



## DBS60E-RJAA01024

DBS60

INCREMENTAL ENCODERS

**SICK**  
Sensor Intelligence.



Illustration may differ

## Ordering information

Type	part no.
DBS60E-RJAA01024	1082937

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

## Detailed technical data

## Safety-related parameters

<b>MTTF<sub>D</sub> (mean time to dangerous failure)</b>	500 years (EN ISO 13849-1) <sup>1)</sup>
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<sup>1)</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.

## Performance

<b>Pulses per revolution</b>	1,024
<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>	TTL / RS-422
<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>Operating current</b>	≤ 50 mA (without load)

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

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

## Electronics

<b>Connection type</b>	Male connector, M23, 12-pin, radial
<b>Supply voltage</b>	4.5 ... 5.5 V

<sup>1)</sup> Short-circuit opposite to another channel or GND permissible for max. 60 s. No protection signal against U<sub>S</sub>.

<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>

<sup>1)</sup> Short-circuit opposite to another channel or GND permissible for max. 60 s. No protection signal against U<sub>S</sub>.

## Mechanics

<b>Mechanical design</b>	Through hollow shaft
<b>Shaft diameter</b>	5/8"Rear clamping
<b>Flange type / stator coupling</b>	2-sided stator coupling, slot, screw hole circle 63–83 mm
<b>Weight</b>	+ 0.25 kg <sup>1)</sup>
<b>Shaft material</b>	Stainless steel
<b>Flange material</b>	Aluminum
<b>Housing material</b>	Aluminum
<b>Start up torque</b>	+ 0.5 Ncm (+20 °C)
<b>Operating torque</b>	0.4 Ncm (+20 °C)
<b>Permissible movement static</b>	± 0.3 mm (radial) ± 0.5 mm (axial) <sup>2)</sup>
<b>Permissible movement dynamic</b>	± 0.1 mm (radial) ± 0.2 mm (axial) <sup>2)</sup>
<b>Operating speed</b>	6,000 min <sup>-1</sup> <sup>3)</sup>
<b>Maximum operating speed</b>	9,000 min <sup>-1</sup> <sup>4)</sup>
<b>Moment of inertia of the rotor</b>	50 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 or cable with male connector.

<sup>2)</sup> Not applicable for stator coupling type C and K.

<sup>3)</sup> Allow for self-heating of 2.6 K per 1,000 rpm when designing the operating temperature range.

<sup>4)</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>	IP65, housing side (IEC 60529) <sup>1)</sup> IP65, shaft side (IEC 60529)
<b>Permissible relative humidity</b>	90 % (Condensation not permitted)
<b>Operating temperature range</b>	-20 °C ... +85 °C <sup>2)</sup>
<b>Storage temperature range</b>	-40 °C ... +100 °C, without package
<b>Resistance to shocks</b>	250 g, 3 ms (EN 60068-2-27)
<b>Resistance to vibration</b>	30 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)

<sup>1)</sup> With mating connector fitted.

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

## Certificates

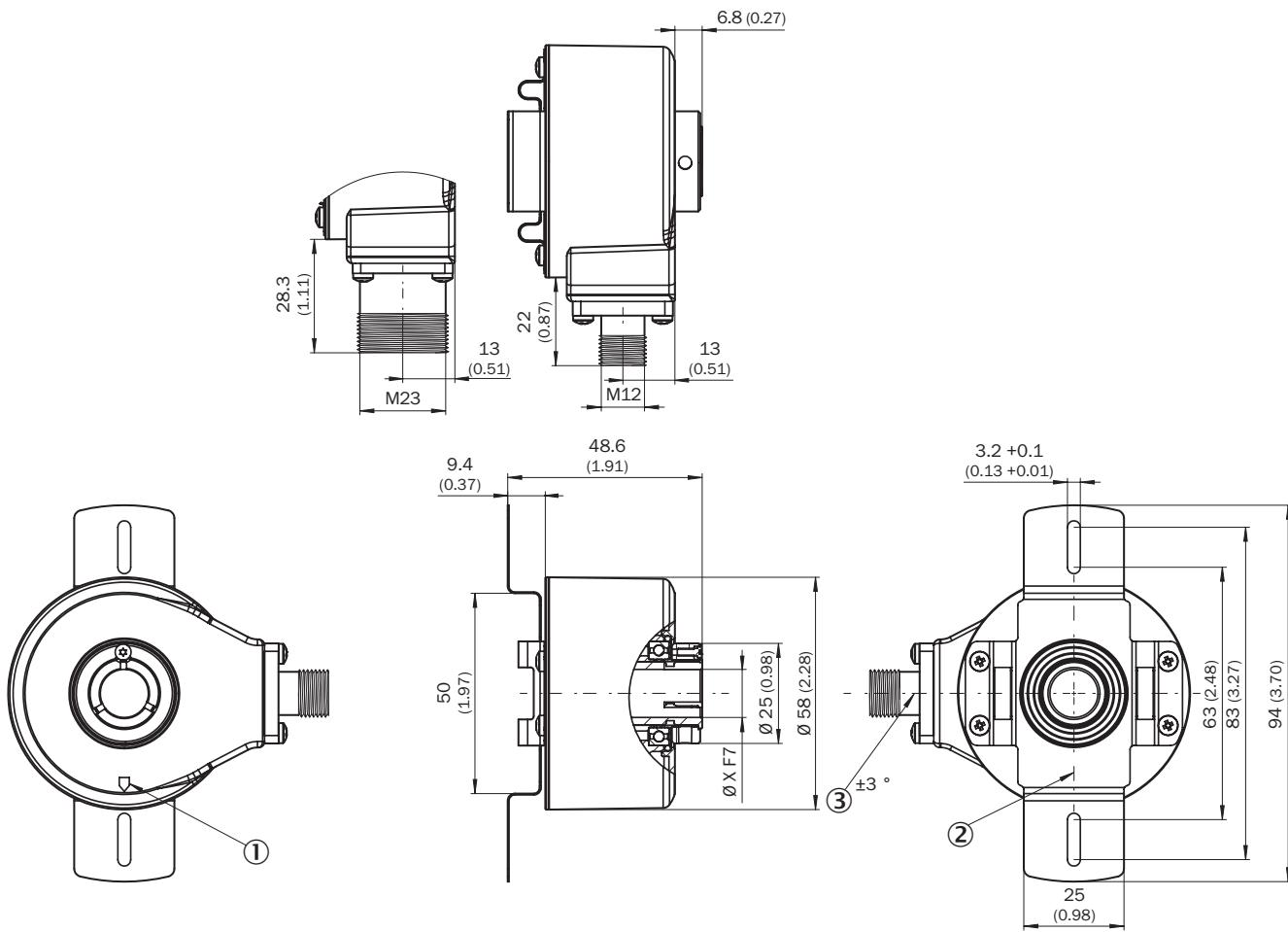
<b>EU declaration of conformity</b>	✓
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<b>UK declaration of conformity</b>	✓
<b>ACMA declaration of conformity</b>	✓
<b>China-RoHS</b>	✓
<b>cRUus certificate</b>	✓
<b>Information according to Art. 3 of Data Act (Regulation EU 2023/2854)</b>	✓

## 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

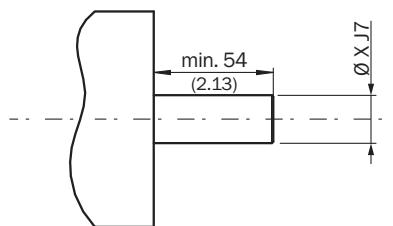


Dimensions in mm (inch)

- ① Zero pulse mark on housing
- ② zero pulse mark on flange under stator coupling
- ③ male connector tolerance in relation to hole pattern

Type	Through hollow shaft with rear clamping	Shaft diameter XF7
DBS60x-RAxxxxxxx	DBS60x-R1xxxxxx	6 mm
DBS60x-RBxxxxxx	DBS60x-R2xxxxxx	8 mm
DBS60x-RCxxxxxx	DBS60x-R3xxxxxx	3/8"
DBS60x-RDxxxxxx	DBS60x-R4xxxxxx	10 mm
DBS60x-RExxxxxx	DBS60x-R5xxxxxx	12 mm
DBS60x-RFxxxxxx	DBS60x-R6xxxxxx	1/2"
DBS60x-RGxxxxxx	DBS60x-R7xxxxxx	14 mm
DBS60x-RHxxxxxx	DBS60x-R8xxxxxx	15 mm
DBS60x-RJxxxxxx		5/8"

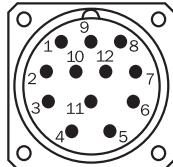
## Attachment specifications Through hollow shaft with rear clamping



customer side

Type	Through hollow shaft with rear clamping	Shaft diameter xj7
DBS60x-RAxxxxxxx	DBS60x-R1xxxxxx	6 mm
DBS60x-RBxxxxxx	DBS60x-R2xxxxxx	8 mm
DBS60x-RCxxxxxx	DBS60x-R3xxxxxx	3/8"
DBS60x-RDxxxxxx	DBS60x-R4xxxxxx	10 mm
DBS60x-RExxxxxx	DBS60x-R5xxxxxx	12 mm
DBS60x-RFxxxxxx	DBS60x-R6xxxxxx	1/2"
DBS60x-RGxxxxxx	DBS60x-R7xxxxxx	14 mm
DBS60x-RHxxxxxx	DBS60x-R8xxxxxx	15 mm
DBS60x-RJxxxxxx		5/8"
		-

## PIN assignment

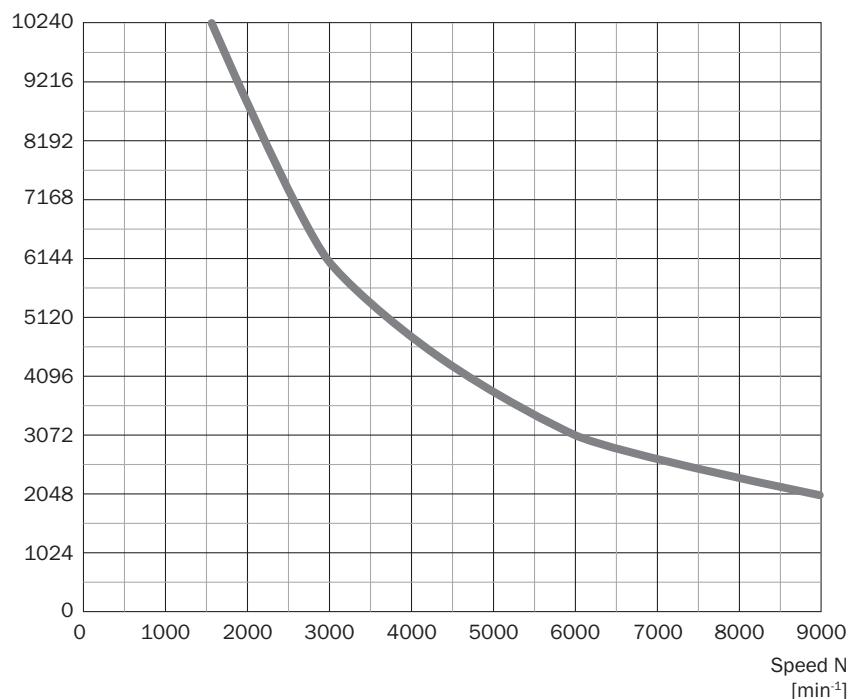


view of M23 male device connector on cable / housing

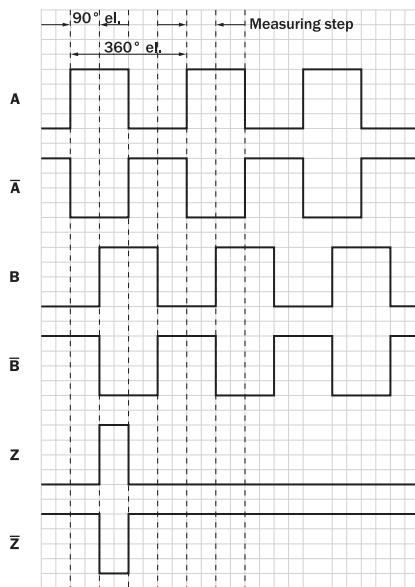
Wire colors (cable connection)	Male connector M12, 8-pin	Male connector M23, 12-pin	TTL/HTL 6-channel signal	Explanation
Brown	1	6	A-	Signal wire
White	2	5	A	Signal wire
Black	3	1	B-	Signal wire
Pink	4	8	B	Signal wire
Yellow	5	4	Z-	Signal wire
Purple	6	3	Z	Signal wire
Blue	7	10	GND	Ground connection
Red	8	12	+U <sub>s</sub>	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



## Diagrams Signal outputs for electrical interfaces TTL and HTL



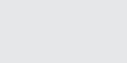
Cw with view on the encoder shaft in direction "A", compare dimensional drawing.

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

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

## Recommended accessories

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

	Brief description	Type	part no.
connectors and cables			
	<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>Items supplied:</b> By the meter</li><li><b>Cable:</b> 8-wire, PUR, halogen-free</li><li><b>Description:</b> SSI, shielded, Incremental, HIPERFACE®</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>Items supplied:</b> By the meter</li><li><b>Cable:</b> 11-wire, PUR</li><li><b>Description:</b> SSI, shielded, Incremental</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, Incremental</li><li><b>Items supplied:</b> By the meter</li><li><b>Cable:</b> 12-wire, PUR, halogen-free</li><li><b>Description:</b> SSI, shielded, Incremental</li></ul>	LTG-2512-MW	6027531
	<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>Items supplied:</b> By the meter</li><li><b>Cable:</b> 12-wire, UV and saltwater-resistant, PUR, halogen-free</li><li><b>Description:</b> SSI, shielded, TTL, HTL, Incremental</li></ul>	LTG-2612-MW	6028516
	<ul style="list-style-type: none"><li><b>Connection type head A:</b> Female connector, M23, 12-pin, straight</li><li><b>Connection type head B:</b> Flying leads</li><li><b>Signal type:</b> Incremental</li><li><b>Cable:</b> 30 m, 11-wire, PUR</li><li><b>Description:</b> Incremental, shielded</li></ul>	DOL-2312-G30MLA3	2030702
	<ul style="list-style-type: none"><li><b>Connection type head A:</b> Female connector, M23, 12-pin, straight</li><li><b>Connection type head B:</b> Flying leads</li><li><b>Signal type:</b> Incremental</li><li><b>Cable:</b> 25 m, 11-wire, PUR</li><li><b>Description:</b> Incremental, shielded</li></ul>	DOL-2312-G25MLA3	2030699
	<ul style="list-style-type: none"><li><b>Connection type head A:</b> Female connector, M23, 12-pin, straight</li><li><b>Connection type head B:</b> Flying leads</li><li><b>Signal type:</b> Incremental</li><li><b>Cable:</b> 20 m, 11-wire, PUR</li><li><b>Description:</b> Incremental, shielded</li></ul>	DOL-2312-G20MLA3	2030695
	<ul style="list-style-type: none"><li><b>Connection type head A:</b> Female connector, M23, 12-pin, straight</li><li><b>Connection type head B:</b> Flying leads</li><li><b>Signal type:</b> Incremental</li><li><b>Cable:</b> 15 m, 11-wire, PUR</li><li><b>Description:</b> Incremental, shielded</li></ul>	DOL-2312-G15MLA3	2030692
	<ul style="list-style-type: none"><li><b>Connection type head A:</b> Female connector, M23, 12-pin, straight</li><li><b>Connection type head B:</b> Flying leads</li><li><b>Signal type:</b> Incremental</li><li><b>Cable:</b> 10 m, 11-wire, PUR</li><li><b>Description:</b> Incremental, shielded</li></ul>	DOL-2312-G10MLA3	2030688
	<ul style="list-style-type: none"><li><b>Connection type head A:</b> Female connector, M23, 12-pin, straight</li><li><b>Connection type head B:</b> Flying leads</li><li><b>Signal type:</b> Incremental</li><li><b>Cable:</b> 7 m, 11-wire, PUR</li><li><b>Description:</b> Incremental, shielded</li></ul>	DOL-2312-G07MLA3	2030685
	<ul style="list-style-type: none"><li><b>Connection type head A:</b> Female connector, M23, 12-pin, straight</li><li><b>Connection type head B:</b> Flying leads</li><li><b>Signal type:</b> Incremental</li><li><b>Cable:</b> 2 m, 11-wire, PUR</li><li><b>Description:</b> Incremental, shielded</li></ul>	DOL-2312-G02MLA3	2030682
	<ul style="list-style-type: none"><li><b>Connection type head A:</b> Female connector, M23, 12-pin, angled, A-coded</li><li><b>Signal type:</b> HIPERFACE®, SSI, Incremental</li><li><b>Description:</b> HIPERFACE®, shieldedSSIIncremental</li></ul>	DOS-2312-W01	2072580

	<b>Brief description</b>	<b>Type</b>	<b>part no.</b>
	<ul style="list-style-type: none"><li>• <b>Connection systems:</b> Solder connection</li><li>• <b>Connection type head A:</b> Female connector, M23, 12-pin, straight, A-coded</li><li>• <b>Signal type:</b> HIPERFACE®, SSI, Incremental</li><li>• <b>Description:</b> HIPERFACE®, shieldedSSIIncremental</li><li>• <b>Connection systems:</b> Solder connection</li></ul>	DOS-2312-G02	2077057

	Brief description	Type	part no.
shaft adaptation			
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 11 mm, outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-011-M	2094671
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 15 mm, outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-015-P	2076233
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 14 mm, outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-014-P	2076232
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 12 mm, outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-012-P	2076231
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 10 mm, outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-010-P	2076230
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 8 mm, outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-008-P	2076229
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 6 mm, outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-006-P	2076228
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 1/2" (12.7 mm), outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-12Z-P	2076227
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet plastic (PEEK) insulated for hollow shaft, shaft diameter 3/8" (9.525 mm), outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-38Z-P	2076226
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 1/2" (12.7 mm), outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-12Z-M	2076225
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 3/8" (9.525 mm), outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-38Z-M	2076224
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 15 mm, outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-015-M	2076223
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 14 mm, outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-014-M	2076222
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 12 mm, outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-012-M	2076221
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 10 mm, outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-010-M	2076220
	<ul style="list-style-type: none"><li><b>Product segment:</b> Shaft adaptation</li><li><b>Product:</b> Collets</li><li><b>Description:</b> Collet metal for hollow shaft, shaft diameter 8 mm, outer diameter 5/8" (15.875 mm)</li></ul>	SPZ-58Z-008-M	2076219



## 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."**

## WORLDWIDE PRESENCE:

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