MINESIC100 TCW
Tunnel Collision Warning System

Operator Assistance for Underground Mining Vehicles

SICK
Sensor Intelligence.

MINESIC100 TCW
Tunnel Collision Warning System

Protection of mine site equipment, infrastructure and personnel is a highly sophisticated task and presents great demands on collision awareness solutions. Building on experience with the development of advanced driver assistance systems, SICK's MINESIC100 TCW is a turnkey proximity detection operator assist and collision awareness system for underground mining equipment.

Challenges in Collision Awareness and Proximity Detection

Heavy mining vehicle operators have to accomplish a difficult task. The increase in mine productivity has led to a proportional increase in the size of the equipment used. Underground trucks have considerable operator blind spots while operating in a confined tunnel. Despite the best efforts of mine management and plant operators, accidents on mine sites remain an industry wide problem.

The avoidance of mine site accidents demands a combination of technologies to assist operators and reduce risk. Any collision awareness and assistance technology applied must be able to also warn of these risks ie. close proximity crush, incidents during loading or unloading or micro-sleep while in control of the vehicle.

The effective combination of proven technologies used in the MINESIC100 TCW gives the underground mine vehicle operators the right system to maximize productivity while reducing downtime due to incidents in the mine.

SICK's solution MINESIC100 TCW – Tunnel Collision Warning System

The MINESIC100 TCW is a high performance collision awareness and tunnel collision warning system. This robust system actively assists underground mobile equipment with safe and efficient maneuvering within the close proximity of the tunnel wall.

The MINESIC100 TCW uses advanced laser scanners (Class 1 Eye Safe). Qualified obstacle information from these sensors is utilized in a sophisticated warning strategy which alerts an operator via a simple user interface to take evasive action. The system delivers active assistance for maneuvering in confined spaces and displays the obstacle and tunnel wall profile in real time. Audible warnings are given in critical situations and the system recognizes driver intentions by automatically adjusting warning zone dimensions and switching the operational context according to the particular driving maneuver.

The system allows for cost effective retrofitting into a variety of underground trucks and load haul dumps, and offers further integration into fleet management systems.
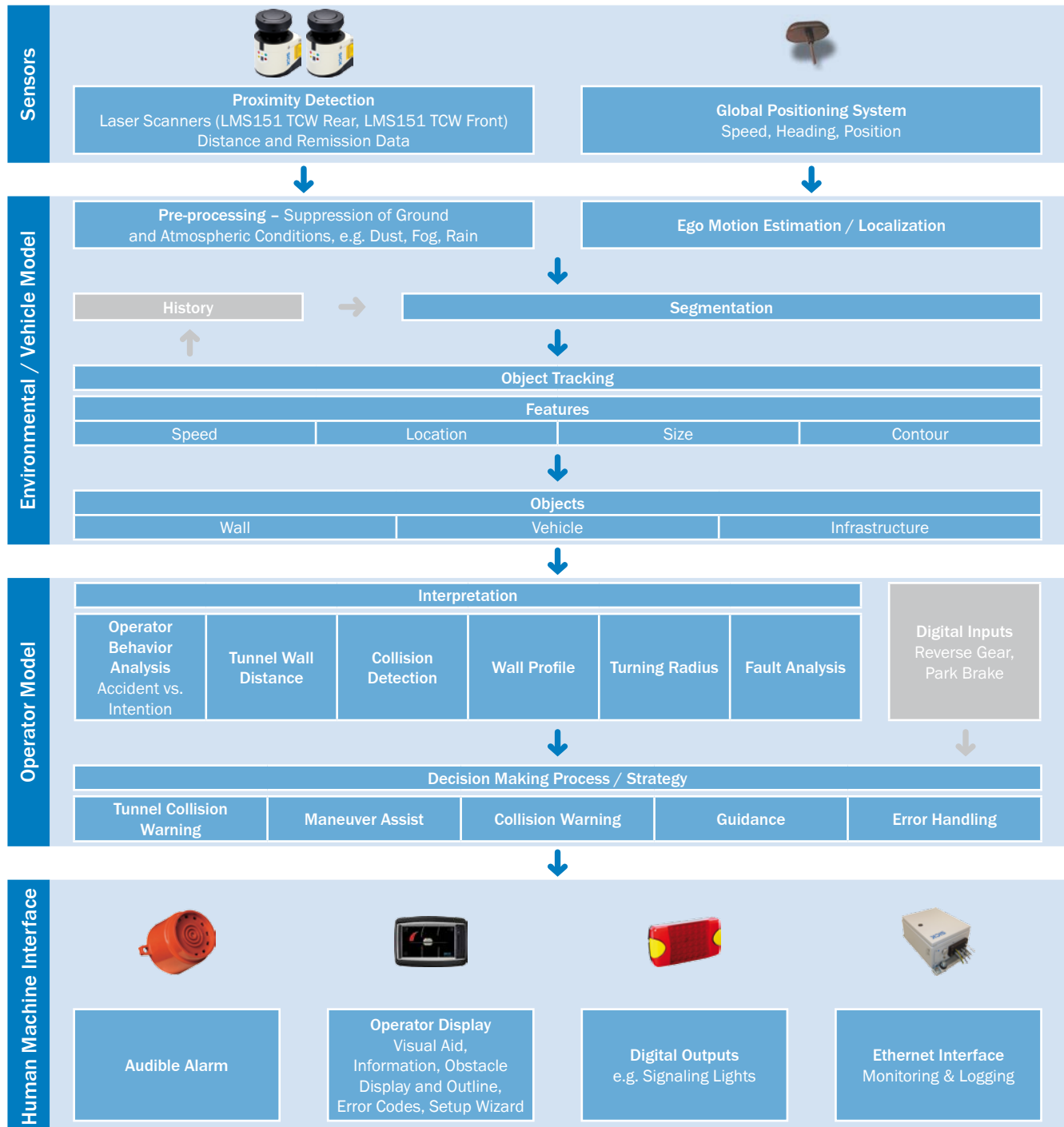
Advanced system funtionality

Unintended road departure, potential collisions, contact with the tunnel wall and reversing incidents are prevented by alerting the operator, displaying only relevant information and, if necessary, alarming audibly. The MINESIC100 TCW has been developed to be an aid to the operator, not a hindrance. No nuisance alarms to distract normal driver operation. It has an inbuilt recognition of intentional driving behavior, i.e. turning at an intersection. The system also automatically switches the context between reversing, travelling forward, crossing roads, turning and loading.
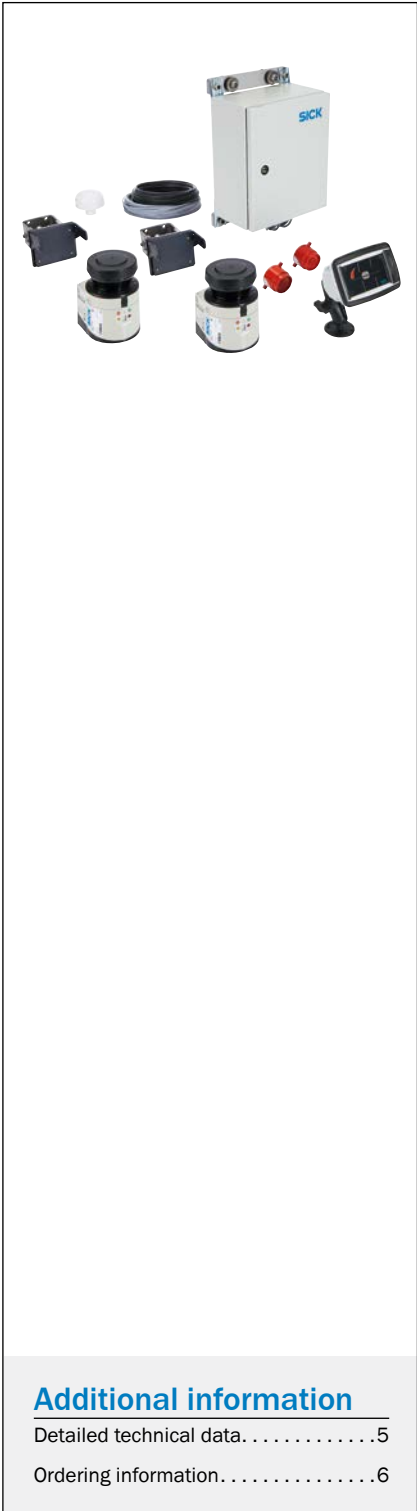
SICK LifeTime Services option

To ensure reliable, repeatable and safe operation the MINESIC100 TCW requires a maintenance program which includes a number of system checks. SICK Service Engineers are qualified to perform this service maintenance.

Installation, service and maintenance training can be provided by SICK.

Tunnel Collision Warning System

Sensors

Proximity Detection Laser Scanners (LMS151 TCW Rear, LMS151 TCW Front) Distance and Remission Data	Global Positioning System Speed, Heading, Position

Environmental / Vehicle Model

Pre-processing – Suppression of Ground and Atmospheric Conditions, e.g. Dust, Fog, Rain	Ego Motion Estimation / Localization

History → Segmentation

Object Tracking

Features

Speed	Location	Size	Contour

Objects

Wall	Vehicle	Infrastructure

Operator Model

Interpretation

Operator Behavior Analysis Accident vs. Intention	Tunnel Wall Distance	Collision Detection	Wall Profile	Turning Radius	Fault Analysis	Digital Inputs Reverse Gear, Park Brake

Decision Making Process / Strategy

Tunnel Collision Warning	Maneuver Assist	Collision Warning	Guidance	Error Handling

Human Machine Interface

Audible Alarm	Operator Display Visual Aid, Information, Obstacle Display and Outline, Error Codes, Setup Wizard	Digital Outputs e.g. Signaling Lights	Ethernet Interface Monitoring & Logging

Operator Assistance for Underground Mining Vehicles

Product description

The MINESIC100 TCW is a high performance collision awareness, guidance and tunnel collision warning system, ideally suited for most underground mining vehicles. This robust system utilizing advanced laser scanner technology, provides underground vehicle operator assistance for the safe and efficient maneuvering within the close proximity of the tunnel wall. The system is easily installed on a variety of underground mine vehicles.

At a glance

- Front and Rear-End tunnel collision warning
- Corner cutting and over shooting warning
- Active assistance for maneuvering in confined spaces – displays the tunnel wall outline
- Visual feedback (touch screen operator display) and audible alarm
- Open interface to fleet management / dispatch systems & event logging
- Full functional operation across speed range (0...V_{max})

Your benefits

- Reduction of incidents, downtime and repair costs
- Detection and tracking of moving and stationary obstacles without the need for RFID tags
- Active situation dependent warning with low false alarm rates
- Simple installation, easy to operate
- Easy to maintain – Integrated test function and reporting
- Configurable to mine site operational requirements
- Full service package provided by SICK LifeTime Services
- Sound system knowledge thanks to comprehensive user training

Application

- Mining vehicles in underground mines
- Haul trucks in underground mines
- Load Haul Dumps in underground mines

Additional information

→ www.mysick.com/en/MINESIC100_TCW

For more information, just 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

System

Application speed range	0 ... 60 km/h
Supply voltage	DC, 24 V, ± 10% (24 V nominal)
Power consumption	40 W 165 W (Peak power consumption with internal sensor heating)
Ambient operating temperature	−20 ... +50 °C [1]
Storage temperature	−40 ... +85 °C
Interfaces	Ethernet (SICK application event protocol, customised object data protocol) Digital I/O (e.g. audible alarm, signalling lights)
Weight	Approx. 20 kg

[1] Components outside cabin (ambient)

Laser scanner

	LMS151 "TPS TCW Front"	LMS151 "TPS TCW Rear"
Operating range	0.2 ... 50 m (up to 18 m at 10% remission)	
Operating conditions	Outdoor (dust, rain, snow, fog)	
Scan angle	270° (total horizontal)	
Angular resolution	0.25° / 0.5°	
Scanning frequency	25 Hz / 50 Hz	
Number of measurement pulses (Multi-Echo)	2	
Dimensions (W x H x D)	102 mm x 162 mm x 105 mm	
Weight	1,100 g	
Error / Distance Accuracy	12 mm	
MTBF	≥ 50,000 h (at 25 °C)	
Protection class	III (EN 50178 (1997;10))	
EMC	EN 61000-6-3 (2007-01), Interference emission EN 61000-6-2 (2005-08), Interference immunity	

Operator Panel PC

Dimensions (W x H x D)	130 mm x 95 mm x 55 mm (landscape or portrait)
Weight	< 1 kg
Screen	Touch Screen, TFT, transmissive
Enclosure rating	IP 67
Repeated bump / shock Immunity	ISO 15003–5.5.2, IEC 60068-2-27, EN 60068-2-29: 1993-04
Vibration, broadband random and guidance	ISO 15003-5.6, IEC 60086-2-6, -2-47, -2-64
EMC	ISO 16750-2 – electrical loads ISO 15003 EN 61000-6-3, 6-4 EN 61000-6-2

Control Cabinet

Enclosure rating	IP 66
Weight	8 kg
Fuse	7.5 A (2x, one in each V+ and GND)
Signal ground	Single GND (vehicle GND) for all supply, input and output signals
Repeated bump / shock Immunity	25 g, 11 ms, 3+3 per axis, all three axis (total 18) (EN 60068-2-29 (1993-04))
Vibration, broadband random and guidance	5 … 2,000 Hz, all 3 axis, 8h per axis (total 24 h), 3g rms, EN 60086-2-6:1994-06

Ancillary Items

Components	GPS Receiver Set Mounting Operator Panel PC Cables – Plugin Electrical Connection Siren – Audible Warning Vibration Mounts

Options

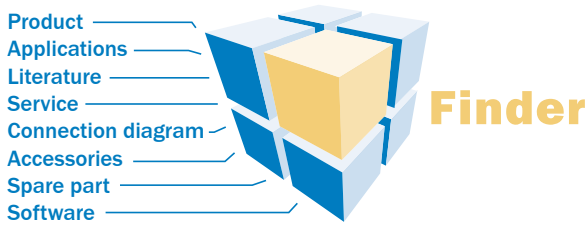|	
Software package	Tunnel Collision Warning

Ordering information

Our regional sales organization will help you to select the best fitting device configuration.

www.mysick.com – search online and order

Search online quickly and safely – with the SICK "Finders"

Product
Applications
Literature
Service
Connection diagram
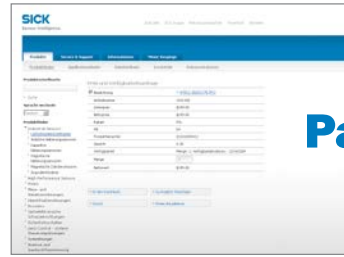Accessories
Spare part
Software

Finder

Product Finder: We can help you to quickly target the product that best matches your application.

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For safety and productivity: SICK LifeTime Services

SICK LifeTime Services is a comprehensive set of high-quality services provided to support the entire life cycle of products and applications from system design all the way to upgrades. These services increase the safety of people, boost the productivity of machines and serve as the basis for our customers' sustainable business success.

SICK LifeTime Services
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TRAIN

Consulting & Design
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Product & System Support
Fast and reliable, by telephone or on location

Verification & Optimization
Checks and recommendations for increased availability
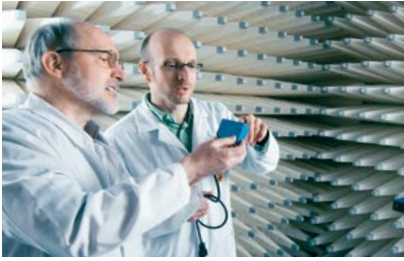
Upgrade & Retrofits
Uncovers new potential for machines and systems

Training & Education
Employee qualification for increased competitiveness

SICK at a glance

Leading technologies

With a staff of more than 6,000 and over 40 subsidiaries and representations worldwide, SICK is one of the leading and most successful manufacturers of sensor technology. The power of innovation and solution competency have made SICK the global market leader. No matter what the project and industry may be, talking with an expert from SICK will provide you with an ideal basis for your plans – there is no need to settle for anything less than the best.

Unique product range

- Non-contact detecting, counting, classifying, positioning and measuring of any type of object or media
- Accident and operator protection with sensors, safety software and services
- Automatic identification with bar code and RFID readers
- Laser measurement technology for detecting the volume, position and contour of people and objects
- Complete system solutions for analysis and flow measurement of gases and liquids

Comprehensive services

- SICK LifeTime Services – for safety and productivity
- Application centers in Europe, Asia and North America for the development of system solutions under real-world conditions
- E-Business Partner Portal www.mysick.com – price and availability of products, requests for quotation and online orders

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