PRODUCT INFORMATION

WGS

DRIVER ASSISTANCE SYSTEM FOR DETECTING AND MEASURING A WINDROW

Driver assistance systems

SICK
Sensor Intelligence.

AUTONOMOUS PROCESSES FOR MORE YIELD: INTELLIGENT SENSOR SOLUTION FOR AGRICULTURAL VEHICLES

During harvest time, farmers need to be especially flexible. Time is always in short supply, the weather is unpredictable and yet crops need to be harvested quickly and efficiently. Driver assistance systems from SICK can be used to optimize and autonomize harvesting processes. Smart laser scanners, a main component of these systems, increase the efficiency of agricultural vehicles, e.g. in terms of windrow guidance, and take some of the burden off of the operator, which leads to significant time and cost savings. With industry knowledge and a wide sensor-technology portfolio, SICK is the ideal partner for providing sensor solutions for mobile work equipment. To help farmers achieve their goal of increased yield while reducing process costs, farm machinery manufacturers are integrating driver assistance systems such as the WGS (Windrow Guidance System) from SICK into agricultural vehicles and farming machinery.

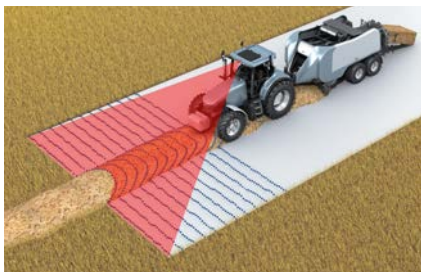
Challenges in windrow processing

When manufacturing grains or other field crops and when mowing grass, the crop or grass clippings—as well as straw—are raked together into rows and piled up as windrows, which make further processing easier. Forage harvesters or attachments hooked up to the tractor, such as balers, take the crop or grass and process it. The forage harvester then throws it into a vehicle driving alongside. The baler creates bales. Several challenges face a farmer working on a windrow: The windrow is curved in places and straight in other places, sometimes it has gaps and the windrow volume varies significantly. Due to these conditions, the crop or grass can clog the forage harvester or baler, forcing the farmer to spend time and effort getting the machine back into operation by hand. In order to avoid this while continuing to utilize the full capacity of the machine, the driver must continuously adjust speed and driving direction.

8019892/2017-11-30
Subject to change without notice

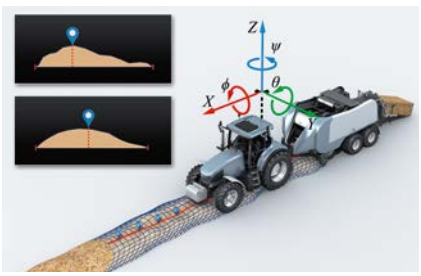
Sensor intelligence from SICK: integrated application software

The WGS driver assistance system from SICK is based on the TiM351 laser scanner with integrated application software and provides windrow guidance for the baler and on the forage harvester. The ultra-compact WGS determines the position and the height profile of the windrow from the roof of the cab on the forage harvester or tractor. The system uses this information to calculate a target trajectory (course of the windrow) for the vehicle control and makes it available on the CAN bus. All measurement and vehicle data processing takes place in the sensor itself, which means that the relevant results are available without CPU-intensive processing in the driver assistance system. This eliminates the need to use an external computer, thereby reducing power consumption and space requirements. This enables and simplifies integration into the existing vehicle architecture. Forage harvesters and balers can automatically take the optimal path while driving as a result.



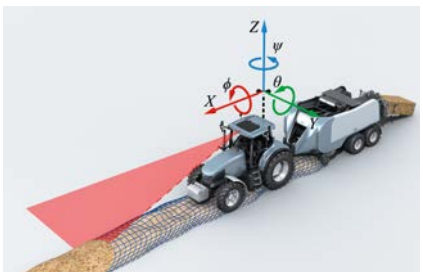
Windrow extraction

The WGS generates a ground profile from the measured data while driving over the windrow. Using algorithms integrated into the laser scanner, the WGS identifies the relevant windrow, follows its profile and saves and extracts it for further processing.



Position determination

The WGS determines the current position of the windrow relative to the machine. The system creates and stores the absolute relationship of the windrow trajectory (windrow path) to the machine from the positions by using detailed machine movement information. This makes it easy for the machine to travel along the path of the windrow and keep the material infeed unit perfectly positioned.



Volume determination

Based on the extracted windrow profile and vehicle movement, the WGS continuously determines the windrow volume and outputs it on the CAN bus. The data about the amount of crop or grass currently present in front of the infeed unit can be used to regulate the speed and ensure optimal material transportation. This means that balers and forage harvesters can maintain optimal performance while working. Additionally, regulating the speed makes it possible to avoid blockages in the machine, reducing the working time in the field.

DRIVER ASSISTANCE SYSTEM FOR DETECTING AND MEASURING A WINDROW

Product description

The WGS (Windrow Guidance System) consists of a TiM351 laser scanner with integrated application software. Once integrated into a driver assistance system or vehicle automation system, the system enables the control of agricultural vehicles. The sensor system detects and measures the windrow. The TiM351 fitted to the vehicle profiles the ground in front of the vehicle transversely to the direction of travel. Based on the ground profile, the system extracts the windrow profile, determines its position, and calculates the cross-sectional area. The vehicle speed and the cross-sectional areas are combined to calculate and add up the windrow volume. If the current wheel angle or yaw rate are available, the sensor calculates a vehicle model. The exact windrow progression is determined using the vehicle's known proper motion. This allows for great precision when controlling the vehicle in a transverse direction and allows for optimal positioning in relation to the windrow.

At a glance

- Determining windrow trajectory (course of the windrow) and absolute windrow position for automatic lateral control
- Determining the windrow volume for automatic speed control
- Integrated vehicle model for calculating the proper motion
- Integrated self-diagnostic function

Your benefits

- Save time and increase efficiency using automatic speed control to drive at the maximum working speed
- Driver fatigue can be reduced thanks to automatic steering and speed control, particularly in poor-visibility conditions or when driving at night
- Reduced machine downtime by avoiding material jam
- Optimal filling and material distribution in the chamber
- Does not require a control unit thanks to an intelligent sensor with integrated application software
- The sensor outputs the windrow position and volume
- Simple integration in the vehicle due to standardized interface

CE

Additional information

→ www.sick.com/WGS

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.

8019892/2017-11-30
Subject to change without notice

Detailed technical data

WGS

Features

Field of application	Agriculture
Vehicle	Forage harvesters, tractors with baler
Laser class	1, eye-safe (EN 60825-1:2014)

Performance

Functions	Determining and outputting of windrow trajectory (windrow progression) and the absolute windrow position for automated transverse control; determining and outputting of windrow volume for automated speed control
Number of laserscanners	1
Self-diagnostics	✔

Interfaces

Ethernet	Interface of the TiM35x laser scanner
Protocol	CAN via Ethernet
Electrical connection	1 x Ethernet, M12 female connector, 4-pin, 1 x voltage supply, M12 male connector, 12-pin
Ethernet CAN gateway	Interface of the CAN gateway that can be ordered as an option
Protocol	J1939
Electrical connection	1 x Ethernet, AMP SuperSeal, 4-pin, 1 x CAN AMP SuperSeal, 3-pin, 1 x voltage supply, AMP SuperSeal, 2-pin

Mechanics/electronics

Supply voltage	9 V DC ... 28 V DC
Power consumption (typ., max.)	3 W, 4.5 W
Weight	250 g, without connecting cables

Ambient data

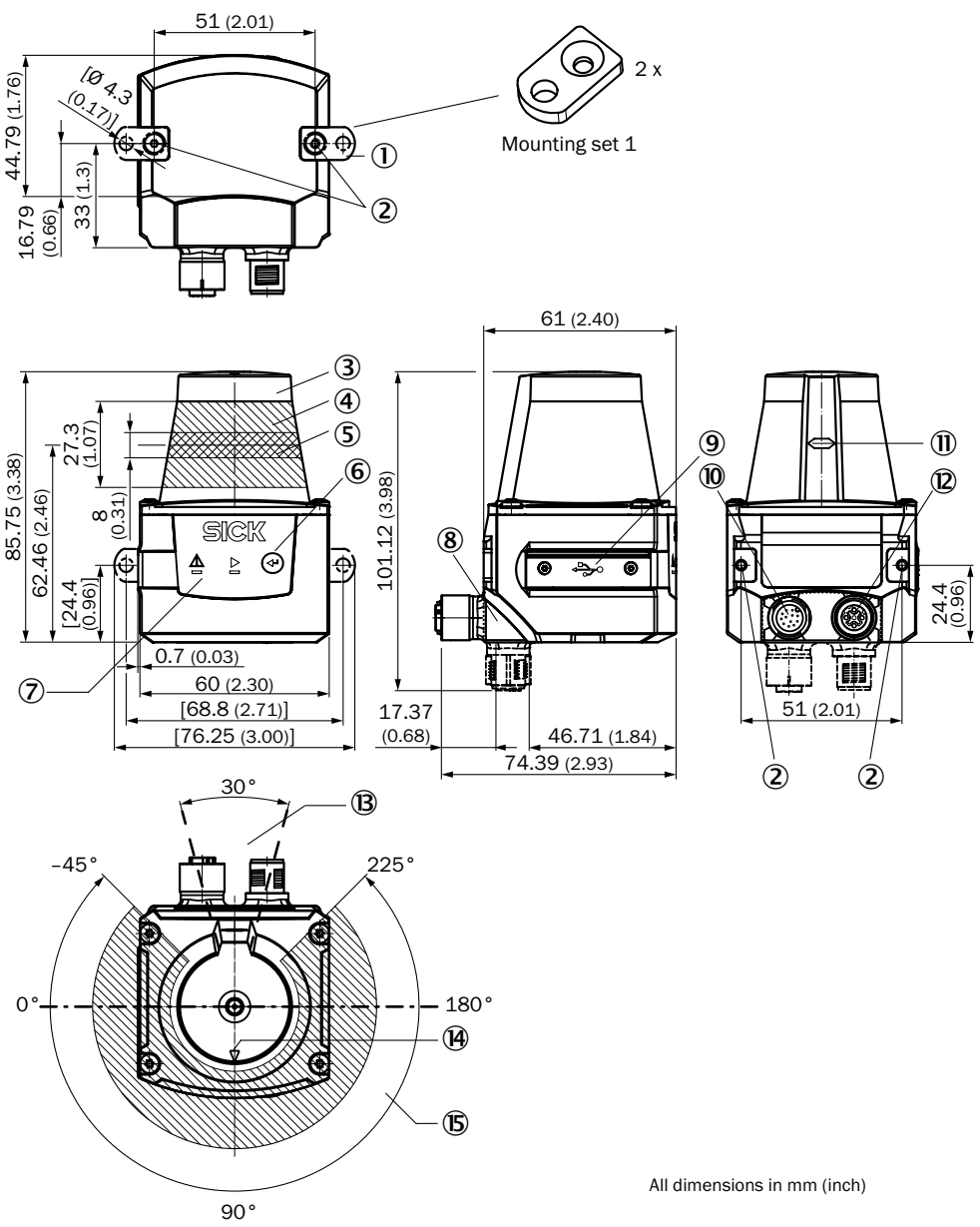
Ambient temperature operation	–25 °C ... +50 °C
Ambient storage temperature	–40 °C ... +75 °C

Ordering information

Application	Items supplied	Type	Part no.
Driver assistance for forage harvesters and tractors with baler	TiM351 laser scanner with integrated windrow guidance software	WGS	1076929

Dimensional drawing (Dimensions in mm (inch))

2D LiDAR sensor LMS15x



All dimensions in mm (inch)

① 2 x straight plates with M3 x 4 mm screw (included in delivery)
② M3 threaded mounting hole, 2.8 mm deep (blind hole thread)
③ Optical hood
④ Receiving range (light inlet)
⑤ Transmission range (light emission)
⑥ Function button for teach-in
⑦ Red and green LED (status displays)
⑧ Swivel connector unit
⑨ Micro USB female connector, type B
⑩ Connection “Power”, 12-pin, M12 male connector
⑪ Marking for the position of the light emission level
⑫ “Ethernet” connection, 4-pin M12 female connector
⑬ Area in which no reflective surfaces are allowed for mounted devices
⑭ Bearing marking to support alignment (90° axis)
⑮ Aperture angle 270° (scanning angle)

Accessories

Mounting systems

Mounting brackets and plates

Mounting brackets

Figure	Brief description	Type	Part no.
 Illustration may differ	Mounting kit with sun shade/weather protection	Mounting kit	2068398

Connection systems

Modules and gateways

Connection modules

Figure	Brief description	Type	Part no.
	Gateway CAN J1939 Ethernet, 1 port, reliable operating temperature –40 °C to +105 °C	CAN J1939 Ethernet gateway	6060948

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Cable length	Type	Part no.
	Head A: female connector, M12, 12-pin, straight, A-coded Head B: open cable ends Cable: Power, I/O, twisted pair, drag chain use, PUR, halogen-free, shielded, 8.5 mm	5 m	Connecting cable (female connector - open)	6042735

Connection cables with male and male connector

Figure	Brief description	Cable length	Type	Part no.
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, straight Cable: PROFINET, PVC, shielded, Ø 6.5 mm, CAT5, CAT5e	5 m	SSL-1204-F05MZ90	6048251
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, straight Cable: PROFINET, PVC, shielded, Ø 6.5 mm, CAT5, CAT5e	5 m	SSL-1204-G05MZ90	6048242
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: Ethernet, twisted pair, PUR, halogen-free, shielded, 6.4 mm, AWG26, CAT5 (100 Mbit/s)	5 m	SSL-2J04-G05ME	6034415

8019892/2017-11-30

REGISTER AT WWW.SICK.COM TO TAKE ADVANTAGE OF OUR FOLLOWING SERVICES FOR YOU

- ☑ Access information on net prices and individual discounts.
- ☑ Easily order online and track your delivery.
- ☑ Check your history of all your orders and quotes.
- ☑ Create, save, and share as many wish lists as you want.
- ☑ Use the direct order to quickly order a big amount of products.
- ☑ Check the status of your orders and quotes and get information on status changes by e-mail.
- ☑ Save time by using past orders.
- ☑ Easily export orders and quotes, suited to your systems.

SERVICES FOR MACHINES AND PLANTS: 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

8019892/2017-11-30 · AB_06 · Pre USmod en47

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 8,000 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."

Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Hong Kong, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Detailed addresses and further locations → www.sick.com

SICK
Sensor Intelligence.