



# DBS60E-R5CA00100

DBS60

**INCREMENTAL ENCODERS**

**SICK**  
Sensor Intelligence.



Illustration may differ

### Ordering information

| Type             | part no.   |
|------------------|------------|
| DBS60E-R5CA00100 | 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>    | 100                                   |
| <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>Power consumption</b>              | ≤ 0.5 W (without load)  |

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

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

#### Electronics

|                                    |                                             |
|------------------------------------|---------------------------------------------|
| <b>Connection type</b>             | Male connector, M23, 12-pin, radial         |
| <b>Supply voltage</b>              | 10 ... 30 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> | ✓                                           |

<sup>1)</sup> Short-circuit opposite to another channel or GND permissible for max. 60 s. No protection signal against U<sub>S</sub>.

**Short-circuit protection of the outputs** ✓ <sup>1)</sup>

<sup>1)</sup> Short-circuit opposite to another channel or GND permissible for max. 60 s. No protection signal against  $U_S$ .

**Mechanics**

|                                       |                                                           |
|---------------------------------------|-----------------------------------------------------------|
| <b>Mechanical design</b>              | Through hollow shaft                                      |
| <b>Shaft diameter</b>                 | 12 mmRear clamping                                        |
| <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 with plastic shaft                        |
| <b>Flange material</b>                | Aluminum                                                  |
| <b>Housing material</b>               | Aluminum                                                  |
| <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>           | ≤ 200,000 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) <sup>1)</sup><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>2)</sup>     |
| <b>Storage temperature range</b>     | –40 °C ... +100 °C, without package                                          |
| <b>Resistance to shocks</b>          | 200 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> With mating connector fitted.

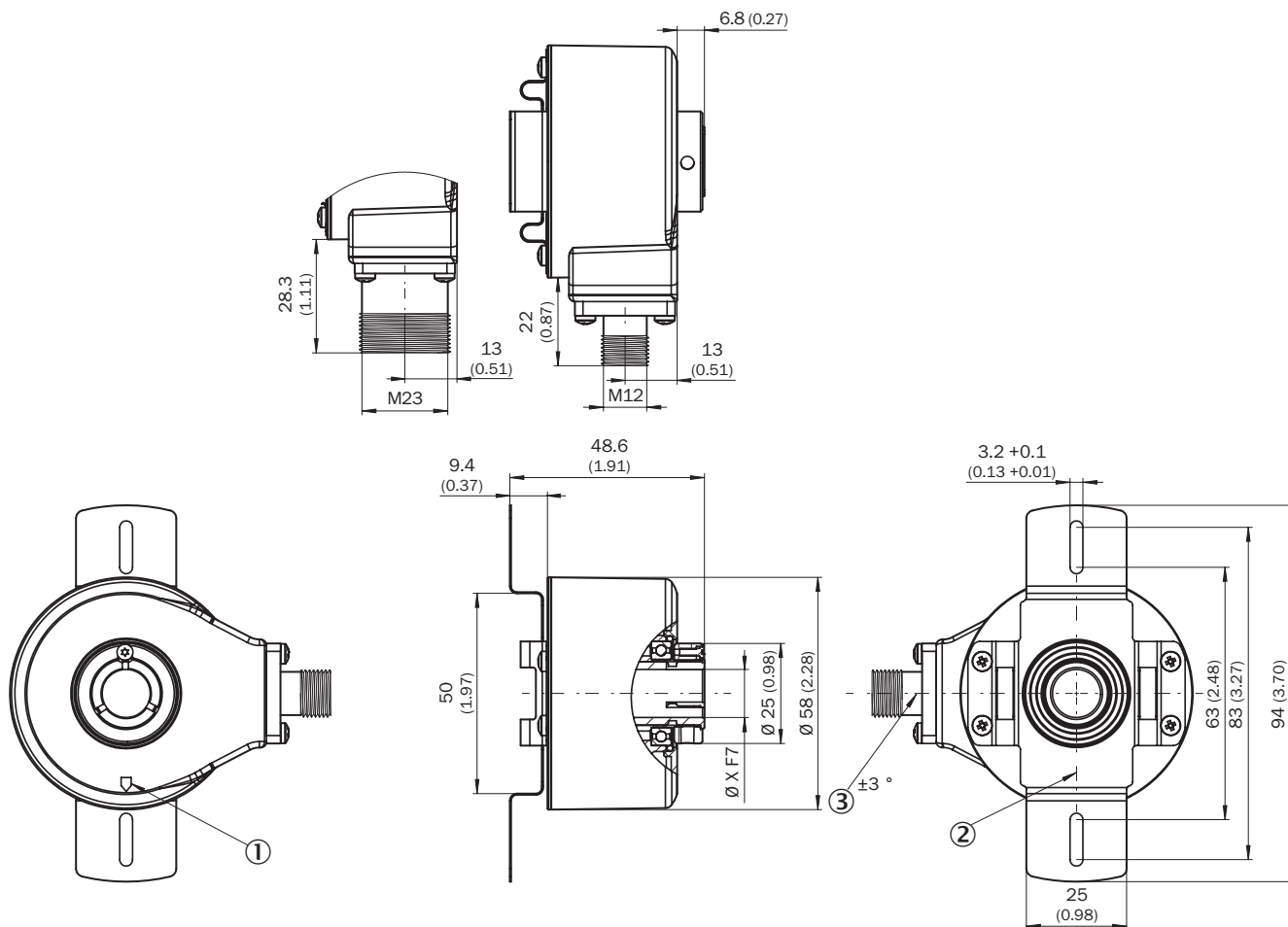
<sup>2)</sup> These values relate to all mechanical versions including recommended accessories unless otherwise noted.

**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

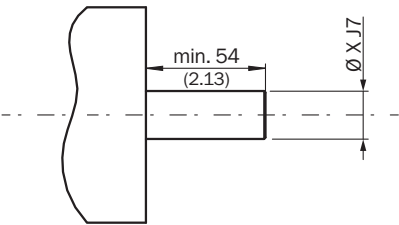


Dimensions in mm (inch)

- ① Zero pulse mark on housing
- ② zero pulse mark on flange under stator coupling
- ③ male connector tolerance in relation to hole pattern

| 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              |
| DBS60x-RJxxxxxxx                            | 5/8"               |
| -                                           |                    |

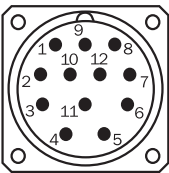
Attachment specifications Through hollow shaft with rear clamping



customer side

| TypeThrough hollow shaft with rear clamping | Shaft diameter xj7 |
|---------------------------------------------|--------------------|
| 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              |
| DBS60x-RJxxxxxxx                            | 5/8"               |
| -                                           |                    |

PIN assignment

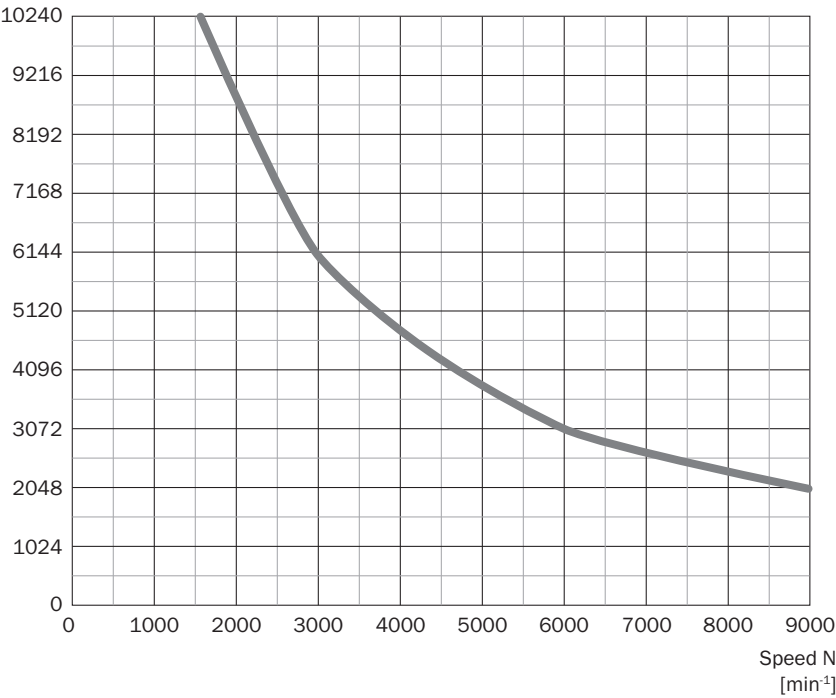


view of M23 male device connector on cable / housing

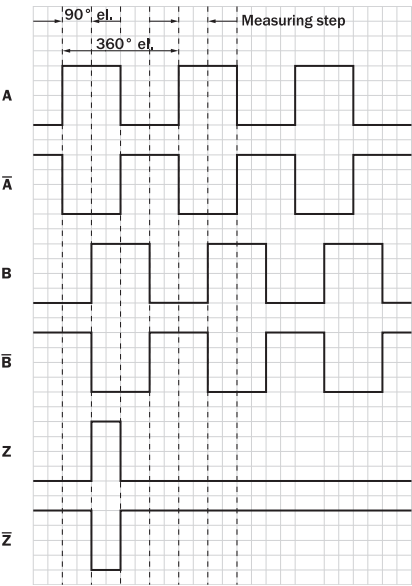
| Wire colors (cable connection) | Male connector M12, 8-pin | Male connector M23, 12-pin | TTL/HTL 6-channel signal | Explanation                         |
|--------------------------------|---------------------------|----------------------------|--------------------------|-------------------------------------|
| Brown                          | 1                         | 6                          | A-                       | Signal wire                         |
| 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> Female connector, M23, 12-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental</li> <li>• <b>Cable:</b> 30 m, 11-wire, PUR</li> <li>• <b>Description:</b> Incremental, shielded</li> </ul>                                                                                       | DOL-2312-G30MLA3 | 2030702  |
|  | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M23, 12-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental</li> <li>• <b>Cable:</b> 25 m, 11-wire, PUR</li> <li>• <b>Description:</b> Incremental, shielded</li> </ul>                                                                                       | DOL-2312-G25MLA3 | 2030699  |
|  | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M23, 12-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental</li> <li>• <b>Cable:</b> 20 m, 11-wire, PUR</li> <li>• <b>Description:</b> Incremental, shielded</li> </ul>                                                                                       | DOL-2312-G20MLA3 | 2030695  |
|  | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M23, 12-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental</li> <li>• <b>Cable:</b> 15 m, 11-wire, PUR</li> <li>• <b>Description:</b> Incremental, shielded</li> </ul>                                                                                       | DOL-2312-G15MLA3 | 2030692  |
|  | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M23, 12-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental</li> <li>• <b>Cable:</b> 10 m, 11-wire, PUR</li> <li>• <b>Description:</b> Incremental, shielded</li> </ul>                                                                                       | DOL-2312-G10MLA3 | 2030688  |
|  | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M23, 12-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental</li> <li>• <b>Cable:</b> 7 m, 11-wire, PUR</li> <li>• <b>Description:</b> Incremental, shielded</li> </ul>                                                                                        | DOL-2312-G07MLA3 | 2030685  |
|  | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M23, 12-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental</li> <li>• <b>Cable:</b> 2 m, 11-wire, PUR</li> <li>• <b>Description:</b> Incremental, shielded</li> </ul>                                                                                        | DOL-2312-G02MLA3 | 2030682  |
|  | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M23, 12-pin, angled, A-coded</li> <li>• <b>Signal type:</b> HIPERFACE®, SSI, Incremental</li> <li>• <b>Description:</b> HIPERFACE®, shieldedSSIIncremental</li> </ul>                                                                                                                                                     | DOS-2312-W01     | 2072580  |



|                                                                                   | Brief description                                                                                                                                                                                                                                                                                                                                                                                 | Type         | part no. |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|
|  | <ul style="list-style-type: none"><li>• <b>Connection systems:</b> Solder connection</li><li>• <b>Connection type head A:</b> Female connector, M23, 12-pin, straight, A-coded</li><li>• <b>Signal type:</b> HIPERFACE<sup>®</sup>, SSI, Incremental</li><li>• <b>Description:</b> HIPERFACE<sup>®</sup>, shieldedSSIIncremental</li><li>• <b>Connection systems:</b> Solder connection</li></ul> |              |          |
|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                   | DOS-2312-G02 | 2077057  |

## 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.”

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