



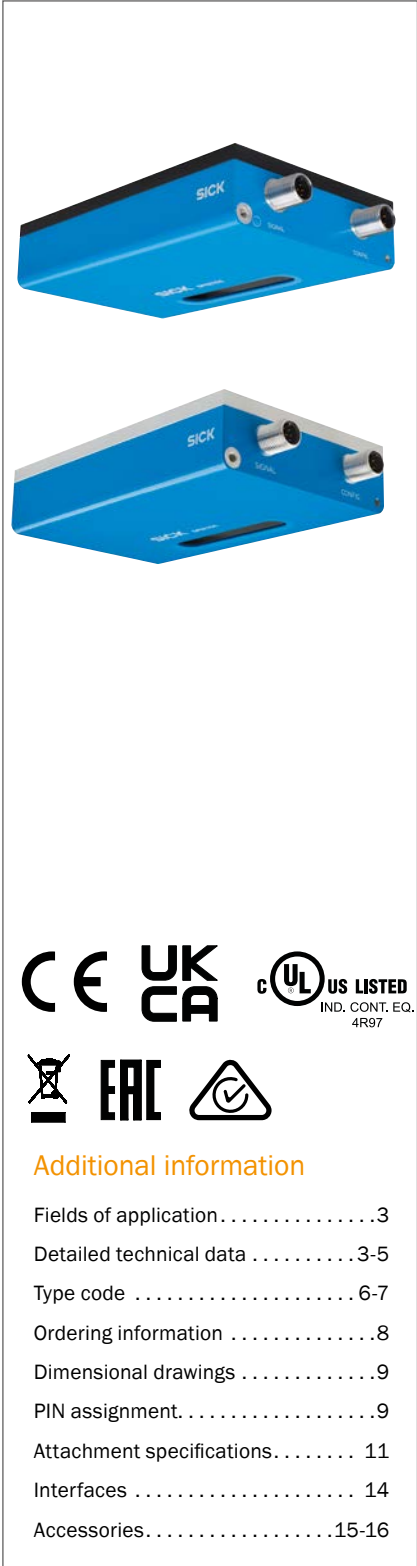
SPEETEC 1D

CAPTURES MOTION.
WITHOUT CONTACT.

Non-contact motion sensors

SICK
Sensor Intelligence.

CAPTURES MOTION. WITHOUT CONTACT.



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Product description

The wear-and-tear and maintenance-free SPEETEC 1D laser surface motion sensor detects the movements of object surfaces without contacting them. This detection requires no scale or measuring elements. The laser Doppler effect based technology enables the SPEETEC 1D to measure the speed, length, movement direction and position of objects on almost any surfaces. The

non-contact measurement method used by the sensor makes it particularly suitable for applications with soft or sensitive surfaces that would be damaged by tactile measurement. The SPEETEC 1D is also ideal for encoder applications with fast and dynamic processes that are unsuitable for encoders. The sensor can be monitored and logic functions configured via an interface.

At a glance

- Non-contact measurement of speed, length and position without measuring elements
- Compatible with many materials, colors and surfaces
- Very high measurement accuracy and repeatability
- Laser class 1
- Rugged design, compact dimensions, low weight
- TTL or HTL interface
- Diagnostics and parameterization function.

Your benefits

- Opens up new possibilities for measuring sensitive, soft or smooth objects
- Optical sensors avoid damage to, and contamination of the surfaces being measured and ensure a high product quality
- Slip-free measurement increases the measurement accuracy thereby optimizing productivity and process quality
- Thanks to the use of class 1 lasers, no expensive laser protection measures and no specially trained personnel are required
- High measurement accuracy, including in start-stop operation and at short measurement lengths
- Configuration interface allows application and sensor diagnostics as well as parameterization
- Easy to retrofit, wear and maintenance free

→ www.sick.com/SPEETEC_1D

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

- Consumer goods industry, e.g., packaging, digital printing
- Mechanical engineering, e.g., extrusion, metal processing, surface treatment
- Tire manufacturing, e.g., tire building
- Construction materials industry, e.g., insulating materials, dry construction
- Quality control
- Cutting processes

Detailed technical data

Safety-related parameters

MTTFd: mean time to dangerous failure	33 years ¹⁾
--	------------------------

¹⁾ 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

	NCV50B	NCV50E
Nominal measuring distance	50 mm	
Static mounting tolerance	Approx.. ± 5 mm ¹⁾	
Permissible static measuring distance	30 ... 100 mm ²⁾	
Direction of movement	1D, x-direction	
Movement detection	Bidirectional	
Measuring increment (µm/pulse)	4 - 2,000 (At 90° electrical)	
Speed measuring range	> 0 m/s ... 10 m/s ³⁾	
Permissible acceleration	≤ 30 m/s ²	
Accuracy		
Measurement accuracy	0.1 % ⁴⁾	0.72 % ⁴⁾
Repeatability	0.05 % ⁵⁾	0.1 % ⁵⁾
Internal sampling rate	330 µs	
Latency period	2.9 ms	

¹⁾ Mounting the device closer than the specified measuring distance will not affect the accuracy of the measurement for suitable materials. Operation outside of the tolerance is possible with restrictions.

²⁾ The possible measuring distance depends on the material and must be determined in each case for the material used in the application, see table "Permissible measuring distance". The static mounting tolerance is already included in the above range and is not additionally available.

³⁾ No continuous operation < 0.1 m/s recommended.

⁴⁾ Error limit for systematic measurement deviation in accordance with DIN 1319-1:1995. Valid between 0.2 m/s ... 10 m/s. The achievable measuring accuracy depends on the accuracy of the installation, see table "Dependence of measuring accuracy on pitch angle deviations".

⁵⁾ Maximum permissible measurement deviation in accordance with DIN 1319-1:1995 under constant conditions. Valid between 0.2 m/s ... 10 m/s, averaged over 0.25 m measuring length.

System

	NCV50B	NCV50E
Light source	2 continuous beam lasers ¹⁾	1 continuous beam laser ¹⁾
Shaft length	850 nm	
Laser class	1 (IEC 60825-1:2014)	
Type of light	Invisible infrared light	
Typ. measurement field size (distance)	2 mm x 3 mm (at 50 mm) 8 mm x 3 mm (at 45 mm) 8 mm x 3 mm (at 55 mm)	2 mm x 1.5 mm (at 50 mm) 2 mm x 1.5 mm (at 45 mm) 2 mm x 1.5 mm (at 55 mm)
Laser power (per laser)	0.78 mW ²⁾	

¹⁾ L10 ≥ 32,500 h (not temperature-dependent). The lasers are always on when the sensor is supplied with voltage. To increase the service life of the sensor, we recommend completely disconnecting the sensor from the voltage supply when it is not needed. No warranty claims relating to the reaching of the service life of the laser will be accepted.

²⁾ The device must not be operated if the screen is damaged or missing.

Mechanical data

	NCV50B	NCV50E
Dimensions	140 mm x 95 mm x 32.5 mm (without plug)	
Weight	400 g	
Material	Housing Aluminum Screen PMMA Plug insert PA66, copper-zinc alloy (CuZn)	
Permissible angle	Permissible pitch angle $\leq \pm 1.5^\circ$ ¹⁾ 0,2° ¹⁾ Permissible yaw angle $\leq \pm 1.5^\circ$ ¹⁾ Permissible roll angle $\leq \pm 10^\circ$ ¹⁾	

¹⁾ Exceeding the values leads to a higher systematic measurement deviation, see table "Permissible deviations from nominal alignment".

Electrical data

	NCV50B	NCV50E
Supply voltage	12 V ... 30 V	
Communication interface	TTL / RS-422 ²⁾ HTL / Push pull ¹⁾	
Output frequency	≤ 625 kHz	
Connection type	Communication interface Male connector, M12, 8-pin, A-coded Parameterization and diagnostic interface Male connector, M12, 4-pin, D-coded (only for parameterizable variants)	
Digital input	Type-dependent, only for parameterizable variants (see type code)	
Digital output	Type-dependent, only for parameterizable variants (see type code)	
Power consumption	< 8 W	
Load current	≤ 30 mA, per channel	
Reverse polarity protection	✓	
Protection class	III according to DIN EN 61140	
Short-circuit resistant outputs	TTL / RS-422 ✓ ²⁾ HTL / Push pull ✓ ³⁾ Digital input ✓ ³⁾ Digital output ✓ ³⁾	
Initialization time	Max. 3 s ⁴⁾	

¹⁾ With 4-channels unless noted.

²⁾ Short-circuit to another channel or GND permissible for a maximum of 30 s. No protection in the case of a short-circuit channel of U_s.

²⁾ Short-circuit to another channel, U_s or GND for max. 30 s.

³⁾ Digital output DO can have an undefined state during this time.

Ambient data

	NCV50B	NCV50E
EMC	EN 61000-6-2, EN 61000-6-3	
Enclosure rating	IP65 (EN 60529) ¹⁾ IP67 (EN 60529) ¹⁾	
Permissible relative humidity	70 % ²⁾	

¹⁾ For suitable mating connector and correct mounting of the mating connector.

²⁾ Condensation on laser modules and screen not permitted.

³⁾ If the permissible temperature range is exceeded, the sensor switches off the laser to protect it against damage. No signal is outputted in this case. The variant with parameterization and diagnostic functions offers the option of monitoring the internal temperature and therefore the reserves up until the point of switching off. Operation down to approx. -30°C possible on request.

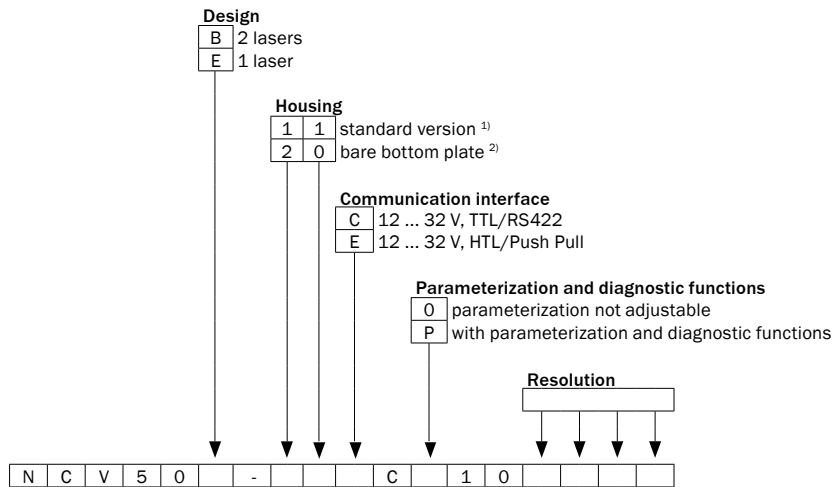
Temperature	Operating temperature range	0 °C ... +45 °C ³⁾
	Storage temperature range	-32 °C ... +60 °C, without package
Resistance	Resistance to shocks	30 g, 6 ms (EN 60068-2-27)
	Resistance to vibration	20 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)

¹⁾ For suitable mating connector and correct mounting of the mating connector.

²⁾ Condensation on laser modules and screen not permitted.

³⁾ If the permissible temperature range is exceeded, the sensor switches off the laser to protect it against damage. No signal is outputted in this case. The variant with parameterization and diagnostic functions offers the option of monitoring the internal temperature and therefore the reserves up until the point of switching off. Operation down to approx. -30°C possible on request.

Type code



Preferred resolutions

Designation in the type code	Resolution/Measurement step(90° electrical)	Resolution/Measurement step (360° electrical)
0004	4 µm	16 µm
0020	20 µm	80 µm
0100	100 µm	400 µm
0200	200 µm	800 µm
1000	1000 µm	4000 µm

Other resolutions are available on request - please contact us. With the parameterizable version you can choose from all technically possible resolutions yourself.

Permissible lengths of cable

Speed (m/s)	Resolution/Measurement step(90° electrical)	Frequency	Permissible lengths of cable for TTL	Permissible lengths of cable for HTL
0.1	4 µm	6.25 kHz	350 m	100 m
1	4 µm	62.5 kHz	350 m	20 m
4	4 µm	250 kHz	350 m	5 m
5	4 µm	312.5 kHz	250 m	2 m
10	4 µm	625 kHz	250 m	-

For four-fold evaluation, differential, the frequency is calculated as follows:

$$\text{Frequency} = (\text{speed}/\text{resolution}) / 4$$

Example:

$$(5.0 \text{ m/s} / 4 \text{ µm}) / 4 = 312.5 \text{ kHz}$$

Functions of the parameterization and diagnostics interface

Notes

The PGT-14 programming tool is required to use the parameterization and diagnostics function, see Accessories.

To use the logic functions, the YM2A28-C20S01MYAAX signal distribution cable and a suitable trigger sensor with PNP switching output and M8 connector, 4-pin are required.

Variants with the parameterization and diagnostics interface offer the following functions:

Parameterization

- of the electrical interface TTL or HTL
- of the measuring step length in steps of 4 μm
- of the movement direction forward or backward
- of the digital inputs and outputs functionality
 - logic function "Deactivate incremental signal"
 - logic function "Digital trigger output active after certain length"
- of a customer correction factor to compensate for mounting tolerances

Diagnosis

- of the operating hours counter
- of the internal sensor temperature
- of the current speed value
- of the current signal-to-noise ratio
- of the digital input and output state

Note: The interface is not designed as a permanent connection. The line of the programming tool must not be extended.

Ordering information

- **Without parameterization and diagnostic interface**
- **Measuring distance:** 50 mm
- **Supply voltage:** 12 V ... 30 V

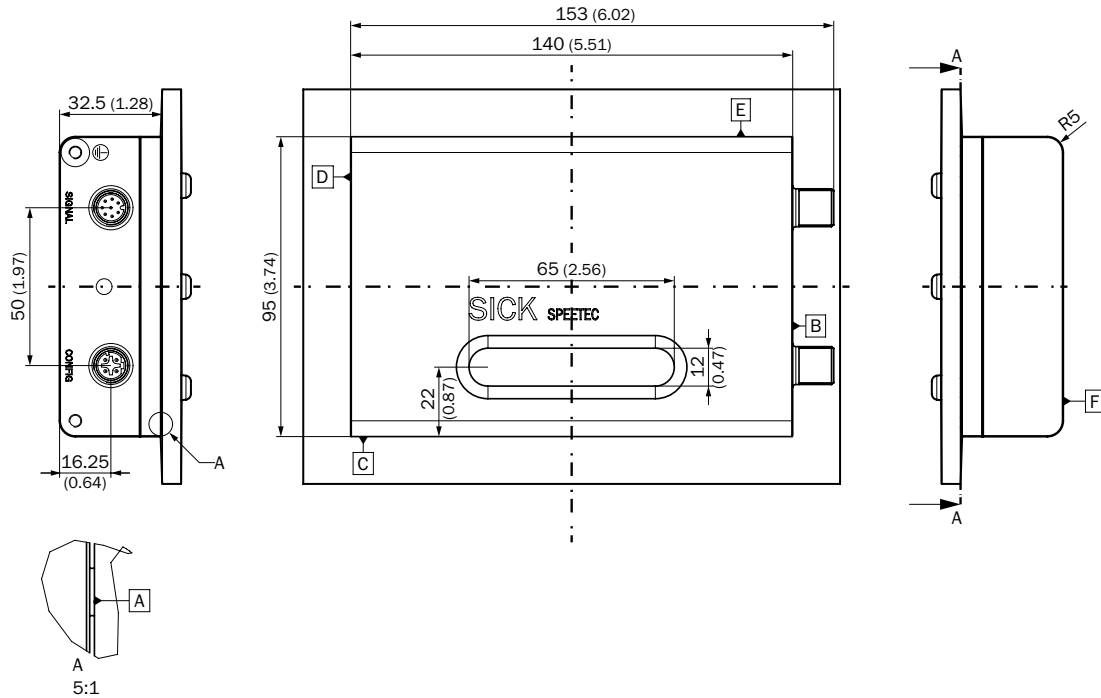
Part no.	Type	Resolution/Measurement step (90° electrical)	Output level
1106854	NCV50B-11CC0100004	4 µm	TTL
1106855	NCV50B-11CC0100100	100 µm	TTL
1106856	NCV50B-11EC0100004	4 µm	HTL
1106857	NCV50B-11EC0100100	100 µm	HTL
1129002	NCV50E-20CC0100100	100 µm	TTL
1129003	NCV50E-20CC0100250	250 µm	TTL
1129000	NCV50E-20CC0100025	25 µm	TTL

- **With parameterization and diagnostic interface**
- **Measuring distance:** 50 mm
- **Supply voltage:** 12 V ... 30 V

Part no.	Type	Resolution / Measurement step (90° electrical)	Output level
1121431	NCV50B-11CCP100100	100 µm	TTL
1133359	NCV50E-20CCP100100	100 µm	TTL

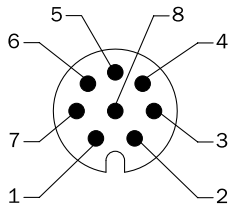
Dimensional drawings (Dimensions in mm (inch))

SPEETEC 1D



PIN assignment

M12 signal male connector,
8-pin and cable, 8-wire



View of M12 male device connector

Male connector M12, 8-pin	Wire color	TTL, HTL standard signal	TTL, HTL signal can be programmed	Explanation
1	Brown	A-	A-	Signal cable
2	White	A	A	Signal cable
3	Black	B-	B-	Signal cable
4	Pink	B	B	Signal cable
5	Yellow	Do not wire!	Digital output	Warning: Observe signal variant!
6	Violet	Do not wire!	Digital input	Warning: Observe signal variant!
7	Blue	GND	GND	Ground connection of the sensor
8	Red	+U _s	+U _s	Supply voltage
Screen	Screen	Screen	Screen	Connect screen to housing on sensor side, connect to earth on the control side
Ground		Earthing point on housing		The sensor must be earthed via the housing at the intended earthing point.

Technical data of digital input

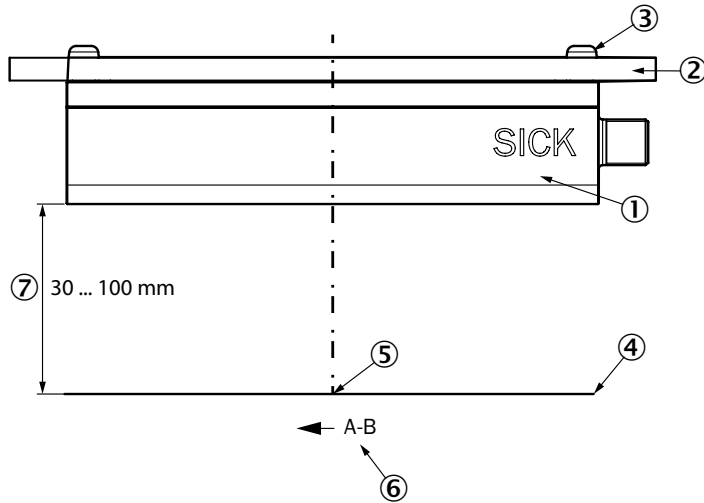
Type	Current Sink Type 1/3
Input voltage HIGH	15 V ... 30 V
Input voltage LOW	-3 V ... 5 V
Input current HIGH	2 mA ... 2.6 mA
Input current LOW	0 mA ... 2.6 mA

Technical data of digital output

Type	Push-Pull Output
Output voltage HIGH	$(U_s - 2 \text{ V}) \dots U_s$
Output voltage LOW	0 V ... 2 V
Output current HIGH	0.5 mA ... 30 mA

Attachment specifications

Nominal alignment of the sensor to the surface (z-axis)



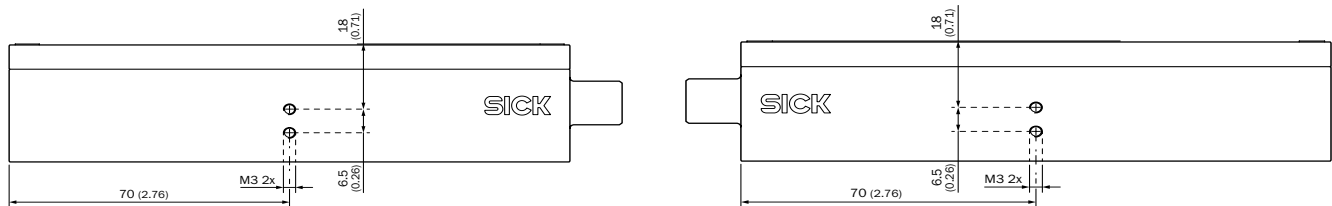
- ① Sensor
- ② Mounting surface
- ③ M4 screws
- ④ Surface to be measured
- ⑤ Measurement point on the surface
- ⑥ Forward material movement; signal sequence A before B
- ⑦ Measuring distance between sensor and surface, see also table "Permissible measuring distance"

Permissible measuring distance

The possible measuring distance depends on the material being measured. The following table shows examples of the possible distances on selected materials. The possible distance must be determined in each case for the material used in the application.

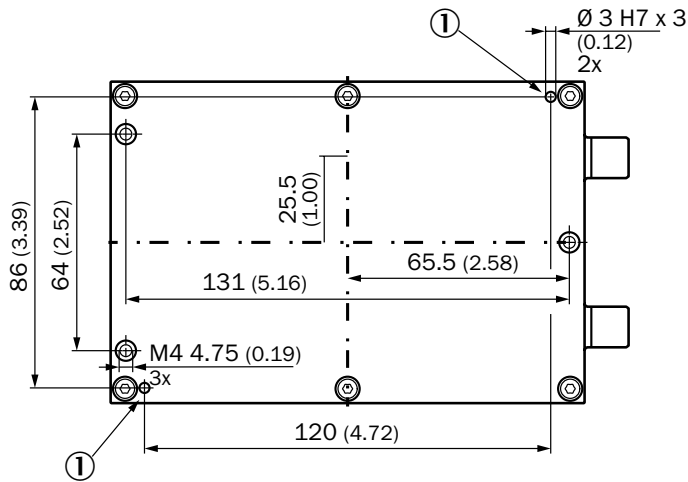
Material	Possible static measuring stand
Wood, sawed	30 ... 100 mm
Paper, white	30 ... 100 mm
Conveyor belt, black	50 ... 80 mm
Textile	40 ... 60 mm

Side view with threaded holes for proximity sensors



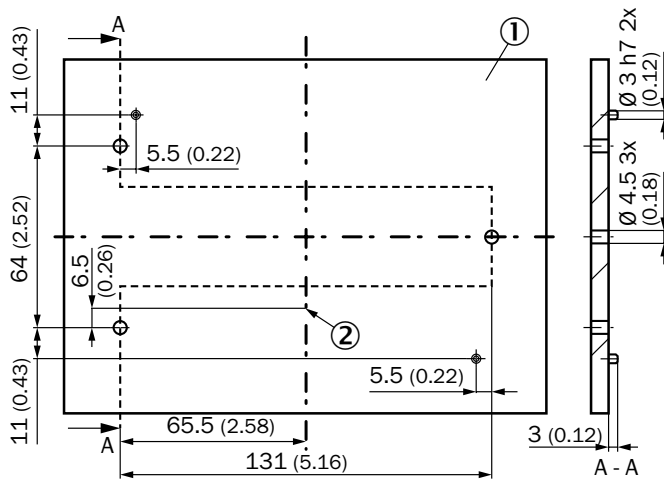
Mx thread for proximity sensors mounting brackets BEF-MK-NCV50-W49G6 (2117457)

Nominal alignment of the sensor to the surface (x-/y-plane)



① Holes Ø 3 H7 x 3 for mounting dowel pins

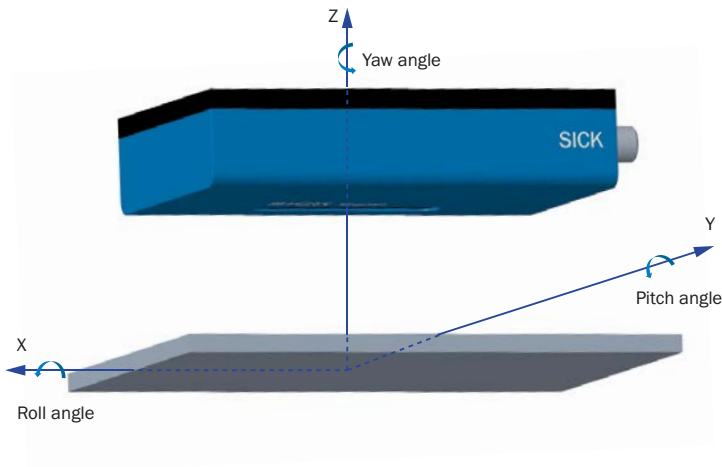
Attachment specifications



① Mounting surface

② Measurement point on x-/y-plane, 82.5 mm from the mounting plane

Permissible deviations from nominal alignment

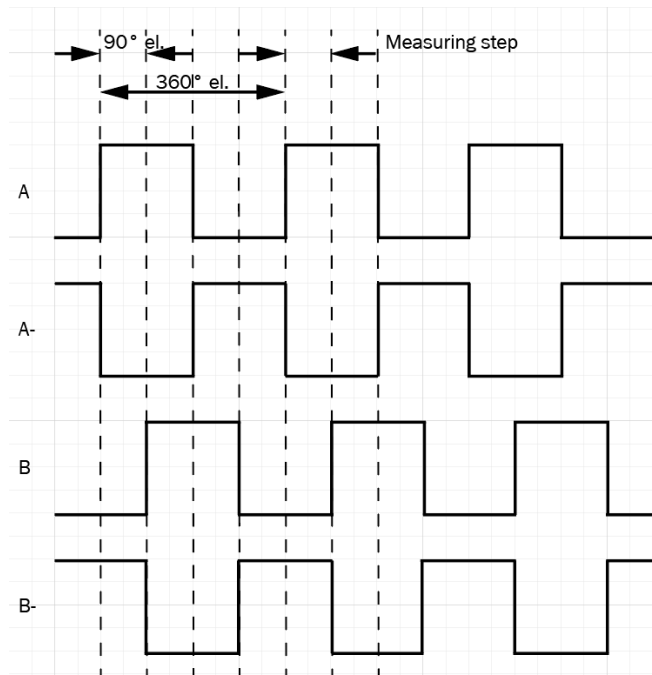


Dependence of measurement accuracy on pitch angle deviations

Pitch angle [°]	NCV50E accuracy [%]	NCV50B accuracy [%]
0.05	0.25	0.10
0.10	0.41	0.10
0.20	0.72	0.10
0.30	1.03	0.10
0.50	1.65	0.10
0.75	2.42	0.10
1.00	3.20	0.10
1.50	4.76	0.10

Interfaces

Signal outputs for electrical interfaces TTL and HTL with forward material movement (see assembly specifications)





Accessories

Mounting systems

Plug connectors and cables

Connecting cables

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: flying leads Cable: PUR, halogen-free, shielded, 4 x 2 x 0.25 mm ² , 7 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, M12, 8-pin, angled Head B: flying leads Cable: PUR, halogen-free, shielded, 4 x 2 x 0,25 mm ² , 7 mm	2 m	DOL-1208-W02MAC1	6037724
		5 m	DOL-1208-W05MAC1	6037725
		10 m	DOL-1208-W10MAC1	6037726
		20 m	DOL-1208-W20MAC1	6037727




Dimensional drawings → [page 17](#)

Field-attachable connectors



Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: - Cable: shielded	DOS-1208-GA	6028369
	Head A: male connector, M12, 8-pin, straight Head B: - Cable: shielded	STE-1208-GA	6028370

Dimensional drawings → [page 17](#)

Cables (ready to assemble)



Figure	Brief description	Type	Part no.
	Head A: cable Head B: Flying leads Cable: SSI, PUR, shielded, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , 7.5 mm	LTG-2411-MW	6027530
	Head A: cable Head B: Flying leads Cable: SSI, PUR, halogen-free, shielded, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , 7.8 mm	LTG-2512-MW	6027531
	Head A: cable Head B: Flying leads Cable: SSI, TTL, HTL, PUR, halogen-free, shielded, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , 7.8 mm, UV and saltwater-resistant	LTG-2612-MW	6028516

Connection cables

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: male connector, M12, 8-pin, straight Cable: PUR, halogen-free, shielded, 7.7 mm	5 m	DSL-1208-G05MAC1	6032913
	Signal distribution cable	0.2 m	YM2A28-C20S01MYAAX	2124388




Dimensional drawings → [page 17](#)

Alignment aids

Figure	Brief description	Type	Part no.
	Adjustment aid for NCV50	BEF-WN-NCV50-ADJST	2117003
	IR converter card for SPEETEC 1D	BEF-SPEETEC-LSD	2120614

Dimensional drawings → [page 18](#)

Mounting brackets

Figure	Brief description	Type	Part no.
	Mounting bracket for photoelectric proximity switch on NCV50	BEF-MK-NCV50-W49G6	2117457
	Mounting bracket for NCV50	BEF-WN-NCV50 mounting bracket	2117456
	Mounting bracket for measuring wheel system MWS120 and laser surface motion sensors SPEETEC 1D	BEF-WF-MWS-NCV	2113284


Dimensional drawings → [page 19](#)

Programming and configuration tools


Figure	Brief description	Type	Part no.
	Programming tool for SPEETEC 1D	PGT-14	1121562

Dimensional drawings → [page 17](#)

Signal and status indicators

Figure	Brief description	Type	Part no.
	Pulse counter and speed measuring device with touchscreen display	DIS-IPDTACCR0000	1121562

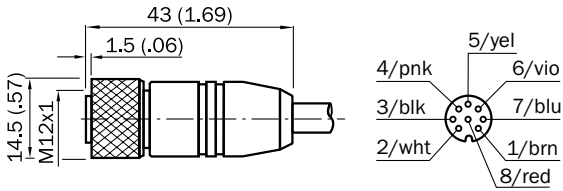
Device protection

Figure	Brief description	Type	Part no.
	Table housing suitable for installation of the DIS-IPDTACCR0000 display unit	DIS-DH30M	7135599

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

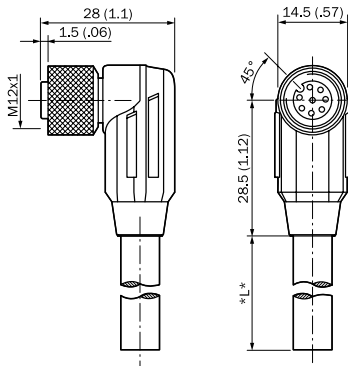
Plug connectors and cables

DOL-1208-GxxMAC1

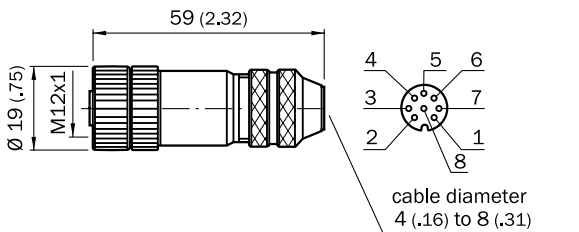


All dimensions in mm (inch)

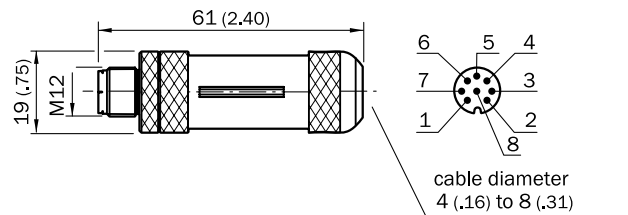
DOL-1208-WxxMAC1



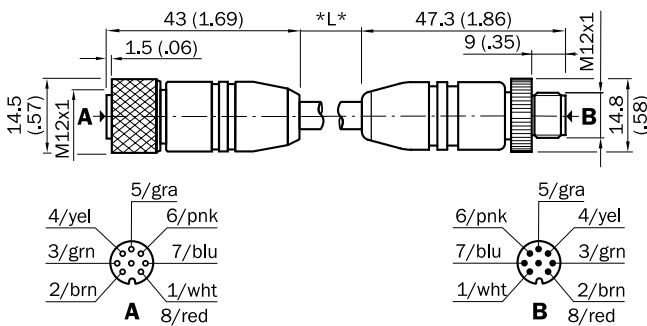
DOS-1208-GA01



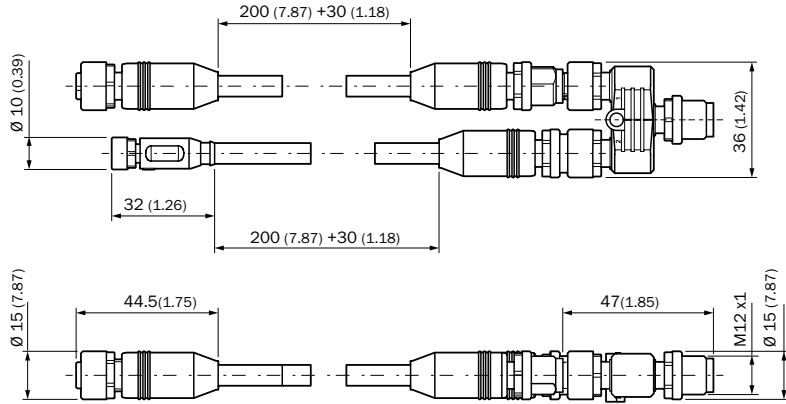
STE-1208-GA01



DSL-1208-G05MAC1

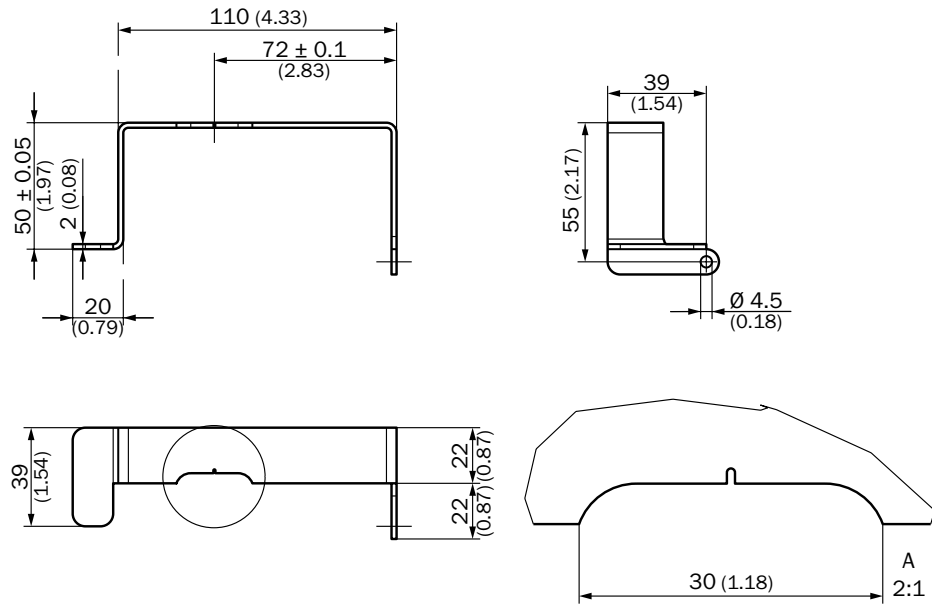


YM2A28-C20S01MYAAX



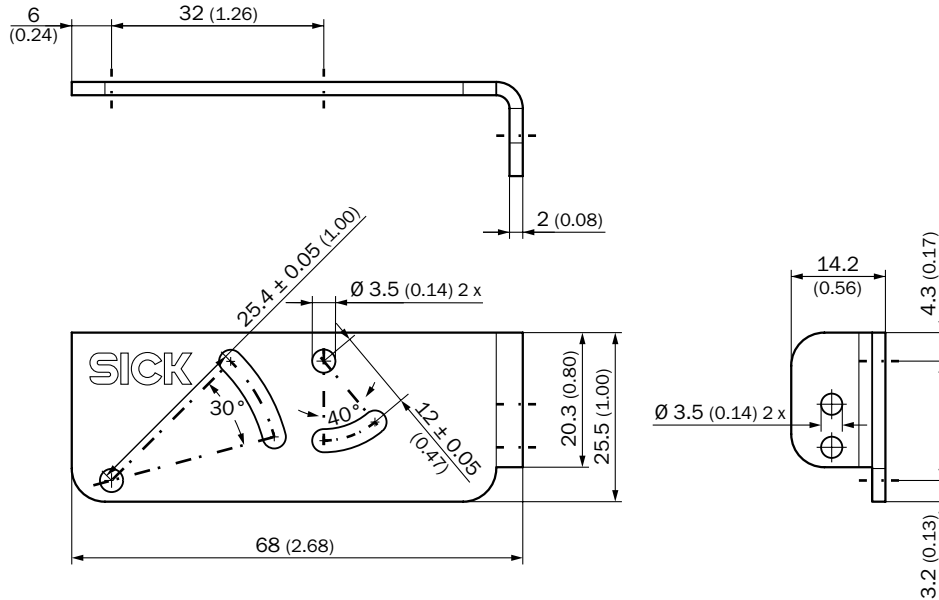
Alignment brackets

BEF-WN-NCV50-ADJST

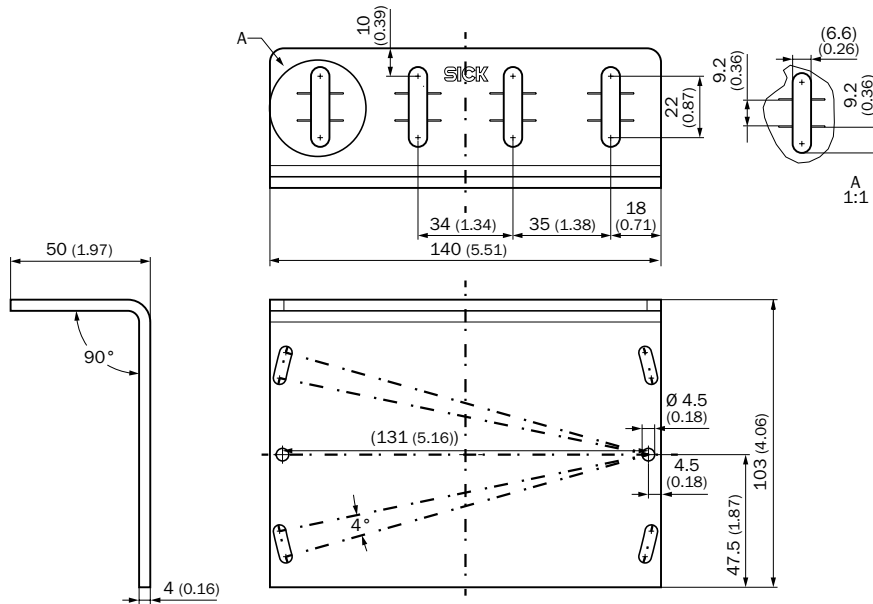


Mounting brackets

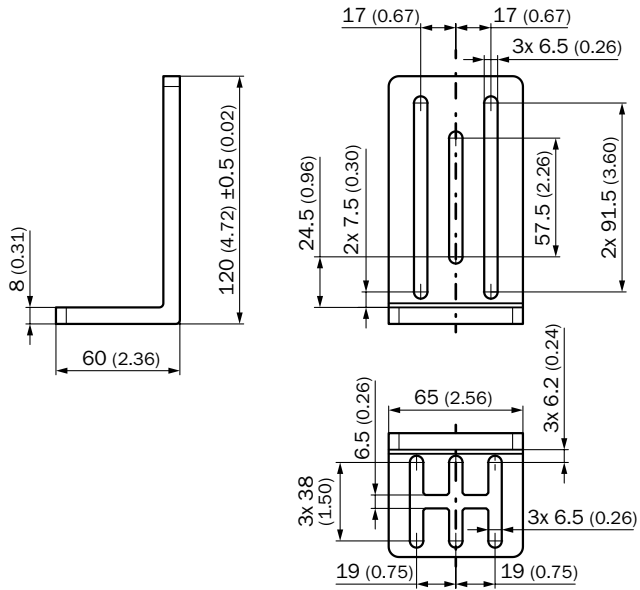
BEF-MK-NCV50-W49G6



BEF-WN-NCV50-Monting bracket

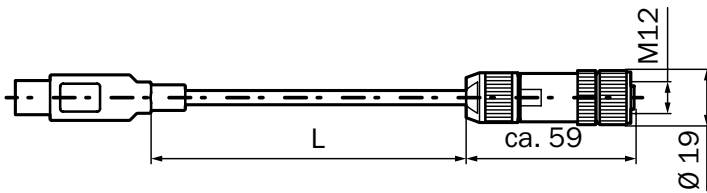


BEF-MWS-NCV



Programming and configuration tools

PGT-14



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SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 10,400 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.

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Detailed addresses and further locations → www.sick.com