

# LASER

## Analog Laser Displacement Transducer



### LAS Series

#### Key-Features:

- Available measurement ranges: 10 to 13000 mm
- Resolution up to 2  $\mu\text{m}$ , linearity up to  $\pm 6 \mu\text{m}$
- Spot and line laser versions
- Individual parametrization by teach-in procedure
- Protection class: IP67
- Working temperature: 0 to 50 °C
- Very precise distance measurement on most materials
- Protected against reverse polarity and short circuit
- Analog output 4..20 mA and/or 0...10 V

#### Content:

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## INTRODUCTION

LAS laser sensors cover measurement ranges from 1 to 13000 mm. The integrated micro-controller delivers an accurate output signal, which is proportional to the detected distance. External analysers to evaluate the signals are not required. Reliable operation, independent of color or other influences of the surface, is ensured by sophisticated electronic elements integrated in the system. The small visible laser spot allows a simple and precise orientation of the sensor. Distances to rough surfaces can be measured by using a fine laser line instead of the spot.

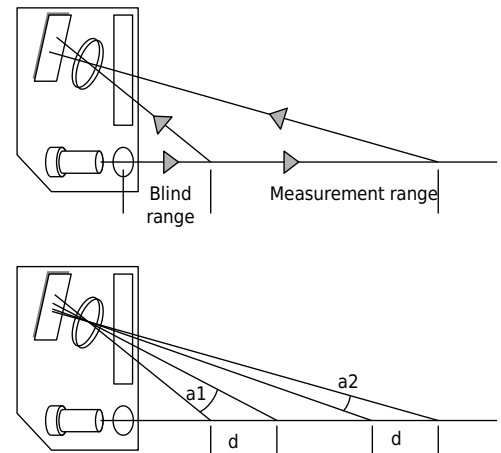
## MEASURING PRINCIPLE

The triangulation principle is basic for this measurement method (exception LAS-TX). The laser beam in the form of a small spot arrives on the surface of the target, while the detector of the system captures its position. The distance itself is calculated by means of the change of the angle. Achievable resolution and accuracy are therefore influenced mainly by the distance  $d$ : In proximity of the sensor, a large angular change  $a1$  can be obtained, whereas larger values result in a smaller angle  $a2$ , thus in reduced accuracy (see drawing).

A photo diode array integrated in the sensor represents the receiver, high speed versions use a PSD element. The receiver is directly coupled to a micro-controller, being part of the system. This micro-controller analyses the light distribution on the element, calculates the exact angle and out of it the distance to the object. The calculated distance is either transferred to a serial port or alternatively is converted to a proportional output current. The micro-controller guarantees a very high linearity and accuracy. The combination of photo diode array and micro-controller allows a suppression of interfering reflections and ensures a reliable results even on most critical surfaces.

The sensor automatically adapts to the surface color by a change of its internal sensitivity. This way influences due to the target color are nearly excluded.

An integrated digital output is activated whenever the sensor does not receive enough light (pollution signal), or if no object within the measuring range can be detected at all.



## INSTALLATION

### Spot laser

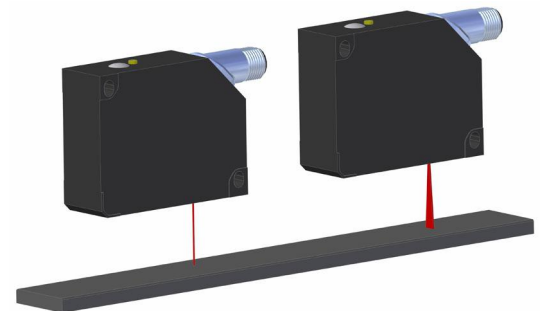
The object is sampled by a focussed laser beam. This version is the most preferred within the LAS series.

### Line laser

The laser beam is expanded to a fine line, by means of a deflection unit. Typical applications for sampling a target with a line laser are the position or thickness measurements of objects with rough, uneven, porous or interrupted surfaces.

### Teach-in function

The desired range can conveniently be adapted within the maximum measurement range by means of the teach-in line or button. The analog output has its full stroke within the teach range. The default configuration uses the maximum measurement range. A separate description of the teach-in procedure is available upon request.



### Installation

The first condition for a successful distance measurement is the absence of any obstruction in the light path, as shown in fig. 3. The receiver optics must be able to detect the light spot directly (fig. 1 and 2).

For highly polished or mirror-like objects it is important to keep the direct reflection away from the detector. In these cases, it is recommended to slightly tilt the sensor (fig. 4).

Optimum results are obtained by transverse installation of the sensor with respect to the target movement (fig. 5).

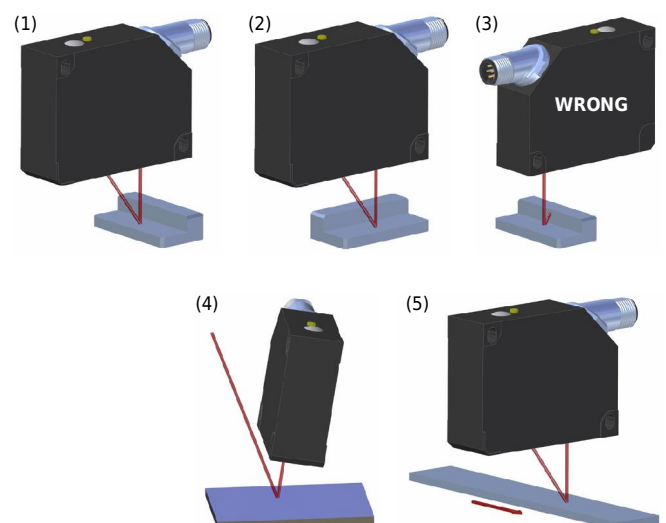
For triangulation sensors, there is a simple rule, that the distance between sensor and target should be as small as possible. The smaller the working range the better the linearity and accuracy.

Electromagnetic compatibility: The sensor must correctly be grounded, a shielded cable is recommended.

### Cleaning of the laser window

- 1) dry cleaning with a soft brush
- 2) cleaning with a dry, soft, antistatic cloth
- 3) wet cleaning with clear water, approx. 30 degree Celsius, if necessary with a little mild soap.

Please do NOT use window cleaner!!



## OVERVIEW OF THE LAS SERIES

|  |      | LAS-TM       | LAS-TML | LAS-TB                            | LAS-T  | LAS-TL |
|--|------|--------------|---------|-----------------------------------|--------|--------|
| Smallest working range within the series *   | [mm] | 16           | 50      | 50                                | 30     | 30     |
| Largest working range within the series **   | [mm] | 550          | 550     | 200                               | 1000   | 1000   |
| Smallest measurement range within the series | [mm] | 10           | 300     | 10                                | 40     | 40     |
| Largest measurement range within the series  | [mm] | 500          | 500     | 100                               | 800    | 800    |
| Measuring range teachable                    |      | ■            | ■       | ■                                 | ■      | ■      |
| Smallest linearity error within the series   | [mm] | ±0,006       | ±0,05   | <0,045                            | ±0,012 | ±0,012 |
| Best resolution within the series            | [mm] | 0,002        | 0,010   | <0,015                            | 0,004  | 0,004  |
| Highest sampling rate within the series      | [ms] | <0,9         | <0,9    | <2                                | <0,9   | <0,9   |
| Spot laser                                   |      | ■            |         |                                   | ■      |        |
| Line laser                                   |      |              | ■       | ■                                 |        | ■      |
| Laser class                                  |      | 2            | 2       | 1                                 | 2      | 2      |
| Output signal 0...10 V                       |      | ■            | ■       | ■                                 |        |        |
| Output signal 4...20 mA                      |      | ■            | ■       | ■                                 |        |        |
| Output signal 0...10 V and 4...20 mA         |      |              |         |                                   | ■      | ■      |
| Alarm output                                 |      |              |         |                                   | PNP    | PNP    |
| Connector M8, 4-pole                         |      | ■            | ■       | ■                                 |        |        |
| Connector M12, 5-pole                        |      |              |         |                                   |        |        |
| Connector M12, 8-pole                        |      |              |         |                                   | ■      | ■      |
| Special properties                           |      | Very compact |         | Applicable for mat black surfaces |        |        |

|  |      | LAS-TX                                 | LAS-T5                              | LAS-Z                                 | LAS-L                                 |  |
|--|------|--|-------------------------------------|---------------------------------------|---------------------------------------|--|
| Smallest working range within the series *   | [mm] | 200                                    | 30                                  | 30                                    | 30                                    |  |
| Largest working range within the series **   | [mm] | 13000                                  | 600                                 | 1000                                  | 1000                                  |  |
| Smallest measurement range within the series | [mm] | 3800                                   | 40                                  | 20                                    | 20                                    |  |
| Largest measurement range within the series  | [mm] | 12800                                  | 500                                 | 800                                   | 800                                   |  |
| Measurement range teachable                  |      | ■                                      | ■                                   |                                       |                                       |  |
| Smallest linearity error within the series   | [mm] | +/- 15                                 | +/- 0,012                           | +/- 0,03                              | +/- 0,03                              |  |
| Best resolution within the series            | [mm] | 1,000                                  | 0,004                               | 0,010                                 | 0,010                                 |  |
| Highest sampling rate within the series      | [ms] | 10                                     | <0,9                                | <10                                   | <10                                   |  |
| Spot laser                                   |      | ■                                      | ■                                   | ■                                     |                                       |  |
| Line laser                                   |      |  |                                     |                                       | ■                                     |  |
| Laser class                                  |      | 2                                      | 2                                   | 2                                     | 2                                     |  |
| Output signal 0...10 V                       |      | ■ (not for TX-13)                      | ■                                   |                                       |                                       |  |
| Output signal 4...20 mA                      |      | ■                                      | ■                                   |                                       |                                       |  |
| Output signal 0...10 V and 4...20 mA         |      |  |                                     | ■                                     | ■                                     |  |
| Alarm output                                 |      | Push-pull                              |                                     | PNP                                   | PNP                                   |  |
| Connector M8, 4-pole                         |      |  |                                     |                                       |                                       |  |
| Connector M12, 5-pole                        |      | ■                                      | ■                                   | ■                                     | ■                                     |  |
| Connector M12, 8-pole                        |      |  |                                     |                                       |                                       |  |
| Special properties                           |      | Large working range at min. dimensions | Outstanding price-performance ratio | Discontinued model replaced by LAS-T5 | Discontinued model replaced by LAS-TL |  |

\* corresponds to the blind range of the sensor

\*\* corresponds to the blind range + the measurement range

## TECHNICAL DATA - LAS-TM / LAS-TB SERIES

**LAS-TM:** Ultra-compact design  
Measurement range teachable  
Type of analog output selectable

**LAS-TB:** Tailored for mat black surfaces (with laser line)  
Measurement range teachable  
Type of analog output selectable



| Spot laser                 |       | LAS-TM-10   | LAS-TM-104    | LAS-TM-300  | LAS-TM-500  |            |                |                |
|----------------------------|-------|---|---------------|-------------|-------------|------------|----------------|----------------|
| Line laser                 |       |   |               | LAS-TML-300 | LAS-TML-500 | LAS-TB-10  | LAS-TB-40      | LAS-TB-100     |
| Measuring range            | [mm]  | 16...26   | 16...120      | 50...350    | 50...550    | 50...60    | 60...100       | 100...200      |
| Resolution *               | [mm]  | 0,002...0,005   | 0,002...0,12  | 0,01...0,40 | 0,01...1,15 | <0,015     | 0,015...0,038  | 0,039...0,15   |
| Linearity error *          | [mm]  | ±0,006...0,015  | ±0,015...0,35 | ±0,05...1,2 | ±0,08...3,5 | <0,045     | ±0,047...0,118 | ±0,123...0,457 |
| Min. teach-in range        | [mm]  | >1  | >2            | >5          | >10         | >1         | >4             | >5             |
| Reponse time               | [ms]  | < 0,9   |               |             | <2          |            |                |                |
| Sensor element             |       | Photo diode array                                     |               |             |             |            |                |                |
| Alarm output               |       | -   |               |             |             |            |                |                |
| Power-ON indicator         |       | LED green   |               |             |             |            |                |                |
| Alarm indicator            |       | LED red   |               |             |             |            |                |                |
| Pollution indicator        |       | LED red flashing                                      |               |             |             |            |                |                |
| Supply                     | [VDC] | 12...28   |               |             |             |            |                |                |
| Max. current consumption   | [mA]  | 100   |               | 80          |             |            |                |                |
| Load resistance            | [Ω]   | 4...20 mA: <300, 0...10 V: >100 k                     |               |             |             |            |                |                |
| Light source               |       | Laser diode red, pulsed                               |               |             |             |            |                |                |
| Laser class                |       | 2   |               |             |             | 1          |                |                |
| Wavelength                 | [nm]  | 650   |               |             |             |            |                |                |
| Safety features            |       | Protection against reverse polarity and short circuit |               |             |             |            |                |                |
| Housing material           |       | Zn  |               | Al          |             | Al         |                |                |
| Protection class           |       | IP67  |               |             |             |            |                |                |
| Working temperature        | [°C]  | 0...50  |               |             |             |            |                |                |
| Connection                 |       | M8 connector, 4-pole                                  |               |             |             |            |                |                |
| Beam diameter spot laser   | [mm]  | 0,5...0,2   | 0,9...0,5     | 1,0         | 1,0         |            |                |                |
| Beam type, line laser ***  |       |   |               |             |             |            |                |                |
| Beam height                | [mm]  |   |               | 4,0...9,0   | 4,0...11,0  | 0,1...0,18 | 0,11...0,45    | 0,2...0,74     |
| Width                      | [mm]  |   |               | 2,0         | 2,0...1,0   | 1,1        | 1,7            | 2,8...3,7      |
| Reflectivity of the target | [%]   |   |               |             |             | >0,5       | >0,8           | >2             |
| Output signal **           |       | 4...20 mA, 0...10 V                                   |               |             |             |            |                |                |

\* Values for linearity and resolution are given for a mat white reference surface.

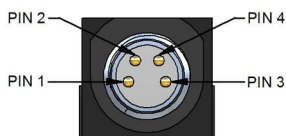
\*\* Type of analog output (4...20 mA or 0...10 V) has to be specified when ordering.

\*\*\* The detector calculates an optical (not a mathematical) averaging of the sampled surface, i.e. a kind of a surface integral.

### Electrical connection

#### LAS-TM / TML / TB

| Pin | Cable color | Function |
|-----|-------------|----------|
| 1   | brown       | V +      |
| 2   | white       | Teach-in |
| 3   | blue        | GND      |
| 4   | black       | Signal + |



### Alarm output

The alarm output is activated, as soon as the object is outside of the measurement range, or if the received signals are useless for a distance measurement (too low, or too high). In both cases the analog output signal is 4 mA / resp. 0 V.

The sensor has no internal hold function to bridge missing measurement signals. Therefore it may happen in critical applications (extremely bright surfaces) that the output shortly drops to 4 mA / resp. 0V, when the measurement signal gets lost. By checking the status of the alarm output before making a measurement, this false output signal can be identified.

## TECHNICAL DATA - LAS-T SERIES

**LAS-T/ -TL:** Universal analog output signal (current and voltage)  
Measurement range teachable  
Synchronization input  
Alarm output



| Spot laser               |       | LAS-T-40  | LAS-T-100    | LAS-T-250   | LAS-T-500    | LAS-T-800    |
|--------------------------|-------|---|--------------|-------------|--------------|--------------|
| Line laser               |       | LAS-TL-40   | LAS-TL-100   | LAS-TL-250  | LAS-TL-500   | LAS-TL-800   |
| Measuring range          | [mm]  | 30...70   | 30...130     | 50...300    | 100...600    | 200...1000   |
| Resolution *             | [mm]  | 0,004...0,02  | 0,005...0,06 | 0,01...0,33 | 0,015...0,67 | 0,02...0,4   |
| Linearity error *        | [mm]  | ±0,012...0,06   | ±0,015...0,2 | ±0,03...1,0 | ±0,05...2    | ±0,11...1,65 |
| Min. teach-in range      | [mm]  | >2  | >3           | >5          | >10          | >10          |
| Response time            | [ms]  | < 0,9   |              |             |              | < 4          |
| Sensor element           |       | Photo diode array                                     |              |             |              |              |
| Alarm output             |       | PNP   |              |             |              |              |
| Max. switching current   | [mA]  | 100   |              |             |              |              |
| Power-ON indicator       |       | LED green   |              |             |              |              |
| Alarm indicator          |       | LED red   |              |             |              |              |
| Pollution indicator      |       | LED red, flashing                                     |              |             |              |              |
| Supply                   | [VDC] | 12...28   |              |             |              |              |
| Max. current consumption | [mA]  | 100   |              |             |              |              |
| Load resistance          | [Ω]   | 4...20 mA: <300, 0...10 V: >100 k                     |              |             |              |              |
| Light source             |       | Laser diode red, pulsed                               |              |             |              |              |
| Laser class              |       | 2   |              |             |              |              |
| Wavelength               | [nm]  | 650   |              |             |              |              |
| Safety features          |       | Protection against reverse polarity and short circuit |              |             |              |              |
| Housing material         |       | Zn  |              |             |              | Al           |
| Protection class         |       | IP67  |              |             |              |              |
| Working temperature      | [°C]  | 0...50  |              |             |              |              |
| Connection               |       | M12 connector, 8-pole                                 |              |             |              |              |
| Beam diameter spot laser | [mm]  | 1,0...0,2   | 2,0...1,0    | 2,0         | 2,0          | 2,0          |
| Beam type line laser *** |       |   |              |             |              |              |
| Beam height              | [mm]  | 2,0   | 3,0...5,0    | 4,0...12    | 5,5...21     | 8,5...35     |
| Width                    | [mm]  | 1,0...0,2   | 2,0...1,0    | 2,5         | 3            | 2,5          |
| Output signal **         |       | 4...20 mA, 0...10 V                                   |              |             |              |              |

\* Values for linearity and resolution are given for a mat white reference surface.

\*\* Automatic output selection: Depending on the connected impedance, current or voltage output becomes active.

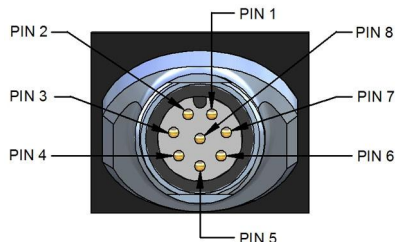
The output must be wired before switching on.

\*\*\* The detector calculates an optical (not a mathematical) averaging of the sampled surface, i.e. a kind of a surface integral.

### Electrical connection

#### LAS-T/ LAS-TL

| Pin | Cable color | Function   |
|-----|-------------|------------|
| 1   | white       | n. c.      |
| 2   | brown       | V +        |
| 3   | green       | 4...20 mA  |
| 4   | yellow      | Teach-in   |
| 5   | grey        | Alarm      |
| 6   | pink        | 0...10 V   |
| 7   | blue        | GND        |
| 8   | red         | Synchro-in |



### Alarm output

The alarm output is activated, as soon as the object is outside of the measurement range, or if the received signals are useless for a distance measurement (too low, or too high). In both cases the analog output signal is 4 mA / resp. 0 V.

The sensor has no internal hold function to bridge missing measurement signals. Therefore it may happen in critical applications (extremely bright surfaces) that the output shortly drops to 4 mA / resp. 0V, when the measurement signal gets lost. By checking the status of the alarm output before making a measurement, this false output signal can be identified.

## TECHNICAL DATA - LAS-TX SERIES

**LAS-TX:** Ultra-compact design  
Large working range  
Measurement range teachable  
Type of analog output selectable  
Phase comparison measurement



|                          |       | LAS-TX-4  | LAS-TX-13   |
|--------------------------|-------|---|-------------|
| Measuring range          | [mm]  | 200...4000  | 200...13000 |
| White 90%                | [mm]  | 200...4000  | 200...13000 |
| Grey 18%                 | [mm]  | 200...4000  | 200...9000  |
| Black 6%                 | [mm]  | 200...4000  | 200...4000  |
| Resolution *             | [mm]  | 1,3   | 5           |
| Linearity error *        | [mm]  | ±15   | ±15         |
| Repeatability **         | [mm]  | ±5  | ±15         |
| Min. teach-in range      | [mm]  | >100  |             |
| Sampling rate            | [ms]  | 10  |             |
| Power ON indicator       |       | LED green   |             |
| Alarm indicator          |       | LED red   |             |
| Alarm output             |       | Push-pull   |             |
| Output current           | [mA]  | <100  |             |
| Pollution indicator      |       | LED red, flashing                                     |             |
| Supply                   | [VDC] | 15...28   |             |
| Current consumption      | [mA]  | typ. 110 at 24 VDC, max. 250                          |             |
| Load resistance          | [Ω]   | 4...20 mA: <300, 0...10 V: >100 k                     |             |
| Light source             |       | Laser diode red, pulsed                               |             |
| Laser class              |       | 2   |             |
| Wavelength               | [nm]  | 660   |             |
| Safety features          |       | Protection against reverse polarity and short circuit |             |
| Housing material         |       | Al  |             |
| Protection class         |       | IP67  |             |
| Working temperature      | [°C]  | -25...50  |             |
| Connection               |       | M12 connector, 5-pole                                 |             |
| Beam diameter spot laser | [mm]  | 5...20  | 5...50      |
| Analog output            |       | 4...20 mA or 0...10 V ***                             | 4...20 mA   |

\* Values for linearity and resolution are given for a mat white reference surface.

\*\* at 40 kLux ambient light

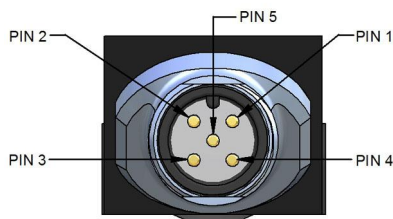
\*\*\* Type of analog output (4...20 mA or 0...10 V) has to be specified when ordering.

### Electrical connection

#### LAS-TX

connector, 5-pole, KSP cable

| Pin | Cable color | Function |
|-----|-------------|----------|
| 1   | brown       | V +      |
| 2   | white       | Signal   |
| 3   | blue        | GND      |
| 4   | black       | Alarm    |
| 5   | grey        | Teach-in |



### Alarm output

The alarm output is activated, as soon as the object is outside of the measurement range, or if the received signals are useless for a distance measurement (too low, or too high). In both cases the analog output signal is 4 mA / resp. 0 V.

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## TECHNICAL DATA - LAS-T5 SERIES

**LAS-T5:** Low-price instruments for conventional applications.  
Measuring range teachable.  
Type of analog output selectable.



|                          |       | LAS-T5-40   | LAS-T5-100   | LAS-T5-250  | LAS-T5-500   |
|--------------------------|-------|---|--------------|-------------|--------------|
| Measuring range          | [mm]  | 30...70   | 30...130     | 50...300    | 100...600    |
| Resolution *             | [mm]  | 0,004...0,02  | 0,005...0,06 | 0,01...0,33 | 0,015...0,67 |
| Linearity error *        | [mm]  | ±0,012...0,06   | ±0,015...0,2 | ±0,03...1   | ±0,05...2    |
| Minimum Teach-in-range   | [mm]  | >2  | >3           | >5          | >10          |
| Response time            | [ms]  | < 0,9   |              |             |              |
| Sensor element           |       | Photo diode array                                     |              |             |              |
| Power ON indicator       |       | LED green   |              |             |              |
| Alarm lamp               |       | LED red   |              |             |              |
| Pollution indicator      |       | LED red, flashing                                     |              |             |              |
| Supply                   | [VDC] | 12...28   |              |             |              |
| Max. current consumption | [mA]  | 100   |              |             |              |
| Load resistance          | [Ω]   | 4...20 mA: <300, 0...10 V: >100 k                     |              |             |              |
| Light source             |       | Laser diode red, pulsed                               |              |             |              |
| Laser class              |       | 2   |              |             |              |
| Wavelength               | [nm]  | 650   |              |             |              |
| Safety features          |       | Protection against reverse polarity and short circuit |              |             |              |
| Housing material         |       | Zn  |              |             |              |
| Protection class         |       | IP67  |              |             |              |
| Working temperature      | [°C]  | 0...50  |              |             |              |
| Connection               |       | M12 plug, 5-pole                                      |              |             |              |
| Beam diameter spot laser | [mm]  | 1...0,2   | 2...1        | 2,0         | 2,0          |
| Analogue output **       |       | 4...20 mA, 0...10 V                                   |              |             |              |

\* Values for linearity and resolution are given for a mat white reference surface.

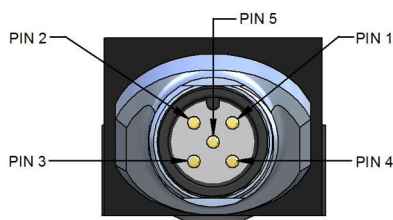
\*\* Type of analog output (4...20 mA or 0...10 V) has to be specified when ordering.

### Electrical connection

#### LAS-T5

connector, 5-pole, KSP cable

| Pin | Cable color | Function |
|-----|-------------|----------|
| 1   | brown       | V +      |
| 2   | white       | Signal   |
| 3   | blue        | GND      |
| 4   | black       | n. c.    |
| 5   | grey        | Teach-in |



### Alarm output

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## TECHNICAL DATA - LAS-Z, LAS-L SERIES

The production of this model will be discontinued soon.  
Please do not use this model for new constructions!  
The model is replaced by LAS-T5.



| Spot laser               |       | LAS-Z-20  | LAS-Z-100    | LAS-Z-120 | LAS-Z-200  | LAS-Z-400  | LAS-Z-800  |
|--------------------------|-------|---|--------------|-----------|------------|------------|------------|
| Line laser               |       | LAS-L-20  | LAS-L-100    | LAS-L-120 | LAS-L-200  | LAS-L-400  | LAS-L-800  |
| Measurement range        | [mm]  | 30...50   | 30...130     | 200...320 | 50...250   | 100...500  | 200...1000 |
| Resolution *             | [mm]  | 0,01  | 0,05...0,07  | 0,20      | 0,1...0,3  | 0,2...0,5  | 0,6...2,5  |
| Linearity error *        | [mm]  | ±0,03   | ±0,15...0,22 | ±0,60     | ±0,3...0,8 | ±0,8...2   | ±2,4...10  |
| Response time            | [ms]  | < 10  |              |           |            |            |            |
| Sensor element           |       | Photo diode array                                     |              |           |            |            |            |
| Alarm output             |       | PNP   |              |           |            |            |            |
| Max. switching current   | [mA]  | 100   |              |           |            |            |            |
| Power ON indicator       |       | LED green   |              |           |            |            |            |
| Alarm indicator          |       | LED red   |              |           |            |            |            |
| Pollution indicator      |       | LED red, flashing                                     |              |           |            |            |            |
| Supply                   | [VDC] | 12...28   |              |           |            |            |            |
| Max. current consumption | [mA]  | <100  |              |           |            |            |            |
| Light source             |       | Laser diode red, pulsed                               |              |           |            |            |            |
| Laser class              |       | 2   |              |           |            |            |            |
| Wavelength               | [nm]  | 650   |              |           |            |            |            |
| Safety features          |       | Protection against reverse polarity and short circuit |              |           |            |            |            |
| Housing material         |       | Zn  |              |           |            |            |            |
| Protection class         |       | IP67  |              |           |            |            |            |
| Working temperature      | [°C]  | 0...50  |              |           |            |            |            |
| Beam diameter spot laser | [mm]  | 1,0...0,4   | 2,0...1,0    | 2,0       | 2,0        | 2,0        | 2,0        |
| Beam type line laser *** |       |   |              |           |            |            |            |
| Beam height              | [mm]  | 2,0   | 3,0...5,0    | -         | 4,0...10,0 | 5,5...18,0 | 8,5...35,0 |
| Width                    | [mm]  | 1,0...0,4   | 2,0...1,0    | -         | 2,5        | 2,5        | 2,5        |
| Analog output **         |       | Dual output, 4...20 mA and 0... 10 V                  |              |           |            |            |            |
| RS485                    |       | upon request  |              |           |            |            |            |

\* Values for linearity and resolution are given for a mat white reference surface.

\*\* Automatic output selection: Depending on the connected impedance, current or voltage output becomes active. The output must be wired before switching on.

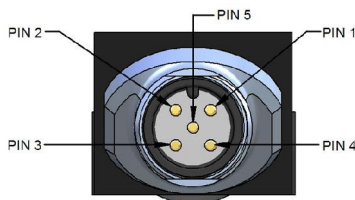
\*\*\* The detector calculates an optical (not a mathematical) averaging of the sampled surface, i.e. a kind of a surface integral.

## ELECTRICAL CONNECTION

### LAS-Z/ LAS-L

connector 5-pole, cabel K5P

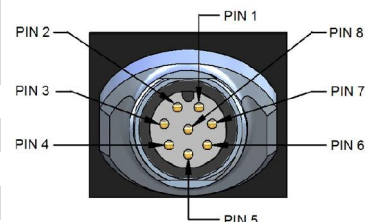
| Pin | Cable color | Funktion  |
|-----|-------------|-----------|
| 1   | brown       | V +       |
| 2   | white       | Alarm     |
| 3   | blue        | GND       |
| 4   | black       | 4...20 mA |
| 5   | grey        | 0...10 V  |



### LAS-Z/ LAS-L with RS485

connector, 8-pole, K8P cable

| Pin | Cable color | Function         |
|-----|-------------|------------------|
| 1   | white       | Rx/Tx-           |
| 2   | brown       | V +              |
| 3+8 | green+red   | n. c.            |
| 4   | yellow      | Switching output |
| 5   | grey        | Alarm            |
| 6   | pink        | Rx/Tx+           |
| 7   | blue        | GND              |

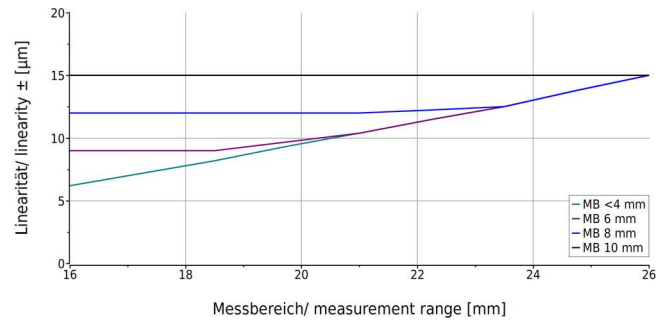
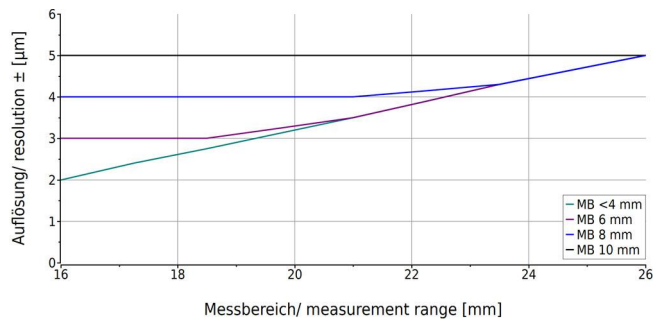


[www.imcortech.net](http://www.imcortech.net)

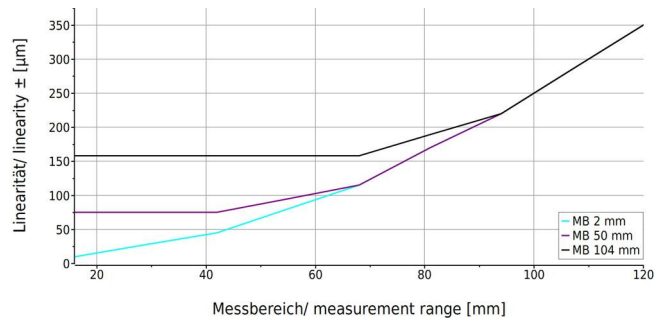
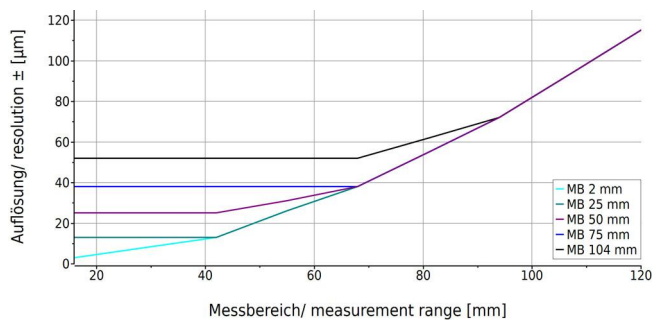
## LINEARITY / RESOLUTION - LAS-TM SERIES

When teaching the measurement range, it is recommended always to select the smallest possible range, because this way the resolution is increased and the linearity error decreased. Also keep in mind that the distance between sensor and target should be as small as possible.

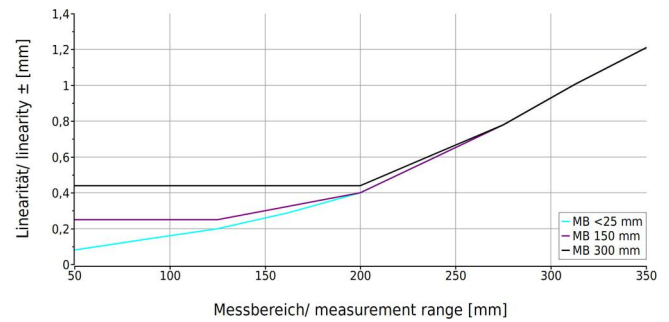
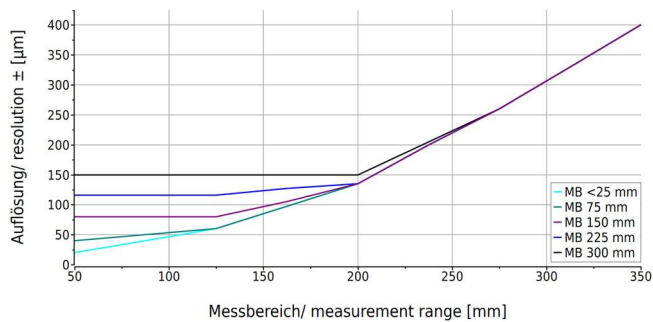
LAS-TM-10



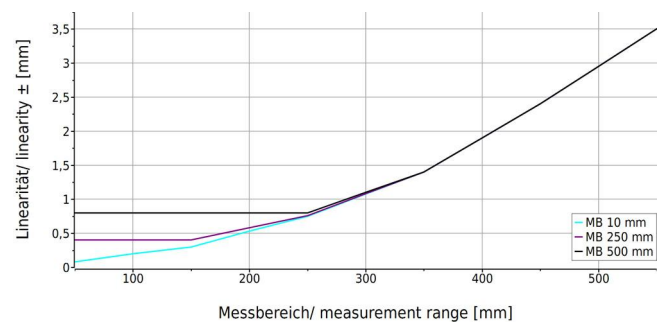
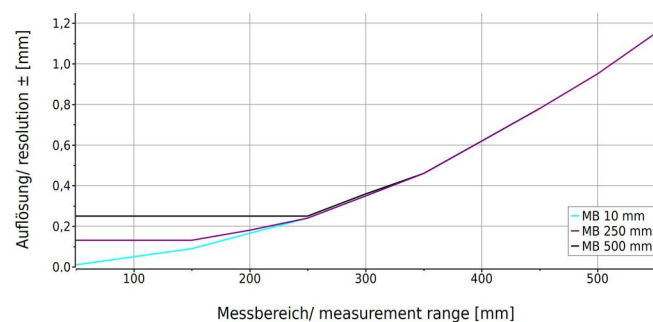
LAS-TM-104



LAS-TM-300



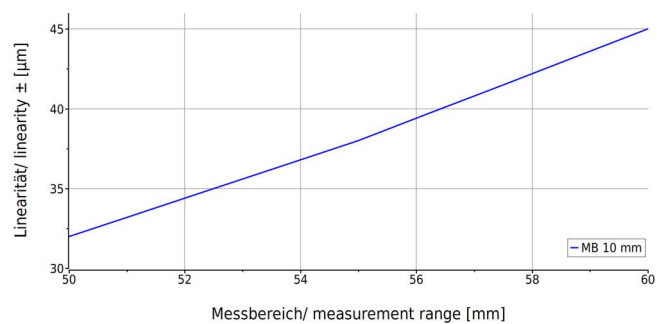
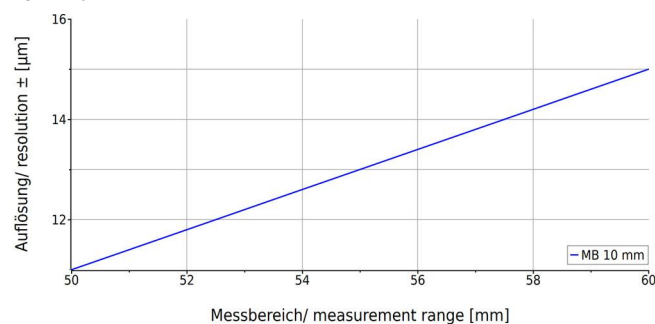
LAS-TM-500



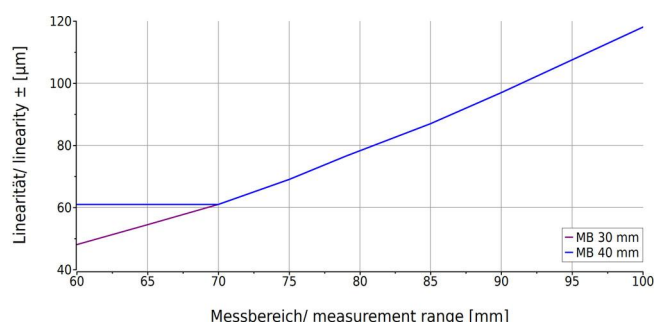
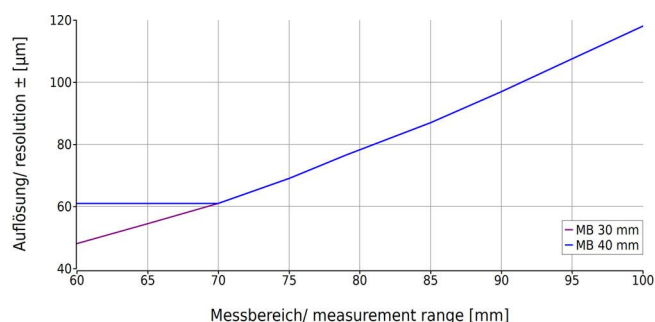
## LINEARITY / RESOLUTION - LAS-TB SERIES

When teaching the measurement range, it is recommended always to select the smallest possible range, because this way the resolution is increased and the linearity error decreased. Also keep in mind that the distance between sensor and target should be as small as possible.

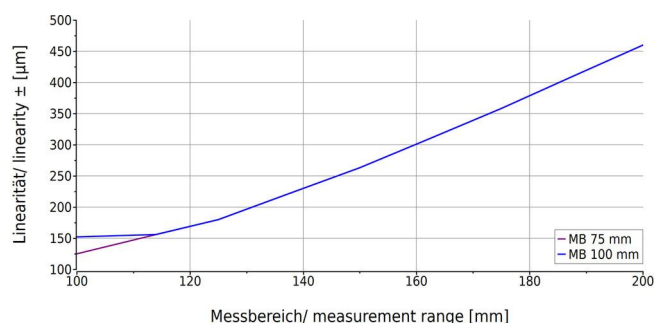
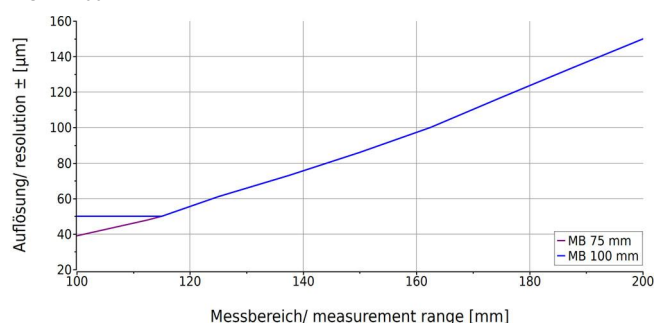
LAS-TB-10



LAS-TB-40



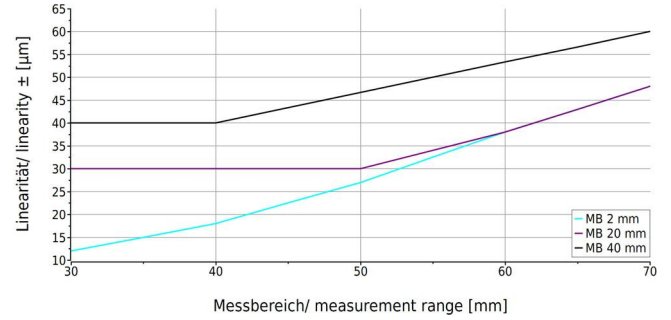
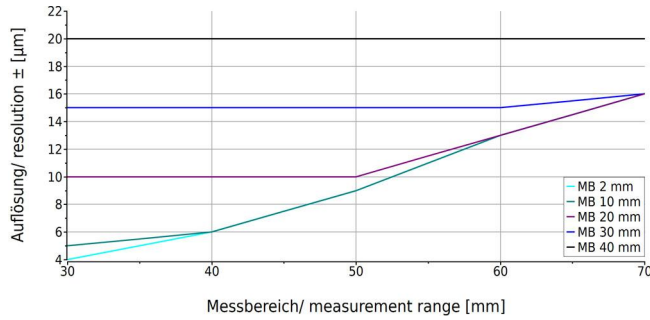
LAS-TB-100



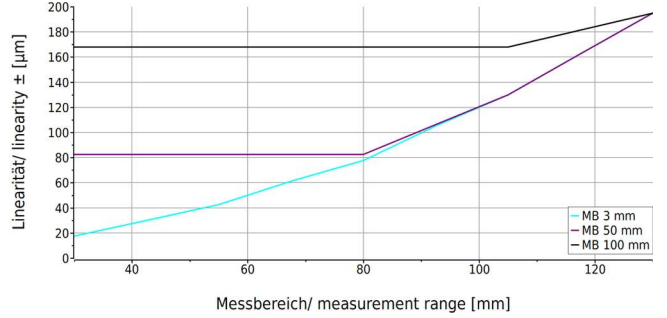
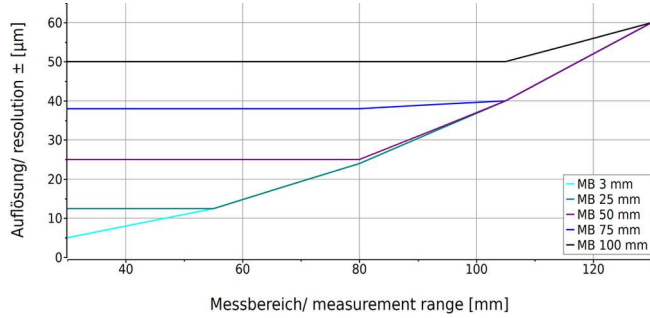
## LINEARITY / RESOLUTION - LAS-T, LAS-T5 SERIES

When teaching the measurement range, it is recommended always to select the smallest possible range, because this way the resolution is increased and the linearity error decreased. Also keep in mind that the distance between sensor and target should be as small as possible.

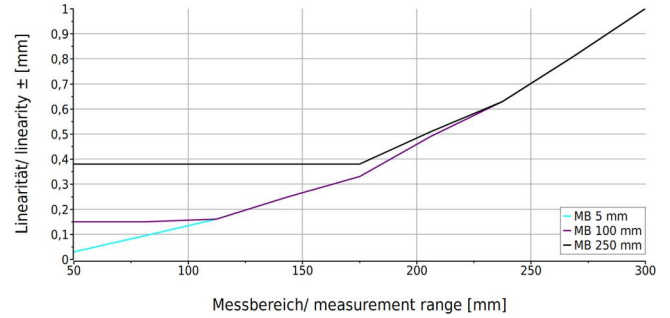
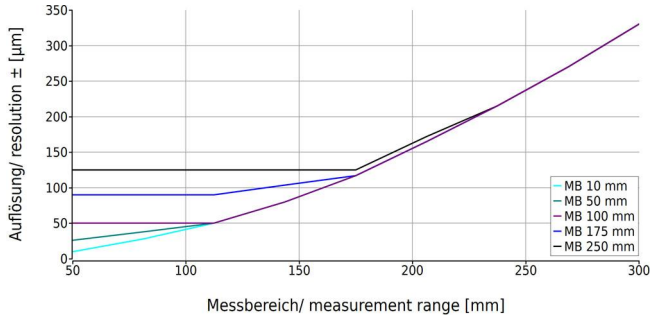
LAS-T-40, LAS-T5-40



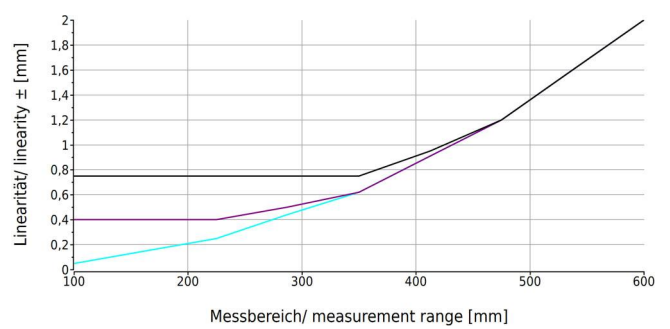
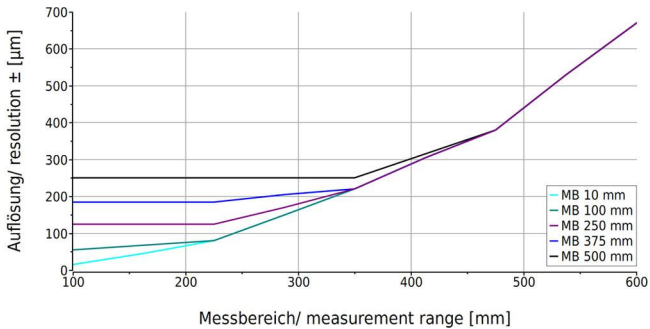
LAS-T-100, LAS-T5-100



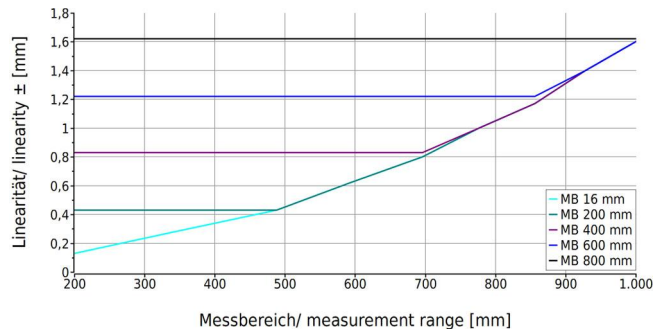
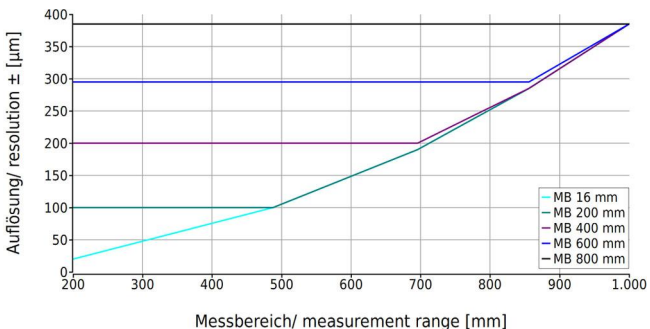
LAS-T-250, LAS-T5-250



LAS-T-500, LAS-T5-500



LAS-T-800



## ORDER CODE LAS-TM / LAS-TML / LAS-TB / LAS-TX

LAS-T

|                                    |    |
|------------------------------------|----|
| Standard version, spot laser       | M  |
| Standard version, line laser       | ML |
| Line laser, high sensitivity       | B  |
| Large working range (4 resp. 13 m) | X  |

| Measurement range              |     |
|--------------------------------|-----|
| 16...26 mm (M), 50...60 mm (B) | 10  |
| 60...100 mm (B)                | 40  |
| 100...200 mm (B)               | 100 |
| 16...120 mm (M)                | 104 |
| 50...350 mm (M), (ML)          | 300 |
| 50...550 mm (M), (ML)          | 500 |
| 200...4000 mm (X)              | 4   |
| 200...13000 mm (X)             | 13  |

| 420A<br>10V | Type of output  |
|-------------|---|
|             | Analog output 4...20 mA<br>Analog output 0...10 V (not for TX-13) |

## ORDER CODE LAS-T / LAS-TL

LAS-T

|            |   |
|------------|---|
| Spot laser | - |
| Line laser | L |

| Measurement range |     |
|-------------------|-----|
| 30...70 mm        | 40  |
| 30...130 mm       | 100 |
| 50...300 mm       | 250 |
| 100...600 mm      | 500 |
| 200...1000 mm     | 800 |

| A | Type of output                       |
|---|--------------------------------------|
|   | Analog output 4...20 mA and 0...10 V |

## ORDER CODE LAS-T5

LAS-T5

| Measurement range |     |
|-------------------|-----|
| 30...70 mm        | 40  |
| 30...130 mm       | 100 |
| 50...300 mm       | 250 |
| 100...600 mm      | 500 |

| 420A<br>10V | Type of output                                    |
|-------------|---|
|             | Analog output 4...20 mA<br>Analog output 0...10 V |

## ORDER CODE LAS-Z / LAS-L (WILL BE DISCONTINUED SOON)

LAS

| Version    |   |
|------------|---|
| Spot laser | Z |
| Line laser | L |

| Measurement range                 |     |
|-----------------------------------|-----|
| 30...50 mm                        | 20  |
| 30...130 mm                       | 100 |
| 200...320 mm (only output type A) | 120 |
| 50...250 mm                       | 200 |
| 100...500 mm                      | 400 |
| 200...1000 mm                     | 800 |

| A<br>RS485 | Type of output  |
|------------|---|
|            | Analog output 4...20 mA and 0...10 V<br>RS485 interface |

## ACCESSORIES

### Connection cable

**Cable, 4-pole, shielded, with mating M8 connector  
for LAS-TM / LAS-TML / LAS-TB series**

|            |                         |
|------------|-------------------------|
| K4P2M-S-M8 | 2 m, connector straight |
| K4P5M-S-M8 | 5 m, connector straight |

**Cable, 5-pole, shielded, with mating M12 connector  
for LAS-Z/L-A / LAS-T5 / LAS-TX series**

|               |                          |
|---------------|--------------------------|
| K5P2M-S-M12   | 2 m, connector straight  |
| K5P5M-S-M12   | 5 m, connector straight  |
| K5P10M-S-M12  | 10 m, connector straight |
| K5P2M-SW-M12  | 2 m, connector angular   |
| K5P5M-SW-M12  | 5 m, connector angular   |
| K5P10M-SW-M12 | 10 m, connector angular  |

### Connection cable

**Cable, 8-pole, shielded, with mating M12 connector  
for LAS-T and LAS-Z/L-RS485 series**

|               |                          |
|---------------|--------------------------|
| K8P2M-S-M12   | 2 m, connector straight  |
| K8P5M-S-M12   | 5 m, connector straight  |
| K8P10M-S-M12  | 10 m, connector straight |
| K8P2M-SW-M12  | 2 m, connector angular   |
| K8P5M-SW-M12  | 5 m, connector angular   |
| K8P10M-SW-M12 | 10 m, connector angular  |

### General safety instructions

Attention radiation laser.

Do not stare into beam.

Do not point the laser beam towards someone's eye.

It is recommended to stop the beam by a matte object or matte metal shield.

Laser regulations require the power to the sensor be switched off when turning off the whole system this sensor is part off.