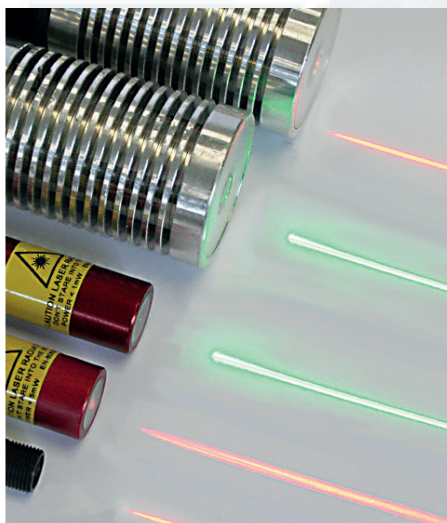




CATALOGUE LASER POINTERS



www.smprox.it



Production :  Made in Italy



Ed. 03/2021 - All specifications are subject to change without notice

Edition March 2021

With the publication of this catalogue all former catalogues are invalid

CATALOGUE LASER POINTERS

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INTRODUCTION

Since several years we produce laser pointers for the industry and thanks to this experience, we can provide quality products and suitable for various application needs.

We produce laser pointers with red or green light which generate points, crosses or lines and which allow you to perform alignments and controls, in particular in those applications in the wood, marble or textile fields.

We produce laser pointers with the following dimensions:

- Ø 10,5x22mm
- Ø 12x65mm, 12x70mm e 12x75mm
- Ø 12x80mm
- Ø 20x130mm, 20x140mm
- Ø 45x200mm
- on request

Our laser pointers can be supplied with three different types of lens:

1. **Glass Rod Lens:** lenses that create "Gaussian" line, it is a line thicker in the middle and thinner at the sides with a good quality / price ratio.
2. **Plastics Diffractive Lens:** economic lenses which create different sizes of crosses and lines (the line is not Gaussian).
3. **Glass Powell Lens:** high quality lenses which can create lines of constant thickness, particularly useful in precision alignments, above all with green light laser pointers.



The Sm.Prox laser pointers are increasingly protected from electrostatic discharges and noises, as we mount specific protections on the laser diode.

The picture below shows a test in our laboratory where a SM311004 - LSV20-R15-L laser pointer is subjected to discharges of 16KV in the air, according to the norm EN61000-4-2.

(Test performed using a connector SM315001 + hose connected to the ground).

However, in those applications where the pointer is subject to constant electrostatic discharges generated by the machine

or by the application itself, the end user has the responsibility to take measures in order to eliminate or at least reduce them (see "Safety Precautions" on page 34).

IMPORTANT NOTE

The SM.PROX laser pointers must be used exclusively for INDUSTRIAL applications and therefore they CANNOT BE USED AS TOYS OR FOR NON-INDUSTRIAL APPLICATIONS.

BEFORE THE INSTALLATION READ THE OPERATING MANUAL ABOUT THE LASER SAFETY CLASS TO WHICH THE POINTER BELONGS CAREFULLY.

The Company Sm.Prox Srl declines all responsibility in case of damage to the eyes and retina due to failures in applying all precautions indicated in the most recent legislation on Laser Safety EN60825-1 2015: 12.

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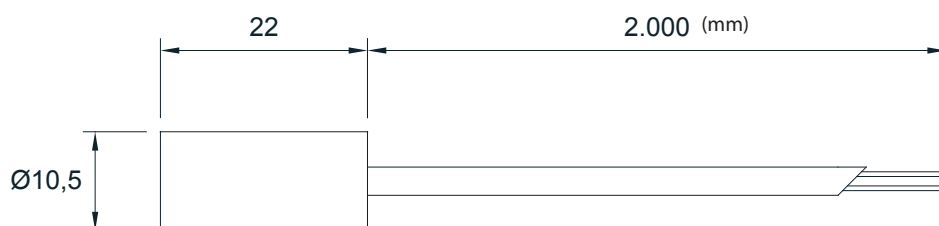
GREEN LIGHT LASER POINTERS

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Diameter 45 - 12...48Vdc/12...24Vac		
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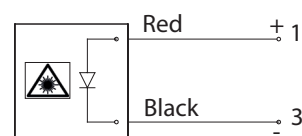
LASER POINTER LSE10 SERIE - RED LIGHT - Ø10.5 - 1mW



Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 1 mW.
Suitable for uses at max 1 m distance.



Cable connection



The brightness varies depending on the ambient light and on the colour of the object on which the laser beam is projected.

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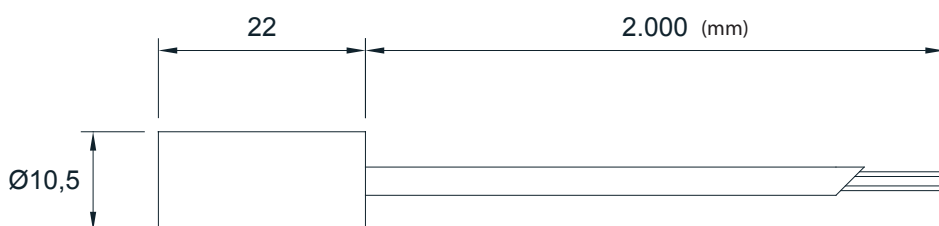
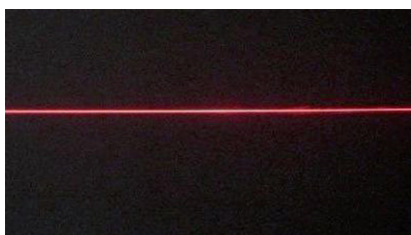
Type	LSE10-635-1-T10-P-AAN
Art. no.	SM319007
Mounted lens	point
Point diameter at 1 m distance	~ 1,0 mm
Power supply	5,0 Vdc
Power	< 1 mW
Wavelength	635 ± 5 nm
Beam divergence	0,5 mrad
Life time	≥ 10.000 h
Permitted temperature	-10°...+50°C
Current consumption	< 40 mA
Focus adjustment	yes
Housing material	black anodized aluminum
Cable connection	2m, 2 wires
Safety protection class	2
Degree of protection	IP40
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING	
Laser according to the standard EN 60825-1: 2015-12	

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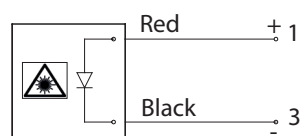
LASER POINTER LSE10 SERIES - RED LIGHT - Ø10.5 - 3.5mW



Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 3.5 mW.
Suitable for uses at max 1 m distance.



Cable connection



The brightness varies depending on the ambient light and on the colour of the object on which the laser beam is projected.

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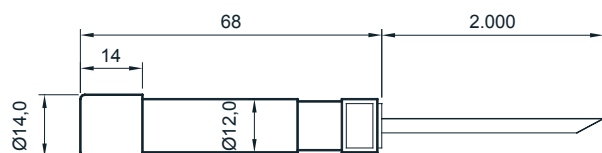
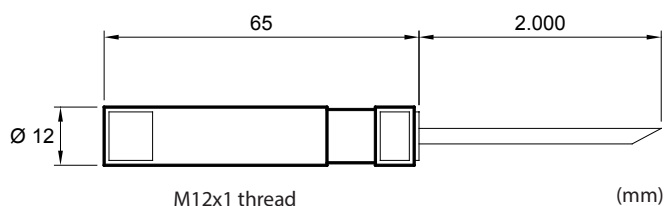
Type	LSE10-635-3-T10-115-AAN
Art. no.	SM319010
Mounted lens	line with plastic lens 115°
Line thickness at 1m distance	~ 1,5 mm
Power supply	5,0 Vdc
Power	< 3,5 mW
Wavelength	635 ± 5 nm
Life time	≥ 10.000 h
Permitted temperature	-10°...+50°C
Current consumption	< 45 mA
Focus adjustment	no
Housing material	black anodized aluminum
Cable connection	2m, 2 wires
Safety protection class	2
Degree of protection	IP40
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING	
Laser according to the standard EN 60825-1: 2015-12	

LASER POINTER LSE12 SERIE - RED LIGHT - $\varnothing 12$ - 1mW



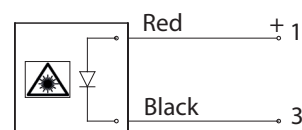
Laser pointer made of a red laser diode, available with 650 nm wavelength and a power of 1 mW.

Suitable for uses at max 1 m distance



Dimension art. SM308010 (**) (mm)

Cable connection



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Type	LSE12-650-1-T10-P	LSE12-650-1-T10-X	LSE12-650-1-T10-60
Art. no.	SM308004	SM308010 (**)	SM309001
Mounted lens	point	cross Plastics Diffractive Lens	line with lens 60° Glass Rod Lens
Point diameter at 1 m distance	~ Ø 1,0 mm	-	-
Cross dimension at 1 m distance	-	150 x 150 mm	-
Line length at 1 m distance	-	-	1.100 mm
Power supply	5,0 Vdc		
Power	1 mW		
Wavelength	650 nm		
Beam divergence	0,5 mrad	-	-
Minimum line thickness	-	-	~ 1,5 mm
Life time	≥ 10.000 h		
Permitted temperature	-10°...+50°C		
Focus adjustment	yes, by screwdriver	yes	no
Tolerance of the lens for line	± 15%		
Current consumption	~ 20 mA typical		
Automatic control of the output power	yes		
Reverse polarity and overvoltage protections	yes		
Housing material	plastic		
Cable connection	2000 mm		
Degree of protection	IP40	IP67	IP67
Safety protection class	2	2	2
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.			
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING			
Laser according to the standard EN 60825-1: 2015-12			

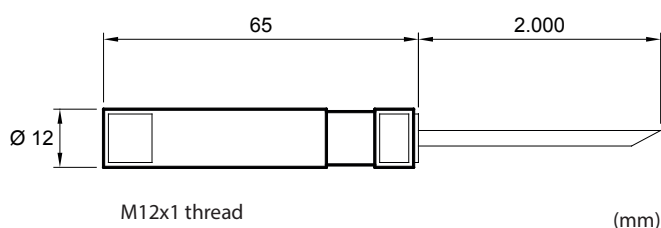
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LASER POINTER LS12 SERIES - RED LIGHT - Ø12 - 3mW

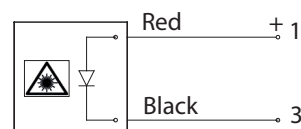


Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 3 mW.

The light intensity can be adjusted and therefore it is very useful in those applications with clear objects.



Cable connection



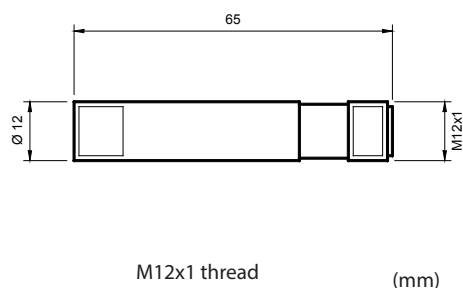
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Type	LS12-635-3-T20-P-V
Art. no.	SM305001
Mounted lens	point
Point diameter at 1 m distance	~ Ø 2,5 mm
Power supply	5,0 Vdc
Power	3 mW
Wavelength	635 nm
Life time	≥ 20.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	yes, by screwdriver
Current consumption	~ 40 mA
Automatic control of the output power	yes
Reverse polarity and overvoltage protections	yes
Housing material	plastic
Cable connection	2m, 2 wires
Degree of protection	IP40
Safety protection class	3R
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.	
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING	
Laser according to the standard EN 60825-1: 2015-12	

LASER POINTER LS12 SERIES - RED LIGHT - $\varnothing 12$ - 3mW



Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 3 mW.



Connection M12x1 connector



1 = Brown = Positive + Vcc.
2 = Free
3 = Blue = Negative GND
4 = Free

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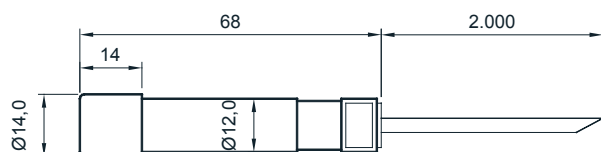
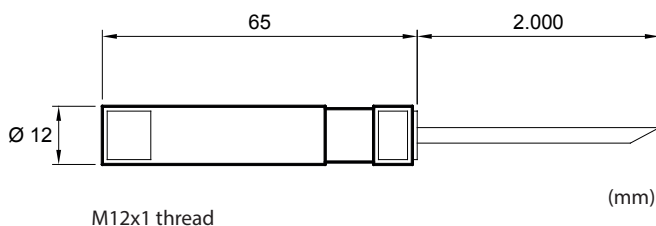
Type	LS12-635-3-T20-P-Y1	LS12-635-3-T20-X-Y1	LS12-635-3-T20-60-Y1
Art. no.	SM314005	SM305009	SM307005
Mounted lens	point	cross Plastics Diffractive Lens	line with lens 60° Glass Rod Lens
Point diameter at 1 m distance	~ $\varnothing 2,5$ mm	-	-
Cross dimension at 1 m distance	-	150 x 150mm	-
Line length at 1 m distance	-	-	1.100 mm
Power supply	5,0 Vdc		
Power	3 mW		
Wavelength	635 nm		
Beam divergence	0,5 mrad	-	-
Minimum line thickness	-	-	~ 1,5 mm
Life time	≥ 20.000 h		
Permitted temperature	$-10^{\circ} \dots +50^{\circ}C$		
Focus adjustment	yes, by screwdriver	no	no
Tolerance of the lens for line	$\pm 15\%$		
Current consumption	~ 40 mA typical		
Automatic control of the output power	yes		
Reverse polarity and overvoltage protections	yes		
Housing material	plastic		
Connection	plastic connector M12x1 - 4p		
Degree of protection	IP40	IP67	IP67
Safety protection class	3R	2M	2
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15. READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING			
Laser according to the standard EN 60825-1: 2015-12			

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LASER POINTER LS12 SERIES - RED LIGHT - Ø12 - 3mW

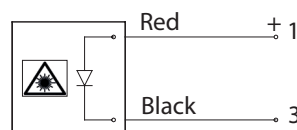


Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 3 mW.



Dimension art. SM314006 (**) (mm)

Cable connection



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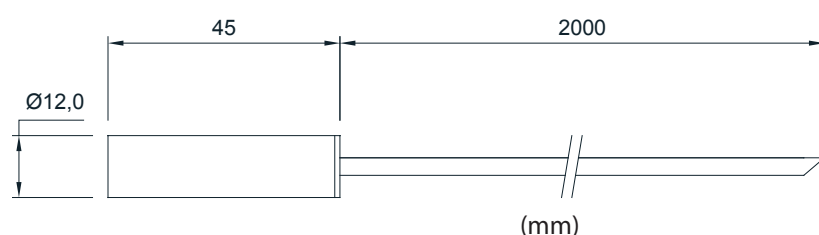
Type	LS12-635-3-T20-P	LS12-635-3-T20-X	LS12-635-3-T20-60
Art. no.	SM305010	SM314006 (**)	SM306005
Mounted lens	point	cross Plastics Diffractive Lens	line with lens 60° Glass Rod Lens
Point diameter at 1 m distance	~ Ø 2,5 mm	-	-
Cross dimension at 1 m distance	-	150 x 150mm	-
Line length at 1 m distance	-	-	1.100 mm
Power supply	5,0 Vdc		
Power	3 mW		
Wavelength	635 nm		
Beam divergence	0,5 mrad	-	-
Minimum line thickness	-	-	~ 1,5 mm
Life time	≥ 20.000 h		
Permitted temperature	-10°...+50°C		
Focus adjustment	yes, by screwdriver	yes	no
Tolerance of the lens for line	± 15%		
Current consumption	~ 40 mA typical		
Automatic control of the output power	yes		
Reverse polarity and overvoltage protections	yes		
Housing material	plastic		
Cable connection	2000 mm		
Degree of protection	IP40	IP67	IP67
Safety protection class	3R	2M	2
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.			
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING			
Laser according to the standard EN 60825-1: 2015-12			

LASER POINTER LSM12 SERIES - RED LIGHT - Ø12 - <0,39mW

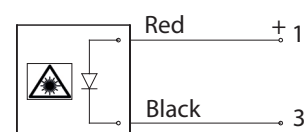


Laser pointer in Class 1 made of a high quality red laser diode, available with 635nm wavelength and a power of only 0,39mW.

F400 = focused at 400mm distance



Cable connection



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Type	LSM12-635-0.4-T10-60-L45-F400
Art. no.	SM320001
Mounted lens	line with 60° lens Plastics Diffractive Lens
Cross dimension at 1 m distance	-
Point diameter at 1m	-
Line length at 400mm distance	~ 400mm
Power supply	5,0 Vdc
Power	< 0.39 mW
Wavelength	635 nm
Life time	≥ 10.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	no
Tolerance of the lens for line	± 15%
Minimum line thickness	~ 1 mm
Current consumption	< 20mA
Automatic control of the output power	yes
Reverse polarity and overvoltage protections	yes
Housing material	black anodized aluminum
Connection	2m cable
Degree of protection	IP54
Safety protection class	1
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15. READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING	
Laser according to the standard EN 60825-1: 2015-12	

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LASER POINTER LSM12 SERIES - RED LIGHT - $\varnothing 12$ - 3mW



Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 3 mW.

Aluminum housing.



Connection M12x1 connector



1 = Brown = Positive + Vcc.
2 = Free
3 = Blue = Negative GND
4 = Free

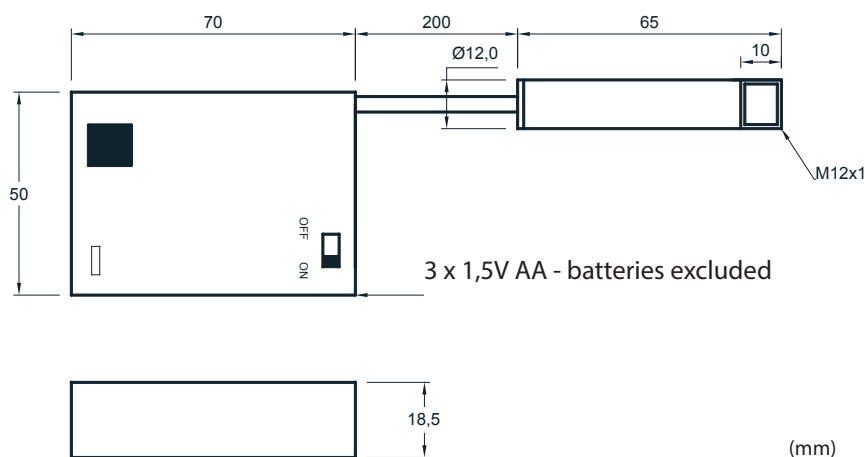
Accessories page 39

Type	LSM12-635-3-T20-X-Y1
Art. no.	SM315004
Mounted lens	cross Plastics Diffractive Lens
Cross dimension at 1 m distance	150 x 150 mm
Power supply	5,0 Vdc
Power	3 mW
Wavelength	635 nm
Life time	≥ 20.000 h
Permitted temperature	$-10^{\circ} \dots +50^{\circ}\text{C}$
Focus adjustment	no
Tolerance of the lens for line	$\pm 15\%$
Minimum line thickness	$\sim 1,5$ mm
Current consumption	~ 40 mA typical
Automatic control of the output power	yes
Reverse polarity and overvoltage protections	yes
Housing material	aluminum
Connection	metal connector M12x1 - 4p
Degree of protection	IP67
Safety protection class	2M
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.	
Laser according to the standard EN 60825-1: 2015-12	

LASER POINTER LS12 SERIES - RED LIGHT - $\varnothing 12$ - 3mW



Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 3 mW.



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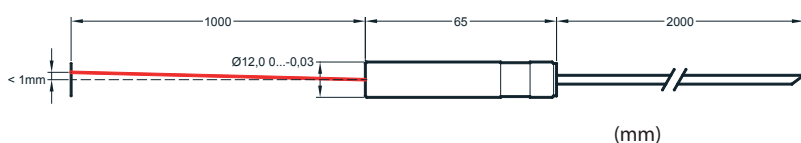
Type	LS12-635-3-T20-60-0.2M-BATT-F600	LS12-635-3-T20-60-0.2M-BATT-F150
Art. no.	SM318002	SM319001
Mounted lens	line	
Line length	~ 900 mm	~ 200 mm
Line thickness	~ 2,0 mm	~ 1,0 mm
Power supply	4.5 Vdc	
Power	3 mW	
Wavelength	635 nm	
Life time laser diode / battery	≥ 20.000 h / 40 h	
Permitted temperature	-10°...+50°C	
Focus adjustment	no - focused at 600mm	no - focused at 150mm
Current consumption	~ 40 mA	
Automatic control of the output power	yes	
Reverse polarity and overvoltage protections	yes	
Housing material	plastic	
Cable connection	200 mm	
Degree of protection pointer / battery holder	IP67 / IP40	
Safety protection class	2	
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.		
Laser according to the standard EN 60825-1: 2015-12		

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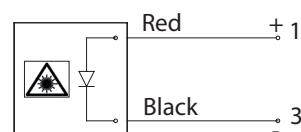
LASER POINTER LSV12 SERIES - RED LIGHT - $\varnothing 12$ - 1mW



Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 1 mW, which generates a point with a maximum error of <1mm at 1m distance, focused at 10cm.



Cable connection



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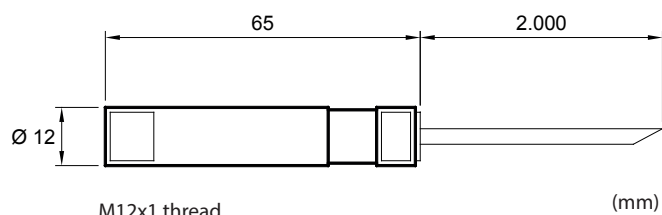
Type	LSV12-635-1-T10-PC-F100
Art. no.	SM321001
Mounted lens	point
Point diameter at 1 m distance	-
Cross dimension at 1 m distance	-
Line length at 1 m distance	-
Power supply	5...24 Vdc
Power	1 mW
Wavelength	635 nm
Beam divergence	0.8 mrad
Life time	≥ 10.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	-
Tolerance of the lens for line	-
Minimum line thickness	-
Current consumption	~ 10 mA typical
Automatic control of the output power	yes
Reverse polarity and overvoltage protections	yes
Housing material	black anodized aluminum
Cable connection	2 x AWG28 - 2000 mm
Degree of protection	IP40
Safety protection class	2
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15	
Laser according to the standard EN 60825-1: 2015-12	

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LASER POINTER LSV12 SERIES - RED LIGHT - $\varnothing 12$ - 3mW

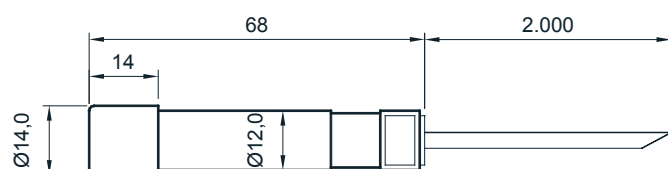


Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 3 mW



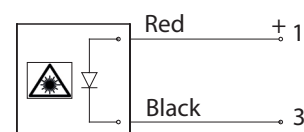
M12x1 thread

(mm)



Dimension art. SM313002 (**) (mm)

Cable connection



Accessories page 39

Type	LSV12-635-3-T20-P	LSV12-635-3-T20-X9E	LSV12-635-3-T20-60
Art. no.	SM309002	SM313002 (**)	SM306010
Mounted lens	point	cross Plastics Diffractive Lens	line with lens 60° Glass Rod Lens
Point diameter at 1 m distance	~ Ø 2,5 mm	-	-
Cross dimension at 1 m distance	-	150 x 150 mm	-
Line length at 1 m distance	-	-	1.100 mm
Power supply	5...24 Vdc		
Power	3 mW		
Wavelength	635 nm		
Beam divergence	0,5 mrad	-	-
Minimum line thickness	-	-	~ 1,5 mm
Life time	≥ 20.000 h		
Permitted temperature	-10°...+50°C		
Focus adjustment	yes, by screwdriver	yes	no
Tolerance of the lens for line	± 15%		
Current consumption	~ 10 mA typical		
Automatic control of the output power	yes		
Reverse polarity and overvoltage protections	yes		
Housing material	plastic		
Cable connection	2000 mm		
Degree of protection	IP40	IP67	IP67
Safety protection class	3R	2M	2
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.			
Laser according to the standard EN 60825-1: 2015-12			

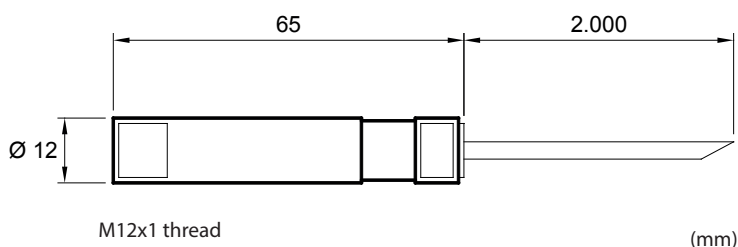
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LASER POINTER LSV12 SERIES - RED LIGHT - Ø12 - 3mW

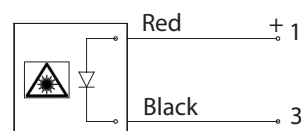


Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 3 mW.

Very thin line < 1.5mm, useful for high precision applications.



Cable connection



Accessories page 39

Type	LSV12-635-3-T20-75
Art. no.	SM314017
Mounted lens	line with lens 75° Glass Rod Lens
Line length at max 1 m distance	2.000 mm
Minimum line thickness	1.5 mm ~
Power supply	5...24 Vdc
Power	3 mW
Wavelength	635 nm
Life time	≥ 20.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	no
Tolerance of the lens for line	± 20%
Minimum line thickness	< 1,5 mm
Current consumption	~ 10 mA typical
Automatic control of the output power	yes
Reverse polarity and overvoltage protections	yes
Housing material	plastic
Cable connection	2000 mm
Degree of protection	IP67
Safety protection class	2
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.	
Laser according to the standard EN 60825-1: 2015-12	

LASER POINTER LSVR12 SERIES - RED LIGHT- $\varnothing 12$ - 0.4mW

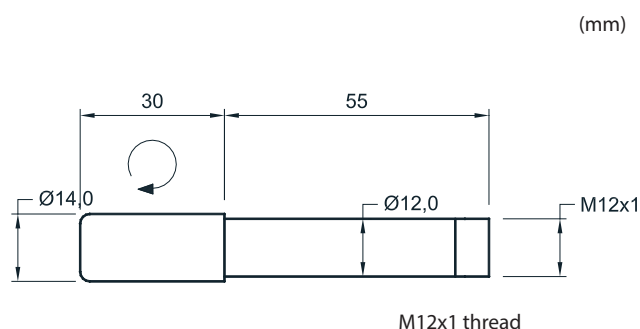


Laser pointer consisting of a high quality red light laser diode, available with 635 nm wavelength and a power of 0.4mW.

The pointer generating a line of only 0.5mm thickness is suitable in applications where a very thin and long line is required.

The adjustment of the focus permits to obtain a visible and well-focused line up to a maximum height of 250mm from the work surface.

Furthermore, being in safety class 1, even the direct vision of the beam does not create any damage to the human eye.



Connection M12x1 connector



1 = Brown = Positive + Vcc.
2 = Free
3 = Blue = Negative GND
4 = Free

Accessories page 39

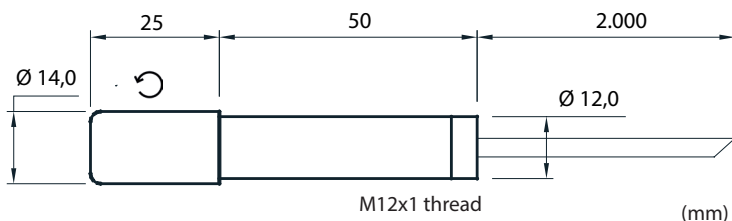
Type	LSVR12-635-0.4-T20-PL90-Y
Art. no.	SM317004
Mounted lens	Line Powell Lens
Line length at 100mm distance	180 mm
Line length at 250mm distance (max. suggested distance)	380 mm
Power supply	5...24 Vdc
Power	0.4 mW
Wavelength	635 nm
Life time	≥ 20.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	yes
Tolerance of the lens for line	$\pm 15\%$
Minimum line thickness	0.5mm (on white surface)
Current consumption	~ 10 mA typical
Automatic control of the output power	yes
Reverse polarity and overvoltage protections	yes
Housing material	plastic
Connection	connector M12x1 - 4p
Degree of protection	IP67
Safety protection class	1
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15. READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING	
Laser according to the standard EN 60825-1: 2015-12	

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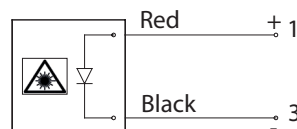
LASER POINTER LSVR12 SERIES - RED LIGHT - Ø12 - 1mW



Economical version of the LSVR12 series consisting of a high quality red light laser diode, available in the 650 nm wavelength and with a power of 1mW. Suitable for application up to a max. of 1 m distance.



Cable connection



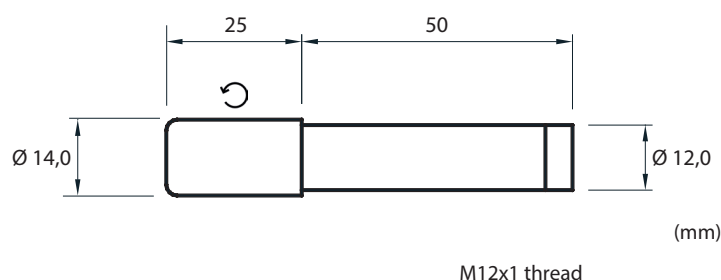
Accessories page 39

Type	LSVR12-650-1-T10-P	LSVR12-650-1-T10-X	LSVR12-650-1-T10-60
Art. no.	SM318015	SM318016	SM318017
Mounted lens	point	cross Plastics Diffractive Lens	line with lens 60° Glass Rod Lens
Line length at 1 m distance	-	-	1.100 mm
Cross dimension at 1 m distance	-	150x150 mm	-
Point diameter at 1 m distance	~ Ø 1,0 mm	-	-
Power supply	5...24 Vdc		
Power	1 mW		
Wavelength	650 nm		
Beam divergence	0,5 mrad	-	-
Minimum line thickness	-	-	~ 1,5 mm
Life time	≥ 10.000 h		
Permitted temperature	-10°...+50°C		
Focus adjustment	yes		
Tolerance of the lens for line	± 15%		
Current consumption	~ 20 mA typical		
Automatic control of the output power	yes		
Reverse polarity and overvoltage protections	yes		
Housing material	aluminum		
Cable connection	2m, 2 wires		
Degree of protection	IP40	housing IP54 / ring IP67	
Safety protection class	2		
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.			
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING			
Laser according to the standard EN 60825-1: 2015-12			

LASER POINTER LSVR12 SERIES - RED LIGHT- $\varnothing 12$ - 3mW



Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 3 mW.
The focus can be adjusted.



Connection M12x1 connector



1 = Brown = Positive + Vcc.
2 = Free
3 = Blue = Negative GND
4 = Free

Accessories page 39

Type	LSVR12-635-3-T20-P-Y	LSVR12-635-3-T20-X-Y	LSVR12-635-3-T20-60-Y	LSVR12-635-3-T20-75-Y
Art. no.	SM315010	SM315011	SM315012	SM315013
Mounted lens	point	cross Plastics Diffractive Lens	line with lens 60° Glass Rod Lens	line with lens 75° Glass Rod Lens
Point diameter at 1 m distance	~ $\varnothing 2,5$ mm	-	-	-
Cross dimension at 0,5 m	-	75x75 mm	-	-
Cross dimension at 1 m distance	-	150x150 mm	-	-
Line length at 0,5 m	-	-	600 mm	1.500 mm
Line length at 1 m distance	-	-	1.100 mm	~ 3.000 mm
Power supply	5...24 Vdc			
Power	3 mW			
Wavelength	635 nm			
Beam divergence	0,5 mrad	-	-	-
Life time	≥ 20.000 h			
Permitted temperature	$-10^{\circ} \dots +50^{\circ}\text{C}$			
Focus adjustment	yes			
Tolerance of the lens for line	$\pm 15\%$			
Minimum line thickness	-	~ 1,5 mm	~ 2 mm	~ 1,5 mm
Current consumption	~ 10 mA typical			
Automatic control of the output power	yes			
Reverse polarity and overvoltage protections	yes			
Housing material	aluminum			
Connection	connector M12x1			
Degree of protection	IP67 ring / IP54 housing			
Safety protection class	3R	2M	2	2
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.				
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING				
Laser according to the standard EN 60825-1: 2015-12				

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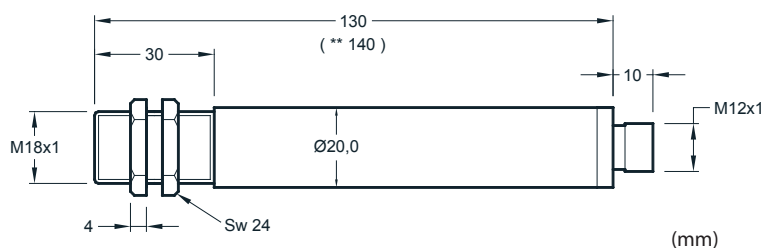
LASER POINTER LSV20 SERIES - RED LIGHT - Ø20-M18 - 5mW



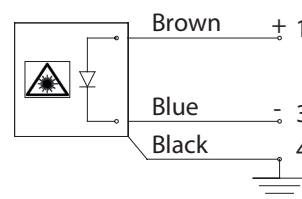
Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 5mW. This laser pointer can generate a point, a line or a cross. On request different lengths of line. The partially threaded housing and the included nuts permits an easy mounting.

Thanks to the anodized aluminium housing and the protection glass, it is suitable for harsh applications or in presence of water.

On request 12...48Vdc / 6...24Vac power supply.



Connection M12x1 connector



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Type	LSV20-R5-P-M18	LSV20-R5-X-M18 (**)	LSV20-R5-L-M18
Art. no.	SM320006	SM320007	SM320008
Mounted lens	point	cross Plastics Diffractive Lens	line Glass Rod Lens
Line length at 1 m distance	-	-	2.000 mm
Point diameter at 1 m distance	~ Ø 3,0 mm	-	-
Cross dimension at 1 m distance	-	150x150 mm	-
Power supply	6...24 Vdc / 6...12 Vac		
Power	5 mW		
Wavelength	635 nm		
Beam divergence	0,5 mrad	-	-
Life time	≥ 20.000 h		
Permitted temperature	-10°...+50°C		
Focus adjustment	yes, by screwdriver	yes, by screwdriver	no
Current consumption	< 50 mA		
Reverse polarity and overvoltage protections	yes		
Housing material	anodized aluminum		
Connection	connector M12x1		
Degree of protection	IP40	IP67	IP67
Safety protection class	3R	2M	2
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.			
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING			
Laser according to the standard EN 60825-1: 2015-12			
In case of disturbances or electrostatic charges connect Pin4 to the machine ground. See SM515001 at page 40.			

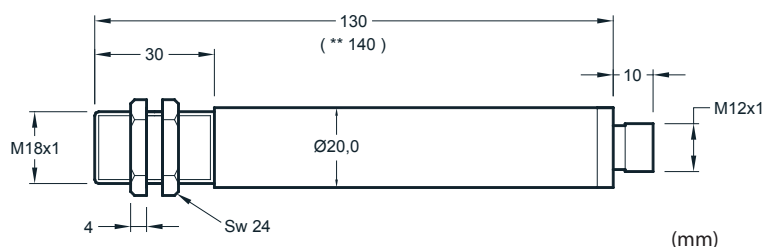
LASER POINTER LSV20 SERIES - RED LIGHT - Ø20-M18 - 15mW



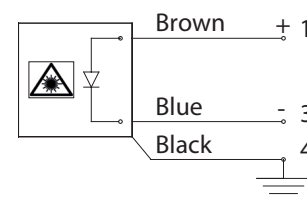
Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 15mW. This laser pointer can generate a point, a line or a cross. On request different lengths of line. The partially threaded housing and the included nuts permits an easy mounting.

Thanks to the anodized aluminium housing and the protection glass, it is suitable for harsh applications or ambient with water.

On request 12...48Vdc / 6...24Vac power supply.



Connection M12x1 connector

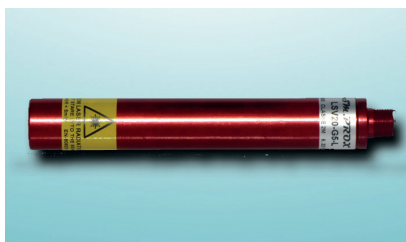


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Type	LSV20-R15-P-M18	LSV20-R15-X-M18 (**)	LSV20-R15-L-M18
Art. no.	SM320009	SM320010	SM320011
Mounted lens	point	cross Plastics Diffractive Lens	line with 100° lens Glass Rod Lens
Line length at 1 m distance	-	-	2.000 mm
Point diameter at 1 m distance	~ Ø 3,0 mm	-	-
Cross dimension at 1 m distance	-	150x150 mm	-
Power supply	6...24 Vdc / 6...12 Vac		
Power	15 mW		
Wavelength	635 nm		
Beam divergence	0,5 mrad	-	-
Life time	≥ 20.000 h		
Permitted temperature	-10°...+50°C		
Focus adjustment	yes, by screwdriver	yes, by screwdriver	no
Current consumption	< 50 mA		
Reverse polarity and overvoltage protections	yes		
Housing material	anodized aluminum		
Connection	connector M12x1		
Degree of protection	IP40	IP67	IP67
Safety protection class	3B	3R (*)	2M
(*) Without ring for cross lens, the safety protection becomes 3B			
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.			
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING			
Laser according to the standard EN 60825-1: 2015-12			
In case of disturbances or electrostatic charges connect Pin4 to the machine ground. See SM515001 at page 40.			

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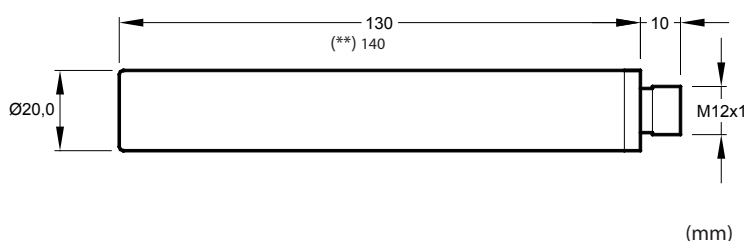
LASER POINTER LSV20 SERIES - RED LIGHT - ø20 - 5mW



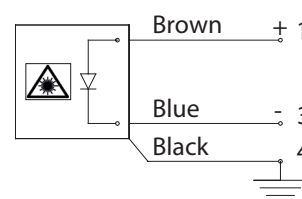
Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 5mW. This laser pointer can generate a point, a line or a cross. On request different lengths of line.

Thanks to the anodized aluminium housing and the protection glass, it is suitable for harsh applications or ambient with water.

On request 12...48Vdc / 6...24Vac power supply.



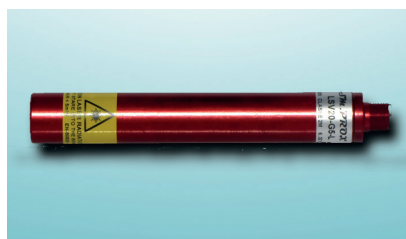
Connection M12x1 connector



Accessories page 39

Type	LSV20-R5-P	LSV20-R5-X (**)	LSV20-R5-L
Art. no.	SM313005	SM314008	SM314009
Mounted lens	point	cross Plastics Diffractive Lens	line Glass Rod Lens
Line length at 1 m distance	-	-	2.000 mm
Point diameter at 1 m distance	~ Ø 3,0 mm	-	-
Cross dimension at 1 m distance	-	150x150 mm	-
Power supply	6...24 Vdc / 6...12 Vac		
Power	5 mW		
Wavelength	635 nm		
Beam divergence	0,5 mrad	-	-
Life time	≥ 20.000 h		
Permitted temperature	-10°...+50°C		
Focus adjustment	yes, by screwdriver	yes, by screwdriver	no
Current consumption	< 50 mA		
Reverse polarity and overvoltage protections	yes		
Housing material	anodized aluminum		
Connection	connector M12x1		
Degree of protection	IP40	IP67	IP67
Safety protection class	3R	2M	2
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.			
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING			
Laser according to the standard EN 60825-1: 2015-12			
In case of disturbances or electrostatic charges connect Pin4 to the machine ground. See SM515001 at page 40.			

LASER POINTER LSV20 SERIES - RED LIGHT - ø20 - 15mW

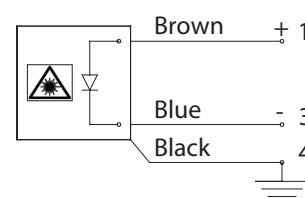
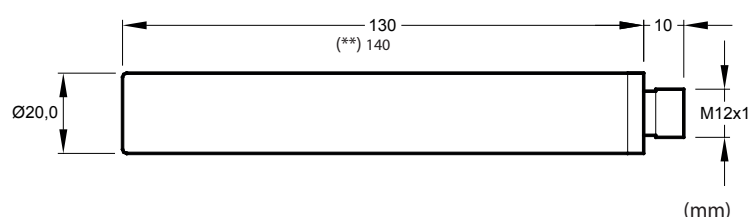


Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 15mW. This laser pointer can generate a point, a line or a cross. On request different lengths of line.

Thanks to the anodized aluminium housing and the protection glass, it is suitable for harsh applications or ambient with water.

On request 12...48Vdc / 6...24Vac power supply.

Connection M12x1 connector

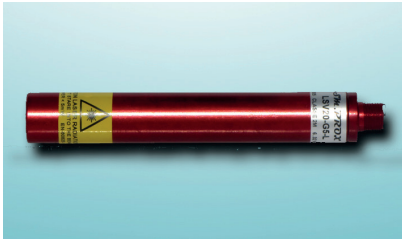


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Type	LSV20-R15-P	LSV20-R15-X (**)	LSV20-R15-L15	LSV20-R15-L
Art. no.	SM314003	SM314002	SM312001	SM311004
Mounted lens	point	cross Plastics Diffractive Lens	line with lens 15° Plastics Diffractive Lens	line with lens 100° Glass Rod Lens
Line length at 1 m distance	-	-	250 mm	4.000-5.000 mm
Point diameter at 1 m distance	~ Ø 4,0 mm	-	-	-
Cross dimension at 1 m distance	-	150x150 mm	-	-
Power supply	6...24 Vdc / 6...12 Vac			
Power	15 mW			
Wavelength	635 nm			
Beam divergence	0,5 mrad	-	-	-
Life time	≥ 20.000 h			
Permitted temperature	-10° ... +50°C			
Focus adjustment	yes, by screwdriver	yes, by screwdriver	no	no
Current consumption	< 50 mA			
Reverse polarity and overvoltage protections	yes			
Housing material	anodized aluminum			
Connection	connector M12x1			
Degree of protection	IP40	IP67	IP67	IP67
Safety protection class	3B	3R (*)	3R	2M
(*) Without ring for cross lens, the safety protection becomes 3B				
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.				
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING				
Laser according to the standard EN 60825-1: 2015-12				
In case of disturbances or electrostatic charges connect Pin4 to the machine ground. See SM515001 at page 40.				

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LASER POINTER LSV20 SERIES - RED LIGHT - ø20 - 20mW

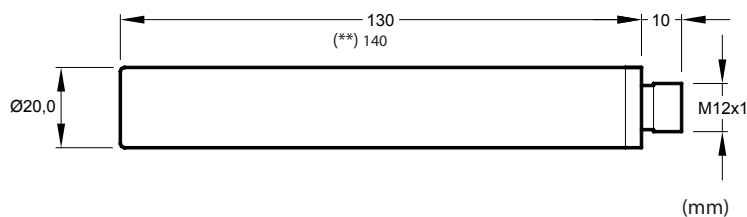


Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 20mW. This laser pointer can generate a point, a line or a cross. On request different lengths of line.

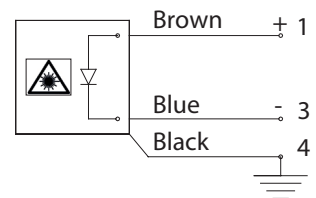
Thanks to the anodized aluminium housing and the protection glass, it is suitable for harsh applications or ambient with water.

On request 12...48Vdc / 6...24Vac power supply.

The Powell lens allows a constant line performance.



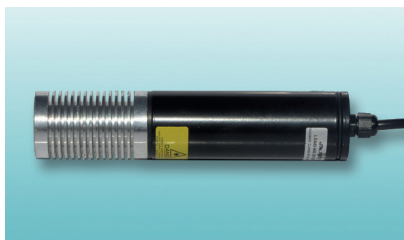
Connection M12x1 connector



Accessories page 39

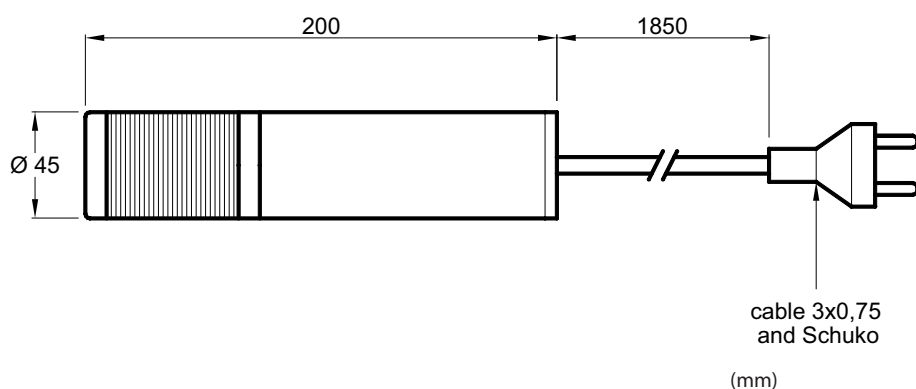
Type	LSV20-R20-P	LSV20-R20-X (**)	LSV20-R20-L	LSV20-R20-PL90
Art. no.	SM314015	SM314016	SM312002	SM319036
Mounted lens	point	cross Plastics Diffractive Lens	line Glass Rod Lens	line Powell Lens
Line length at 1 m distance	-	-	4.000-6.000 mm	6.000-8.000 mm
Line thickness	-	-	-	~ 2-3 mm
Linearity error	-	-	-	1 mm every 1.000 mm
Point diameter at 1 m distance	Ø 5,0 mm ~	-	-	-
Dimension cross a 1 m distance	-	150x150 mm	-	-
Power supply	6...24 Vdc / 6...12 Vac			
Power	20 mW			
Wavelength	635 nm			
Beam divergence	0,5 mrad	-	-	-
Life time	≥ 20.000 h			
Permitted temperature	-10°...+50°C			
Focus adjustment	yes, by screwdriver	yes, by screwdriver	no	no
Current consumption	< 50 mA			
Reverse polarity and overvoltage protections	yes			
Housing material	anodized aluminum			
Connection	connector M12x1			
Degree of protection	IP40	IP67	IP67	IP67
Safety protection class	3B	3R (*)	2M	2M
(*) Without ring for cross lens, the safety protection becomes 3B				
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.				
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING				
Laser according to the standard EN 60825-1: 2015-12				
In case of disturbances or electrostatic charges connect Pin4 to the machine ground. See SM515001 at page 40.				

LASER POINTER LSA45 SERIES - RED LIGHT - $\varnothing 45$ - 15mW



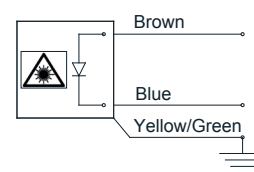
Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 15mW.

Thanks to the hermetic housing and the protection glass, it is suitable for harsh applications or ambient with water, as in the marble sector.



The brightness varies depending on the ambient light and on the colour of the object on which the laser beam is projected.

Cable connection



The yellow/green cable must be connected to the machine ground

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Type	LSA45-635-15-T20-100
Art. no.	SM311002
Mounted lens	line with lens 100° Glass Rod Lens
Line length at 1 m distance	4.000 mm
Power supply	120...275 Vdc/85...264 Vac
Power	15 mW
Wavelength	635 nm
Life time	≥ 20.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	no
Lens tolerance per line	± 15%
Current consumption	< 300 mA
Housing material	aluminum
Connection	cable 1850 mm - 3x0,75 and Schuko plug
Degree of protection	IP67
Safety protection class	2M
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.	
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING	
Laser according to the standard EN 60825-1: 2015-12	
THE YELLOW/GREEN CABLE MUST BE CONNECTED TO THE MACHINE GROUND	

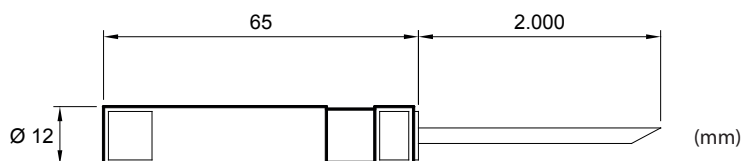
Ed. 03/2021 - All specifications are subject to change without notice

LASER POINTER LS12 SERIES - GREEN LIGHT - Ø12 - <0,39mW

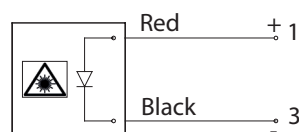


Laser pointer made of a high quality green laser diode, available with 520 nm wavelength and a power of 0.39mW.

F600 = Special version focused at 600mm distance



Cable connection



Accessories page 39

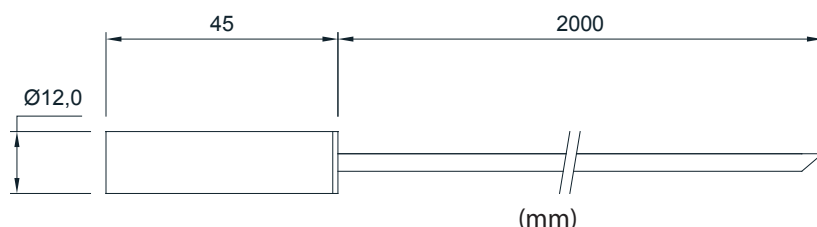
Type	LS12-520-0,4-T10-90-F600
Art. no.	SM319031
Mounted lens	line with lens 90° Plastic Diffractive Lens
Line length at 1 m distance	1000 mm
Power supply	5 Vdc
Power	< 0,39 mW
Wavelength	520nm
Life time	≥ 10.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	no
Lens tolerance per line	± 15%
Min. line thickness	~ 1,5 mm
Current consumption	~ 100 mA
Automatic control of the output power	yes
Reverse polarity and overvoltage protections	no
Housing material	anodized aluminum
Connection	cable 2000 mm
Degree of protection	IP67
Safety protection class	1
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15. READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING	
Laser according to the standard EN 60825-1: 2015-12	

LASER POINTER LSM SERIES - GREEN LIGHT - Ø12 - <0,39mW

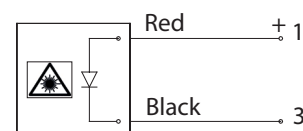


Laser pointer in Class 1 made of a high quality green laser diode, available with 520nm wavelength and a power of only 0,39mW.

F400 = focused at 400mm distance



Cable connection



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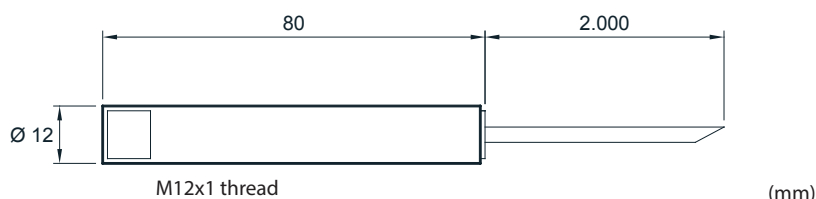
Type	LSM12-520-0.4-T10-60-L45-F400
Art. no.	SM320002
Mounted lens	line with 60° lens Plastics Diffractive Lens
Cross dimension at 1 m distance	-
Point diameter at 1 m distance	-
Line length at 400mm distance	~ 400mm
Power supply	5,0 Vdc
Power	< 0.39 mW
Wavelength	520 nm
Life time	≥ 10.000 h (with metal bracket)
Permitted temperature	-10°...+50°C
Focus adjustment	no
Tolerance of the lens for line	± 15%
Minimum line thickness	~ 1 mm
Current consumption	< 100mA
Automatic control of the output power	yes
Reverse polarity and overvoltage protections	no
Module isolation	total
Housing material	black anodized aluminum
Connection	2m cable
Degree of protection	IP54
Safety protection class	1
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.	
Laser according to the standard EN 60825-1: 2015-12	

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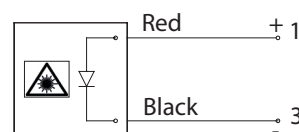
LASER POINTER LSV12 SERIES - GREEN LIGHT - Ø12 - 1mW



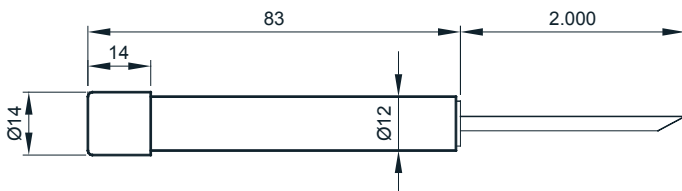
Laser pointer made of a high quality green laser diode, available with 520 nm wavelength and a power of 1 mW.



Cable connection



Dimension art. SM319014 and art. SM319015 (**) (mm)



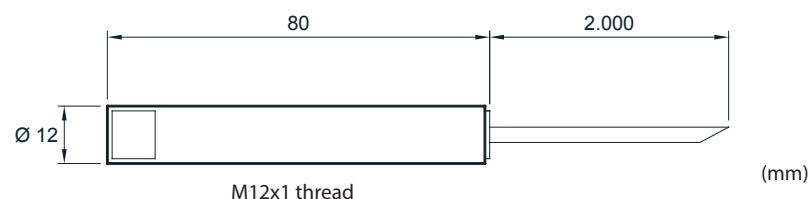
Accessories page 39

Type	LSV12-520-1-T10-P	LSV12-520-1-T10-X	LSV12-520-1-T10-60
Art. no.	SM319013	SM319014 (**)	SM319015 (**)
Mounted lens	point	cross Plastics Diffractive Lens	line with lens 60° Plastics Diffractive Lens
Point diameter at 1 m distance ~	Ø < 2,0 mm	-	-
Cross dimension at 1 m distance	-	120x120 mm	-
Line length at 1 m distance	-	-	1.200 mm
Power supply	5...24 Vdc		
Power	1 mW		
Wavelength	520nm		
Beam divergence	0,4 mrad	-	-
Minimum line thickness	-	-	~ 1,5 mm
Life time	≥ 10.000 h (with metal bracket)		
Permitted temperature	-10°...+50°C		
Focus adjustment	yes		
Tolerance of the lens for line	± 15%		
Current consumption	< 50mA		
Automatic control of the output power	yes		
Reverse polarity and overvoltage protections	yes		
Housing material	anodized aluminum		
Cable connection	2.000 mm		
Degree of protection	IP40	IP67	
Safety protection class	2		
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.			
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING			
Laser according to the standard EN 60825-1: 2015-12			

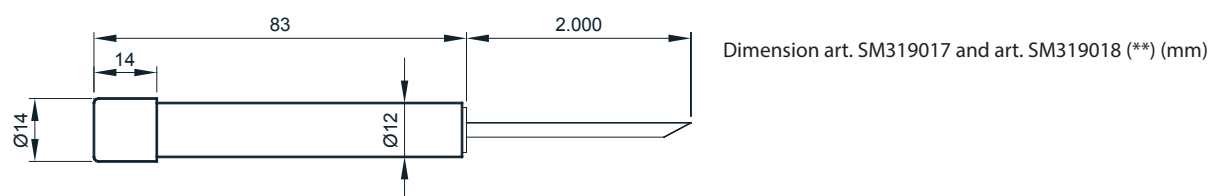
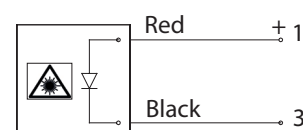
LASER POINTER LSV12 SERIES - GREEN LIGHT - Ø12 - 5mW



Laser pointer made of a high quality green laser diode, available with 520 nm wavelength and a power of 5 mW.



Cable connection



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Type	LSV12-520-5-T10-P	LSV12-520-5-T10-X	LSV12-520-5-T10-60
Art. no.	SM319016	SM319017 (**)	SM319018 (**)
Mounted lens	point	cross Plastics Diffractive Lens	line with lens 60° Plastics Diffractive Lens
Point diameter at 1 m distance	~ Ø < 2,5 mm	-	-
Cross dimension at 1 m distance	-	120x120 mm	-
Line length at 1 m distance	-	-	1.200 mm
Power supply	5...24 Vdc		
Power	5 mW		
Wavelength	520nm		
Beam divergence	0,4 mrad	-	-
Minimum line thickness	-	-	~ 2 mm
Life time	≥ 10.000 h (with metal bracket)		
Permitted temperature	-10°...+50°C		
Focus adjustment	yes		
Tolerance of the lens for line	± 15%		
Current consumption	< 50mA		
Automatic control of the output power	yes		
Reverse polarity and overvoltage protections	yes		
Housing material	anodized aluminum		
Cable connection	2.000 mm		
Degree of protection	IP40	IP67	
Safety protection class	3R	3R	2
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.			
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING			
Laser according to the standard EN 60825-1: 2015-12			

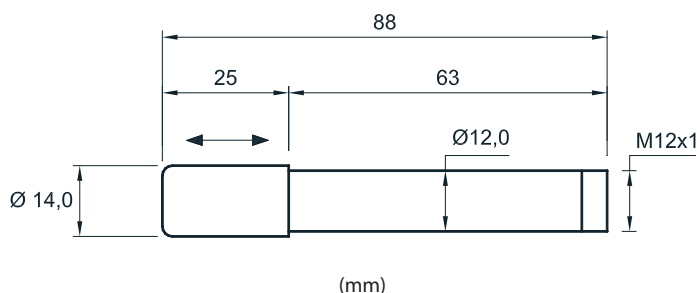
Ed. 03/2021 - All specifications are subject to change without notice

LASER POINTER LSVR12 SERIES - GREEN LIGHT - Ø12 - 3mW



Laser pointer made of a high quality green laser diode, available with 520 nm wavelength and a power of 3 mW.

The ring allows an easy focus adjustment.



Connection M12x1 connector

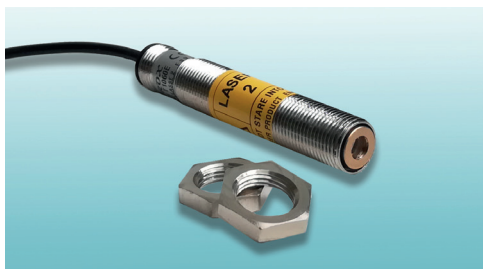


1 = Brown = Positive + Vcc.
2 = Free
3 = Blue = Negative GND
4 = Free

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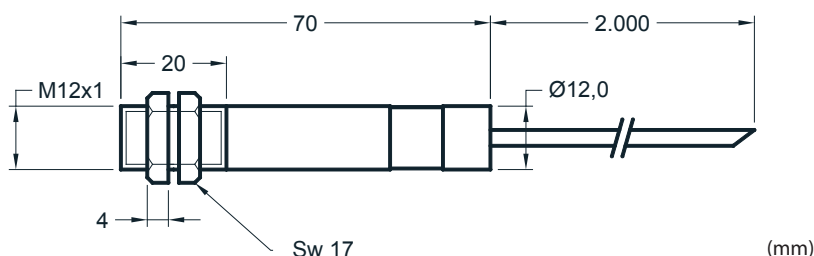
Type	LSVR12-520-3-T10-P-Y1	LSVR12-520-3-T10-X-Y1	LSVR12-520-3-T10-60-Y1	LSVR12-520-3-T10-75-Y1
Art. no.	SM318011	SM318012	SM318013	SM318014
Mounted lens	point	cross Plastics Diffractive Lens	line with lens 60° Glass Rod Lens	line with lens 75° Glass Rod Lens
Point diameter at 1 m distance ~	Ø 2,5 mm	-	-	-
Cross dimension at 1 m distance	-	120x120 mm	-	-
Line length at 1 m distance	-	-	1.100 mm	2.000 mm
Power supply	5...24 Vdc			
Power	3 mW			
Wavelength	520 nm			
Beam divergence	0,4 mrad	-	-	-
Life time	≥ 10.000 h (with metal bracket)			
Permitted temperature	-10°...+50°C			
Focus adjustment	si			
Tolerance of the lens for line	± 15%			
Minimum line thickness	-	~ 1,5 mm	~ 2 mm	~ 1,5 mm
Current consumption	~ 30 mA typical			
Automatic control of the output power	yes			
Reverse polarity and overvoltage protections	yes			
Housing material	aluminum			
Connection	connector M12x1			
Degree of protection	IP67 frontal / IP54 body			
Safety protection class	3R	2M	2	2
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.				
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING				
Laser according to the standard EN 60825-1: 2015-12				

LASER POINTER LSM12 SERIES - GREEN LIGHT - $\varnothing 12$ - 5mW

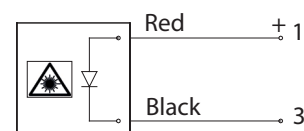


Laser pointer made of a high quality green laser diode, available with 520 nm wavelength and a power of 5 mW.

Easy mounting with 2 nuts M12x1 included in the package.



Cable connection

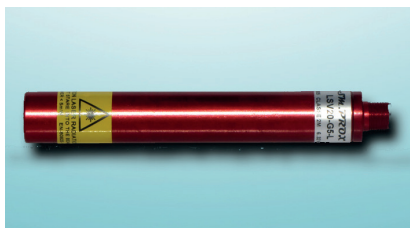


Accessories page 39

Type	LSM12-520-5-T10-X15E	LSM12-520-5-T10-60E
Art. no.	SM319028	SM319027
Mounted lens	cross Plastics Diffractive Lens	line with lens 60° Plastic Lens
Point diameter at 1 m distance ~	-	-
Cross dimension at 1 m distance	250x250 mm	-
Line length at 1 m distance	-	1.100 mm
Power supply	5 Vdc	
Power	5mW	5mW
Wavelength	520 nm	
Life time	≥ 10.000 h (with metal bracket)	
Permitted temperature	-10°...+50°C	
Focus adjustment	no	
Tolerance of the lens for line	± 15%	
Minimum line thickness	~ 2mm	~ 2 mm
Current consumption	~ 120 mA typical	
Automatic control of the output power	yes	
Module isolation	total	
Housing material	nickel brass	
Connection	cable 2m, 2 x AWG28	
Degree of protection	IP40	
Safety protection class	2M	2
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.		
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING		
Laser according to the standard EN 60825-1: 2015-12		

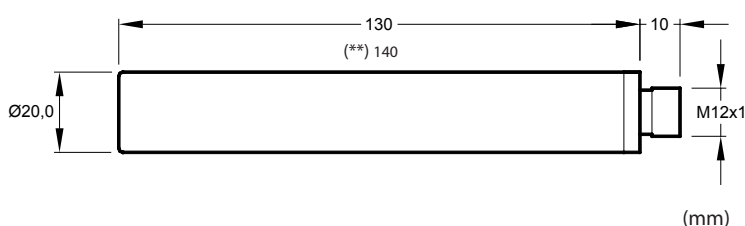
Ed. 03/2021 - All specifications are subject to change without notice

LASER POINTER LSV20 SERIES - GREEN LIGHT - Ø20 - 1mW

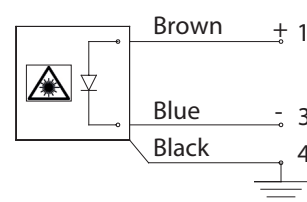


Laser pointer made of a high quality green laser diode, available with 520 nm wavelength and a power of 1mW. This laser pointer can generate a point, a line or a cross. On request different powers.

Thanks to the anodized aluminium housing and the protection glass, it is suitable for harsh applications or ambient with water.



Connection M12x1 connector



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Type	LSV20-G1-520-P	LSV20-G1-520-X (**)	LSV20-G1-520-L
Art. no.	SM319021	SM319020	SM319019
Mounted lens	point	cross Plastics Diffractive Lens	line Glass Rod Lens
Point diameter at 1 m distance ~	Ø 3,0 mm	-	-
Cross dimension at 1 m distance	-	120x120 mm	-
Line length at 1 m distance	-	-	< 500 mm
Power supply	6...24 Vdc / 6...12 Vac		
Power	1 mW		
Wavelength	520nm		
Beam divergence	0,4 mrad	-	-
Life time	≥ 10.000 h		
Permitted temperature	-10°...+50°C		
Focus adjustment (fixed at 1m)	no	no	no
Current consumption	< 30 mA		
Reverse polarity and overvoltage protections	yes		
Housing material	anodized aluminum		
Connection	connector M12x1		
Degree of protection	IP67		
Safety protection class	2		

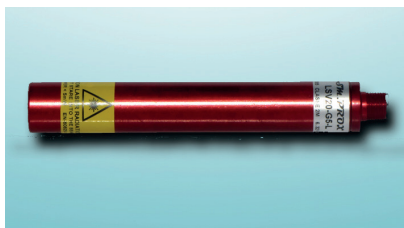
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.

READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING

Laser according to the standard EN 60825-1: 2015-12

In case of disturbances or electrostatic charges connect Pin4 to the machine ground. See SM515001 at page 40.

LASER POINTER LSV20 SERIES - GREEN LIGHT - Ø20 - 5mW

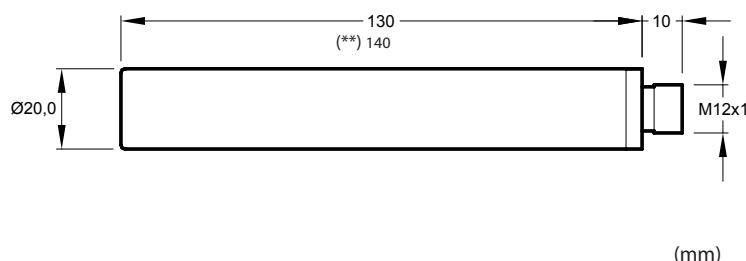
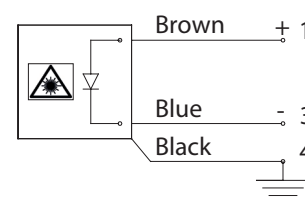


Laser pointer made of a high quality green laser diode, available with 520 nm wavelength and a power of 5mW. This laser pointer can generate a point, a line or a cross. On request different powers.

Thanks to the anodized aluminium housing and the protection glass, it is suitable for harsh applications or ambient with water.

The new 520nm diode allows for a wider temperature range (-10 ... + 50 °C) and greater stability.

Connection M12x1 connector

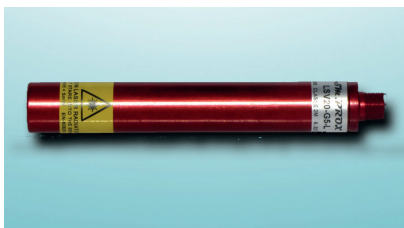


Accessories page 39

Type	LSV20-G5-520-P	LSV20-G5-520-X (**)	LSV20-G5-520-L
Art. no.	SM319022	SM319023	SM319024
Mounted lens	point	cross Plastics Diffractive Lens	line Glass Rod Lens
Line length at 1 m distance	-	-	< 1.000 mm
Point diameter at 1 m distance	~ Ø 3,0 mm	-	-
Cross dimension at 1 m distance	-	120x120 mm	-
Power supply	6...24 Vdc / 6...12 Vac		
Power	5 mW		
Wavelength	520 nm		
Beam divergence	0,4 mrad	-	-
Life time	≥ 10.000 h		
Permitted temperature	-10°...+50°C		
Focus adjustment (fixed at 1m)	no		
Current consumption	< 50 mA		
Reverse polarity and overvoltage protections	yes		
Housing material	anodized aluminum		
Connection	connector M12x1		
Degree of protection	IP67		
Safety protection class	3R	3R	2
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.			
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING			
Laser according to the standard EN 60825-1: 2015-12			
In case of disturbances or electrostatic charges connect Pin4 to the machine ground. See SM515001 at page 40.			

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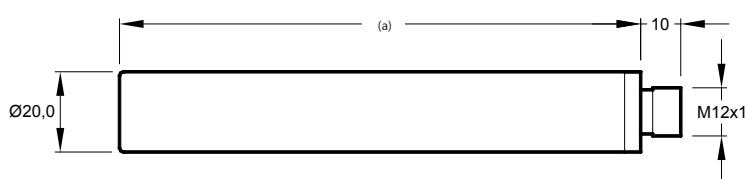
LASER POINTER LSV20 SERIES - GREEN LIGHT - Ø20 - 10mW



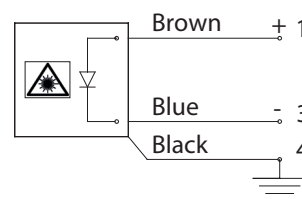
Laser pointer made of a high quality green laser diode, available with 520 nm wavelength and a power of 10mW. This laser pointer can generate a point, a line or a cross. On request different line length.

Thanks to the anodized aluminium housing and the protection glass, it is suitable for harsh applications or ambient with water.

The new 520nm diode allows for a wider temperature range (-10 ... + 50 ° C) and greater stability.



Connection M12x1 connector



Accessories page 39

(mm)

Type	LSV20-G10-520-P	LSV20-G10-520-X	LSV20-G10-520-X15	LSV20-G10-520-L
Art. no.	SM319011	SM320005	SM320004	SM319033
Dimensions (a)	130 mm	140 mm	140 mm	130 mm
Mounted lens	point	cross Plastic Diffractive Lens		line Glass Rod Lens 90°
Point diameter at 1 m distance	~ Ø 3,0-4,0 mm	-	-	-
Cross dimensions at 1 m distance	-	~ 150x150 mm	~ 250x250 mm	-
Line length at 1 m distance	-	-	-	~ 2000 mm
Line thickness	-	-	-	~ 2 mm
Power supply	6...24 Vdc / 6...12 Vac			
Power	10 mW			
Wavelength	520 nm			
Beam divergence	< 1.5 mrad	-	-	-
Life time	≥ 10.000 h (at +20°C)			
Permitted temperature	-10°...+50°C			
Focus adjustment	yes			no (focused at 1 m distance)
Current consumption	< 50 mA			
Reverse polarity and overvoltage protections	yes			
Warm-Up Time	< 1 min			
Housing material	anodized aluminum			
Connection	connector M12x1 - 4 poles			
Degree of protection	IP67			
Safety protection class	3B	3R (*)	2M (*)	2M

*) Without ring for cross lens, the safety protection becomes 3B

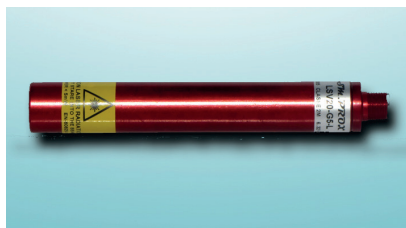
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.

READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING

Laser according to the standard EN 60825-1: 2015-12

In case of disturbances or electrostatic charges connect Pin4 to the machine ground. See SM515001 at page 40.

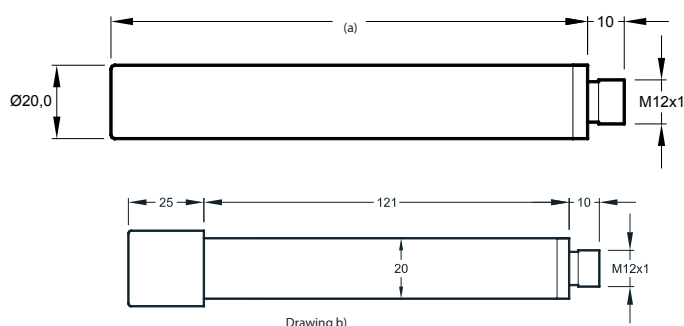
LASER POINTER LSV20 SERIES - GREEN LIGHT - Ø20 - 20mW



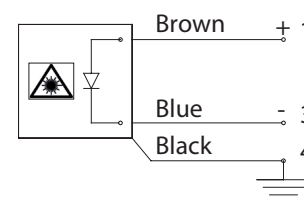
Laser pointer made of a high quality green laser diode, available with 520 nm wavelength and a power of 20mW. This laser pointer can generate a point, a line or a cross. On request different line length.

The new laser module permits applications with a wide temperature range. Thanks to the anodized aluminium housing and the protection glass, it is suitable for harsh applications or ambient with water.

The new 520nm diode allows for a wider temperature range (-10 ... + 50 ° C) and greater stability.



Connection M12x1 connector

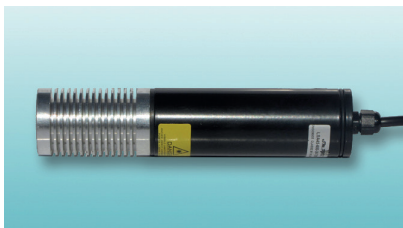


Accessories page 39

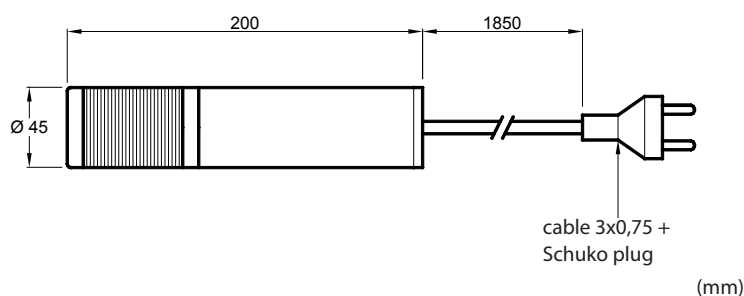
Type	LSV20-G20-520-P	LSV20-G20-520-X	LSV20-G20-520-PL90	LSV20-G20-520-PL90-CV2
Art. no.	SM318019	SM318020	SM319012	SM318018
Dimension	(a) 130mm	(a) 140mm	(a) 130mm	drawing (b)
Mounted lens	point	cross Plastics Diffractive Lens	line with lens 90° Glass Powell Lens	
Point diameter at 1 m distance	< Ø 5,0 mm ~	-	-	-
Cross dimension at 1 m distance	-	150x150 mm	-	-
Line length at 1m distance	-	-	2000 mm 1 mm every 1000 mm < 3-4 mm	2000 mm 1 mm every 2000 mm < 3-4 mm
Linearity error	-	-	-	-
Line thickness	-	-	-	-
Power supply	6...24 Vdc / 6...12 Vac			
Power	20 mW			
Wavelength	520 nm			
Life time	≥ 10.000 h			
Beam divergence	1 mrad	-	-	-
Permitted temperature	-10°...+50°C			
Focus adjustment	no (focused at 1m)			
Warm-up	~ 5 minutes			
Current consumption	< 100 mA			
Reverse polarity and overvoltage protections	yes			
Housing material	anodized aluminum			
Connection	conn. M12x1 - 4 poles			
Degree of protection	IP67			
Safety protection class	3B	3R (*)	2M	2M
(*) Without the ring for cross lens the safety protection class becomes 3B				
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.				
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING				
Laser according to the standard EN 60825-1: 2015-12				
In case of disturbances or electrostatic charges connect Pin4 to the machine ground. See SM515001 at page 40.				

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LASER POINTER LSA45 SERIE - GREEN LIGHT - Ø45

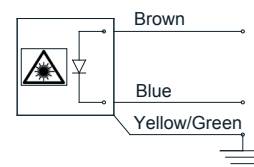


Laser pointer made of a high quality red laser diode, available with 520 nm wavelength and several powers. This laser pointer can generate a point, a line or a cross. Thanks to the hermetic housing and the protection glass, it is suitable for harsh applications or ambient with water, as in the marble sector. The brightness of the green light allows to see the line on dark surfaces. The special lens generates a long and uniform line.



The brightness varies depending on the ambient light and on the colour of the object on which the laser beam is projected.

Cable connection

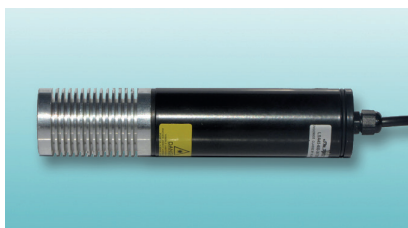


The yellow/green cable must be connected to the machine ground

Accessories page 39

Type	LSA45-520-20-T10-60-CV2	LSA45-520-20-T10-90-CV2	LSA45-520-30-T10-90-CV2	LSA45-520-50-T10-90-CV2
Art. no.	SM319002	SM319003	SM319004	SM319005
Mounted lens	line with lens 60° Glass Powell Lens	line with lens 90° Glass Powell Lens	line with lens 90° Glass Powell Lens	line with lens 90° Glass Powell Lens
Line length at 1 m distance	1.200 mm	2.000 mm	2.000 mm	2.000 mm
Max. line length	4.000-5.000 mm	5.000-6.000 mm	6.000-8.000 mm	8.000-10.000 mm
Linearity error	1 mm every 2.000 mm			
Power supply	120...275 Vdc/85...264Vac			
Power	20mW	20mW	30mW	50mW
Wavelength	520 nm			
Life time	≥ 10.000 h			
Permitted temperature	-10°...+50°C			
Focus adjustment (fixed 1m)	no			
Current consumption	< 300 mA			
Housing material	aluminum			
Cable connection	1.850 mm - 3x0,75 - Schuko plug			
Degree of protection	IP67			
Safety protection class	2M	2M	2M	3R
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.				
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING				
Laser according to the standard EN 60825-1: 2015-12				
THE YELLOW/GREEN CABLE MUST BE CONNECTED TO THE MACHINE GROUND				

LASER POINTER LSV45 SERIES - GREEN LIGHT - Ø45 - 20mW

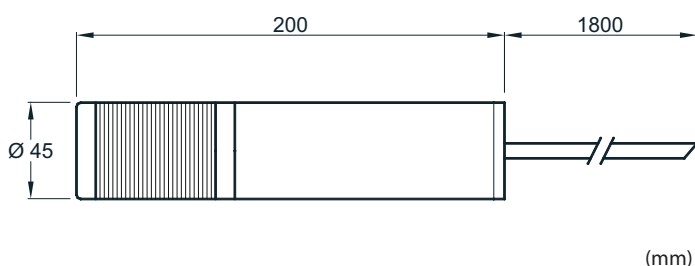


Laser pointer made of a high quality red laser diode, available with 520 nm wavelength and 20mW power.

Thanks to the hermetic housing and the protection glass, it is suitable for harsh applications or ambient with water, as in the marble sector.

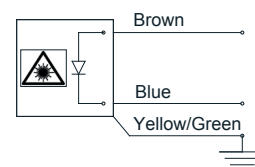
The brightness of the green light allows to see the line on dark surfaces.

The special lens generates a long and uniform line.



The brightness varies depending on the ambient light and on the colour of the object on which the laser beam is projected.

Cable connection



The yellow/green cable must be connected to the machine ground

Accessories page 39

Type	LSV45-520-20-T10-90-CV2
Art. no.	SM319025
Mounted lens	line with lens 90° Glass Powell Lens
Line length at 1 m distance	2.000 mm
Line thickness	≈ 2 mm
Power supply	12...48Vdc / 12...24Vac
Power	20 mW
Wavelength	520 nm
Life time	≥ 10.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	no
Warm-up	after 5 minutes at 25°C
Current consumption	< 300 mA
Housing material	aluminum
Cable connection	1.800 mm - 3x0,75
Degree of protection	IP67
Safety protection class	2M
For the classification of the laser systems: only in perfect conditions and supplied with DC power supply, the system can be specified in the safety class, according to the new regulations in force since 12/15.	
READ THE INSTRUCTIONS CAREFULLY BEFORE ASSEMBLING	
Laser according to the standard EN 60825-1: 2015-12	
THE YELLOW/GREEN CABLE MUST BE CONNECTED TO THE MACHINE GROUND	

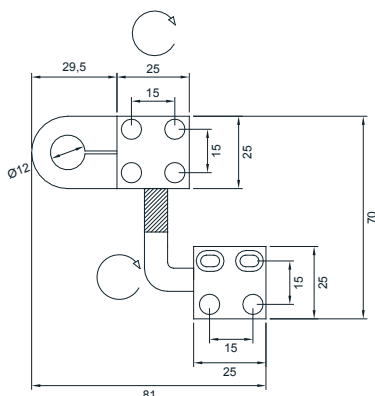
Ed. 03/2021 - All specifications are subject to change without notice

ACCESSORIES

Brackets for laser pointers

Type

SF010418

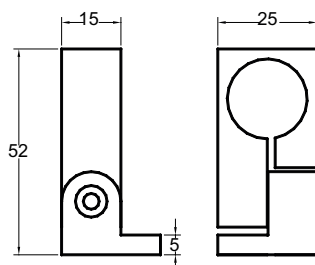


Technical data

Bracket for laser pointer Ø 12, adapter included in the package

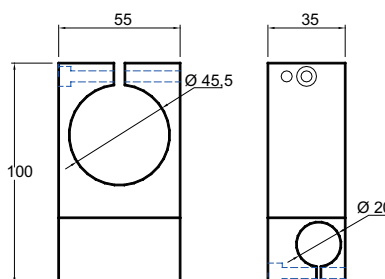


SF010423



Bracket for laser pointer Ø 20.

SF010419



Bracket for laser pointer Ø 45.

Safety glasses for laser pointers

Type

OP001

Technical data

Protection glasses for laser pointers, CE marked.

This glasses provides the following optical protections:

range from 600 to 680nm, optical density = 1

range from 660 to 680nm, optical density = 3



ACCESSORIES

Power supply

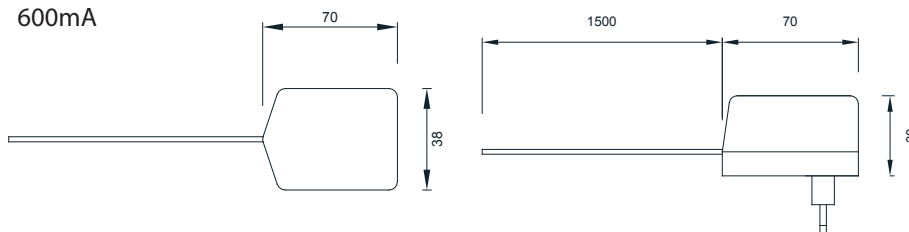
Type Technical data

SM516001 Input voltage: 85~264 Vac - 120~370 Vdc
Output voltage: 0,33 A/115 Vac - 0,21 A/230 Vac
5,0 Vdc - 2A;

SM516002 Input voltage: 85~264 Vac - 120~370 Vdc
Output voltage: 0,33 A/115 Vac - 0,21 A/230 Vac
24,0 Vdc - 0,42A



SM505001 Input voltage: 100..240Vac.
Output voltage: 3,0-4,5-5,0-7,5-9,0-12,0Vdc.
Max. current: 600mA



Female connectors

Type Technical data

C8IF3A 5M
M8 - 3 poles - straight - 5 m PVC 3x0,25



C8LF3A 5M
M8 - 3 poles - angled - 5 m PVC 3x0,25



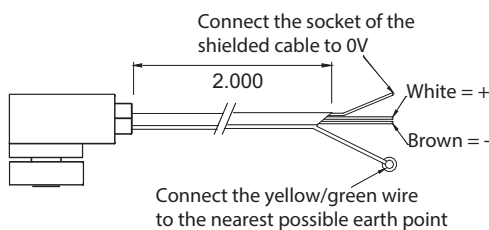
C12IF4A 5M
M12 - 4 poles - straight - 5 m PVC 4x0,25



C12LF4A 5M
M12 - 4 poles - angled - 5 m PVC 4x0,25



SM515001
M12 - 4 poles - angled - 2 m shielded cable + ground cable



CUSTOMIZED VERSIONS

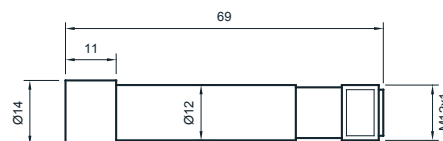
We are available to design special models to meet application requirements: dimensions, cable length and focus on customer request.

Here are some models we have realized:



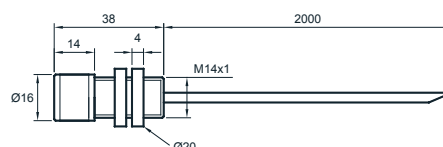
SM315002 - LS12-635-3-T2060-F600
Red laser pointer dia.12x65mm 5Vdc that generates a long and thin line, focused at 600mm for alignment on tire changing machines.

SM317020 - LSM12-635-3-T20-XY1+SF0002
Red laser pointer dia.12x68mm 5Vdc that generates a cross 150x150mm with double protective glass against splashes; application in environments with strong presence of splatters.



SM318009- LS12-520-5-T1060-CUSTOM
520nm green laser pointer, dia.12x80mm, 5Vdc that generates a line, with special cable for mobile laying and 2-pole Molex Picoblade connector; parcel alignment in automatic warehouses.

SM307004 - LSH14-635-5-T2060-2MT
Red laser pointer M14x38mm that generates a line, with shielded cable, compact and easy to assemble thanks to the fixing rings. Alignment in a applications with little space.



SM317024 - LSVR12-635-3-T20-X15E-Y
Red laser pointer dia.12x75mm, 5 ... 24Vdc that generates a cross, adjustable focus with external ring.

SM319029 - LSV12-635-3-T20-20-F500

Red laser pointer dia.12x65mm 5-24Vdc that generates a 140mm long line focused at 500mm distance. Textile sector application.

SM319032 - LSV12-635-3-T20-X15E-F500

Red laser pointer dia.12x65mm. 5-24Vdc which generates a 130x130mm cross focused at a distance of 500mm. Textile sector application.

SM317009 - LSV12-635-3-T20-X60E

Red laser pointer dia.12x65mm 5-24Vdc that generates a large cross 900x900mm at 1m distance.

SAFETY PRECAUTIONS

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PRECAUTIONS FOR PROPER OPERATION OF LASER POINTERS

Please read the following notes before the installation:

1. Supply the laser pointers with transformer power supplies that give STABILIZED voltages: this means that a regulator and a voltage stabilizer are integrated in the unit (eg. 7805, 7824 etc.) and appropriate filters in order to eliminate all variations, disorders and transients that may originate from the supply line. In the case of pointers with power supply +5 Vdc provide for a power supply separated from the rest of the machine wiring.
2. You can also use SWITCHING power supplies, as long as they supply stabilized voltages and especially without voltage spikes and radio frequency disturbances, which cause the damage of the laser pointer over the time.
3. Choose high-quality switching power supplies.
4. ELIMINATE ALL electrostatic charges that may be generated on the machine. If the pointer works near materials such as cloth, paper, polyester and similar, apply appropriate antistatic bars, or other solutions in order to eliminate ALL ELECTROSTATIC DISCHARGES which can be generated and that can damage the pointer over the time.
5. ELIMINATE any noise with filters that AC motors can generate both starting-up and during their operation.
6. For pointers with metal casing, in the case of electrostatic charges CONNECT the housing of the pointer to the mass of the machine to allow electrostatic charges to be discharged to the ground.
7. Consider laser pointer CLASS SAFETY to take precautions.

SAFETY INSTRUCTIONS

1. These instructions must be read and kept together with the laser.
2. To avoid damages to third parties, the work area should be marked.
3. As the mirrors can reflect harmful rays, they should not be placed in the working area.
4. In case of malfunctions switch off the unit immediately!
5. To prevent noises, the lasers must work in accordance with the indicated voltage.
6. High temperatures reduce the life of the laser pointer.
7. Follow the protective classes as indicated in the table.

SAFETY CLASSES

Laser devices are classified in different safety classes according to the risk of injury to eyes and to the skin of the operator, as well as to the power and the laser wavelength. Electrical, mechanical, chemical hazards or risks of secondary optical radiation are excluded. By increasing the risk of injury there is an increase of the safety class. Classes details at page 38.

OBLIGATIONS OF THE PRODUCER

The manufacturer must test and label the laser pointer carefully according to the specifications of the standard.

The labeling must include as minimum:

- a danger signal (not prescribed for Class 1)
- indication of the class and warning indication (from Class 1M)
- the identification plate

CLASS 1 LASER PRODUCT
or as alternative the following label:



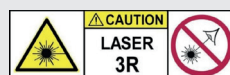
LASER RADIATION
DO NOT STARE INTO BEAM OR EXPOSE
USERS OF TELESCOPIC OPTICS
CLASS 2M LASER PRODUCT
or as alternative the following label:



LASER RADIATION
DO NOT EXPOSE USERS OF TELESCOPIC OPTICS
CLASS 1M LASER PRODUCT
or as alternative the following label:



LASER RADIATION
AVOID DIRECT EYE EXPOSURE
CLASS 3R LASER PRODUCT
or as alternative the following label:



LASER RADIATION
FOLLOW INSTRUCTIONS
CLASS 1C LASER PRODUCT
or as alternative the following label:



WARNING — LASER RADIATION
AVOID EXPOSURE TO BEAM
CLASS 3B LASER PRODUCT
or as alternative the following label:



LASER RADIATION
DO NOT STARE INTO BEAM
CLASS 2 LASER PRODUCT
or as alternative the following label:



DANGER — LASER RADIATION
AVOID EYE OR SKIN EXPOSURE
TO DIRECT OR SCATTERED
RADIATION
CLASS 4 LASER PRODUCT



USER'S OBLIGATIONS

1. Before starting up the unit, the user must read the manual carefully and observe the safety requirements established from who has put the product on the market. For lasers in Class 1 the safety must be guaranteed by those who put the product on the market, while for lasers in Class 3R, 3B and 4 is the user that must take care of their security by providing the laser of a protective casing, if necessary, so that the device meets the requirements of Class 1. If this is not possible due to the machining process, the laser must be employed in a guarded area with controlled access. A risk assessment should illustrate in which cases may exist hazards and what protective equipments must the present people use to save themselves. Note: General provisions on security require the user and the employer to take all necessary measures to ensure the safety and the protection of health at work, to document these measures and to verify the compliance periodically. The rule for laser describes the objectives to be followed to ensure the safety of the users. The legal bases are provided by the Federal Law on Accident Insurance (AIL) and Ordinance Prevention of Accidents and Occupational Diseases (OPI). Another condition is the respect of the exposure limit values in the workplace.
2. Because of the variable range of risk, associated with the Class 3R, the applicability of specific user control (including administrative controls and the staff eye protection) should be clearly described in the instructions.
3. For each type of pointer the buyer has to examine the following two tables.

SAFETY PRECAUTIONS

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ACCESS PANELS AND SAFETY SWITCHES

If the following two conditions occur simultaneously, a safety switch must be mounted at the access to the panels:

- When you want to remove or move the access panel during maintenance operations
- When the transfer or removal of the panel allows the access to levels of laser radiation indicated by X in the following table

Safety class of the laser pointer	Radiation levels which may be accessible during or after the removal of the access panels, if lock switches are not present				
	1, 1M	2, 2M	3R	3B	4
1, 1M, 1C	-	-	X	X	X
2, 2M	-	-	X	X	X
3R	-	-	-	X	X
3B	-	-	-	X	X
4	-	-	-	X	X

SUMMARY OF THE SAFETY CLASSES - REFERENCE STANDARDS CEI EN 60825-1 2017-06

Requirements	Class 1	Class 1M	Class 2	Class 2M	Class 3R	Class 3B	Class 4
Description of the hazard class	Safety under reasonably foreseeable conditions	As Class 1 except may be hazardous if the user employs optics	Low power: eye protection is normally afforded by defense reactions including the eyelid reflex	As Class 2 but may be more hazardous if user employs optics	Direct intrabeam viewing may be hazardous	Direct intrabeam viewing is normally dangerous	High power: dangerous, diffuse reflections may be hazardous. Extreme caution is required
1 Protective housing	-	Required for each laser product, limits access necessary for performance of functions of the products					
2 Safety interlocks in protective housing	Designed to prevent panel removal until accessible emission values are below Class 3R				Designed in some products to prevent panel removal until accessible emission values are lower than Class 3B or 3R		
3 Remote interlock connectors	Not required					Permits easy addition of an external interlock during laser installation. It is not required for some products in Class 3B	
4 Manual reset	Not required						Required if the power has been interrupted or if the remote interlock has been activated
5 Key control	Not required					Laser not operational when the key is removed	
6 Emission warning device	Not required				Visibel or audible alarm when the laser is switches on or if the pulsed laser capacitors are charging. For Class 3R, it applies only if invisible radiation is emitted		
7 Attenuator	Not required					Provides temporarily beam lock	
8 Control location	Not required				Localized controls so that there is no danger of exposure to AELs over Classes 1 or 2, when adjustments are made		
9 Viewing optics	Not required		The emission from all vision systems should be lower than the 1M AEL Class				
10 Scanning	The failure of the tests does not allow the product to exceed its classification						

LASER CLASSES DESCRIPTION

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C.1 - General

This annex contains a description of the classes as well as potentially associated hazards.

The annex is intended as a guide for the manufacturers in their task of describing the hazards associated with the product. This annex also points out limitations of the classification scheme, i.e. situations where the generally associated meaning of the class is not appropriate.

Classification was developed to aid the user in hazard evaluation of the laser and to determine necessary user control measures. Laser classification relates to the potential hazard of the accessible laser radiation in respect to skin or eye damage and does not relate to other potential hazards such as electrical, mechanical or chemical hazards, or hazards from secondary optical radiation. The intent of classification is to re-evaluate the increased risk of injury with increasing powers accessible above the base-line, Class 1 condition and most accurately describes the risk from potential exposures at short distances from the laser. The hazard zone can differ greatly for different lasers within one class. The potential hazard could be greatly reduced by additional user protective measures, including additional engineering controls such as protective housings.

C.2 - Description of classes

C.2.1 - Class 1

Laser products that are safe during use, including long-term direct intra-beam viewing, even when exposure occurs while using telescopic optics. Class 1 also includes high power lasers that are fully enclosed so that no potentially hazardous radiation is accessible during use (embedded laser product). Intra-beam viewing of Class 1 laser products which emit visible radiant energy may still produce dazzling visual effects, particularly in low ambient light. The term "eye-safe" may only be used for Class 1 laser products. The term "eye-safe laser" should not be used to describe a laser, based solely on its output wavelength being greater than 1400 nm. Lasers of any wavelength with sufficient output power can cause injury.

C.2.2 - Class 1M

Laser products that are safe, including long-term direct intra-beam viewing for the naked eye (unaided eye). The MPE can be exceeded and eye injury may occur following exposure with telescopic optics such as binoculars for a collimated beam with a diameter larger than the measurement diameter specified for Condition 3 (see Table 10).

The wavelength region for Class 1M lasers is restricted to the spectral region where most glass optical materials used in optical instruments can significantly transmit, i.e., between 302,5 nm and 4000 nm. Intra-beam viewing of Class 1M laser products which emit visible radiant energy may still produce dazzling visual effects, particularly in low ambient light.

C.2.3 - Class 1C

Laser products that are intended for direct application of laser radiation to the skin or internal body tissues for medical, diagnostic, therapeutic or cosmetic procedures such as hair removal, skin wrinkle reduction, acne reduction. Although the emitted laser radiation may be at Class 3R, 3B or 4 levels, ocular exposures are prevented by one or more engineering means. The exposure level of the skin depends on the application, therefore this aspect is covered by vertical standards. This class was introduced in this standard because these products currently exist in the marketplace, and the control measures normally specified for Class 3B or 4 laser products are inappropriate for them. Technical committees who use Class 1C must develop the required specifications for safety in their vertical standards.

C.2.4 - Class 2

Laser products that emit visible radiation in the wavelength range from 400 nm to 700 nm that are safe for momentary exposures but can be hazardous for deliberate staring into the beam. The time base of 0,25 s is inherent in the definition of the class and presumption is that there is very low risk of injury for momentary exposures that are somewhat longer.

The following factors contribute to precluding injury under reasonably foreseeable conditions:

- unintentional exposures would rarely reflect worst-case conditions, for example, of beam alignment with the pupil for a stabilised head, worst-case accommodation;
- the inherent safety margin in the MPE upon which the AEL is based;
- natural aversion behaviour for exposure to bright light.

For Class 2, in contrast to Class 2M, the use of optical instruments does not increase the risk of ocular injury.

However, dazzle, flash-blindness and after-images may be caused by a beam from a Class 2 laser product, particularly under low ambient light conditions. This may have indirect general safety implications resulting from temporary disturbance of vision or from startle reactions. Such visual disturbances could be of particular concern if experienced while performing safety-critical operations such as working with machines or at height, with high voltages or driving.

Users are instructed by labelling not to stare into the beam, i.e. to perform active protective reactions by moving the head or closing the eyes and to avoid continued intentional intra-beam viewing.

C.2.5 - Class 2M

Laser products that emit visible laser beams and are safe for short time exposure only for the naked (unaided) eye. The MPE can be exceeded and eye injury may occur following exposure with telescopic optics such as binoculars for a collimated beam with a diameter larger than the measurement diameter specified for Condition 3 (see Table 10).

However, dazzle, flash-blindness and after-images may be caused by a beam from a Class 2M laser product, particularly under low ambient light conditions. This may have indirect general safety implications resulting from temporary disturbance of vision or from startle reactions. Such visual disturbances could be of particular concern if experienced while performing safety-critical operations such as working with machines or at height, with high voltages or driving.

Users are instructed by labelling not to stare into the beam, i.e. to perform active protective reactions by moving the head or closing the eyes and to avoid continued intentional intra-beam viewing. Labelling of Class 2M products also instructs against exposing users of telescopic optical instruments.

C.2.6 - Class 3R

Laser products that emit radiation that can exceed the MPE under direct intra-beam viewing, but the risk of injury in most cases is relatively low. The AEL for Class 3R is limited to 5 times the AEL of Class 2 (visible laser radiation) or 5 times the AEL of Class 1 (for non-visible laser radiation). Because of the lower risk, fewer manufacturing requirements and control measures for the user (depending on national regulations) apply than for Class 3B. While Class 3R laser products are not considered intrinsically safe, the risk is limited because

- unintentional exposures would rarely reflect worst-case conditions of (e.g.) beam alignment with a large pupil and worst-case accommodation with the entire beam energy entering the eye,
- of the inherent reduction factor (safety margin) in the MPE,
- of natural aversion behaviour for exposure to bright light for the case of visible radiation and by the response to heating of the cornea for infrared radiation.

The risk of injury increases with exposure duration, and exposure may be hazardous for ocular exposure under worst-case conditions or for intentional

LASER CLASSES DESCRIPTION

2/2

direct intra-beam viewing.

Due to the varying range of the risk that is associated with Class 3R lasers, the applicability of specific user controls (including administrative controls and personal eye protection) should be clearly described in the user instructions.

NOTE: Compared to ocular MPE values as well as AEL values for Class 1, 1M, 2, 2M and 3R specified in the second edition of IEC 60825-1, the respective values in this third edition were decreased for some single-pulsed point sources, but increased for most repetitively pulsed sources, and also increased for most pulsed extended sources; reduction factors (safety margins) in these values were changed correspondingly. Consequently, some pulsed products that were classified as Class 3R under Edition 2 are Class 2 under Edition 3, and some pulsed products that were classified as Class 3B under Edition 2 are Class 3R under Edition 3. For the latter, there is less practical experience available regarding the risk for injury as it exists for CW sources with collimated beams with powers up to 5 mW being used for many years as alignment lasers.

Dazzle, flash-blindness and after-images may be caused by a beam from a Class 3R laser product in the visible wavelength range (as from a Class 2 laser), particularly under low ambient light conditions. This may have indirect general safety implications resulting from temporary disturbance of vision or from startle reactions. Such visual disturbances could be of particular concern if experienced while performing safety-critical operations such as working with machines or at height, with high voltages or driving.

Class 3R lasers should only be used where direct intra-beam viewing is unlikely.

C.2.7 - Class 3B

Laser products that are normally hazardous when intra-beam ocular exposure occurs (i.e. within the NOHD) including accidental short time exposure. Viewing diffuse reflections is normally safe. Class 3B lasers which approach the AEL for Class 3B may produce minor skin injuries or even pose a risk of igniting flammable materials. However, this is only likely if the beam has a small diameter or is focussed.

NOTE: There exist some theoretical (but rare) viewing conditions where viewing a diffuse reflection could exceed the MPE. For example for Class 3B lasers having powers approaching the AEL, lengthy viewing of greater than 10 s of true diffuse reflections of visible radiation and viewing at distances less than 13 cm between the diffusing surface and the cornea can exceed the MPE.

C.2.8 - Class 4

Laser products for which intra-beam viewing and skin exposure is hazardous and for which the viewing of diffuse reflections may be hazardous. These lasers also often represent a fire hazard.

C.2.9 - Note on nomenclature

"C" in Class 1C is derived from the mode of operation where laser radiation above the AEL of Class 1 can be emitted only when the applicator is in contact with (or very close to) the skin or internal body tissue.

"M" in Class 1M and Class 2M is derived from magnifying optical viewing instruments. "R" in Class 3R is derived from reduced, or relaxed, requirements: reduced requirements both for the manufacturer (e.g. no key switch, beam stop or attenuator and interlock connector required) and the user. The "B" for Class 3B has historical origins, as in a previous version of this standard (IEC 60825-1:1993), a Class 3A existed, which had a similar meaning to what is now Class 1M and Class 2M.

It should be noted that for the above descriptions, whenever "hazardous" is used or there is a reference to a high risk of injury, this hazard and risk only exists within the area around the laser where the corresponding MPE levels are exceeded. For exposure of the naked eye, this area is bounded by the NOHD, or for well collimated Class 1M and 2M viewed with binoculars or telescopes, the extended NOHD (ENOH). It may well be that a particular (Class 3B or Class 4) laser product has a very short NOHD associated with it, so that for a particular installation or application, for personnel outside the NOHD eye protection is not necessary. Examples of such installations are scanning lasers or line lasers mounted on the ceiling of the manufacturing hall that project a pattern or line onto the work-piece in the work area below. While the power level and scan pattern could be such that the exposure in the work area is below the MPE and therefore safe, maintenance and service routines will need special consideration. For example, exposure at closer distances might be hazardous, for instance, when the user is up on a ladder cleaning an exit window. Another example is that, whilst a scan pattern might be safe, a hazard may arise if the beam reverts to the non-scanning mode. In addition, for Class 4 laser products, there is a NOHD associated with diffuse reflections (although this NOHD is likely to be quite limited in extent). The characterisation of the hazard associated with a particular laser and application is part of a risk assessment.

Classification tests are designed to be rather "worst-case" and restrictive in order to ensure that a "low-class" (e.g. Class 1) product does not present a hazard to the eye or skin even in reasonably foreseeable worst-case situations; the test conditions are designed to consider a variety of worst-case situations (see Sliney et al.). Consequently, a Class 3B or Class 4 product can still be designed in such a way that it can be considered safe for its intended use and normal operation, since the hazard only becomes accessible in worst-case situations. For instance, the product could feature a protective housing (which complies with IEC 60825-4) but fails to be an embedded Class 1 laser product because of the following reasons:

- the protective housing fails the test according to this Part 1 for an extended period (whereas for machines according to IEC 60825-4 a shorter evaluation time may be used)
- it has no top cover but would be considered safe for an environment where no persons are present above the guard
- it does not feature an automatic detection of walk-in access. (However, in a controlled environment, this can be replaced by an organisational safety measure of individualised locks that prevent closure of the door when somebody is inside the protective housing - which does not affect the classification but represents a procedure which achieves the desired level of safety for the user)

In cases where the hazard associated with a Class 3B and Class 4 laser product is limited to within the housing, organisational safety measures may be sufficient. Similarly, for a laser system with no roof, or a situation where burn-through of the guard may occur after some longer lasting fault, organisational safety measures may be sufficient.

Other examples exist where the hazards associated with Class 3B and Class 4 lasers arise only in specific situations. For example, consider the situation in which the classification is based on an accessory such as a collimating lens applied to a highly divergent source for low level laser therapy. This product may be classified as Class 3B based on the accessory lens being screwed on, since this lens produces a potentially hazardous collimated beam. However use without the accessory being screwed on, which would result in a divergent beam, could be safe (i.e. any exposure to the eye would be below the MPE). Thus a hazard area would only exist around the laser once the accessory has been screwed on.



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