SICK.COM

DATA SHEET

# DBS60E-S1FA01000

DBS60
Incremental encoders

SICK Sensor Intelligence

Illustration may differ

## INCREMENTAL ENCODERS

# DBS60E-S1FA01000

### ORDERING INFORMATION

| Type | part no. |
|---|---|
| DBS60E-S1FA01000 | 1094652 |

Further device versions and accessories at www.sick.com/DBS60

## DETAILED TECHNICAL DATA

### SAFETY-RELATED PARAMETERS

| | |
|---|---|
| $MTTF_D$ (mean time to dangerous failure) | 500 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 | 1,000 |
| Measuring step | ≤ 90°, electric/pulses per revolution |
| Measuring step deviation | ± 18° / pulses per revolution |
| Error limits | Measuring step deviation x 3 |
| Duty cycle | ≤ 0.5 ± 5 % |

### INTERFACES

| | |
|---|---|
| Communication interface | Incremental |
| Communication Interface detail | TTL / HTL / HTL [1] |
| Number of signal channels | 6-channel |
| Initialization time | < 5 ms [2] |

[1] Output level depends on the supply voltage.

[2] Valid signals can be read once this time has elapsed.

[3] Up to 450 kHz on request.

| | |
|---|---|
| Output frequency | + 300 kHz [3] |
| Load current | ≤ 30 mA, per channel |
| Power consumption | ≤ 0.5 W (without load) |

[1] Output level depends on the supply voltage.

[2] Valid signals can be read once this time has elapsed.

[3] Up to 450 kHz on request.

## ELECTRONICS

| | |
|---|---|
| Connection type | Male connector, M23, 12-pin, radial |
| Supply voltage | 4.5 ... 30 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 permissable for maximum 30 s.

## MECHANICS

| | |
|---|---|
| Mechanical design | Solid shaft, Servo flange |
| Shaft diameter | 6 mm<br>With flat |
| Shaft length | 10 mm |
| Flange type / stator coupling | Flange with 3 x M3 and 3 x M4 |
| Weight | + 0.3 kg [1] |
| Shaft material | Stainless steel |
| Flange material | Aluminum |
| Housing material | Aluminum |
| Start up torque | + 1.2 Ncm (+20 °C) |
| Operating torque | 1.1 Ncm (+20 °C) |
| Permissible shaft loading | 100 N (radial) [2]<br>50 N (axial) [2] |
| Operating speed | 6,000 $min^{-1}$ [3] |
| Maximum operating speed | 9,000 $min^{-1}$ [4] |
| Moment of inertia of the rotor | 33 $gcm^2$ |
| Bearing lifetime | 3.6 x $10^9$ revolutions |
| Angular acceleration | ≤ 500,000 $rad/s^2$ |

[1] Based on encoder with male connector or cable with male connector.

[2] Higher values are possible using limited bearing life.

[3] Allow for self-heating of 3.2 K per 1,000 rpm when designing the operating temperature range.

[4] Maximum speed which does not cause mechanical damage to the encoder. Impact on the service life and signal quality is possible. Please note the maximum output frequency.

## AMBIENT DATA

| | |
|---|---|
| EMC | According to EN 61000-6-2 and EN 61000-6-3 |
| Enclosure rating | IP67, housing side (IEC 60529) [1]<br>IP65, shaft side (IEC 60529) |

[1] With mating connector fitted.

[2] These values relate to all mechanical versions including recommended accessories unless otherwise noted.

| | |
|---|---|
| Permissible relative humidity | 90 % (Condensation not permitted) |
| Operating temperature range | –30 °C ... +100 °C, at maximum 3,000 pulses per revolution [2] |
| Storage temperature range | –40 °C ... +100 °C, without package |
| Resistance to shocks | 250 g, 3 ms (EN 60068-2-27) |
| Resistance to vibration | 30 g, 10 Hz ... 2,000 Hz (EN 60068-2-6) |

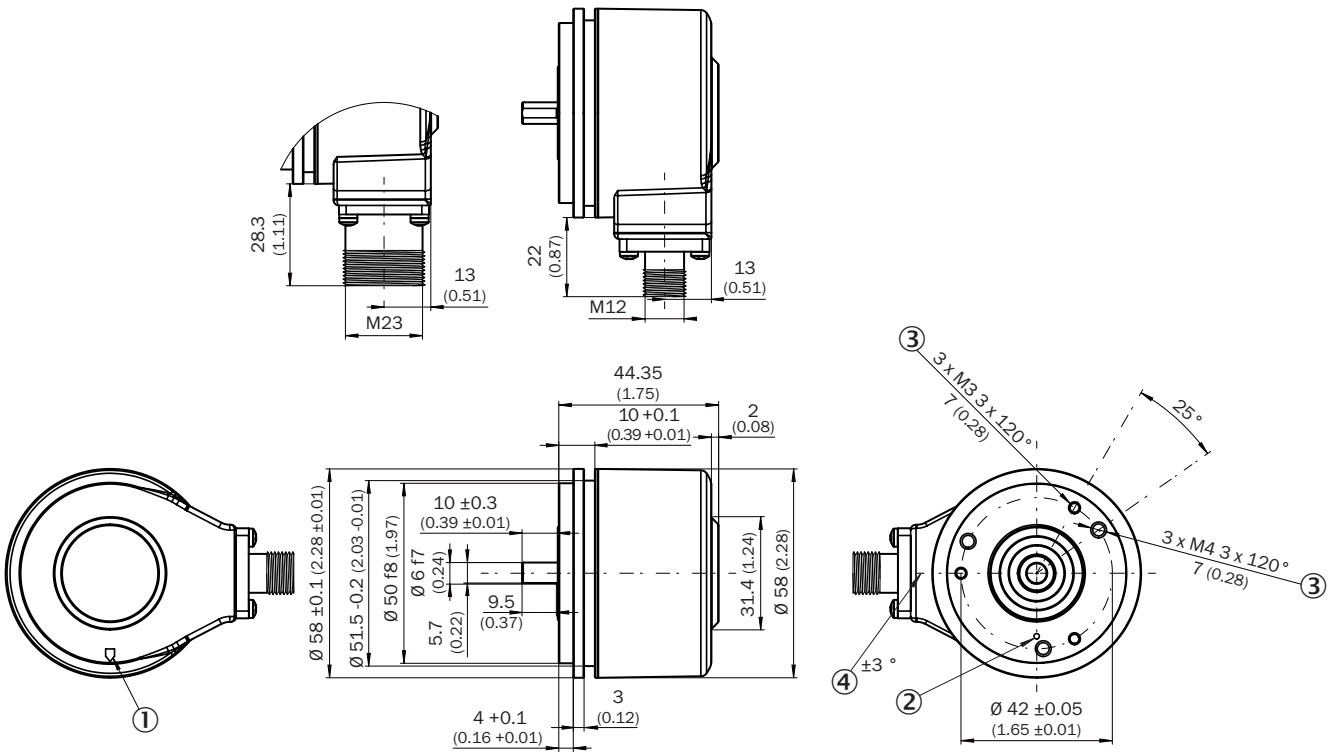
[1] With mating connector fitted.

[2] These values relate to all mechanical versions including recommended accessories unless otherwise noted.

## CERTIFICATES

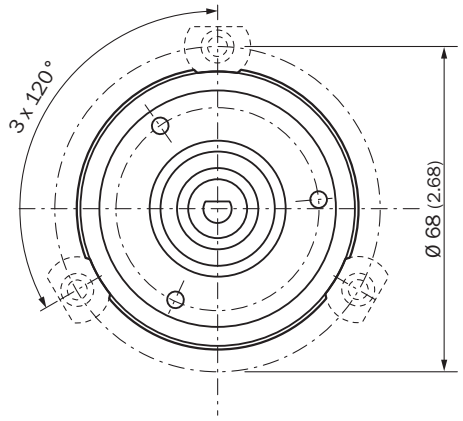
| | |
|---|---|
| EU declaration of conformity | ✓ |
| UK declaration of conformity | ✓ |
| ACMA declaration of conformity | ✓ |
| China RoHS | ✓ |
| cRUus certificate | ✓ |
| Information according to Art. 3 of Data Act (Regulation EU 2023/2854) | ✓ |

## DIMENSIONAL DRAWING



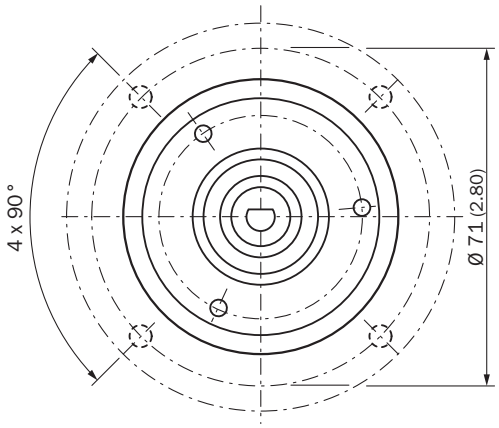

Dimensions in mm (inch)
① Zero pulse mark on housing
② Zero pulse mark on flange
③ depth
④ male connector tolerance in relation to hole pattern

### ATTACHMENT SPECIFICATIONS MOUNTING REQUIREMENTS FOR SMALL SERVO CLAMP



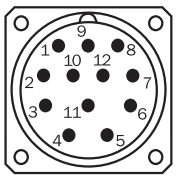

All dimensions in mm (inch)

### ATTACHMENT SPECIFICATIONS MOUNTING REQUIREMENTS FOR HALF-SHELL SERVO CLAMP




All dimensions in mm (inch)

### PIN ASSIGNMENT



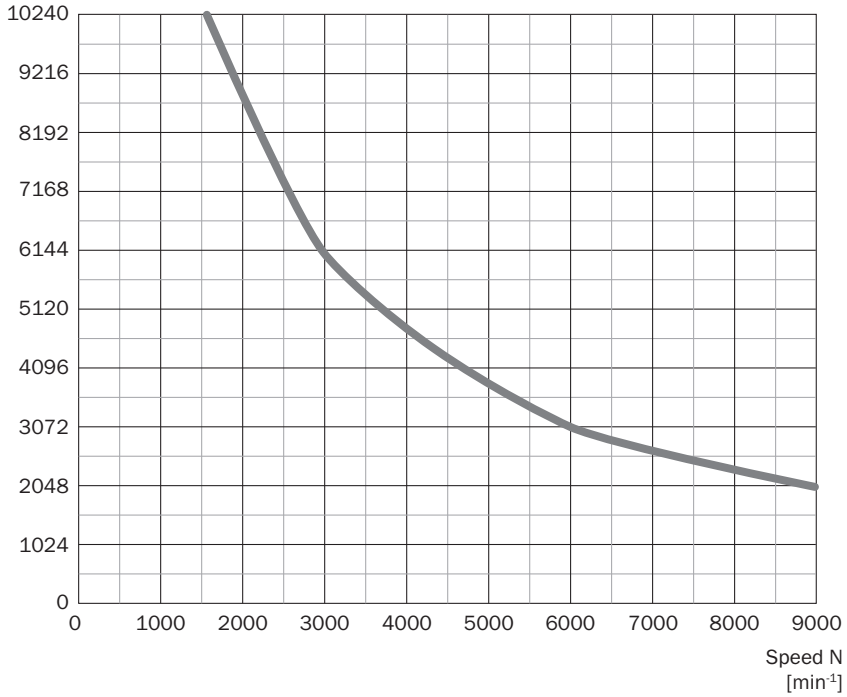

view of M23 male device connector on cable / housing

| Wire colors (cable connection) | Male connector M12, 8-pin | Male connector M23, 12-pin | TTL/HTL 6-channel signal | Explanation |
|---|---|---|---|---|
| Brown | 1 | 6 | A- | Signal wire |
| White | 2 | 5 | A | Signal wire |
| Black | 3 | 1 | B- | Signal wire |
| Pink | 4 | 8 | B | Signal wire |
| Yellow | 5 | 4 | Z- | Signal wire |
| Purple | 6 | 3 | Z | Signal wire |
| Blue | 7 | 10 | GND | Ground connection |
| Red | 8 | 12 | $+U_s$ | Supply voltage |
| - | - | 9 | Not assigned | Not assigned |
| - | - | 2 | Not assigned | Not assigned |

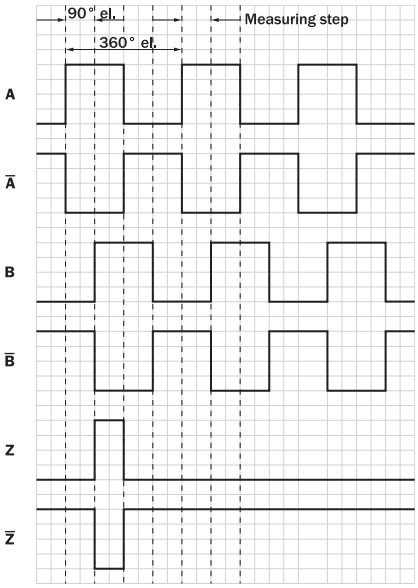
| Wire colors (cable connection) | Male connector M12, 8-pin | Male connector M23, 12-pin | TTL/HTL 6-channel signal | Explanation |
|---|---|---|---|---|
| - | - | 11 | Not assigned | Not assigned |
| - | - | 7 | Not assigned | Not assigned |
| Screen | Screen | Screen | Screen | Screen connected to encoder housing |

## DIAGRAMS

Pulses per revolution




## DIAGRAMS SIGNAL OUTPUTS FOR ELECTRICAL INTERFACES TTL AND HTL




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 ... 30 V | TTL |
| 10 V ... 27 V | HTL |
| 4,5 V ... 30 V | TTL/HTL universal |
| 4,5 V ... 30 V | TTL |

Further information as well as suitable accessories, example applications and downloads such as CAD dimensional models, operating instructions and software can be found at www.sick.com/1094652

SICK AG
WALDKIRCH
GERMANY
SICK.COM

# SICK AT A GLANCE

SICK is a leading global technology company for intelligent sensors and integrated solutions in industrial automation. Our technologies set benchmarks, making your industrial processes more efficient, safer and more sustainable – both in logistics and manufacturing operations.

SICK combines sensor intelligence with industry expertise and certified consulting services. We provide the ideal foundation for scalable as well as tailor-made automation solutions and create added value along the entire value chain. Our close partnerships with our customers are more than just a promise: Together, we optimize productivity, improve quality, protect health and safety, and help build a sustainable future. All with empathy and trust.

Since 1946, we have been developing innovative technologies with passion and a pioneering spirit. With a global network in around 40 countries, SICK has a global presence and is always close by. The company's headquarters are located in Waldkirch near Freiburg, Germany. Our customers benefit from our understanding of both local and global requirements, which enables us to deliver tailor-made solutions

SICK

Sensor Intelligence