

# DFS60B-THPZ00S90

DFS60

**INCREMENTAL ENCODERS**

**SICK**  
Sensor Intelligence.

Illustration may differ

### Ordering information

| Type             | Part no. |
|------------------|----------|
| DFS60B-THPZ00S90 | 1086807  |

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, 8-wire, 10 m with customized cable end (doubling signal B and B_)<br>4.5...32 V, TTL/HTL programmable, preprogrammed to HTL<br>Programmable resolution up to 10 000 lines<br>Additional customized type labels, details find on page 5 |
| <b>Standard reference device</b> | DFS60B-THPN1000, 1062711                                                                                                                                                                                                                      |
| <b>Additional information</b>    | Customer project BAA633B2                                                                                                                                                                                                                     |

#### 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 <sup>1)</sup><br>30 ms      |
| <b>Output frequency</b>                | ≤ 600 kHz                         |
| <b>Load current</b>                    | ≤ 30 mA                           |
| <b>Power consumption</b>               | ≤ 0.7 W (without load)            |
| <b>4.5 V... 5.5 V, TTL/RS-422</b>      |                                   |
| Load current                           | ≤ 30 mA                           |
| <b>4.5 V ... 5.5 V, Open Collector</b> |                                   |
| Load current                           | ≤ 30 mA                           |
| <b>TTL/RS-422</b>                      |                                   |

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

|                       |                   |                        |
|-----------------------|-------------------|------------------------|
|                       | Load current      | ≤ 30 mA                |
|                       | Power consumption | ≤ 0.7 W (without load) |
| <b>HTL/Push pull</b>  |                   |                        |
|                       | Load current      | ≤ 30 mA                |
|                       | Power consumption | ≤ 0.7 W (without load) |
| <b>TTL/HTL</b>        |                   |                        |
|                       | Load current      | ≤ 30 mA                |
|                       | Power consumption | ≤ 0.7 W (without load) |
| <b>Open Collector</b> |                   |                        |
|                       | Load current      | ≤ 30 mA                |
|                       | Power consumption | ≤ 0.7 W (without load) |

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

## Electrical data

|                                                |                                                                         |
|------------------------------------------------|-------------------------------------------------------------------------|
| <b>Connection type</b>                         | Cable, 8-wire, universal, 10 m, customized pin assignment <sup>1)</sup> |
| <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>2)</sup> <sup>3)</sup>                                           |
| <b>MTTFd: mean time to dangerous failure</b>   | 300 years (EN ISO 13849-1) <sup>4)</sup>                                |

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

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

<sup>3)</sup> Programming HTL or TTL with < 5.5 V: short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

<sup>4)</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.

## Mechanical data

|                                                          |                                         |
|----------------------------------------------------------|-----------------------------------------|
| <b>Mechanical design</b>                                 | Through hollow shaft                    |
| <b>Shaft diameter</b>                                    | 15 mm                                   |
| <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 shaft movement, axial static/dynamic</b>  | ± 0.5 mm / ± 0.2 mm                     |
| <b>Permissible shaft movement, radial static/dynamic</b> | ± 0.3 mm / ± 0.1 mm                     |
| <b>Operating speed</b>                                   | ≤ 6,000 min <sup>-1</sup> <sup>1)</sup> |
| <b>Moment of inertia of the rotor</b>                    | 40 gcm <sup>2</sup>                     |
| <b>Bearing lifetime</b>                                  | 3.6 x 10 <sup>10</sup> revolutions      |

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

|                             |                                |
|-----------------------------|--------------------------------|
| <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 (according to IEC 60529)<br>IP65, shaft side (according to IEC 60529) |
| <b>Permissible relative humidity</b> | 90 % (condensation of the optical scanning 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 (according to EN 60068-2-27)                                                                    |
| <b>Resistance to vibration</b>       | 30 g, 10 Hz ... 2,000 Hz (according to EN 60068-2-6)                                                       |

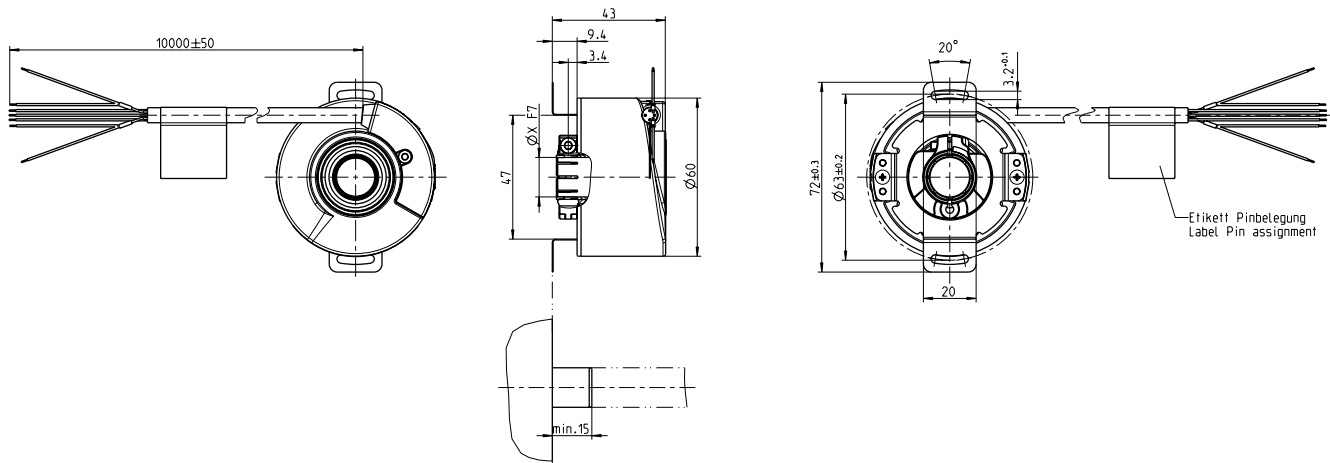
<sup>1)</sup> Stationary position of the cable.

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

## Classifications

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

## Dimensional drawing (Dimensions in mm (inch))



## PIN assignment

| Wire colors | TTL/HTL signal  | Explanation                                                                             |
|-------------|-----------------|-----------------------------------------------------------------------------------------|
| Black       | $\bar{B}$       | Signal cable                                                                            |
| Grey        | $\bar{C}$       | doubling signal B                                                                       |
| Lilac       | Z               | Signal cable                                                                            |
| Yellow      | $\bar{Z}$       | Signal cable                                                                            |
| White       | A               | Signal cable                                                                            |
| Brown       | $\bar{A}$       | Signal cable                                                                            |
| Green       | C               | doubling signal B                                                                       |
| Pink        | B               | Signal cable                                                                            |
| Blue        | GND             | Ground connection of the encoder                                                        |
| Red         | +U <sub>S</sub> | Supply voltage (volt-free to housing)                                                   |
| Shield      | Shield          | Shield connected to housing on side of encoder. Connected to ground on side of control. |

## Type label

Otis specific packaging label



Customized label with pin assignment, fastened to the cable

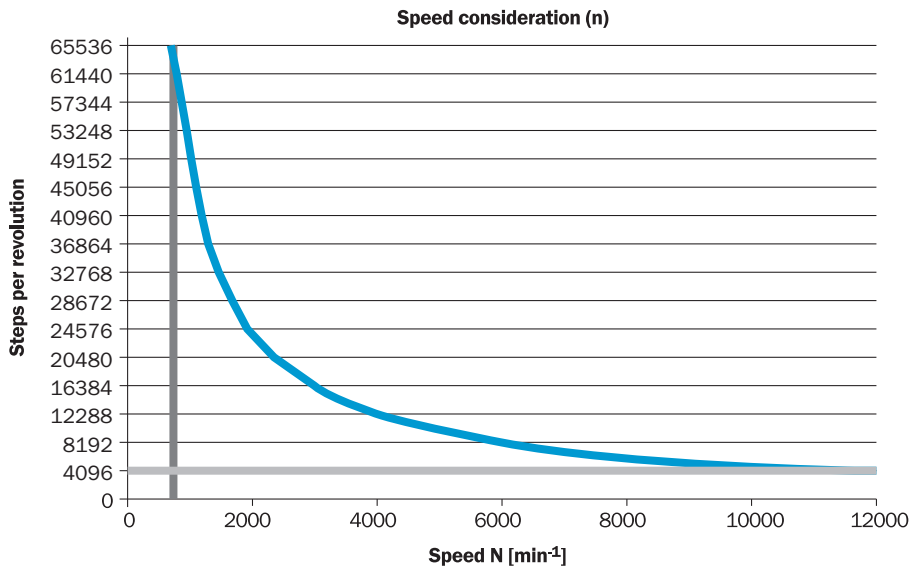
| Pinbelegung<br>Pin assignment | Aderfarbe<br>Color of wire |
|-------------------------------|----------------------------|
| GND                           | blau / blue                |
| US                            | rot / red                  |
| A                             | weiss / white              |
| A-                            | braun / brown              |
| B                             | rosa / pink                |
| C                             | gruen / green              |
| B-                            | schwarz / black            |
| C-                            | grau / grey                |
| Z                             | lila / purple              |
| Z-                            | gelb / yellow              |

Customized Encoder Label



### Maximum revolution range

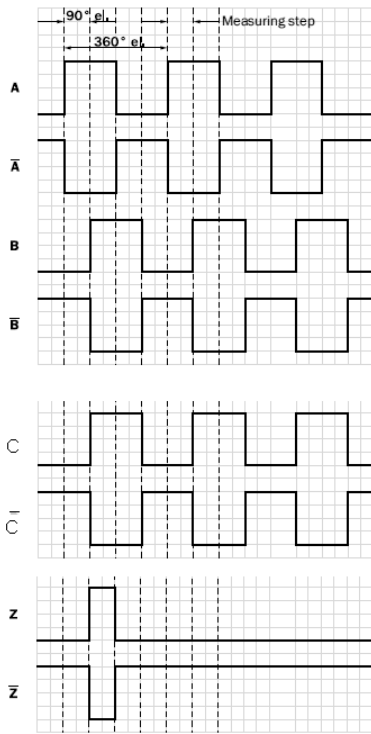
Maximum revolution range



## Diagrams

Signal outputs for electrical interfaces TTL and HTL

Signal outputs for electrical interfaces TTL and HTL



## 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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