



## Incremental encoders DFS60, Rotary

DFS60E-BHCK02048



**Model Name** > [DFS60E-BHCK02048](#)  
**Part No.** > [1059206](#)



*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: | 2,048                                 |

**Mechanical data**

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|   |                    |
|---|--------------------|
| Mechanical interface:                       | Blind hollow shaft |
| Shaft diameter:                             | 15 mm              |
| Mass:                                       | 0.2 kg             |
| Start up torque:                            | 0.8 Ncm (+20 °C)   |
| Operating torque:                           | 0.6 Ncm (+20 °C)   |
| Permissible movement axial static/dynamic:  | ± 0.5 mm, ± 0.2 mm |
| Permissible movement radial static/dynamic: | ± 0.3 mm, ± 0.1 mm |
| Maximum operating speed:                    | 6,000 /min         |

|                                 |                                    |
|---------------------------------|------------------------------------|
| Moment of inertia of the rotor: | 40 gcm <sup>2</sup>                |
| Bearing lifetime:               | 3.6 x 10 <sup>10</sup> revolutions |
| Max. angular acceleration:      | 500,000 rad/s <sup>2</sup>         |
| Shaft material:                 | Metal                              |

### Electrical data

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|  |  |
|--|--|
| Electrical interface:                  | 10 V ... 32 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:               | 10 V ... 32 V  |
| Load current max.:                     | 30 mA  |
| Power consumption:                     | 0.5 W (without load)                                     |
| 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



[1] Cable diameter = 5,6 mm  
+/- 2 mm Bending radius = 30 mm

## 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                                     | A               | Signal cable  |
| 2                         | 5                          | White                                     | A               | Signal cable  |
| 3                         | 1                          | Black                                     | B               | Signal cable  |
| 4                         | 8                          | Pink                                      | B               | Signal cable  |
| 5                         | 4                          | Yellow                                    | 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>a</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>a</sup> Only at 4.5 ... 32 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 was open for at least 1,000 ms or applied to GND, the current shaft position is assigned the zero pulse signal "Z".

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Drehzahlbetrachtung



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