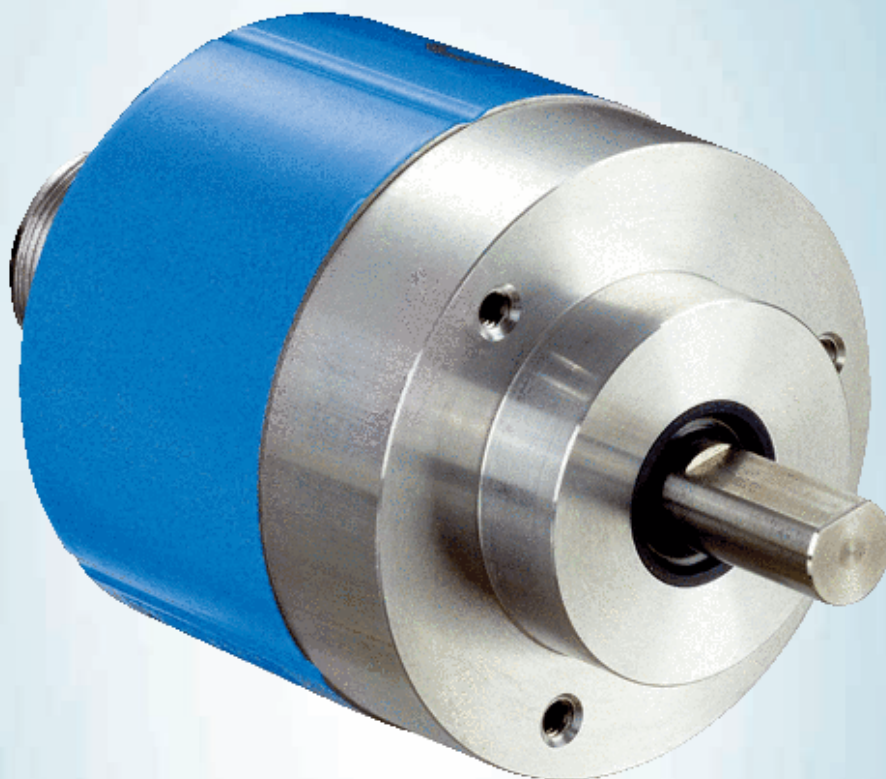




**ARS60-F4B00512**

ARS60

**ABSOLUTE ENCODERS**

**SICK**  
Sensor Intelligence.



Illustration may differ



## Ordering information

| Type           | part no. |
|----------------|----------|
| ARS60-F4B00512 | 1031564  |

Other models and accessories → [www.sick.com/ARS60](http://www.sick.com/ARS60)

## 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>Number of steps per revolution (max. resolution)</b>       | 512 (9 bit)                                   |
| <b>Measuring step</b>                                         | 360° / number of steps                        |
| <b>Measuring step deviation</b>                               | 0.005° binary number of steps                 |
| <b>Error limits G</b>                                         | 0.035° (binary number of steps) <sup>1)</sup> |
| <b>Repeatability standard deviation <math>\sigma_r</math></b> | 0.005° <sup>2)</sup>                          |

<sup>1)</sup> In accordance with DIN ISO 1319-1, position of the upper and lower error limit depends on the installation situation, specified value refers to a symmetrical position, i.e. deviation in upper and lower direction is the same.

<sup>2)</sup> In accordance with DIN ISO 55350-13; 68.3% of the measured values are inside the specified area.

### Interfaces

|                                           |                                                                     |
|-------------------------------------------|---------------------------------------------------------------------|
| <b>Communication interface</b>            | Parallel data world                                                 |
| <b>Initialization time</b>                | 80 ms <sup>1)</sup>                                                 |
| <b>Code type</b>                          | Gray                                                                |
| <b>Code sequence parameter adjustable</b> | CW (clockwise) increasing when viewing the clockwise rotating shaft |
| <b>Measured value backlash</b>            | 0.005°                                                              |
| <b>Response threshold</b>                 | 0.003°                                                              |

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

### Electronics

|                        |                                    |
|------------------------|------------------------------------|
| <b>Connection type</b> | Male connector, M23, 21-pin, axial |
|------------------------|------------------------------------|

<sup>1)</sup> Only with shaft stationary (note initialisation time).

|                                          |                                                                         |
|------------------------------------------|-------------------------------------------------------------------------|
| <b>Supply voltage</b>                    | 10 ... 32 V                                                             |
| <b>Operating current</b>                 | Typ. 90 mA                                                              |
| <b>Switching level of control inputs</b> | Logic H = 0.7 x U <sub>S</sub> , Logic L = 0 V ... 0.3 x U <sub>S</sub> |
| <b>Actuation of set button</b>           | ≥ 100 ms <sup>1)</sup>                                                  |

<sup>1)</sup> Only with shaft stationary (note initialisation time).

## Mechanics

|                                       |                                                                                                          |
|---------------------------------------|----------------------------------------------------------------------------------------------------------|
| <b>Mechanical design</b>              | Solid shaft, face mount flange                                                                           |
| <b>Shaft diameter</b>                 | 10 mm                                                                                                    |
| <b>Shaft length</b>                   | 19 mm                                                                                                    |
| <b>Characteristics of the shaft</b>   | With flat                                                                                                |
| <b>Weight</b>                         | Approx. 0.3 kg <sup>1)</sup>                                                                             |
| <b>Housing material</b>               | Aluminum die cast                                                                                        |
| <b>Start up torque</b>                | Typ. 0.4 Ncm                                                                                             |
| <b>Operating torque</b>               | Typ. 0.3 Ncm                                                                                             |
| <b>Permissible shaft loading</b>      | 20 N (radial)<br>10 N (axial)                                                                            |
| <b>Operating speed</b>                | ≤ 6,000 min <sup>-1</sup> with shaft seal<br>≤ 10,000 min <sup>-1</sup> without shaft seal <sup>2)</sup> |
| <b>Moment of inertia of the rotor</b> | 54 gcm <sup>2</sup>                                                                                      |
| <b>Bearing lifetime</b>               | 3.6 x 10 <sup>9</sup> revolutions                                                                        |
| <b>Angular acceleration</b>           | ≤ 500,000 rad/s <sup>2</sup>                                                                             |

<sup>1)</sup> Based on devices with male connector.

<sup>2)</sup> If the shaft seal has been removed by the customer.

## Ambient data

|                                      |                                                          |
|--------------------------------------|----------------------------------------------------------|
| <b>EMC</b>                           | According to EN 61000-6-2 and EN 61000-6-3 <sup>1)</sup> |
| <b>Enclosure rating</b>              | IP65, male connector (IEC 60529) <sup>2)</sup>           |
| <b>Permissible relative humidity</b> | 90 % (Condensation not permitted)                        |
| <b>Operating temperature range</b>   | -20 °C ... +85 °C                                        |
| <b>Storage temperature range</b>     | -40 °C ... +100 °C, without package                      |
| <b>Resistance to shocks</b>          | 50 g, 11 ms (EN 60068-2-27)                              |
| <b>Resistance to vibration</b>       | 20 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)                  |

<sup>1)</sup> EMC according to the standards quoted is achieved if shielded cables are used.

<sup>2)</sup> With mating connector fitted.

## Certificates

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

### Classifications

|                       |          |
|-----------------------|----------|
| <b>ECLASS 5.0</b>     | 27270502 |
| <b>ECLASS 5.1.4</b>   | 27270502 |
| <b>ECLASS 6.0</b>     | 27270590 |
| <b>ECLASS 6.2</b>     | 27270590 |
| <b>ECLASS 7.0</b>     | 27270502 |
| <b>ECLASS 8.0</b>     | 27270502 |
| <b>ECLASS 8.1</b>     | 27270502 |
| <b>ECLASS 9.0</b>     | 27270502 |
| <b>ECLASS 10.0</b>    | 27270502 |
| <b>ECLASS 11.0</b>    | 27270502 |
| <b>ECLASS 12.0</b>    | 27270502 |
| <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



PIN assignment



| PIN | Wire colors (cable connection) | SignalBinary    | SignalGray      | SignalBCD                         |   |
|-----|--------------------------------|-----------------|-----------------|-----------------------------------|---|
| 1   | Violet                         | 2 <sup>0</sup>  | G <sup>0</sup>  | 2 <sup>0</sup> v. 10 <sup>0</sup> | - |
| 2   | White/brown                    | 2 <sup>1</sup>  | G <sup>1</sup>  | 2 <sup>1</sup> v. 10 <sup>0</sup> | - |
| 3   | White/green                    | 2 <sup>2</sup>  | G <sup>2</sup>  | 2 <sup>2</sup> v. 10 <sup>0</sup> | - |
| 4   | White/yellow                   | 2 <sup>3</sup>  | G <sup>3</sup>  | 2 <sup>3</sup> v. 10 <sup>0</sup> | - |
| 5   | White/grey                     | 2 <sup>4</sup>  | G <sup>4</sup>  | 2 <sup>0</sup> v. 10 <sup>1</sup> | - |
| 6   | White/pink                     | 2 <sup>5</sup>  | G <sup>5</sup>  | 2 <sup>1</sup> v. 10 <sup>1</sup> | - |
| 7   | White/blue                     | 2 <sup>6</sup>  | G <sup>6</sup>  | 2 <sup>2</sup> v. 10 <sup>1</sup> | - |
| 8   | White/red                      | 2 <sup>7</sup>  | G <sup>7</sup>  | 2 <sup>3</sup> v. 10 <sup>1</sup> | - |
| 9   | White/black                    | 2 <sup>8</sup>  | G <sup>8</sup>  | 2 <sup>0</sup> v. 10 <sup>2</sup> | - |
| 10  | Brown/green                    | 2 <sup>9</sup>  | G <sup>9</sup>  | 2 <sup>1</sup> v. 10 <sup>2</sup> | - |
| 11  | Brown/yellow                   | 2 <sup>10</sup> | G <sup>10</sup> | 2 <sup>2</sup> v. 10 <sup>2</sup> | - |
| 12  | Brown/gray                     | 2 <sup>11</sup> | G <sup>11</sup> | 2 <sup>3</sup> v. 10 <sup>2</sup> | - |
| 13  | Brown/pink                     | 2 <sup>12</sup> | G <sup>12</sup> | 2 <sup>0</sup> v. 10 <sup>3</sup> | - |
| 14  | Brown/blue                     | 2 <sup>13</sup> | G <sup>13</sup> | 2 <sup>1</sup> v. 10 <sup>3</sup> | - |
| 15  | Brown/red                      | 2 <sup>14</sup> | G <sup>14</sup> | 2 <sup>2</sup> v. 10 <sup>3</sup> | - |
| 16  | Green                          | Parity          |                 | Parity                            |   |
| 17  | Pink                           |                 | Store           |                                   | - |
| 18  | Yellow                         |                 | Enable          |                                   | - |
| 19  | Brown                          |                 | CW/CCW (V/R)    |                                   | - |
| *   | Gray                           |                 | SET             |                                   | - |
| 20  | Blue                           |                 | GND             |                                   | - |
| 21  | Red                            |                 | U <sub>S</sub>  |                                   | - |

Diagrams



Recommended accessories

Other models and accessories → [www.sick.com/ARS60](http://www.sick.com/ARS60)

|                                                                                     | 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> Parallel</li><li>• <b>Items supplied:</b> By the meter</li><li>• <b>Cable:</b> 22-wire, PUR, halogen-free</li><li>• <b>Description:</b> Parallel, shielded</li></ul> | LTG-2622-MW      | 6027532  |
|  | <ul style="list-style-type: none"><li>• <b>Connection type head A:</b> Female connector, M23, 21-pin, straight</li><li>• <b>Signal type:</b> SSI</li><li>• <b>Description:</b> SSI, shielded</li><li>• <b>Connection systems:</b> Crimp contacts</li></ul>                                                                                   | DOS-2321-G       | 6027539  |
|  | <ul style="list-style-type: none"><li>• <b>Connection type head A:</b> Female connector, M23, 21-pin, straight</li><li>• <b>Connection type head B:</b> Flying leads</li><li>• <b>Signal type:</b> Parallel</li><li>• <b>Cable:</b> 1.5 m, 22-wire, PUR, halogen-free</li><li>• <b>Description:</b> Parallel, shielded</li></ul>             | DOL-2321-G1M5PA4 | 2029218  |
|  | <ul style="list-style-type: none"><li>• <b>Connection type head A:</b> Female connector, M23, 21-pin, straight</li><li>• <b>Connection type head B:</b> Flying leads</li><li>• <b>Signal type:</b> Parallel</li><li>• <b>Cable:</b> 3 m, 22-wire, PUR, halogen-free</li><li>• <b>Description:</b> Parallel, shielded</li></ul>               | DOL-2321-G03MPA4 | 2029219  |
|  | <ul style="list-style-type: none"><li>• <b>Connection type head A:</b> Female connector, M23, 21-pin, straight</li><li>• <b>Connection type head B:</b> Flying leads</li><li>• <b>Signal type:</b> Parallel</li><li>• <b>Cable:</b> 5 m, 22-wire, PUR, halogen-free</li><li>• <b>Description:</b> Parallel, shielded</li></ul>               | DOL-2321-G05MPA4 | 2029220  |
|  | <ul style="list-style-type: none"><li>• <b>Connection type head A:</b> Female connector, M23, 21-pin, straight</li><li>• <b>Connection type head B:</b> Flying leads</li><li>• <b>Signal type:</b> Parallel</li><li>• <b>Cable:</b> 10 m, 22-wire, PUR, halogen-free</li><li>• <b>Description:</b> Parallel, shielded</li></ul>              | DOL-2321-G10MPA4 | 2029221  |
|  | <ul style="list-style-type: none"><li>• <b>Connection type head A:</b> Female connector, M23, 21-pin, straight</li><li>• <b>Connection type head B:</b> Flying leads</li><li>• <b>Signal type:</b> Parallel</li><li>• <b>Cable:</b> 20 m, 22-wire, PUR, halogen-free</li><li>• <b>Description:</b> Parallel, shielded</li></ul>              | DOL-2321-G20MPA4 | 2029222  |

|                                                                                     | Brief description                                                                                                                                                                                                                                                                                                                                                       | Type              | part no. |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----------|
| Mounting systems                                                                    |                                                                                                                                                                                                                                                                                                                                                                         |                   |          |
|    | <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 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> 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  |

|                                                                                   | 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> 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> 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> 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> 10 mm / 12 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-1012-B | 5312984  |

## 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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