

DFS60A-TEEC32768

DFS60

INCREMENTAL ENCODERS





Ordering information

Туре	Part no.
DFS60A-TEEC32768	1037014

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

Illustration may differ



Detailed technical data

Performance

Pulses per revolution	32,768 ¹⁾
Measuring step	90°, electric/pulses per revolution
Measuring step deviation at binary number of lines	± 0.0015°
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
Power consumption	≤ 0.5 W (without load)

Electrical data

Connection type	Male connector, M12, 8-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	✓
Short-circuit protection of the outputs	✓ ¹)
MTTFd: mean time to dangerous failure	300 years (EN ISO 13849-1) ²⁾

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

²⁾ 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.

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	± 0.05 mm (radial) ± 0.01 mm (axial)
Operating speed	≤ 6,000 min ^{-1 1)}
Moment of inertia of the rotor	40 gcm ²
Bearing lifetime	3.6 x 10^10 revolutions
Angular acceleration	≤ 500,000 rad/s²

 $^{^{1)}}$ 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) 1) IP65, 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	30 g, 10 Hz 2,000 Hz (EN 60068-2-6)

¹⁾ With mating connector fitted.

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

²⁾ Stationary position of the cable.

³⁾ Flexible position of the cable.

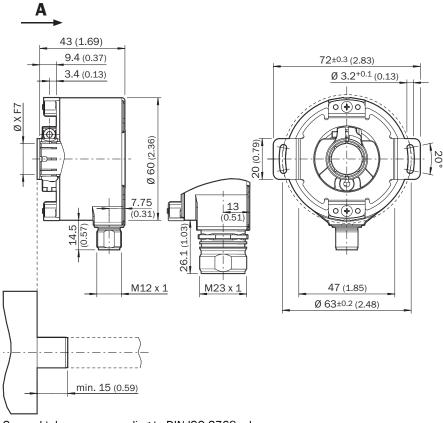
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INCREMENTAL ENCODERS

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

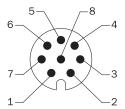
Dimensional drawing (Dimensions in mm (inch))

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



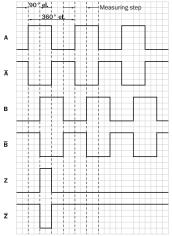
View of M12 male device connector on encoder

housing on encoder side. Connected to	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 _{PP}	Explanation
3 1 Black B SIN- Signal wire 4 8 Pink B SIN+ Signal wire 5 4 Yellow Z Z Signal wire 6 3 Purple Z Z Signal wire 7 10 Blue GND GND Ground connection 8 12 Red +Us +Us Supply voltage - 9 - N.c. N.c. Not assigned - 2 - N.c. N.c. Not assigned - 11 - N.c. N.c. N.c. Set zero pulse 1) Orange O-SET 1 N.c. Screen Screen connected to housing on encoder side. Connected to	1	6	Brown	_A	COS-	Signal wire
4 8 Pink B SIN+ Signal wire 5 4 Yellow Z Z Signal wire 6 3 Purple Z Z Signal wire 7 10 Blue GND GND Ground connection 8 12 Red +Us +Us Supply voltage - 9 - N.c. N.c. Not assigned - 2 - N.c. N.c. Not assigned - 11 - N.c. N.c. N.c. Not assigned - 7 Orange O-SET 1) N.c. Set zero pulse 1) Screen Screen Screen Screen connected to housing on encoder side. Connected to	2	5	White	Α	COS+	Signal wire
5 4 Yellow TZ TZ Signal wire 6 3 Purple Z Z Signal wire 7 10 Blue GND GND Ground connection 8 12 Red +Us +Us Supply voltage - 9 - N.c. N.c. Not assigned - 2 - N.c. N.c. Not assigned - 11 - N.c. N.c. Not assigned - 7 Orange O-SET 1) N.c. Set zero pulse 1) Screen Screen Screen Screen connected to housing on encoder side. Connected to	3	1	Black	⁻ в	SIN-	Signal wire
6 3 Purple Z Z Signal wire 7 10 Blue GND GND Ground connection 8 12 Red +U _S +U _S Supply voltage - 9 - N.c. N.c. Not assigned - 2 - N.c. N.c. Not assigned - 11 - N.c. N.c. Not assigned - 7 Orange 0-SET 1 N.c. Set zero pulse 1) Screen Screen Screen connected to housing on encoder side. Connected to	4	8	Pink	В	SIN+	Signal wire
7 10 Blue GND GND Ground connection 8 12 Red +U _S +U _S Supply voltage - 9 - N.c. N.c. N.c. Not assigned - 11 - N.c. N.c. N.c. Not assigned - 7 1 Orange O-SET 1 N.c. Set zero pulse 1) Screen	5	4	Yellow	_Z	_Z	Signal wire
8 12 Red +U _S +U _S Supply voltage - 9 - N.c. N.c. N.c. Not assigned - 2 - N.c. N.c. N.c. Not assigned - 11 - N.c. N.c. Not assigned - 7 1) Orange O-SET 1) N.c. Set zero pulse 1) Screen Screen Screen Screen Screen Screen Screen connected to housing on encoder side. Connected to	6	3	Purple	Z	Z	Signal wire
- 9 - N.c. N.c. Not assigned - 2 - N.c. N.c. Not assigned - 11 - N.c. N.c. Not assigned - 7 1 Orange O-SET 1 N.c. Set zero pulse 1) Screen Screen Screen Screen Screen Screen Screen Screen connected to housing on encoder side. Connected to	7	10	Blue	GND	GND	Ground connection
- 2 - N.c. N.c. Not assigned - 11 - N.c. N.c. Not assigned - 7 1) Orange O-SET 1) N.c. Set zero pulse 1) Screen Screen Screen Screen Screen Screen Screen connected to housing on encoder side. Connected to	8	12	Red	+U _S	+U _S	Supply voltage
- 11 - N.c. N.c. Not assigned - 7 1) Orange O-SET 1) N.c. Set zero pulse 1) Screen Screen Screen Screen Screen Screen Screen connected to housing on encoder side. Connected to	-	9	-	N.c.	N.c.	Not assigned
- 7 ¹⁾ Orange O-SET ¹⁾ N.c. Set zero pulse 1) Screen Screen Screen Screen Screen Screen connected to housing on encoder side. Connected to	-	2	-	N.c.	N.c.	Not assigned
Screen Screen Screen Screen Screen Screen Screen Screen connected to housing on encoder side. Connected to	-	11	-	N.c.	N.c.	Not assigned
housing on encoder side. Connected to	-	7 1)	Orange	0-SET ¹⁾	N.c.	
side.	Screen	Screen	Screen	Screen	Screen	side. Connected to ground on control

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".

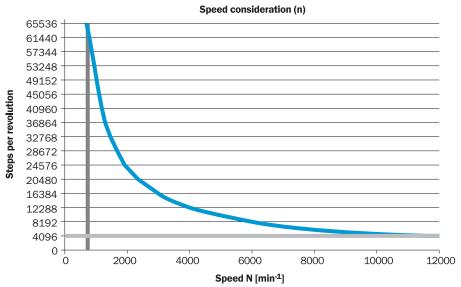
Diagrams

Signal outputs



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

Maximum revolution range



Supply voltage	Output
4,5 V 5,5 V	ΠL
10 V 32 V	ΠL
10 V 32 V	HTL

Recommended accessories

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

	Brief description	Туре	Part no.
Flanges			
	Standard stator coupling	BEF-DS00XFX	2056812
Other mount	ing 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 \emptyset 12 mm., fastening screws included	BEF-FA-B12-010	2042728
	Clamping ring for metal hollow shaft [©] , metal	BEF-KR-M	2064709
Plug connect	cors and cables		
~	Head A: female connector, M12, 8-pin, straight Head B: Flying leads Cable: Incremental, SSI, PUR, halogen-free, shielded, 2 m	DOL-1208-G02MAC1	6032866
	Head A: female connector, M12, 8-pin, straight Head B: Flying leads Cable: Incremental, SSI, PUR, halogen-free, shielded, 5 m	DOL-1208-G05MAC1	6032867

	Brief description	Туре	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: Flying leads Cable: Incremental, SSI, PUR, halogen-free, shielded, 10 m	DOL-1208-G10MAC1	6032868
	Head A: female connector, M12, 8-pin, straight Head B: Flying leads Cable: Incremental, SSI, PUR, halogen-free, shielded, 20 m	DOL-1208-G20MAC1	6032869
	Head A: female connector, M12, 8-pin, angled Head B: Flying leads Cable: PVC, shielded, 2 m	DOL-1208-W02MA	6020992
	Head A: female connector, M12, 8-pin, angled Head B: Flying leads Cable: HIPERFACE [®] , Incremental, PUR, halogen-free, shielded, 2 m	DOL-1208-W02MAC1	6037724
1/2	Head A: female connector, M12, 8-pin, angled Head B: Flying leads Cable: Sensor/actuator cable, PUR, halogen-free, shielded, 2 m	DOL-1208- W02MAS01	6029224
3	Head A: female connector, M12, 8-pin, angled Head B: Flying leads Cable: PUR, halogen-free, unshielded, 2 m	DOL-1208-W02MC	6035623
	Head A: female connector, M12, 8-pin, angled Head B: Flying leads Cable: PVC, shielded, 5 m	DOL-1208-W05MA	6021033
	Head A: female connector, M12, 8-pin, angled Head B: Flying leads Cable: HIPERFACE [®] , Incremental, PUR, halogen-free, shielded, 5 m	DOL-1208-W05MAC1	6037725
3	Head A: female connector, M12, 8-pin, angled Head B: Flying leads Cable: PUR, unshielded, 5 m	DOL-1208-W05MC	6035624
	Head A: female connector, M12, 8-pin, angled Head B: Flying leads Cable: HIPERFACE [®] , Incremental, PUR, halogen-free, shielded, 10 m	DOL-1208-W10MAC1	6037726
3	Head A: female connector, M12, 8-pin, angled Head B: Flying leads Cable: PUR, halogen-free, unshielded, 10 m	DOL-1208-W10MC	6035625
	Head A: female connector, M12, 8-pin, angled Head B: Flying leads Cable: HIPERFACE [®] , Incremental, PUR, shielded, 20 m	DOL-1208-W20MAC1	6037727
	Head A: female connector, M12, 8-pin, straight, A-coded Cable: Incremental, SSI, shielded	DOS-1208-GA01	6045001

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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.

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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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