

# DFS60B-BEWA00512

DFS60

**INCREMENTAL ENCODERS** 





# Ordering information

Туре	Part no.
DFS60B-BEWA00512	1084645

Other models and accessories → www.sick.com/DFS60

Illustration may differ



#### Detailed technical data

#### Performance

Pulses per revolution	512 <sup>1)</sup>
Measuring step	90° electric/pulses per revolution
Measuring step deviation at binary number of lines	± 0.008°
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
0-set function via hardware pin	<b>√</b>
0-SET function	H-active, L = 0 - 3 V, H = $4.0 - U_s V^{(1)}$
Initialization time	30 ms
Output frequency	≤ 600 kHz
Load current	≤ 30 mA
Power consumption	≤ 0.7 W (without load)
4.5 V 5.5 V, TTL/RS-422	
Load current	≤ 30 mA
4.5 V 5.5 V, Open Collector	
Load current	≤ 30 mA
TTL/RS-422	
Load current	≤ 30 mA
Power consumption	≤ 0.7 W (without load)
HTL/Push pull	
Load current	≤ 30 mA
Power consumption	≤ 0.7 W (without load)
TTL/HTL	

 $<sup>^{1)}</sup>$  Only with devices with M23 connector in connection with electrical interfaces M, U, V and W.

Load current	≤ 30 mA
Power consumption	≤ 0.7 W (without load)
Open Collector	
Load current	≤ 30 mA
Power consumption	≤ 0.7 W (without load)

 $<sup>^{1)}</sup>$  Only with devices with M23 connector in connection with electrical interfaces M, U, V and W.

#### Electrical data

Connection type	Male connector, M23, 12-pin, radial
Supply voltage	4.5 32 V
Reference signal, number	1
Reference signal, position	90°, electric, logically gated with A and B
Reverse polarity protection	✓
Short-circuit protection of the outputs	<b>✓</b> ¹)
MTTFd: mean time to dangerous failure	300 years (EN ISO 13849-1) <sup>2)</sup>

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

#### Mechanical data

Mechanical design	Blind 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 shaft movement, axial static/dynamic	± 0.5 mm / ± 0.2 mm
Permissible shaft movement, radial static/dynamic	± 0.3 mm / ± 0.1 mm
Operating speed	≤ 6,000 min <sup>-1</sup> 1)
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

 $<sup>^{1)}</sup>$  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 61000-6-3	
Enclosure rating	IP67, Housing side, male connector (according to IEC 60529) 1)	

 $<sup>^{1)}</sup>$  With mating connector fitted.

<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

 $<sup>^{2)}</sup>$  Stationary position of the cable.

 $<sup>^{</sup>m 3)}$  Flexible position of the cable.

	IP65, shaft side (according to IEC 60529)
Permissible relative humidity	90 % (condensation of the optical scanning 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 (according to EN 60068-2-27)
Resistance to vibration	30 g, 10 Hz 2,000 Hz (according to EN 60068-2-6)

 $<sup>^{1)}</sup>$  With mating connector fitted.

## Classifications

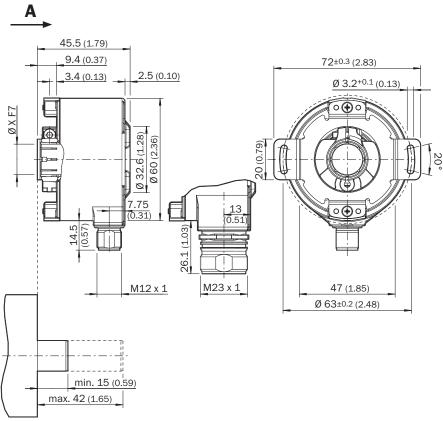
ECI@ss 5.0	27270501
ECI@ss 5.1.4	27270501
ECI@ss 6.0	27270590
ECI@ss 6.2	27270590
ECI@ss 7.0	27270501
ECI@ss 8.0	27270501
ECI@ss 8.1	27270501
ECI@ss 9.0	27270501
ECI@ss 10.0	27270501
ECI@ss 11.0	27270501
ETIM 5.0	EC001486
ETIM 6.0	EC001486
ETIM 7.0	EC001486
UNSPSC 16.0901	41112113

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

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

## Dimensional drawing (Dimensions in mm (inch))

Blind hollow shaft, radial male connector M12 and M23



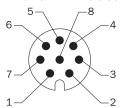
General tolerances according to DIN ISO 2768-mk

Type Blind hollow shaft	Shaft diameter XF7	Shaft diameter xj7
DFS60x-BAxxxxxxxx	6 mm	Provided by customer
DFS60x-BBxxxxxxxx	8 mm	
DFS60x-BCxxxxxxxx	3/8"	
DFS60x-BDxxxxxxxx	10 mm	
DFS60x-BExxxxxxxx	12 mm	
DFS60x-BFxxxxxxxxx	1/2"	
DFS60x-BGxxxxxxxx	14 mm	
DFS60x-BHxxxxxxxxx	15 mm	
DFS60x-BJxxxxxxxxx	5/8"	

## PIN assignment

#### Cable, 8-wire

View of M12 male device connector on encoder



View of M23 male device connector on encoder

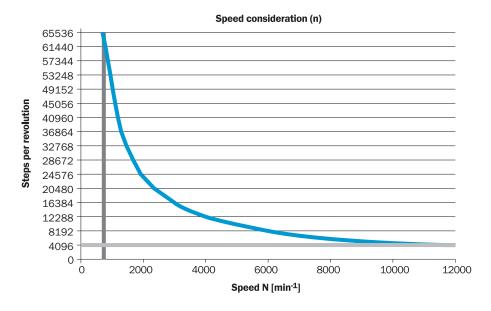


PIN, 8-pin, M12 male connector	PIN, 12-pin, M23 male connector	Color of the wires for encoders with cable outlet	TTL/HTL signal	Sin/cos 1.0 V <sub>ss</sub>	Explanation
1	6	Brown	_A	COS-	Signal wire
2	5	White	A	COS+	Signal wire
3	1	Black	_В	SIN-	Signal wire
4	8	Pink	В	SIN+	Signal wire
5	4	Yellow	_Z	_Z	Signal wire
6	3	Violet	Z	Z	Signal wire
7	10	Blue	GND	GND	Ground connection of the encoder
8	12	Red	+U <sub>s</sub>	+U <sub>s</sub>	Supply voltage (volt-free to housing)
-	9	-	n.c.	n.c.	Not assigned
-	2	-	n.c.	n.c.	Not assigned
-	11	-	n.c.	n.c.	Not assigned
-	7 1)	-	O-SET 1)	n.c.	Set zero pulse 1)
Screen	Screen	Screen	Screen	Screen	Screen connected to housing on encoder side.  Connected to ground on control side.

<sup>&</sup>lt;sup>1)</sup> For electrical interfaces only: M, U, V, W with 0-SET function on PIN 7 on M23 male connector. The 0-SET input is used to set the zero pulse on the current shaft position. If the 0-SET input is connected to U<sub>S</sub> for longer than 250 ms after it had previously been unassigned for at least 1,000 ms or had been connected to the GND, the current position of the shaft is assigned to the zero pulse signal "Z".

# Maximum revolution range

Maximum revolution range



#### Recommended accessories

Other models and accessories → www.sick.com/DFS60

	Brief description	Туре	Part no.		
Flanges					
	Standard stator coupling	BEF-DS00XFX	2056812		
Other mounting	ng accessories				
	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 Ø 12 mm., fastening screws included	BEF-FA-B12-010	2042728		
	Clamping ring for metal hollow shaft, metal	BEF-KR-M	2064709		
Plug connecto	ors and cables				
-	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, shielded, 2 m	DOL-2312-G02MLD1	2062202		
-	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, halogen-free, shielded, 3 m	DOL-2312- G03MMD1	2062243		
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, halogen-free, shielded, 5 m	DOL-2312- G05MMD1	2062244		

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# **INCREMENTAL ENCODERS**

	Brief description	Туре	Part no.
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, shielded, 7 m	DOL-2312-G07MLD1	2062203
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, shielded, 10 m	DOL-2312-G10MLD1	2062204
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, halogen-free, shielded, 10 m	DOL-2312- G10MMD1	2062245
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, shielded, 15 m	DOL-2312-G15MLD1	2062205
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, halogen-free, shielded, 1.5 m	DOL-2312- G1M5MD1	2062240
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, shielded, 20 m	DOL-2312-G20MLD1	2062206
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, halogen-free, shielded, 20 m	DOL-2312- G20MMD1	2062246
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, shielded, 25 m	DOL-2312-G25MLD1	2062207
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, shielded, 30 m	DOL-2312-G30MLD1	2062208
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: Incremental, PUR, halogen-free, shielded, 30 m	DOL-2312- G30MMD1	2062247
	Head A: female connector, M23, 12-pin, straight Head B: - Cable: HIPERFACE <sup>®</sup> , SSI, Incremental, shielded	DOS-2312-G02	2077057
(H)-0	Head A: female connector, M23, 12-pin, angled Head B: -	DOS-2312-W01	2072580
	Cable: HIPERFACE <sup>®</sup> , SSI, Incremental, shielded		

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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.

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For us, that is "Sensor Intelligence."

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