



# DBV50E-22EMA1000

DBV50

MEASURING WHEEL ENCODERS

**SICK**  
Sensor Intelligence.



Illustration may differ



### Ordering information

| Type             | part no. |
|------------------|----------|
| DBV50E-22EMA1000 | 1081894  |

Other models and accessories → [www.sick.com/DBV50](http://www.sick.com/DBV50)

### Detailed technical data

#### Safety-related parameters

|                                                          |                                          |
|----------------------------------------------------------|------------------------------------------|
| <b>MTTF<sub>D</sub> (mean time to dangerous failure)</b> | 600 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>                        | 1,000                                                      |
| <b>Resolution in pulses/mm</b>                      | 5                                                          |
| <b>Measuring increment (resolution in mm/pulse)</b> | 0.2                                                        |
| <b>Measuring step deviation</b>                     | ± 18° / pulses per revolution                              |
| <b>Error limits</b>                                 | ± 4 mm/m, subject to the measuring wheel (wheel + surface) |
| <b>Duty cycle</b>                                   | ≤ 0.5 ± 5 %                                                |
| <b>Initialization time</b>                          | < 3 ms                                                     |

#### Interfaces

|                                       |                 |
|---------------------------------------|-----------------|
| <b>Communication interface</b>        | Incremental     |
| <b>Communication Interface detail</b> | HTL / Push pull |
| <b>Number of signal channels</b>      | 6-channel       |

#### Electronics

|                                              |                                             |
|----------------------------------------------|---------------------------------------------|
| <b>Operating power consumption (no load)</b> | 50 mA                                       |
| <b>Connection type</b>                       | Cable, 8-wire, universal, 5 m <sup>1)</sup> |
| <b>Power consumption max. without load</b>   | ≤ 0.5 W                                     |
| <b>Supply voltage</b>                        | 7 V ... 30 V                                |
| <b>Load current max.</b>                     | 30 mA                                       |
| <b>Maximum output frequency</b>              | ≤ 300 kHz                                   |
| <b>Reference signal, number</b>              | 1                                           |

<sup>1)</sup> Number of wires depending on electrical interface: Interface A, C, E: 8-wire; Interface G, P, R: 5-wire.

<sup>2)</sup> The short-circuit rating is only given if Us and GND are connected correctly.

|                                                |                                             |
|------------------------------------------------|---------------------------------------------|
| <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> Number of wires depending on electrical interface: Interface A, C, E: 8-wire; Interface G, P, R: 5-wire.

<sup>2)</sup> The short-circuit rating is only given if Us and GND are connected correctly.

## Mechanics

|                                                                            |                                                                   |
|----------------------------------------------------------------------------|-------------------------------------------------------------------|
| <b>Measuring wheel circumference</b>                                       | 200 mm                                                            |
| <b>Measuring wheel surface</b>                                             | O-ring NBR70 <sup>1)</sup>                                        |
| <b>Spring arm design</b>                                                   | 63.5 mm spring arm, encoder on mounting side (left), single wheel |
| <b>Mass</b>                                                                | + 300 g                                                           |
| <b>Encoder material</b>                                                    |                                                                   |
| Shaft                                                                      | Stainless steel                                                   |
| Flange                                                                     | Aluminum                                                          |
| Housing                                                                    | Aluminum                                                          |
| Cable                                                                      | PVC                                                               |
| <b>Spring arm mechanism material</b>                                       |                                                                   |
| Spring element                                                             | Spring steel, anti-corrosive                                      |
| Measuring wheel, spring arm                                                | Aluminum                                                          |
| <b>Start up torque</b>                                                     | 0.9 Ncm (at 20 °C)                                                |
| <b>Operating torque</b>                                                    | 0.6 Ncm (at 20 °C)                                                |
| <b>Operating speed</b>                                                     | 1,500 min <sup>-1</sup>                                           |
| <b>Maximum operating speed</b>                                             | 3,000 min <sup>-1</sup> <sup>2)</sup>                             |
| <b>Bearing lifetime</b>                                                    | 2.0 x 10 <sup>9</sup> revolutions                                 |
| <b>Maximum travel/deflection of spring arm</b>                             | 14 mm at 14 N spring travel                                       |
| <b>Recommended pretension</b>                                              | 15 N At 10 mm deflection <sup>3)</sup>                            |
| <b>Max. permissible working area for the spring (continuous operation)</b> | ± 3 mm                                                            |
| <b>Recommended spring deflection</b>                                       | 2 mm ... 13 mm                                                    |
| <b>Service life of spring element</b>                                      | > 1.4 million cycles <sup>4)</sup>                                |
| <b>Mounting position relative to the measuring object</b>                  | Preferably from above, from below possible <sup>5)</sup>          |

<sup>1)</sup> The surface of a measuring wheel is subject to wear. This depends on contact pressure, acceleration behavior in the application, traversing speed, measurement surface, mechanical alignment of the measuring wheel, temperature, and ambient conditions. We recommend you regularly check the condition of the measuring wheel and replace as required.

<sup>2)</sup> No permanent operation. Decreasing signal quality.

<sup>3)</sup> When measured from the top of the measuring surface.

<sup>4)</sup> One cycle corresponds to an upward and downward movement of ± 3 mm from the recommended pretension position.

<sup>5)</sup> When mounted from below, the encoder weight during spring pretensioning must be taken into account.

## Ambient data

|                                      |                                                      |
|--------------------------------------|------------------------------------------------------|
| <b>EMC</b>                           | According to EN 61000-6-2 and EN 61000-6-3 (class A) |
| <b>Enclosure rating</b>              | IP65                                                 |
| <b>Permissible relative humidity</b> | 90 % (Condensation not permitted)                    |
| <b>Operating temperature range</b>   | -20 °C ... +85 °C<br>-35 °C ... +95 °C (on request)  |

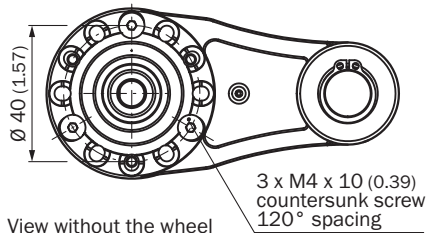
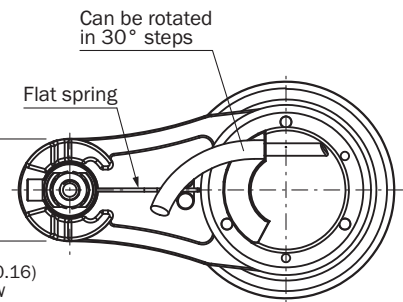
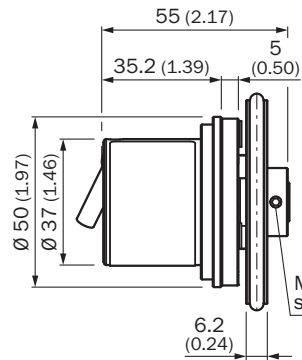
|                                  |                                         |
|----------------------------------|-----------------------------------------|
| <b>Storage temperature range</b> | -40 °C ... +100 °C, without package     |
| <b>Resistance to shocks</b>      | 100 g, 6 ms (EN 60068-2-27)             |
| <b>Resistance to vibration</b>   | 20 g, 10 Hz ... 2,000 Hz (EN 60068-2-6) |

### Certificates

|                                                                              |   |
|------------------------------------------------------------------------------|---|
| <b>EU declaration of conformity</b>                                          | ✓ |
| <b>UK declaration of conformity</b>                                          | ✓ |
| <b>ACMA declaration of conformity</b>                                        | ✓ |
| <b>China RoHS</b>                                                            | ✓ |
| <b>cRUus certificate</b>                                                     | ✓ |
| <b>Information according to Art. 3 of Data Act (Regulation EU 2023/2854)</b> | ✓ |

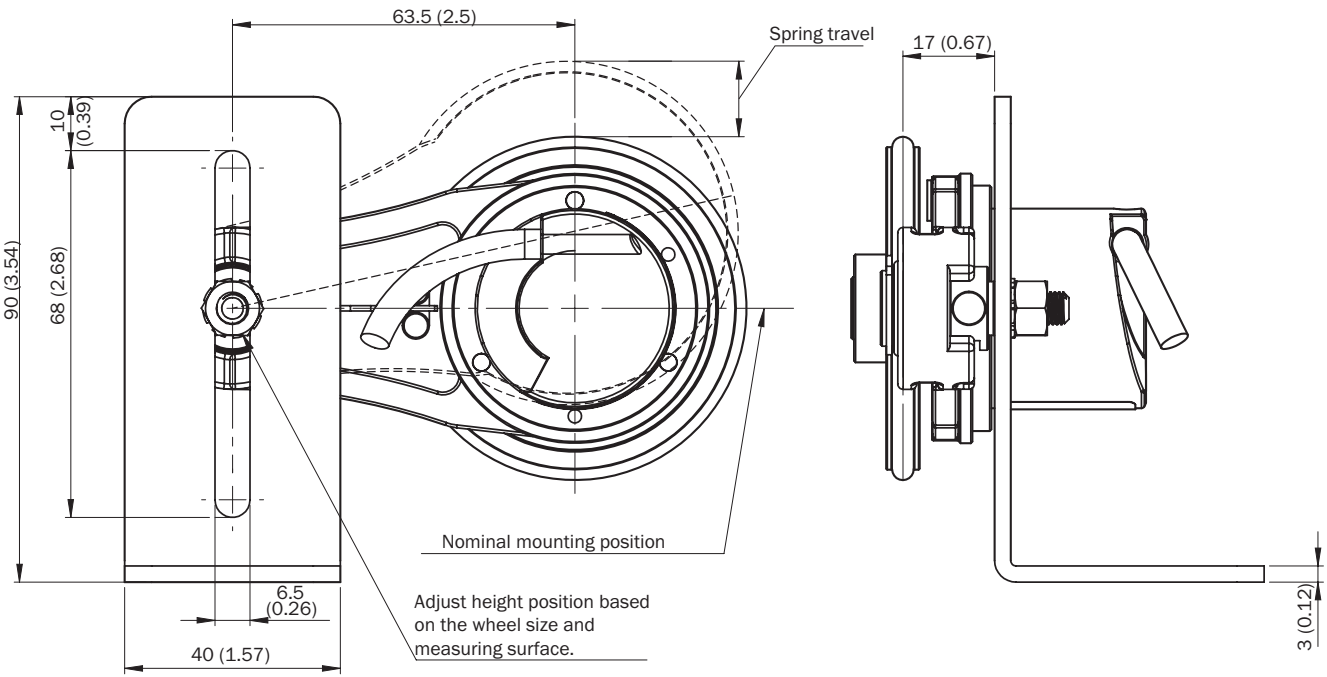
### Classifications

|                       |          |
|-----------------------|----------|
| <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>    | 27270790 |
| <b>ECLASS 11.0</b>    | 27270707 |
| <b>ECLASS 12.0</b>    | 27270504 |
| <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 |

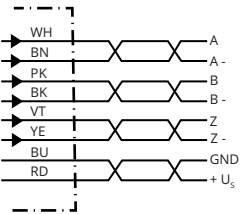


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Attachment specifications



Anschlussbelegung



| 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      |

### Diagrams Force deflection chart with working range



- ① Proposed Pre-tension: 10 mm
- ② Allowed operating travel (continuous operation) +/- 3 mm
- ③ Proposed spring deflection: 2 - 13 mm
- ④ Maximum spring travel: 14 mm

### Diagrams Signal outputs for electrical interfaces TTL and HTL



CW with view on the encoder shaft , compare dimensional drawing.  
 Interfaces G, P, R perform only the channels A, B, Z.

### Recommended accessories

Other models and accessories → [www.sick.com/DBV50](http://www.sick.com/DBV50)

|                                                                                     | Brief description                                                                                                                                                                                                                                                                                                                                                                                                   | Type             | part no. |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------|
| connectors and cables                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                     |                  |          |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental, SSI</li> <li>• <b>Cable:</b> 2 m, 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, shielded, SSI</li> <li>• <b>Connection systems:</b> Flying leads</li> </ul>               | DOL-1208-G02MAC1 | 6032866  |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental, SSI</li> <li>• <b>Cable:</b> 5 m, 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, shielded, SSI</li> <li>• <b>Connection systems:</b> Flying leads</li> </ul>               | DOL-1208-G05MAC1 | 6032867  |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental, SSI</li> <li>• <b>Cable:</b> 10 m, 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, shielded, SSI</li> <li>• <b>Connection systems:</b> Flying leads</li> </ul>              | DOL-1208-G10MAC1 | 6032868  |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental, SSI</li> <li>• <b>Cable:</b> 20 m, 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, shielded, SSI</li> <li>• <b>Connection systems:</b> Flying leads</li> </ul>              | DOL-1208-G20MAC1 | 6032869  |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental, SSI</li> <li>• <b>Cable:</b> 25 m, 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, shielded, SSI</li> <li>• <b>Connection systems:</b> Flying leads</li> </ul>              | DOL-1208-G25MAC1 | 6067859  |
|  | <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, 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  |
|  | <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, RS-422</li> <li>• <b>Description:</b> HIPERFACE®, shieldedSSIIncrementalRS-422</li> </ul>                                                                                                                                       | STE-2312-G       | 6027537  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Brief description                                                                                                                                                                                                                                                                                                                                                                                           | Type           | part no. |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------|
| <br><br><br><br><br> | <ul style="list-style-type: none"> <li>• <b>Connection systems:</b> Solder connection</li> <li>• <b>Connection type head A:</b> Male 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>       | STE-2312-G01   | 2077273  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight, A-coded</li> <li>• <b>Signal type:</b> Incremental, SSI</li> <li>• <b>Cable:</b> CAT5, CAT5e</li> <li>• <b>Description:</b> Incremental, shieldedSSI</li> <li>• <b>Connection systems:</b> IDC quick connection</li> <li>• <b>Permitted cross-section:</b> 0.14 mm² ... 0.34 mm²</li> </ul> | DOS-1208-GA01  | 6045001  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <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-G     | 6027538  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <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  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <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<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-W01   | 2072580  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M23, 9-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-2309-G     | 6028533  |
| measuring wheels and measuring wheel mechanics                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                             |                |          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• <b>Product segment:</b> Measuring wheels and measuring wheel mechanics</li> <li>• <b>Product family:</b> Measuring wheels</li> <li>• <b>Description:</b> Adapter flange for modular measuring wheel system</li> </ul>                                                                                                                                              | BEF-AP-MRS     | 2084969  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• <b>Product segment:</b> Measuring wheels and measuring wheel mechanics</li> <li>• <b>Product family:</b> Measuring wheels</li> <li>• <b>Description:</b> Mounting bracket for encoder with spigot 36 mm</li> </ul>                                                                                                                                                 | BEF-WF-MRS     | 2084709  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• <b>Product segment:</b> Measuring wheels and measuring wheel mechanics</li> <li>• <b>Product family:</b> Measuring wheels</li> <li>• <b>Description:</b> Aluminium measuring wheel with O-ring (NBR70) for 8 mm solid shaft, circumference 200 mm</li> </ul>                                                                                                       | BEF-MR008020R  | 2055223  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>• <b>Product segment:</b> Measuring wheels and measuring wheel mechanics</li> <li>• <b>Product family:</b> Measuring wheel mechanics</li> <li>• <b>Description:</b> O-ring for measuring wheels (circumference 200 mm)</li> </ul>                                                                                                                                    | BEF-OR-053-040 | 2064061  |

## 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.”**

## WORLDWIDE PRESENCE:

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