



DBS60E-S4EM01000

DBS60

INCREMENTAL ENCODERS

SICK
Sensor Intelligence.



Illustration may differ



Ordering information

Type	Part no.
DBS60E-S4EM01000	1120353

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

Detailed technical data

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	HTL / Push pull
Number of signal channels	6-channel
Initialization time	< 5 ms ¹⁾
Output frequency	+ 300 kHz ²⁾
Load current	≤ 30 mA, per channel
Power consumption	≤ 1 W (without load)

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

²⁾ Up to 450 kHz on request.

Electrical data

Connection type	Cable, 8-wire, universal, 5 m ¹⁾
Supply voltage	10 ... 27 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⁾
MTTFd: mean time to dangerous failure	500 years (EN ISO 13849-1) 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⁾ Short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

³⁾ 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	Solid shaft, face mount flange
Shaft diameter	10 mm
Shaft length	19 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
Material, cable	PVC
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) IP65, shaft side (IEC 60529)
Permissible relative humidity	90 % (Condensation not permitted)
Operating temperature range	-20 °C ... +85 °C ¹⁾
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⁾ These values relate to all mechanical versions including recommended accessories unless otherwise noted.

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
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))



- ① Zero pulse mark on housing
- ② Zero pulse mark on flange
- ③ Depth

PIN assignment



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

Wire colors (cable connection)	Male connector M12, 8-pin	Male connector M23, 12-pin	TTL/HTL 6-channel signal	Explanation
Red	8	12	+U _s	Supply voltage
-	-	9	Not assigned	Not assigned
-	-	2	Not assigned	Not assigned
-	-	11	Not assigned	Not assigned
-	-	7	Not assigned	Not assigned
Screen	Screen	Screen	Screen	Screen connected to encoder housing

Diagrams

Pulses per revolution



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

Supply voltage	Output
10 V ... 30 V	TTL
10 V ... 27 V	HTL
4,5 V ... 30 V	TTL/HTL universal
4,5 V ... 30 V	TTL

Operation note

Solid shaft, face mount flange



- ① Zero pulse mark on flange
- ② Zero pulse active when the surface of the shaft shows the zero pulse mark on the flange

Recommended accessories

Flanges

Flange plates

Mounting brackets and plates

Mounting brackets

Other mounting accessories

Measuring wheels and measuring wheel systems

Modular measuring wheel system

Others

Plug connectors and cables

Field-attachable connectors

Shaft adaptation

Shaft couplings

Others

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

Brief description	Type	Part no.
<ul style="list-style-type: none"> • Description: Flange adapter, adaptation of face mount flange with 36 mm centering hub to 50 mm servo flange, aluminum, including 3 flat head screws M4 x 10 • Material: Aluminum 	BEF-FA-036-050	2029160

Brief description	Type	Part no.
<ul style="list-style-type: none"> • Details: Aluminum • Items supplied: Including 3 countersunk screws M3 x 10 		
<ul style="list-style-type: none"> • Description: Flange adapter, adaptation of face mount flange with 36 mm centering hub to 60 mm square mounting plate, aluminum, including 3 flat head screws M4 x 8 • Material: Aluminum • Details: Aluminum • Items supplied: Including 3 countersunk screws M4 x 8 	BEF-FA-036-060REC	2029162
<ul style="list-style-type: none"> • Description: Flange adapter, adaptation of face mount flange with 36 mm centering hub to 58 mm square mounting plate with shock absorbers, aluminum • Material: Aluminum • Details: Aluminum 	BEF-FA-036-060RSA	2029163
<ul style="list-style-type: none"> • Description: Flange adapter, adaptation of face mount flange with 36 mm centering hub to 63 mm square mounting plate, aluminum, including 3 flat head screws M4 x 10 • Material: Aluminum • Details: Aluminum • Items supplied: Including 3 countersunk screws M3 x 10 	BEF-FA-036-063REC	2034225
<ul style="list-style-type: none"> • Description: Flange adapter, adaptation of face mount flange with 36 mm centering hub to 100 mm servo flange with 60 mm centering hub, aluminum • Material: Aluminum • Details: Aluminum 	BEF-FA-036-100	2029161
Brief description	Type	Part no.
<ul style="list-style-type: none"> • Description: Mounting bracket for encoder with spigot 36 mm for face mount flange • Items supplied: Mounting kit included 	BEF-WF-36	2029164
<ul style="list-style-type: none"> • Description: Mounting angle spring-loaded, for flange with centerring collar 36 mm, working temperature range -40° ... +120°C • Details: Aluminum 	BEF-WF36F	4084775
Brief description	Type	Part no.
<ul style="list-style-type: none"> • Description: Aluminium measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 200 mm 	BEF-MR010020R	2055224
<ul style="list-style-type: none"> • Description: Aluminium measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm 	BEF-MR010030R	2049278
<ul style="list-style-type: none"> • Description: Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 500 mm 	BEF-MR010050R	2055227
<ul style="list-style-type: none"> • Description: Aluminum measuring wheel with cross-knurled surface for 10 mm solid shaft, circumference 200 mm 	BEF-MR10200AK	4084737
<ul style="list-style-type: none"> • Description: Aluminum measuring wheel with smooth polyurethane surface for 10 mm solid shaft, circumference 200 mm 	BEF-MR10200AP	4084738
<ul style="list-style-type: none"> • Description: Aluminum measuring wheel with ridged polyurethane surface for 10 mm solid shaft, circumference 200 mm 	BEF-MR10200APG	4084740
<ul style="list-style-type: none"> • Description: Aluminum measuring wheel with studded polyurethane surface for 10 mm solid shaft, circumference 200 mm 	BEF-MR10200APN	4084739
<ul style="list-style-type: none"> • Description: Aluminum measuring wheel with cross-knurled surface for 10 mm solid shaft, circumference 500 mm 	BEF-MR10500AK	4084733
<ul style="list-style-type: none"> • Description: Aluminum measuring wheel with smooth polyurethane surface for 10 mm solid shaft, circumference 500 mm 	BEF-MR10500AP	4084734
<ul style="list-style-type: none"> • Description: Aluminum measuring wheel with ridged polyurethane surface for 10 mm solid shaft, circumference 500 mm 	BEF-MR10500APG	4084736
<ul style="list-style-type: none"> • Description: Aluminum measuring wheel with studded polyurethane surface for 10 mm solid shaft, circumference 500 mm 	BEF-MR10500APN	4084735
<ul style="list-style-type: none"> • Description: O-ring for measuring wheels (circumference 200 mm) 	BEF-OR-053-040	2064061
<ul style="list-style-type: none"> • Description: O-ring for measuring wheels (circumference 300 mm) • Items supplied: 2x O-ring 	BEF-OR-083-050	2064076
<ul style="list-style-type: none"> • Description: O-ring for measuring wheels (circumference 500 mm) 	BEF-OR-145-050	2064074

Brief description	Type	Part no.
<ul style="list-style-type: none"> Description: SICK modular measuring wheel system for face mount flange encoder with S4 mechanical design (10 mm x 19 mm solid shaft), e.g., DFS60-S4: with O-ring measuring wheel, circumference 200 mm Suitable for: Face mount flange encoder DFS60, DBS60, AFM60, AFS60, mechanical design S4 (solid shaft 10 mm x 19 mm) 	BEF-MRS-10-U	2085714
Brief description	Type	Part no.
<ul style="list-style-type: none"> Description: Flange adapter (adapts size 60 face mount flange encoder to bearing block with part. no. 2044591) 	BEF-FA-036-050-019	2063378
<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 x 10⁹ revolutions 	BEF-FA-LB1210	2044591
<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
Brief description	Type	Part no.
<ul style="list-style-type: none"> Connection type head A: Male connector, M12, 8-pin, straight, A-coded Signal type: Incremental Cable: CAT5, CAT5e Description: Incremental, shielded, Head A: male connector, M12, 8-pin, straight, A coded, shielded, for cable diameter 4 mm ... 8 mm Head B: - Operating temperature: -40 °C ... +85 °C Connection systems: IDC quick connection Permitted cross-section: 0.14 mm² ... 0.34 mm² 	STE-1208-GA01	6044892
<ul style="list-style-type: none"> Connection type head A: Male connector, M23, 12-pin, straight Signal type: HIPERFACE[®], SSI, Incremental Description: HIPERFACE[®], SSI, Incremental, shielded, Head A: male connector, M23, 12-pin, straight, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: -40 °C ... +125 °C Connection systems: Solder connection 	STE-2312-G01	2077273
<ul style="list-style-type: none"> Connection type head A: Male connector, M23, 12-pin, straight Signal type: HIPERFACE[®], SSI, Incremental Description: HIPERFACE[®], SSI, Incremental, shielded, M23 female connector with central fixing (for cabinet bushing) Connection systems: Solder connection 	STE-2312-GX	6028548
Brief description	Type	Part no.
<ul style="list-style-type: none"> Description: Bellows coupling, shaft diameter 6 mm / 10 mm, maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular +/- 4°; max. speed 10,000 rpm, -30 °C to +120 °C, max. torque 120 Ncm; material: stainless steel bellows, aluminum hub 	KUP-0610-B	5312982
<ul style="list-style-type: none"> 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"> 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 °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"> Description: Claw coupling, shaft diameter 6 mm / 10 mm, damping element 80 shore blue, maximum shaft offset: radial ± 0.22 mm, axial ± 1 mm angular ± 1.3°, max. speed 19,000 rpm, angle of twist max. 10°, -30 °C to +80 °C, max. torque 800 Ncm, tightening torque of screws: ISO 4029 150 Ncm, material: aluminum flange, damping element: polyurethane 	KUP-0610-J	2127056
<ul style="list-style-type: none"> Description: Bar coupling, shaft diameter 6 mm / 10 mm, max. shaft offset: radial ± 0,3 mm, axial ± 0,3 mm, angular ± 3°; max. speed 10.000 rpm, -10° to +80 °C, max. torque: 80 Ncm, material: fiber-glass reinforced polyamide, aluminum hub 	KUP-0610-S	2056407

Brief description	Type	Part no.
<ul style="list-style-type: none"> Description: Double loop coupling, shaft diameter 8 mm / 10 mm, max. shaft offset: radially +/- 0,25 mm, axially +/- 0,4 mm, angle +/- 4 degrees; max. speed 10.000 rpm, -30 to +120 degrees Celsius, torsional spring stiffness of 150 Nm/rad 	KUP-0810-D	5326704
<ul style="list-style-type: none"> Description: Claw coupling, shaft diameter 8 mm / 10 mm, damping element 80 shore blue, maximum shaft offset: radial ± 0.22 mm, axial ± 1 mm angular $\pm 1.3^\circ$, max. speed 19,000 rpm, angle of twist max. 10°, -30 °C to +80 °C, max. torque 800 Ncm, tightening torque of screws: ISO 4029 150 Ncm, material: aluminum flange, damping element: polyurethane 	KUP-0810-J	2128267
<ul style="list-style-type: none"> Description: Bar coupling, shaft diameter 8 mm / 10 mm, max. shaft offset: radial $\pm 0,3$ mm, axial $\pm 0,3$ mm, angular $\pm 3^\circ$; max. speed 10.000 rpm, -10° to +80 °C, max. torque: 80 Ncm, material: fiber-glass reinforced polyamide, aluminum hub 	KUP-0810-S	5314178
<ul style="list-style-type: none"> Description: Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial +/- 0.25 mm, axial +/- 0.4 mm, angular +/- 4°; max. revolutions 10,000 rpm, -30° to +120 °C, max. torque 120 Ncm; material: stainless steel bellows, aluminum clamping hubs 	KUP-1010-B	5312983
<ul style="list-style-type: none"> Description: Double loop coupling, shaft diameter 10 mm / 10 mm, Maximum shaft offset: radial +/- 2.5 mm, axial +/- 3 mm, angular +/- 10°; max. speed 3,000 rpm, -30° to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange 	KUP-1010-D	5326703
<ul style="list-style-type: none"> Description: Spring washer coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin 	KUP-1010-F	5312986
<ul style="list-style-type: none"> Description: Claw coupling, shaft diameter 10 mm / 10 mm, damping element 80 shore blue, maximum shaft offset: radial ± 0.22 mm, axial ± 1 mm angular $\pm 1.3^\circ$, max. speed 19,000 rpm, angle of twist max. 10°, -30 °C to +80 °C, max. torque 800 Ncm, tightening torque of screws: ISO 4029 150 Ncm, material: aluminum flange, damping element: polyurethane 	KUP-1010-J	2127054
<ul style="list-style-type: none"> Description: Bar coupling, shaft diameter 10 mm / 10 mm; maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular $\pm 3^\circ$; speed 10,000 rpm, -10° to +80° Celsius, max. torque 80 Ncm; material: glass fiber-reinforced polyamide, aluminum hub 	KUP-1010-S	2056408
<ul style="list-style-type: none"> Description: Spring coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset: radial ± 1.5 mm, axial ± 1.0 mm, angular $\pm 5^\circ$, max. speed 3,000 rpm, -30° to +120 °Celsius, nominal torque 150 Ncm, rotational angle at half nominal torque, direction of rotation right viewed on driving shaft 40°, left viewed on driving shaft 60°, material: spring steel 1.0600 nickel plated, zinc die cast hubs 	KUP-1010-W	5319914
<ul style="list-style-type: none"> Description: 10 mm / 12 mm; maximum shaft offset: radial +/- 0.25 mm, axial +/- 0.4 mm, angular +/- 4°; max. revolutions 10,000 rpm, -30° to +120 °C, max. torque 120 Ncm; material: stainless steel bellows, aluminum clamping hubs 	KUP-1012-B	5312984
Brief description	Type	Part no.
<ul style="list-style-type: none"> Connection type head A: Flying leads Connection type head B: Flying leads Signal type: SSI, Incremental, HIPERFACE® Cable: 8-wire, PUR, halogen-free Description: SSI, Incremental, HIPERFACE®, shielded Items supplied: By the meter 	LTG-2308-MWENC	6027529
Brief description	Type	Part no.
<ul style="list-style-type: none"> Connection type head A: Flying leads Connection type head B: Flying leads Signal type: SSI, Incremental Cable: 11-wire, PUR Description: SSI, Incremental, shielded Items supplied: By the meter 	LTG-2411-MW	6027530
Brief description	Type	Part no.
<ul style="list-style-type: none"> Connection type head A: Flying leads Connection type head B: Flying leads Signal type: SSI, Incremental Cable: 12-wire, PUR, halogen-free Description: SSI, Incremental, shielded Items supplied: By the meter 	LTG-2512-MW	6027531

Brief description	Type	Part no.
<ul style="list-style-type: none"> • Connection type head A: Flying leads • Connection type head B: Flying leads • Signal type: SSI, TTL, HTL, Incremental • Cable: 12-wire, UV and saltwater-resistant, PUR, halogen-free • Description: SSI, TTL, HTL, Incremental, shielded, Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, UV and saltwater resistant, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm • Items supplied: By the meter 	LTG-2612-MW	6028516

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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