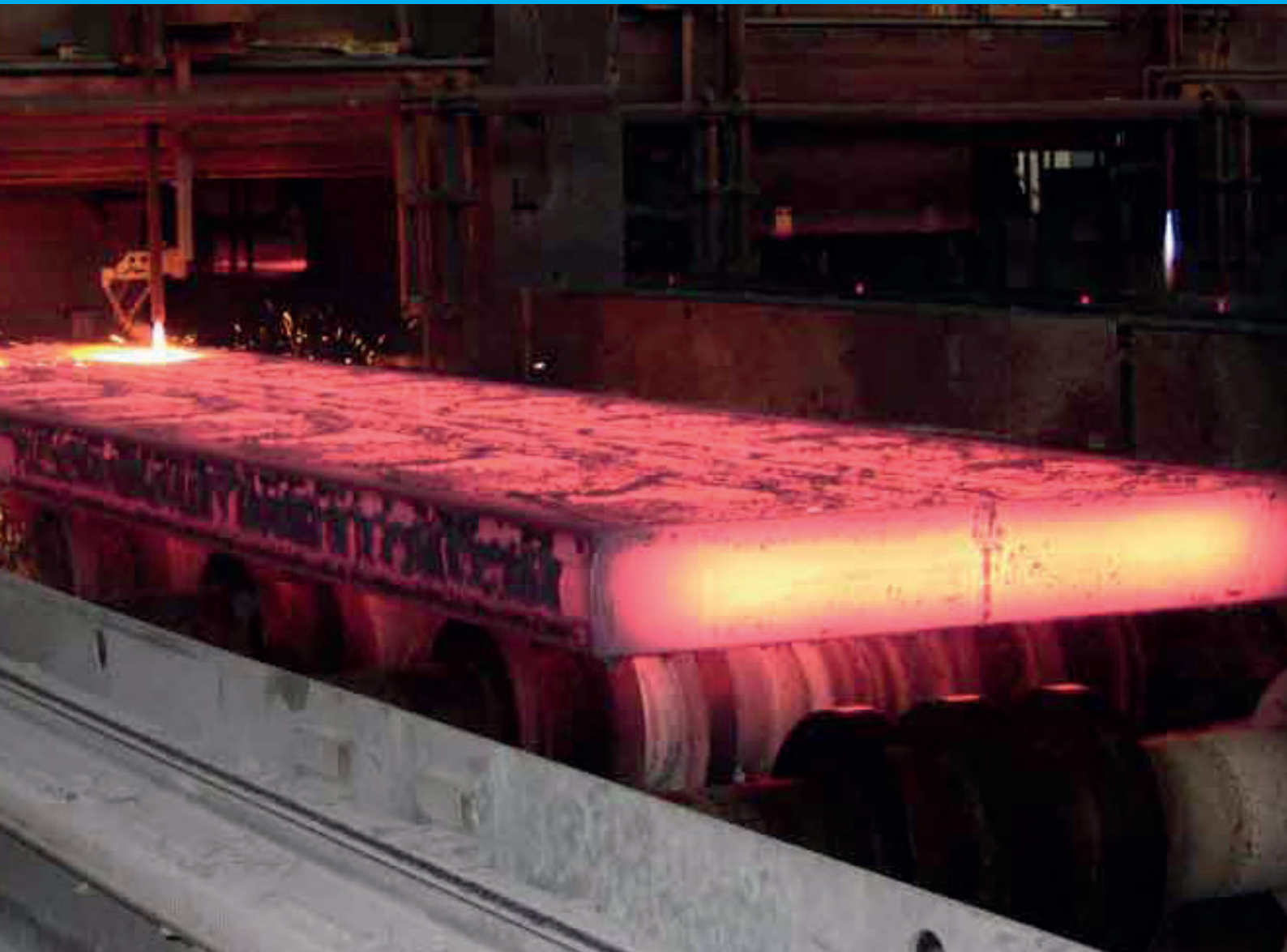


EMG iSCAN®

Slab dimension measurement,
tracking and positioning



- ▶ Improved process stability and reliability
- ▶ Transparency of input quality
- ▶ Minimized scrap and efficient material release processes
- ▶ Quality assurance of the slab casting process

Slab dimension measurement, tracking and positioning – EMG iSCAN®

Customer challenges:

- ▶ Precise measurement of width, length & thickness
- ▶ Further information of the width profile during casting process
- ▶ Harsh environmental conditions
- ▶ Wedge, camber, bending and chamfers of real slabs

EMG solution:

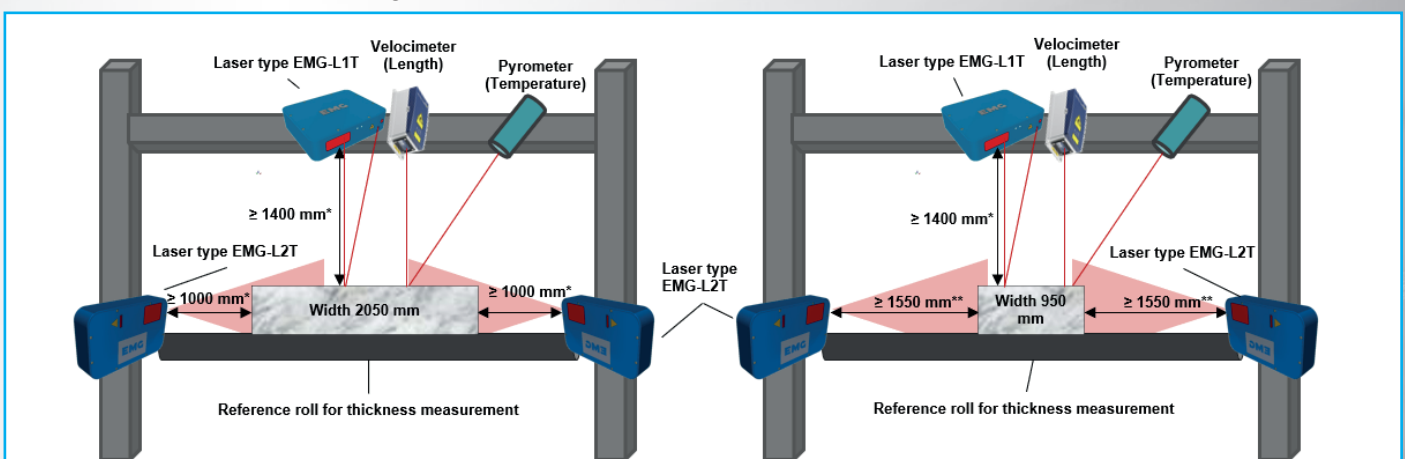
Width, length and thickness – EMG iSCAN® is your solution for hot strands and slabs. The precise and non-contact slab dimension measurement is performed with a customer-based arrangement of laser-based sensors. Even under great heat, our sensors keep a cool head. Therefore, ideally suited for harsh environmental conditions.

From distances to slab dimensions, from casting process to reheating furnace – EMG iSCAN® is a reliable quality assurance product in a lot of conditions. Number, type and configuration of the laser-based sensors are determined on the customer-based application. Gutter formation, edge shape and off-corner cracks are examples of the influence of the casting process.

This information can be used to optimize the casting process, for instance, by change the coquille setup or the primary and secondary cooling. EMG iSCAN® is perfect suitable to display this information and to support the casting process.

The width and thickness values are length-dependent values based on the speed and length measurement with a velocimeter. Hot measured slab dimensions can be checked on standard temperature condition, for instance, at 25 °C by using the pyrometer for temperature measurement and the integrated temperature model. If the implementation of a customer-based temperature model is desired, EMG iSCAN® will provide it.

The precise dimension measurement of slabs is also realizable at incorrect slab alignment in limits. Within these limits the software compensates the influence of the incorrect alignment of slabs on a roller table. Wedge, camber, bending and chamfers are furthermore aspects of real slab and no limitation for EMG iSCAN®. Additional temperature sensor, inside the housing, monitor the cooling conditions inside the protection housing.



EMG iSCAN® - Measuring principle

* Recommended sensor distance to the maximum strand or slab

** resulting distance

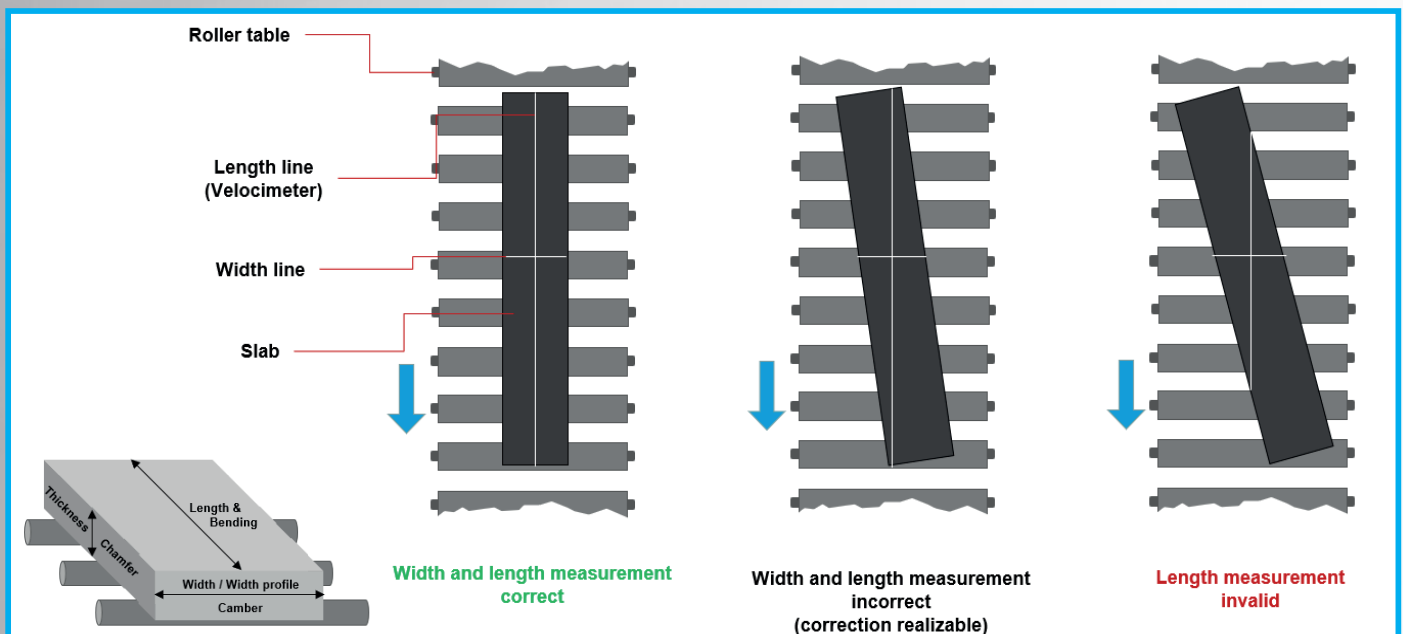
Improved process stability and reliability

Performance features:

- ▶ Calculation of the minimum, maximum and average width
- ▶ Skew correction of the slab on the roller table
- ▶ Calculation of the slab wedge
- ▶ Measurement up to 2,200 °C material temperature
- ▶ Wavelengths of 405 nm and 670 nm available
- ▶ Different measurement ranges available
- ▶ Application-based selection of the best sensor type and configuration
- ▶ Stable measuring technology and cooling concept for $T_{amb.} > 45\text{ °C}$
- ▶ Calculation of cold dimension of the strand or slab based on temperature model and pyrometer
- ▶ Implementation of customer-based temperature models possible
- ▶ Typical installation locations:
 - ▶ at the end of the continuous slab casting machine (cooling section) before or after the cutting burn process
 - ▶ on the roller table from the slab storage to the reheating furnace
 - ▶ before or after the reheating furnace

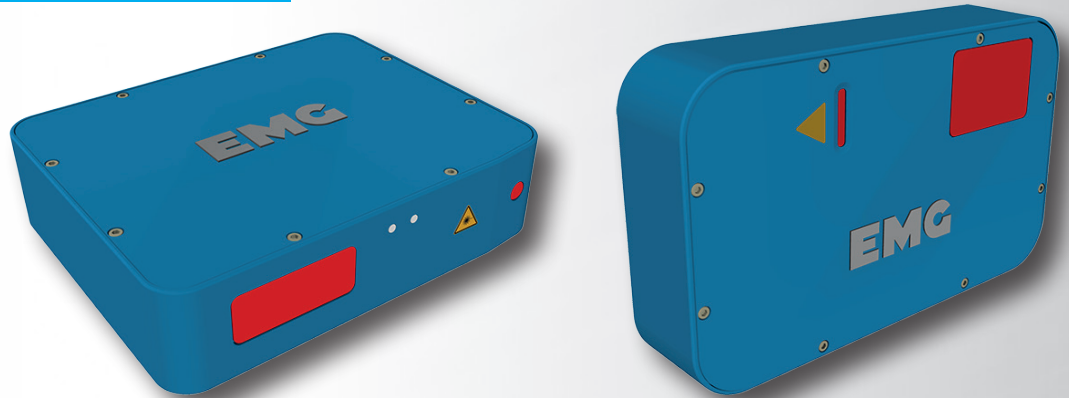
Measuring principle:

- ▶ Stable frame for the installation of laser sensors, velocimeter and pyrometer (avoidance of temperature influences to the sensor systems)
- ▶ Laser sensors for width measurement
- ▶ Laser sensor for one-side thickness measurement (reference roller required)
- ▶ Velocimeter for the speed and length measurement
- ▶ Pyrometer for the temperature measurement
- ▶ Selection of laser sensors based on:
 - ▶ minimum and maximum strand or slab width
 - ▶ maximum strand or slab thickness
 - ▶ position range of the slab on the roller table
- ▶ Recommendation of the minimum distance of laser sensors to the strand or slab according to the application specification
- ▶ Laser sensors with laser safety class 2 preferred



Transparency of input quality

Product types:



	Laser type EMG-L1T	Laser type EMG-L2T
Application	thickness measurement	width measurement
Dimensions	255 x 205 x 70 mm	310 x 190 x 64 mm
Weight	4.5 kg	
Laser safety class (acc. to IEC)	2 (preferred by EMG) / 3R / 3B	
Wave length	405 nm / 670 nm	

Technical data:

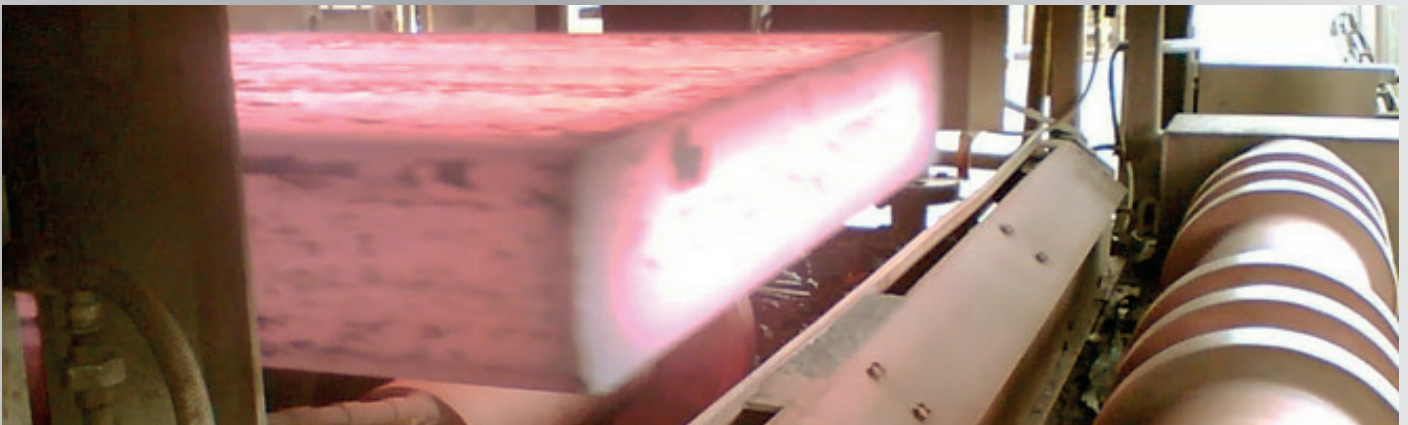
Measuring accuracy*	+/- 4 mm (width) +/- 2 mm (thickness) +/- 15 mm (length) +/- 5 °C (temperature)
Ambient temperature	0 up to 45 °C (no cooling necessary)
Material surface temperature	up to 2,200 °C
Air humidity	80 % (max. / non condensing)
Protection class (acc. to DIN EN 60529)	IP65
Power supply	110 ... 230 VAC (50/60 Hz)
Interfaces	Ethernet, Profinet, Profibus

*typically for standard applications

Minimized scrap and efficient material release

Customer benefits:

- ▶ Length, width and thickness measurement on the hot strand or slabs under harsh environmental conditions
- ▶ Display of the slab width profile, for instance, gutter formation, edge shape and off-corner cracks
- ▶ Optimization of the casting process by the customer, for instance, change of the coquille setup, primary and secondary cooling
- ▶ Slab dimension measurement on the roller table to perform a efficient reheating process
- ▶ Calculation of a virtual rectangle of the slab to determine the optimal space inside the furnace
- ▶ Precise pushing of the slab into the furnace by exact slab positioning in front the reheating furnace (avoidance of damages on the furnace wall)
- ▶ Selection of laser sensors with laser safety class 2 often possible



Slab positioning and tracking:

Other applications of EMG iSCAN® are the slab tracking on the roller table from the slab storage to the reheating furnace and the position, orientation and length measurement before or after the reheating furnace.

The slab transportation to the furnace can be optimized and a precise pushing into the reheating furnace can be realized.



Slab tracking at the roller table


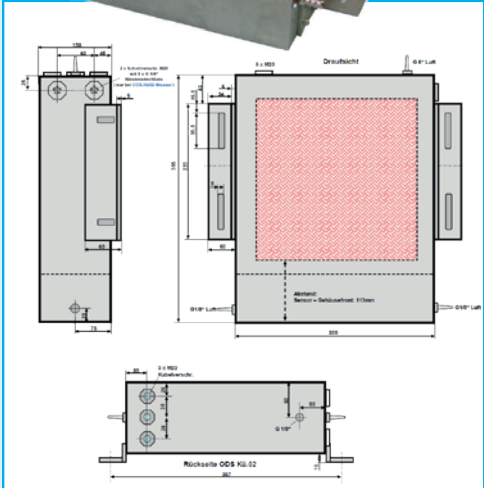



Function principle of the slab positioning at the roller table

Quality assurance of the slab casting process

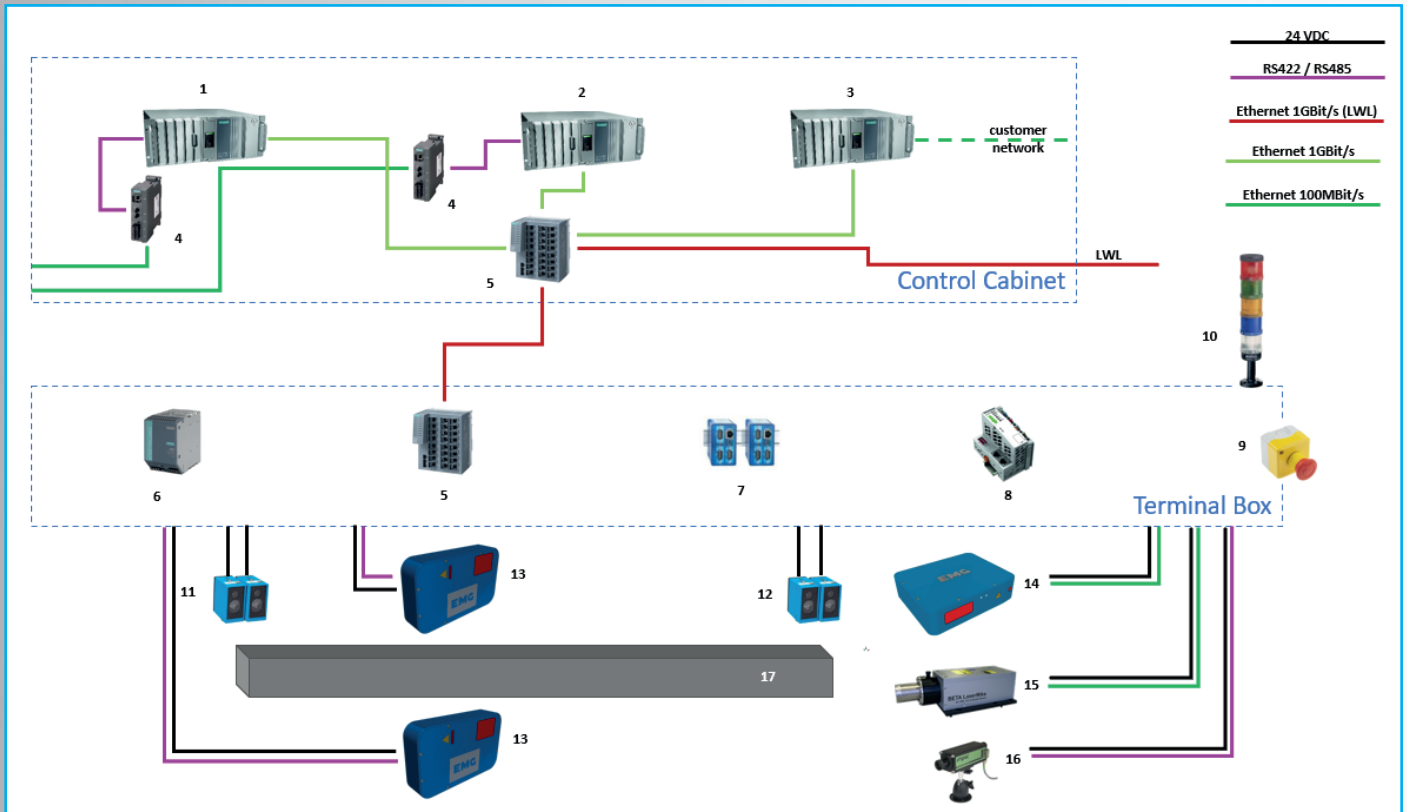
Protection and cooling housing:

For the minimization of dust deposition on the laser optic or for cooling at ambient conditions $> 45\text{ °C}$ it is possible as an option to protect the sensors with special housings.

	Laser type EMG-L1T	Laser type EMG-L2T
Height	400 mm	500 mm
Width	300 mm	
Depth	150 mm	
Temperature monitoring	Yes (temperature sensor Pt 100)	
Dust protection	<ul style="list-style-type: none"> • compressed air <ul style="list-style-type: none"> • typ. 3 bar • cold, dry & oil free air • Thread diameter compressed air 1 x G1/8" • Housing weight: 10 kg 	
Cooling	<ul style="list-style-type: none"> • cold water: <ul style="list-style-type: none"> • max. 6 bar • typ. 3 bar (24 l/min) • Thread diameter: compressed air 1 x G1/8" and cold water 2 x G1/4" • Housing weight: 16 kg 	
	 	



Networking topology:



No.	Title	Additional information
1	EMG Control unit 1	-
2	EMG Control unit 2	-
3	EMG Server unit	-
4	ProfiNet converter	-
5	Ethernet switch	-
6	Power supply	24 VDC
7	RS422/RS485 converter	RS422/RS485 to Ethernet
8	Field bus controller	-
9	Emergency stop	complete system or sensor only, depends on application
10	Signal lamps	-
11	Light barrier 1	Start of velocimeter measurement (side)
12	Light barrier 2	Stopp of velocimeter measurement (side)
13	1D / 2D laser sensor	Width measurement (side)
14	1D / 2D laser sensor	Thickness measurement (above)
15	Velocimeter	Speed and length measurement (above)
16	Pyrometer	Temperature measurement (above)
17	Slab or strand	-

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