

# DFS60B-S4PZ00S04

DFS60

**INCREMENTAL ENCODERS**

**SICK**  
Sensor Intelligence.

Illustration may differ

### Ordering information

Type	Part no.
DFS60B-S4PZ00S04	1100134

Other models and accessories → [www.sick.com/DFS60](http://www.sick.com/DFS60)



### Detailed technical data

#### Features

<b>Special device</b>	✓
<b>Specialty</b>	Cable, with male connector, M12, 8-pin, universal, 0.5 m
<b>Standard reference device</b>	DFS60B-S4PK10000, 1036722

#### Performance

<b>Pulses per revolution</b>	10,000 <sup>1)</sup>
<b>Measuring step</b>	90°, electric/pulses per revolution
<b>Measuring step deviation at non binary number of lines</b>	± 0.01°
<b>Error limits</b>	± 0.05°

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

#### Interfaces

<b>Communication interface</b>	Incremental
<b>Communication Interface detail</b>	TTL / HTL
<b>Factory setting</b>	Factory setting: output level TTL
<b>Number of signal channels</b>	6-channel
<b>Programmable/configurable</b>	✓
<b>Initialization time</b>	32 ms <sup>1)</sup> 30 ms
<b>Output frequency</b>	≤ 600 kHz
<b>Load current</b>	≤ 30 mA
<b>Power consumption</b>	≤ 0.7 W (without load)

<sup>1)</sup> With mechanical zero pulse width.

#### Electrical data

<b>Connection type</b>	Cable, 8-wire, with male connector, M12, 8-pin, universal, 0.5 m <sup>1)</sup>
<b>Supply voltage</b>	4.5 ... 32 V

<sup>1)</sup> The universal cable connection is positioned so that it is possible to lay it without bends in a radial or axial direction.

<sup>2)</sup> Programming TTL with ≥ 5.5 V: short-circuit opposite to another channel or GND permissible for maximum 30 s.

<sup>3)</sup> Programming HTL or TTL with < 5.5 V: short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

<sup>4)</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.

<b>Reference signal, number</b>	1
<b>Reference signal, position</b>	90°, electric, logically gated with A and B
<b>Reverse polarity protection</b>	✓
<b>Short-circuit protection of the outputs</b>	✓ <sup>2) 3)</sup>
<b>MTTFd: mean time to dangerous failure</b>	300 years (EN ISO 13849-1) <sup>4)</sup>

<sup>1)</sup> The universal cable connection is positioned so that it is possible to lay it without bends in a radial or axial direction.

<sup>2)</sup> Programming TTL with  $\geq 5.5$  V: short-circuit opposite to another channel or GND permissible for maximum 30 s.

<sup>3)</sup> Programming HTL or TTL with  $< 5.5$  V: short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

<sup>4)</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.

## Mechanical data

<b>Mechanical design</b>	Solid shaft, face mount flange
<b>Shaft diameter</b>	10 mm
<b>Shaft length</b>	19 mm
<b>Weight</b>	+ 0.3 kg
<b>Shaft material</b>	Stainless steel
<b>Flange material</b>	Aluminum
<b>Housing material</b>	Aluminum die cast
<b>Start up torque</b>	0.5 Ncm (+20 °C)
<b>Operating torque</b>	0.3 Ncm (+20 °C)
<b>Permissible shaft loading</b>	80 N (radial) 40 N (axial)
<b>Operating speed</b>	$\leq 9,000 \text{ min}^{-1}$ <sup>1)</sup>
<b>Moment of inertia of the rotor</b>	6.2 gcm <sup>2</sup>
<b>Bearing lifetime</b>	$3.6 \times 10^{10}$ revolutions
<b>Angular acceleration</b>	$\leq 500,000 \text{ rad/s}^2$

<sup>1)</sup> Allow for self-heating of 3.3 K per 1,000 rpm when designing the operating temperature range.

## Ambient data

<b>EMC</b>	According to EN 61000-6-2 and EN 61000-6-3
<b>Enclosure rating</b>	IP67, Housing side, male connector (IEC 60529) <sup>1)</sup> IP65, shaft side (IEC 60529)
<b>Permissible relative humidity</b>	90 % (Condensation not permitted)
<b>Operating temperature range</b>	-40 °C ... +100 °C <sup>2)</sup> -30 °C ... +100 °C <sup>3)</sup>
<b>Storage temperature range</b>	-40 °C ... +100 °C, without package
<b>Resistance to shocks</b>	70 g, 6 ms (EN 60068-2-27)
<b>Resistance to vibration</b>	30 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)

<sup>1)</sup> With mating connector fitted.

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

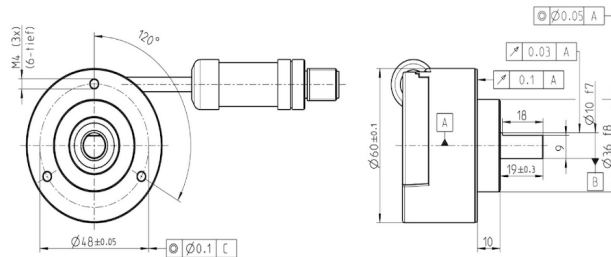
<sup>3)</sup> Flexible position of the cable.

## Classifications

<b>eCl@ss 5.0</b>	27270501
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<b>eCl@ss 5.1.4</b>	27270501
<b>eCl@ss 6.0</b>	27270590
<b>eCl@ss 6.2</b>	27270590
<b>eCl@ss 7.0</b>	27270501
<b>eCl@ss 8.0</b>	27270501
<b>eCl@ss 8.1</b>	27270501
<b>eCl@ss 9.0</b>	27270501
<b>eCl@ss 10.0</b>	27270501
<b>eCl@ss 11.0</b>	27270501
<b>eCl@ss 12.0</b>	27270501
<b>ETIM 5.0</b>	EC001486
<b>ETIM 6.0</b>	EC001486
<b>ETIM 7.0</b>	EC001486
<b>ETIM 8.0</b>	EC001486
<b>UNSPSC 16.0901</b>	41112113

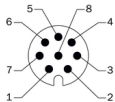
### Dimensional drawing (Dimensions in mm (inch))



### PIN assignment

#### Cable, 8-wire

View of M12 male device connector on encoder

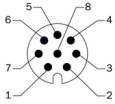


PIN, 8-pin, M12 male connector	Color of the wires for encoders with cable outlet	TTL/HTL signal	Explanation
1	Brown	"A	Signal wire
2	White	A	Signal wire
3	Black	"B	Signal wire
4	Pink	B	Signal wire
5	Yellow	"Z	Signal wire
6	Violet	Z	Signal wire
7	Blue	GND	Ground connection of the encoder
8	Red	+U <sub>s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

<sup>1)</sup> For electrical interfaces only: M, U, V, W with O-SET function on PIN 7 on M23 male connector. The O-SET input is used to set the zero pulse on the current shaft position. If the O-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".

**Cable, 8-wire**

View of M12 male device connector on encoder



PIN, 8-pin, M12 male connector	Color of the wires for encoders with cable outlet	TTL/HTL signal	Explanation
1	Brown	$\bar{A}$	Signal wire
2	White	A	Signal wire
3	Black	$\bar{B}$	Signal wire
4	Pink	B	Signal wire
5	Yellow	$\bar{Z}$	Signal wire
6	Violet	Z	Signal wire
7	Blue	GND	Ground connection of the encoder
8	Red	$+U_s$	Supply voltage (volt-free to housing)
-	-	n.c.	Not assigned
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-	-	O-SET <sup>1)</sup>	Set zero pulse <sup>1)</sup>
Screen	Screen	Screen	Screen connected to housing on encoder side. Connected to ground on control side.

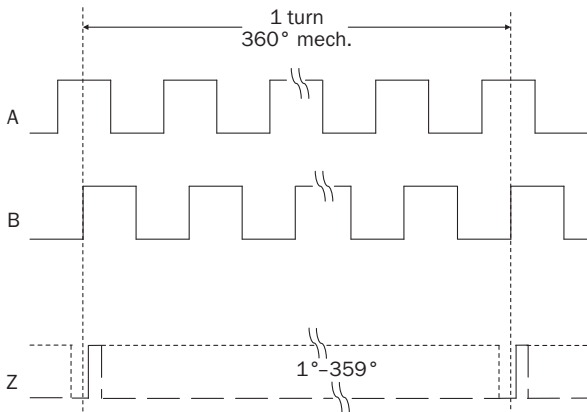
<sup>1)</sup> For electrical interfaces only: M, U, V, W with O-SET function on PIN 7 on M12 male connector. The O-SET input is used to set the zero pulse on the current shaft position. If the O-SET input is connected to U, for longer than 250 ms after it had previously been unassigned for at least 1,000 ms or had been connected to the GND, the current position of the shaft is assigned to the zero pulse signal "Z".

Type label



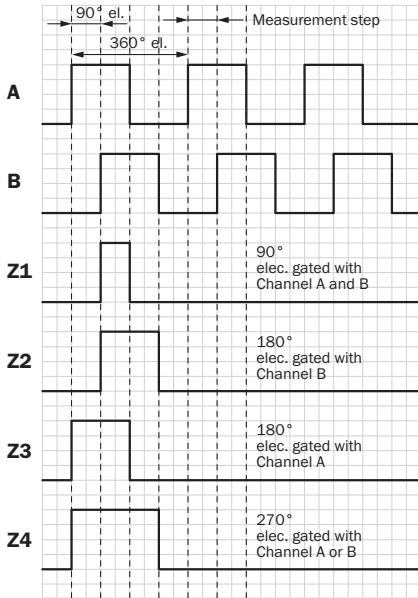
Diagrams

Mechanical zero pulse width 1° to 359° programmable. Width of the zero pulse in relation to a mechanical revolution of the shaft.



Supply voltage	Output
4,5 V ... 32 V	TTL/HTL programmable

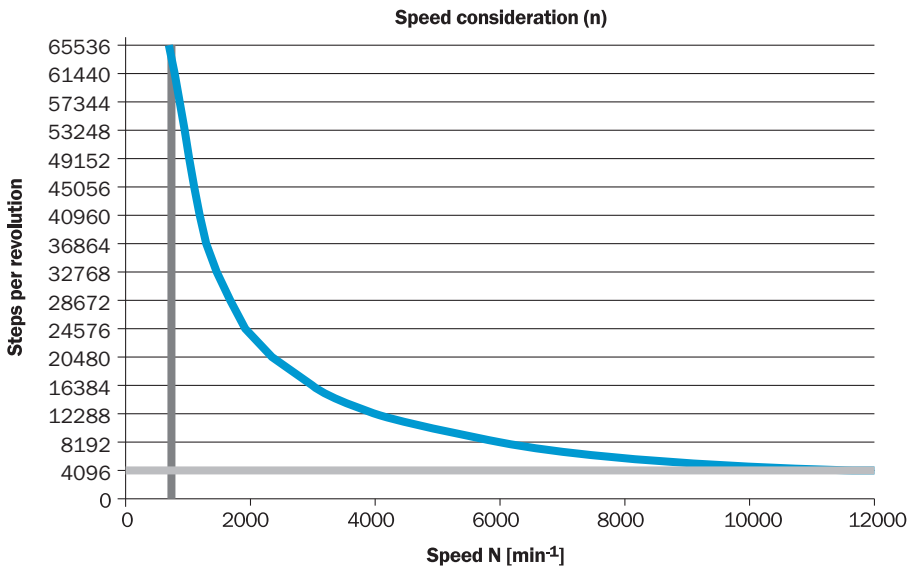
Electrical zero pulse width can be configured to 90°, 180°, or 270°. Width of the zero pulse in relation to a pulse period.



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

Supply voltage	Output
4,5 V ... 32 V	TTL/HTL programmable

Maximum revolution range



## 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.

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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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