DFS60B-S1PK00S03

DFS60

INCREMENTAL ENCODERS

SICK
Sensor Intelligence.

DFS60B-S1PK00S03 | DFS60
INCREMENTAL ENCODERS

Ordering information

Type	Part no.
DFS60B-S1PK00S03	1111736

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

Illustration may differ

Detailed technical data

Features

Special device	✔
Specialty	Pulses per revolution: preprogrammed to 3600
Standard reference device	1036757, DFS60B-S1PK10000

Safety-related parameters

MTTF$_D$ (mean time to dangerous failure)	300 years (EN ISO 13849-1) [1]

[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	3,600 [1]
Measuring step	90°, electric/pulses per revolution
Measuring step deviation at non binary number of lines	± 0.01°
Error limits	± 0.05°

[1] See maximum revolution range.

Interfaces

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

[1] With mechanical zero pulse width.

Electronics

Connection type	Cable, 8-wire, universal, 1.5 m [1]
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	✓ [2] [3]

[1] The universal cable connection is positioned so that it is possible to lay it without bends in a radial or axial direction.

[2] Programming TTL with ≥ 5.5 V: short-circuit opposite to another channel or GND permissable for maximum 30 s.

[3] Programming HTL or TTL with < 5.5 V: short-circuit opposite to another channel, US or GND permissable for maximum 30 s.

Mechanics

Mechanical design	Solid shaft, Servo flange
Shaft diameter	6 mm With face
Shaft length	10 mm
Weight	+ 0.3 kg
Shaft material	Stainless steel
Flange material	Aluminum
Housing material	Aluminum die cast
Start up torque	0.5 Ncm (+20 °C)
Operating torque	0.3 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 gcm²
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 61000-6-3
Enclosure rating	IP67, housing side, cable connection (IEC 60529) IP65, shaft side (IEC 60529)
Permissible relative humidity	90 % (Condensation not permitted)
Operating temperature range	–40 °C ... +100 °C [1] –30 °C ... +100 °C [2]
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] Stationary position of the cable.

[2] Flexible position of the cable.

Classifications

ECLASS 5.0	27270501

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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))
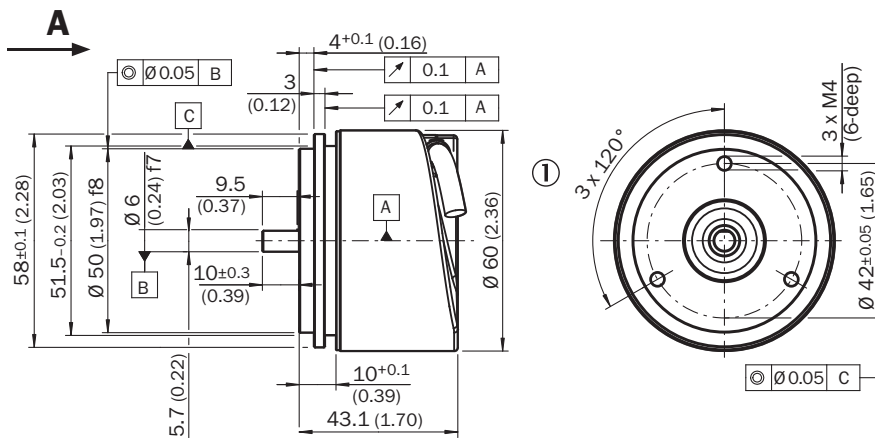
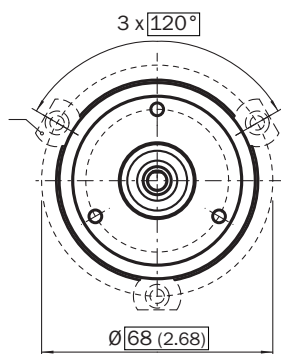① Cable diameter = 5.6 mm +/- 0.2 mm bend radius = 30 mm

Attachment specifications

Mounting requirements for half-shell servo clamp

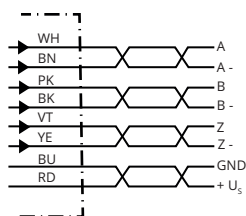4 x 90°

Ø 71 (2.80)
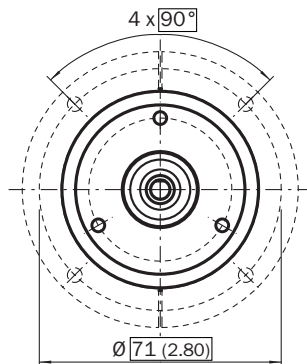
All dimensions in mm (inch)

Part no. 2029165

Mounting requirements for small servo clamp

3 x 120°

Ø 68 (2.68)

All dimensions in mm (inch)

Part no. 2029166

PIN assignment

WH	A
BN	A -
PK	B
BK	B -
VT	Z
YE	Z -
BU	GND
RD	+ U$_s$

| PIN Male connector M12, 8-pin	PIN Male connector M23, 12-pin	Wire colors (cable connection)	TTL/HTL signal	Sin/Cos 1.0 V$_{PP}$	Explanation
1	6	Brown	$\overline{A}$	COS-	Signal wire
2	5	White	A	COS+	Signal wire
3	1	Black	$\overline{B}$	SIN-	Signal wire
4	8	Pink	B	SIN+	Signal wire
5	4	Yellow	$\overline{Z}$	$\overline{Z}$	Signal wire
6	3	Purple	Z	Z	Signal wire

PIN Male connector M12, 8-pin	PIN Male connector M23, 12-pin	Wire colors (cable connection)	TTL/HTL signal	Sin/Cos 1.0 V$_{PP}$	Explanation
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 [1]	Orange	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.

[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".
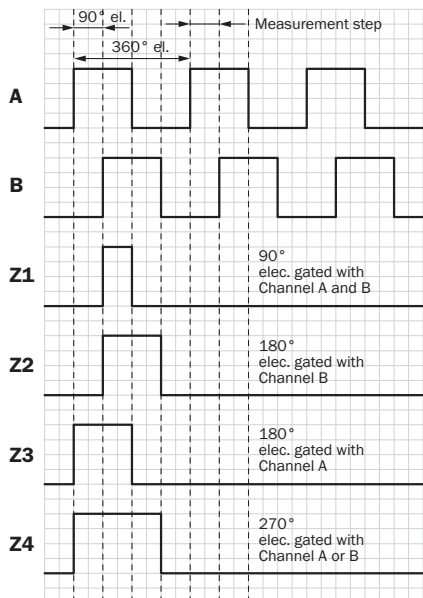
Diagrams

Mechanical zero pulse width 1° to 359° programmable. Width of the zero pulse in relation to a mechanical revolution of the shaft.
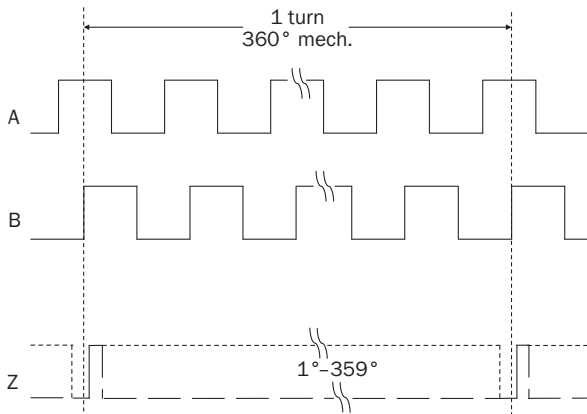
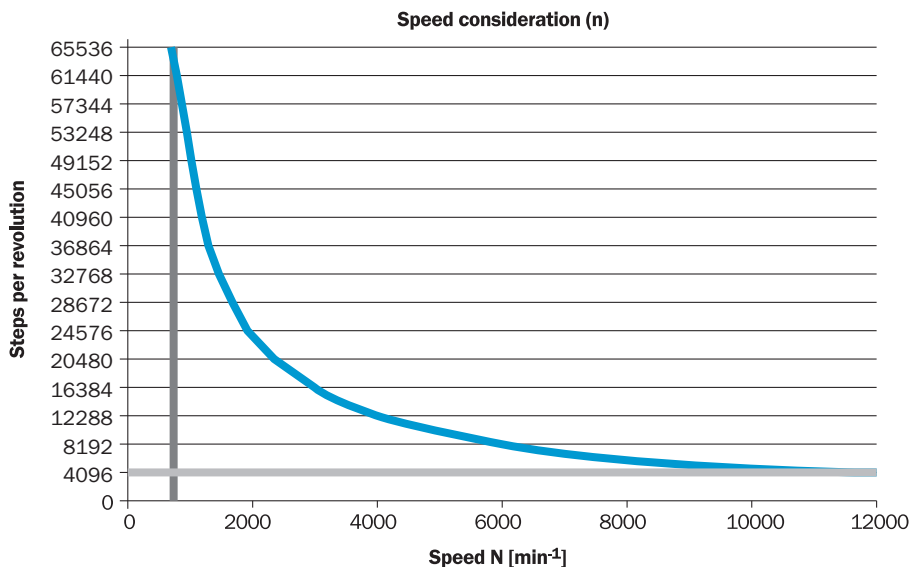| Supply voltage	Output
4,5 V … 32 V	TTL/HTL programmable

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.

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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