

# DBS60I-BBEM02000

DBS60

INCREMENTAL ENCODERS

**SICK**  
Sensor Intelligence.

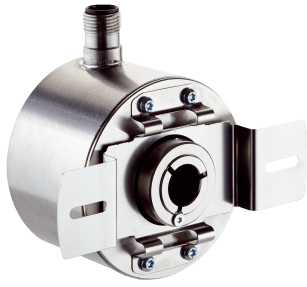


Illustration may differ



### Ordering information

Type	Part no.
DBS60I-BBEM02000	1125782

Other models and accessories → [www.sick.com/DBS60](http://www.sick.com/DBS60)

### Detailed technical data

#### Performance

<b>Pulses per revolution</b>	2,000
<b>Measuring step</b>	90°, electric/pulses per revolution
<b>Measuring step deviation</b>	± 18° / pulses per revolution
<b>Error limits</b>	Measuring step deviation x 3
<b>Duty cycle</b>	≤ 0.5 ± 5 %

#### Interfaces

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

<sup>1)</sup> Valid signals can be read once this time has elapsed.

<sup>2)</sup> Up to 450 kHz on request.

#### Electrical data

<b>Connection type</b>	Cable, 8-wire, radial, 5 m
<b>Supply voltage</b>	10 ... 27 V
<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>1)</sup>
<b>MTTFd: mean time to dangerous failure</b>	500 years (EN ISO 13849-1) <sup>2)</sup>

<sup>1)</sup> Short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

<sup>2)</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>	Blind hollow shaft
<b>Shaft diameter</b>	8 mm
<b>Flange type / stator coupling</b>	2-sided stator coupling, slot, screw hole circle 63–83 mm
<b>Weight</b>	0.44 kg <sup>1)</sup>
<b>Shaft material</b>	Stainless steel V2A
<b>Flange material</b>	Stainless steel V2A
<b>Housing material</b>	Stainless steel V2A
<b>Material, cable</b>	PVC
<b>Shaft sealing ring material</b>	FKM80
<b>Start up torque</b>	2.1 Ncm (+20 °C)
<b>Operating torque</b>	2 Ncm (+20 °C)
<b>Permissible movement static</b>	± 0.3 mm (radial) ± 0.5 mm (axial)
<b>Permissible movement dynamic</b>	± 0.1 mm ± 0.2 mm
<b>Operating speed</b>	≤ 6,000 min <sup>-1</sup> <sup>2)</sup>
<b>Moment of inertia of the rotor</b>	52 gcm <sup>2</sup>
<b>Bearing lifetime</b>	3.6 x 10 <sup>9</sup> revolutions
<b>Angular acceleration</b>	≤ 500,000 rad/s <sup>2</sup>

<sup>1)</sup> Based on encoder with male connector.

<sup>2)</sup> 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

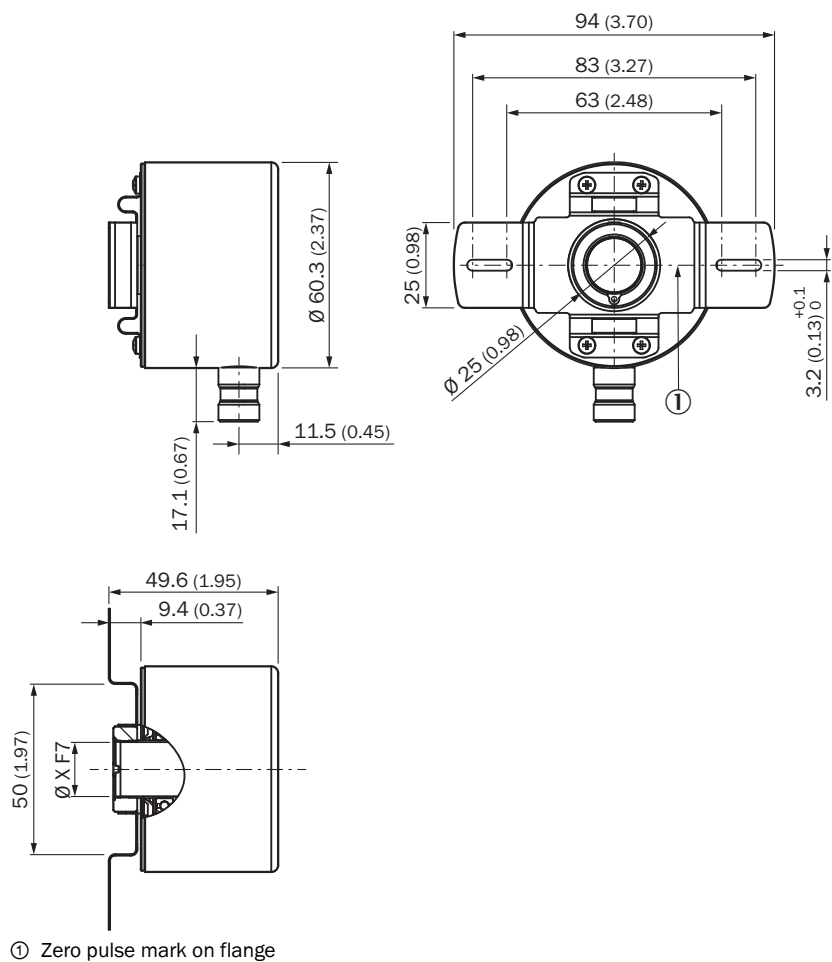
<b>EMC</b>	According to EN 61000-6-2 and EN 61000-6-3
<b>Enclosure rating</b>	IP67, cable connection (IEC 60529)
<b>Permissible relative humidity</b>	90 % (Condensation not permitted)
<b>Operating temperature range</b>	-20 °C ... +85 °C
<b>Storage temperature range</b>	-40 °C ... +100 °C, without package
<b>Resistance to shocks</b>	100 g, 6 ms (EN 60068-2-27)
<b>Resistance to vibration</b>	10 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)

## Classifications

<b>ECLASS 5.0</b>	27270501
<b>ECLASS 5.1.4</b>	27270501
<b>ECLASS 6.0</b>	27270590
<b>ECLASS 6.2</b>	27270590
<b>ECLASS 7.0</b>	27270501
<b>ECLASS 8.0</b>	27270501
<b>ECLASS 8.1</b>	27270501
<b>ECLASS 9.0</b>	27270501
<b>ECLASS 10.0</b>	27270501
<b>ECLASS 11.0</b>	27270501

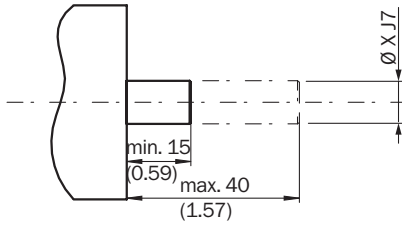
<b>ECLASS 12.0</b>	27270501
<b>ETIM 5.0</b>	EC001486
<b>ETIM 6.0</b>	EC001486
<b>ETIM 7.0</b>	EC001486
<b>ETIM 8.0</b>	EC001486
<b>UNSPSC 16.0901</b>	41112113

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



## Attachment specifications

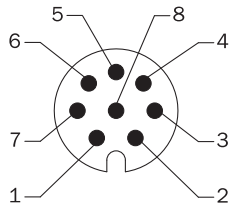
Blind hollow shaft



Customer side

Type Blind hollow shaft	Shaft diameter xJ7
DBS60I-BAxxxxxxx	6 mm
DBS60I-BBxxxxxxx	8 mm
DBS60I-BDxxxxxxx	10 mm
DBS60I-BExxxxxxx	12 mm
DBS60I-BGxxxxxxx	14 mm
DBS60I-BHxxxxxxx	15 mm

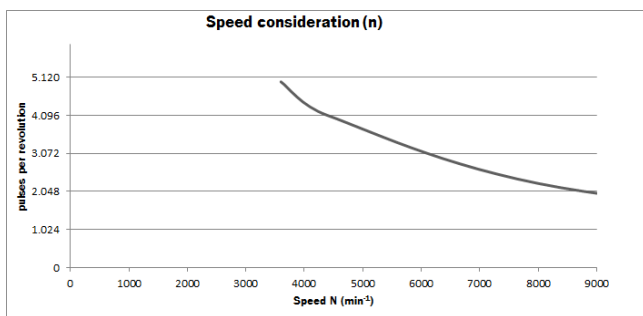
## PIN assignment



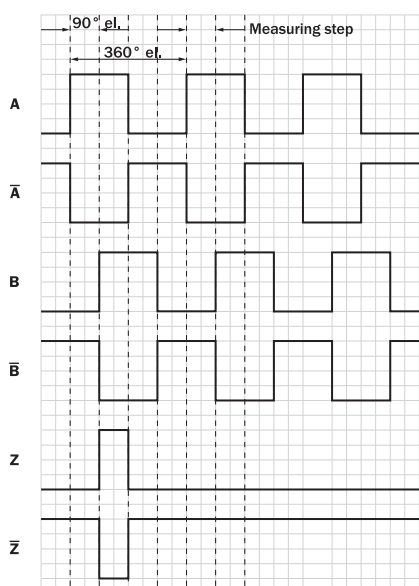
View of M12 male device connector on cable / housing

Wire colors (cable connection)	Male connector M12, 8-pin	TTL/HTL signal	Explanation
Brown	1	A-	Signal cable
White	2	A	Signal cable
Black	3	B-	Signal cable
Pink	4	B	Signal cable
Yellow	5	Z-	Signal cable
Purple	6	Z	Signal cable
Blue	7	GND	Ground connection
Red	8	+U <sub>S</sub>	Supply voltage
Screen	Screen	Screen	Screen connected to housing on encoder side

Diagrams



Signal outputs for electrical interfaces TTL and HTL

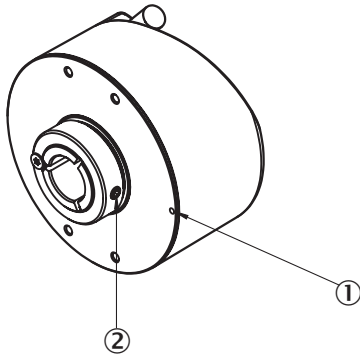


Cw with view on the encoder shaft in direction "A", compare dimensional drawing.

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

## Operation note

Hollow shaft










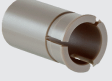
Attention! If stator coupling is mounted, the zero pulse mark can be hidden by the stator coupling






① Zero pulse mark on flange

② Zero pulse is active when screw of clamping is inline with zero pulse mark on flange or housing mark

## Recommended accessories

Other models and accessories → [www.sick.com/DBS60](http://www.sick.com/DBS60)

	Brief description	Type	Part no.
<b>Flanges</b>			
	Two-sided stator coupling, screw hole circle diameter 63 mm, slot width 3.2 mm	BEF-DS-09	2076214
	Two-sided stator coupling, slot, slot radius 63 mm – 83 mm, slot width 3.2 mm	BEF-DS-10	2076215
	One-sided stator coupling, slots, slot radius 32.75 mm – 142.65 mm, slot width 4.5 mm	BEF-DS-11	2076216
	Torque support, 1-sided, slotted hole, screw hole radius 31.5 mm - 48.5 mm, hole width 5.1 mm	BEF-DS-12	2076217
	One-sided stator coupling, slot, slot radius 32.1 mm – 37.6 mm, slot width 4.5 mm	BEF-DS-14	2076678
	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 50 mm servo flange, stainless steel, Including 3 countersunk screws with Precote 85-8 coating; M4*12	BEF-FA-036-050-I	2094778
<b>Shaft adaptation</b>			
	Collet metal for hollow shaft, shaft diameter 8 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-008-M	2076219
	Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 8 mm, outer diameter 5/8" (15.875 mm), plastic, PEEK	SPZ-58Z-008-P	2076229

	Brief description	Type	Part no.
Others			
	<ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Male connector, M12, 8-pin, straight, A-coded</li> <li>• <b>Description:</b> Shielded</li> <li>• <b>Connection systems:</b> Screw-type terminals</li> <li>• <b>Permitted cross-section:</b> ≤ 0.5 mm<sup>2</sup></li> <li>• <b>Application:</b> Hygienic and washdown zones</li> </ul>	YM12ES8-0050S5586A	2097337
	<ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Flying leads</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> SSI, Incremental, HIPERFACE®</li> <li>• <b>Cable:</b> 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> SSI, Incremental, HIPERFACE®, shielded</li> <li>• <b>Items supplied:</b> By the meter</li> </ul>	LTG-2308-MWENC	6027529
	<ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Flying leads</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> SSI, Incremental</li> <li>• <b>Cable:</b> 11-wire, PUR</li> <li>• <b>Description:</b> SSI, Incremental, shielded</li> <li>• <b>Items supplied:</b> By the meter</li> </ul>	LTG-2411-MW	6027530
	<ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Flying leads</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> SSI, TTL, HTL, Incremental</li> <li>• <b>Cable:</b> 12-wire, UV and saltwater-resistant, PUR, halogen-free</li> <li>• <b>Description:</b> 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 mm<sup>2</sup> + 2 x 0.5 mm<sup>2</sup> + 2 x 0.14 mm<sup>2</sup>, Ø 7.8 mm</li> <li>• <b>Items supplied:</b> By the meter</li> </ul>	LTG-2612-MW	6028516
	<ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight, A-coded</li> <li>• <b>Description:</b> Shielded</li> <li>• <b>Connection systems:</b> Screw-type terminals</li> <li>• <b>Permitted cross-section:</b> 0.25 mm<sup>2</sup> ... 0.5 mm<sup>2</sup></li> <li>• <b>Application:</b> Hygienic and washdown zones</li> </ul>	YF12ES8-0050S5586A	2097334
	<ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight, A-coded</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental, SSI</li> <li>• <b>Cable:</b> 2 m, 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, SSI, shielded, Head A: Female connector, M12, 8-pin, straight Head B: Cable suitable for drag chain, PUR, halogen-free, shielded, UV and salt water resistant, 8 x 0.15 mm<sup>2</sup>, Ø 6.1 mm</li> <li>• <b>Connection systems:</b> Flying leads</li> </ul>	DOL-1208-G02MIE1	2120313



## SICK AT A GLANCE

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