



## Incremental encoders DFS60, Rotary

DFS60E-BAAL02048



**Model Name** > **DFS60E-BAAL02048**  
**Part No.** > **1056337**



*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:	6 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:	4.5 V ... 5.5 V, TTL/RS422, Cable, 8-pin, universal, 3 m
Connection type:	Cable, 8-wire, universal, 3 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



[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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