

LASER

Analog Laser Displacement Transducer



LAS Series

Key-Features:

- Available measurement ranges: 10 to 13000 mm
- Resolution up to 2 μm , 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

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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	LAS-TB-10	LAS-TB-40	LAS-TB-100
Line laser				LAS-TML-300	LAS-TML-500			
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.

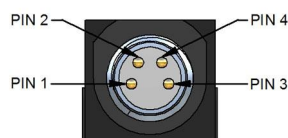
** Type of analog output (4...20 mA or 0...10 V) has to be specified when ordering.

*** 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.

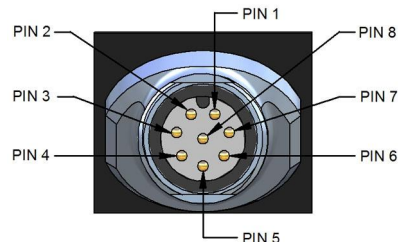
The output must be wired before switching on.

*** 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

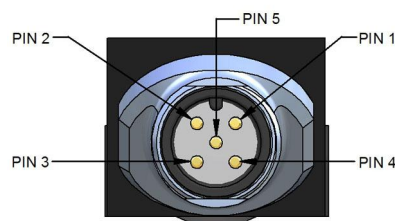
*** Type of analog output (4...20 mA or 0...10 V) has to be specified when ordering.

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.

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-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.

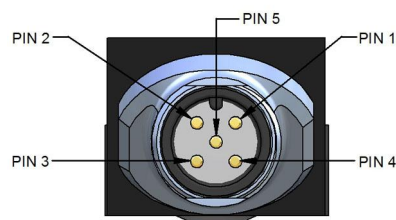
** Type of analog output (4...20 mA or 0...10 V) has to be specified when ordering.

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

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-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.

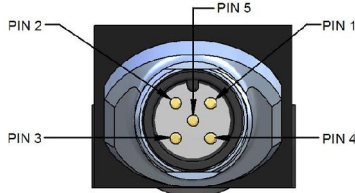
*** The detector calculates an optical (not a mathematical) averaging of the sampled surface, i.e. a kind of a surface integral.

ELECTRICAL CONNECTION

LAS-Z/ LAS-L

connector 5-pole, cabel K5P

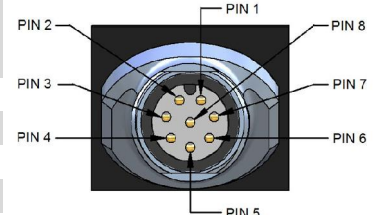
Pin	Cable color	Funktion
1	brown	V +
2	white	Alarm
3	blue	GND
4	black	4...20 mA
5	grey	0...10 V



LAS-Z/ LAS-L with RS485

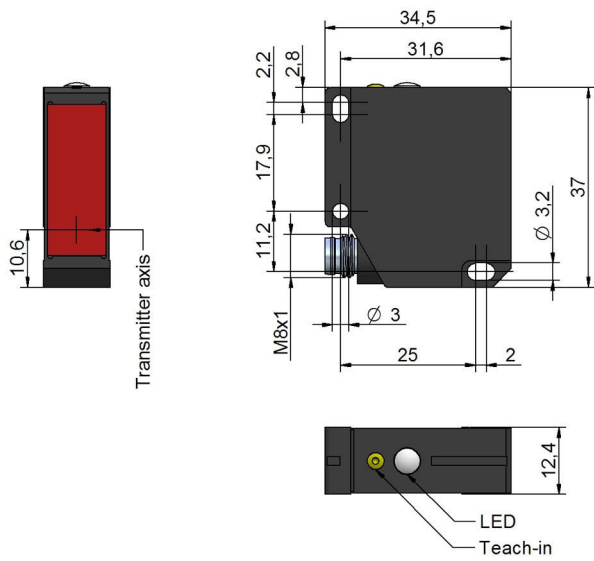
connector, 8-pole, K8P cable

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

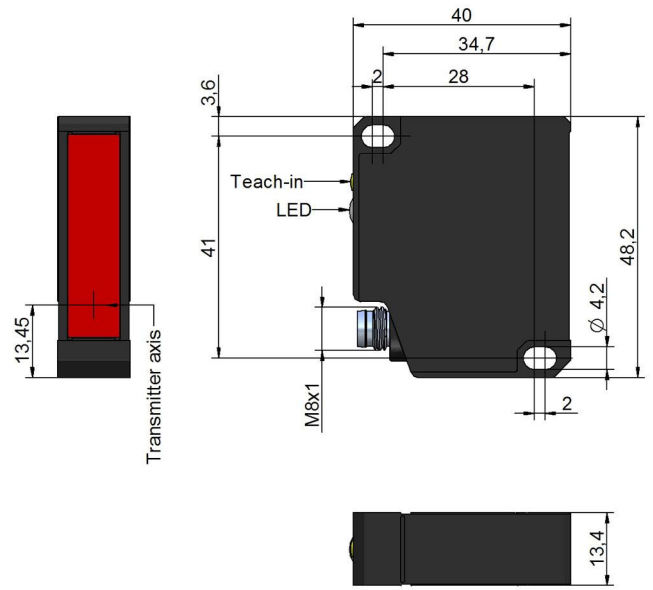


TECHNICAL DRAWINGS

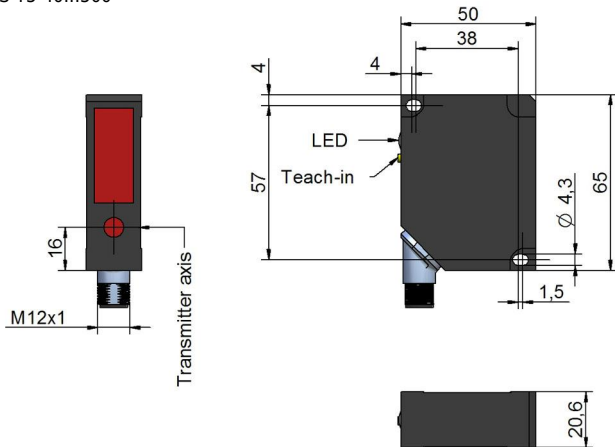
LAS-TM-10 / LAS-TM-104



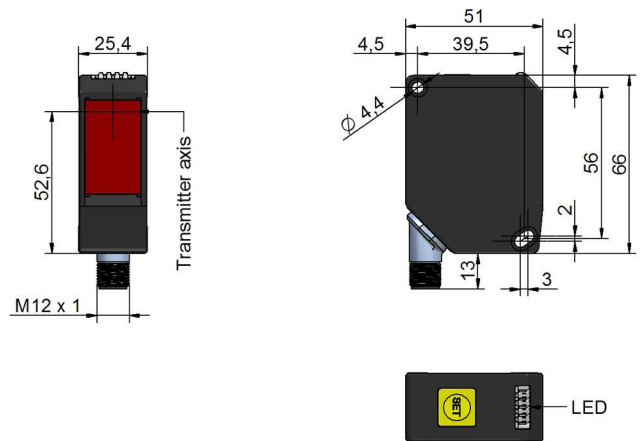
LAS-TM-300 / LAS-TM-500 / LAS-TB-10 / LAS-TB-40 / LAS-TB-100



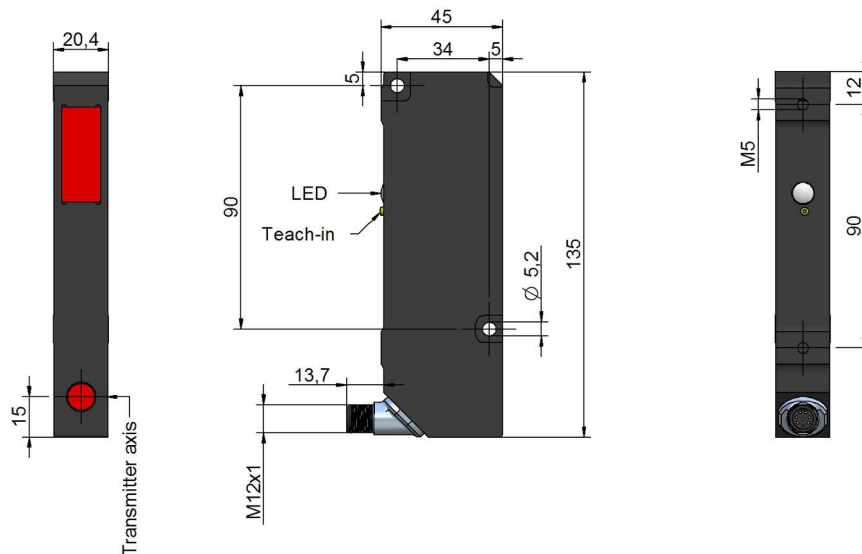
LAS-Z-20...800 / LAS-L-20...800 / LAS-T-40...500 / LAS-TL-40...500 / LAS-T5-40...500



LAS-TX-4 / LAS-TX-13

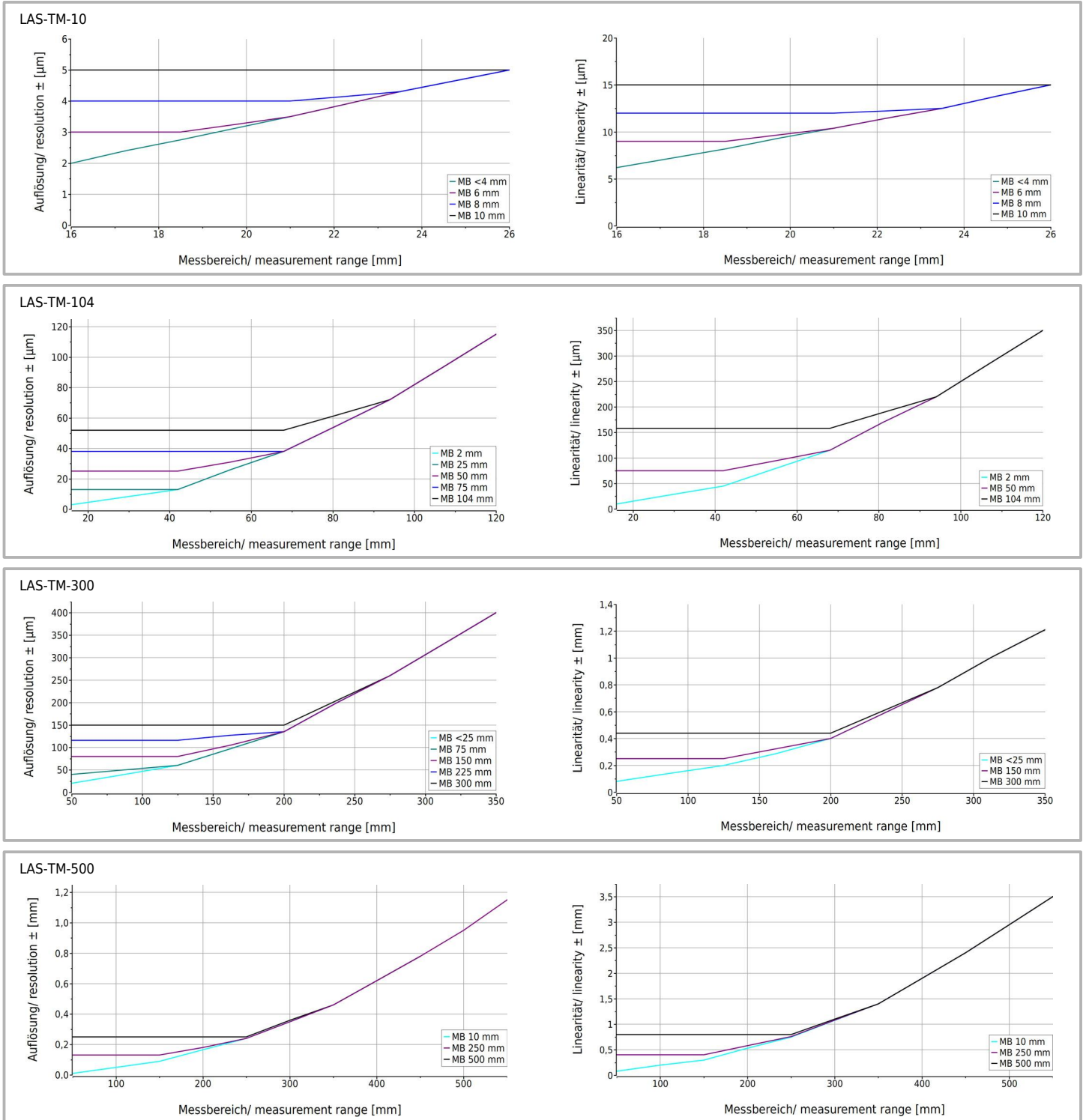


LAS-T-800 / LAS-TL-800



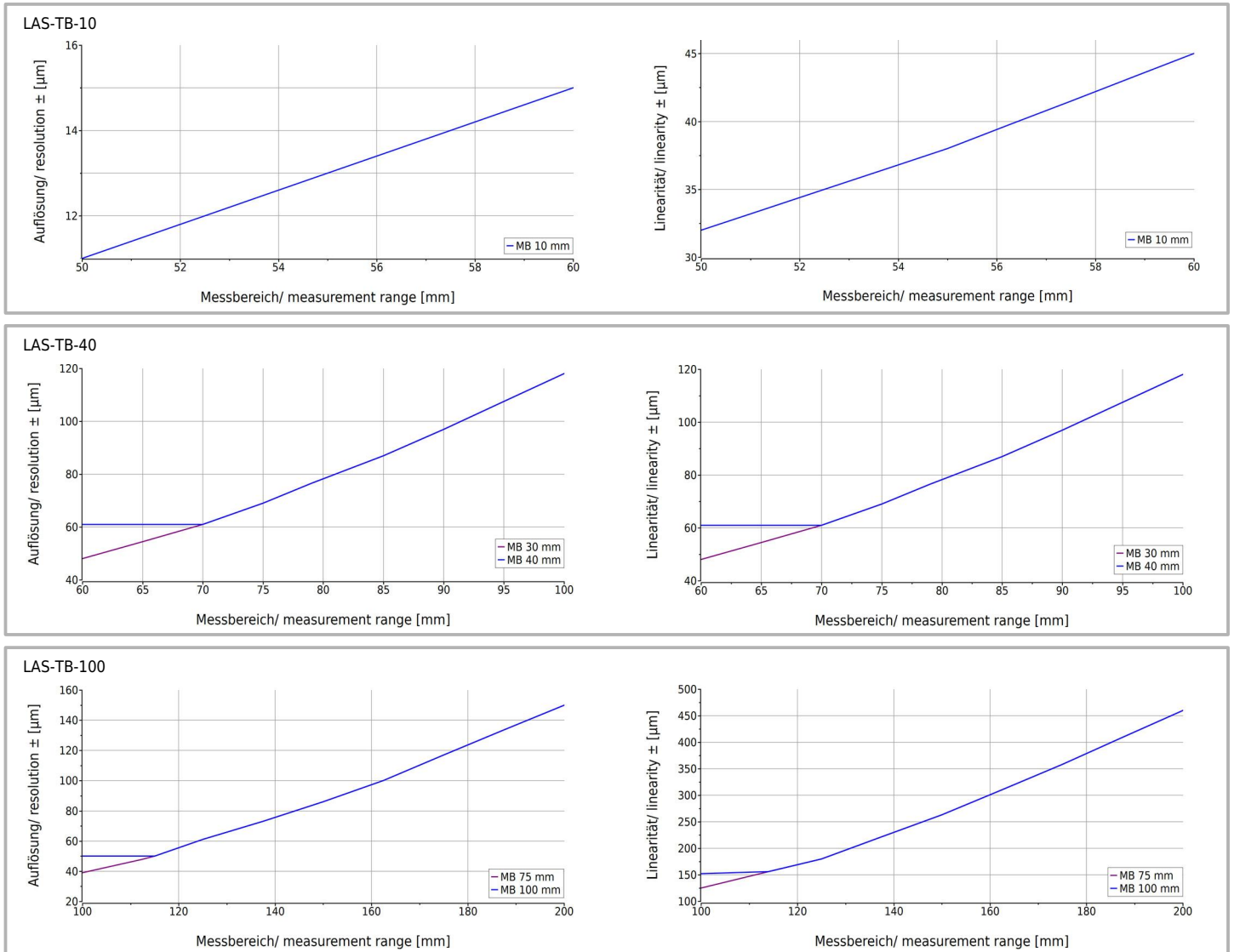
LINEARITY / RESOLUTION - LAS-TM SERIES

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.



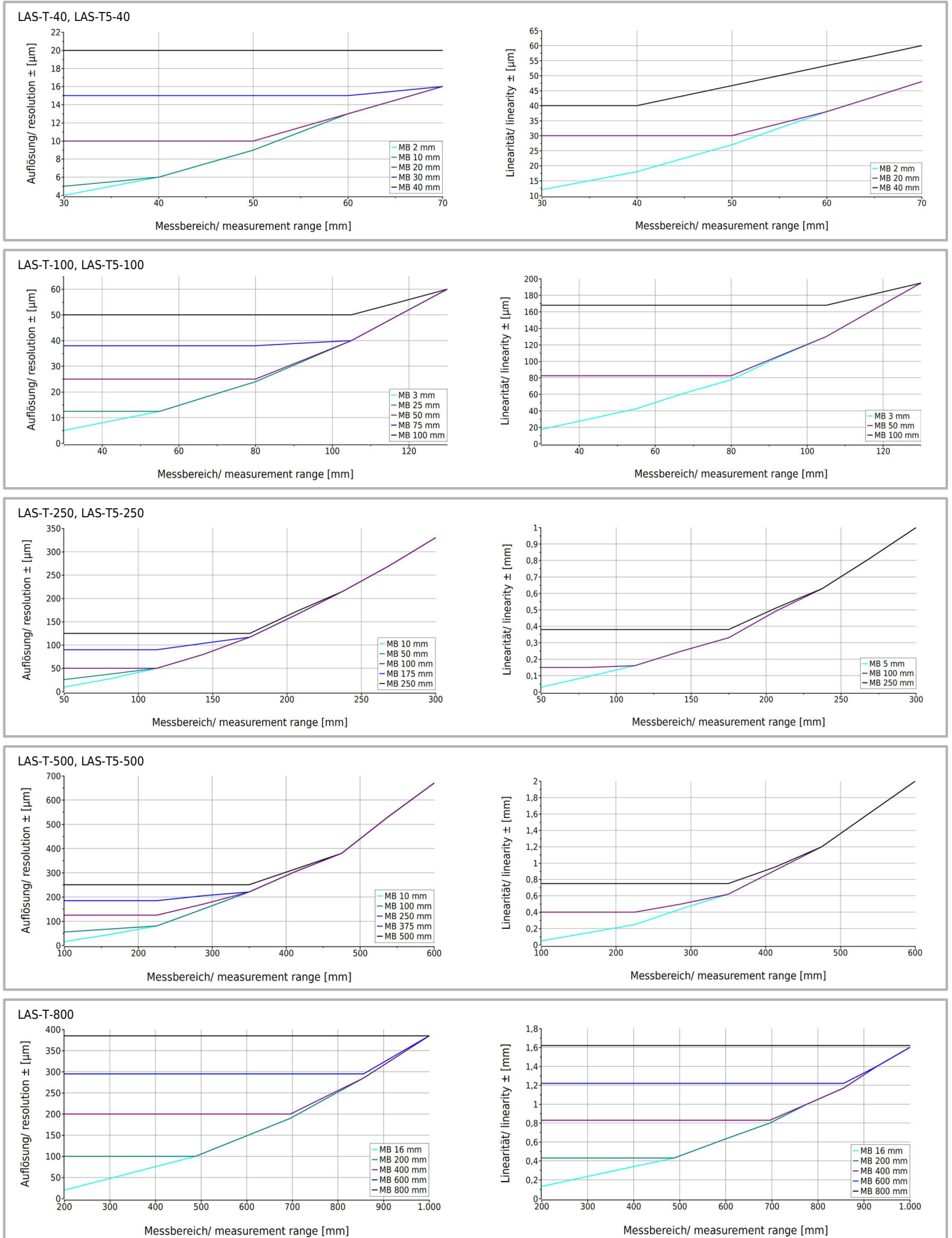
LINEARITY / RESOLUTION - LAS-TB SERIES

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.



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.



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

Standard version, spot laser	M		420A 10V	Type of output Analog output 4...20 mA Analog output 0...10 V (not for TX-13)
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			

ORDER CODE LAS-T / LAS-TL

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

ORDER CODE LAS-T5

Measurement range			420A 10V	Type of output Analog output 4...20 mA Analog output 0...10 V
30...70 mm	40			
30...130 mm	100			
50...300 mm	250			
100...600 mm	500			

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

Version			A RS485	Type of output Analog output 4...20 mA and 0...10 V RS485 interface
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			

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.