



DLS40

SLIM AND COMPACT INCREMENTAL ENCODER FOR ECONOMICAL SOLUTIONS

Incremental Encoders

SICK
Sensor Intelligence.

SLIM AND COMPACT INCREMENTAL ENCODER FOR ECONOMICAL SOLUTIONS



Product description

The DLS40 incremental encoder is a reliable solution for measuring rotation speed and position. With various unique features, it is fundamentally redefining the operating principle of encoders. The housing integrated in the flange enables a low-cost, slim and compact design and therefore uncomplicated installation,

especially in tight spaces. The DLS40 offers solid shafts and blind hollow shafts with a variety of mechanical and electrical interfaces. In addition, the encoder is equipped with an easily-accessible laser-marked QR code which enables direct access to the operating instructions.

At a glance

- Pulses per revolution: Up to 1,024
- Housing diameter: 40 mm
- Solid shaft and blind hollow shaft
- Enclosure rating: IP50
- Communication interfaces: TTL/RS-422, HTL/Push Pull, Open Collector
- Connection type: cable
- Slim, compact design

Your benefits

- The compact design facilitates the integration of the encoder even where installation space is limited and helps reduce machine size
- The flange with integrated housing enables a very compact and cost-efficient design
- A wide variety of output signal options makes it easy to find the right solution for every application

→ www.sick.com/DLS40

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.



Fields of application

A large range of applications for the measurement of speed and position, e.g. in

- Printing and packaging
- Paper processing
- Processing, forming and cutting of metal, wood and glass
- Automated guided vehicle systems (AGV systems)
- Manufacture and filling of bottles
- Asynchronous motors
- Cable manufacturing

Detailed technical data

Performance

Pulses per revolution	0 ... 1024
Measuring step	90° electric/pulses per revolution
Duty cycle	≤ 0.5 ± 10 %

Interfaces

Communication interface	Incremental
Communication Interface detail	TTL / RS-422 HTL / Push pull Open Collector (depending on type)
Number of signal channels	
TTL / RS-422	6-channel
HTL / Push pull	3 channel
Open Collector	3 channel
Output frequency	≤ 150 kHz
Load current	≤ 30 mA
Power consumption	≤ 2 W (without load)

Electrical data

Connection type	Cable, 5-wire, radial, 2 m Cable, 8-wire, radial, 2 m (depending on type)
Supply voltage	4.5 ... 5.5 V 10 ... 27 V (depending on type)
Reference signal, number	1
Reverse polarity protection	✓
Short-circuit protection of the outputs	
4.5 V ... 5.5 V, TTL, RS-422	✓ ¹⁾
10 V ... 27 V, HTL, Push pull	✓ ²⁾
10 V ... 27 V, Open Collector	✓ ²⁾
MTTFd: mean time to dangerous failure	600 years (EN ISO 13849-1) ³⁾

¹⁾ Protection against short circuit only to GND. Short-circuit resistance is only guaranteed when GND and U_s are connected correctly.

²⁾ Protection against short circuit to GND and U_s. Short-circuit resistance is only guaranteed when U_s and GND are connected correctly.

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

	Solid shaft	Blind hollow shaft
Mechanical design	Solid shaft, face mount flange	Blind hollow shaft
Shaft diameter	6 mm	6 mm 8 mm 10 mm 12 mm (depending on type)
Shaft length		
Solid shaft, face mount flange	12 mm	-
Weight	Approx. 130 g ⁴⁾	Approx. 170 g ⁴⁾
Shaft material	Stainless steel	
Flange material	Aluminum	
Housing material	Aluminum	
Material, cable	PVC	
Start up torque	0.3 Ncm	0.5 Ncm
Operating torque	0.2 Ncm	0.3 Ncm
Permissible shaft movement, static (for hollow shafts only)	-	± 0.3 mm (radial) ± 0.5 mm (axial)
Permissible shaft movement, dynamic (for hollow shafts only)	-	± 0.1 mm (radial) ± 0.2 mm (axial)
Permissible shaft load (for solid shafts only)	40 N (radial) ¹⁾ 20 N (axial)	-
Operating speed	6,000 min ⁻¹ ²⁾	
Maximum operating speed	≤ 8,000 min ⁻¹ ³⁾	
Moment of inertia of the rotor	7.6 gcm ²	24.6 gcm ²
Bearing lifetime	2.0 x 10 ⁹ revolutions	
Angular acceleration	≤ 500,000 rad/s ²	

¹⁾ Higher values are possible using limited bearing life.

²⁾ Allow for self-heating of 1.3 K per 1,000 rpm when designing the operating temperature range.

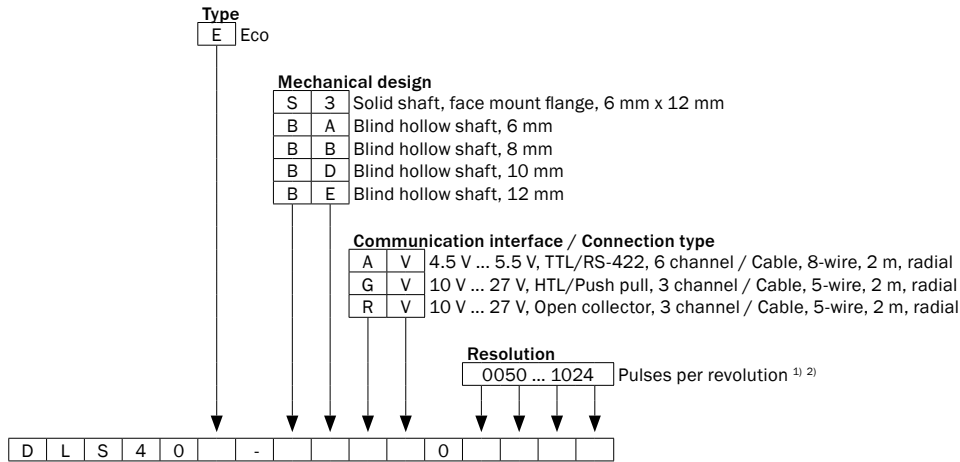
³⁾ No permanent operation. Decreasing signal quality.

⁴⁾ Relates to encoders with 2-m cable connection

Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3
Enclosure rating	IP50
Permissible relative humidity	90 % (Condensation not permitted)
Operating temperature range	-10 °C ... +70 °C
Storage temperature range	-25 °C ... +85 °C
Resistance to shocks	100 g, 6 ms (EN 60068-2-27)
Resistance to vibration	20 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)

Type code



¹⁾ See table "Pulses per revolution".

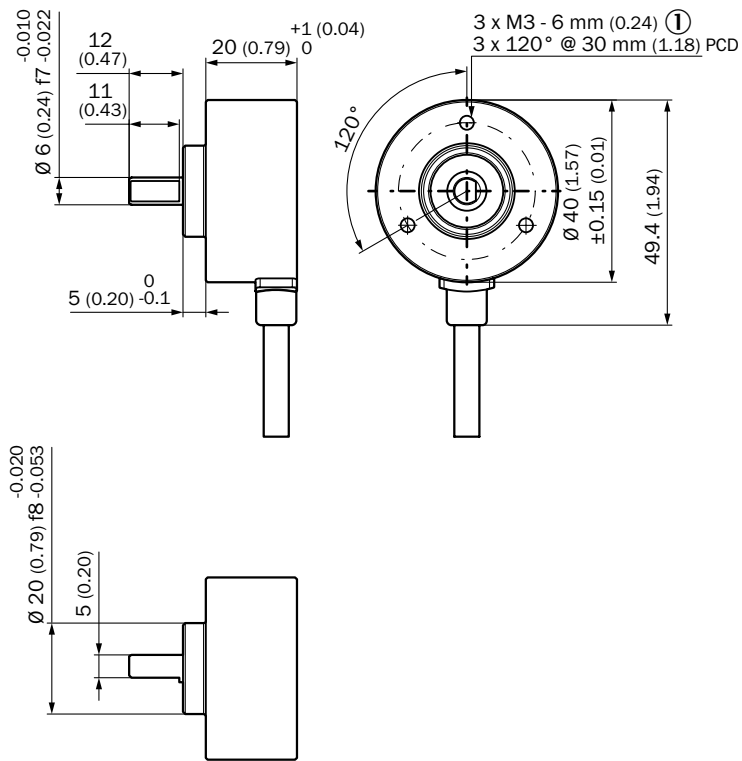
²⁾ Other pulses upon request.

Pulses per revolution (other pulses upon request)

DLS40
50
60
100
200
360
400
500
600
1000
1024

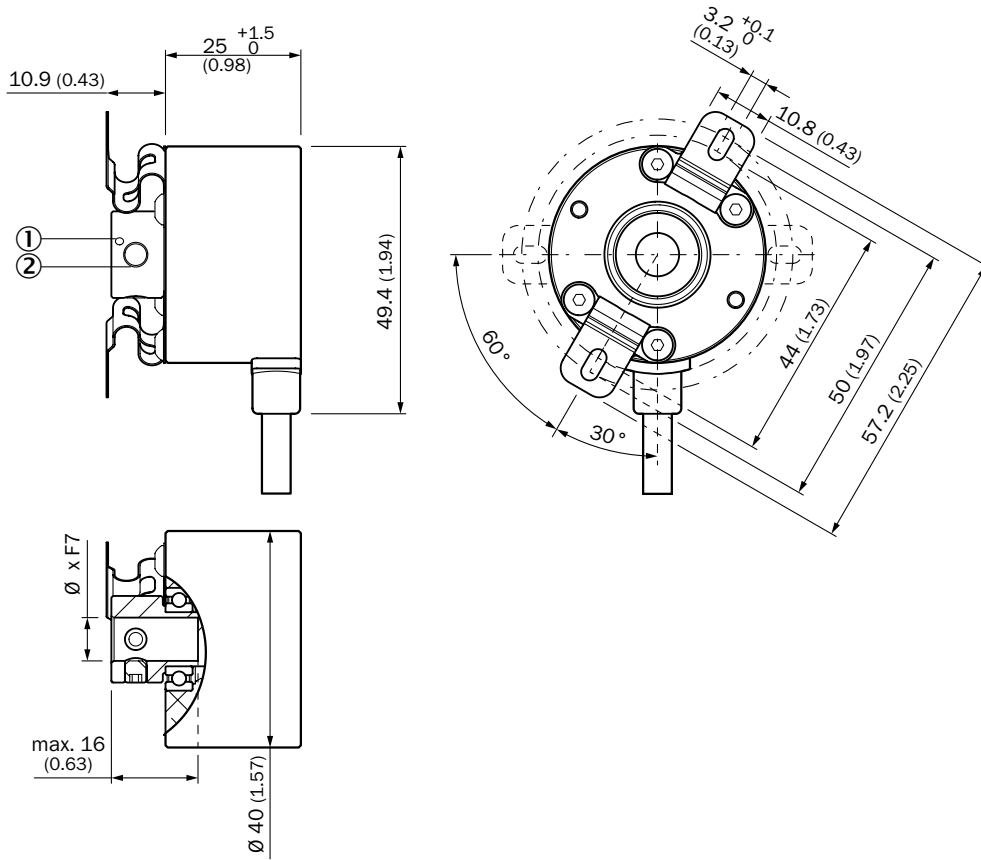
Dimensional drawings (Dimensions in mm (inch))

Solid shaft



$\text{\textcircled{1}}$ Depth

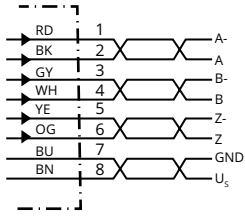
Blind hollow shaft



- ① Start position of the Z-pulse
- ② 2x M4 threaded pin hex key screw size 2.0

Type	Shaft diameter XF7
Blind hollow shaft	
DLS40E-BAxxxxxx	6 mm
DLS40E-BBxxxxxx	8 mm
DLS40E-BDxxxxxx	10 mm
DLS40E-BExxxxxx	12 mm

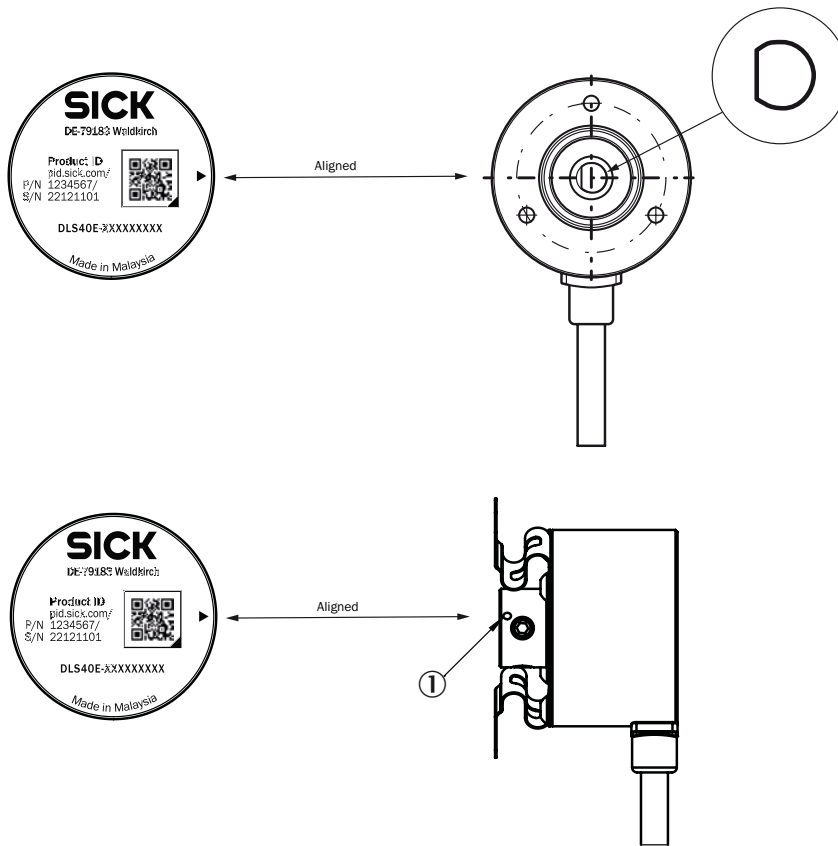
PIN assignment



Wire colors (cable connection)	Signal	Description	Type
Brown	U _s	Supply voltage	DLS40E-*
Blue	GND	Ground connection	DLS40E-*
Black	A	Signal cable	DLS40E-*
White	B	Signal cable	DLS40E-*
Orange	Z	Signal cable	DLS40E-*
Red	A-	Signal cable	DLS40E-AV*
Gray	B-	Signal cable	DLS40E-AV*
Yellow	Z-	Signal cable	DLS40E-AV*

Zero pulse explanation

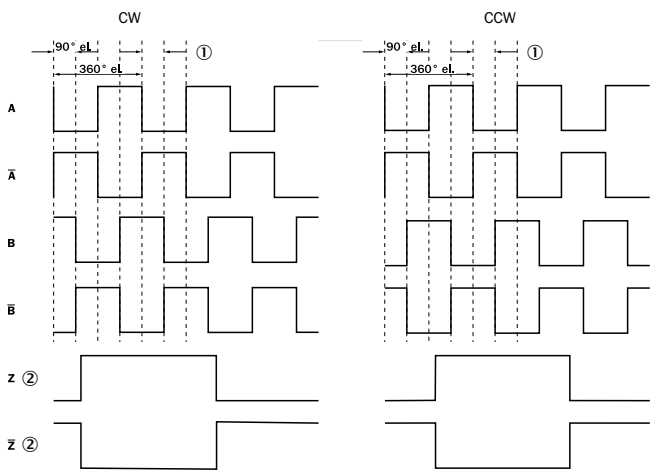
You can see the position with the mark on the rear side of the encoder



① Zero pulse mark on housing

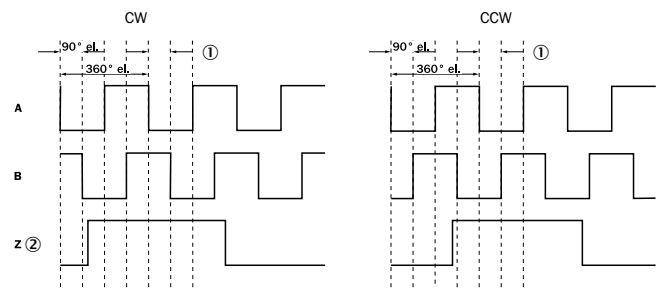
Signal outputs

TTL / RS-422



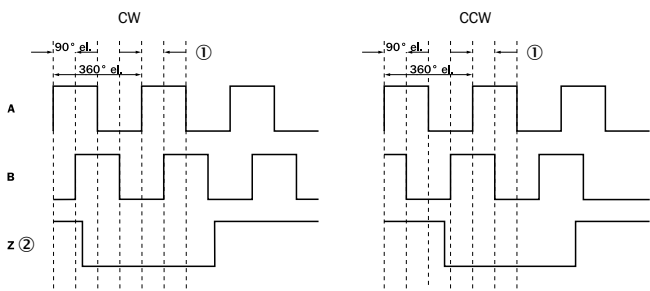
- ① Measuring step
- ② Only as reference

HTL / Push pull



- ① Measuring step
- ② Only as reference

Open Collector




- ① Measuring step
- ② Only as reference

Accessories

Mounting systems

Mounting brackets and plates






Mounting brackets

	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 20 mm, including mounting kit for face mount flange, mounting kit for face mount flange included	BEF-WF-20	2066393

Dimensional drawings → [page 12](#)

Other mounting accessories




Measuring wheels and measuring wheel systems




	Brief description	Type	Part no.
	Aluminium measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Aluminium measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 500 mm	BEF-MR006050R	2055225
	Aluminum measuring wheel with cross-knurled surface for 6 mm solid shaft, circumference 200 mm	BEF-MR06200AK	4084745
	Aluminum measuring wheel with smooth polyurethane surface for 6 mm solid shaft, circumference 200 mm	BEF-MR06200AP	4084746
	Aluminum measuring wheel with ridged polyurethane surface for 6 mm solid shaft, circumference 200 mm	BEF-MR06200APG	4084748
	Aluminum measuring wheel with studded polyurethane surface for 6 mm solid shaft, circumference 200 mm	BEF-MR06200APN	4084747
	O-ring for measuring wheels (circumference 200 mm)	BEF-OR-053-040	2064061
	O-ring for measuring wheels (circumference 300 mm), 2x O-ring	BEF-OR-083-050	2064076
	O-ring for measuring wheels (circumference 500 mm)	BEF-OR-145-050	2064074

Dimensional drawings → [page 13](#)

Shaft adaptation

Shaft couplings

	Brief description	Type	Part no.
	Bellows coupling, shaft diameter 6 mm / 6 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-0606-B	5312981
	Cross-slotted coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, -10° to +80 °C, max. torque 80 Ncm; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0606-S	2056406
	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
	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

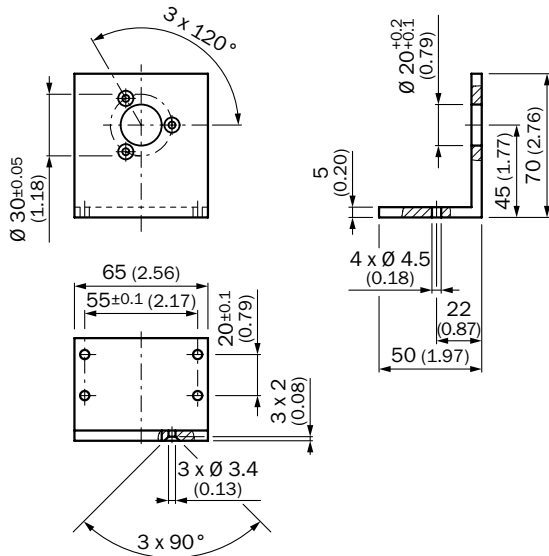
	Brief description	Type	Part no.
	Double loop coupling, shaft diameter 6 mm / 10 mm, max. shaft offset: radially +/- 2,5 mm, axially +/- 3 mm, angle +/- 10 degrees; max. speed 3.000 rpm, -30 to +80 degrees Celsius, torsional spring stiffness of 25 Nm/rad	KUP-0610-D	5326697
	Spring washer coupling, shaft 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
	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

Dimensional drawings → [page 13](#)

Dimensional drawings for accessories (Dimensions in mm (inch))

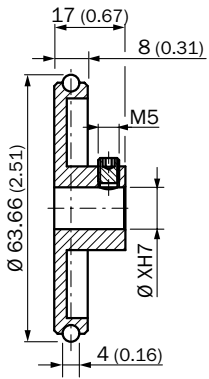
Mounting brackets and plates

BEF-WF-20

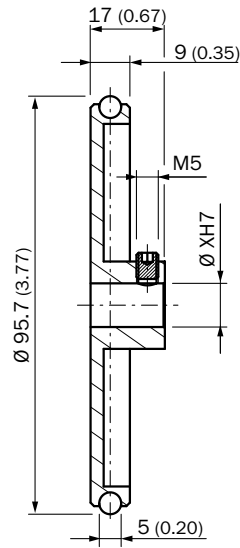


Other mounting accessories

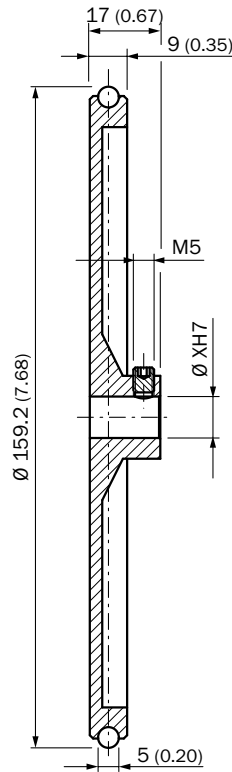
BEF-MR006020R



BEF-MR006030R



BEF-MR006050R

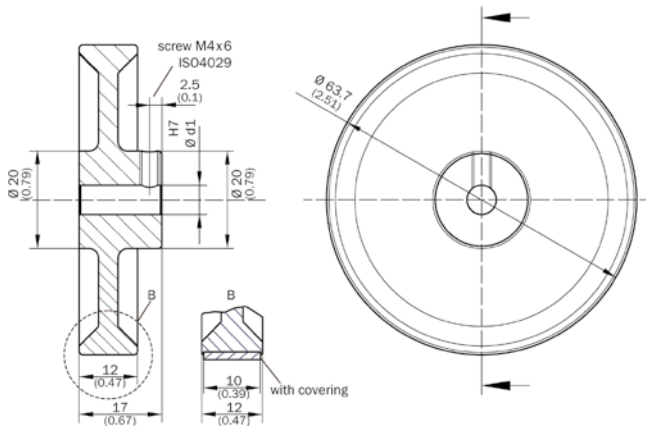


BEF-MR06200AK

BEF-MR06200AP

BEF-MR06200APG

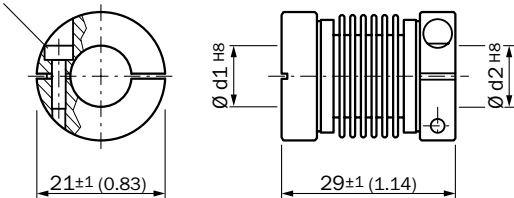
BEF-MR06200APN



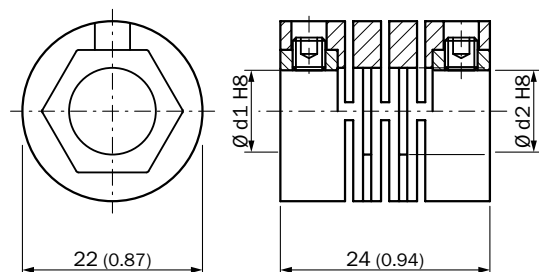
Shaft adaptation

KUP-06xx-B

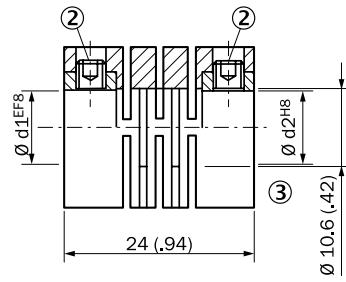
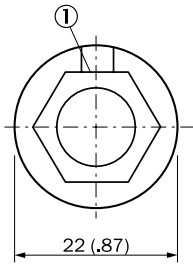
Cheese-head screw
M2.5 x 8, DIN 912 A2



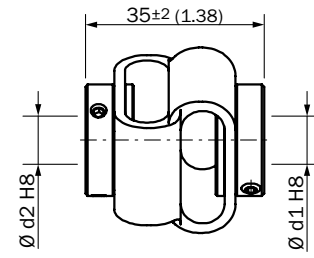
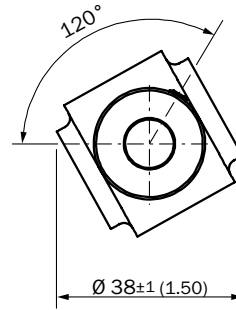
KUP-06xx-S



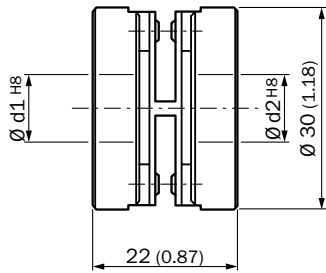
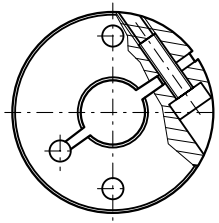
KUP-0608-S



KUP-0610-D



KUP-0610-F



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SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 11,000 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, SICK is always close to its customers. 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.

SICK has extensive experience in various industries and understands their processes and requirements. With intelligent sensors, SICK delivers exactly what the 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 SICK a reliable supplier and development partner.

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