

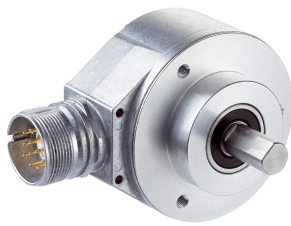


# DFS60B-S4EA00333

DFS60

INCREMENTAL ENCODERS

**SICK**  
Sensor Intelligence.

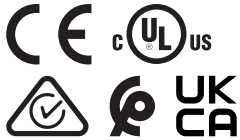


## Ordering information

| Type             | part no. |
|------------------|----------|
| DFS60B-S4EA00333 | 1124775  |

Other models and accessories → [www.sick.com/DFS60](http://www.sick.com/DFS60)

Illustration may differ



## Detailed technical data

## Safety-related parameters

|                                                          |                                          |
|----------------------------------------------------------|------------------------------------------|
| <b>MTTF<sub>D</sub> (mean time to dangerous failure)</b> | 300 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>                                  | 333 <sup>1)</sup>                   |
| <b>Measuring step</b>                                         | 90°, electric/pulses per revolution |
| <b>Measuring step deviation at non binary number of lines</b> | ± 0.01°                             |
| <b>Error limits</b>                                           | ± 0.05°                             |

<sup>1)</sup> See maximum revolution range.

## Interfaces

|                                       |                        |
|---------------------------------------|------------------------|
| <b>Communication interface</b>        | Incremental            |
| <b>Communication Interface detail</b> | HTL / Push pull        |
| <b>Number of signal channels</b>      | 6-channel              |
| <b>Initialization time</b>            | 40 ms                  |
| <b>Output frequency</b>               | ≤ 600 kHz              |
| <b>Load current</b>                   | ≤ 30 mA                |
| <b>Power consumption</b>              | ≤ 0.5 W (without load) |

## Electronics

|                                    |                                             |
|------------------------------------|---------------------------------------------|
| <b>Connection type</b>             | Male connector, M23, 12-pin, radial         |
| <b>Supply voltage</b>              | 10 ... 32 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, US or GND permissible for maximum 30 s.

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

<sup>1)</sup> Short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

## Mechanics

|                                       |                                         |
|---------------------------------------|-----------------------------------------|
| <b>Mechanical design</b>              | Solid shaft, face mount flange          |
| <b>Shaft diameter</b>                 | 10 mm<br>With flat                      |
| <b>Shaft length</b>                   | 19 mm                                   |
| <b>Weight</b>                         | + 0.3 kg                                |
| <b>Shaft material</b>                 | Stainless steel                         |
| <b>Flange material</b>                | Aluminum                                |
| <b>Housing material</b>               | Aluminum die cast                       |
| <b>Start up torque</b>                | 0.5 Ncm (+20 °C)                        |
| <b>Operating torque</b>               | 0.3 Ncm (+20 °C)                        |
| <b>Permissible shaft loading</b>      | 80 N (radial)<br>40 N (axial)           |
| <b>Operating speed</b>                | ≤ 9,000 min <sup>-1</sup> <sup>1)</sup> |
| <b>Moment of inertia of the rotor</b> | 6.2 gcm <sup>2</sup>                    |
| <b>Bearing lifetime</b>               | 3.6 x 10 <sup>10</sup> revolutions      |
| <b>Angular acceleration</b>           | ≤ 500,000 rad/s <sup>2</sup>            |

<sup>1)</sup> Allow for self-heating of 3.3 K per 1,000 rpm when designing the operating temperature range.

## Ambient data

|                                      |                                                                                              |
|--------------------------------------|----------------------------------------------------------------------------------------------|
| <b>EMC</b>                           | According to EN 61000-6-2 and EN 61000-6-4                                                   |
| <b>Enclosure rating</b>              | IP67, Housing side, male connector (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>   | -40 °C ... +100 °C <sup>2)</sup><br>-30 °C ... +100 °C <sup>3)</sup>                         |
| <b>Storage temperature range</b>     | -40 °C ... +100 °C, without package                                                          |
| <b>Resistance to shocks</b>          | 70 g, 6 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> Stationary position of the cable.

<sup>3)</sup> Flexible position of the cable.

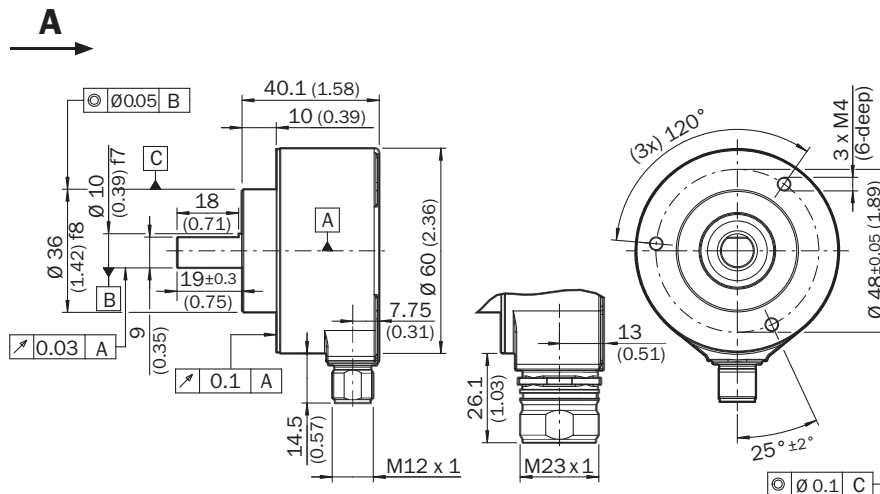
## Certificates

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

## Classifications

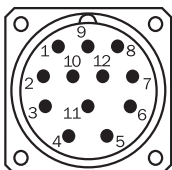
|                       |          |
|-----------------------|----------|
| <b>ECLASS 5.0</b>     | 27270501 |
| <b>ECLASS 5.1.4</b>   | 27270501 |
| <b>ECLASS 6.0</b>     | 27270590 |
| <b>ECLASS 6.2</b>     | 27270590 |
| <b>ECLASS 7.0</b>     | 27270501 |
| <b>ECLASS 8.0</b>     | 27270501 |
| <b>ECLASS 8.1</b>     | 27270501 |
| <b>ECLASS 9.0</b>     | 27270501 |
| <b>ECLASS 10.0</b>    | 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)

## PIN assignment

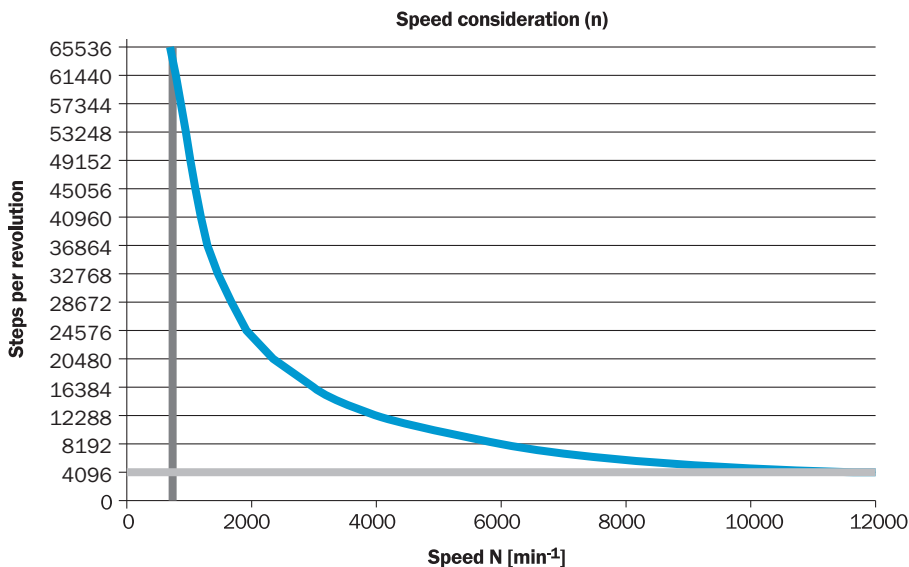


view of M23 male device connector on encoder

| PINMale connector M12, 8-pin | PINMale connector M23, 12-pin | Wire colors (cable connection) | TTL/HTL signal      | Sin/Cos 1.0 V <sub>pp</sub> | Explanation                                                                       |
|------------------------------|-------------------------------|--------------------------------|---------------------|-----------------------------|-----------------------------------------------------------------------------------|
| 1                            | 6                             | Brown                          | $\bar{A}$           | COS-                        | Signal wire                                                                       |
| 2                            | 5                             | White                          | A                   | COS+                        | Signal wire                                                                       |
| 3                            | 1                             | Black                          | $\bar{B}$           | SIN-                        | Signal wire                                                                       |
| 4                            | 8                             | Pink                           | B                   | SIN+                        | Signal wire                                                                       |
| 5                            | 4                             | Yellow                         | $\bar{Z}$           | $\bar{Z}$                   | Signal wire                                                                       |
| 6                            | 3                             | Purple                         | Z                   | Z                           | Signal wire                                                                       |
| 7                            | 10                            | Blue                           | GND                 | GND                         | Ground connection                                                                 |
| 8                            | 12                            | Red                            | +U <sub>S</sub>     | +U <sub>S</sub>             | Supply voltage                                                                    |
| -                            | 9                             | -                              | N.c.                | N.c.                        | Not assigned                                                                      |
| -                            | 2                             | -                              | N.c.                | N.c.                        | Not assigned                                                                      |
| -                            | 11                            | -                              | N.c.                | N.c.                        | Not assigned                                                                      |
| -                            | 7 <sup>1)</sup>               | Orange                         | 0-SET <sup>1)</sup> | N.c.                        | Set zero pulse <sup>1)</sup>                                                      |
| Screen                       | Screen                        | Screen                         | Screen              | Screen                      | Screen connected to housing on encoder side. Connected to ground on control side. |

<sup>1)</sup>For electrical interfaces only: M, U, V, W with 0-SET function on PIN 7 on M23 plug. The 0-SET input is used to set the zero pulse to the current shaft position. If the 0-SET input is applied to U<sub>S</sub> for longer than 250 ms after it has previously been open or applied to GND for at least 1,000 ms, the current shaft position is assigned zero pulse signal "Z".

## maximum revolution range



signal outputs



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 ... 32 V   | TTL    |
| 10 V ... 32 V   | HTL    |

## Recommended accessories

Other models and accessories → [www.sick.com/DFS60](http://www.sick.com/DFS60)

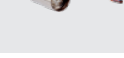
|                                                                                     | Brief description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Type       | part no. |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------|
| shaft adaptation                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |          |
|    | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> <li><b>Description:</b> Bellows coupling, shaft diameter 6 mm / 10 mm, maximum shaft offset: radial <math>\pm 0.25</math> mm, axial <math>\pm 0.4</math> mm, angular <math>\pm 4^\circ</math>; max. speed 10,000 rpm, <math>-30^\circ\text{C}</math> to <math>+120^\circ\text{C}</math>, max. torque 120 Ncm; material: stainless steel bellows, aluminum hub</li> </ul>                                                                                                                              | KUP-0610-B | 5312982  |
|    | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> <li><b>Description:</b> Double loop coupling, shaft diameter 6 mm / 10 mm, max. shaft offset: radially <math>\pm 2.5</math> mm, axially <math>\pm 3</math> mm, angle <math>\pm 10</math> degrees; max. speed 3,000 rpm, <math>-30</math> to <math>+80</math> degrees Celsius, torsional spring stiffness of 25 Nm/rad</li> </ul>                                                                                                                                                                      | KUP-0610-D | 5326697  |
|    | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> <li><b>Description:</b> Spring washer coupling, shaft diameter 6 mm / 10 mm, Maximum shaft offset: radial <math>\pm 0.3</math> mm, axial <math>\pm 0.4</math> mm, angular <math>\pm 2.5^\circ</math>; max. speed 12,000 rpm, <math>-10^\circ</math> to <math>+80^\circ\text{C}</math>, max. torque 60 Ncm; material: aluminum flange, glass fiber-reinforced polyamide membrane and hardened steel coupling pin</li> </ul>                                                                            | KUP-0610-F | 5312985  |
|    | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> <li><b>Description:</b> Bar coupling, shaft diameter 6 mm / 10 mm, max. shaft offset: radial <math>\pm 0.3</math> mm, axial <math>\pm 0.3</math> mm, angular <math>\pm 3^\circ</math>; max. speed 10,000 rpm, <math>-10^\circ</math> to <math>+80^\circ\text{C}</math>, max. torque: 80 Ncm, material: fiber-glass reinforced polyamide, aluminum hub</li> </ul>                                                                                                                                      | KUP-0610-S | 2056407  |
|    | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> <li><b>Description:</b> Claw coupling, shaft diameter 6 mm / 10 mm, damping element 80 shore blue, maximum shaft offset: radial <math>\pm 0.22</math> mm, axial <math>\pm 1</math> mm angular <math>\pm 1.3^\circ</math>, max. speed 19,000 rpm, angle of twist max. <math>10^\circ</math>, <math>-30^\circ\text{C}</math> to <math>+80^\circ\text{C}</math>, max. torque 800 Ncm, tightening torque of screws: ISO 4029 150 Ncm, material: aluminum flange, damping element: polyurethane</li> </ul> | KUP-0610-J | 2127056  |
|  | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> <li><b>Description:</b> Double loop coupling, shaft diameter 8 mm / 10 mm, max. shaft offset: radially <math>\pm 0.25</math> mm, axially <math>\pm 0.4</math> mm, angle <math>\pm 4</math> degrees; max. speed 10,000 rpm, <math>-30</math> to <math>+120</math> degrees Celsius, torsional spring stiffness of 150 Nm/rad</li> </ul>                                                                                                                                                                 | KUP-0810-D | 5326704  |
|  | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> <li><b>Description:</b> Bar coupling, shaft diameter 8 mm / 10 mm, max. shaft offset: radial <math>\pm 0.3</math> mm, axial <math>\pm 0.3</math> mm, angular <math>\pm 3^\circ</math>; max. speed 10,000 rpm, <math>-10^\circ</math> to <math>+80^\circ\text{C}</math>, max. torque: 80 Ncm, material: fiber-glass reinforced polyamide, aluminum hub</li> </ul>                                                                                                                                      | KUP-0810-S | 5314178  |
|  | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> <li><b>Description:</b> Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial <math>\pm 0.25</math> mm, axial <math>\pm 0.4</math> mm, angular <math>\pm 4^\circ</math>; max. revolutions 10,000 rpm, <math>-30^\circ</math> to <math>+120^\circ\text{C}</math>, max. torque 120 Ncm; material: stainless steel bellows, aluminum clamping hubs</li> </ul>                                                                                                                       | KUP-1010-B | 5312983  |
|  | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> <li><b>Description:</b> Double loop coupling, shaft diameter 10 mm / 10 mm, Maximum shaft offset: radial <math>\pm 2.5</math> mm, axial <math>\pm 3</math> mm, angular <math>\pm 10^\circ</math>; max. speed 3,000 rpm, <math>-30^\circ</math> to <math>+80^\circ\text{C}</math>, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange</li> </ul>                                                                                                                                      | KUP-1010-D | 5326703  |
|  | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> <li><b>Description:</b> Spring washer coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset, radial <math>\pm 0.3</math> mm, axial <math>\pm 0.4</math> mm, angle <math>\pm 2.5^\circ</math>, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin</li> </ul>                                                                                                                                              | KUP-1010-F | 5312986  |
|  | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> <li><b>Description:</b> Bar coupling, shaft diameter 10 mm / 10 mm; maximum shaft offset: radial <math>\pm 0.3</math> mm, axial <math>\pm 0.2</math> mm, angular <math>\pm 3^\circ</math>; speed 10,000 rpm, <math>-10^\circ</math> to <math>+80^\circ\text{C}</math>, max. torque 80 Ncm; material: glass fiber-reinforced polyamide, aluminum hub</li> </ul>                                                                                                                                        | KUP-1010-S | 2056408  |
|  | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | KUP-1012-B | 5312984  |

|                                                                                   | Brief description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Type       | part no. |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------|
|  | <ul style="list-style-type: none"> <li><b>Description:</b> 10 mm / 12 mm; maximum shaft offset: radial +/- 0.25 mm, axial +/- 0.4 mm, angular +/- 4°; max. revolutions 10,000 rpm, -30° to +120 °C, max. torque 120 Ncm; material: stainless steel bellows, aluminum clamping hubs</li> </ul>                                                                                                                                                                                                                                                                      |            |          |
|                                                                                   | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> <li><b>Description:</b> Double loop coupling, shaft diameter 10 mm / 12 mm, Maximum shaft offset: radial +/- 2.5 mm, axial +/- 3 mm, angular +/- 10°; max. speed 3,000 rpm, -30° to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange</li> </ul>                                                                                                                                                           | KUP-1012-D | 5326702  |
|                                                                                   | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> <li><b>Description:</b> Claw coupling, shaft diameter 8 mm / 10 mm, damping element 80 shore blue, maximum shaft offset: radial <math>\pm 0.22</math> mm, axial <math>\pm 1</math> mm angular <math>\pm 1.3^\circ</math>, max. speed 19,000 rpm, angle of twist max. 10°, -30 °C to +80 °C, max. torque 800 Ncm, tightening torque of screws: ISO 4029 150 Ncm, material: aluminum flange, damping element: polyurethane</li> </ul>  | KUP-0810-J | 2128267  |
|                                                                                   | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> <li><b>Description:</b> Claw coupling, shaft diameter 10 mm / 10 mm, damping element 80 shore blue, maximum shaft offset: radial <math>\pm 0.22</math> mm, axial <math>\pm 1</math> mm angular <math>\pm 1.3^\circ</math>, max. speed 19,000 rpm, angle of twist max. 10°, -30 °C to +80 °C, max. torque 800 Ncm, tightening torque of screws: ISO 4029 150 Ncm, material: aluminum flange, damping element: polyurethane</li> </ul> | KUP-1010-J | 2127054  |
|                                                                                   | <ul style="list-style-type: none"> <li><b>Product segment:</b> Shaft adaptation</li> <li><b>Product:</b> Shaft couplings</li> <li><b>Description:</b> Claw coupling, shaft diameter 10 mm / 12 mm, damping element 80 shore blue, maximum shaft offset: radial <math>\pm 0.22</math> mm, axial <math>\pm 1</math> mm angular <math>\pm 1.3^\circ</math>, max. speed 19,000 rpm, angle of twist max. 10°, -30 °C to +80 °C, max. torque 800 Ncm, tightening torque of screws: ISO 4029 150 Ncm, material: aluminum flange, damping element: polyurethane</li> </ul> | KUP-1012-J | 2128265  |

|                                                                                     | Brief description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Type           | part no. |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------|
| 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> Aluminum measuring wheel with studded polyurethane surface for 6 mm solid shaft, circumference 200 mm</li> </ul>                                                                                                                                                                                                                                    | BEF-MR06200APN | 4084747  |
|    | <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> SICK modular measuring wheel system for face mount flange encoder with S4 mechanical design (10 mm x 19 mm solid shaft), e.g., DFS60-S4: with O-ring measuring wheel, circumference 200 mm</li> <li><b>Suitable for:</b> Face mount flange encoder DFS60, DBS60, AFM60, AFS60, mechanical design S4 (solid shaft 10 mm x 19 mm)</li> </ul> | BEF-MRS-10-U   | 2085714  |
|    | <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 10 mm solid shaft, circumference 200 mm</li> </ul>                                                                                                                                                                                                                                                | BEF-MR010020R  | 2055224  |
|    | <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 10 mm solid shaft, circumference 300 mm</li> </ul>                                                                                                                                                                                                                                                | BEF-MR010030R  | 2049278  |
|  | <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> Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 500 mm</li> </ul>                                                                                                                                                                                                                                                          | BEF-MR010050R  | 2055227  |
|  | <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> Aluminum measuring wheel with cross-knurled surface for 10 mm solid shaft, circumference 200 mm</li> </ul>                                                                                                                                                                                                                                          | BEF-MR10200AK  | 4084737  |
|  | <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> Aluminum measuring wheel with smooth polyurethane surface for 10 mm solid shaft, circumference 200 mm</li> </ul>                                                                                                                                                                                                                                    | BEF-MR10200AP  | 4084738  |
|                                                                                     | <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> </ul>                                                                                                                                                                                                                                                                                                                                                                       | BEF-MR10200APN | 4084739  |

|                                                                                    | Brief description                                                                                                                                                                                                                                                                                             | Type           | part no. |
|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------|
|                                                                                    | <ul style="list-style-type: none"> <li><b>Description:</b> Aluminum measuring wheel with studded polyurethane surface for 10 mm solid shaft, circumference 200 mm</li> </ul>                                                                                                                                  |                |          |
|   | <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> Aluminum measuring wheel with cross-knurled surface for 10 mm solid shaft, circumference 500 mm</li> </ul>        | BEF-MR10500AK  | 4084733  |
|   | <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> Aluminum measuring wheel with smooth polyurethane surface for 10 mm solid shaft, circumference 500 mm</li> </ul>  | BEF-MR10500AP  | 4084734  |
|   | <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> Aluminum measuring wheel with ridged polyurethane surface for 10 mm solid shaft, circumference 500 mm</li> </ul>  | BEF-MR10500APG | 4084736  |
|  | <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> Aluminum measuring wheel with studded polyurethane surface for 10 mm solid shaft, circumference 500 mm</li> </ul> | BEF-MR10500APN | 4084735  |

|                                                                                     | Brief description                                                                                                                                                                                                                                                                                                                                                                                                                                | Type               | part no. |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------|
| Mounting systems                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                    |          |
|    | <ul style="list-style-type: none"> <li><b>Description:</b> Bearing block for servo and face mount flange encoder. The heavy-duty bearing block is used to absorb very large radial and axial shaft loads. Particularly when using belt pulleys, chain sprockets, friction wheels. Operating speed max. 4,000 rpm<sup>-1</sup>, axial shaft load 150 N, radial shaft load 250 N, bearing service life 3.6 x 10<sup>9</sup> revolutions</li> </ul> | BEF-FA-LB1210      | 2044591  |
|    | <ul style="list-style-type: none"> <li><b>Description:</b> Mounting bracket for encoder with spigot 36 mm for face mount flange</li> <li><b>Items supplied:</b> Mounting kit included</li> </ul>                                                                                                                                                                                                                                                 | BEF-WF-36          | 2029164  |
|    | <ul style="list-style-type: none"> <li><b>Description:</b> Flange adapter, adaptation of face mount flange with 36 mm centering hub to 50 mm servo flange, aluminum, including 3 flat head screws M4 x 10</li> <li><b>Material:</b> Aluminum</li> <li><b>Details:</b> Aluminum</li> <li><b>Items supplied:</b> Including 3 countersunk screws M3 x 10</li> </ul>                                                                                 | BEF-FA-036-050     | 2029160  |
|    | <ul style="list-style-type: none"> <li><b>Description:</b> Flange adapter, adaptation of face mount flange with 36 mm centering hub to 60 mm square mounting plate, aluminum, including 3 flat head screws M4 x 8</li> <li><b>Material:</b> Aluminum</li> <li><b>Details:</b> Aluminum</li> <li><b>Items supplied:</b> Including 3 countersunk screws M4 x 8</li> </ul>                                                                          | BEF-FA-036-060REC  | 2029162  |
|  | <ul style="list-style-type: none"> <li><b>Description:</b> Flange adapter, adaptation of face mount flange with 36 mm centering hub to 58 mm square mounting plate with shock absorbers, aluminum</li> <li><b>Material:</b> Aluminum</li> <li><b>Details:</b> Aluminum</li> </ul>                                                                                                                                                                | BEF-FA-036-060RSA  | 2029163  |
|  | <ul style="list-style-type: none"> <li><b>Description:</b> Flange adapter, adaptation of face mount flange with 36 mm centering hub to 63 mm square mounting plate, aluminum, including 3 flat head screws M4 x 8</li> <li><b>Material:</b> Aluminum</li> <li><b>Details:</b> Aluminum</li> <li><b>Items supplied:</b> Including 3 countersunk screws M4 x 8</li> </ul>                                                                          | BEF-FA-036-063REC  | 2034225  |
|  | <ul style="list-style-type: none"> <li><b>Description:</b> Flange adapter, adaptation of face mount flange with 36 mm centering hub to 100 mm servo flange with 60 mm centering hub, aluminum</li> <li><b>Material:</b> Aluminum</li> <li><b>Details:</b> Aluminum</li> </ul>                                                                                                                                                                    | BEF-FA-036-100     | 2029161  |
|  | <ul style="list-style-type: none"> <li><b>Description:</b> Flange adapter (adapts size 60 face mount flange encoder to bearing block with part. no. 2044591)</li> </ul>                                                                                                                                                                                                                                                                          | BEF-FA-036-050-019 | 2063378  |
|  | <ul style="list-style-type: none"> <li><b>Description:</b> Mounting angle spring-loaded, for flange with centerring collar 36 mm, working temperature range -40° ... +120°C</li> <li><b>Material:</b> Aluminum</li> <li><b>Details:</b> Aluminum</li> </ul>                                                                                                                                                                                      | BEF-WF36F          | 4084775  |

|                                                                                     | Brief description                                                                                                                                                                                                                                                                                                                            | Type             | part no. |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------|
| connectors and cables                                                               |                                                                                                                                                                                                                                                                                                                                              |                  |          |
|    | <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, 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> 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> 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> 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> 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> 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> 1.5 m, 12-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, shielded</li> </ul> | DOL-2312-G1M5MA3 | 2029212  |
|  | <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> 3 m, 12-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, shielded</li> </ul>   | DOL-2312-G03MMA3 | 2029213  |
|  | <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> 5 m, 12-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, shielded</li> </ul>   | DOL-2312-G05MMA3 | 2029214  |
|  | <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, 12-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, shielded</li> </ul>  | DOL-2312-G10MMA3 | 2029215  |
|  | <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, 12-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, shielded</li> </ul>  | DOL-2312-G20MMA3 | 2029216  |
|  | <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, 12-wire, PUR, halogen-free</li> </ul>                                                       | DOL-2312-G30MMA3 | 2029217  |

|                                                                                   | Brief description                                                                                                                                                                                                                                                                                                                                                                                    | Type         | part no. |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|
|  | <ul style="list-style-type: none"> <li>• <b>Description:</b> Incremental, shielded</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  |
|                                                                                   | <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  |

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