6,000 $min^{-1}$ [3] |
| **Maximum operating speed** | 9,000 $min^{-1}$ [4] |
| **Moment of inertia of the rotor** | 50 $gcm^2$ |
| **Bearing lifetime** | 3.6 x $10^9$ revolutions |
| **Angular acceleration** | ≤ 500,000 $rad/s^2$ |

[1] Based on encoder with male connector or cable with male connector.

[2] Not apllicable for stator coupling type C and K.

[3] Allow for self-heating of 2.6 K per 1,000 rpm when designing the operating temperature range.

[4] Maximum speed which does not cause mechanical damage to the encoder. Impact on the service life and signal quality is possible. Please note the maximum output frequency.

## Ambient data

| | |
|---|---|
| **EMC** | According to EN 61000-6-2 and EN 61000-6-3 |
| **Enclosure rating** | IP65, housing side (IEC 60529) [1]<br>IP65, shaft side (IEC 60529) |
| **Permissible relative humidity** | 90 % (Condensation not permitted) |
| **Operating temperature range** | –20 °C ... +85 °C [2] |
| **Storage temperature range** | –40 °C ... +100 °C, without package |
| **Resistance to shocks** | 250 g, 3 ms (EN 60068-2-27) |
| **Resistance to vibration** | 30 g, 10 Hz ... 2,000 Hz (EN 60068-2-6) |

[1] With mating connector fitted.

[2] These values relate to all mechanical versions including recommended accessories unless otherwise noted.

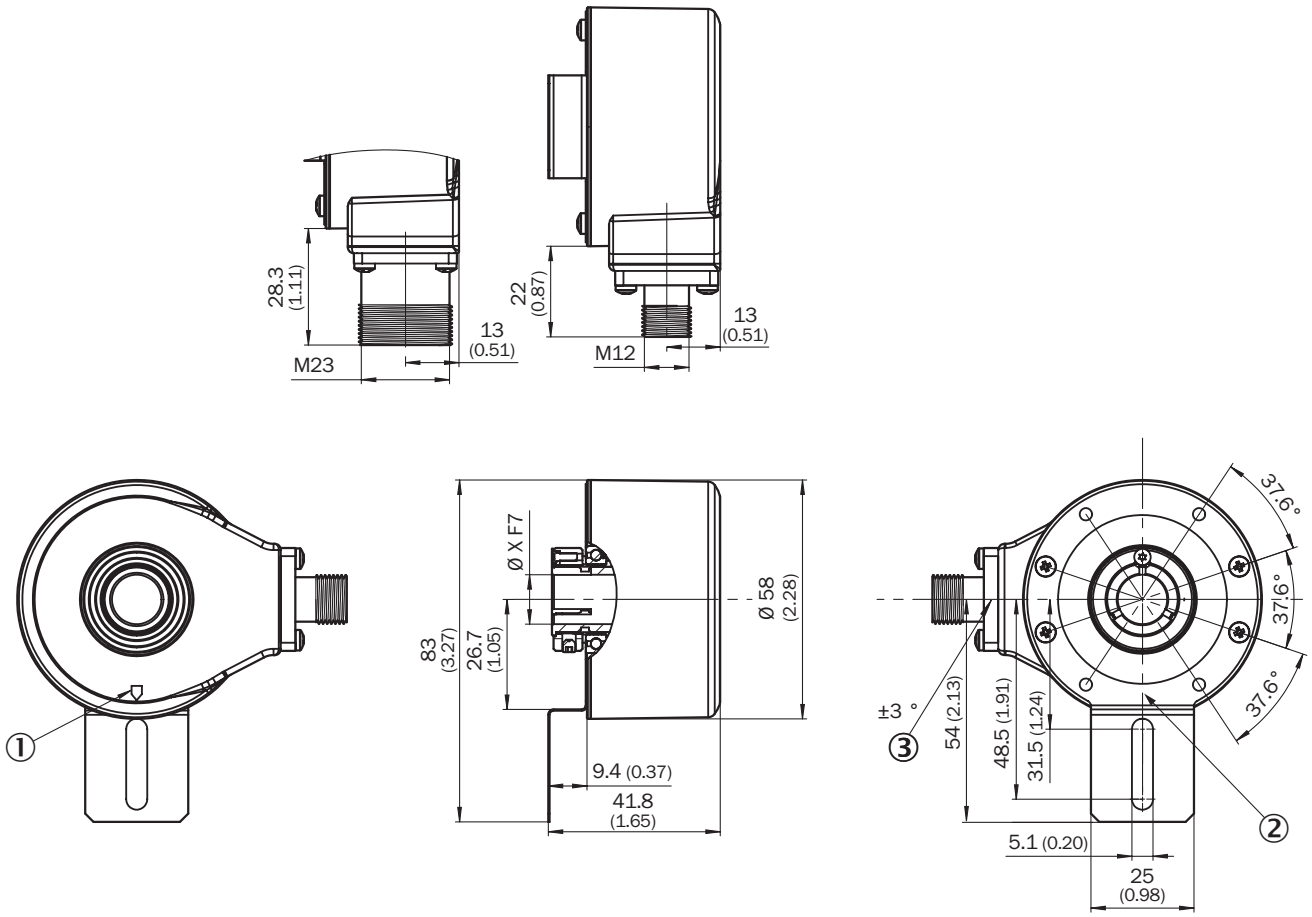
## Certificates

| | |
|---|---|
| **EU declaration of conformity** | ✓ |
| **UK declaration of conformity** | ✓ |
| **ACMA declaration of conformity** | ✓ |
| **China-RoHS** | ✓ |
| **cRUus certificate** | ✓ |
| **Information according to Art. 3 of Data Act (Regulation EU 2023/2854)** | ✓ |

## Classifications

| | |
|---|---|
| **ECLASS 5.0** | 27270501 |
| **ECLASS 5.1.4** | 27270501 |
| **ECLASS 6.0** | 27270590 |
| **ECLASS 6.2** | 27270590 |
| **ECLASS 7.0** | 27270501 |
| **ECLASS 8.0** | 27270501 |
| **ECLASS 8.1** | 27270501 |
| **ECLASS 9.0** | 27270501 |
| **ECLASS 10.0** | 27270501 |
| **ECLASS 11.0** | 27270501 |
| **ECLASS 12.0** | 27270501 |
| **ETIM 5.0** | EC001486 |
| **ETIM 6.0** | EC001486 |
| **ETIM 7.0** | EC001486 |
| **ETIM 8.0** | EC001486 |
| **UNSPSC 16.0901** | 41112113 |

## Dimensional drawing

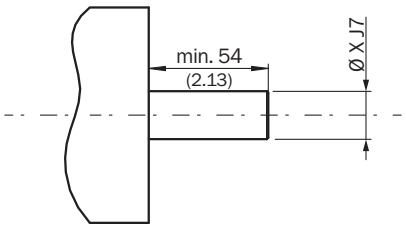



Dimensions in mm (inch)
XF7 values see shaft diameter table for through hollow shaft, clamping at the back
① Zero pulse mark on housing
② zero pulse mark on flange under stator coupling
③ male connector tolerance in relation to hole pattern

| TypeThrough hollow shaft with rear clamping | Shaft diameter XF7 |
|---|---|
| DBS60x-RAxxxxxxxxDBS60x-R1xxxxxxxx | 6 mm |
| DBS60x-RBxxxxxxxxDBS60x-R2xxxxxxxx | 8 mm |
| DBS60x-RCxxxxxxxxDBS60x-R3xxxxxxxx | 3/8″ |
| DBS60x-RDxxxxxxxxDBS60x-R4xxxxxxxx | 10 mm |
| DBS60x-RExxxxxxxxDBS60x-R5xxxxxxxx | 12 mm |
| DBS60x-RFxxxxxxxxDBS60x-R6xxxxxxxx | 1/2″ |
| DBS60x-RGxxxxxxxxDBS60x-R7xxxxxxxx | 14 mm |
| DBS60x-RHxxxxxxxxDBS60x-R8xxxxxxxx | 15 mm |
| DBS60x-RJxxxxxxxx | 5/8″ |

–

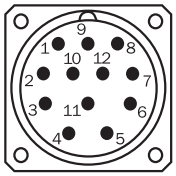
## Attachment specifications Through hollow shaft with rear clamping




customer side

| TypeThrough hollow shaft with rear clamping | Shaft diameter xj7 |
|---|---|
| DBS60x-RAxxxxxxxxDBS60x-R1xxxxxxxx | 6 mm |
| DBS60x-RBxxxxxxxxDBS60x-R2xxxxxxxx | 8 mm |
| DBS60x-RCxxxxxxxxDBS60x-R3xxxxxxxx | 3/8″ |
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| DBS60x-RExxxxxxxxDBS60x-R5xxxxxxxx | 12 mm |
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| – | |

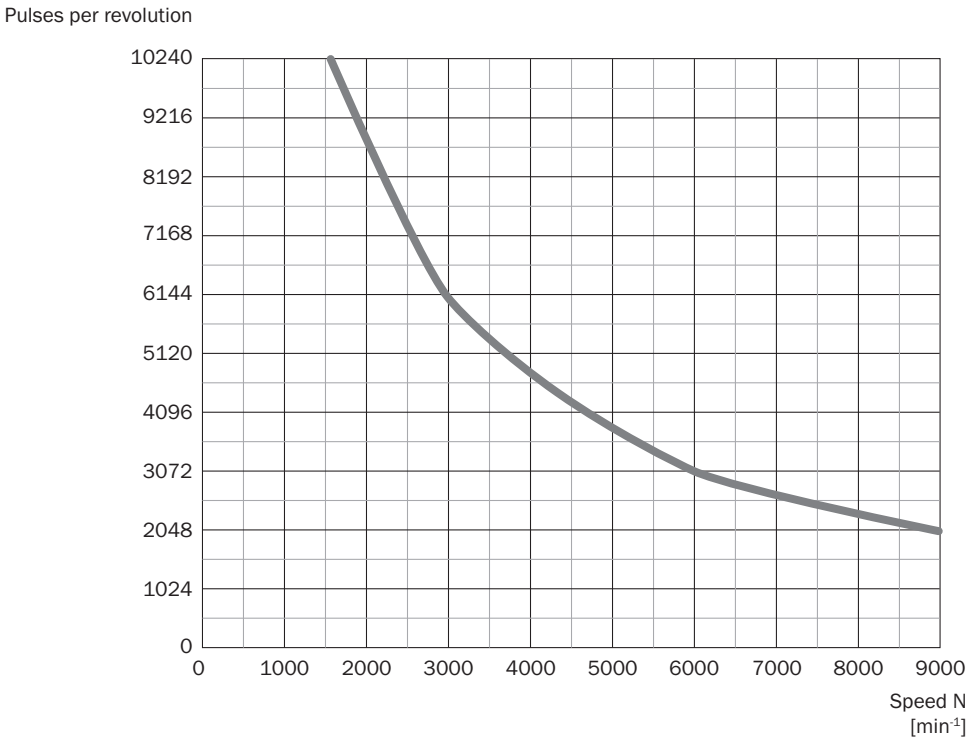
## PIN assignment



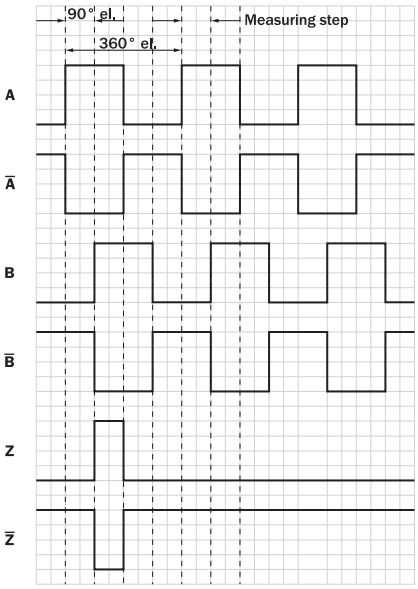

view of M23 male device connector on cable / housing

| Wire colors (cable connection) | Male connector M12, 8-pin | Male connector M23, 12-pin | TTL/HTL 6-channel signal | Explanation |
|---|---|---|---|---|
| Brown | 1 | 6 | A- | Signal wire |
| White | 2 | 5 | A | Signal wire |
| Black | 3 | 1 | B- | Signal wire |
| Pink | 4 | 8 | B | Signal wire |
| Yellow | 5 | 4 | Z- | Signal wire |
| Purple | 6 | 3 | Z | Signal wire |
| Blue | 7 | 10 | GND | Ground connection |
| Red | 8 | 12 | $+U_s$ | Supply voltage |
| - | - | 9 | Not assigned | Not assigned |
| - | - | 2 | Not assigned | Not assigned |
| - | - | 11 | Not assigned | Not assigned |
| - | - | 7 | Not assigned | Not assigned |
| Screen | Screen | Screen | Screen | Screen connected to encoder housing |

## Diagrams




## Diagrams Signal outputs for electrical interfaces TTL and HTL

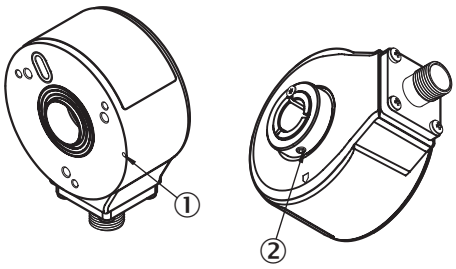



Cw with view on the encoder shaft in direction "A", compare dimensional drawing.

| Supply voltage | Output |
|---|---|
| 4,5 V ... 5,5 V | TTL |
| 10 V ... 30 V | TTL |
| 10 V ... 27 V | HTL |

| Supply voltage | Output |
|---|---|
| 4,5 V ... 30 V | TTL/HTL universal |
| 4,5 V ... 30 V | TTL |

## Operation note Through hollow shaft with rear clamping




① Zero pulse mark on flange
② Zero pulse is active when screw of clamping is inline with zero pulse mark on flange or housing mark

## Recommended accessories

Other models and accessories ➜ www.sick.com/DBS60

| | Brief description | Type | part no. |
|---|---|---|---|
| connectors and cables | | | |
|  | • **Connection type head A:** Flying leads<br>• **Connection type head B:** Flying leads<br>• **Signal type:** SSI, Incremental, HIPERFACE®<br>• **Items supplied:** By the meter<br>• **Cable:** 8-wire, PUR, halogen-free<br>• **Description:** SSI, shielded, Incremental, HIPERFACE® | LTG-2308-MWENC | 6027529 |
|  | • **Connection type head A:** Flying leads<br>• **Connection type head B:** Flying leads<br>• **Signal type:** SSI, Incremental<br>• **Items supplied:** By the meter<br>• **Cable:** 11-wire, PUR<br>• **Description:** SSI, shielded, Incremental | LTG-2411-MW | 6027530 |
|  | • **Connection type head A:** Flying leads<br>• **Connection type head B:** Flying leads<br>• **Signal type:** SSI, Incremental<br>• **Items supplied:** By the meter<br>• **Cable:** 12-wire, PUR, halogen-free<br>• **Description:** SSI, shielded, Incremental | LTG-2512-MW | 6027531 |
|  | • **Connection type head A:** Flying leads<br>• **Connection type head B:** Flying leads<br>• **Signal type:** SSI, TTL, HTL, Incremental<br>• **Items supplied:** By the meter<br>• **Cable:** 12-wire, UV and saltwater-resistant, PUR, halogen-free<br>• **Description:** SSI, shielded, TTL, HTL, Incremental | LTG-2612-MW | 6028516 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** Incremental<br>• **Cable:** 30 m, 11-wire, PUR<br>• **Description:** Incremental, shielded | DOL-2312-G30MLA3 | 2030702 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** Incremental<br>• **Cable:** 25 m, 11-wire, PUR<br>• **Description:** Incremental, shielded | DOL-2312-G25MLA3 | 2030699 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** Incremental<br>• **Cable:** 20 m, 11-wire, PUR<br>• **Description:** Incremental, shielded | DOL-2312-G20MLA3 | 2030695 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** Incremental<br>• **Cable:** 15 m, 11-wire, PUR<br>• **Description:** Incremental, shielded | DOL-2312-G15MLA3 | 2030692 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** Incremental<br>• **Cable:** 10 m, 11-wire, PUR<br>• **Description:** Incremental, shielded | DOL-2312-G10MLA3 | 2030688 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** Incremental<br>• **Cable:** 7 m, 11-wire, PUR<br>• **Description:** Incremental, shielded | DOL-2312-G07MLA3 | 2030685 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** Incremental<br>• **Cable:** 2 m, 11-wire, PUR<br>• **Description:** Incremental, shielded | DOL-2312-G02MLA3 | 2030682 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, angled, A-coded<br>• **Signal type:** HIPERFACE®, SSI, Incremental<br>• **Description:** HIPERFACE®, shieldedSSIIncremental | DOS-2312-W01 | 2072580 |

| | Brief description | Type | part no. |
|---|---|---|---|
| | • **Connection systems:** Solder connection | | |
|  | • **Connection type head A:** Female connector, M23, 12-pin, straight, A-coded<br>• **Signal type:** HIPERFACE®, SSI, Incremental<br>• **Description:** HIPERFACE®, shieldedSSIIncremental<br>• **Connection systems:** Solder connection | DOS-2312-G02 | 2077057 |

# SICK AT A GLANCE

SICK is one of the leading manufacturers of intelligent sensors and sensor solutions for industrial applications. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

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**For us, that is “Sensor Intelligence.”**

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