



DBS60E-S1AA0S166

DBS60

INCREMENTAL ENCODERS

SICK
Sensor Intelligence.



Ordering information

Type	part no.
DBS60E-S1AA0S166	1127792

Other models and accessories → www.sick.com/DBS60

Illustration may differ



Detailed technical data

Features

Special device	✓
Specialty	Customized pin configuration in M23 male connector in encoder side 2500 pulses per revolution
Standard reference device	DBS60E-S1AA02500

Safety-related parameters

MTTF_D (mean time to dangerous failure)	500 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	2,500
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 / RS-422
Number of signal channels	6-channel
Initialization time	< 5 ms ¹⁾
Output frequency	+ 300 kHz ²⁾
Load current	≤ 30 mA, per channel

¹⁾ Valid signals can be read once this time has elapsed.

²⁾ Up to 450 kHz on request.

Operating current	≤ 50 mA (without load)
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1) Valid signals can be read once this time has elapsed.

2) Up to 450 kHz on request.

Electronics

Connection type	Male connector, M23, 12-pin, radial
Supply voltage	4.5 ... 5.5 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 or GND permissible for max. 60 s. No protection signal against U_S.

Mechanics

Mechanical design	Solid shaft, Servo flange
Shaft diameter	6 mmWith 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⁾ 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⁾ IP65, shaft side (IEC 60529)
Permissible relative humidity	90 % (Condensation not permitted)

1) With mating connector fitted.

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

Operating temperature range	-20 °C ... +85 °C 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.

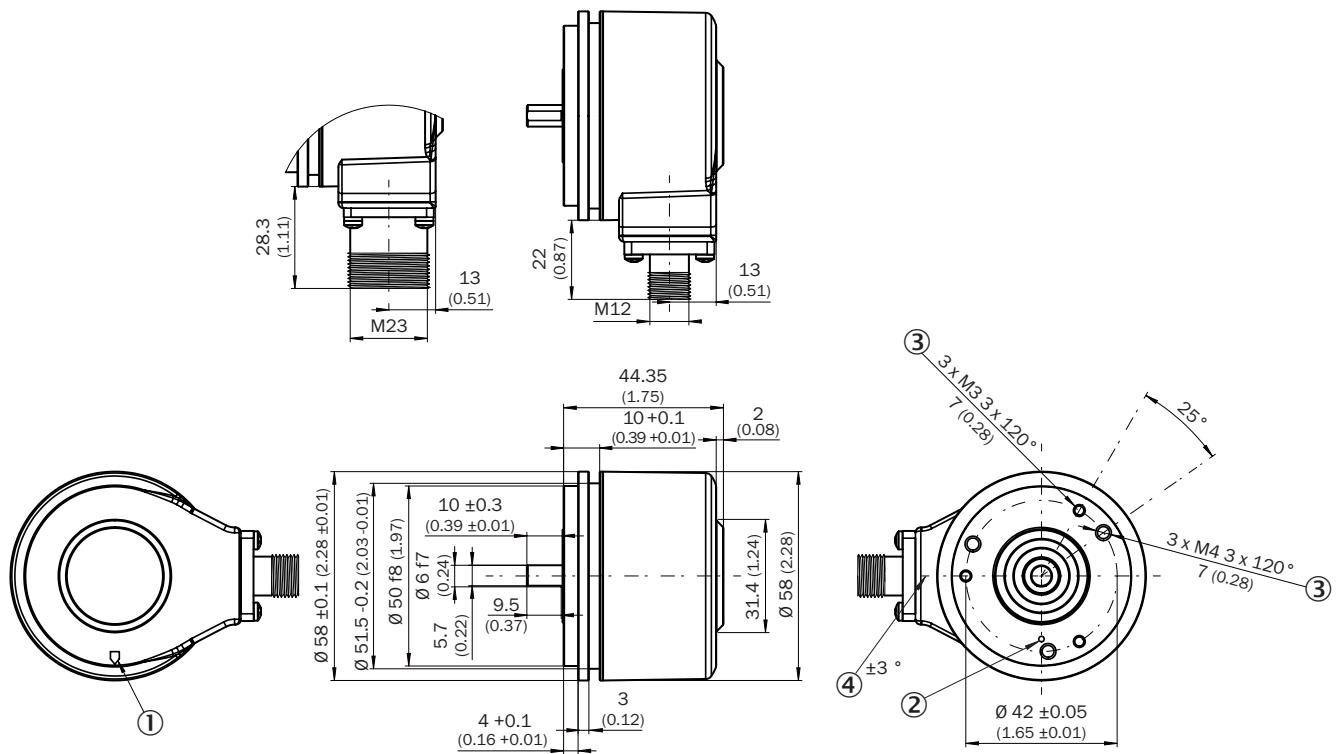
Certificates

EU declaration of conformity	✓
UK declaration of conformity	✓
ACMA declaration of conformity	✓
China-RoHS	✓
cRUs 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

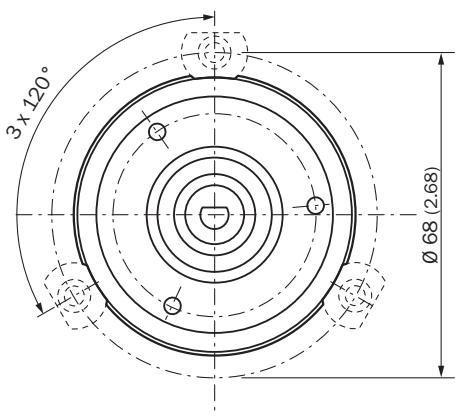
Dimensional drawing



Dimensions in mm (inch)

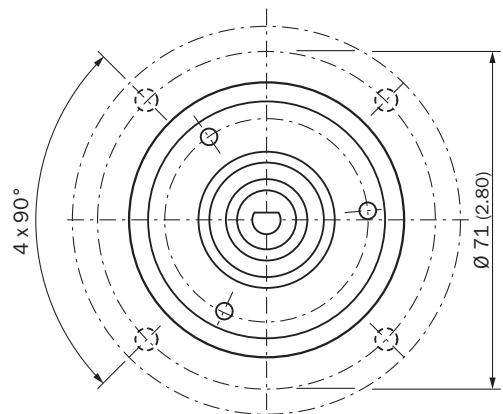
- ① Zero pulse mark on housing
- ② Zero pulse mark on flange
- ③ depth
- ④ male connector tolerance in relation to hole pattern

Attachment specifications Mounting requirements for small servo clamp



All dimensions in mm (inch)

Attachment specifications Mounting requirements for half-shell servo clamp



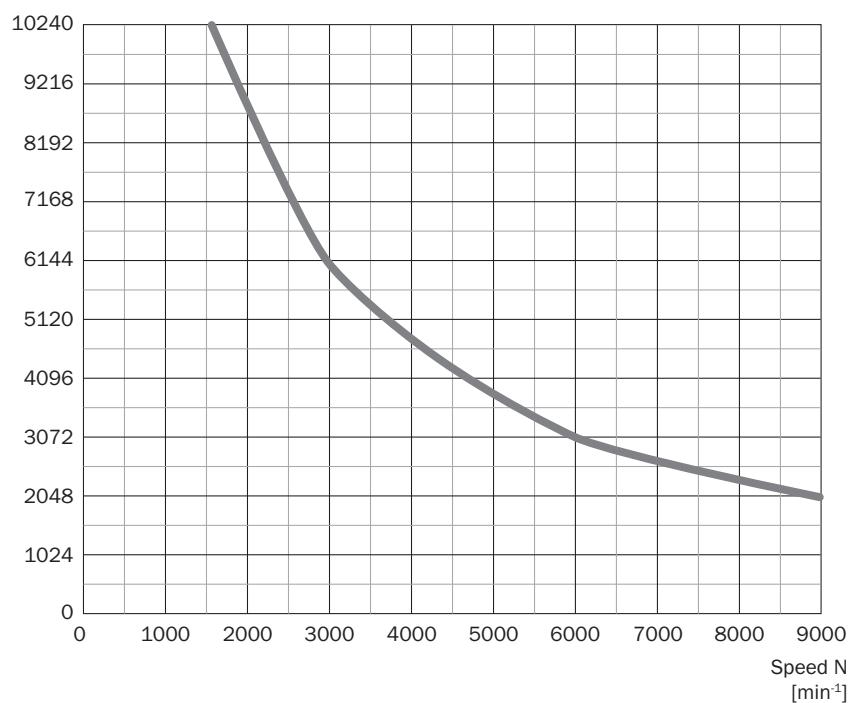
All dimensions in mm (inch)

PIN assignment

ACE Designer M23, Pin configuration	
Signal	Customer require M23 Pin configuration
Z	6
Z-	7
A	1
A-	2
B	3
B-	4
GND	12
GND	10
Supply Voltage	5
Supply Voltage	9
Shield	11

Diagrams

Pulses per revolution



Recommended accessories

Other models and accessories → www.sick.com/DBS60

	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 3.6×10^9 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: 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
	<ul style="list-style-type: none"> Description: Half-shell servo clamps (2 pcs.) for servo flanges with a 50 mm centering hub 	BEF-WG-SF050	2029165
	<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

	Brief description	Type	part no.
measuring wheels and measuring wheel mechanics			
	<ul style="list-style-type: none">Product segment: Measuring wheels and measuring wheel mechanicsProduct family: Measuring wheelsDescription: 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 mechanicsProduct family: Measuring wheelsDescription: 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 mechanicsProduct family: Measuring wheelsDescription: 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 mechanicsProduct family: Measuring wheelsDescription: 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 mechanicsProduct family: Measuring wheelsDescription: 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 mechanicsProduct family: Measuring wheelsDescription: 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 mechanicsProduct family: Measuring wheelsDescription: Aluminum measuring wheel with studded polyurethane surface for 6 mm solid shaft, circumference 200 mm	BEF-MR06200APN	4084747
<ul style="list-style-type: none">Product segment: Measuring wheels and measuring wheel mechanicsProduct family: Measuring wheel mechanicsDescription: O-ring for measuring wheels (circumference 200 mm)		BEF-OR-053-040	2064061
<ul style="list-style-type: none">Product segment: Measuring wheels and measuring wheel mechanicsProduct family: Measuring wheel mechanicsDescription: O-ring for measuring wheels (circumference 300 mm)		BEF-OR-083-050	2064076

	Brief description	Type	part no.
	<ul style="list-style-type: none">• Items supplied: 2x O-ring• Product segment: Measuring wheels and measuring wheel mechanics• Product family: Measuring wheel mechanics• Description: O-ring for measuring wheels (circumference 500 mm)	BEF-OR-145-050	2064074

	Brief description	Type	part no.
connectors and cables			
	<ul style="list-style-type: none">Connection type head A: Female connector, M23, 12-pin, straightConnection type head B: Flying leadsSignal type: IncrementalCable: 2 m, 11-wire, PURDescription: Incremental, shielded	DOL-2312-G02MLA3	2030682
	<ul style="list-style-type: none">Connection type head A: Female connector, M23, 12-pin, straightConnection type head B: Flying leadsSignal type: IncrementalCable: 7 m, 11-wire, PURDescription: Incremental, shielded	DOL-2312-G07MLA3	2030685
	<ul style="list-style-type: none">Connection type head A: Female connector, M23, 12-pin, straightConnection type head B: Flying leadsSignal type: IncrementalCable: 10 m, 11-wire, PURDescription: Incremental, shielded	DOL-2312-G10MLA3	2030688
	<ul style="list-style-type: none">Connection type head A: Female connector, M23, 12-pin, straightConnection type head B: Flying leadsSignal type: IncrementalCable: 15 m, 11-wire, PURDescription: Incremental, shielded	DOL-2312-G15MLA3	2030692
	<ul style="list-style-type: none">Connection type head A: Female connector, M23, 12-pin, straightConnection type head B: Flying leadsSignal type: IncrementalCable: 20 m, 11-wire, PURDescription: Incremental, shielded	DOL-2312-G20MLA3	2030695
	<ul style="list-style-type: none">Connection type head A: Female connector, M23, 12-pin, straightConnection type head B: Flying leadsSignal type: IncrementalCable: 25 m, 11-wire, PURDescription: Incremental, shielded	DOL-2312-G25MLA3	2030699
	<ul style="list-style-type: none">Connection type head A: Female connector, M23, 12-pin, straightConnection type head B: Flying leadsSignal type: IncrementalCable: 30 m, 11-wire, PURDescription: Incremental, shielded	DOL-2312-G30MLA3	2030702
	<ul style="list-style-type: none">Connection type head A: Female connector, M23, 12-pin, straight, A-codedSignal type: HIPERFACE®, SSI, IncrementalDescription: HIPERFACE®, shieldedSSIIncrementalConnection systems: Solder connection	DOS-2312-G02	2077057
	<ul style="list-style-type: none">Connection type head A: Female connector, M23, 12-pin, angled, A-codedSignal type: HIPERFACE®, SSI, IncrementalDescription: HIPERFACE®, shieldedSSIIncrementalConnection systems: Solder connection	DOS-2312-W01	2072580
	<ul style="list-style-type: none">Connection type head A: Flying leadsConnection type head B: Flying leadsSignal type: SSI, Incremental, HIPERFACE®Items supplied: By the meterCable: 8-wire, PUR, halogen-freeDescription: SSI, shielded, Incremental, HIPERFACE®	LTG-2308-MWENC	6027529
	<ul style="list-style-type: none">Connection type head A: Flying leadsConnection type head B: Flying leadsSignal type: SSI, IncrementalItems supplied: By the meterCable: 11-wire, PURDescription: SSI, shielded, Incremental	LTG-2411-MW	6027530
	<ul style="list-style-type: none">Connection type head A: Flying leadsConnection type head B: Flying leadsSignal type: SSI, IncrementalItems supplied: By the meterCable: 12-wire, PUR, halogen-freeDescription: SSI, shielded, Incremental	LTG-2512-MW	6027531
	<ul style="list-style-type: none">Connection type head A: Flying leadsConnection type head B: Flying leadsSignal type: SSI, TTL, HTL, IncrementalItems supplied: By the meter	LTG-2612-MW	6028516

	Brief description	Type	part no.
	<ul style="list-style-type: none"> Cable: 12-wire, UV and saltwater-resistant, PUR, halogen-free Description: SSI, shielded, TTL, HTL, Incremental 		
shaft adaptation			
	<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 \pm 0.25 mm, axial \pm 0.4 mm, angular $+/$ 4°; 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: Cross-slotted coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial \pm 0.3 mm, axial \pm 0.2 mm, angle \pm 3°; 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 \pm 0.3 mm, axial \pm 0.2 mm, angle \pm 3°, 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: Bellows coupling, shaft diameter 6 mm / 10 mm, maximum shaft offset: radial \pm 0.25 mm, axial \pm 0.4 mm, angular $+/$ 4°; 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 $+/$ 2.5°; 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 \pm 0.3 mm, axial \pm 0.3 mm, angular \pm 3°; 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

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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