

**INCREMENTAL ENCODERS** 



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#### Ordering information

Туре	Part no.
DFS60B-TEEA01800	1069700

Other models and accessories -> www.sick.com/DFS60

Illustration may differ



#### Detailed technical data

#### Performance

Pulses per revolution	1,800 <sup>1)</sup>
Measuring step	90°, electric/pulses per revolution
Measuring step deviation at non binary number of lines	±0.01°
Error limits	± 0.05°

<sup>1)</sup> See maximum revolution range.

#### Interfaces

Communication interface	Incremental
Communication Interface detail	HTL / Push pull
Number of signal channels	6-channel
Initialization time	40 ms
Output frequency	≤ 600 kHz
Load current	≤ 30 mA
Power consumption	≤ 0.5 W (without load)

#### Electrical data

Connection type	Male connector, M23, 12-pin, radial
Supply voltage	10 32 V
Reference signal, number	1
Reference signal, position	90°, electric, logically gated with A and B
Reverse polarity protection	$\checkmark$
Short-circuit protection of the outputs	✓ <sup>1)</sup>
MTTFd: mean time to dangerous failure	300 years (EN ISO 13849-1) <sup>2)</sup>

 $^{\rm 1)}$  Short-circuit opposite to another channel, US or GND permissable for maximum 30 s.

<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.

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#### Mechanical data

Mechanical design	Through hollow shaft
Shaft diameter	12 mm
Weight	+ 0.2 kg
Shaft material	Stainless steel
Flange material	Aluminum
Housing material	Aluminum die cast
Start up torque	0.8 Ncm (+20 °C)
Operating torque	0.6 Ncm (+20 °C)
Permissible movement static	± 0.3 mm (radial) ± 0.5 mm (axial)
Permissible movement dynamic	± 0.1 mm (radial) ± 0.2 mm (axial)
Operating speed	≤ 6,000 min <sup>-1 1)</sup>
Moment of inertia of the rotor	40 gcm <sup>2</sup>
Bearing lifetime	3.6 x 10^10 revolutions
Angular acceleration	≤ 500,000 rad/s²

 $^{\rm 1)}$  Allow for self-heating of 3.3 K per 1,000 rpm when designing the operating temperature range.

#### Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-4
Enclosure rating	IP65, Housing side, male connector (IEC 60529) <sup>1)</sup> IP65, shaft side (IEC 60529)
Permissible relative humidity	90 % (Condensation not permitted)
Operating temperature range	-40 °C +100 °C <sup>2)</sup> -30 °C +100 °C <sup>3)</sup>
Storage temperature range	-40 °C +100 °C, without package
Resistance to shocks	70 g, 6 ms (EN 60068-2-27)
Resistance to vibration	30 g, 10 Hz 2,000 Hz (EN 60068-2-6)

 $^{(1)}$  With mating connector fitted.

<sup>2)</sup> Stationary position of the cable.

<sup>3)</sup> Flexible position of the cable.

#### Classifications

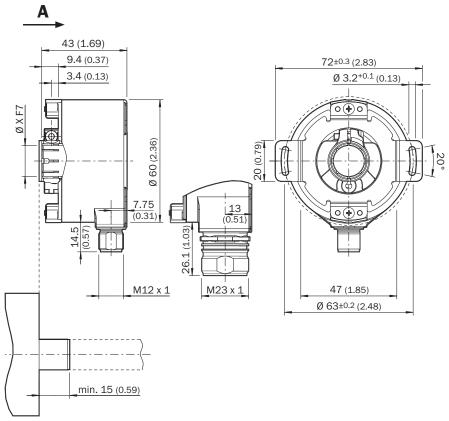
eCl@ss 5.0	27270501
eCl@ss 5.1.4	27270501
eCl@ss 6.0	27270590
eCl@ss 6.2	27270590
eCl@ss 7.0	27270501
eCl@ss 8.0	27270501
eCl@ss 8.1	27270501
eCl@ss 9.0	27270501
eCl@ss 10.0	27270501
eCl@ss 11.0	27270501

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eCl@ss 12.0	27270501
ETIM 5.0	EC001486
ETIM 6.0	EC001486
ETIM 7.0	EC001486
ETIM 8.0	EC001486
UNSPSC 16.0901	41112113

Dimensional drawing (Dimensions in mm (inch))

Through hollow shaft, M12 and M23 radial male connector



General tolerances according to DIN ISO 2768-mk ① Cable diameter = 5.6 mm +/- 0.2 mm bend radius = 30 mm

#### **PIN** assignment



View of M23 male device connector on encoder

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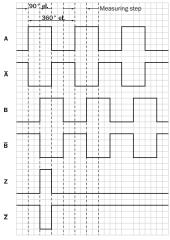
PIN Male connector M12, 8-pin	PIN Male connec- tor M23, 12-pin	Wire colors (ca- ble connection)	TTL/HTL signal	Sin/Cos 1.0 V <sub>PP</sub>	Explanation
1	6	Brown	A	COS-	Signal wire
2	5	White	A	COS+	Signal wire
3	1	Black	В	SIN-	Signal wire
4	8	Pink	В	SIN+	Signal wire
5	4	Yellow	<sup>-</sup> z	<sup>-</sup> z	Signal wire
6	3	Purple	Z	Z	Signal wire
7	10	Blue	GND	GND	Ground connection
8	12	Red	+U <sub>S</sub>	+U <sub>S</sub>	Supply voltage
-	9	-	N.c.	N.c.	Not assigned
-	2	-	N.c.	N.c.	Not assigned
-	11	-	N.c.	N.c.	Not assigned
-	7 <sup>1)</sup>	Orange	0-SET <sup>1)</sup>	N.c.	Set zero pulse
Screen	Screen	Screen	Screen	Screen	Screen connected to housing on encoder side. Connected to ground on control side.

1)

For electrical interfaces only: M, U, V, W with 0-SET function on PIN 7 on M23 plug. The 0-SET input is used to set the zero pulse to the current shaft position. If the 0-SET input is applied to US for longer than 250 ms after it has previously been open or applied to GND for at least 1,000 ms, the current shaft position is assigned zero pulse signal "Z".

#### Diagrams

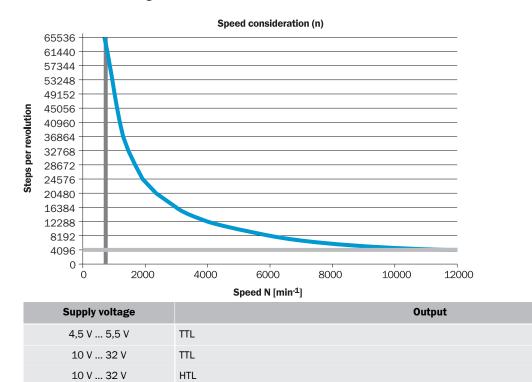
Signal outputs



CW with view on the encoder shaft in direction "A", compare dimensional drawing.

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Maximum revolution range



#### **Recommended accessories**

Other models and accessories -> www.sick.com/DFS60

	Brief description	Туре	Part no.		
Flanges					
Ŵ	Standard stator coupling	BEF-DS00XFX	2056812		
Other mountin	ng accessories				
9.	Bearing bracket for hollow shaft encoders, fastening screws included the Bearing Block is intended for very large radial and axial shaft loads. Particularly for application on: Belt pulleys, Chain pinions, Friction wheels. It is designed this way to enable fitting of encoder with blind hollow shaft with $\emptyset$ 12 mm., fastening screws included	BEF-FA-B12-010	2042728		
	Clamping ring for metal hollow shaft <sup>®</sup> , metal	BEF-KR-M	2064709		
Plug connectors and cables					
->-	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, shielded, 2 m	DOL-2312-G02MLA3	2030682		
->-	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, halogen-free, shielded, 3 m	DOL-2312- GO3MMA3	2029213		

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	Brief description	Туре	Part no.
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, halogen-free, shielded, 5 m	DOL-2312- G05MMA3	2029214
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, shielded, 7 m	DOL-2312-G07MLA3	2030685
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, shielded, 10 m	DOL-2312-G10MLA3	2030688
->-	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, halogen-free, shielded, 10 m	DOL-2312- G10MMA3	2029215
->-	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, shielded, 15 m	DOL-2312-G15MLA3	2030692
->-	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, halogen-free, shielded, 1.5 m	DOL-2312- G1M5MA3	2029212
-	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, shielded, 20 m	DOL-2312-G20MLA3	2030695
->-	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, halogen-free, shielded, 20 m	DOL-2312- G20MMA3	2029216
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, shielded, 25 m	DOL-2312-G25MLA3	2030699
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, shielded, 30 m	DOL-2312-G30MLA3	2030702
->-	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, halogen-free, shielded, 30 m	DOL-2312- G30MMA3	2029217
	Head A: female connector, M23, 12-pin, straight Cable: HIPERFACE <sup>®</sup> , SSI, Incremental, shielded	D0S-2312-G02	2077057
(F=0)	Head A: female connector, M23, 12-pin, angled Cable: HIPERFACE <sup>®</sup> , SSI, Incremental, shielded	DOS-2312-W01	2072580

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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.

We have extensive experience in a wide range of industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services complete our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is "Sensor Intelligence."

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Online data sheet

