Product data sheet

NCV50E-20CCP100100

SPEETEC 1D

NON-CONTACT MOTION SENSORS

SICK
Sensor Intelligence.

Illustration may differ

Ordering information

Type	Part no.
NCV50E-20CCP100100	1133359

Other models and accessories ➜ www.sick.com/SPEETEC_1D

Detailed technical data

Features

Specialty	SPEETEC closes the gap between tactile measuring wheel systems and complex laser Doppler sensors – and is suitable for almost all surfaces and objects thanks to the non-contact measurement that uses no measuring elements. This opens up new fields of application in motion monitoring. NCV50E is the ideal solution for OEM customers who want to determine the best mounting position in their application and ensure accurate mounting. With a reference measurement after mounting, the systematic errors of the application can be determined. If this is not possible, the NCV50B model should be preferred. Non-contact measurement on moving objects without measuring elements. Class 1 laser

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.

System

Light source	1 continuous beam laser [1]
Wave length	850 nm
Laser class	1 (IEC 60825-1:2014)
Type of light	Invisible infrared light
Typ. measurement field size (distance)	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.

Performance

Nominal measuring distance	50 mm
Static mounting tolerance	Ca. ± 5 mm [1]
Possible static measuring distance	30 ... 100 mm [2]
Direction of movement	1D, x-direction
Start/stop	Not recommended
Movement detection	Bidirectional
Measuring increment (µm/pulse)	100
Speed measuring range	> 0 m/s ... 10 m/s [3]
Permissible acceleration	≤ 30 m/s²
Accuracy	
Measurement accuracy	0.72% [4]
Repeatability	0.1 % [5]
Internal sampling rate	330 µs
Latency	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 identified in each case for the material used in the application, see the “Permissible measuring distance” table. The static mounting tolerance is included in the range mentioned above 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 measurement accuracy depends on the accuracy of installation. See “Permissible deviations from nominal alignment”.

[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.

Electrical data

Supply voltage	12 V ... 30 V
Communication interface	TTL / HTL
Output frequency	≤ 625 kHz
Connection type	Male connector, M12, 8-pin, A-coded [1]
Parameterization and diagnostic interface with digital input and output	Yes
Parameterising data	TTL or HTL electrical interface Length of the measuring step Direction of movement forward or backward Functionality of the digital inputs and outputs Logic function “Deactivate incremental signal” Logic function “Digital trigger output active after defined length” Customer correction factor to compensate for assembly tolerances
Available diagnostics data	Operating hour counter Sensor temperature Current speed value Current signal-to-noise ratios Indicators for measurement errors due to reflections State of the digital inputs and outputs
Power consumption	< 8 W

[1] Observe the maximum length of cable: e.g. 20 m at a resolution of 4µm and 1 m/s or 2 m at a resolution of 4µm and 5 m/s: The frequency is calculated differentially with 4-fold evaluation as follows: Frequency = (speed/resolution) / 4; Example: (5.0 m/s / 4µm) / 4 = 312.5 kHz; maximum frequency 625 hKz.

[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.

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

Load current	≤ 30 mA, per channel
Reverse polarity protection	✓
Protection class	III according to DIN EN 61140
Short-circuit resistant outputs	✓ [2]
Initialization time	Max. 3 s [3]
Factory setting	Factory setting: output level TTL

[1] Observe the maximum length of cable: e.g. 20 m at a resolution of 4µm and 1 m/s or 2 m at a resolution of 4µm and 5 m/s: The frequency is calculated differentially with 4-fold evaluation as follows: Frequency = (speed/resolution) / 4; Example: (5.0 m/s / 4µm) / 4 = 312.5 kHz; maximum frequency 625 hKz.
[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.
[3] Digital output DO can have an undefined state during this time.

Mechanical data

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	≤ ± 0.2° [1]
Permissible yaw angle	≤ ± 1.5° [1]
Permissible roll angle	≤ ± 10° [1]

[1] Exceeding these values will result in a higher systematic measurement error, see “Permissible deviations from nominal alignment”.

Ambient data

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

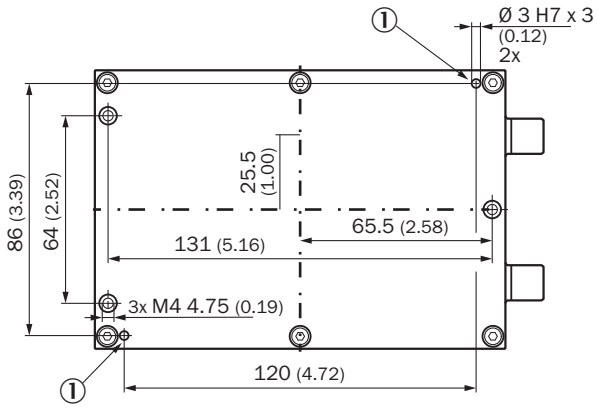
Classifications

ECLASS 5.0	27270790
ECLASS 5.1.4	27270790
ECLASS 6.0	27270790
ECLASS 6.2	27270790

ECLASS 7.0	27270790
ECLASS 8.0	27270790
ECLASS 8.1	27270790
ECLASS 9.0	27270790
ECLASS 10.0	27270790
ECLASS 11.0	27270790
ECLASS 12.0	27275201

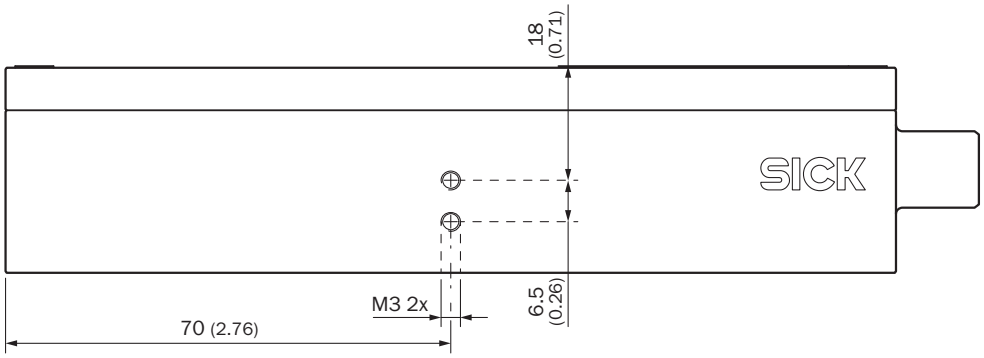
Dimensional drawing (Dimensions in mm (inch))

Mounting side

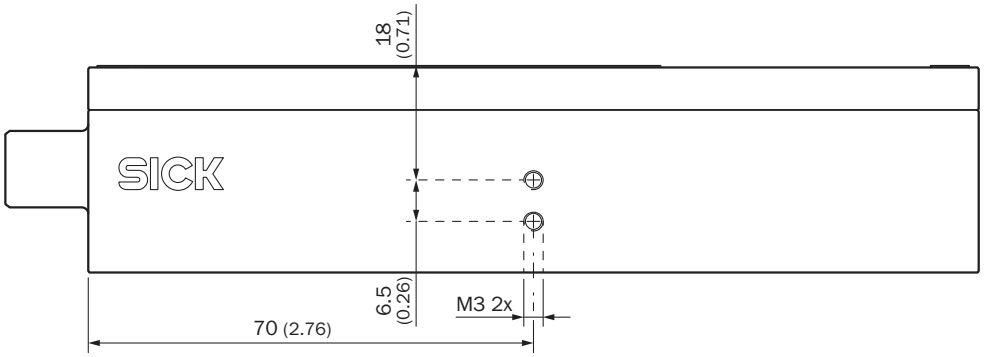


① Ø 3 H7 x 3 holes for accommodating locating pins

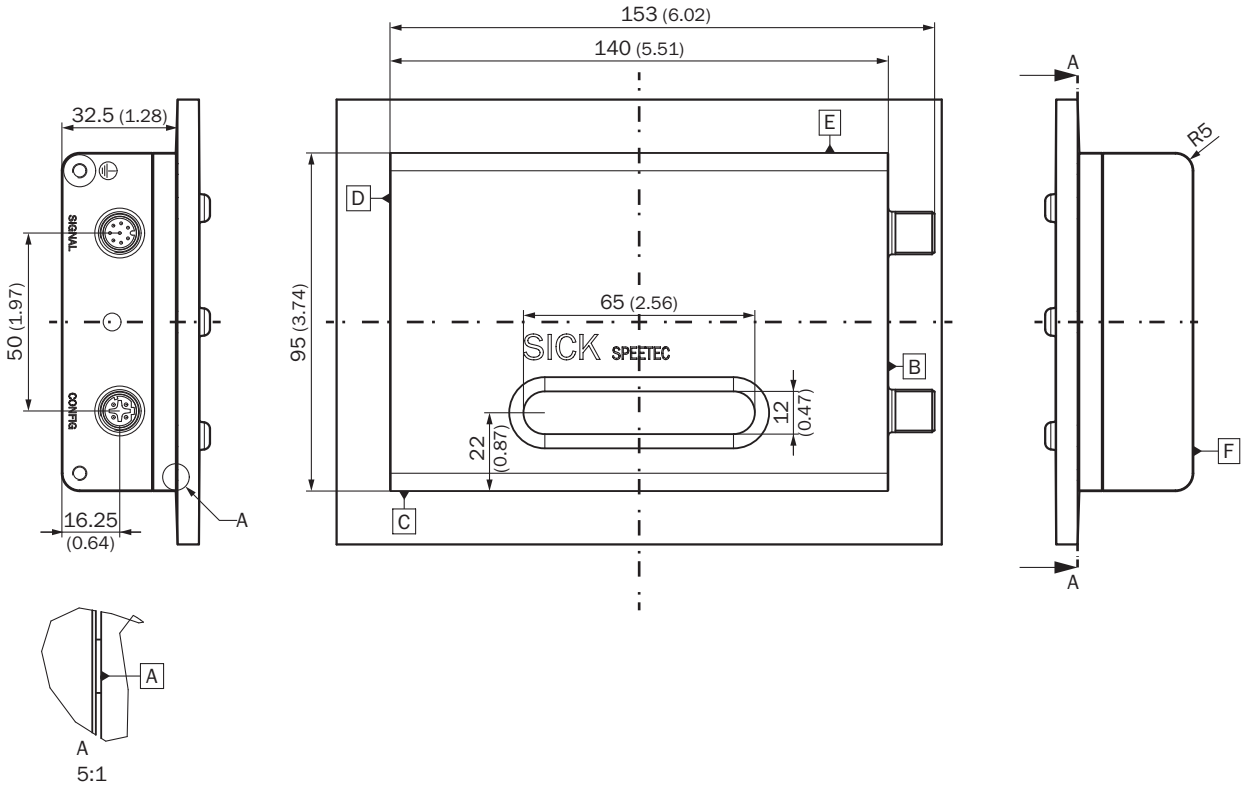
Side view with threaded holes for proximity sensors



Side view with threaded holes for proximity sensors

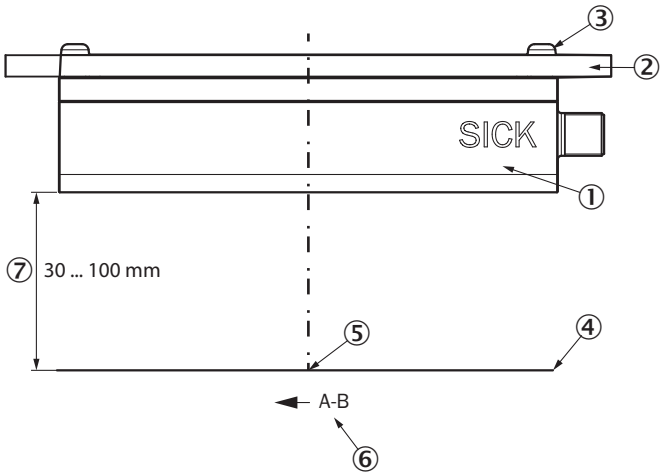


SPEETEC 1D



Attachment specifications

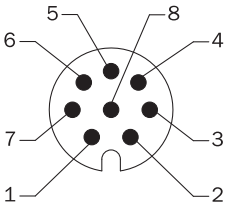
Nominal alignment of the sensor to the surface (z-axis)



① Sensor
② Mounting surface
③ M4 screws
④ Surface to be measured
⑤ Measuring point on x-/y-plane, 82.5 mm away from the mounting level
⑥ Forward material movement; signal sequence A before B
⑦ Measuring distance between sensor and surface, also see “Permissible measuring distance” table

Material	Permissible measuring distance
Wood, sawed	30 ... 100 mm
Paper, white	30 ... 100 mm
Conveyor belt, black	50 ... 80 mm
Textile	40 ... 60 mm

PIN assignment



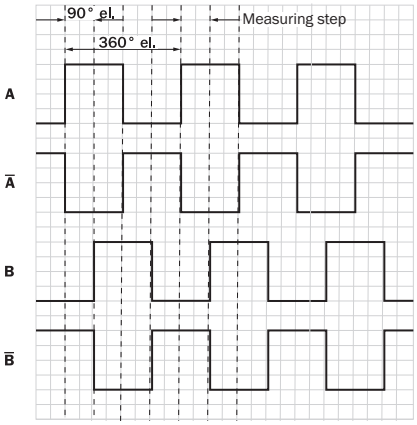
M12 signal male connector, 8-pin and cable, 8-wire

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!

Male connector M12, 8-pin	Wire color	TTL, HTL standard signal	TTL, HTL signal can be programmed	Explanation
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 V) ... U_S			
Output voltage LOW	0 V ... 2 V			
Output current HIGH	0.5 mA ... 30 mA			

Diagrams

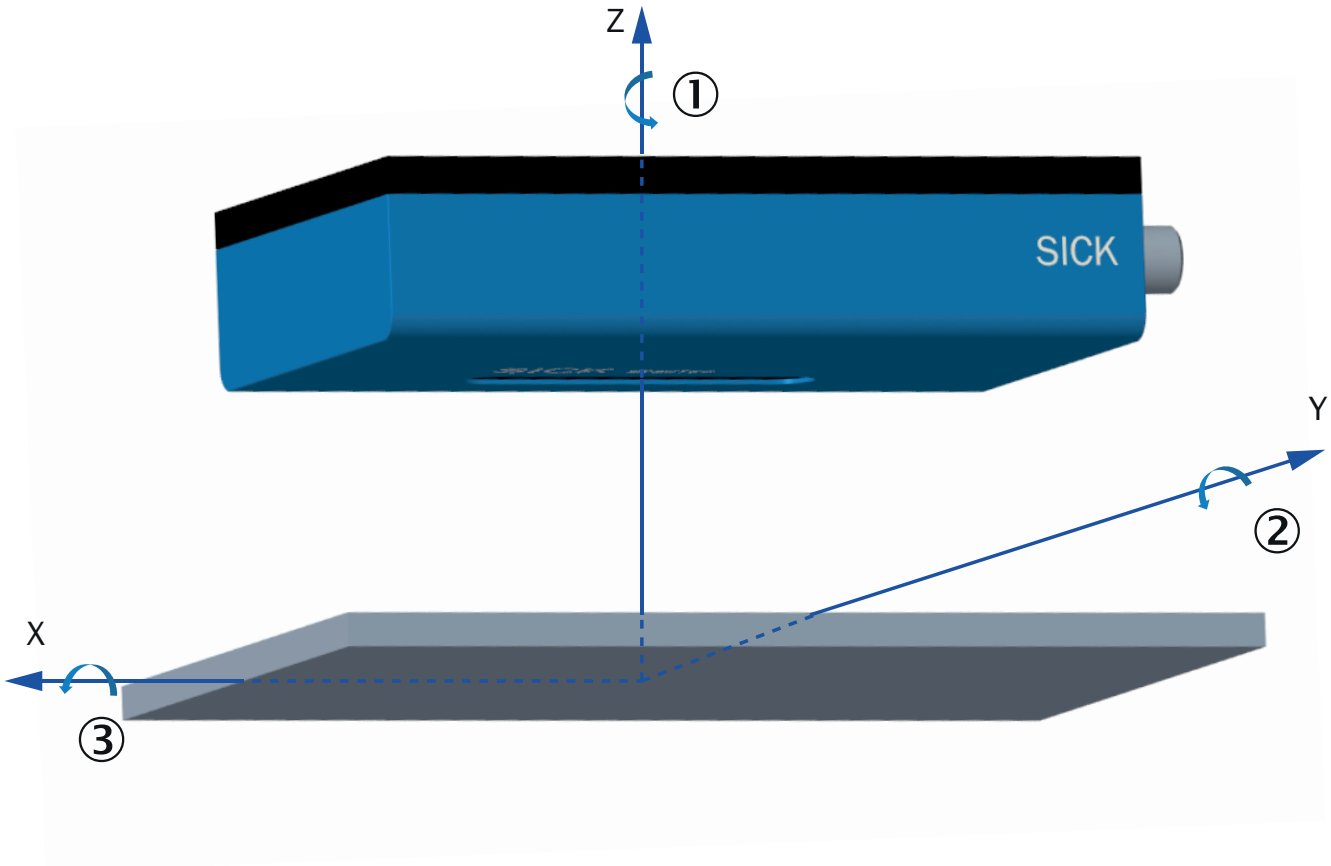
Signal outputs for electrical interfaces TTL and HTL with forward material movement (see assembly specifications)



The measuring step corresponds to 90° electrical. The measuring step [µm/pulse] specified under Performance can only be achieved if the output signals of the sensor are evaluated differentially.

Operation note

Permissible deviations from nominal alignment



① Yaw angle
② Pitch angle
③ Roll angle

Pitch angle	NCV50E accuracy
0,05°	0,25%
0,10°	0,41%
0,20°	0,72%
0,30°	1,03%
0,50°	1,65%
0,75°	2,42%
1,00°	3,20%
1,50°	4,76%

Recommended accessories

Other models and accessories ➜ www.sick.com/SPEETEC_1D

	Brief description	Type	Part no.
Alignment aids			
	Laser spot detector map to visualize the SPEETEC NCV50 laser spot for the eye and to determine the correct operating point.	BEF-SPEETEC-LSD	2120614
Optics cloths			
	Cloth for cleaning optical surfaces	Lens cloth	4003353
Signal and status indicators			
	Digital display with resistive touch screen, for SPEETEC, incremental encoders and measuring wheel encoders. Multi-function device for use as tachometer, speed measuring device, pulse counter, position display, piece counter and total counter↳Communication interface: incremental↳Communication interface detailed: RS-422, RS485	DIS-IPDTACCR0000	4119630
Device protection (mechanical)			
	Table housing suitable for installation of the DIS-IPDTACCR0000 display unit	DIS-DH30M	7135599
Mounting brackets and plates			
	Mounting bracket for MWS120 measuring wheel system and SPEETEC 1D laser surface motion sensors	BEF-WF-MWS-NCV	2113284
	1 piece, The BEF-WN-NCV50 mounting bracket makes it possible to easily and correctly mount the sensors while complying with the specified tolerances for distance and angle. The BEF-WN-NCV50 mounting bracket can be combined with the BEF-WF-MWS120 mounting bracket. This makes it possible to mount on the machine frame., Mounting bracket, screws for mounting the NCV50	BEF-WN-NCV50 mounting bracket	2117456
Terminal and alignment brackets			
	1 piece, Bracket for mounting SICK photoelectric proximity sensors, W4, W9, G6 to the NCV50. SICK photoelectric proximity sensors from the W4, W9, G6 series can be easily mounted on the NCV50 using the BEF-MK-NCV50-W49G6. This makes it possible to better detect material edges and makes length measurement more exact. The position of the scanning point in the direction of movement is specified by the mounting position, the position in the y-direction can be adjusted using the bracket slots., Adjustment aid, screws for mounting the photoelectric proximity sensor	BEF-MK-NCV50-W49G6	2117457
	Suitable for NCV50 / SPEETEC. Simplifies mounting of the SPEETEC at the right distance and angle to the surface. Packaging unit: 1 unit, Adjustment aid, screws for mounting the NCV50	BEF-WN-NCV50-ADJST	2117003
Others			
	• **Connection type head A:** Female connector, M12, 8-pin, straight • **Connection type head B:** Flying leads • **Signal type:** Incremental, SSI • **Cable:** 2 m, 8-wire, PUR, halogen-free • **Description:** Incremental, SSI, shielded, 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 • **Connection systems:** Flying leads	DOL-1208-G02MAC1	6032866

	Brief description	Type	Part no.
	• **Connection type head A:** Female connector, M12, 8-pin, straight • **Connection type head B:** Flying leads • **Signal type:** Incremental, SSI • **Cable:** 5 m, 8-wire, PUR, halogen-free • **Description:** Incremental, SSI, shielded, 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 • **Connection systems:** Flying leads	DOL-1208-G05MAC1 DOL-1208-G05MAD3	6032867 2121359
	• **Connection type head A:** Female connector, M12, 8-pin, straight • **Connection type head B:** Flying leads • **Signal type:** Incremental, SSI • **Cable:** 10 m, 8-wire, PUR, halogen-free • **Description:** Incremental, SSI, shielded, 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 • **Connection systems:** Flying leads	DOL-1208-G10MAC1	6032868
	• **Connection type head A:** Female connector, M12, 8-pin, straight • **Connection type head B:** Flying leads • **Signal type:** Incremental, SSI • **Cable:** 20 m, 8-wire, PUR, halogen-free • **Description:** Incremental, SSI, shielded, 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 • **Connection systems:** Flying leads	DOL-1208-G20MAC1	6032869
	• **Connection type head A:** Female connector, M12, 8-pin, straight • **Connection type head B:** Male connector, M12, 8-pin, straight • **Cable:** 5 m, 8-wire, PUR, halogen-free • **Description:** Shielded, Connection cable, M12, 8-pin, straight male connector / straight female connector, 2 m, PUR halogen-free, shielded	DSL-1208-G05MAC1	6032913
	• **Connection type head A:** Flying leads • **Connection type head B:** Flying leads • **Signal type:** SSI, Incremental • **Items supplied:** By the meter • **Cable:** 11-wire, PUR • **Description:** SSI, Incremental, shielded	LTG-2411-MW	6027530
	• **Connection type head A:** Flying leads • **Connection type head B:** Flying leads • **Signal type:** SSI, Incremental • **Items supplied:** By the meter • **Cable:** 12-wire, PUR, halogen-free • **Description:** SSI, Incremental, shielded	LTG-2512-MW	6027531
	• **Connection type head A:** Flying leads • **Connection type head B:** Flying leads • **Signal type:** SSI, TTL, HTL, Incremental • **Items supplied:** By the meter • **Cable:** 12-wire, UV and saltwater-resistant, PUR, halogen-free • **Description:** 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	LTG-2612-MW	6028516
	• **Connection type head A:** Female connector, M12, 8-pin, straight, A-coded • **Description:** Shielded • **Connection systems:** Screw-type terminals • **Permitted cross-section:** 0.25 mm² ... 0.5 mm²	DOS-1208-GA	6028369
	• **Connection type head A:** Male connector, M12, 8-pin, straight, A-coded • **Description:** Shielded • **Connection systems:** Screw-type terminals • **Permitted cross-section:** ≤ 0.5 mm²	STE-1208-GA	6028370

	Brief description	Type	Part no.
	• **Connection type head A:** Female connector, M12, 8-pin, angled • **Connection type head B:** Flying leads • **Signal type:** HIPERFACE®, Incremental • **Cable:** 20 m, 8-wire, PUR • **Description:** HIPERFACE®, Incremental, shielded	DOL-1208-W20MAC1	6037727
	• **Connection type head A:** Female connector, M12, 8-pin, angled • **Connection type head B:** Flying leads • **Signal type:** HIPERFACE®, Incremental • **Cable:** 2 m, 8-wire, PUR, halogen-free • **Description:** HIPERFACE®, Incremental, shielded	DOL-1208-W02MAC1	6037724
	• **Connection type head A:** Female connector, M12, 8-pin, angled • **Connection type head B:** Flying leads • **Signal type:** HIPERFACE®, Incremental • **Cable:** 5 m, 8-wire, PUR, halogen-free • **Description:** HIPERFACE®, Incremental, shielded	DOL-1208-W05MAC1	6037725
	• **Connection type head A:** Female connector, M12, 8-pin, angled • **Connection type head B:** Flying leads • **Signal type:** HIPERFACE®, Incremental • **Cable:** 10 m, 8-wire, PUR, halogen-free • **Description:** HIPERFACE®, Incremental, shielded	DOL-1208-W10MAC1	6037726
	• **Connection type head A:** Female connector, M12, 8-pin, angled, A-coded • **Signal type:** Ethernet • **Cable:** CAT5, CAT5e • **Description:** Ethernet, shielded, M12 female connector, A-coded • **Connection systems:** QUICKON connection • **Permitted cross-section:** 0.14 mm² ... 0.34 mm²	DOS-1208-WA	6043358
	• **Connection type head A:** Female connector, M12, 8-pin, straight, A-coded • **Connection type head B:** Male connector, M12, 8-pin, straight, A-coded • **Connection type head C:** Female connector, M8, 4-pin, A-coded • **Signal type:** Sensor/actuator cable • **Items supplied:** Cable A: YM2A28-C20UA6F2A28 (6079346), cable B: YM2A18-C20UA3F8U14 (6079404), Y-distributor: YM2A28-000000FY2A8 (2123351) • **Cable:** 0.2 m • **Description:** Sensor/actuator cable, Y-distribution, 1 x female connector M12, 8-pin, straight, 1 x male connector M12, 8-pin, straight, 1 x female connector M8, 4-pin, straight, 0.2 m PUR cable for providing trigger signal for NCV50	YM2A28-C20S01MYAAX	2124388
Photoelectric sensors			
	• **Sensing range max.:** 5 mm ... 250 mm • **Functional principle:** Photoelectric proximity sensor • **Connection type:** Cable with connector M8, 3-pin • **Type of light:** Visible red light • **Adjustment:** Potentiometer • **Housing:** Rectangular	GTB6-P5211	1059333
	• **Sensing range max.:** 5 mm ... 250 mm • **Functional principle:** Photoelectric proximity sensor • **Connection type:** Cable with M8 male connector, 4-pin • **Type of light:** Visible red light • **Adjustment:** Potentiometer • **Housing:** Rectangular	GTB6-P6211	1059320
	• **Sensing range max.:** 25 mm ... 300 mm • **Functional principle:** Photoelectric proximity sensor • **Connection type:** Cable with M8 male connector, 4-pin • **Type of light:** Visible red light • **Adjustment:** Potentiometer • **Housing:** Rectangular	WTB4SL-3P3261	1058238

	Brief description	Type	Part no.
	• **Sensing range max.:** 20 mm ... 350 mm • **Functional principle:** Photoelectric proximity sensor • **Functional principle detail:** Background suppression • **Switching output:** PNP • **Switching mode:** Light/dark switching • **Connection type:** Cable with M8 male connector, 4-pin, 120 mm • **Light source:** PinPoint LED • **Adjustment:** Potentiometer	WTB9-3P3261	1054306
	• **Sensing range max.:** 25 mm ... 300 mm • **Functional principle:** Photoelectric proximity sensor • **Functional principle detail:** Background suppression • **Switching output:** PNP • **Switching mode:** Light/dark switching • **Connection type:** Cable with M8 male connector, 4-pin, 120 mm • **Light source:** Laser • **Adjustment:** Potentiometer	WTB9L-3P3261S03	1073333

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.”

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