PROTON PRODUCTS

Product Measurement & Process Control

InteliSENS®

SL mini & SLR mini SERIES

Non-Contact Laser Doppler Speed & Length Sensor Technology

- Smallest sensor on the market provides direct replacement for contact tachometers and wheel encoders.
- Fastest speed sensor on the market and unrivalled in both performance and price.
- Non-contact, non-marking, zero-slippage.
- Highest accuracy and repeatability with CE-M certified legal metrology versions available.
- Compact, intelligent, and easy-to-integrate, featuring a broad range of interfaces.
- Designed, manufactured and supported by the global leader in non-contact laser Doppler speed and length measurement technology.

InteliSENS®

SL mini & SLR mini SERIES

Non-Contact Laser Doppler Speed & Length Sensor Technology

The new, smart and uniquely-compact Laser Doppler “Speed and Length” sensor that sets new standards in non-contact speed and length measurements of moving objects and materials in industrial applications.

Designed to replace cumbersome, inaccurate and high-wear contact-wheel speed and length measurement devices in industrial processes. Contact-wheel encoders are prone to excessive measurement errors due to slippage, vibration, wear and dirt accumulation; resulting in product give-away and non-conformance to specifications.

- Provides savings on product give-aways with a typical return-on-investment within a few weeks to a few months.
- Non-contact measurement technique provides an industry-leading accuracy of ±0.05% without need to ever re-calibrate due to wear.
- Industry-leading 200kHz internal measurement rate with one measurement output every 20 microseconds.
- Fully solid-state design with no moving parts for maintenance free operation.
- 2 pulse outputs user-configurable for independent or quadrature operation.
- Includes Ethernet, RS-232 and Proton CANbus communications interfaces as standard.
- Optional PROFIBUS, PROFINET, DeviceNet, EtherNet/IP or Wifi may be substituted for the Ethernet communications interface.

Applications

The InteliSENS® SL mini / SLR mini series is designed for industrial applications and material processing lines; compatible with almost all moving materials including web, plate and sheet. The InteliSENS® SL mini / SLR mini is suitable for a wide range of applications involving measurement and control of length, speed, differential speed or elongation.

Typical industrial applications include:

- Woven, non-woven, textile, and leather industries
- Plastic film, foil, tape and liner industries
- Paper, corrugated and packing materials industries
- Rubber and synthetics industries
- Timber, wood, ceramics industries
- Printing industries
- Building materials
- Extrusion industries
- Automotive industries

Specifications

MODELS	SL mini 1220	SL mini 3060	SLR mini 1220	SLR mini 3060
	Unidirectional		Zero-speed and bidirectional	
Minimum speed (m/min)	0.1	0.25	0	0
Maximum speed (m/min)	5000	5000	±5000	±5000
Nominal stand-off distance (mm)	120	300	120	300
Depth-of-field (mm)	20	60	20	60
Accuracy (%)	±0.05			
Repeatability (%)	±0.02			
Maximum acceleration (m/s^2)	>1000			
Measurement update time	200 kHz internal and 20µs at the outputs			
Power supply	24VDC / 8W			
Environmental protection rating	IP67 (harsher environments possible with an optional environmental enclosure)			
Operating temperature	5-45°C (higher temperatures possible with an optional environmental enclosure)			
Dimensions (mm)	length 140 × width 105 × height 50			
Laser beam diameter (mm)	4			
Laser safety classification	Class 3B			
Diagnostic display	Integrated LCD			
Pulse outputs	2×pulse outputs or 1×quadrature output, freely programmable, pulse rate < 1MHz			
Digital inputs	Laser enable	Shutter enable	3 programmable inputs	
Digital outputs	Shutter status	2 programmable outputs		
Standard communications interfaces	RS-232	Ethernet TCP/IP (Modbus protocol)		
Display communications	Proton CANbus for optional SiDi-CDI interface display			
Optional communications interfaces (replaces Ethernet TCP/IP interface)	PROFINET PROFIBUS	DeviceNet EtherNet/IP		

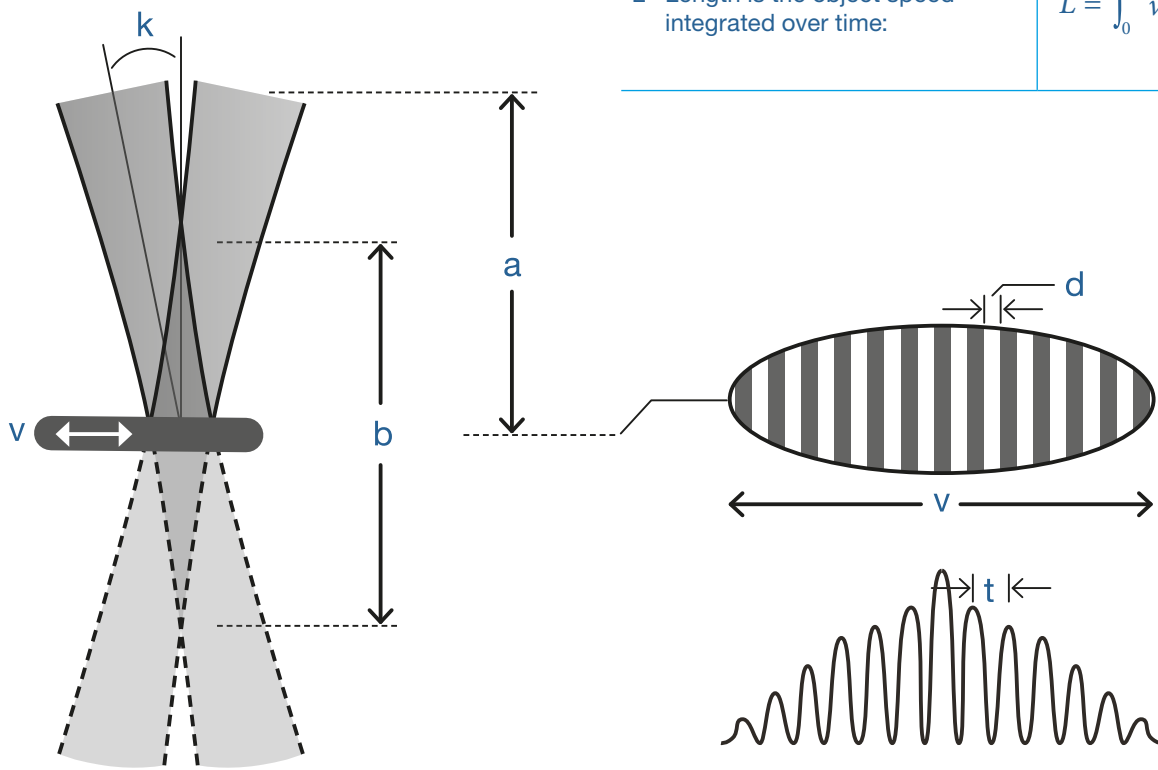
Operating principle

Proton Products InteliSENS® SL mini Series speed and length gauges illuminate the measured surface with an interference pattern created by the intersection of two laser beams. The alternating bright and dark interference fringes modulate the light scattered by the object with a frequency proportional to the object speed. This scattered light is detected by a photodiode and the electrical signal digitally processed to determine the frequency and hence the speed. Object length is then calculated by integrating the speed measurement over time.

The InteliSENS® SLR mini Series bidirectional speed and length gauges extend this principle by using a high-frequency Bragg cell modulator to illuminate the measured surface with a scanning interference pattern, which generates an oscillating light signal even when the object is stationary. Direction of motion is determined by whether the scattered light frequency is higher or lower than the stationary frequency.

a Stand-off distance	
b Depth-of-field	
k Angle between the two laser beams	
v Object speed	
d Laser interference pattern period (not visible to the human eye):	$d = \frac{\lambda}{2 \sin k}$

t Detected signal period: the gauge photodiode detects the light scattered from the laser interference pattern by the motion of the object. The detected signal frequency (f) is the inverse of the detected signal period (t) and is proportional to the object speed:	$f = \frac{1}{t} \alpha \frac{v}{d}$
L Length is the object speed integrated over time:	$L = \int_0^T v \, dt$

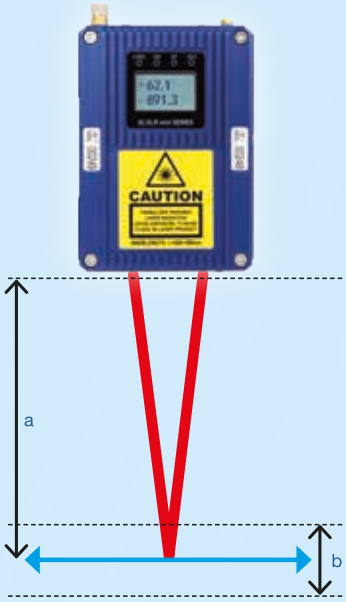


Stand-off distance and Depth-of-field

SL mini and SLR mini non-contact laser Doppler speed and length gauges are specified with a “Stand-off distance” and a “Depth-of-field”.

The object to be measured may be located within the “Depth-of-field” which is centred on the “Stand-off distance”.

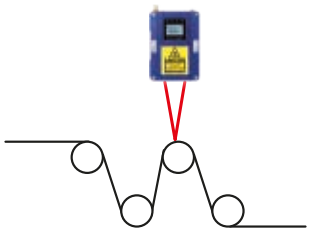
- The SL mini 3060 and SLR mini 3060 are recommended for use in most commonly-encountered applications.
- The SL mini 1220 and SLR mini 1220 are recommended for use on lower reflectivity materials such as transparent films or in applications with limited installation space.



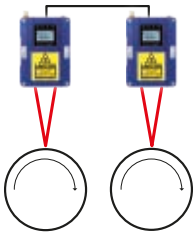
MODELS		SL mini 1220	SL mini 3060	SLR mini 1220	SLR mini 3060
		Unidirectional		Bidirectional	
a	Stand-off distance (mm)	120	300	120	300
b	Depth-of-field (mm)	20	60	20	60

Applications

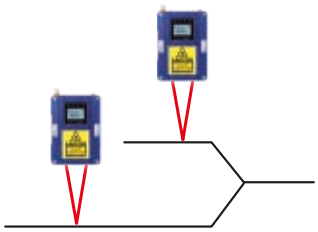
Speed measurement



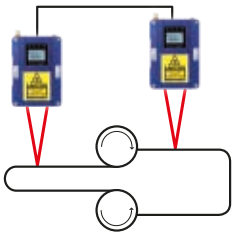
Speed synchronisation



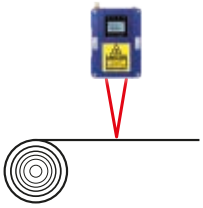
Speed balancing



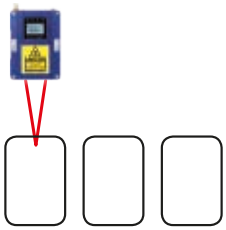
Speed ratio (Elongation)



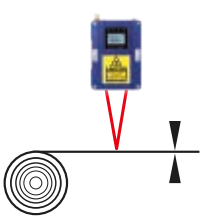
Speed length measurement



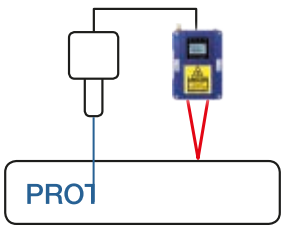
Part length measurement



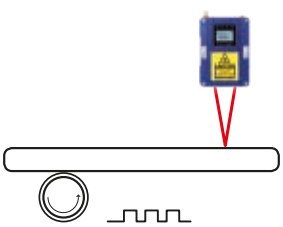
Cut-to-length control



Inkjet printer control



Encoder calibration



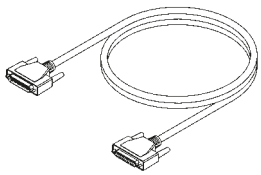
Optional Installation Accesories

PCIS-SL-mini software package

For easy configuration and display of gauge settings and measurements.

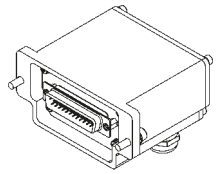
Interface cable

DB-25 to DB-25 cable available in 3, 5,10, 15, 20 or 30m lengths.



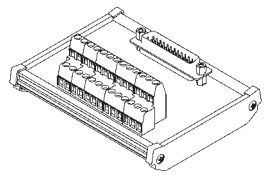
Terminal Expander (OEM only)

For power supply, electrical and communications interface connection.



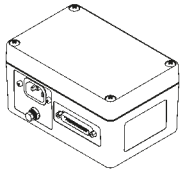
DIN-Rail Terminals

DIN-Rail wiring break-out terminals for power supply, electrical and communications interface connection.



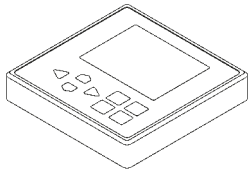
PSU-BOB-mini

Universal mains power supply unit and wiring breakout box.



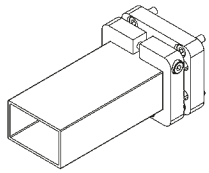
SiDi-CDI

Colour interface display unit for configuration and display of gauge settings and measurements.



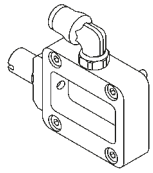
Adjustable beam enclosure tube

BPU1220 (for SL mini 1220 or SLR mini 1220)
BPU3060 (for SL mini 3060 or SLR mini 3060)
Enclosure of the laser beam to within 10mm of the object for laser safety and harsh environments.



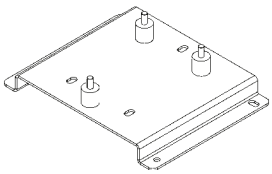
Air-wiped quick-change window

High-efficiency, air-wiped protection window for dusty and steamy environments with a quick-change window release mechanism.



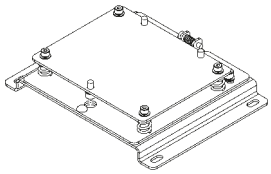
Vibration isolation mount

Isolates the gauge from vibrating machine parts or structures that could otherwise disrupt measurements.



Vibration isolation mount with angle adjustment

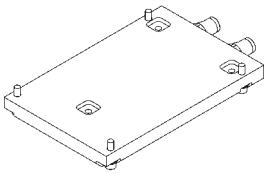
Vibration isolation mount with ±3° of roll and yaw adjustment.



Harsh Environment Accesories

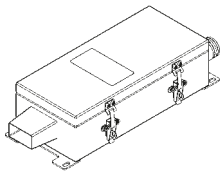
Cooling Plate

Air or water cooled plate for installation between the gauge and mounting surface; for use in ambient temperatures up to 60°C.



ENV-BOX

Stainless-steel environmental protection housing for increased protection against dust, splash, drip or airborne materials. Also available fitted with vortex air-cooler for high temperature environments.



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