



DFS60I-S1EC01024

DFS60

INCREMENTAL ENCODERS

SICK
Sensor Intelligence.



Ordering information

Type	part no.
DFS60I-S1EC01024	1111704

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

Illustration may differ



Detailed technical data

Safety-related parameters

MTTF_D (mean time to dangerous failure)	300 years (EN ISO 13849-1) ¹⁾
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¹⁾ 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.

Performance

Pulses per revolution	1,024 ¹⁾
Measuring step	90°, electric/pulses per revolution
Measuring step deviation at binary number of lines	± 0.008°
Error limits	± 0.03°

¹⁾ 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	≤ 820 kHz
Load current	≤ 30 mA
Operating current	40 mA (without load)
Power consumption	≤ 0.5 W (without load)
Load resistance	≥ 120 Ω

Electronics

Connection type	Male connector, M12, 8-pin, radial
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¹⁾ Short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

Supply voltage	10 ... 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	✓ ¹⁾

¹⁾ Short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

Mechanics

Mechanical design	Solid shaft, Servo flange
Shaft diameter	6 mm With flat
Shaft length	10 mm
Weight	+ 0.5 kg
Shaft material	Stainless steel V2A
Flange material	Stainless steel V2A
Housing material	Stainless steel V2A
Start up torque	1 Ncm (+20 °C)
Operating torque	0.5 Ncm (+20 °C)
Permissible shaft loading	80 N (radial) 40 N (axial)
Operating speed	≤ 9,000 min ⁻¹ ¹⁾
Moment of inertia of the rotor	6.2 gcm ²
Bearing lifetime	3.6 x 10 ¹⁰ revolutions
Angular acceleration	≤ 500,000 rad/s ²

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	IP67, housing side (IEC 60529) ¹⁾ IP67, shaft side (IEC 60529)
Permissible relative humidity	90 % (Condensation not permitted)
Operating temperature range	-40 °C ... +100 °C ²⁾ -30 °C ... +100 °C ³⁾
Storage temperature range	-40 °C ... +100 °C, without package
Resistance to shocks	100 g, 6 ms (EN 60068-2-27)
Resistance to vibration	10 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)

¹⁾ With mating connector fitted.

²⁾ Stationary position of the cable.

³⁾ Flexible position of the cable.

Certificates

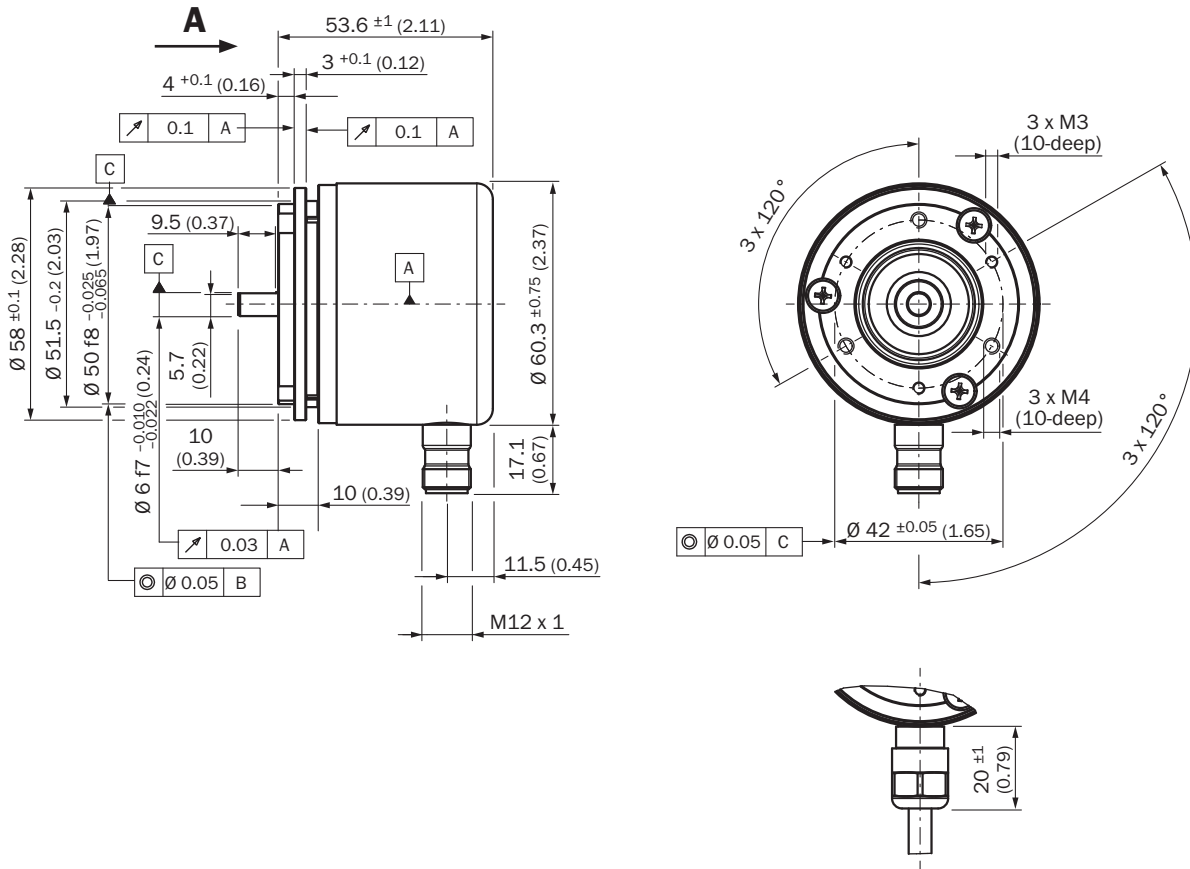
EU declaration of conformity	✓
UK declaration of conformity	✓
ACMA declaration of conformity	✓
Moroccan declaration of conformity	✓

China RoHS	✓
cULus certificate	✓
Information according to Art. 3 of Data Act (Regulation EU 2023/2854)	✓

Classifications

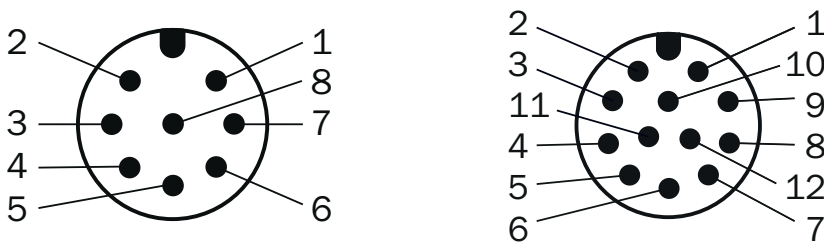
ECLASS 5.0	27270501
ECLASS 5.1.4	27270501
ECLASS 6.0	27270590
ECLASS 6.2	27270590
ECLASS 7.0	27270501
ECLASS 8.0	27270501
ECLASS 8.1	27270501
ECLASS 9.0	27270501
ECLASS 10.0	27270501
ECLASS 11.0	27270501
ECLASS 12.0	27270501
ETIM 5.0	EC001486
ETIM 6.0	EC001486
ETIM 7.0	EC001486
ETIM 8.0	EC001486
UNSPSC 16.0901	41112113

Dimensional drawing



Dimensions in mm (inch)

PIN assignment

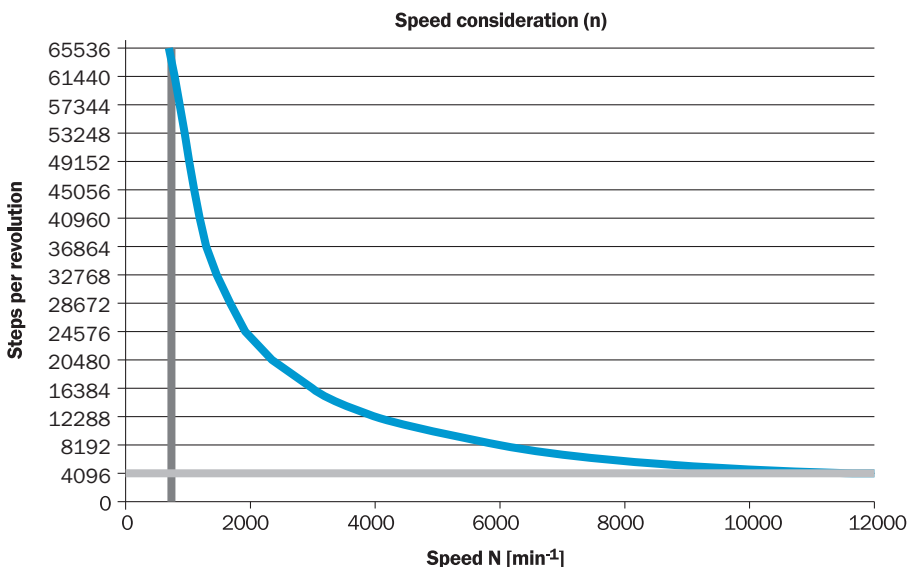


view of M12 male device connector on encoder

Male connector M12, 8-pin	Connector M12, 12-pin	Wire colors (cable connection)	TTL/HTL signal	Sin/Cos 1.0 V _{PP}	Explanation
1	7	Brown	\bar{A}	COS-	Signal wire
2	6	White	A	COS+	Signal wire
3	9	Black	\bar{B}	SIN-	Signal wire
4	8	Pink	B	SIN+	Signal wire
5	4	Yellow	\bar{Z}	\bar{Z}	Signal wire

Male connector M12, 8-pin	Connector M12, 12-pin	Wire colors (cable connection)	TTL/HTL signal	Sin/Cos 1.0 V _{pp}	Explanation
6	11	Purple	Z	Z	Signal wire
7	12	Blue	GND	GND	Ground connection
8	5	Red	+U _S	+U _S	Supply voltage
-	2	-	N.c.	N.c.	Not assigned
-	3	-	N.c.	N.c.	Not assigned
-	1	-	N.c.	N.c.	Not assigned
-	10 ¹⁾	-	0-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.

maximum revolution range



signal outputs






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

Supply voltage	Output
4,5 V ... 5,5 V	TTL
10 V ... 32 V	TTL
10 V ... 32 V	HTL

Recommended accessories

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

	Brief description	Type	part no.
shaft adaptation			
	<ul style="list-style-type: none"> Product segment: Shaft adaptation Product: Shaft couplings Description: Bellows coupling, shaft diameter 6 mm / 10 mm, maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular $\pm 4^\circ$; max. speed 10,000 rpm, -30°C to $+120^\circ\text{C}$, max. torque 120 Ncm; material: stainless steel bellows, aluminum hub 	KUP-0610-B	5312982
	<ul style="list-style-type: none"> Product segment: Shaft adaptation Product: Shaft couplings Description: Double loop coupling, shaft diameter 6 mm / 10 mm, max. shaft offset: radially ± 2.5 mm, axially ± 3 mm, angle ± 10 degrees; max. speed 3,000 rpm, -30 to $+80$ degrees Celsius, torsional spring stiffness of 25 Nm/rad 	KUP-0610-D	5326697
	<ul style="list-style-type: none"> Product segment: Shaft adaptation Product: Shaft couplings Description: Spring washer coupling, shaft diameter 6 mm / 10 mm, Maximum shaft offset: radial ± 0.3 mm, axial ± 0.4 mm, angular $\pm 2.5^\circ$; max. speed 12,000 rpm, -10° to $+80^\circ\text{C}$, max. torque 60 Ncm; material: aluminum flange, glass fiber-reinforced polyamide membrane and hardened steel coupling pin 	KUP-0610-F	5312985
	<ul style="list-style-type: none"> Product segment: Shaft adaptation Product: Shaft couplings Description: Bar coupling, shaft diameter 6 mm / 10 mm, max. shaft offset: radial ± 0.3 mm, axial ± 0.3 mm, angular $\pm 3^\circ$; max. speed 10,000 rpm, -10° to $+80^\circ\text{C}$, max. torque: 80 Ncm, material: fiber-glass reinforced polyamide, aluminum hub 	KUP-0610-S	2056407
	<ul style="list-style-type: none"> Product segment: Shaft adaptation Product: Shaft couplings Description: Claw coupling, shaft diameter 6 mm / 10 mm, damping element 80 shore blue, maximum shaft offset: radial ± 0.22 mm, axial ± 1 mm angular $\pm 1.3^\circ$, max. speed 19,000 rpm, angle of twist max. 10°, -30°C to $+80^\circ\text{C}$, max. torque 800 Ncm, tightening torque of screws: ISO 4029 150 Ncm, material: aluminum flange, damping element: polyurethane 	KUP-0610-J	2127056
	<ul style="list-style-type: none"> Product segment: Shaft adaptation Product: Shaft couplings Description: Bellows coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular $\pm 4^\circ$; max. speed 10,000 rpm, -30°C to $+120^\circ\text{C}$, max. torque 120 Ncm; material: stainless steel bellows, aluminum hub 	KUP-0606-B	5312981
	<ul style="list-style-type: none"> Product segment: Shaft adaptation Product: Shaft couplings Description: Double-loop coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular $\pm 10^\circ$; max. speed 3,000 rpm, -30°C to $+80^\circ\text{C}$, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange 	KUP-0606-D	5340152
	<ul style="list-style-type: none"> Product segment: Shaft adaptation Product: Shaft couplings Description: Cross-slotted coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$; max. speed 10,000 rpm, -10° to $+80^\circ\text{C}$, max. torque 80 Ncm; material: fiber-glass reinforced polyamide, aluminum hub 	KUP-0606-S	2056406
	<ul style="list-style-type: none"> Product segment: Shaft adaptation Product: Shaft couplings Description: Bar coupling, shaft diameter 6 mm / 8 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub 	KUP-0608-S	5314179
	<ul style="list-style-type: none"> Product segment: Shaft adaptation Product: Shaft couplings Description: Claw coupling, shaft diameter 6 mm / 6 mm, damping element 80 shore blue, maximum shaft offset: radial ± 0.22 mm, axial ± 1 mm angular $\pm 1.3^\circ$, max. speed 19,000 rpm, angle of twist max. 10°, -30°C to $+80^\circ\text{C}$, max. torque 800 Ncm, tightening torque of screws: ISO 4029 150 Ncm, material: aluminum flange, damping element: polyurethane 	KUP-0606-J	2127057

	Brief description	Type	part no.
Mounting systems			
	<ul style="list-style-type: none"> Description: Bearing block for servo and face mount flange encoder. The heavy-duty bearing block is used to absorb very large radial and axial shaft loads. Particularly when using belt pulleys, chain sprockets, friction wheels. Operating speed max. 4,000 rpm⁻¹, axial shaft load 150 N, radial shaft load 250 N, bearing service life 3.6 x 10⁹ revolutions 	BEF-FA-LB1210	2044591
	<ul style="list-style-type: none"> Description: Mounting bell for encoder with servo flange, 50 mm spigot Items supplied: Mounting kit included 	BEF-MG-50	5312987
	<ul style="list-style-type: none"> Description: Servo clamps, large, for servo flange (clamps, eccentric fastener), 3 pcs, without mounting material Items supplied: Without mounting hardware 	BEF-WK-SF	2029166
	<ul style="list-style-type: none"> Description: Mounting kit for servo flange encoder on the bearing block, 1 bar coupling SKPS 1520 06/06 1 hexagon socket wrench SW1.5 DIN 911, 3 mounting eccentric BEMN 1242 49 3 screws M4 x 10 DIN 912, 1 hexagon socket wrench SW3 DIN 911 Items supplied: 1 bar coupling SKPS 1520 06/06 1 hexagon socket wrench SW1.5 DIN 911, 3 mounting eccentric BEMN 1242 49 3 screws M4 x 10 DIN 912, 1 hexagon socket wrench SW3 DIN 911 	BEF-MK-LB	5320872

	Brief description	Type	part no.
measuring wheels and measuring wheel mechanics			
	<ul style="list-style-type: none"> • Product segment: Measuring wheels and measuring wheel mechanics • Product: Measuring wheels • Description: Aluminium measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm 	BEF-MR006020R	2055222
	<ul style="list-style-type: none"> • Product segment: Measuring wheels and measuring wheel mechanics • Product: Measuring wheels • Description: Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm 	BEF-MR006030R	2055634
	<ul style="list-style-type: none"> • Product segment: Measuring wheels and measuring wheel mechanics • Product: Measuring wheels • Description: Aluminium measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 500 mm 	BEF-MR006050R	2055225
	<ul style="list-style-type: none"> • Product segment: Measuring wheels and measuring wheel mechanics • Product: Measuring wheels • Description: Aluminum measuring wheel with cross-knurled surface for 6 mm solid shaft, circumference 200 mm 	BEF-MR06200AK	4084745
	<ul style="list-style-type: none"> • Product segment: Measuring wheels and measuring wheel mechanics • Product: Measuring wheels • Description: Aluminum measuring wheel with smooth polyurethane surface for 6 mm solid shaft, circumference 200 mm 	BEF-MR06200AP	4084746
	<ul style="list-style-type: none"> • Product segment: Measuring wheels and measuring wheel mechanics • Product: Measuring wheels • Description: Aluminum measuring wheel with ridged polyurethane surface for 6 mm solid shaft, circumference 200 mm 	BEF-MR06200APG	4084748
	<ul style="list-style-type: none"> • Product segment: Measuring wheels and measuring wheel mechanics • Product: Measuring wheels • Description: Aluminum measuring wheel with studded polyurethane surface for 6 mm solid shaft, circumference 200 mm 	BEF-MR06200APN	4084747

	Brief description	Type	part no.
connectors and cables			
	<ul style="list-style-type: none"> Description: Incremental, shielded, SSI Connection type head A: Female connector, M12, 8-pin, straight Connection type head B: Flying leads Signal type: Incremental, SSI Cable: 2 m, 8-wire, PUR, halogen-free Connection systems: Flying leads Application: Drag chain operation, Zones with oils and lubricants 	DOL-1208-G02MAC1	6032866
	<ul style="list-style-type: none"> Description: Incremental, shielded, SSI Connection type head A: Female connector, M12, 8-pin, straight, A-coded Connection type head B: Flying leads Signal type: Incremental, SSI Cable: 2 m, 8-wire, PUR, halogen-free Connection systems: Flying leads 	DOL-1208-G02MIE1	2120313
	<ul style="list-style-type: none"> Description: Incremental, shielded, SSI Connection type head A: Female connector, M12, 8-pin, straight Connection type head B: Flying leads Signal type: Incremental, SSI Cable: 5 m, 8-wire, PUR, halogen-free Connection systems: Flying leads Application: Drag chain operation, Zones with oils and lubricants 	DOL-1208-G05MAC1	6032867
	<ul style="list-style-type: none"> Description: Incremental, shielded, SSI Connection type head A: Female connector, M12, 8-pin, straight Connection type head B: Flying leads Signal type: Incremental, SSI Cable: 10 m, 8-wire, PUR, halogen-free Connection systems: Flying leads Application: Drag chain operation, Zones with oils and lubricants 	DOL-1208-G10MAC1	6032868
	<ul style="list-style-type: none"> Description: Incremental, shielded, SSI Connection type head A: Female connector, M12, 8-pin, straight Connection type head B: Flying leads Signal type: Incremental, SSI Cable: 20 m, 8-wire, PUR, halogen-free Connection systems: Flying leads Application: Drag chain operation, Zones with oils and lubricants 	DOL-1208-G20MAC1	6032869
	<ul style="list-style-type: none"> Description: Incremental, shielded, SSI Connection type head A: Female connector, M12, 8-pin, straight Connection type head B: Flying leads Signal type: Incremental, SSI Cable: 25 m, 8-wire, PUR, halogen-free Connection systems: Flying leads Application: Drag chain operation, Zones with oils and lubricants 	DOL-1208-G25MAC1	6067859
	<ul style="list-style-type: none"> Description: Shielded Connection type head A: Male connector, M12, 8-pin, straight, A-coded Connection systems: Screw-type terminals Permitted cross-section: ≤ 0.5 mm² Application: Hygienic and washdown zones 	YM12ES8-0050S5586A	2097337
	<ul style="list-style-type: none"> Description: Incremental, shielded, SSI Connection type head A: Female connector, M12, 8-pin, straight, A-coded Signal type: Incremental, SSI Cable: CAT5, CAT5e Connection systems: IDC quick connection Permitted cross-section: 0.14 mm² ... 0.34 mm² 	DOS-1208-GA01	6045001
	<ul style="list-style-type: none"> Description: Shielded Connection type head A: Female connector, M12, 8-pin, straight, A-coded Connection systems: Screw-type terminals Permitted cross-section: 0.25 mm² ... 0.5 mm² Application: Hygienic and washdown zones 	YF12ES8-0050S5586A	2097334

SICK AT A GLANCE

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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