

DBS60E-S1FM01024

DBS60

INCREMENTAL ENCODERS

SICK
Sensor Intelligence.



Illustration may differ



Ordering information

| Type | Part no. |
|------------------|----------|
| DBS60E-S1FM01024 | 1095079 |

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 / HTL ¹⁾ |
| Number of signal channels | 6-channel |
| Initialization time | < 5 ms ²⁾ |
| Output frequency | + 300 kHz ³⁾ |
| Load current | ≤ 30 mA, per channel |
| Power consumption | ≤ 0.5 W (without load) |

¹⁾ Output level depends on the supply voltage.

²⁾ Valid signals can be read once this time has elapsed.

³⁾ Up to 450 kHz on request.

Electronics

| | |
|-----------------------------------|---|
| Connection type | Cable, 8-wire, universal, 5 m ¹⁾ |
| Supply voltage | 4.5 ... 30 V |
| Reference signal, number | 1 |
| Reference signal, position | 90°, electric, logically gated with A and B |

¹⁾ The universal cable connection is positioned so that it is possible to lay it without bends in a radial or axial direction.

²⁾ Short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

| | |
|--|-----------------|
| Reverse polarity protection | ✓ |
| Short-circuit protection of the outputs | ✓ ²⁾ |

1) The universal cable connection is positioned so that it is possible to lay it without bends in a radial or axial direction.

2) Short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

Mechanics

| | |
|---------------------------------------|--|
| Mechanical design | Solid shaft, Servo flange |
| Shaft diameter | 6 mm With face |
| Shaft length | 10 mm |
| Flange type / stator coupling | Flange with 3 x M3 and 3 x M4 |
| Weight | + 0.3 kg ¹⁾ |
| Shaft material | Stainless steel |
| Flange material | Aluminum |
| Housing material | Aluminum |
| Material, cable | PVC |
| Start up torque | + 1.2 Ncm (+20 °C) |
| Operating torque | 1.1 Ncm (+20 °C) |
| Permissible shaft loading | 100 N (radial) ²⁾ 50 N (axial) ²⁾ |
| Operating speed | 6,000 min ⁻¹ ³⁾ |
| Maximum operating speed | 9,000 min ⁻¹ ⁴⁾ |
| Moment of inertia of the rotor | 33 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) Higher values are possible using limited bearing life.

3) Allow for self-heating of 3.2 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 | IP67, housing side (IEC 60529) IP65, shaft side (IEC 60529) |
| Permissible relative humidity | 90 % (Condensation not permitted) |
| Operating temperature range | -30 °C ... +100 °C, at maximum 3,000 pulses per revolution ¹⁾ |
| 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) |

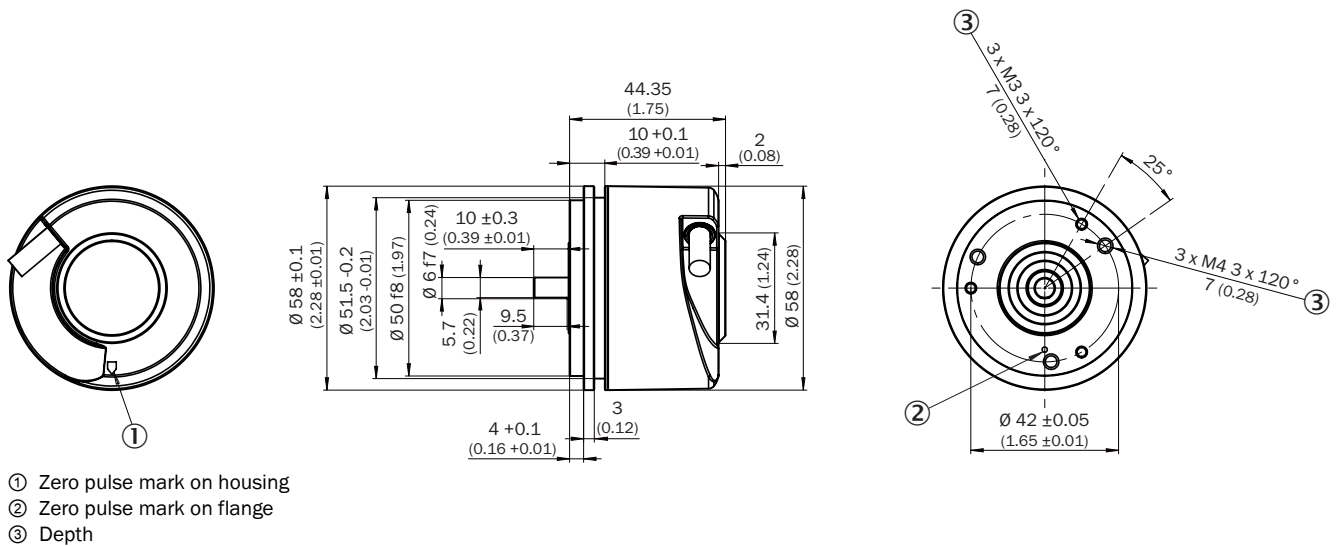
1) These values relate to all mechanical versions including recommended accessories unless otherwise noted.

Classifications

| | |
|---------------------|----------|
| ECLASS 5.0 | 27270501 |
| ECLASS 5.1.4 | 27270501 |

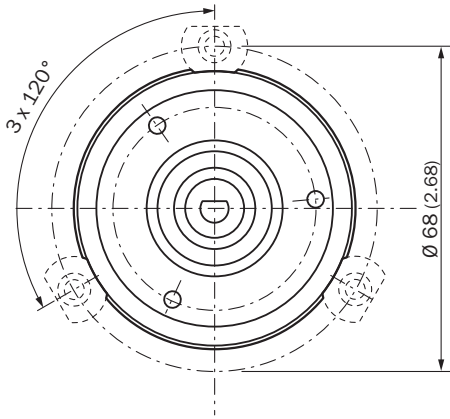
| | |
|-----------------------|----------|
| ECLASS 6.0 | 27270590 |
| ECLASS 6.2 | 27270590 |
| ECLASS 7.0 | 27270501 |
| ECLASS 8.0 | 27270501 |
| ECLASS 8.1 | 27270501 |
| ECLASS 9.0 | 27270501 |
| ECLASS 10.0 | 27270501 |
| ECLASS 11.0 | 27270501 |
| ECLASS 12.0 | 27270501 |
| ETIM 5.0 | EC001486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

Dimensional drawing (Dimensions in mm (inch))



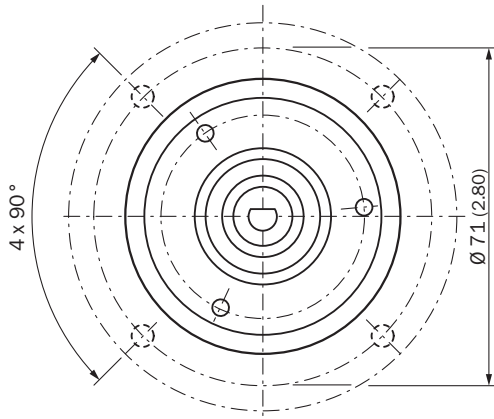
Attachment specifications

Mounting requirements for small servo clamp



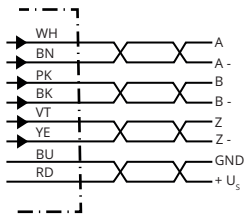
All dimensions in mm (inch)

Mounting requirements for half-shell servo clamp



All dimensions in mm (inch)

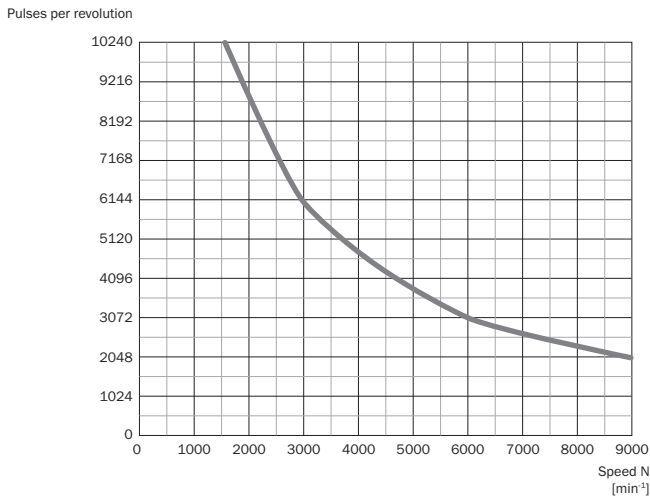
PIN assignment



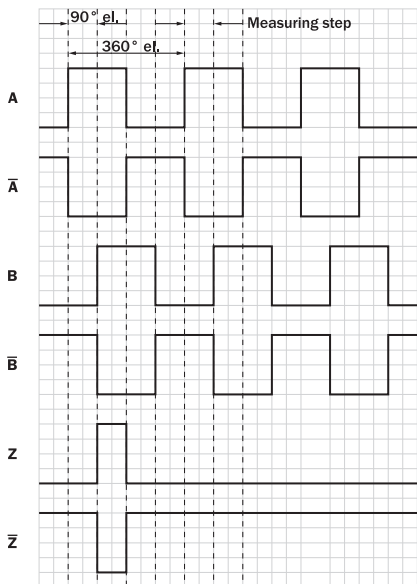
| Wire colors (cable connection) | Male connector M12, 8-pin | Male connector M23, 12-pin | TTL/HTL 6-channel signal | Explanation |
|--------------------------------|---------------------------|----------------------------|--------------------------|-------------|
| Brown | 1 | 6 | A- | Signal wire |
| White | 2 | 5 | A | Signal wire |
| Black | 3 | 1 | B- | Signal wire |
| Pink | 4 | 8 | B | Signal wire |
| Yellow | 5 | 4 | Z- | Signal wire |

| Wire colors (cable connection) | Male connector M12, 8-pin | Male connector M23, 12-pin | TTL/HTL 6-channel signal | Explanation |
|--------------------------------|---------------------------|----------------------------|--------------------------|-------------------------------------|
| 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



Signal outputs for electrical interfaces TTL and HTL

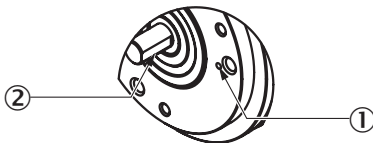


Cw with view on the encoder shaft in direction "A", compare dimensional drawing.

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

Operation note

Solid shaft, servo flange













- ① Zero pulse mark on flange
- ② Zero pulse active when the surface of the shaft shows the zero pulse mark on the flange

Recommended accessories

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

| | Brief description | Type | Part no. |
|--------|--|----------------|----------|
| Others | | | |
| | <ul style="list-style-type: none"> • Connection type head A: Flying leads • Connection type head B: Flying leads • Signal type: SSI, Incremental, HIPERFACE® • Items supplied: By the meter • Cable: 8-wire, PUR, halogen-free • Description: SSI, Incremental, HIPERFACE®, shielded | LTG-2308-MWENC | 6027529 |
| | <ul style="list-style-type: none"> • Connection type head A: Flying leads • Connection type head B: Flying leads • Signal type: SSI, Incremental • Items supplied: By the meter • Cable: 11-wire, PUR • Description: SSI, Incremental, shielded | LTG-2411-MW | 6027530 |
| | <ul style="list-style-type: none"> • Connection type head A: Flying leads • Connection type head B: Flying leads • Signal type: SSI, Incremental • Items supplied: By the meter • Cable: 12-wire, PUR, halogen-free • Description: SSI, Incremental, shielded | LTG-2512-MW | 6027531 |
| | <ul style="list-style-type: none"> • Connection type head A: Flying leads • Connection type head B: Flying leads • Signal type: SSI, TTL, HTL, Incremental • Items supplied: By the meter • Cable: 12-wire, UV and saltwater-resistant, PUR, halogen-free • Description: SSI, TTL, HTL, Incremental, shielded, Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, UV and saltwater resistant, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm | LTG-2612-MW | 6028516 |

| | Brief description | Type | Part no. |
|---|--|----------------|----------|
|  | <ul style="list-style-type: none"> Product family: Assembly accessories Description: Bearing block for servo and face mount flange encoder. The heavy-duty bearing block is used to absorb very large radial and axial shaft loads. Particularly when using belt pulleys, chain sprockets, friction wheels. Operating speed max. 4,000 rpm⁻¹, axial shaft load 150 N, radial shaft load 250 N, bearing service life 3.6 x 10⁹ revolutions | BEF-FA-LB1210 | 2044591 |
|  | <ul style="list-style-type: none"> Product segment: Shaft adaptation Product family: Shaft couplings Description: Bellows coupling, shaft diameter 6 mm / 10 mm, maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular +/- 4°; max. speed 10,000 rpm, -30 °C to +120 °C, max. torque 120 Ncm; material: stainless steel bellows, aluminum hub | KUP-0610-B | 5312982 |
|  | <ul style="list-style-type: none"> Product segment: Shaft adaptation Product family: Shaft couplings Description: Spring washer coupling, shaft diameter 6 mm / 10 mm, Maximum shaft offset: radial +/- 0.3 mm, axial +/- 0.4 mm, angular +/- 2.5°; max. speed 12,000 rpm, -10° to +80 °C, max. torque 60 Ncm; material: aluminum flange, glass fiber-reinforced polyamide membrane and hardened steel coupling pin | KUP-0610-F | 5312985 |
| | BEF-OR-053-040 | BEF-OR-053-040 | 2064061 |
| | BEF-OR-083-050 | BEF-OR-083-050 | 2064076 |
| | BEF-MK-LB | BEF-MK-LB | 5320872 |
| | BEF-OR-145-050 | BEF-OR-145-050 | 2064074 |
|  | <ul style="list-style-type: none"> Product segment: Shaft adaptation Product family: Shaft couplings Description: Double loop coupling, shaft diameter 6 mm / 10 mm, max. shaft offset: radially +/- 2,5 mm, axially +/-3 mm, angle +/- 10 degrees;max. speed 3.000 rpm, -30 to +80 degrees Celsius, torsional spring stiffness of 25 Nm/rad | KUP-0610-D | 5326697 |
|  | <ul style="list-style-type: none"> Product segment: Shaft adaptation Product family: Shaft couplings Description: Bar coupling, shaft diameter 6 mm / 10 mm, max. shaft offset: radial ± 0,3 mm, axial ± 0,3 mm, angular ± 3°; max. speed 10.000 rpm, -10° to +80 °C, max. torque: 80 Ncm, material: fiber-glass reinforced polyamide, aluminum hub | KUP-0610-S | 2056407 |
|  | <ul style="list-style-type: none"> Product segment: Shaft adaptation Product family: Shaft couplings Description: Claw coupling, shaft diameter 6 mm / 10 mm, damping element 80 shore blue, maximum shaft offset: radial ± 0.22 mm, axial ± 1 mm angular ± 1.3°, max. speed 19,000 rpm, angle of twist max. 10°, -30 °C to +80 °C, max. torque 800 Ncm, tightening torque of screws: ISO 4029 150 Ncm, material: aluminum flange, damping element: polyurethane | KUP-0610-J | 2127056 |
|  | <ul style="list-style-type: none"> Product segment: Measuring wheels and measuring wheel mechanics Product family: Measuring wheels Description: Aluminum measuring wheel with studded polyurethane surface for 6 mm solid shaft, circumference 200 mm | BEF-MR06200APN | 4084747 |
|  | <ul style="list-style-type: none"> Product segment: Measuring wheels and measuring wheel mechanics Product family: Measuring wheels Description: Aluminum measuring wheel with smooth polyurethane surface for 6 mm solid shaft, circumference 200 mm | BEF-MR06200AP | 4084746 |
|  | <ul style="list-style-type: none"> Product segment: Measuring wheels and measuring wheel mechanics Product family: Measuring wheels Description: Aluminum measuring wheel with cross-knurled surface for 6 mm solid shaft, circumference 200 mm | BEF-MR06200AK | 4084745 |
|  | <ul style="list-style-type: none"> Product segment: Measuring wheels and measuring wheel mechanics Product family: Measuring wheels Description: Aluminum measuring wheel with ridged polyurethane surface for 6 mm solid shaft, circumference 200 mm | BEF-MR06200APG | 4084748 |

| | Brief description | Type | Part no. |
|---|---|---------------|----------|
|  | <ul style="list-style-type: none"> Product segment: Shaft adaptation Product family: Shaft couplings Description: Bar coupling, shaft diameter 6 mm / 8 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub | KUP-0608-S | 5314179 |
|  | <ul style="list-style-type: none"> Product segment: Shaft adaptation Product family: Shaft couplings Description: Cross-slotted coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$; max. speed 10,000 rpm, -10° to $+80^\circ$ °C, max. torque 80 Ncm; material: fiber-glass reinforced polyamide, aluminum hub | KUP-0606-S | 2056406 |
|  | <ul style="list-style-type: none"> Product segment: Shaft adaptation Product family: Shaft couplings Description: Bellows coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular $\pm 4^\circ$; max. speed 10,000 rpm, -30° °C to $+120^\circ$ °C, max. torque 120 Ncm; material: stainless steel bellows, aluminum hub | KUP-0606-B | 5312981 |
|  | <ul style="list-style-type: none"> Product family: Assembly accessories Description: Mounting bell for encoder with servo flange, 50 mm spigot Items supplied: Mounting kit included | BEF-MG-50 | 5312987 |
|  | <ul style="list-style-type: none"> Product family: Assembly accessories Description: Half-shell servo clamps (2 pcs.) for servo flanges with a 50 mm centering hub | BEF-WG-SF050 | 2029165 |
|  | <ul style="list-style-type: none"> Product family: Assembly accessories Description: Servo clamps, large, for servo flange (clamps, eccentric fastener), 3 pcs, without mounting material Items supplied: Without mounting hardware | BEF-WK-SF | 2029166 |
|  | <ul style="list-style-type: none"> Product segment: Measuring wheels and measuring wheel mechanics Product family: Measuring wheels Description: Aluminium measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm | BEF-MR006020R | 2055222 |
|  | <ul style="list-style-type: none"> Product segment: Measuring wheels and measuring wheel mechanics Product family: Measuring wheels Description: Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm | BEF-MR006030R | 2055634 |
|  | <ul style="list-style-type: none"> Product segment: Measuring wheels and measuring wheel mechanics Product family: Measuring wheels Description: Aluminium measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 500 mm | BEF-MR006050R | 2055225 |
|  | <ul style="list-style-type: none"> Connection type head A: Male connector, M23, 12-pin, straight, A-coded Signal type: HIPERFACE[®], SSI, Incremental Description: HIPERFACE[®], SSI, Incremental, shielded, Head A: male connector, M23, 12-pin, straight, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: -40° °C ... $+125^\circ$ °C Connection systems: Solder connection | STE-2312-G01 | 2077273 |
|  | <ul style="list-style-type: none"> Connection type head A: Male connector, M23, 12-pin, straight, A-coded Signal type: HIPERFACE[®], SSI, Incremental Description: HIPERFACE[®], SSI, Incremental, shielded, M23 female connector with central fixing (for cabinet bushing) Connection systems: Solder connection | STE-2312-GX | 6028548 |
|  | <ul style="list-style-type: none"> Connection type head A: Male connector, M12, 8-pin, straight, A-coded Signal type: Incremental Cable: CAT5, CAT5e Description: Incremental, shielded, Head A: male connector, M12, 8-pin, straight, A coded, shielded, for cable diameter 4 mm ... 8 mm Head B: - Operating temperature: -40° °C ... $+85^\circ$ °C Connection systems: IDC quick connection Permitted cross-section: 0.14 mm² ... 0.34 mm² | STE-1208-GA01 | 6044892 |

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.

We have extensive experience in a wide range of industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services complete our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is “Sensor Intelligence.”

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