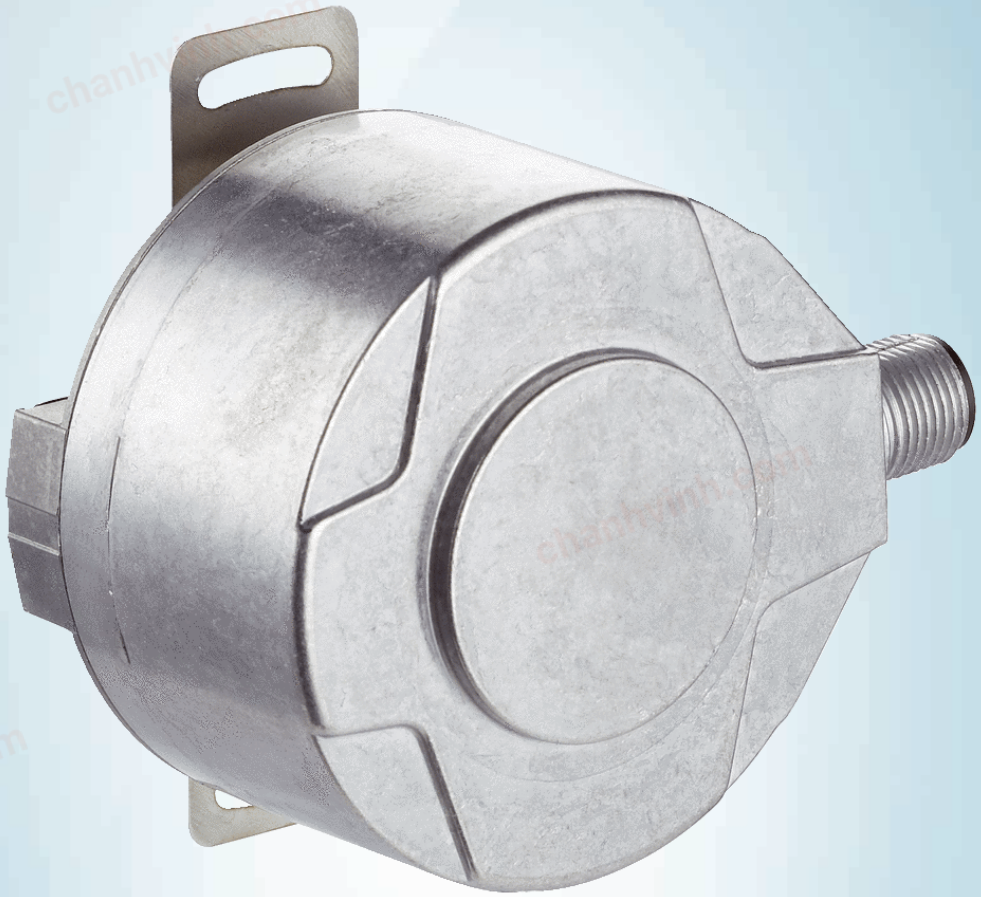
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Product data sheet



# DFS60B-BBPC10000

## DFS60

INCREMENTAL ENCODERS

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# DFS60B-BBPC10000 | DFS60

INCREMENTAL ENCODERS

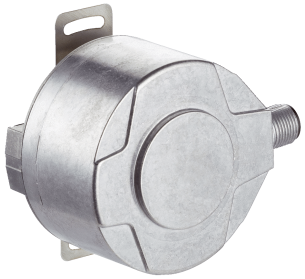


Illustration may differ

## Ordering information

| Type | Part no. |
|---|---|
| DFS60B-BBPC10000 | 1036773 |

Other models and accessories → www.sick.com/DFS60

## Detailed technical data

### Performance

| | |
|---|---|
| **Pulses per revolution** | 10,000 [1] |
| **Measuring step** | 90° electric/pulses per revolution |
| **Measuring step deviation at non binary number of lines** | ± 0.01° |
| **Error limits** | ± 0.05° |

[1] See maximum revolution range.

### Interfaces

| | |
|---|---|
| **Communication interface** | Incremental |
| **Communication Interface detail** | TTL / HTL |
| **Factory setting** | Factory setting: output level TTL |
| **Number of signal channels** | 6-channel |
| **Programmable/configurable** | ✓ |
| **Initialization time** | 32 ms [1]<br>30 ms |
| **Output frequency** | ≤ 600 kHz |
| **Load current** | ≤ 30 mA |
| **Power consumption** | ≤ 0.7 W (without load) |

[1] With mechanical zero pulse width.

### Electrical data

| | |
|---|---|
| **Connection type** | Male connector, M12, 8-pin, radial |
| **Supply voltage** | 4.5 ... 32 V |
| **Reference signal, number** | 1 |
| **Reference signal, position** | 90°, electric, logically gated with A and B |

[1] Programming TTL with ≥ 5.5 V: short-circuit opposite to another channel or GND permissable for maximum 30 s.

[2] Programming HTL or TTL with < 5.5 V: short-circuit opposite to another channel, US or GND permissable for maximum 30 s.

[3] 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.

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| | |
|---|---|
| **Reverse polarity protection** | ✓ |
| **Short-circuit protection of the outputs** | ✓ [1] [2] |
| **MTTFd: mean time to dangerous failure** | 300 years (EN ISO 13849-1) [3] |

[1] Programming TTL with ≥ 5.5 V: short-circuit opposite to another channel or GND permissable for maximum 30 s.

[2] Programming HTL or TTL with < 5.5 V: short-circuit opposite to another channel, US or GND permissable for maximum 30 s.

[3] 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.

## Mechanical data

| | |
|---|---|
| **Mechanical design** | Blind hollow shaft |
| **Shaft diameter** | 8 mm |
| **Weight** | + 0.2 kg |
| **Shaft material** | Stainless steel |
| **Flange material** | Aluminum |
| **Housing material** | Aluminum die cast |
| **Start up torque** | 0.8 Ncm (+20 °C) |
| **Operating torque** | 0.6 Ncm (+20 °C) |
| **Permissible movement static** | ± 0.3 mm (radial)<br>± 0.5 mm (axial) |
| **Permissible movement dynamic** | ± 0.2 mm (radial)<br>± 0.1 mm (axial) |
| **Operating speed** | ≤ 6,000 $min^{-1}$ [1] |
| **Moment of inertia of the rotor** | 40 $gcm^2$ |
| **Bearing lifetime** | 3.6 x 10^10 revolutions |
| **Angular acceleration** | ≤ 500,000 $rad/s^2$ |

[1] Allow for self-heating of 3.3 K per 1,000 rpm when designing the operating temperature range.

## Ambient data

| | |
|---|---|
| **EMC** | According to EN 61000-6-2 and EN 61000-6-3 |
| **Enclosure rating** | IP67, Housing side, male connector (IEC 60529) [1]<br>IP65, shaft side (IEC 60529) |
| **Permissible relative humidity** | 90 % (Condensation not permitted) |
| **Operating temperature range** | –40 °C ... +100 °C [2]<br>–30 °C ... +100 °C [3] |
| **Storage temperature range** | –40 °C ... +100 °C, without package |
| **Resistance to shocks** | 70 g, 6 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] Stationary position of the cable.

[3] Flexible position of the cable.

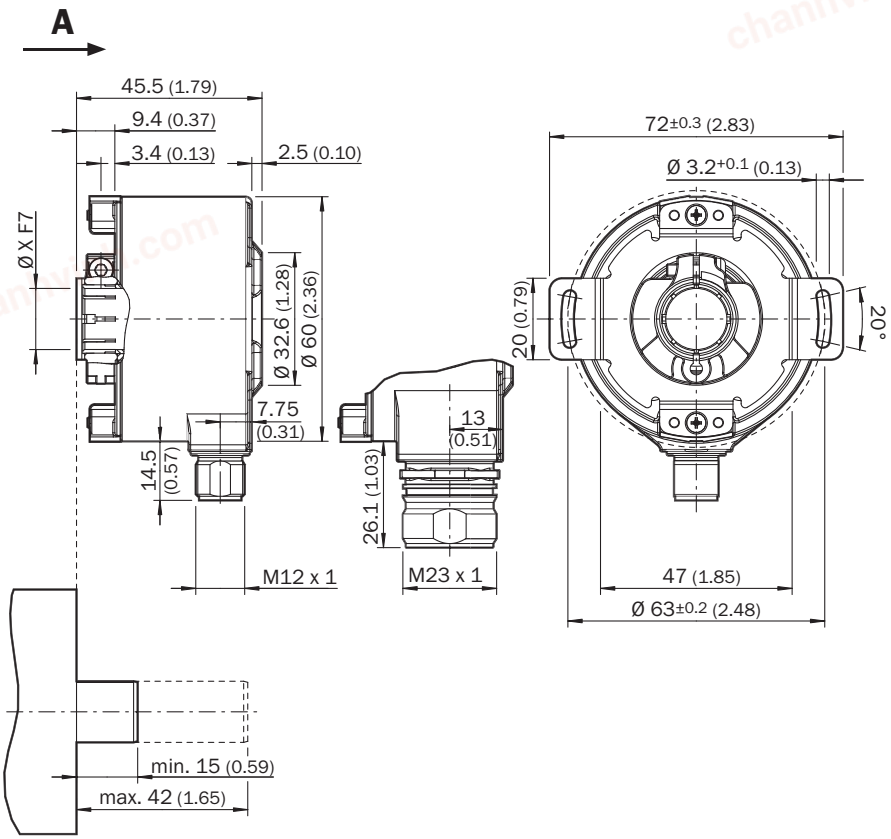
## Classifications

| | |
|---|---|
| **ECl@ss 5.0** | 27270501 |
| **ECl@ss 5.1.4** | 27270501 |
| **ECl@ss 6.0** | 27270590 |

| | |
|---|---|
| **ECl@ss 6.2** | 27270590 |
| **ECl@ss 7.0** | 27270501 |
| **ECl@ss 8.0** | 27270501 |
| **ECl@ss 8.1** | 27270501 |
| **ECl@ss 9.0** | 27270501 |
| **ECl@ss 10.0** | 27270501 |
| **ECl@ss 11.0** | 27270501 |
| **ECl@ss 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))

Blind hollow shaft, radial male connector M12 and M23




General tolerances according to DIN ISO 2768-mk

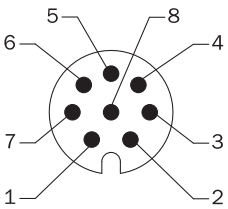
| Type<br>Blind hollow shaft | Shaft diameter XF7 | Shaft diameter xj7 |
|---|---|---|
| DFS60x-BAxxxxxxx | 6 mm | Provided by customer |
| DFS60x-BBxxxxxxx | 8 mm | |

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| Type<br>Blind hollow shaft | Shaft diameter XF7 | Shaft diameter xj7 |
|---|---|---|
| DFS60x-BCxxxxxxxx | 3/8″ | |
| DFS60x-BDxxxxxxxx | 10 mm | |
| DFS60x-BExxxxxxxx | 12 mm | |
| DFS60x-BFxxxxxxxx | 1/2″ | |
| DFS60x-BGxxxxxxxx | 14 mm | |
| DFS60x-BHxxxxxxxx | 15 mm | |
| DFS60x-BJxxxxxxxx | 5/8″ | |

## PIN assignment




View of M12 male device connector on encoder

| PIN<br>Male connector M12, 8-pin | PIN<br>Male connector M23, 12-pin | Wire colors (cable connection) | TTL/HTL signal | Sin/Cos 1.0 $V_{PP}$ | Explanation |
|---|---|---|---|---|---|
| 1 | 6 | Brown | $\overline{A}$ | COS- | Signal wire |
| 2 | 5 | White | A | COS+ | Signal wire |
| 3 | 1 | Black | $\overline{B}$ | SIN- | Signal wire |
| 4 | 8 | Pink | B | SIN+ | Signal wire |
| 5 | 4 | Yellow | $\overline{Z}$ | $\overline{Z}$ | Signal wire |
| 6 | 3 | Purple | Z | Z | Signal wire |
| 7 | 10 | Blue | GND | GND | Ground connection |
| 8 | 12 | Red | $+U_S$ | $+U_S$ | Supply voltage |
| - | 9 | - | N.c. | N.c. | Not assigned |
| - | 2 | - | N.c. | N.c. | Not assigned |
| - | 11 | - | N.c. | N.c. | Not assigned |
| - | 7 [1] | - | 0-SET [1] | N.c. | Set zero pulse [1] |
| Screen | Screen | Screen | Screen | Screen | Screen connected to housing on encoder side. Connected to ground on control side. |

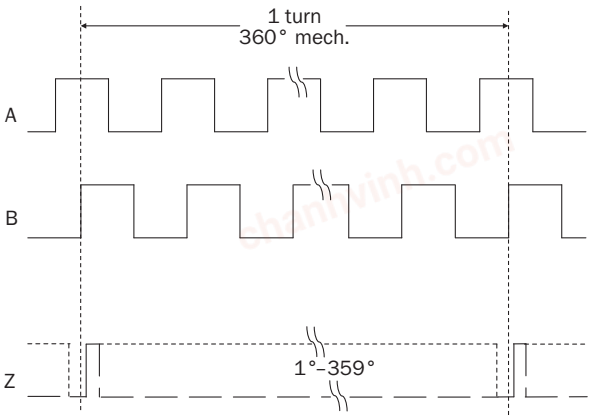
[1] For electrical interfaces only: M, U, V, W with 0-SET function on PIN 7 on M23 plug. The 0-SET input is used to set the zero pulse to the current shaft position. If the 0-SET input is applied to US for longer than 250 ms after it has previously been open or applied to GND for at least 1,000 ms, the current shaft position is assigned zero pulse signal “Z”.

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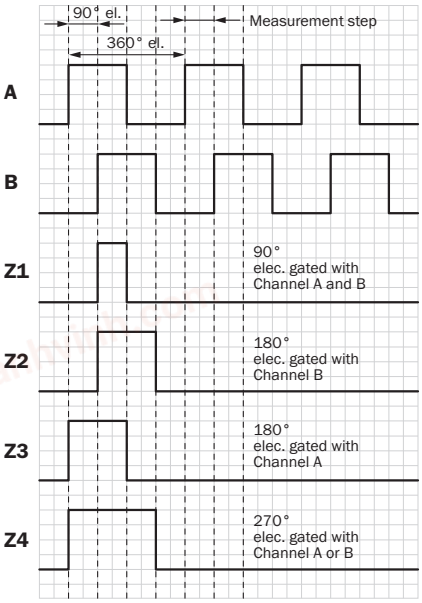
## Diagrams

Mechanical zero pulse width 1° to 359° programmable. Width of the zero pulse in relation to a mechanical revolution of the shaft.




| Supply voltage | Output |
|---|---|
| 4,5 V ... 32 V | TTL/HTL programmable |

Electrical zero pulse width can be configured to 90°, 180°, or 270°. Width of the zero pulse in relation to a pulse period.



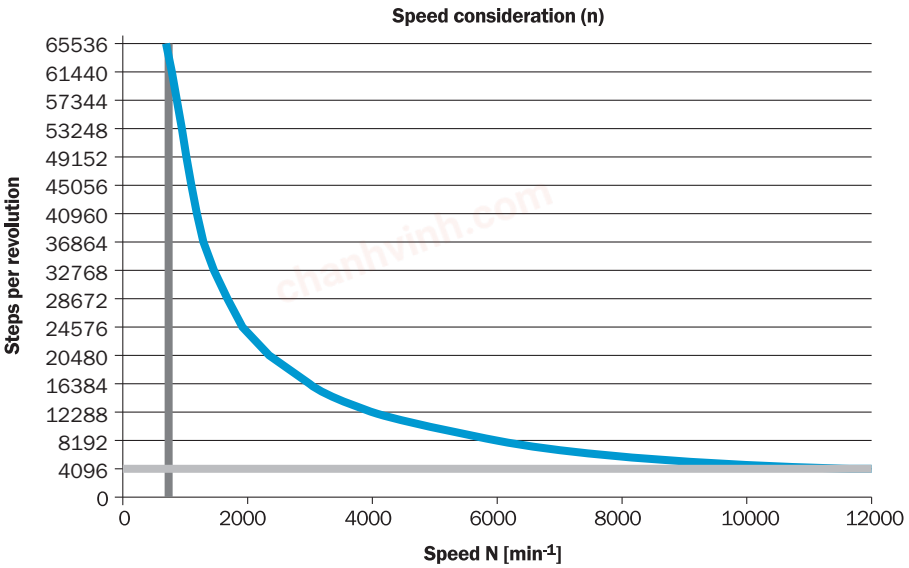

Cw with view on the encoder shaft in direction "A", compare dimensional drawing.

| Supply voltage | Output |
|---|---|
| 4,5 V ... 32 V | TTL/HTL programmable |

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Maximum revolution range




## Recommended accessories

Other models and accessories ➜ www.sick.com/DFS60

| | Brief description | Type | Part no. |
|---|---|---|---|
| Programming and configuration tools | | | |
|  | USB programming unit, for programmable SICK encoders AFS60, AFM60, DFS60, VFS60, DFV60 and wire draw encoders with programmable encoders | PGT-08-S | 1036616 |
|  | Programming unit display for programmable SICK DFS60, DFV60, AFS/AFM60, AHS/AHM36 encoders, and wire draw encoder with DFS60, AFS/AFM60 and AHS/AHM36. Compact dimensions, low weight, and intuitive operation. | PGT-10-Pro | 1072254 |
| Flanges | | | |
|  | Standard stator coupling | BEF-DS00XFX | 2056812 |
| Other mounting accessories | | | |
|  | Clamping ring for metal hollow shaft, metal | BEF-KR-M | 2064709 |
| Plug connectors and cables | | | |
|  | Head A: female connector, M12, 8-pin, straight<br>Head B: Flying leads<br>Cable: Incremental, SSI, PUR, halogen-free, shielded, 2 m | DOL-1208-G02MAC1 | 6032866 |
| | Head A: female connector, M12, 8-pin, straight<br>Head B: Flying leads<br>Cable: Incremental, SSI, PUR, halogen-free, shielded, 5 m | DOL-1208-G05MAC1 | 6032867 |
| | Head A: female connector, M12, 8-pin, straight<br>Head B: Flying leads<br>Cable: Incremental, SSI, PUR, halogen-free, shielded, 10 m | DOL-1208-G10MAC1 | 6032868 |

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# DFS60B-BBPC10000 | DFS60

## INCREMENTAL ENCODERS

| | Brief description | Type | Part no. |
|---|---|---|---|
| | Head A: female connector, M12, 8-pin, straight<br>Head B: Flying leads<br>Cable: Incremental, SSI, PUR, halogen-free, shielded, 20 m | DOL-1208-G20MAC1 | 6032869 |
|  | Head A: female connector, M12, 8-pin, straight<br>Head B: male connector, D-Sub, 9-pin, straight<br>Cable: Incremental, shielded, 0.5 m<br>Programming adapter cable for programming tool PGT-10-Pro and PGT-08-S | DSL-2D08-G0M5AC3 | 2046579 |
|  | Head A: female connector, M12, 8-pin, straight, A-coded<br>Cable: Incremental, SSI, shielded | DOS-1208-GA01 | 6045001 |

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