RUGGED, HIGH-PERFORMANCE INCREMENTAL ENCODER



Product description

The DKS40 incremental encoder offers an outstanding price-performance ratio. Its housing is made of solid zinc die cast and, with an external diameter of 50 mm, it is extremely compact, saving valuable installation space. Use of mini-disc technology makes the DKS40 extremely resistant to shock and vibration. In addition, the DKS40 has a high IP 64 enclosure rating.

At a glance

- Compact diameter
- Rugged, low-cost design
- Interfaces: Open collector NPN, TTL/RS-422 or HTL/Push Pull.
- Connection via cable outlet, for radial or axial use with open ends or fitted with an M12 connector
- Face mount flange with solid shaft
- Housing for simple clamping ring mounting
- Any number of lines possible from 1 to 2,048

Your benefits

- Low-cost encoder with outstanding quality
- Withstands harsh ambient conditions due to high IP protection class and rugged design
- Universal cable outlet enables axial and radial cable guidance
- Compact dimensions enable simple installation even where space is cramped

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Fields of application

- Due to the variety of products, there is a wide range of application possibilities such as in tool machines, textile machines, wood processing machines, packaging machinery

Detailed technical data

Performance

Pulses per revolution	1 ... 2,048
Error limits binary pulses	0.09° [1]
Error limits non-binary pulses	0.13° [2]
Measuring step deviation at binary number of lines	0.035°
Measuring step deviation at non-binary number of lines	0.07°
Initialization time	40 ms
Measurement step	90° electrical/pulses per revolution

[1] "Binary" number of lines: 2n, where n is a whole number

[2] "Non-binary" number of lines: 2n, where n is not a whole number

Mechanical data

Mechanical design	Solid shaft
Shaft diameter	8 mm x 13 mm
Mass	0.18 kg
Start up torque	0.6 Ncm (+20 °C)
Operating torque	0.4 Ncm (+20 °C)
Permissible shaft load, radial/axial	40 N, 20 N
Maximum operating speed	6,000 rpm
Rotor moment of inertia	6 gcm²
Bearing lifetime	2 x 10^9 revolutions
Max. angular acceleration	5 x 10^5 rad/s²

Electrical data

Electrical interface	4.5 ... 5.5 V, TTL/RS422, 6 channel 10 ... 30 V, HTL/Push Pull, 6 channel 4.5 ... 5.5 V, Open Collector NPN, 3 channel 10 ... 30 V, Open Collector NPN, 3 channel
Connection type	Cable, 8-wire, universal outlet, 0.5 m [1] Cable, 8-wire, universal outlet, 1.5 m [1] Cable, 8-wire, universal outlet, 3.0 m [1] Cable, 8-wire, universal outlet, 5.0 m [1] Cable, 8-pin, universal outlet, 1.5 m, male connector M12 [1]
Operating current without load	≤ 40 mA
Supply voltage	4.5 V ... 5.5 V 10 V ... 30 V
Load current	≤ 30 mA
Maximum output frequency	
Open Collector NPN	≤ 50 kHz
TTL/RS422	≤ 200 kHz
HTL/Push Pull	≤ 200 kHz

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

[2] 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 devices, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Reference signal, number	1
Reference signal, position	90° electric, logically gated with A and B
MTTFd: mean time to dangerous failure	600 years (EN ISO 13849-1) [2]

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

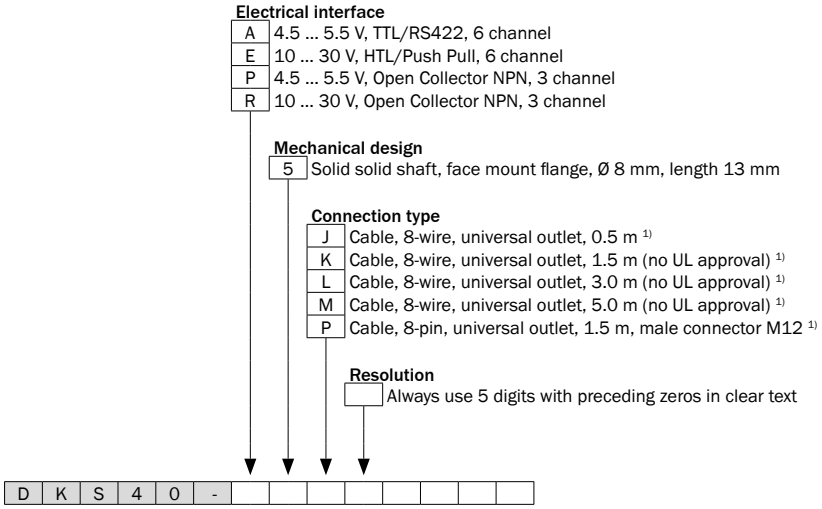
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Ambient data

EMC	EN 61000-6-2, EN 61000-6-3
Enclosure rating as per IEC 60529	IP 64
Air humidity	90% [1]
Operating temperature range	0 °C ... +60 °C
Storage temperature range	–40 °C ... +70 °C, without packaging
Resistance to shocks	50 g/ 7 ms (EN 60068-2-27)
Resistance to vibrations	20 g / 10 Hz ... 2,000 Hz (EN 60068-2-6)

[1] Condensation of optical surfaces not permitted.

Type code



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

Ordering information

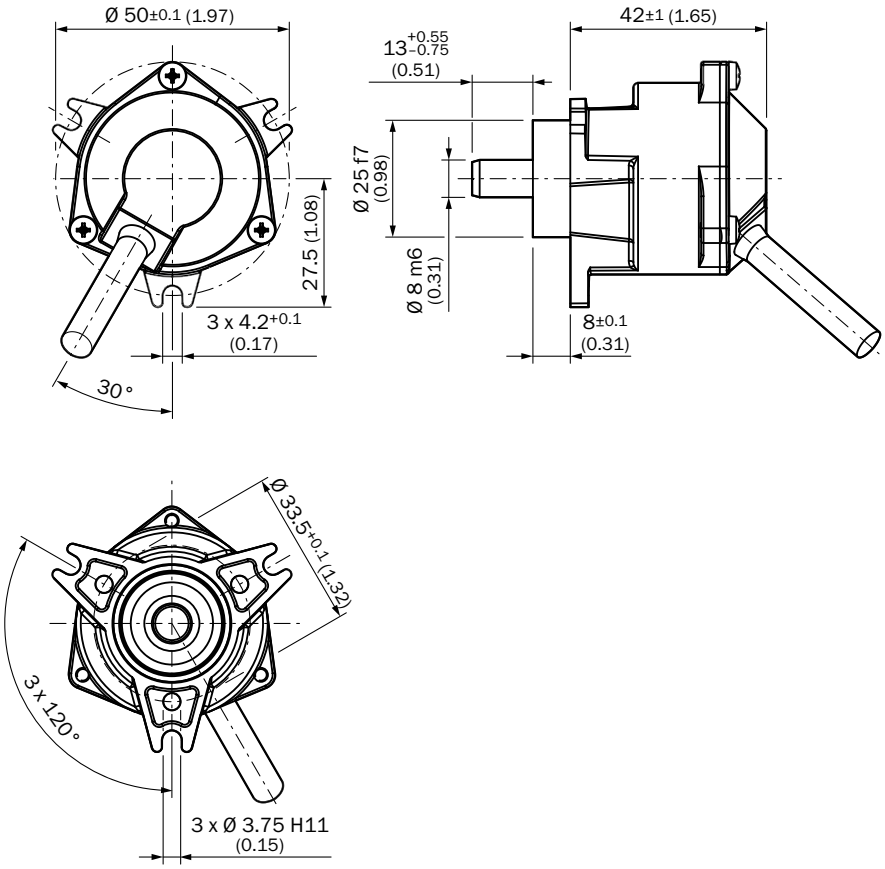
- **Mechanical design:** solid shaft, face mount flange

Electrical interface	Connection type	Pulses per revolution	Type	Part no.
10 ... 30 V Open Collector NPN	Cable, universal, 0.5 m	10	DKS40-R5J00010	1034621
		20	DKS40-R5J00020	1034622
		50	DKS40-R5J00050	1034623
		100	DKS40-R5J00100	1034624
		200	DKS40-R5J00200	1034625
		250	DKS40-R5J00250	1034626
		256	DKS40-R5J00256	1034627
		360	DKS40-R5J00360	1034628
		500	DKS40-R5J00500	1034629
		512	DKS40-R5J00512	1034630
		720	DKS40-R5J00720	1034631
		800	DKS40-R5J00800	1036154
		1,000	DKS40-R5J01000	1034632
		1,024	DKS40-R5J01024	1034633
		2,000	DKS40-R5J02000	1034813
		2,048	DKS40-R5J02048	1034814
4.5 ... 5.5 V TTL/RS422	Cable, universal, 0.5 m	4	DKS40-A5J00004	1036293
		10	DKS40-A5J00010	1034634
		20	DKS40-A5J00020	1034635
		50	DKS40-A5J00050	1034636
		100	DKS40-A5J00100	1034637
		200	DKS40-A5J00200	1034638
		250	DKS40-A5J00250	1034639
		360	DKS40-A5J00360	1034641
		500	DKS40-A5J00500	1034642
		512	DKS40-A5J00512	1034643
		720	DKS40-A5J00720	1034644
		1,000	DKS40-A5J01000	1034645
		1,024	DKS40-A5J01024	1034646
		2,000	DKS40-A5J02000	1034815
		2,048	DKS40-A5J02048	1034816

Electrical interface	Connection type	Pulses per revolution	Type	Part no.
10 ... 30 V HTL/Push Pull		10	DKS40-E5J00010	1034647
		20	DKS40-E5J00020	1034648
		50	DKS40-E5J00050	1034649
		100	DKS40-E5J00100	1034650
		200	DKS40-E5J00200	1034651
		250	DKS40-E5J00250	1034652
		256	DKS40-E5J00256	1034653
		360	DKS40-E5J00360	1034654
		500	DKS40-E5J00500	1034655
		512	DKS40-E5J00512	1034656
		720	DKS40-E5J00720	1034657
		1,000	DKS40-E5J01000	1034658
		1,024	DKS40-E5J01024	1034659
		2,000	DKS40-E5J02000	1034817
		2,048	DKS40-E5J02048	1034818

Dimensional drawings (dimensions in mm)

Face mount flange, cable output

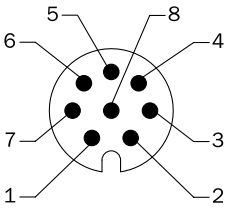


General tolerances according to ISO 2768-mk

PIN assignment

Cable, 8-wire

View of male connector, device side



PIN, 8-pin, M12 male connector	Wire colors	OC signal	TTL/HTL signal	Explanation
1	Brown	Not assigned	$\overline{A}$	Signal wire
2	White	A	A	Signal wire
3	Black	Not assigned	$\overline{B}$	Signal wire
4	Pink	B	B	Signal wire
5	Yellow	Not assigned	$\overline{Z}$	Signal wire
6	Violet	Z	Z	Signal wire
7	Blue	GND	GND	Ground connection of the encoder
8	Red	$+U_S$	$+U_S$	Supply voltage (volt-free to housing)
Screen	Screen	Screen	Screen	Screen, connected to housing on the encoder side. Connected to ground on control side.

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Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 25 mm, including mounting kit for face mount flange	BEF-WF-25	2032621

Flanges

Flange plate

Figure	Brief description	Type	Part no.
	Flange adapter, adaption of face mount flange with centering hub 20 mm to 33 mm servo flange, aluminum	BEF-FA-020-033	2066312
	Flange adapter, adaption of face mount flange with 25 mm centering hub to size 60 face mount flange with 36 mm centering hub, aluminum	BEF-FA-025-036	2034226
	Flange adapter, adaption of face mount flange with centering hub 25 mm to 50 mm servo flange, aluminum	BEF-FA-025-050	2032622
	Flange adapter, adaption of face mount flange with 25 mm centering hub to 60 mm square mounting plate, aluminum	BEF-FA-025-060RCA	2032623
	Flange adapter, adaptation of face mount flange with 25 mm centering hub to 60 mm square mounting plate with shock absorbers, aluminum	BEF-FA-025-060RSA	2032624
	Flange adapter, adaption of face mount flange with 25 mm centering hub to 63 mm square mounting plate, aluminum	BEF-FA-025-063-REC	2033631

Other mounting accessories

Mounting bell

Figure	Brief description	Type	Part no.
	Mounting bell for encoders with a servo flange, centering collar 50 mm, including mounting kit	BEF-MG-50	5312987

Servo clamps

Figure	Brief description	Type	Part no.
	Servo clamps, large, for servo flanges (clamps, eccentric fastener), 3 pcs., without mounting material	BEF-WK-SF	2029166

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Shaft adaptation

Shaft couplings

Figure	Brief description	Type	Part no.
	Bar coupling, shaft diameter 6 mm / 8 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Bar coupling, shaft diameter 8 mm / 8 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0808-S	5314177
	Bar coupling, shaft diameter 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178
	Double-loop coupling, shaft diameter 8 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0810-D	5326704

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm², Ø 7.0 mm	2 m	DOL-1208-G02MAC1	6032866
		5 m	DOL-1208-G05MAC1	6032867
		10 m	DOL-1208-G10MAC1	6032868
		20 m	DOL-1208-G20MAC1	6032869
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	2 m	DOL-2312-G02MLA3	2030682
		7 m	DOL-2312-G07MLA3	2030685
		10 m	DOL-2312-G10MLA3	2030688
		15 m	DOL-2312-G15MLA3	2030692
		20 m	DOL-2312-G20MLA3	2030695
		25 m	DOL-2312-G25MLA3	2030699
		30 m	DOL-2312-G30MLA3	2030702
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	1.5 m	DOL-2312-G1M5MA3	2029212
		3 m	DOL-2312-G03MMA3	2029213
		5 m	DOL-2312-G05MMA3	2029214
		10 m	DOL-2312-G10MMA3	2029215
		20 m	DOL-2312-G20MMA3	2029216
		30 m	DOL-2312-G30MMA3	2029217

[1] Warning! Only in combination with electrical interfaces A, C, E and P.

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Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-G	6027538
	Head A: female connector, M23, 12-pin, angled, shielded, for cable diameter 4.2 mm ... 6.6 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-W01	2072580
	Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: –40 °C ... +125 °C	DOS-2312-G02	2077057

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.5 mm		LTG-2411-MW	6027530
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		LTG-2512-MW	6027531
	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		LTG-2612-MW	6028516

Male connector (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: Operating temperature: –20 °C ... +130 °C	STE-2312-G	6027537
	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	STE-2312-G01	2077273

➜ For additional accessories, please see page K-668 onwards

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