



## Incremental encoders DFS60, Rotary

DFS60E-S1AK02000



**Model Name** > [DFS60E-S1AK02000](#)  
**Part No.** > [1054192](#)



*Illustration may differ*

**At a glance**

- Compact installation depth
- High resolution up to 16 bits
- Optionally programmable: Output voltage, zero pulse position, zero pulse width and number of pulses
- Connection: Radial or axial cable outlet, M23 or M12 connector, axial or radial
- Electrical interfaces: 5V & 24V TTL/RS-422, 24 V HTL/push pull
- Mechanical interfaces: face mount or servo flange, blind or through hollow shaft
- Remote zero set possible

**Your benefits**

- Reduced storage costs and downtime due to customer-specific programming
- Variety of different mechanical and electrical interfaces enable the encoder to be optimally adjusted to fit the installation situation
- Excellent concentricity even at high speeds
- High resolution of up to 16 bits ensures precise measurements
- Permanent and safe operation due to a high enclosure rating, temperature resistance and a long bearing lifetime
- Programmability via the PGT-08 programming software and the PGT-10-S display programming tool allow the encoder to be adapted flexibly and quickly according to customer needs
- Programmable zero pulse position simplifies installation



**Performance**

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|                        |                                       |
|------------------------|---------------------------------------|
| Error limits:          | ± 0.3 °                               |
| Measuring step:        | 90 ° / electronically/number of lines |
| Initialization time:   | 40 ms                                 |
| Pulses per revolution: | 2,000                                 |

**Mechanical data**

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|                                 |                                    |
|---------------------------------|------------------------------------|
| Mechanical interface:           | Solid shaft, Servo flange          |
| Shaft diameter:                 | 6 mm x 10 mm                       |
| Mass:                           | 0.3 kg                             |
| Start up torque:                | 0.5 Ncm (+20 °C)                   |
| Operating torque:               | 0.3 Ncm (+20 °C)                   |
| Maximum operating speed:        | 10,000 /min                        |
| Moment of inertia of the rotor: | 6.2 gcm <sup>2</sup>               |
| Bearing lifetime:               | 3.6 x 10 <sup>10</sup> revolutions |

Max. angular acceleration: 500,000 rad/s<sup>2</sup>  
Permissible shaft loading radial/axial: 40 N (axial), 80 N (radial)

### Electrical data

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Electrical interface: 4.5 V ... 5.5 V, TTL/RS422, Cable, 8-pin, universal, 1.5 m  
Connection type: Cable, 8-wire, universal, 1.5 m<sup>1)</sup>  
Maximum output frequency: 300 kHz  
Reference signal, number: 1  
Reference signal, position: 90 °, electronically, gated with A and B  
Operating voltage range: 4.5 V ... 5.5 V  
Load current max.: 30 mA  
MTTFd: mean time to dangerous failure: 300 a (EN ISO 13849-1)<sup>2)</sup>

<sup>1)</sup> The universal cable outlet is positioned in such a way, that it is possible to lay the cable in a radial or axial direction without kinking it <sup>2)</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

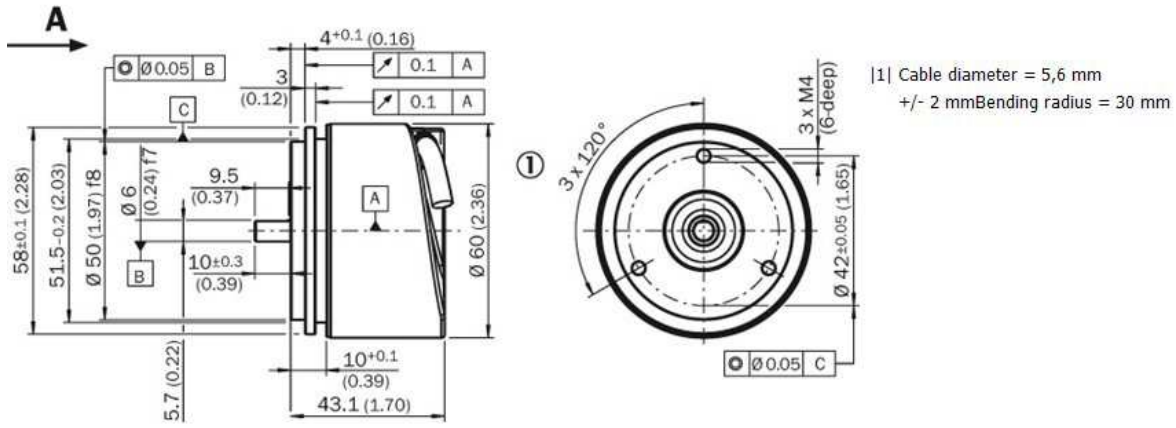
electronic failures are considered hazardous. For more information, see document no. 8015532.

### Ambient data

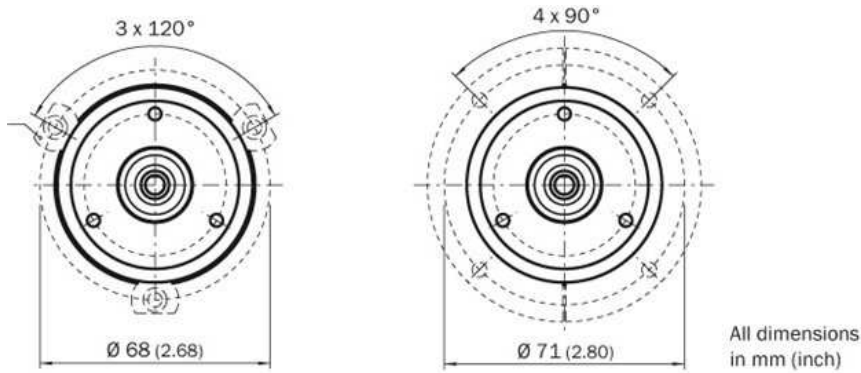
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EMC: (according to EN 61000-6-2 and EN 61000-6-3)  
Working temperature range: 0 °C ... +85 °C  
Storage temperature range: -40 °C ... +100 °C, without package  
Resistance to shocks: 50 g (according to EN 60068-2-27)  
Resistance to vibration: 20 g, 10 Hz ... 2,000 Hz (according to EN 60068-2-6)  
Enclosure rating: IP 65 (according to IEC 60529), shaft side, IP 67 (according to IEC 60529), housing side  
Permissible relative humidity: 90 % (condensation of the optical scanning not permitted)

**Dimensional drawing**



**Proposed fitting**



## PIN assignment

### 8-core cable

View of M12 device connector on encoder



View of M23 device connector on encoder



| PIN, 8-pin, M12 connector | PIN, 12-pin, M23 connector | Core colors of encoders with cable outlet | TTL/HTL signal  | Explanation   |
|---------------------------|----------------------------|---|-----------------|---|
| 1                         | 6                          | Brown                                     | $\bar{A}$       | Signal cable  |
| 2                         | 5                          | White                                     | A               | Signal cable  |
| 3                         | 1                          | Black                                     | $\bar{B}$       | Signal cable  |
| 4                         | 8                          | Pink                                      | B               | Signal cable  |
| 5                         | 4                          | Yellow                                    | $\bar{Z}$       | Signal cable  |
| 6                         | 3                          | Lilac                                     | Z               | Signal cable  |
| 7                         | 10                         | Blue                                      | GND             | Ground connection of the encoder  |
| 8                         | 12                         | Red                                       | +U <sub>s</sub> | Supply voltage (volt-free to housing)   |
| -                         | 9                          | -   | N.C.            | Not assigned  |
| -                         | 2                          | -   | N.C.            | Not assigned  |
| -                         | 11                         | -   | N.C.            | Not assigned  |
| -                         | 7 <sup>ii</sup>            | -   | SET             | Zero pulse teach  |
| Shield                    | Shield                     | Shield                                    | Shield          | Shield connected to housing on side of encoder. Connected to ground on side of control. |

<sup>ii</sup> Only at 4.5 ... 22 V, TTL/HTL programmable

The SET input serves to carry out the zero pulse teach function. If the SET input is applied to U<sub>s</sub> for longer than 250 ms, after it has been open for at least 1,000 ms or applied to GND, the current shaft position is assigned the zero pulse signal "Z".

## Signalansgänge

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## Drehzahlbetrachtung



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