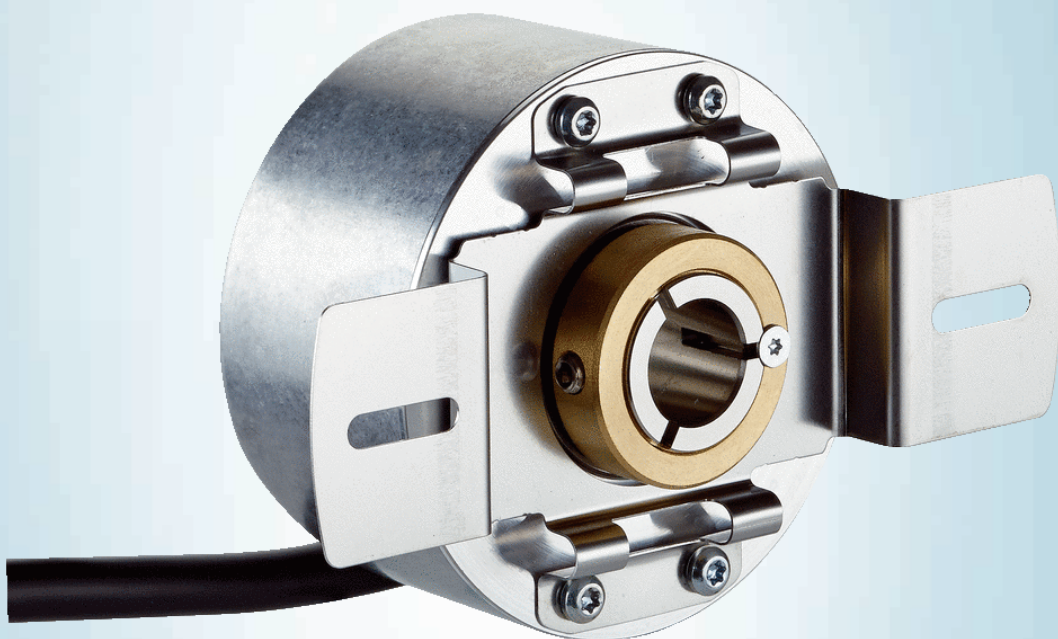




# DBS60E-TJAK02048

DBS60 Core

INCREMENTAL ENCODERS

**SICK**  
Sensor Intelligence.

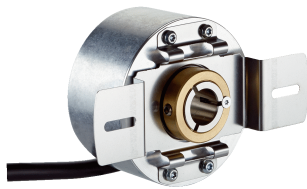


Illustration may differ



### Ordering information

| Type             | Part no. |
|------------------|----------|
| DBS60E-TJAK02048 | 1069747  |

Other models and accessories → [www.sick.com/DBS60\\_Core](http://www.sick.com/DBS60_Core)

### Detailed technical data

#### Performance

|                                 |                                      |
|---------------------------------|--------------------------------------|
| <b>Pulses per revolution</b>    | 2,048                                |
| <b>Measuring step</b>           | ≤ 90° electric/pulses per revolution |
| <b>Measuring step deviation</b> | ± 18° / pulses per revolution        |
| <b>Error limits</b>             | Measuring step deviation x 3         |
| <b>Duty cycle</b>               | ≤ 0.5 ± 5 %                          |

#### Interfaces

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

<sup>1)</sup> Valid signals can be read once this time has elapsed.

<sup>2)</sup> Up to 450 kHz on request.

#### Electrical data

|                                                |                                               |
|------------------------------------------------|-----------------------------------------------|
| <b>Connection type</b>                         | Cable, 8-wire, universal, 1.5 m <sup>1)</sup> |
| <b>Supply voltage</b>                          | 4.5 ... 5.5 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>                               |
| <b>MTTFd: mean time to dangerous failure</b>   | 500 years (EN ISO 13849-1) <sup>3)</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> Short-circuit opposite to another channel or GND permissible for max. 60 s. No protection signal against U<sub>S</sub>.

<sup>3)</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, Front clamp                         |
| <b>Shaft diameter</b>                                    | 5/8"                                                      |
| <b>Flange type / stator coupling</b>                     | 2-sided stator coupling, slot, screw hole circle 63–83 mm |
| <b>Weight</b>                                            | + 0.25 kg <sup>1)</sup>                                   |
| <b>Shaft material</b>                                    | Stainless steel                                           |
| <b>Flange material</b>                                   | Aluminum                                                  |
| <b>Housing material</b>                                  | Aluminum                                                  |
| <b>Material, cable</b>                                   | PVC                                                       |
| <b>Start up torque</b>                                   | + 0.5 Ncm (+20 °C)                                        |
| <b>Operating torque</b>                                  | 0.4 Ncm (+20 °C)                                          |
| <b>Permissible shaft movement, axial static/dynamic</b>  | ± 0.5 mm / ± 0.2 mm <sup>2)</sup>                         |
| <b>Permissible shaft movement, radial static/dynamic</b> | ± 0.3 mm / ± 0.1 mm <sup>2)</sup>                         |
| <b>Operating speed</b>                                   | 6,000 min <sup>-1</sup> <sup>3)</sup>                     |
| <b>Maximum operating speed</b>                           | 9,000 min <sup>-1</sup> <sup>4)</sup>                     |
| <b>Moment of inertia of the rotor</b>                    | 50 gcm <sup>2</sup>                                       |
| <b>Bearing lifetime</b>                                  | 3.6 x 10 <sup>9</sup> revolutions                         |
| <b>Angular acceleration</b>                              | ≤ 500,000 rad/s <sup>2</sup>                              |

<sup>1)</sup> Based on an encoder with a male connector outlet or a cable with a male connector outlet.

<sup>2)</sup> Not applicable for stator coupling type C and K.

<sup>3)</sup> Allow for self-heating of 2.6 K per 1,000 rpm when designing the operating temperature range.

<sup>4)</sup> 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

|                                      |                                                                                          |
|--------------------------------------|------------------------------------------------------------------------------------------|
| <b>EMC</b>                           | According to EN 61000-6-2 and EN 61000-6-3                                               |
| <b>Enclosure rating</b>              | IP65, housing side (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>   | -20 °C ... +85 °C <sup>1)</sup>                                                          |
| <b>Storage temperature range</b>     | -40 °C ... +100 °C, without package                                                      |
| <b>Resistance to shocks</b>          | 250 g, 3 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> These values relate to all mechanical versions including recommended accessories unless otherwise noted.

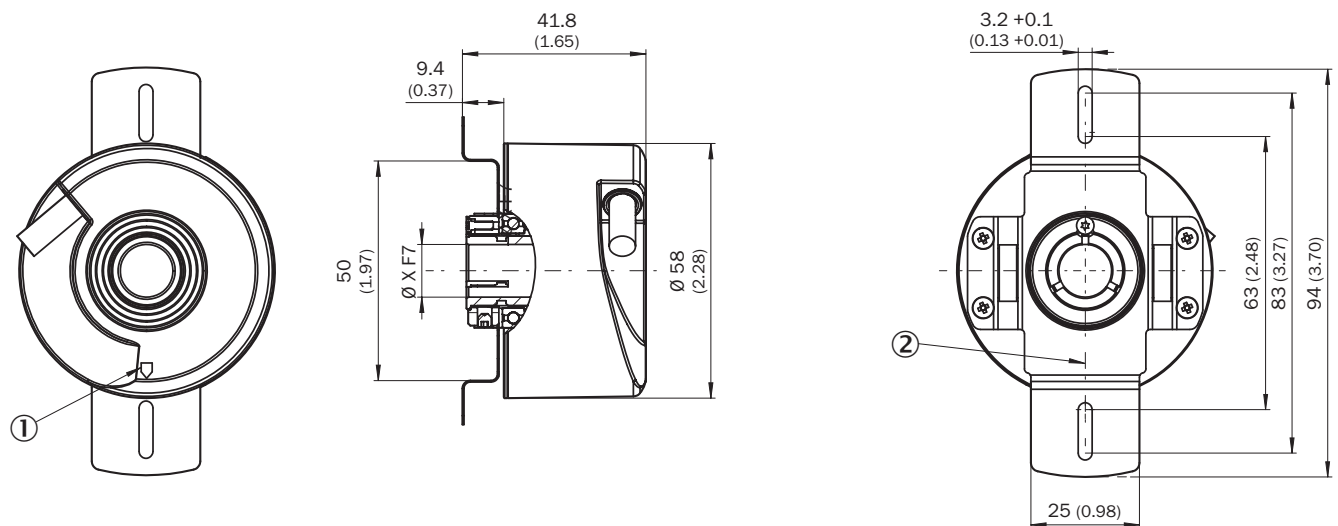
## Classifications

|                     |          |
|---------------------|----------|
| <b>ECI@ss 5.0</b>   | 27270501 |
| <b>ECI@ss 5.1.4</b> | 27270501 |
| <b>ECI@ss 6.0</b>   | 27270590 |
| <b>ECI@ss 6.2</b>   | 27270590 |
| <b>ECI@ss 7.0</b>   | 27270501 |
| <b>ECI@ss 8.0</b>   | 27270501 |

|                       |          |
|-----------------------|----------|
| <b>ECI@ss 8.1</b>     | 27270501 |
| <b>ECI@ss 9.0</b>     | 27270501 |
| <b>ECI@ss 10.0</b>    | 27270501 |
| <b>ECI@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))

Through hollow shaft clamping at the front, cable connection, 2-sided stator coupling, slot, screw hole circle 63–83 mm



XF7 values see shaft diameter table for through hollow shaft, clamping at the front

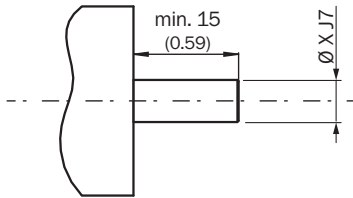
- ① Zero pulse mark on housing
- ② Zero pulse mark on flange under stator coupling

| Type<br>Through hollow shaft with front clamping | Shaft diameter XF7 |
|--------------------------------------------------|--------------------|
| DBS60x-TAxxxxxxx<br>DBS60x-T1xxxxxxx             | 6 mm               |
| DBS60x-TBxxxxxxx<br>DBS60x-T2xxxxxxx             | 8 mm               |
| DBS60x-TCxxxxxxx<br>DBS60x-T3xxxxxxx             | 3/8"               |
| DBS60x-TDxxxxxxx<br>DBS60x-T4xxxxxxx             | 10 mm              |
| DBS60x-TExxxxxxx<br>DBS60x-T5xxxxxxx             | 12 mm              |
| DBS60x-TFxxxxxxx<br>DBS60x-T6xxxxxxx             | 1/2"               |
| DBS60x-TGxxxxxxx<br>DBS60x-T7xxxxxxx             | 14 mm              |
| DBS60x-THxxxxxxx<br>DBS60x-T8xxxxxxx             | 15 mm              |

| Type<br>Through hollow shaft with front clamping | Shaft diameter XF7 |
|--------------------------------------------------|--------------------|
| DBS60x-TJxxxxxxxx                                | 5/8"               |

## Attachment specifications

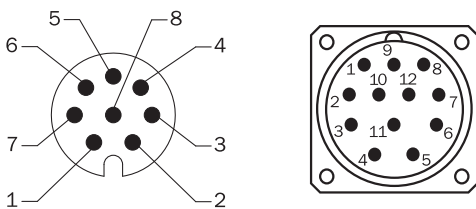
Through hollow shaft with front clamping



Customer side

| Type<br>Through hollow shaft with front clamping | Shaft diameter xj7 |
|--------------------------------------------------|--------------------|
| DBS60x-TAxxxxxxxx<br>DBS60x-T1xxxxxxxx           | 6 mm               |
| DBS60x-TBxxxxxxxx<br>DBS60x-T2xxxxxxxx           | 8 mm               |
| DBS60x-TCxxxxxxxx<br>DBS60x-T3xxxxxxxx           | 3/8"               |
| DBS60x-TDxxxxxxxx<br>DBS60x-T4xxxxxxxx           | 10 mm              |
| DBS60x-TExxxxxxxx<br>DBS60x-T5xxxxxxxx           | 12 mm              |
| DBS60x-TFxxxxxxxx<br>DBS60x-T6xxxxxxxx           | 1/2"               |
| DBS60x-TGxxxxxxxx<br>DBS60x-T7xxxxxxxx           | 14 mm              |
| DBS60x-THxxxxxxxx<br>DBS60x-T8xxxxxxxx           | 15 mm              |
| DBS60x-TJxxxxxxxx                                | 5/8"               |

## PIN assignment

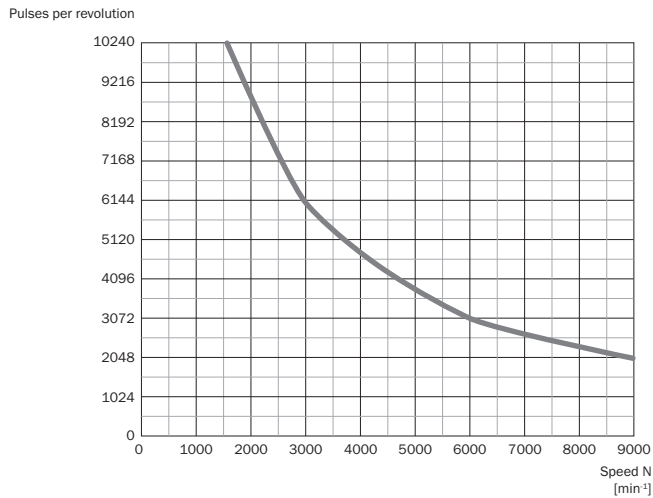


View of M12 / M23 male device connector on cable / housing

| 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 |

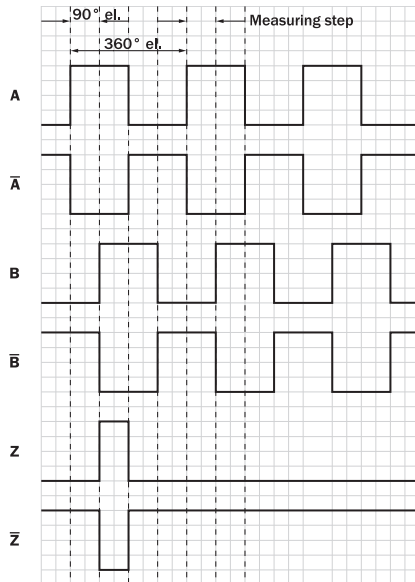
| Wire colors (cable connection) | Male connector M12, 8-pin | Male connector M23, 12-pin | TTL/HTL 6-channel signal | Explanation                         |
|--------------------------------|---------------------------|----------------------------|--------------------------|-------------------------------------|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

### Maximum revolution range



## Signal outputs

Signal outputs for electrical interfaces TTL and HTL

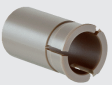
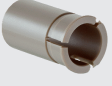


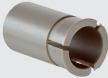
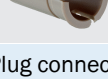
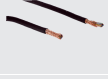
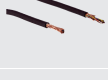
Cw with view on the encoder shaft in direction "A", compare dimensional drawing.

| 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               |

## Recommended accessories

Other models and accessories → [www.sick.com/DBS60\\_Core](http://www.sick.com/DBS60_Core)

|                                                                                     | Brief description                                                                                        | Type          | Part no. |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|---------------|----------|
| Shaft adaptation                                                                    |                                                                                                          |               |          |
|  | Collet plastic insulated for hollow shaft, shaft diameter 6 mm, outer diameter 5/8" (15.875 mm), plastic | SPZ-58Z-006-P | 2076228  |
|  | Collet metal for hollow shaft, shaft diameter 8 mm, outer diameter 5/8" (15.875 mm), metal               | SPZ-58Z-008-M | 2076219  |
|  | Collet plastic insulated for hollow shaft, shaft diameter 8 mm, outer diameter 5/8" (15.875 mm), plastic | SPZ-58Z-008-P | 2076229  |
|  | Collet metal for hollow shaft, shaft diameter 10 mm, outer diameter 5/8" (15.875 mm), metal              | SPZ-58Z-010-M | 2076220  |

|                                                                                     | Brief description                                                                                                   | Type           | Part no. |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|----------------|----------|
|    | Collet plastic insulated for hollow shaft, shaft diameter 10 mm, outer diameter 5/8" (15.875 mm), plastic           | SPZ-58Z-010-P  | 2076230  |
|    | Collet metal for hollow shaft, shaft diameter 11 mm, outer diameter 5/8" (15.875 mm), metal                         | SPZ-58Z-011-M  | 2094671  |
|    | Collet metal for hollow shaft, shaft diameter 12 mm, outer diameter 5/8" (15.875 mm), metal                         | SPZ-58Z-012-M  | 2076221  |
|    | Collet plastic insulated for hollow shaft, shaft diameter 12 mm, outer diameter 5/8" (15.875 mm), plastic           | SPZ-58Z-012-P  | 2076231  |
|    | Collet metal for hollow shaft, shaft diameter 14 mm, outer diameter 5/8" (15.875 mm), metal                         | SPZ-58Z-014-M  | 2076222  |
|    | Collet plastic insulated for hollow shaft, shaft diameter 14 mm, outer diameter 5/8" (15.875 mm), plastic           | SPZ-58Z-014-P  | 2076232  |
|    | Collet metal for hollow shaft, shaft diameter 15 mm, outer diameter 5/8" (15.875 mm), metal                         | SPZ-58Z-015-M  | 2076223  |
|    | Collet plastic insulated for hollow shaft, shaft diameter 15 mm, outer diameter 5/8" (15.875 mm), plastic           | SPZ-58Z-015-P  | 2076233  |
|  | Collet metal for hollow shaft, shaft diameter 1/2" (12.7 mm), outer diameter 5/8" (15.875 mm), metal                | SPZ-58Z-12Z-M  | 2076225  |
|  | Collet plastic insulated for hollow shaft, shaft diameter 1/2" (12.7 mm), outer diameter 5/8" (15.875 mm), plastic  | SPZ-58Z-12Z-P  | 2076227  |
|  | Collet metal for hollow shaft, shaft diameter 3/8" (9.525 mm), outer diameter 5/8" (15.875 mm), metal               | SPZ-58Z-38Z-M  | 2076224  |
|  | Collet plastic insulated for hollow shaft, shaft diameter 3/8" (9.525 mm), outer diameter 5/8" (15.875 mm), plastic | SPZ-58Z-38Z-P  | 2076226  |
| Plug connectors and cables                                                          |                                                                                                                     |                |          |
|  | Head A: cable<br>Head B: Flying leads<br>Cable: SSI, Incremental, HIPERFACE®, PUR, halogen-free, shielded           | LTG-2308-MWENC | 6027529  |
|  | Head A: cable<br>Head B: Flying leads<br>Cable: SSI, Incremental, PUR, shielded                                     | LTG-2411-MW    | 6027530  |
|  | Head A: cable<br>Head B: Flying leads<br>Cable: SSI, Incremental, PUR, halogen-free, shielded                       | LTG-2512-MW    | 6027531  |
|  | Head A: cable<br>Head B: Flying leads<br>Cable: SSI, TTL, HTL, Incremental, PUR, halogen-free, shielded             | LTG-2612-MW    | 6028516  |
|  | Head A: male connector, M12, 8-pin, straight, A-coded<br>Head B: -<br>Cable: Incremental, shielded                  | STE-1208-GA01  | 6044892  |
|  | Head A: male connector, M23, 12-pin, straight<br>Head B: -<br>Cable: HIPERFACE®, SSI, Incremental, shielded         | STE-2312-G01   | 2077273  |

|                                                                                   | Brief description | Type        | Part no. |
|-----------------------------------------------------------------------------------|-------------------|-------------|----------|
|  |                   | STE-2312-GX | 6028548  |

## 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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