NAV series

PRECISE LASER NAVIGATION FOR MAXIMUM EFFICIENCY

2D laser scanners

SICK
Sensor Intelligence.

BECAUSE SICK MOVES MORE DURING NAVIGATION

The NAV series from SICK provides outstanding performance when it comes to measurements, navigation and position determination. High computing power, individual configuration, various sizes and scanning ranges allow for use in various applications, even in harsh environments. The NAV series sensors simultaneously identify contour and reflector data or the position (e.g. of automated guided systems), very quickly and with accuracy.

Automated guided vehicles can also drive in areas where the mounting of reflector marks is not possible. In this case, changing the navigation mode from localization based on reflector data to a contour-based localization ensures continuous operation. Reflector navigation can, depending on application and environment, be designed using flat and cylindrical reflectors. NAV series sensors can also be used within buildings in either reflector or sensor operation.

NAV2XX – TRIED-AND-TESTED HAS BEEN TAKEN ONE STEP FURTHER

The high performance of the NAV3xx sensor technology has lead to a significant performance increase in industrial vehicles for quite some time now. For the user this means increased profitability due to significant cost and time savings. SICK, however, is not yet satisfied and is taking the NAV2xx one step further. Based on the functions and the design of the well-established NAV3xx, the NAV2xx sensor is outfitted with additional functions.

Compact lightweight

The NAV2xx, which only weighs 1.1 kg, is approximately half the weight of the NAV3xx. It is significantly more compact than the sensors of the NAV3xx product family, including in terms of dimensions.

Protection in harsh application areas

The IP 67 housing ensures that the NAV2xx functions efficiently, even in harsh environments.

Ideal solution for small and mid-size scanning ranges

With a maximal scanning range of up to 50 m (up to 30 m on reflectors), the NAV2xx demonstrates its high performance in small and medium transport vehicles to the fullest.

Integrated heating system for cold environments

The NAV2xx can be used in refrigerated warehouses or in outdoor areas with its integrated heating system. Therefore, travel paths of vehicles that lead through outdoor areas (e. g. drives from one building into another) do not pose a problem anymore.

THE RIGHT SOLUTION FOR EVERY APPLICATION

Particular in the transport and logistics division, the NAV series sensors demonstrate their full potential. Different fields of application and ambient conditions are only two requirements that are to be taken into account in this process. The wide variety of possible industrial vehicles to be used should also be considered when selecting the correct sensor solution.

There are numerous fields of application where applying reflector marks is not possible in large industrial facilities and consequently moves the processing of contour data into the foreground. Only this way, fully automatic loading and unloading of trucks is possible, for example. Furthermore, additional protection from various ambient conditions is absolutely necessary for industrial vehicles that operate both indoors and outdoors. SICK provides a tailored solution for various applications on specific application areas with its portfolio of navigation scanners from the NAV series.

## Industrial vehicles and cleaning robots

➜ NAV2xx
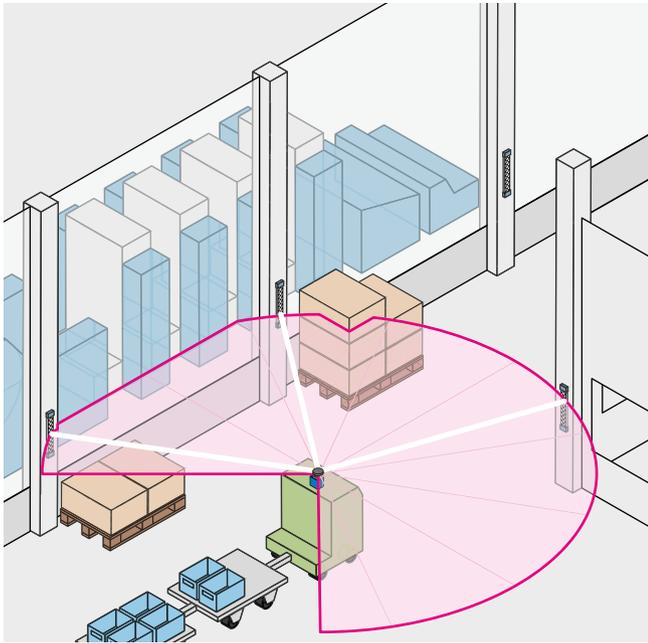
Application on small to medium vehicles with a sensor scanning range of up to 30 m on reflectors. It is ideal for narrow tram lines in warehouses and production halls.
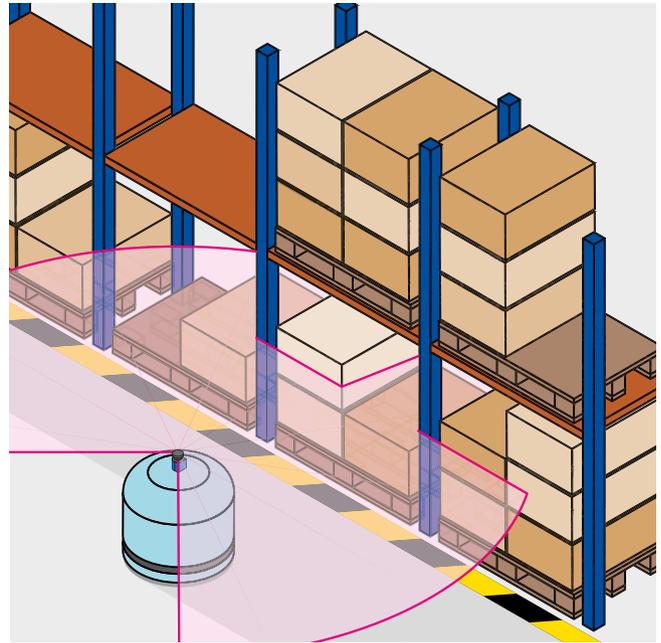

Application on cleaning robots in manufacturing halls and warehouses with narrow tram lines.

➜ NAV3xx
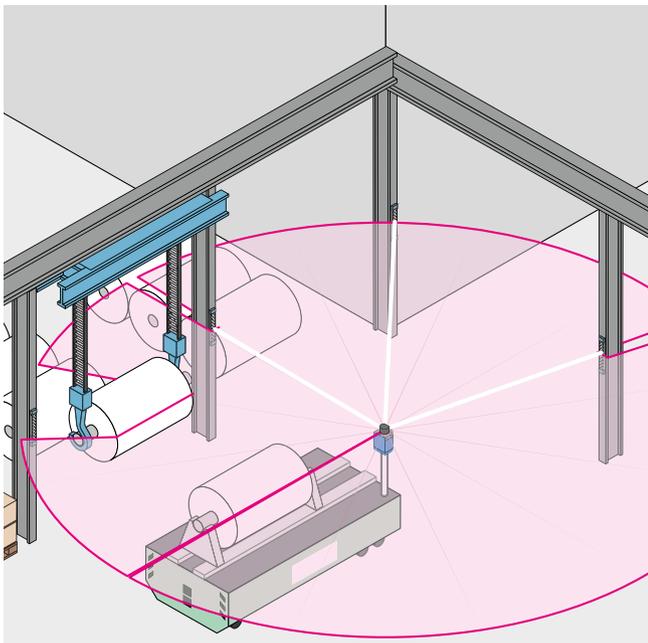
Application on complex and large industrial vehicles with a sensor scanning range of up to 70 m on reflectors. This guarantees the reliable transport of bulky goods in spacious halls.
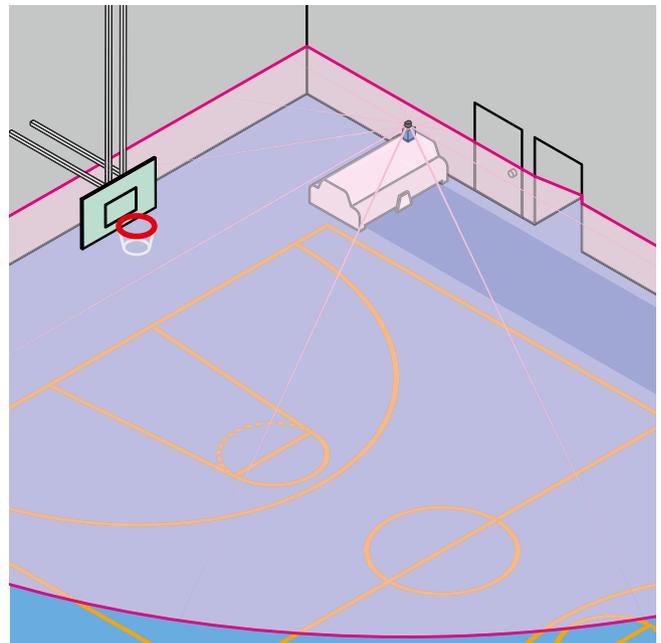
Application on large cleaning robots in spacious industry and sports halls.

Outdoor and refrigerated areas

Application areas where navigation scanners had previously not even been considered, are now accessible with the NAV245.

➔ NAV245
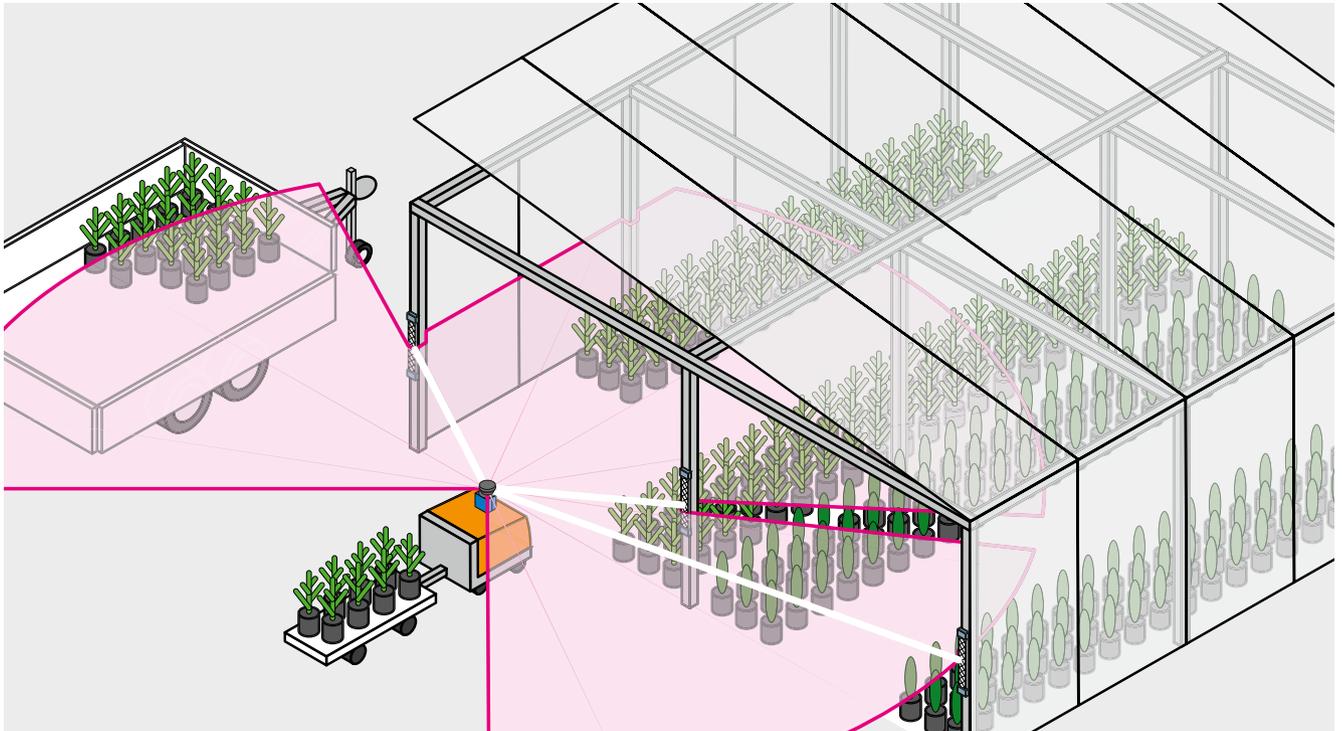
Application in dusty and damp outdoor and indoor areas thanks to the IP 67 housing.
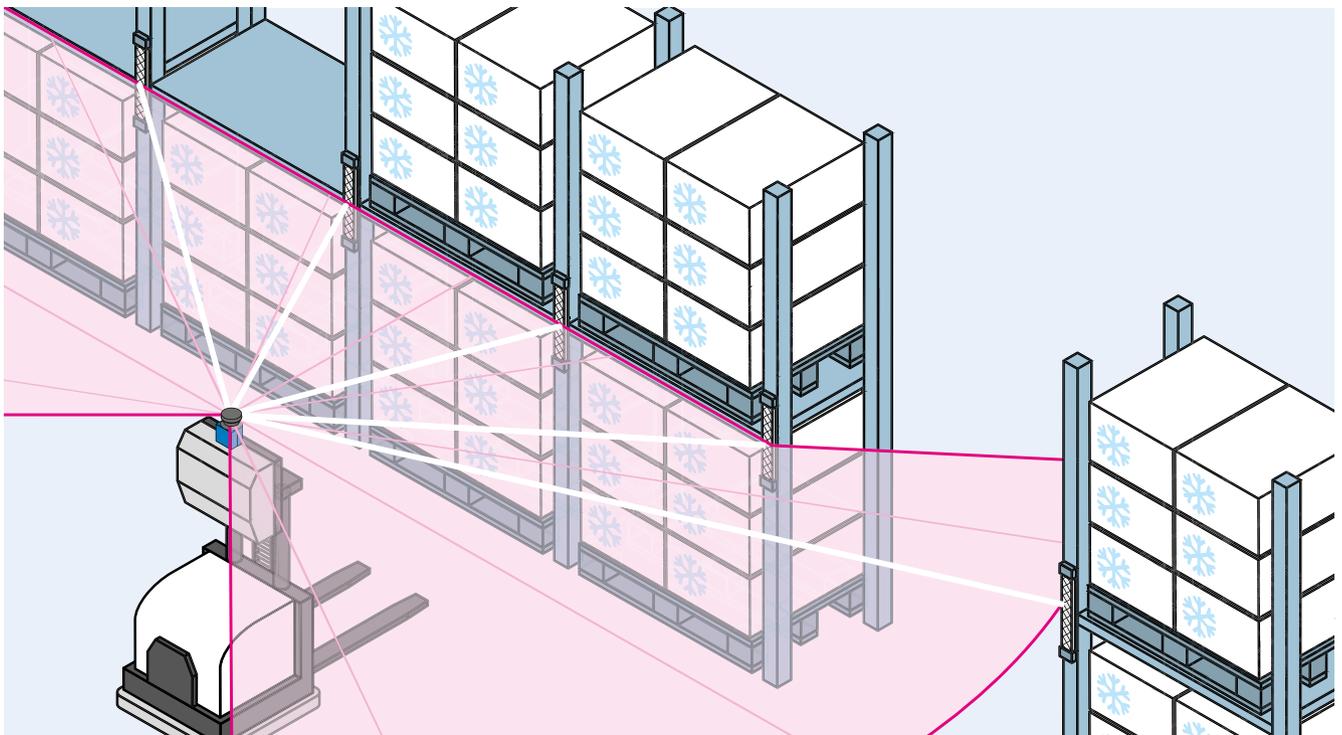
Application in refrigerated warehouses thanks to integrated heating system.

THE PRODUCTS AT A GLANCE

➜ NAV2xx

The localization of small and medium vehicles (e. g. towing vehicles or cleaning robots) in NAV2xx is possible via contour and reflector data.

➜ NAV3xx

While the localization of complex and large vehicles (e. g. manned forklift trucks or large transport vehicles) is only possible via contour data with the NAV310, the NAV340 can also detect reflector data. The NAV350 adds one more position detection method to these two localization options.

Selection guide according to product characteristics

Product	SOPAS Tools					Ambient operating temperature		Scanning frequency		Enclosure rating		Max. operating range on reflectors		Page
	Configuration	Visualization	Layout determination	Layout verification	Position detection	–30 °C ... +50 °C	0 °C ... +50 °C	8 Hz	25 Hz	IP 65	IP 67	On reflector	At 10% remission	
NAV2xx	■	■				■			■		■	30 m	18 m	➜ 8
NAV3xx	■	■	■	■	■		■	■		■		70 m	35 m	➜ 12

Selection guide according to application

Product	Outdoor area	Refrigerated area	Small to medium transport vehicles	Complex and large transport vehicles	Truck loading	Cleaning robots	Shuttle systems	Material transportation systems and platform vehicles	Page
NAV2xx	■	■	■		■	■	■	■	➜ 8
NAV3xx				■	■	■			➜ 12

POSITION DETERMINATION AND NAVIGATION – EVEN IN HIGHLY DEMANDING CONDITIONS
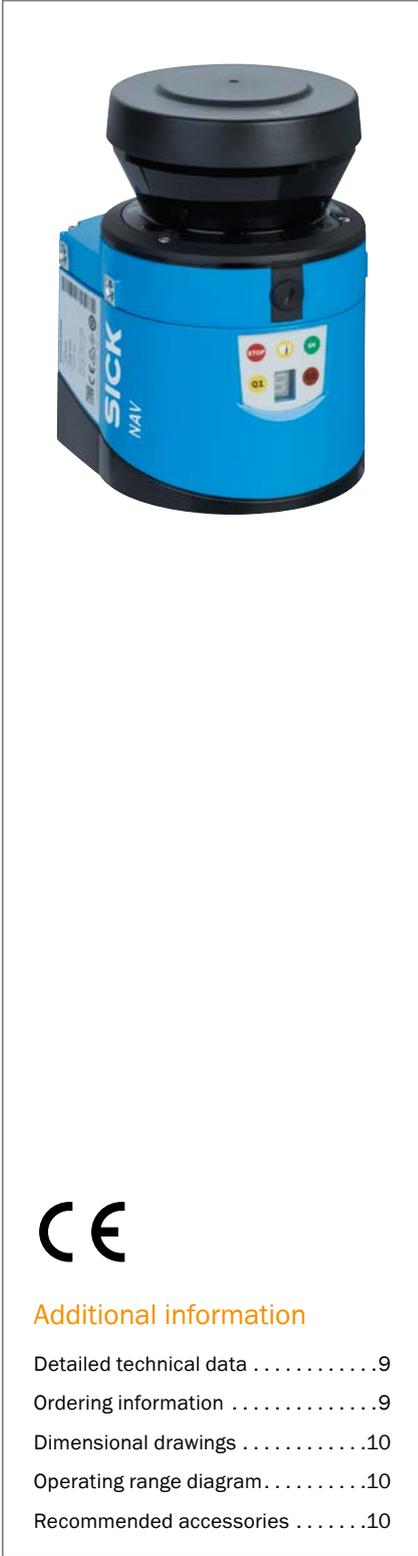
Product description

The NAV2xx navigation scanner works with precision and reliability – in small and medium-sized vehicles too. Thanks to its integrated heating, excellent vibration resistance, and IP 67 enclosure rating, the NAV245 even satisfies requirements for use outdoors or in cold storage. Priced to ensure outstanding value for money, the navigation scanner offers scanning ranges of up to 30 m on reflectors and up to 50 m on spatial contours. When combined with raw data collection, the technology even allows guided track-controlled vehicles to travel in areas where it is not possible to apply reflector marks (automatic truck loading, block storage). Integrated evaluation of measured data reduces computing load in the vehicle computer – ensuring reliable position determination in real time.

At a glance

- Integrated data evaluation for determining reflector positions
- Scanning range of up to 30 m on reflectors, up to 18 m on black (10 % remission), maximum of up to 50 m
- Collection angle: 270°
- Scanning frequency: 25 Hz
- Angle resolution on reflectors: 0.001°
- Temperature resistant from –30 °C to +50 °C
- IP 67 enclosure rating and integrated heating

Your benefits

- Reliable position determination and navigation even in highly demanding environmental conditions, thanks to the IP 67 enclosure rating, integrated heating, and vibration resistance
- Compact size – suitable even for use in small vehicles
- Precise, fast collection of spatial contour data and/or simultaneous determination of reflector data in real time
- Integrated evaluation of measured data reduces computing load in the vehicle computer
- Excellent flexibility, as guided-track control is possible even in areas without reflector marks

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Additional information

➜ **www.mysick.com/en/NAV2xx**

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.

Detailed technical data

Features

Version	Long Range
Field of application	Outdoor
Light source	Laser diode (905 nm)
Laser class	1 (IEC 60825-1 : 2007-03)
Aperture angle	270°
Scanning frequency	25 Hz
Angular resolution	0.001°, on reflectors 0.25°, on raw / contour data
Operating range	0.5 m … 50 m (30 m on reflectors)

Performance

Systematic error	Typ. ± 10 mm (RDI) Typ. ± 30 mm (Contour)
Statistical error	Typ. ± 8 mm (RDI) [1] Typ. ± 12 mm (Contour) [1]

[1] 1 sigma.

Interfaces

Serial (RS-232)	✔
Function	Host, AUX
Data transmission rate	9.6 kBaud … 115.2 kBaud
Ethernet	✔
Function	Host
Data transmission rate	10/100 MBit/s
Protocol	TCP/IP

Mechanics/electronics

|	
Operating voltage	10.8 V DC … 30 V DC
Power consumption	Typ. 20 W, heating typ. 40 W
Housing	Aluminum die cast
Housing color	Light blue (RAL 5012)
Enclosure rating	IP 67 (EN 60529/A1 (2002-02))
Protection class	III (EN 61140 (2002-03))
Weight	1.1 kg

Ambient data

Electromagnetic compatibility (EMC)	EN 61000-6-2 (2005-08) / EN 61000-6-4 (2007-01)
Vibration resistance	EN 60068-2-6 (1995-04)
Ambient operating temperature	–30 °C … +50 °C
Storage temperature	–30 °C … +70 °C
Permissible relative humidity	≤ 85 %, Non-condensing

Ordering information

Sub product family	Field of application	Angular resolution	Housing color	Type	Part no.
NAV245	Outdoor	0.25°	Light blue (RAL 5012)	NAV245-10100	1074308

Dimensional drawings (Dimensions in mm (inch))

NAV245
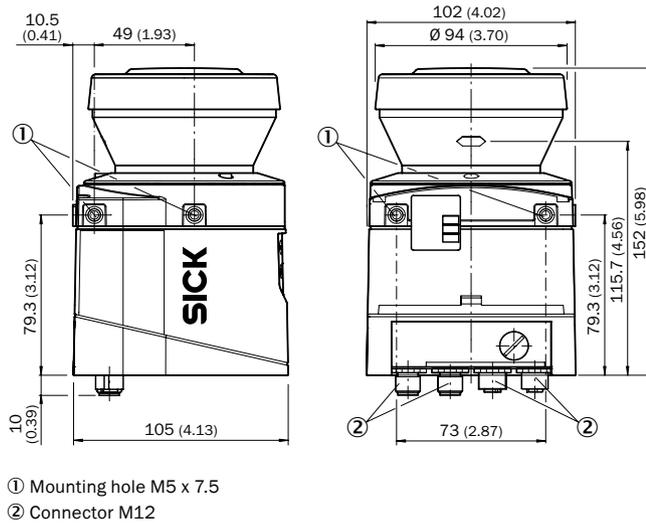
① Mounting hole M5 x 7.5
② Connector M12

Operating range diagram

NAV245

Scanning range in m (ft)

Scanning range in m (ft)

■ Scanning range max. 50 m (164.04 ft)

■ Scanning range for objects up to 10 % remission 18 m (59.06 ft)
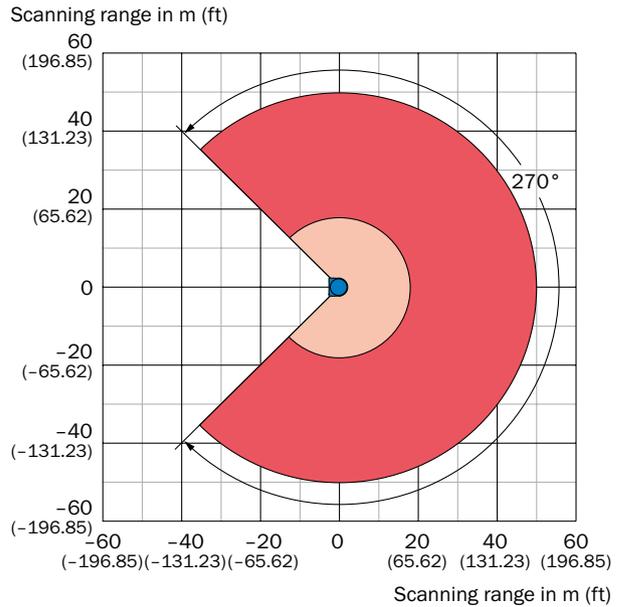
Recommended accessories

	Brief description	Part no.
Mounting brackets and mounting plates		
	1 piece, mounting bracket for rear mounting on wall or machine	2034324
	1 piece, mounting bracket for rear mounting on wall or machine with protection of optics hood	2034325
	1 piece, mounting bracket, adjustable lateral axis, only in conjunction with mounting kit 1a (2034324) or 1b (2034325)	2039302
	1 piece, mounting plate, adjustable longitudinal axis, only in conjunction with mounting kit 2 (2039302)	2039303
Plug connectors and cables		
	Head A: female connector, M12, 5-pin, straight, A-coded Head B: Cable Cable: shielded, 5 m	6036159
	Head A: male connector, M12, 8-pin, straight, A-coded Head B: Cable Cable: shielded, 5 m	6036155
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: Ethernet, drag chain use, PUR, shielded, 5 m	6034415

PRECISE LASER NAVIGATION FOR MAXIMUM EFFICIENCY

Product description

Navigation scanners in the NAV product family provide the highest level of performance for the navigation of automated guided vehicles (AGVs). The unrestricted spatial location of positions is performed using reflector marks and provides the AGV with maximum flexibility by virtually changing the route in the vehicle computer. NAV navigation scanners provide spatial contour data about the distance, the angle, and the remission, as well as reflector data over a 360-degree scanning path, with high speed and accuracy. Multiple measurements made on each reflector are converted into precise reflector coordinates. This information makes it possible to transmit the precise vehicle position to the vehicle computer, even if environmental conditions change. The combination of spatial contour data and reflector data (mixed-mode navigation) enables line-guided vehicles to travel in areas where it is not possible to position reflector marks, such as automatic truck loading or block storage areas.

At a glance

- Mixed-mode navigation provides both spatial contour data and reflector data
- Long scanning range: up to 70 m on reflectors (up to 35 m on black targets)
- High internal computing power and individual AGV configuration
- Measurement, navigation, and determination of position with highest level of precision from three visible reflectors
- Angular resolution of up to 0.001°
- Navigation, spatial and contour data, reflector marks, angular position and/or raw data collection

Your benefits

- Precise, fast collection of spatial contour data and/or simultaneous determination of reflector data (managing up to 12,000 reflectors) in real time
- Integrated evaluation of measured data reduces the computing load in the vehicle computer, minimizing power consumption and reducing operating costs
- High flexibility, since line guidance is also possible in areas without reflector marks, and routes can be easily modified using teach-in mode
- Precise measurements in harsh industrial environments thanks to IP65 housing for indoor applications
- High angular resolution for gap-free scanning even under difficult conditions
- Hardware synchronization output ensures precise control

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Additional information

➜ www.mysick.com/en/NAV3xx

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.

Detailed technical data

Features

	NAV310	NAV340	NAV350
Version	Long Range		
Field of application	Indoor		
Light source	905 nm		
Laser class	1, eye-safe		
Aperture angle	360°		
Scanning frequency	5 Hz … 20 Hz	8 Hz, ± 5 %	
Angular resolution	0.125°, 1.875°, 0.25°, 0.375°, 0.5°, 0.75°, 1°, interlaced: 0.0625 °	0.25°	
Operating range	0.5 m … 250 m	0.5 m … 250 m (0.5 m … 70 m on reflectors)	
Max. range with **10 %** reflectivity	35 m		

Performance

	NAV310	NAV340	NAV350
Detectable object shape	Almost any		
Systematic error	± 10 mm [1]	± 10 mm (RDI) [2] ± 15 mm (Contour) [2]	
Statistical error	15 mm [1]	15 mm (Contour) [2]	
Reflector memory	–		12,000
Positioning accuracy	–		± 4 mm
Integrated application	–		Navigation

[1] Actual value depends on environmental conditions.

[2] Typical value; actual value depends on environmental conditions.

Interfaces

Serial (RS-232)	✔
Data transmission rate	19.2 kBaud … 115 kBaud
Ethernet	✔
Data transmission rate	100 Mbit/s
Protocol	TCP/IP
Switching outputs	1 (digital)
Optical indicators	4 LEDs (status displays)

Mechanics/electronics

Electrical connection	3 x M12 male connector/female connector
Operating voltage	24 V DC, ± 15 %
Power consumption	36 W
Housing	Aluminum die cast
Housing color	Light blue (RAL 5012)
Enclosure rating	IP 65
Protection class	III
Weight	2.4 kg
Dimensions (L x W x H)	115 mm x 120.5 mm x 222 mm

Ambient data

	NAV310	NAV340	NAV350
Ambient operating temperature	0 °C … +50 °C		
Storage temperature	−20 °C … +80 °C		
Permissible relative humidity	85 %, Non-condensing		
Reflector marks (recommended)	–	Stripes: width ≥ 80 mm, cylindrical: diameter ≥ 80 mm	

Ordering information

| Sub product family	Field of application	Angular resolution	Housing color	Type	Part no.
NAV310	Indoor	0.125°, 1.875°, 0.25°, 0.375°, 0.5°, 0.75°, 1°	Light blue (RAL 5012)	NAV310-3211	1060834
NAV340	Indoor	0.25°	Light blue (RAL 5012)	NAV340-3232	1060821
NAV350	Indoor	0.25°	Light blue (RAL 5012)	NAV350-3232	1052928

Dimensional drawings (Dimensions in mm (inch))

NAV310, NAV340, NAV350

① Optical axis
② Zero level
③ LED (from top: yellow, yellow, green, red)
④ Mounting hole M6 x 12
⑤ Rotating diameter
⑥ Aligning pin
⑦ RS-232 connection (M12 x 8, male connector)
⑧ Ethernet connection (M12 x 4, female connector)
⑨ Power supply connection (M12 x 5. male connector)
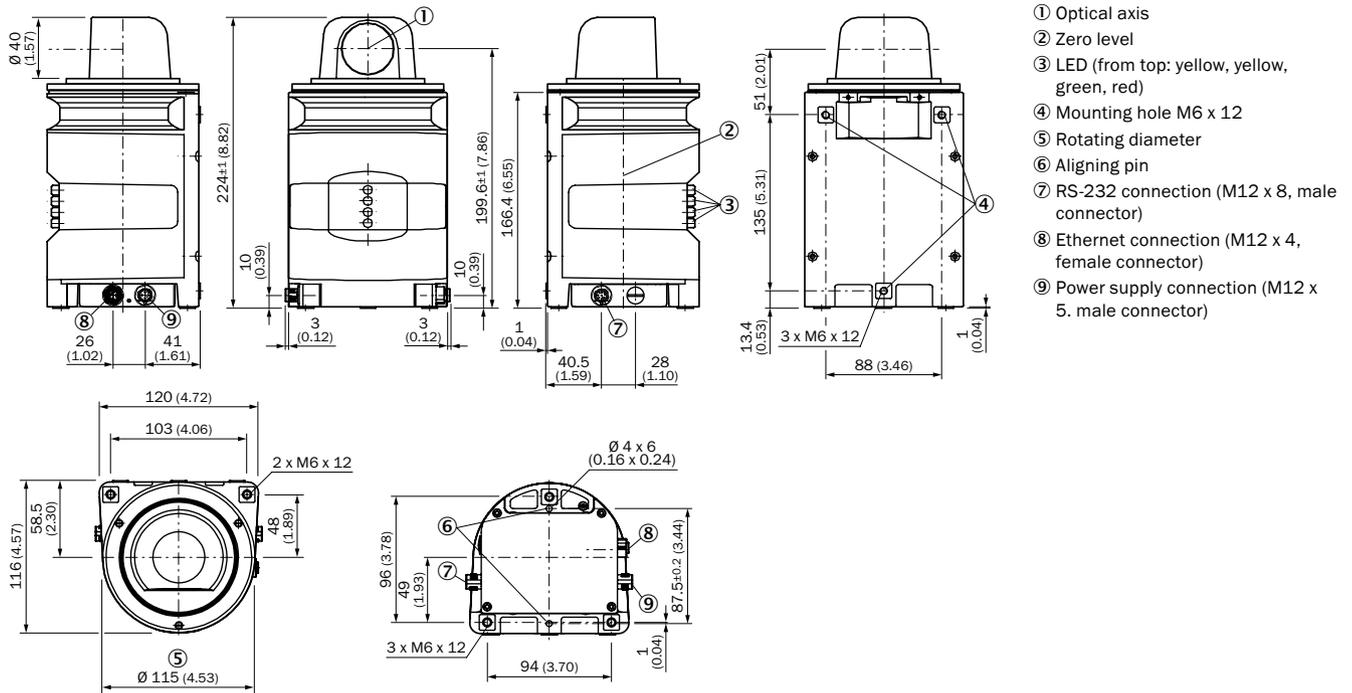
Operating range diagram

NAV310, NAV340, NAV350

Scanning range in m (ft)

Scanning range in m (ft)
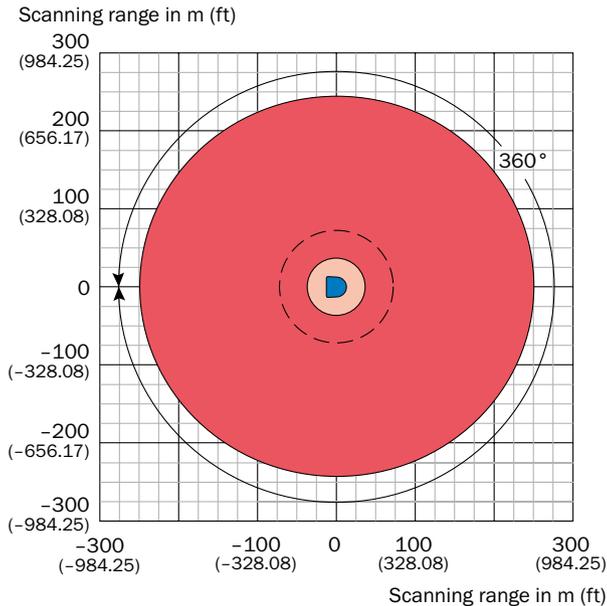
■ Scanning range max. 250 m (820.21 ft)

■ Scanning range for objects up to
10 % remission 35 m (114.83 ft)

⌐⌐ Scanning range on reflector 70 m (229.66 ft)

Recommended accessories

	Brief description	Part no.
Plug connectors and cables		
	Head A: male connector, M12, 5-pin, straight Head B: Cable Cable: shielded, 5 m	6043440
	Head A: female connector, M12, 8-pin, straight, A-coded Head B: Cable Cable: RS-232, RS-422, shielded, 5 m	6036153
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: Ethernet, drag chain use, PUR, shielded, 5 m	6034415
Reflectors		
	Reflective tape "Diamond Grade", self-adhesive, sheet, 749 mm x 914 mm, self-adhesive	5320565
Test and monitoring tools		
Illustration may differ	Scan finder, receiver to localize infrared scans	6020756

NOTES

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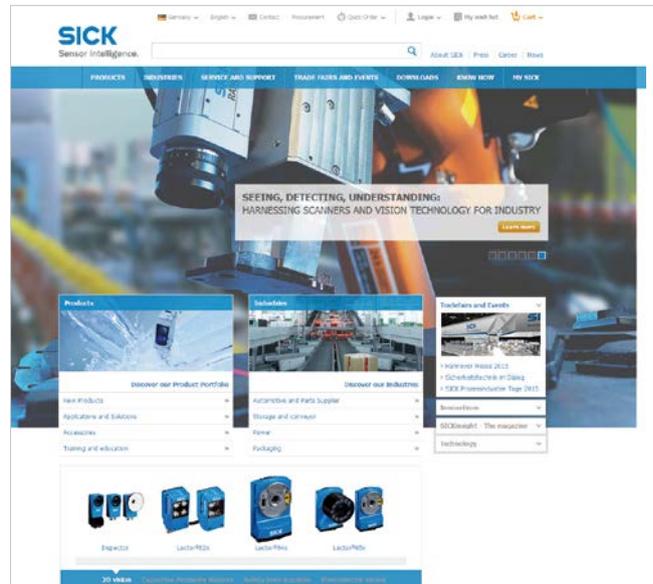
SERVICES FOR MACHINES AND SYSTEMS: SICK LifeTime Services

Our comprehensive and versatile LifeTime Services are the perfect addition to the comprehensive range of products from SICK. The services range from product-independent consulting to traditional product services.
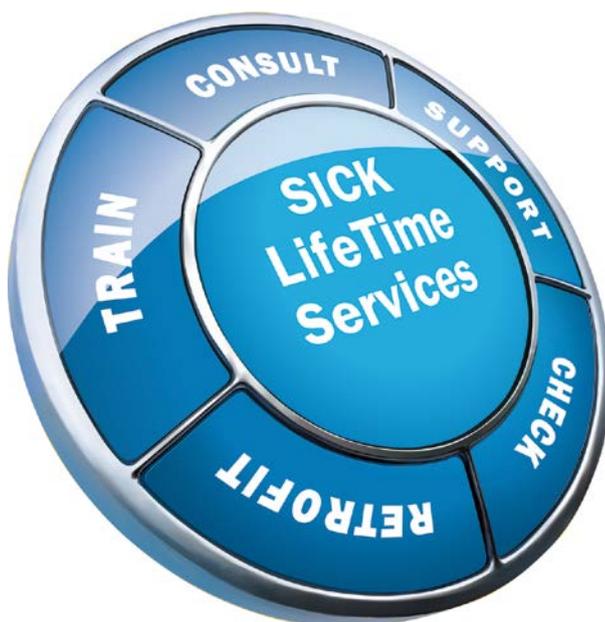
Consulting and design
Safe and professional

Product and system support
Reliable, fast and on-site

Verification and optimization
Safe and regularly inspected

Upgrade and retrofits
Easy, safe and economical

Training and education
Practical, focused and professional

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 7,400 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, we are always close to our 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.

We have extensive experience in various 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 round out 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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Detailed addresses and further locations ➜ **www.sick.com**

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