MID - Product Overview

Non-Contact / tactile certified length measurement
MID 2014/32/EU

Product Overview
Q1/2020 - Version 1.0

ELOVIS

Product Information

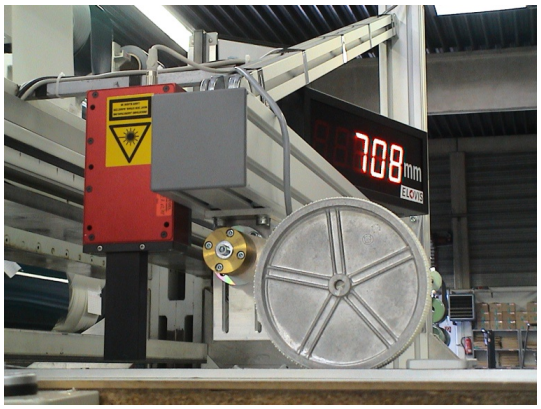
If within the European market, goods are sold by length or area, they have to be measured by calibrated and certified length measurement machines. The European Measurement Instruments Directive MID 2014/23/EU requires, that such length measurement machines have to pass a conformity assessment. For this purpose ELOVIS provides contact and non-contact length measurement systems acc. to MID 2014/32/EU. The non-contact µSPEED Laser-Encoder, as well as contact-wheel driven encoders, both in combination with the MID-COUNTER. The ELOVIS MID-COUNTER is equipped with a long-term memory, which stores over 4 million measurement results and additionally offers numerous control functions and interfaces. The ELOVIS consultation on MID topics is appreciated and often used in the market.

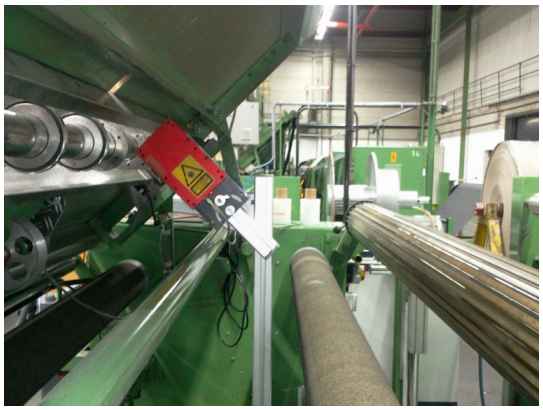
Most important system features:
- depending on the application, sensors can be tactile with wheel encoder or non-contact using laser encoders
- verifiable according to MID 2014/32/EU
- legal security nationally and internationally

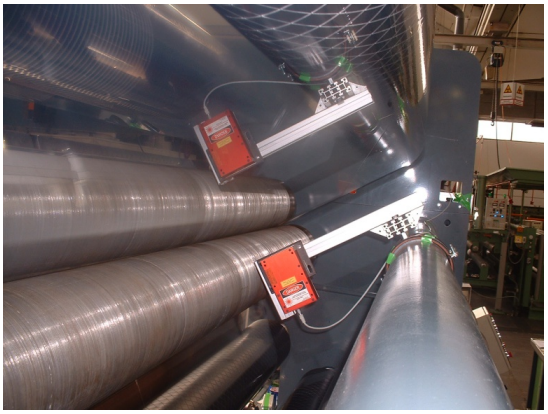
Advantages

compared to other tactile MID length measurement systems:
- calibration and gearing function
- large long-term memory
- network usable
- control functions (cutting control, ...)
- label printer available

in comparison to other non-contact MID length measuring systems:
- smallest system in the market
- most user friendly system in the market
- permanently calibrated
- very long life time
- very good price / performance ratio
- developped and produced in Germany







Figures on page 2: Calibrated tactile and non-contact length measurement; artificial leather, fabric inspection, non-woven, foil

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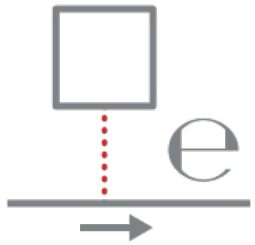
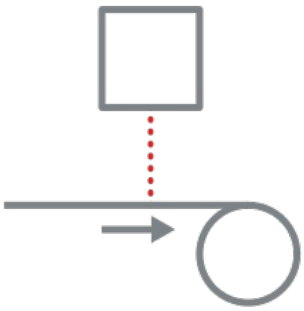
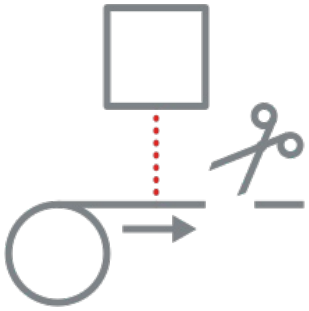


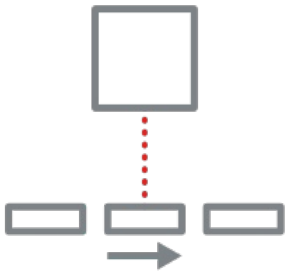
Calibratable length measurement



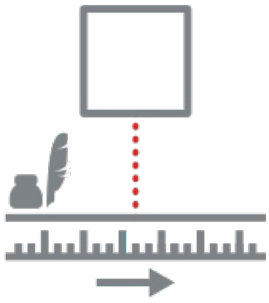
Roll length, coiled or spooled length



Cut-to-length control



Discrete part length measurement



Area measurement

Application Overview

Calibratable and certified length measurement acc. to MID 2014/32/EU:

Measurement of roll lenghts / material inspection:
of web, sheet, ribbon and rolled goods such as:
- textile
- carpet
- nonwoven
- artificial leather
- foil, film
- self-adhesive film, tape
- paper, corrugated cardboard
- rubber
- laminate
- roofing membranes, bitumen membranes
- sealing membranes
- sheet metal coils

Measurement of coiled or spooled lengths:
of winding and coiled materials such as:
- cable, sea cable, umbilical
- wire
- rope
- tube
- profiles

Cut-to-length control:
for production of short rolls, plates, tiles, sections, pipes, beams, blanks
- all the above mentioned materials
- bars, profiles, rails
- plasterboard, chipboard, MDF boards
- insulation boards
- wooden beams, wooden panels, KVH
- metal and plastic pipes

Length as part of an area measurement:
- paper area measurement
- nonwoven area measurement
- artificial leather area measurement
- foils area measurement

... in combination with a width measurement

Application Examples

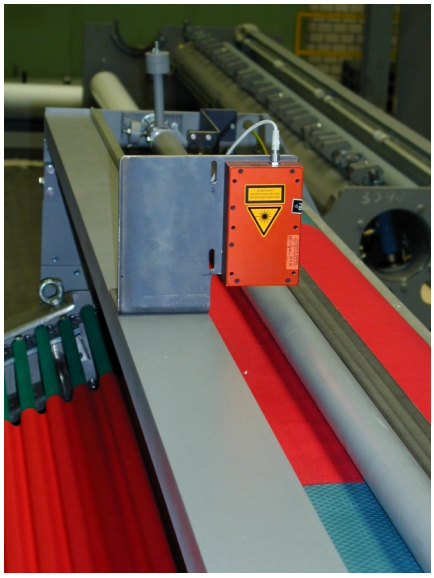
The MID-COUNTER has been developed for all length measuring tasks where the legislator requires calibration. When using the MID-COUNTER, system builders and plant operators have the option of using either non-contact or tactile encoders.

Non-contact Gauges:
µSPEED Laser-Encoders work on almost all moving materials and also on difficult to measure surfaces:
- soft, elastic surfaces
- uneven and wavy surfaces
- surfaces with different thicknesses

Laser-Encoders are suitable for applications:
- with strong accelerations
- high maximum speeds

Tactile / touching Sensors:
Measuring wheel-encoders µSPEED-WE work on many moving materials but rather on easy measurable surfaces:
- solid, stable, non-elastic surfaces
- flat surfaces
- surfaces with constant thicknesses

Measuring wheel encoders are suitable for the following applications:
- with moderate accelerations
- low maximum speeds



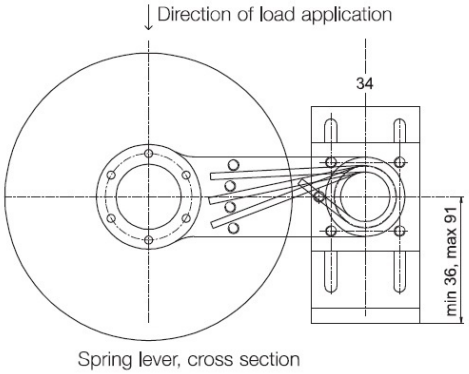


Fig.: Wheel-Encoder - µSPEED-WE

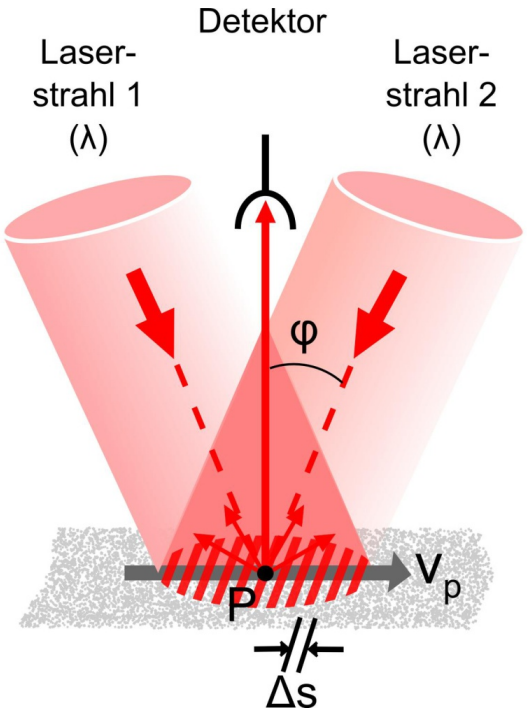


Fig.: Laser-Encoder - µSPEED-SMART / PRO

Figures on page 4:
Calibrated length and area measurement in the fields of:
Fabrics inspection; cable; carpet; paper and non-woven

Measurement Principle

Wheel-Encoder - µSPEED-WE
work tactile and require static friction to the material to be measured. Depending on the material, the measuring wheel surface must be selected accordingly. The measuring wheel drives an incremental encoder by rotation. This provides a quadrature signal to the MID-COUNTER.

Laser-Encoder - µSPEED
work without contact and largely independent from material surface, according to the differential doppler method, where two laser beams, each incident at an angle φ to the optical axis, are superimposed on the surface of the measurement object. For a point P moving at the velocity v through the intersection of the two laser beams, the frequencies of the two laser beams are doppler-shifted. The two laser beams are superimposed in the measurement volume, creating an interference pattern of light and dark stripes. The stripe distance Δs is a constant which depends on the laser wavelength λ and on the angle between the measuring beams 2φ: $\Delta s = \lambda/(2 \sin \varphi)$
If a surface moves through the stripe pattern, the light scattered back by it is modulated in its intensity. A photoreceiver in the measuring head generates a signal whose frequency fD is directly proportional to the velocity component of the surface in the measuring direction vp, and the following applies:

$$fD = vp / \Delta s = (2v / \lambda) \sin \varphi$$

fD = doppler frequency
vp = velocity vector in measuring device
Δs = strip spacing in the measuring volume
The value $\lambda/\sin\varphi$ forms the material measure for the speed and length measurement.
The gauge supplies a quadrature signal to the MID-COUNTER.

Product Overview

Counter: MID-COUNTER

- length counter acc. MID 2014/32 / EU
- lood / waste or partial length counter
- correction factor and calibration function
- cutting control, value preselection, pre-/stop out
- storage of > 4 million measured values
- communication e.g. via MODBUS (serial + network) + optional other field buses
- Welmec certificate of PTB available
- PTB construction unit certificate is available

Fig 1: MID-COUNTER

Laser-Encoder: µSPEED-SMART

- smart sensor with typ. accuracy of ± 0,05%
- speed range up to 4800 m / min
- for winding and cutting processes
- prepared for MID approval (MID 2014/32 / EU)

Laser-Encoder: µSPEED-PRO

identical to µSPEED-SMART (see above), however:

- non-contact direction detection
- measurement from 0 m/min to 1200 m/min
- for any conveying process incl. start/stop and processes with direction change
- prepared for MID approval (MID 2014/32 / EU)

Fig. 2: Laser-Encoder µSPEED-SMART/-PRO

Wheel-Encoder: µSPEED-WE

measuring wheel with wheel surface gummed or metal corrugated (optional other surfaces)

- for bidirectional measurement
- for slow winding and cutting processes
- for processes with moderate accelerations
- for non-slip material surfaces
- prepared for MID approval (MID 2014/32 / EU)

Fig. 3: Wheel-Encoder µSPEED-WE

Accessories

- protocol / label printer µSPEED-PRT
- large displays µSPEED-DIS
- protective housing, air conditioning µSPEED-HSE
- optical adjustment monitoring µSPEED-OAJ-N
- laser protection tube µSPEED-TUBE

Fig. 4: Protocol-/label printer µSPEED-PRT

Technical Data

Parameter	Unit	MID-COUNTER and µSPEED-PRO	MID-COUNTER and µSPEED-SMART	MID-COUNTER and µSPEED-WE (wheel)
Direction detection		YES non-contact	via external direction signal	YES contact method
Start measure V=0		YES non-contact	NO	YES contact method
Material presence		YES non-contact	optional non-contact	NO
Accuracy (typ.) **(2σ;L>10m/3σ;L>20m)**	%	± 0,05	± 0,05	typ. ± 0,3
Repeatability	%	± 0,02 of measurement value		± 0,1 of meas. value
Sensor-type		Laser-Encoder + counter	Laser-Encoder + counter	Wheel-Encoder + counter
Speed-range	m/min m/s	0 bis ± 1.200 0-20	1 bis ± 4800 0,02-80	ca. 0 bis ± 300
Stand-off distance **(Tolerances)**	mm	115±5 (±20)	120±5 (±20) 240±10 (±40)	contact method
Interfaces		2 x RS-232 USB 2.0 Device (PC connect) 10/100 MBit Ethernet Interface		
I/Os	pls/m	quadratur output 1 to 100.000 (acc. to max speed) input: 4 x digital output: 4 x digital		
I/O Typ		RS-422 level Laser interlock (single, 24V)		
Available data		speed, length, laser interlock, valid measurement data storage: > 4 Mio measurement values		
Fieldbus		available protocolls: SOAP, XML, JSON, UPD output for each reset: serial number, Meas-ID, meter, status optional data output: date, time, pre-settings, order-N°		
Protection Class		Laser-Encoder sensor head: IP67 MID-COUNTER: front: IP51; back: IP20		Wheel-Enc.: z.B IP65, IP66
Sizes **(LxBxH)**	mm	Laser-Encoder sensor head: 154x94x39 MID-COUNTER: 96x96x160		Wheel: acc. to diameter
Power supply		24VDC (18 V to 34 V)		
Weight	kg	sensor head: 0,9 kg; MID-COUNTER: 1,5 kg;		Wheel: acc. to diameter
Laser specification		25mW, 780 nm (laser class 3B)		no Laser
Environment Temp./ **Humidity**		5 to 55°C - non condensating outside temperature range external cooling / heating required		

Sizes

Fig.:
Laser-Encoder - sensor head:
Size and drilling dimensions identical for all system types (µSPEED-SMART,-PRO)

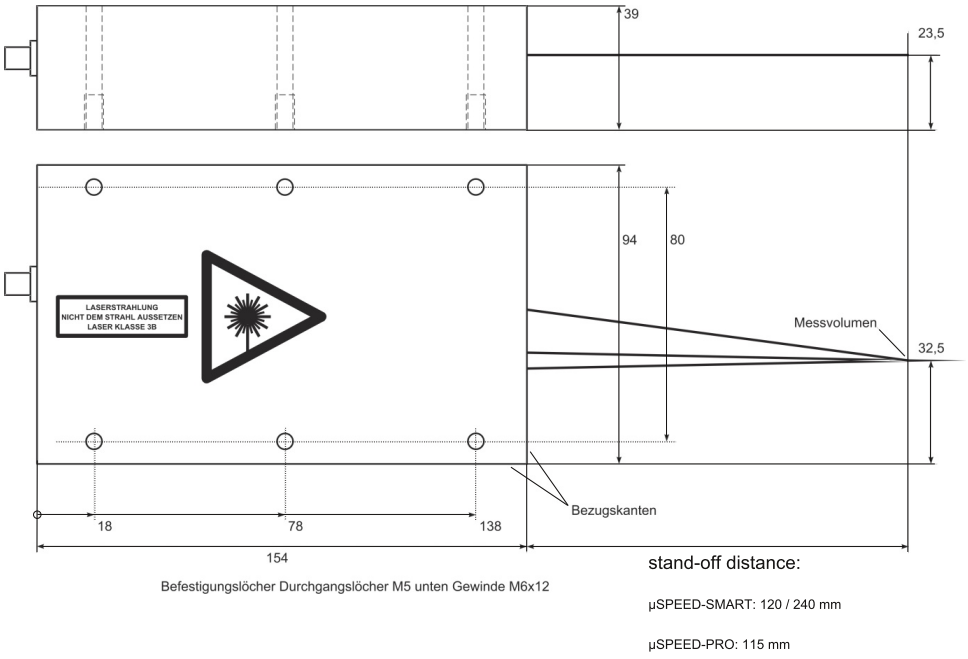
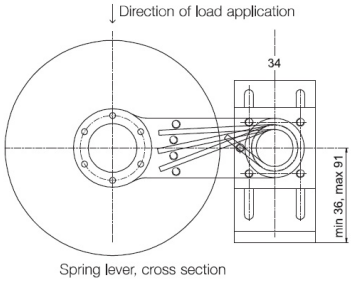
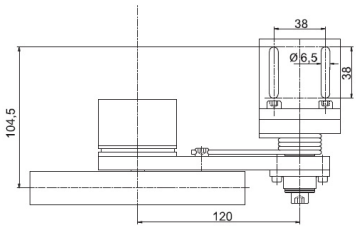
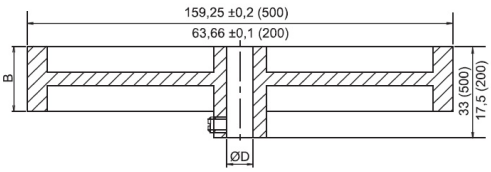


Fig.:
Wheel-Encoder - rotational encoder:
Size according to wheel diameter (µSPEED-WE)







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Version 1.0