

## DBS60E-TJFJK0060

DBS60

INCREMENTAL ENCODERS

**SICK**  
Sensor Intelligence.



## Ordering information

| Type            | part no. |
|-----------------|----------|
| DBS60E-TJJK0060 | 1140540  |

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

Illustration may differ



## 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>    | 60                                    |
| <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                                  |

<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.

|  |   |
|--|---|
| <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>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

|                                       |   |
|---------------------------------------|---|
| <b>Mechanical design</b>              | Through hollow shaft  |
| <b>Shaft diameter</b>                 | 5/8"Front clamp   |
| <b>Flange type / stator coupling</b>  | Without stator coupling, flange with 3 x M3, 3 x M4, axial register pin mounting, for 4 mm register pin |
| <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 movement static</b>    | ± 0.3 mm (radial)<br>± 0.5 mm (axial) <sup>2)</sup>   |
| <b>Permissible movement dynamic</b>   | ± 0.1 mm (radial)<br>± 0.2 mm (axial) <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 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

|                                      |  |
|--------------------------------------|--|
| <b>EMC</b>                           | According to EN 61000-6-2 and EN 61000-6-3                               |
| <b>Enclosure rating</b>              | IP65, housing side (IEC 60529)<br>IP65, shaft side (IEC 60529)           |
| <b>Permissible relative humidity</b> | 90 % (Condensation not permitted)  |
| <b>Operating temperature range</b>   | -30 °C ... +100 °C, at maximum 3,000 pulses per revolution <sup>1)</sup> |
| <b>Storage temperature range</b>     | -40 °C ... +100 °C, without package                                      |
| <b>Resistance to shocks</b>          | 250 g, 3 ms (EN 60068-2-27)  |
| <b>Resistance to vibration</b>       | 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.

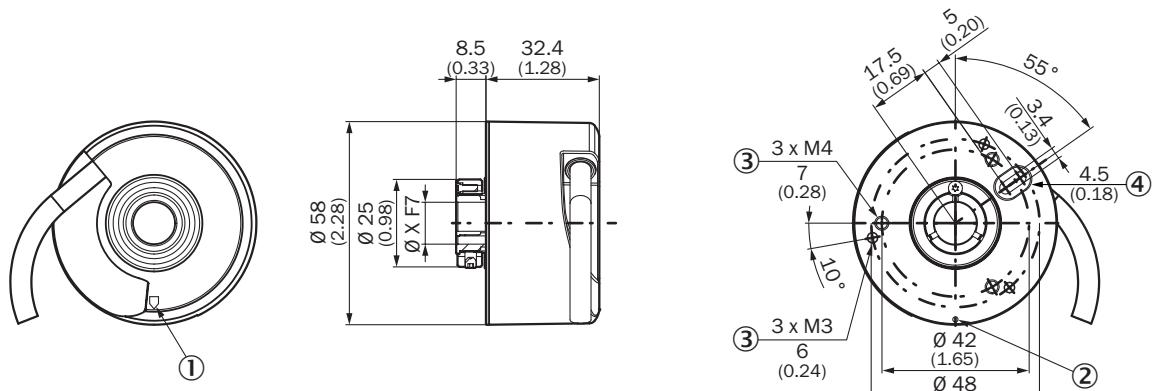
## Certificates

|  |   |
|--|---|
| <b>EU declaration of conformity</b>  | ✓ |
| <b>UK declaration of conformity</b>  | ✓ |
| <b>ACMA 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)

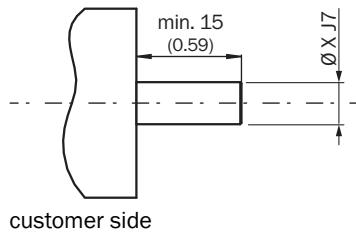
XF7 values see shaft diameter table for through hollow shaft, clamping at the front

(1) Zero pulse mark on housing

- ② Zero pulse mark on flange
- ③ depth
- ④ rubber insert, material: NBR

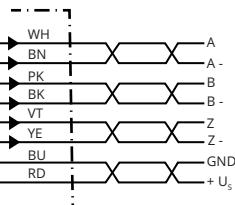
| Type                           | Through hollow shaft with front clamping | Shaft diameter XF7 |
|--------------------------------|--|--------------------|
| DBS60x-TAxxxxxxDBS60x-T1xxxxxx |  | 6 mm               |
| DBS60x-TBxxxxxxDBS60x-T2xxxxxx |  | 8 mm               |
| DBS60x-TCxxxxxxDBS60x-T3xxxxxx |  | 3/8"               |
| DBS60x-TDxxxxxxDBS60x-T4xxxxxx |  | 10 mm              |
| DBS60x-TExxxxxxDBS60x-T5xxxxxx |  | 12 mm              |
| DBS60x-TFxxxxxxDBS60x-T6xxxxxx |  | 1/2"               |
| DBS60x-TGxxxxxxDBS60x-T7xxxxxx |  | 14 mm              |
| DBS60x-THxxxxxxDBS60x-T8xxxxxx |  | 15 mm              |
| DBS60x-TJxxxxxx                |  | 5/8"               |
|                                |  | -                  |

#### Attachment specifications Through hollow shaft with front clamping



| Type                           | Through hollow shaft with front clamping | Shaft diameter xj7 |
|--------------------------------|--|--------------------|
| DBS60x-TAxxxxxxDBS60x-T1xxxxxx |  | 6 mm               |
| DBS60x-TBxxxxxxDBS60x-T2xxxxxx |  | 8 mm               |
| DBS60x-TCxxxxxxDBS60x-T3xxxxxx |  | 3/8"               |
| DBS60x-TDxxxxxxDBS60x-T4xxxxxx |  | 10 mm              |
| DBS60x-TExxxxxxDBS60x-T5xxxxxx |  | 12 mm              |
| DBS60x-TFxxxxxxDBS60x-T6xxxxxx |  | 1/2"               |
| DBS60x-TGxxxxxxDBS60x-T7xxxxxx |  | 14 mm              |
| DBS60x-THxxxxxxDBS60x-T8xxxxxx |  | 15 mm              |
| DBS60x-TJxxxxxx                |  | 5/8"               |
|                                |  | -                  |

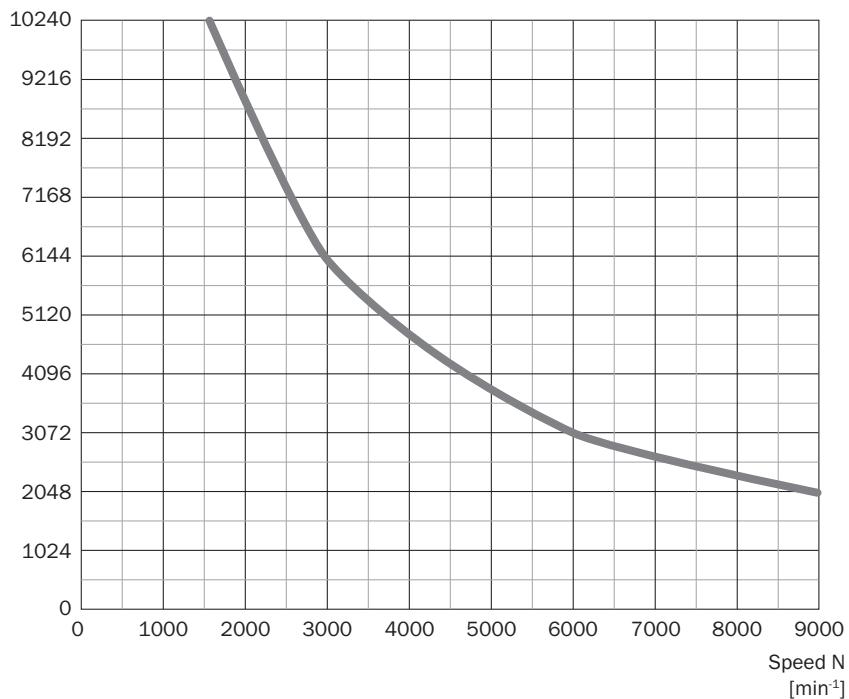
#### PIN assignment



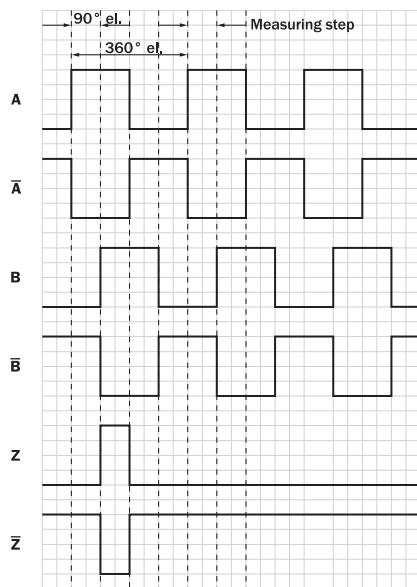
| Wire colors (cable connection) | Male connector M12, 8-pin | Male connector M23, 12-pin | TTL/HTL 6-channel signal | Explanation                         |
|--------------------------------|---------------------------|----------------------------|--------------------------|-------------------------------------|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

## Diagrams

Pulses per revolution



## 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  |

|   | Brief description  | Type          | part no. |
|---|--|---------------|----------|
| shaft adaptation  |  |               |          |
|    | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 11 mm, outer diameter 5/8" (15.875 mm)</li></ul>                              | SPZ-58Z-011-M | 2094671  |
|    | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 15 mm, outer diameter 5/8" (15.875 mm)</li></ul>           | SPZ-58Z-015-P | 2076233  |
|    | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 14 mm, outer diameter 5/8" (15.875 mm)</li></ul>           | SPZ-58Z-014-P | 2076232  |
|    | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 12 mm, outer diameter 5/8" (15.875 mm)</li></ul>           | SPZ-58Z-012-P | 2076231  |
|    | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 10 mm, outer diameter 5/8" (15.875 mm)</li></ul>           | SPZ-58Z-010-P | 2076230  |
|    | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 8 mm, outer diameter 5/8" (15.875 mm)</li></ul>            | SPZ-58Z-008-P | 2076229  |
|   | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 6 mm, outer diameter 5/8" (15.875 mm)</li></ul>            | SPZ-58Z-006-P | 2076228  |
|  | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 1/2" (12.7 mm), outer diameter 5/8" (15.875 mm)</li></ul>  | SPZ-58Z-12Z-P | 2076227  |
|  | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 3/8" (9.525 mm), outer diameter 5/8" (15.875 mm)</li></ul> | SPZ-58Z-38Z-P | 2076226  |
|  | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 1/2" (12.7 mm), outer diameter 5/8" (15.875 mm)</li></ul>                     | SPZ-58Z-12Z-M | 2076225  |
|  | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 3/8" (9.525 mm), outer diameter 5/8" (15.875 mm)</li></ul>                    | SPZ-58Z-38Z-M | 2076224  |
|  | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 15 mm, outer diameter 5/8" (15.875 mm)</li></ul>                              | SPZ-58Z-015-M | 2076223  |
|  | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 14 mm, outer diameter 5/8" (15.875 mm)</li></ul>                              | SPZ-58Z-014-M | 2076222  |
|  | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 12 mm, outer diameter 5/8" (15.875 mm)</li></ul>                              | SPZ-58Z-012-M | 2076221  |
|  | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 10 mm, outer diameter 5/8" (15.875 mm)</li></ul>                              | SPZ-58Z-010-M | 2076220  |
|  | <ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 8 mm, outer diameter 5/8" (15.875 mm)</li></ul>                               | SPZ-58Z-008-M | 2076219  |



## 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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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."**

## WORLDWIDE PRESENCE:

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