



## Incremental encoders DFS60, Rotary

DFS60B-BBEK00020



**Model Name** > DFS60B-BBEK00020  
**Part No.** > 1038143



*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

|                        |                                                    |
|------------------------|----------------------------------------------------|
| Error limits:          | $\pm 0.05^\circ$                                   |
| Measuring step:        | $90^\circ / \text{electronically/number of lines}$ |
| Initialization time:   | 40 ms                                              |
| Pulses per revolution: | 20                                                 |

#### Mechanical data

|                                             |                            |
|---------------------------------------------|----------------------------|
| Mechanical interface:                       | Blind hollow shaft         |
| Shaft diameter:                             | 8 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:  | $\pm 0.5$ mm, $\pm 0.2$ mm |
| Permissible movement radial static/dynamic: | $\pm 0.3$ mm, $\pm 0.1$ 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:       | HTL/Push pull, Cable, 8-pin, universal, 1.5 m |
| Connection type:            | Cable, 8-pin, universal, 1.5 m <sup>1)</sup>  |
| Maximum output frequency:   | 600 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)                          |

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.;

<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

#### Ambient data

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|                                |                                                                            |
|--------------------------------|----------------------------------------------------------------------------|
| EMC:                           | (according to EN 61000-6-2 and EN 61000-6-3)                               |
| Working temperature range:     | -30 °C ... 100 °C                                                          |
| Storage temperature range:     | -40 °C ... 100 °C, without package                                         |
| Resistance to shocks:          | 70 g (according to EN 60068-2-27)                                          |
| Resistance to vibration:       | 30 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) |
| 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 been 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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