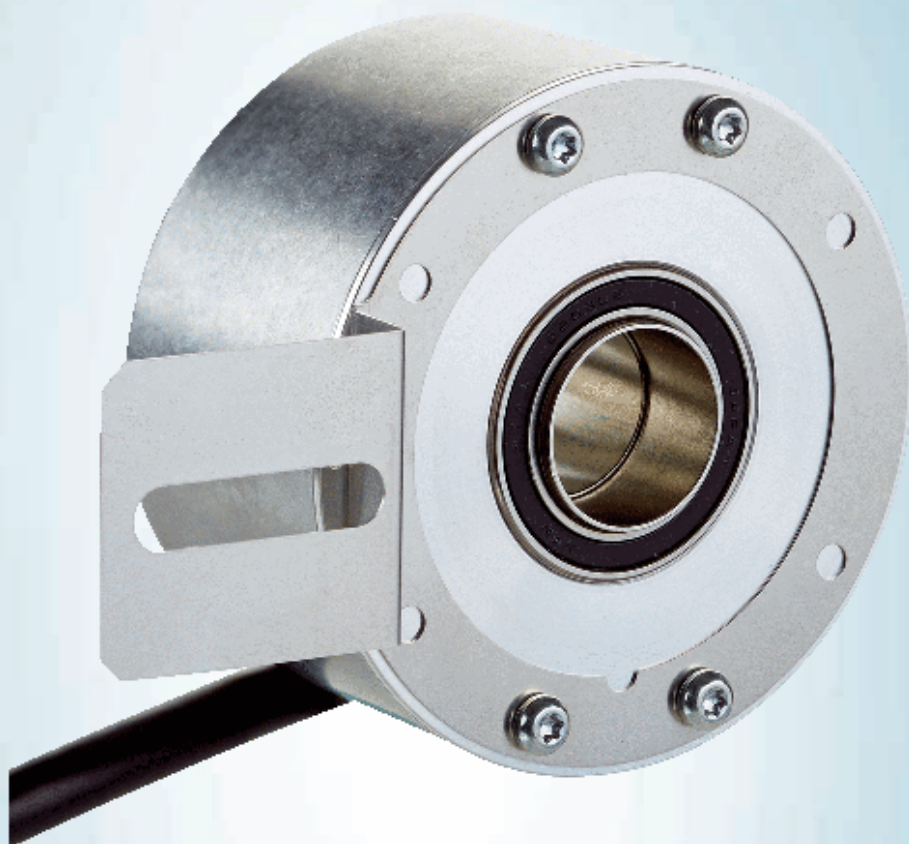




# DBS60E-RFFJD1024

DBS60

INCREMENTAL ENCODERS

**SICK**  
Sensor Intelligence.

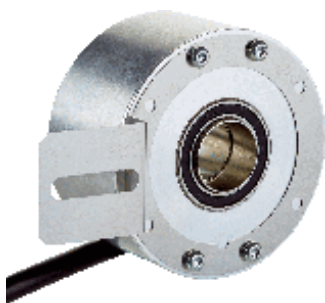


Illustration may differ

## Ordering information

| Type             | part no.   |
|------------------|------------|
| DBS60E-RFFJD1024 | On request |

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

## Detailed technical data

### Safety-related parameters

|                                                          |                                          |
|----------------------------------------------------------|------------------------------------------|
| <b>MTTF<sub>D</sub> (mean time to dangerous failure)</b> | 500 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>    | 1,024                                 |
| <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 / HTL / HTL <sup>1)</sup> |
| <b>Number of signal channels</b>      | 6-channel                     |
| <b>Initialization time</b>            | < 5 ms <sup>2)</sup>          |
| <b>Output frequency</b>               | + 300 kHz <sup>3)</sup>       |
| <b>Load current</b>                   | ≤ 30 mA, per channel          |
| <b>Power consumption</b>              | ≤ 0.5 W (without load)        |

<sup>1)</sup> Output level depends on the supply voltage.

<sup>2)</sup> Valid signals can be read once this time has elapsed.

<sup>3)</sup> Up to 450 kHz on request.

### Electronics

|                                   |                                               |
|-----------------------------------|-----------------------------------------------|
| <b>Connection type</b>            | Cable, 8-wire, universal, 0.5 m <sup>1)</sup> |
| <b>Supply voltage</b>             | 4.5 ... 30 V                                  |
| <b>Reference signal, number</b>   | 1                                             |
| <b>Reference signal, position</b> | 90°, electric, logically gated with A and B   |

<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, US or GND permissible for maximum 30 s.

|                                         |                 |
|-----------------------------------------|-----------------|
| Reverse polarity protection             | ✓               |
| Short-circuit protection of the outputs | ✓ <sup>2)</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, US or GND permissible for maximum 30 s.

## Mechanics

|                                |                                                                      |
|--------------------------------|----------------------------------------------------------------------|
| Mechanical design              | Through hollow shaft                                                 |
| Shaft diameter                 | 1/2"Rear clamping                                                    |
| Flange type / stator coupling  | 1-sided stator coupling, slot, screw hole circle radius 31.5–48.5 mm |
| Weight                         | + 0.25 kg <sup>1)</sup>                                              |
| Shaft material                 | Stainless steel                                                      |
| Flange material                | Aluminum                                                             |
| Housing material               | Aluminum                                                             |
| Material, cable                | PVC                                                                  |
| Start up torque                | + 0.5 Ncm (+20 °C)                                                   |
| Operating torque               | 0.4 Ncm (+20 °C)                                                     |
| Permissible movement static    | ± 0.3 mm (radial)<br>± 0.5 mm (axial) <sup>2)</sup>                  |
| Permissible movement dynamic   | ± 0.1 mm (radial)<br>± 0.2 mm (axial) <sup>2)</sup>                  |
| Operating speed                | 6,000 min <sup>-1</sup> <sup>3)</sup>                                |
| Maximum operating speed        | 9,000 min <sup>-1</sup> <sup>4)</sup>                                |
| Moment of inertia of the rotor | 50 gcm <sup>2</sup>                                                  |
| Bearing lifetime               | 3.6 x 10 <sup>9</sup> revolutions                                    |
| Angular acceleration           | ≤ 500,000 rad/s <sup>2</sup>                                         |

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

<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

|                               |                                                                          |
|-------------------------------|--------------------------------------------------------------------------|
| EMC                           | According to EN 61000-6-2 and EN 61000-6-3                               |
| Enclosure rating              | IP65, housing side (IEC 60529)<br>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 <sup>1)</sup> |
| 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)                                  |

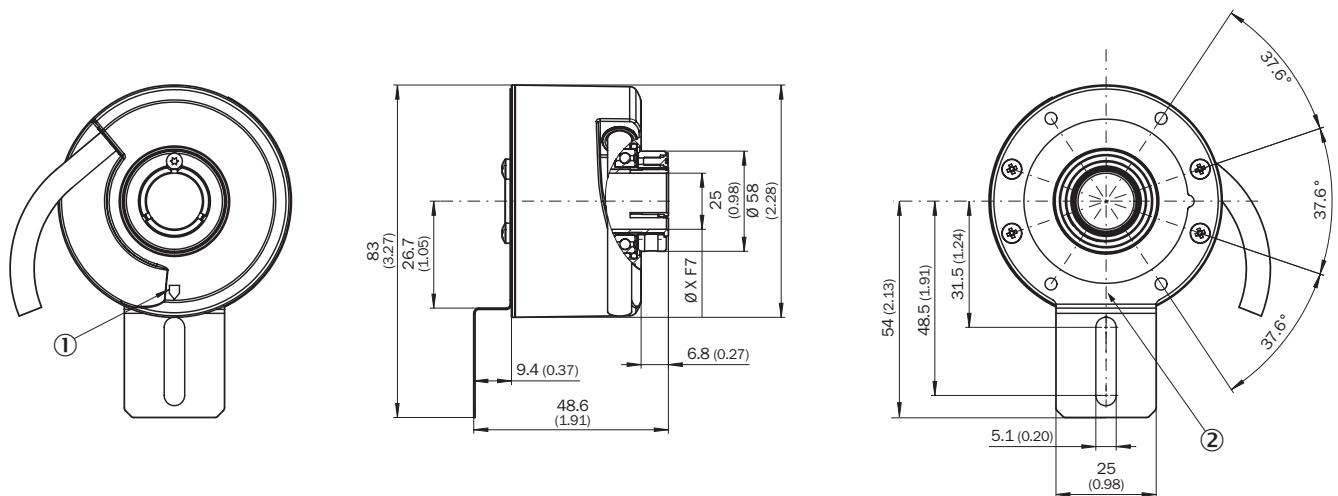
<sup>1)</sup> These values relate to all mechanical versions including recommended accessories unless otherwise noted.

## Classifications

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

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

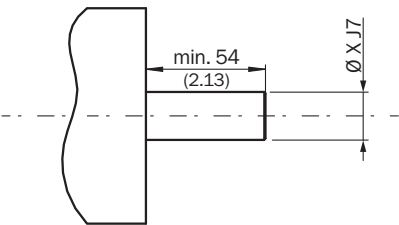
① Zero pulse mark on housing

② zero pulse mark on flange under stator coupling

| TypeThrough hollow shaft with rear clamping | Shaft diameter XF7 |
|---------------------------------------------|--------------------|
| DBS60x-RAxxxxxxxDBS60x-R1xxxxxxx            | 6 mm               |
| DBS60x-RBxxxxxxxDBS60x-R2xxxxxxx            | 8 mm               |
| DBS60x-RCxxxxxxxDBS60x-R3xxxxxxx            | 3/8"               |
| DBS60x-RDxxxxxxxDBS60x-R4xxxxxxx            | 10 mm              |
| DBS60x-RExxxxxxxDBS60x-R5xxxxxxx            | 12 mm              |
| DBS60x-RFxxxxxxxDBS60x-R6xxxxxxx            | 1/2"               |
| DBS60x-RGxxxxxxxDBS60x-R7xxxxxxx            | 14 mm              |
| DBS60x-RHxxxxxxxDBS60x-R8xxxxxxx            | 15 mm              |

| TypeThrough hollow shaft with rear clamping | Shaft diameter XF7 |
|---------------------------------------------|--------------------|
| DBS60x-RJxxxxxxxx                           | 5/8"               |
| -                                           |                    |

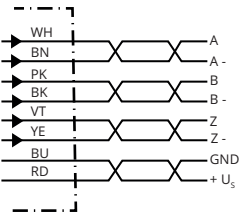
Attachment specifications Through hollow shaft with rear clamping



customer side

| TypeThrough hollow shaft with rear clamping | Shaft diameter xj7 |
|---------------------------------------------|--------------------|
| DBS60x-RAxxxxxxxxDBS60x-R1xxxxxxxx          | 6 mm               |
| DBS60x-RBxxxxxxxxDBS60x-R2xxxxxxxx          | 8 mm               |
| DBS60x-RCxxxxxxxxDBS60x-R3xxxxxxxx          | 3/8"               |
| DBS60x-RDxxxxxxxxDBS60x-R4xxxxxxxx          | 10 mm              |
| DBS60x-RExxxxxxxxDBS60x-R5xxxxxxxx          | 12 mm              |
| DBS60x-RFxxxxxxxxDBS60x-R6xxxxxxxx          | 1/2"               |
| DBS60x-RGxxxxxxxxDBS60x-R7xxxxxxxx          | 14 mm              |
| DBS60x-RHxxxxxxxxDBS60x-R8xxxxxxxx          | 15 mm              |
| DBS60x-RJxxxxxxxx                           | 5/8"               |
| -                                           |                    |

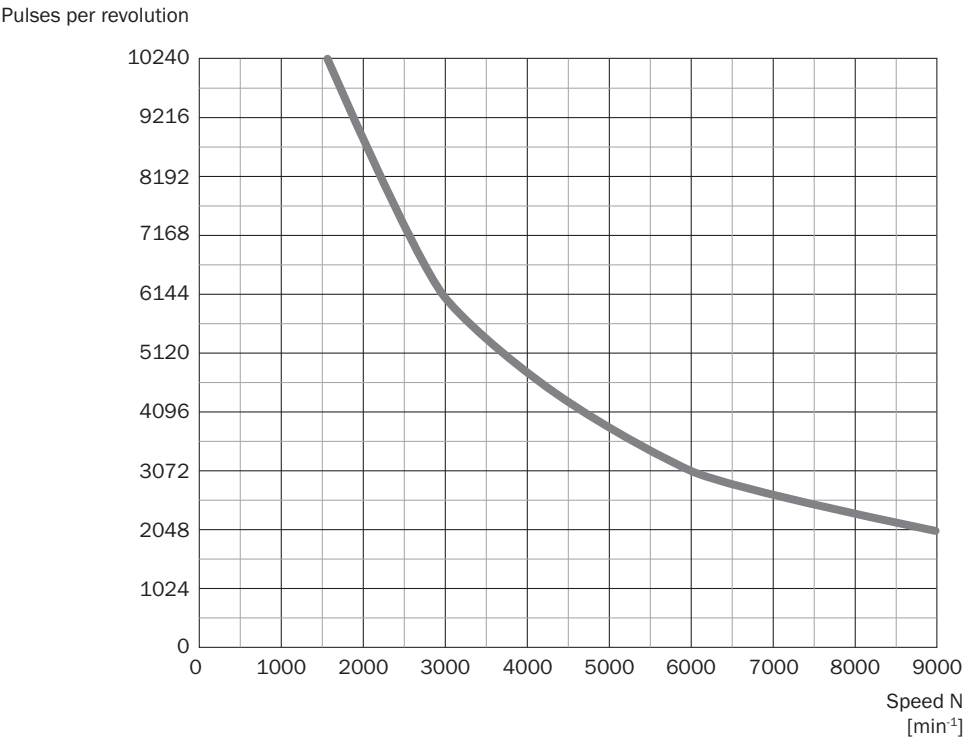
PIN assignment



| 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       |
| Purple                         | 6                         | 3                          | Z                        | Signal wire       |
| Blue                           | 7                         | 10                         | GND                      | Ground connection |
| Red                            | 8                         | 12                         | +Us                      | Supply voltage    |

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



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               |

### Recommended accessories

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

|                                                                                     | Brief description                                                                                                                                                                                                                                                                                                                                                                                                   | Type           | part no. |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------|
| connectors and cables                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                     |                |          |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Flying leads</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> SSI, Incremental, HIPERFACE®</li> <li>• <b>Items supplied:</b> By the meter</li> <li>• <b>Cable:</b> 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> SSI, shielded, Incremental, HIPERFACE®</li> </ul>                          | LTG-2308-MWENC | 6027529  |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Flying leads</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> SSI, Incremental</li> <li>• <b>Items supplied:</b> By the meter</li> <li>• <b>Cable:</b> 11-wire, PUR</li> <li>• <b>Description:</b> SSI, shielded, Incremental</li> </ul>                                                               | LTG-2411-MW    | 6027530  |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Flying leads</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> SSI, Incremental</li> <li>• <b>Items supplied:</b> By the meter</li> <li>• <b>Cable:</b> 12-wire, PUR, halogen-free</li> <li>• <b>Description:</b> SSI, shielded, Incremental</li> </ul>                                                 | LTG-2512-MW    | 6027531  |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Flying leads</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> SSI, TTL, HTL, Incremental</li> <li>• <b>Items supplied:</b> By the meter</li> <li>• <b>Cable:</b> 12-wire, UV and saltwater-resistant, PUR, halogen-free</li> <li>• <b>Description:</b> SSI, shielded, TTL, HTL, Incremental</li> </ul> | LTG-2612-MW    | 6028516  |
|   | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Male connector, M23, 12-pin, straight, A-coded</li> <li>• <b>Signal type:</b> HIPERFACE®, SSI, Incremental</li> <li>• <b>Description:</b> HIPERFACE®, shieldedSSIIncremental</li> <li>• <b>Connection systems:</b> Solder connection</li> </ul>                                                                                             | STE-2312-G01   | 2077273  |
|  | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Male connector, M23, 12-pin, straight, A-coded</li> <li>• <b>Signal type:</b> HIPERFACE®, SSI, Incremental</li> <li>• <b>Description:</b> HIPERFACE®, shieldedSSIIncremental</li> <li>• <b>Connection systems:</b> Solder connection</li> </ul>                                                                                             | STE-2312-GX    | 6028548  |
|  | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Male connector, M12, 8-pin, straight, A-coded</li> <li>• <b>Signal type:</b> Incremental</li> <li>• <b>Cable:</b> CAT5, CAT5e</li> <li>• <b>Description:</b> Incremental, shielded</li> <li>• <b>Connection systems:</b> IDC quick connection</li> <li>• <b>Permitted cross-section:</b> 0.14 mm² ... 0.34 mm²</li> </ul>                   | STE-1208-GA01  | 6044892  |



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