

# DFS60B-TJPZ00S06

DFS60

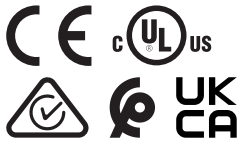
**INCREMENTAL ENCODERS**

**SICK**  
Sensor Intelligence.

Illustration may differ

## Ordering information

| Type             | part no. |
|------------------|----------|
| DFS60B-TJPZ00S06 | 1100135  |

Other models and accessories → [www.sick.com/DFS60](http://www.sick.com/DFS60)

## Detailed technical data

## Features

|                                  |                                                                       |
|----------------------------------|-----------------------------------------------------------------------|
| <b>Special device</b>            | ✓                                                                     |
| <b>Specialty</b>                 | Cable, universal, 0.5 m with M12, 5-pin plug, customer-specific label |
| <b>Standard reference device</b> | DFS60B-TJPK10000, 1036928                                             |

## Safety-related parameters

|                                                          |                                          |
|----------------------------------------------------------|------------------------------------------|
| <b>MTTF<sub>D</sub> (mean time to dangerous failure)</b> | 300 years (EN ISO 13849-1) <sup>1)</sup> |
|----------------------------------------------------------|------------------------------------------|

<sup>1)</sup> 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

|                                                               |                                     |
|---------------------------------------------------------------|-------------------------------------|
| <b>Pulses per revolution</b>                                  | 10,000 <sup>1)</sup>                |
| <b>Measuring step</b>                                         | 90°, electric/pulses per revolution |
| <b>Measuring step deviation at non binary number of lines</b> | ± 0.01°                             |
| <b>Error limits</b>                                           | ± 0.05°                             |

<sup>1)</sup> See maximum revolution range.

## Interfaces

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

<sup>1)</sup> With mechanical zero pulse width.

## Electronics

|                                                |                                                                       |
|------------------------------------------------|-----------------------------------------------------------------------|
| <b>Connection type</b>                         | Special version                                                       |
| <b>Connection type Detail</b>                  | Cable, universal, 0.5 m with M12, 5-pin plug, customer-specific label |
| <b>Supply voltage</b>                          | 4.5 ... 32 V                                                          |
| <b>Reference signal, number</b>                | 1                                                                     |
| <b>Reference signal, position</b>              | 90°, electric, logically gated with A and B                           |
| <b>Reverse polarity protection</b>             | ✓                                                                     |
| <b>Short-circuit protection of the outputs</b> | ✓ <sup>1)</sup> <sup>2)</sup>                                         |

<sup>1)</sup> Programming TTL with  $\geq 5.5$  V: short-circuit opposite to another channel or GND permissible for maximum 30 s.

<sup>2)</sup> Programming HTL or TTL with  $< 5.5$  V: short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

## Mechanics

|                                       |                                               |
|---------------------------------------|-----------------------------------------------|
| <b>Mechanical design</b>              | Through hollow shaft                          |
| <b>Shaft diameter</b>                 | 5/8" Front clamp                              |
| <b>Weight</b>                         | + 0.2 kg                                      |
| <b>Shaft material</b>                 | Stainless steel                               |
| <b>Flange material</b>                | Aluminum                                      |
| <b>Housing material</b>               | Aluminum die cast                             |
| <b>Start up torque</b>                | 0.8 Ncm (+20 °C)                              |
| <b>Operating torque</b>               | 0.6 Ncm (+20 °C)                              |
| <b>Permissible movement static</b>    | $\pm 0.3$ mm (radial)<br>$\pm 0.5$ mm (axial) |
| <b>Permissible movement dynamic</b>   | $\pm 0.1$ mm (radial)<br>$\pm 0.2$ mm (axial) |
| <b>Operating speed</b>                | $\leq 6,000 \text{ min}^{-1}$ <sup>1)</sup>   |
| <b>Moment of inertia of the rotor</b> | 40 gcm <sup>2</sup>                           |
| <b>Bearing lifetime</b>               | $3.6 \times 10^{10}$ revolutions              |
| <b>Angular acceleration</b>           | $\leq 500,000 \text{ rad/s}^2$                |

<sup>1)</sup> Allow for self-heating of 3.3 K per 1,000 rpm when designing the operating temperature range.

## Ambient data

|                                      |                                                                                  |
|--------------------------------------|----------------------------------------------------------------------------------|
| <b>EMC</b>                           | According to EN 61000-6-2 and EN 61000-6-3                                       |
| <b>Enclosure rating</b>              | IP65, housing side, cable connection (IEC 60529)<br>IP65, shaft side (IEC 60529) |
| <b>Permissible relative humidity</b> | 90 % (Condensation not permitted)                                                |
| <b>Operating temperature range</b>   | -40 °C ... +100 °C <sup>1)</sup><br>-30 °C ... +100 °C <sup>2)</sup>             |
| <b>Storage temperature range</b>     | -40 °C ... +100 °C, without package                                              |
| <b>Resistance to shocks</b>          | 70 g, 6 ms (EN 60068-2-27)                                                       |
| <b>Resistance to vibration</b>       | 30 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)                                          |

<sup>1)</sup> Stationary position of the cable.

<sup>2)</sup> Flexible position of the cable.

## Certificates

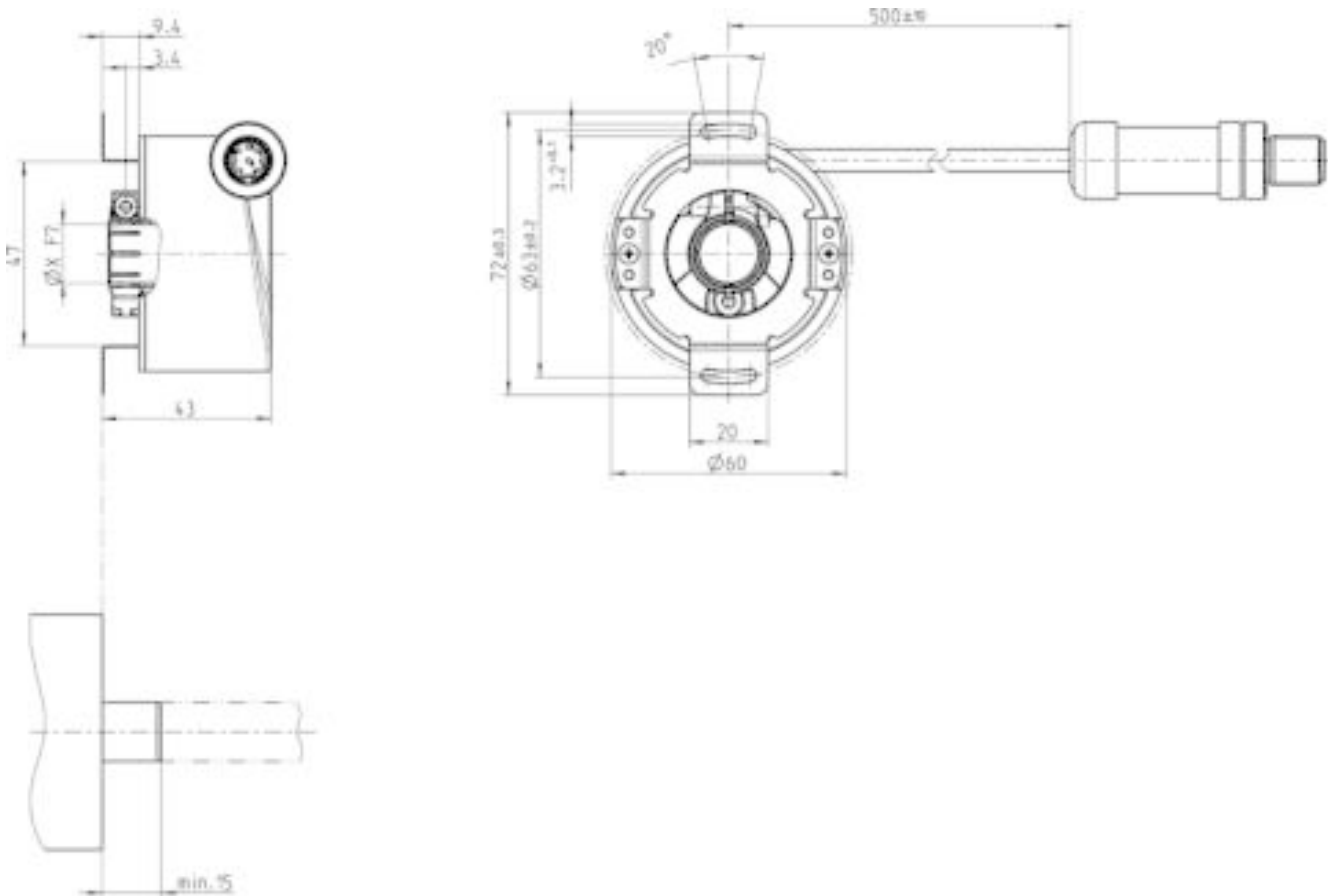
|                                     |   |
|-------------------------------------|---|
| <b>EU declaration of conformity</b> | ✓ |
|-------------------------------------|---|

|                                                                                  |   |
|----------------------------------------------------------------------------------|---|
| <b>UK declaration of conformity</b>                                              | ✓ |
| <b>ACMA declaration of conformity</b>                                            | ✓ |
| <b>Moroccan declaration of conformity</b>                                        | ✓ |
| <b>China-RoHS</b>                                                                | ✓ |
| <b>cULus certificate</b>                                                         | ✓ |
| <b>Information according to Art. 3 of Data Act<br/>(Regulation EU 2023/2854)</b> | ✓ |

## Classifications

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

Dimensional drawing



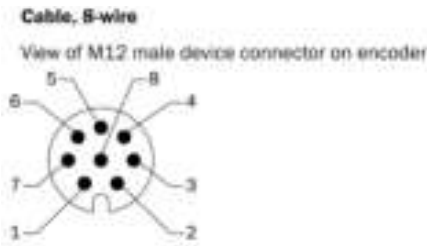
Dimensions in mm (inch)

Dimensional drawing



Dimensions in mm (inch)

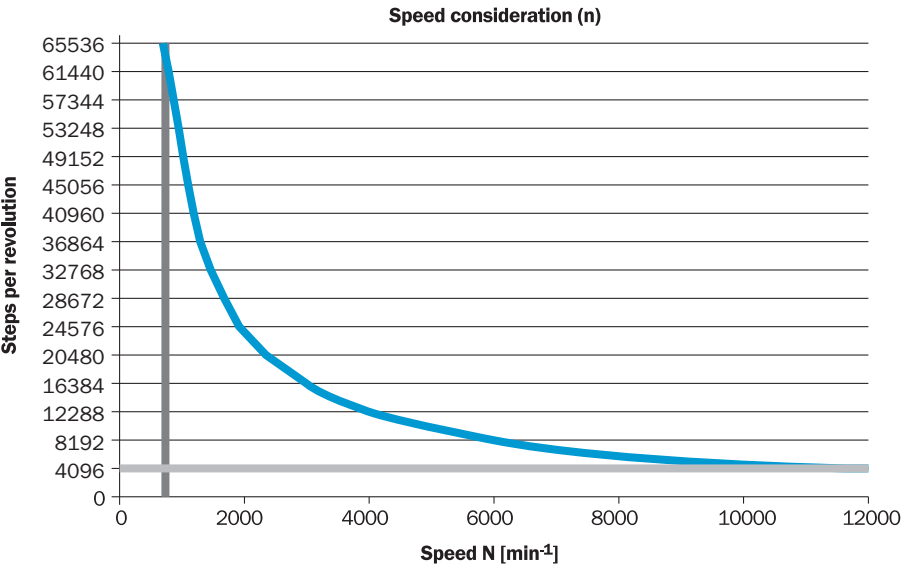
PIN assignment



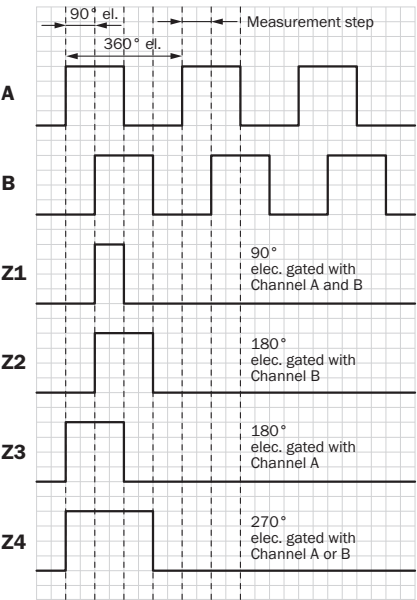
| PIN, 8-pin, M12 male connector | Color of the wires for encoders with cable outlet | TTL/HTL signal     | Explanation                                                                          |
|--------------------------------|---------------------------------------------------|--------------------|--------------------------------------------------------------------------------------|
| 1                              | Brown                                             | A                  | Signal wire                                                                          |
| 2                              | White                                             | A                  | Signal wire                                                                          |
| 3                              | Black                                             | B                  | Signal wire                                                                          |
| 4                              | Pink                                              | B                  | Signal wire                                                                          |
| 5                              | Yellow                                            | Z                  | Signal wire                                                                          |
| 6                              | Violet                                            | Z                  | Signal wire                                                                          |
| 7                              | Blue                                              | GND                | Ground connection of the encoder                                                     |
| 8                              | Red                                               | +U <sub>s</sub>    | Supply voltage (volt-free to housing)                                                |
| -                              | -                                                 | n.c.               | Not assigned                                                                         |
| -                              | -                                                 | n.c.               | Not assigned                                                                         |
| -                              | -                                                 | n.c.               | Not assigned                                                                         |
| -                              | -                                                 | O-SET <sup>®</sup> | Set zero pulse <sup>®</sup>                                                          |
| Screen                         | Screen                                            | Screen             | Screen connected to housing on encoder side.<br>Connected to ground on control side. |

<sup>®</sup> For electrical interfaces only: M, U, V, W with O-SET function on PIN 7 on M23 male connector, the O-SET input is used to set the zero pulse on the current shaft position. If the O-SET input is connected to U<sub>s</sub> for longer than 200 ms after it had previously been unassigned for at least 1,000 ms or had been connected to the GND, the current position of the shaft is assigned to the zero pulse signal "Z".

maximum revolution range



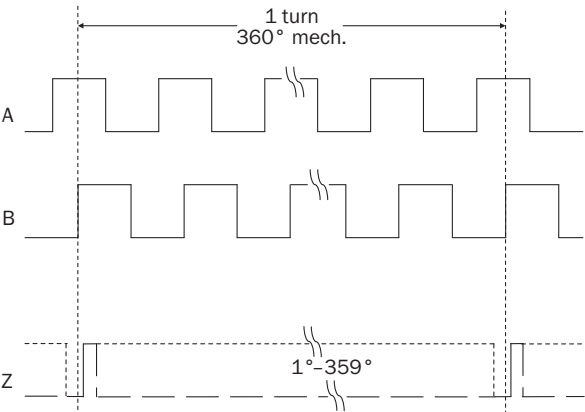
Diagrams Electrical zero pulse width can be configured to 90°, 180°, or 270°. Width of the zero pulse in relation to a pulse period.



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

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

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 |

## 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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