



CATALOGUE

LASER POINTERS



www.smprox.it



Production:  Made in Italy

Certificate:  

Edition June 2017.

With the publication of this catalogue all former catalogues are invalid.

Ed. 06/17 - All specifications are subject to change without notice

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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 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 the applications of the wood, marble or textile industries.

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 43).

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RED LIGHT LASER POINTERS

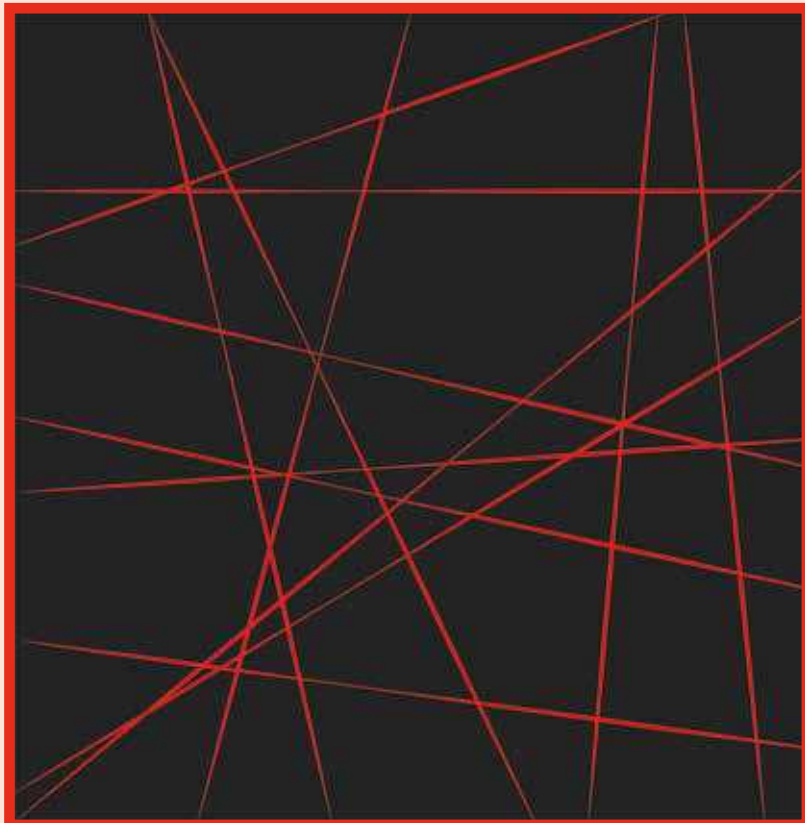
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RED LIGHT LASER POINTERS



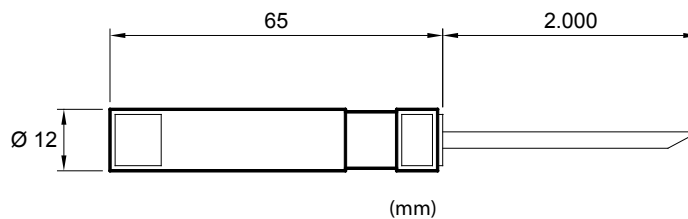
LASER POINTER LSE12 SERIE - RED LIGHT - $\varnothing 12$ - 3mW



Laser pointers made of a high quality red laser diode and plastic lens for line.

Art. no.	Type	Lens for line - Plastic lens			
		Opening angle / Line length			
		at 500mm high		at 1000mm high	
SM317010	LSV12-635-3-T20-15E	15°	150mm	15°	300mm
SM317011	LSV12-635-3-T20-36E	36°	400mm	36°	900mm
SM317012	LSV12-635-3-T20-45E	45°	500mm	45°	1000mm
SM317013	LSV12-635-3-T20-60E	60°	700mm	60°	1200mm
SM317014	LSV12-635-3-T20-90E	90°	900mm	90°	2000mm*
SM317015	LSV12-635-3-T20-110E	110°	1000mm	110°	2700mm*
SM317016	LSV12-635-3-T20-130E	130°	2100mm	130°	4200mm*

*** it is suggested to use at 500mm**

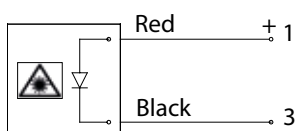


Power supply	5...36 Vdc
Power	3 mW
Wave length	635 nm
Life time	≥ 20.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	no
Tolerance of lens for line	± 15%
Min. line thickness	~ 1,5 mm
Current consumption	< 10 mA typical
Automatic control of the output power	yes
Reverse polarity protection and overvoltage protection	yes
Housing material	plastic
Cable connection	2000 mm
Degree of protection	IP67
Safety 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

Cable connection



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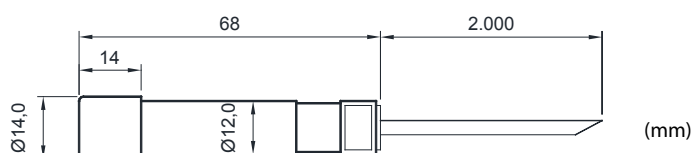
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LASER POINTER LSV12 SERIE - RED LIGHT - $\varnothing 12$ - 3mW



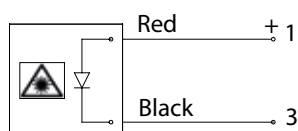
Laser pointers made of a high quality red laser diode and plastic lens for cross.

Art. no.	Type	Cross - Plastic lens			
		Opening angle / Cross dimensions			
		at 500mm hight		at 1000mm hight	
SM313002	LSV12-635-3-T20-X9E	9°	75x75mm	9°	150x150mm
SM317008	LSV12-635-3-T20-X15E	15°	120x120mm	15°	250x250mm
SM317009	LSV12-635-3-T20-X60E	60°	450x450mm	60°	900x900mm



Power supply	5...36 Vdc
Power	3 mW
Wave lenght	635 nm
Life time	≥ 20.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	yes, by screwdriver
Tollerance of lens for line	± 15%
Min. line thickness	~ 1,5 mm
Current consumption	< 10 mA typical
Automatic control of the output power	yes
Reverse polarity protection and overvoltage protection	yes
Housing material	plastic
Cable connection	2000 mm
Degree of protection	IP67
Safety 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	

Cable connection



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



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

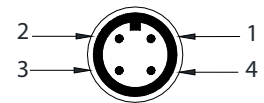
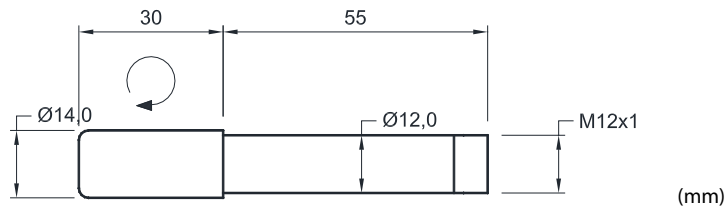
This laser pointer generates a line of only 0.5mm thickness and therefore it is suitable for those applications where a thin and long line is required.

The adjustment of the focus gives the possibility to obtain a clear and well visible line at max. 250mm high from the work surface.

Safety classe 1 for safe use.



Connection M12x1 connector



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

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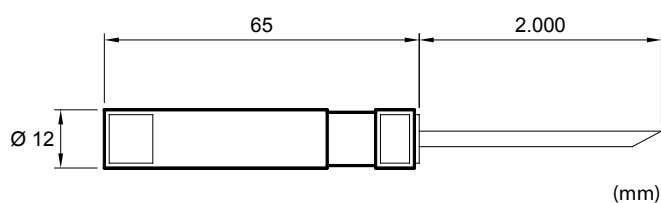
Type	LSVR12-635-0.4-T20-PL90-Y
Art. no.	SM317004
Lens	line Powell Lens
Line lenght at 100mm high	180mm
Line lenght at max. 250mm high	380mm
Power supply	5...36 Vdc
Power	0.4 mW
Wave lenght	635 nm
Life time	≥ 20.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	yes
Tollerance of lens for line	± 15%
Min. line thickness	0.5mm (white surface)
Current consumption	~ 10 mA typical
Automatic control of the output power	yes
Reverse polarity protection and overvoltage protection	yes
Housing material	plastic
Connection	conn. M12x1
Degree of protection	IP67
Safety 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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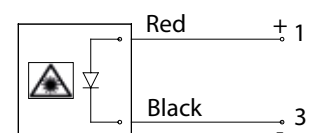
LASER POINTER LSV12 SERIE - RED LIGHT - $\varnothing 12$ - 5mW



Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 5 mW.



Cable connection



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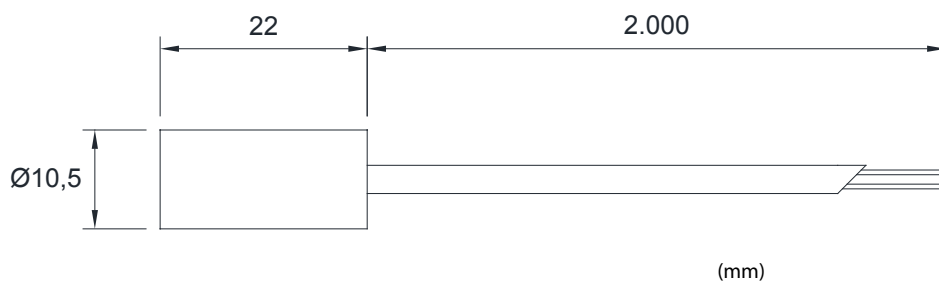
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Type	LSV12-635-5-T20-90-E
Art. no.	SM316020
Lens	line 90° plastic lens
Line length at 1 m	2.000 mm
Power supply	5...36 Vdc
Power	5 mW
Wave length	635 nm
Life time	≥ 20.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	no
Tolerance of lens for line	± 15%
Min. line thickness	~ 1,5 mm
Current consumption	~ 10 mA typical
Automatic control of the output power	yes
Reverse polarity protection and overvoltage protection	yes
Housing material	plastic
Cable connection	2000 mm
Degree of protection	IP67
Safety 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	

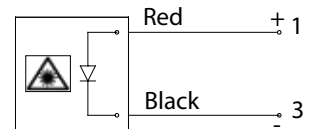
LASER POINTER LSE10 SERIE - RED LIGHT - Ø10.5 - 1mW



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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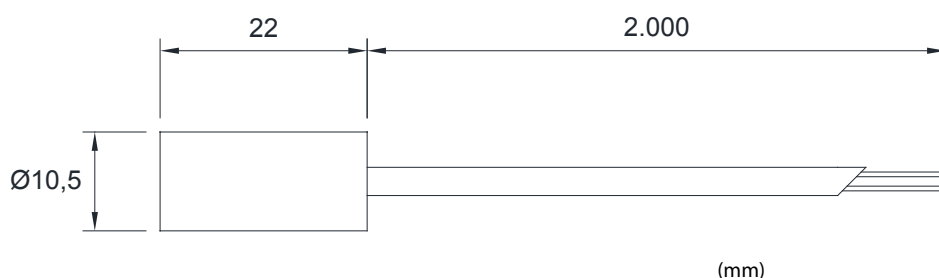
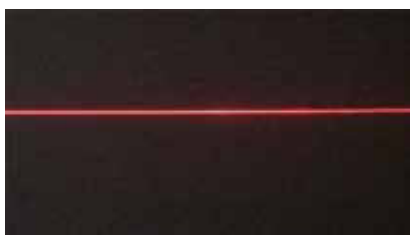
Type	LSE10-635-1-T10-P
Art. no.	SM316019
Lens type	point
Point diameter at 1 m (mm)	~ 1,0
Power supply	5,0 Vdc
Power	< 1 mW a 25° C
Wave length	635 ± 5 nm
Life time	≥ 10.000 h
Permitted temperature	-10°...+50°C
Current consumption	< 40 mA
Focus adjustment	fixed
Housing material	brass
Cable connection	2 wires, 2000 mm
Safety class	2

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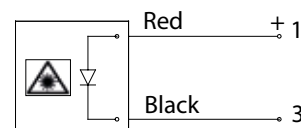
LASER POINTER LSE10 SERIE - RED LIGHT - Ø10.5 - 3.5mW



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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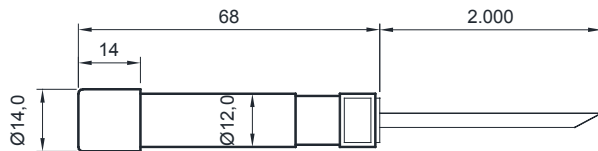
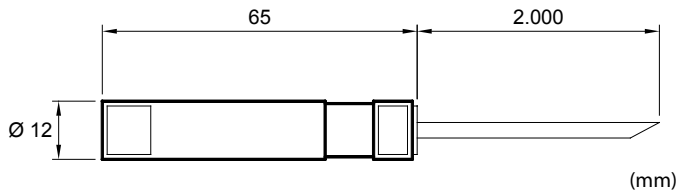
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Type	LSE10-635-3-T10-115
Art. no.	SM315003
Lens type	line with plastic lens 115°
Line thickness at 1 m (mm)	~ 1,0
Power supply	5,0 Vdc
Power	< 3,5 mW a 25° C
Wave length	635 ± 5 nm
Life time	≥ 10.000 h
Permitted temperature	-10°...+50°C
Current consumption	< 45 mA
Focus adjustment	fixed
Housing material	plastic
Cable connection	2 wires, 150 mm
Safety class	2

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

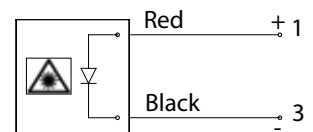


Laser pointer made of a red laser diode, available with 650 nm wavelength and a power of 1 mW.
Suitable for uses at max 1 m distance.



Dimension art. SM308010 (**)(mm)

Cable connection



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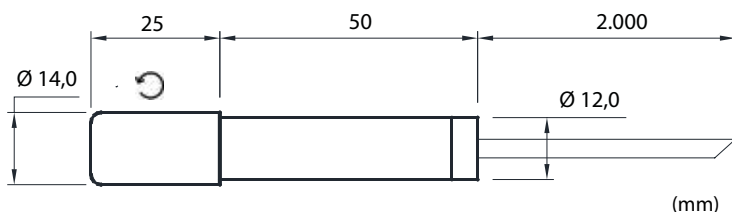
Type	LSE12-650-1-T10-P	LSE12-650-1-T10-X	LSE12-650-1-T10-60
Art. no.	SM308004	SM308010 (**)	SM309001
Lens type	point	cross Plastics Diffractive Lens	line with lens 60° Glass Rod Lens
Point diameter at 1 m (mm) ~	$\varnothing 1,0$	-	-
Cross dimension at 1 m (mm)	-	150 x 150	-
Line length at 1 m (mm)	-	-	1.100
Power supply	5,0 Vdc		
Power	1 mW		
Wave length	650 nm		
Life time	≥ 10.000 h		
Permitted temperature	$-10^{\circ}\dots+50^{\circ}\text{C}$		
Focus adjustment	yes, by screwdriver	yes	no
Tolerance of lens for line	$\pm 15\%$		
Min. line thickness	$\sim 1,5$ mm		
Current consumption	~ 20 mA typical		
Automatic control of the output power	yes		
Reverse polarity protection and overvoltage protection	yes		
Housing material	plastic		
Cable connection	2000 mm		
Degree of protection	IP40	IP54	IP67
Safety 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.			
Laser according to the standard EN 60825-1: 2015-12			

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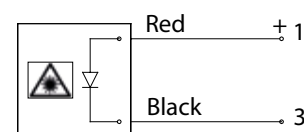
LASER POINTER LSR12 SERIE - RED LIGHT - $\varnothing 12$ - 1mW



Laser pointer made of a red laser diode, available with 650 nm wavelength and a power of 1 mW.
The beam can be focused.
Suitable for uses at max 1 m distance.



Cable connection



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Type	LSR12-650-1-T10-P	LSR12-650-1-T10-X	LSR12-650-1-T10-60
Art. no.	SM316011	SM316010	SM316001
Lens type	point	cross Plastics Diffractive Lens	line with lens 60° Glass Rod Lens
Line length at 1 m (mm)	-	-	1.100
Cross dimension at 1 m (mm)	-	150x150	-
Point diameter at 1 m (mm) ~	$\varnothing 1,0$	-	-
Power supply	5,0 Vdc		
Power	1 mW		
Wave length	650 nm		
Life time	≥ 10.000 h		
Permitted temperature	$-10^{\circ} \dots +50^{\circ}C$		
Focus adjustment	yes		
Tolerance of lens for line	$\pm 15\%$		
Min. line thickness	~ 1,5 mm		
Current consumption	~ 20 mA typical		
Automatic control of the output power	yes		
Reverse polarity protection and overvoltage protection	yes		
Housing material	aluminium		
Cable connection	2000 mm		
Degree of protection	IP67		
Safety 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			

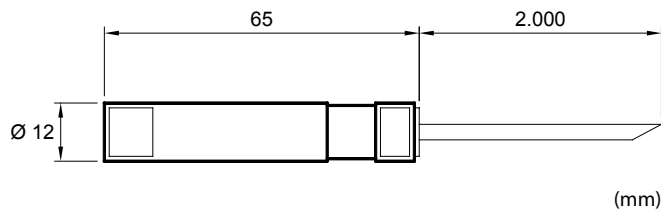
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LASER POINTER LS12 SERIE - RED LIGHT - $\varnothing 12$ - 3mW

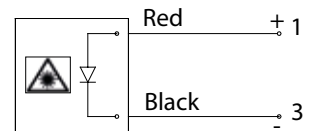


Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 3 mW.

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



Cable connection



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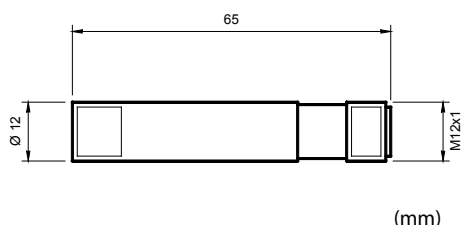
Type	LS12-635-3-T20-P-V
Art. no.	SM305001
Lens type	point
Point diameter at 1 m (mm) ~	$\varnothing 2,5$
Power supply	5,0 Vdc
Power	3 mW
Wave length	635 nm
Life time	≥ 20.000 h
Permitted temperature	$-10^{\circ}\dots+50^{\circ}\text{C}$
Focus adjustment	yes, by screwdriver
Current consumption	~ 40 mA
Automatic control of the output power	yes
Reverse polarity protection and overvoltage protection	yes
Housing material	plastic
Cable connection	2000 mm
Degree of protection	IP40
Safety 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	

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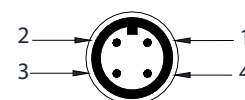
LASER POINTER LS12 SERIE - RED LIGHT - Ø12 - 3mW



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



Connection M12x1 connector



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

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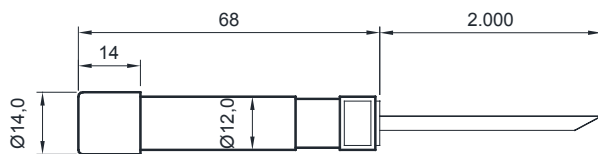
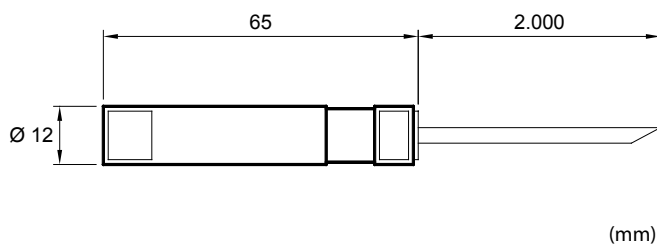
Type	LS12-635-3-T20-P-Y1	LS12-635-3-T20-X-Y1	LS12-635-3-T20-60-Y1
Art. no.	SM314005	SM305009	SM307005
Lens type	point	cross Plastics Diffractive Lens	line with lens 60° Glass Rod Lens
Point diameter at 1 m (mm) ~	Ø 2,5	-	-
Cross dimension at 1 m (mm)	-	150 x 150	-
Line length at 1 m (mm)	-	-	1.100
Power supply	5,0 Vdc		
Power	3 mW		
Wave length	635 nm		
Life time	≥ 20.000 h		
Permitted temperature	-10°...+50°C		
Focus adjustment	yes, by screwdriver	no	no
Tolerance of lens for line	± 15%		
Min. line thickness	~ 1,5 mm		
Current consumption	~ 40 mA typical		
Automatic control of the output power	yes		
Reverse polarity protection and overvoltage protection	yes		
Housing material	plastic		
Connection	M12x1 plastic connector		
Degree of protection	IP40	IP67	IP67
Safety class	2M	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 LS12 SERIE - RED LIGHT - $\phi 12$ - 3mW

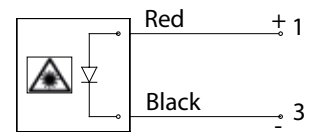


Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 3 mW.



Dimension art. SM314006 (**) (mm)

Cable connection



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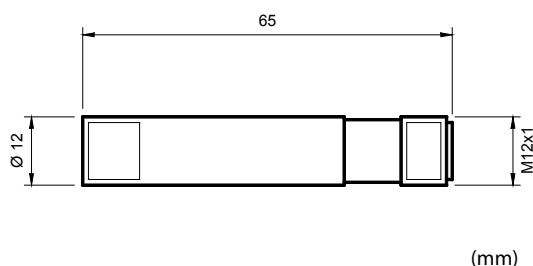
Type	LS12-635-3-T20-P	LS12-635-3-T20-X	LS12-635-3-T20-60
Art. no.	SM305010	SM314006 (**)	SM306005
Lens type	point	cross Plastics Diffractive Lens	line with lens 60° Glass Rod Lens
Point diameter at 1 m (mm) ~	$\phi 2,5$	-	-
Cross dimension at 1 m (mm)	-	150 x 150	-
Line length at 1 m (mm)	-	-	1.100
Power supply	5,0 Vdc		
Power	3 mW		
Wave length	635 nm		
Life time	≥ 20.000 h		
Permitted temperature	$-10^{\circ} \dots +50^{\circ}C$		
Focus adjustment	yes, by screwdriver	yes	no
Tolerance of lens for line	$\pm 15\%$		
Min. line thickness	$\sim 1,5$ mm		
Current consumption	~ 40 mA typical		
Automatic control of the output power	yes		
Reverse polarity protection and overvoltage protection	yes		
Housing material	plastic		
Cable connection	2000 mm		
Degree of protection	IP40	IP67	IP67
Safety class	2M	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 LSM12 SERIE - 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.
Aluminium housing.



Connection M12x1 connector



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

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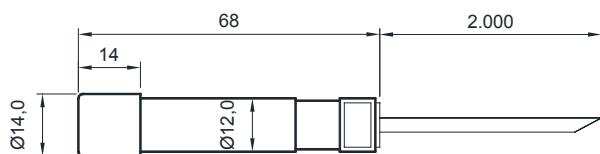
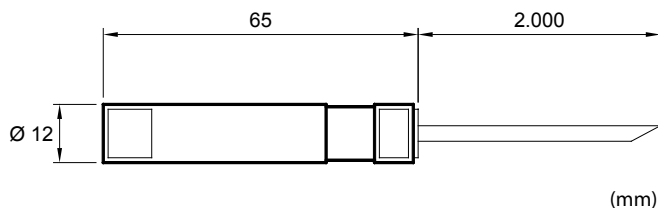
Type	LSM12-635-3-T20-X-Y1
Art. no.	SM315004
Lens type	cross Plastics Diffractive Lens
Cross dimension at 1 m (mm)	150 x 150
Power supply	5,0 Vdc
Power	3 mW
Wave length	635 nm
Life time	≥ 20.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	no
Tolerance of lens for line	$\pm 15\%$
Min. line thickness	$\sim 1,5$ mm
Current consumption	~ 40 mA typical
Automatic control of the output power	yes
Reverse polarity protection and overvoltage protection	yes
Housing material	aluminium
Connection	metal M12x1 connector
Degree of protection	IP67
Safety 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	

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

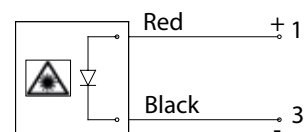


Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 3 mW.



Dimension art. SM313002 (**) (mm)

Cable connection



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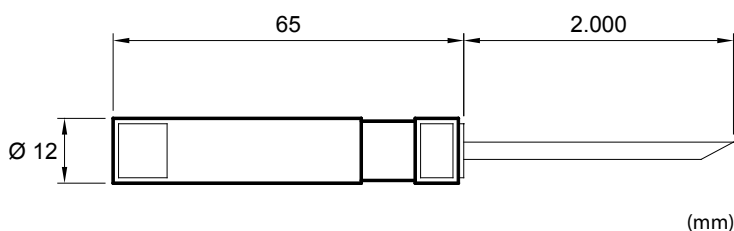
Type	LSV12-635-3-T20-P	LSV12-635-3-T20-X9E	LSV12-635-3-T20-60
Art. no.	SM309002	SM313002 (**)	SM306010
Lens type	point	cross Plastics Diffractive Lens	line with lens 60° Glass Rod Lens
Point diameter at 1 m (mm) ~	$\varnothing 2,5$	-	-
Cross dimension at 1 m (mm)	-	150 x 150	-
Line length at 1 m (mm)	-	-	1.100
Power supply	5...36 Vdc		
Power	3 mW		
Wave length	635 nm		
Life time	≥ 20.000 h, only with metal fixing		
Permitted temperature	$-10^{\circ}\dots+50^{\circ}\text{C}$		
Focus adjustment	yes, by screwdriver	yes	no
Tolerance of lens for line	$\pm 15\%$		
Min. line thickness	$\sim 1,5$ mm		
Current consumption	~ 10 mA typical		
Automatic control of the output power	yes		
Reverse polarity protection and overvoltage protection	yes		
Housing material	plastic		
Cable connection	2000 mm		
Degree of protection	IP40	IP54	IP67
Safety class	2M	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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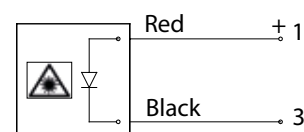
LASER POINTER LSV12 SERIE - RED LIGHT - ø12 - 3mW



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



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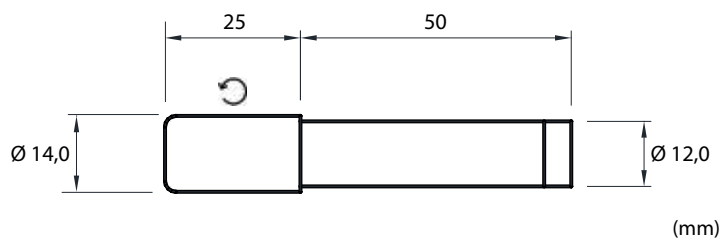
Type	LSV12-635-3-T20-LC75
Art. no.	SM314017
Lens type	line with lens 75° Glass Rod Lens
Line length at max 1 m (mm)	1.200
Power supply	5...36 Vdc
Power	3 mW
Wave length	635 nm
Life time	≥ 20.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	no
Tolerance of lens for line	± 20%
Min. line thickness	< 1,5 mm
Current consumption	~ 10 mA typical
Automatic control of the output power	yes
Reverse polarity protection and overvoltage protection	yes
Housing material	plastic
Cable connection	2000 mm
Degree of protection	IP67
Safety 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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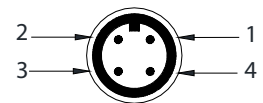
LASER POINTER LSVR12 SERIE - RED LIGHT- \varnothing 12 - 3mW



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 at page 41

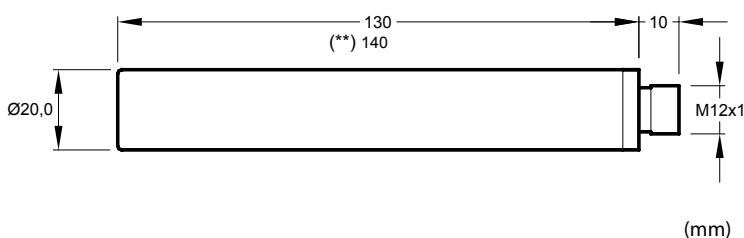
Type	LSVR12-635-3-T20-P-Y	LSVR12-635-3-T20-X-Y	LSVR12-635-3-T20-60-Y	LSVR12-635-3-T20-75-Y
Art. no.	SM315010	SM315011	SM315012	SM315013
Lens type	point	cross Plastics Diffractive Lens	line with lens 60° Glass Rod Lens	line with lens 75° Glass Rod Lens
Point diameter at 1 m (mm) ~	\varnothing 2,5	-	-	-
Cross dimension at 0,5 m (mm)	-	75x75	-	-
Cross dimension at 1 m (mm)	-	150x150	-	-
Line length at 0,5 m (mm)	-	-	600	1.500
Line length at 1 m (mm)	-	-	1.100	3.000
Power supply	5...36 Vdc			
Power	3 mW			
Wave length	635 nm			
Life time	\geq 20.000 h			
Permitted temperature	-10°...+50°C			
Focus adjustment	yes			
Tolerance of lens for line	\pm 15%			
Min. line thickness	-	~ 1,5 mm	~ 2 mm	~ 1 mm
Current consumption	~ 10 mA typical			
Automatic control of the output power	yes			
Reverse polarity and overvoltage protections	yes			
Housing material	aluminium			
Connection	M12x1 connector			
Degree of protection	IP67			
Safety class	2M	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.				
Laser according to the standard EN 60825-1: 2015-12				

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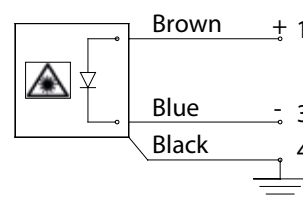
LASER POINTER LSV20 SERIE - RED LIGHT - ø20 - 5mW



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.



Connection M12x1 connector

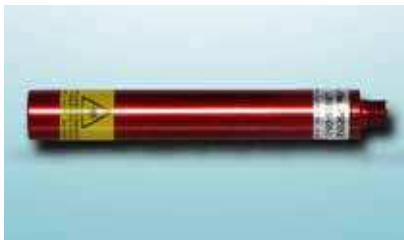


Accessories at page 41

Type	LSV20-R5-P	LSV20-R5-X (**)	LSV20-R5-L
Art. no.	SM313005	SM314008	SM314009
Lens type	point	cross Plastics Diffractive Lens	line Glass Rod Lens
Line length at 1 m (mm)	-	-	2.000
Point diameter at 1 m (mm) ~	Ø 3,0	-	-
Cross dimension at 1 m (mm)	-	150x150	-
Power supply	6...24 Vdc / 6...12 Vac		
Power	5 mW		
Wave length	635 nm		
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 protection and overvoltage protection	yes		
Housing material	anodized aluminium		
Connection	M12x1 connector		
Degree of protection	IP40	IP67	IP67
Safety 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			
In event of electrostatic discharges connect the laser pointer with the shielded cable and the earth, article SM515001.			

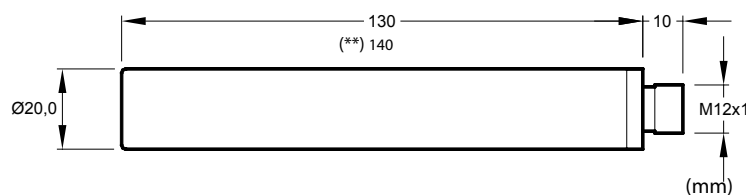
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LASER POINTER LSV20 SERIE - RED LIGHT - Ø20 - 15mW

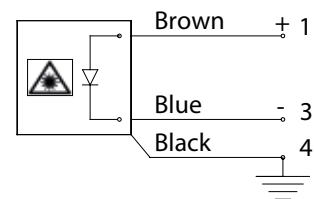


Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 15mW. This laser pointer can generate a point, a line or a cross. On request different lengths of line.

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



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
Lens type	point	cross Plastics Diffractive Lens	line with lens 15° Glass Rod Lens	line with lens 100° Glass Rod Lens
Line length at 1 m (mm)	-	-	250	4.000-5.000
Point diameter at 1 m (mm) ~	Ø 4,0	-	-	-
Cross dimension at 1 m (mm)	-	150x150	-	-
Power supply	6...24 Vdc / 6...12 Vac			
Power	15 mW			
Wave length	635 nm			
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 aluminium			
Connection	M12x1 connector			
Degree of protection	IP40	IP67	IP67	IP67
Safety 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				
In event of electrostatic discharges connect the laser pointer with the shielded cable and the earth, article SM515001.				

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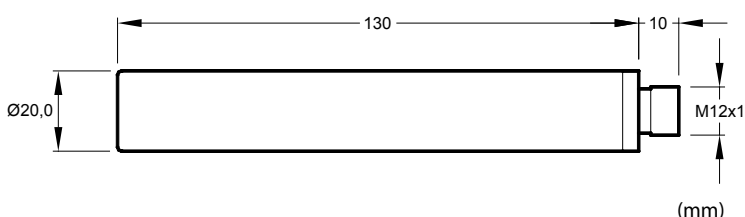
LASER POINTER LSK20 SERIE - RED LIGHT - Ø20 - 15mW



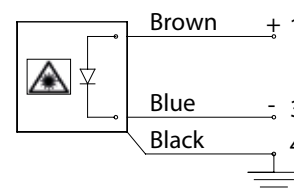
Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 15mW. This laser pointer can generate a point, a line or a cross. On request different lengths of line.

Thanks to the plastic housing and the protection glass, it is suitable for harsh applications or ambients with water.

This laser pointer offers a better resistance to noises. (*)



Connection M12x1 connector



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Type	LSK20-R15-L
Art. no.	SM316002
Lens type	line with lens 100° Glass Rod Lens
Line length at 1 m (mm)	4.000-5.000
Power supply	6...24 Vdc / 6...12 Vac
Power	15 mW
Wave length	635 nm
Life time	≥ 20.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	no
Current consumption	< 50 mA
Reverse polarity protection and overvoltage protection	yes
Housing material	PVC
Connection	M12x1 connector
Degree of protection	IP67
Safety 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

(*) In event of electrostatic discharges connect the laser pointer with the shielded cable and the earth, article SM515001.

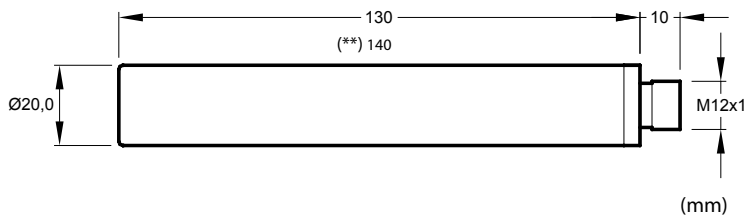
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LASER POINTER LSV20 SERIE - RED LIGHT - Ø20 - 20mW

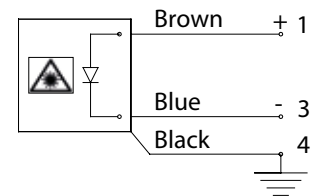


Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 20mW. This laser pointer can generate a point, a line or a cross. On request different lengths of line.

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



Connection M12x1 connector



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Type	LSV20-R20-P	LSV20-R20-X (**)	LSV20-R20-L
Art. no.	SM314015	SM314016	SM312002
Lens type	point	cross Plastics Diffractive Lens	line Glass Rod Lens
Line length at 1 m (mm)	-	-	4.000-6.000
Point diameter at 1 m (mm) ~	Ø 5,0	-	-
Cross dimension at 1 m (mm)	-	150x150	-
Power supply	6...24 Vdc / 6...12 Vac		
Power	20 mW		
Wave length	635 nm		
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 protection and overvoltage protection	yes		
Housing material	anodized aluminium		
Connection	M12x1 connector		
Degree of protection	IP40	IP67	IP67
Safety class	3R	2M	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			
In event of electrostatic discharges connect the laser pointer with the shielded cable and the earth, article SM515001.			

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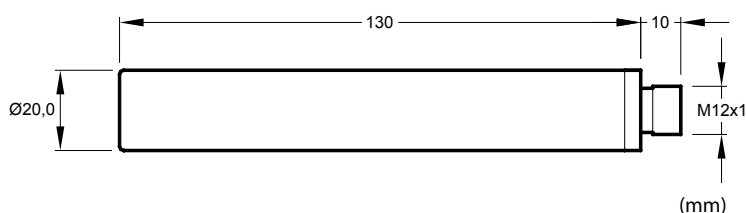
LASER POINTER LSK20 SERIE - RED LIGHT - $\varnothing 20$ - 20mW



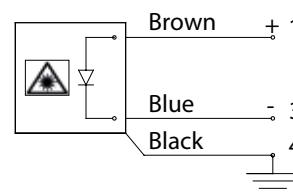
Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 20mW. This laser pointer generates a line. On request different lengths of line.

Thanks to the plastic housing and the protection glass, it is suitable for harsh applications or ambients with water.

This laser pointer offers a better resistance to noises. (*)



Connection M12x1 connector



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Type	LSK20-R20-L
Art. no.	SM314018
Lens type	line with lens 100° Glass Rod Lens
Line length at 1 m (mm)	4.000-6.000
Power supply	6...24 Vdc / 6...12 Vac
Power	20 mW
Wave length	635 nm
Life time	≥ 20.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	no
Current consumption	< 50 mA
Reverse polarity protection and overvoltage protection	yes
Housing material	PVC
Connection	M12x1 connector
Degree of protection	IP67
Safety 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

(*) In event of electrostatic discharges connect the laser pointer with the shielded cable and the earth, article SM515001.

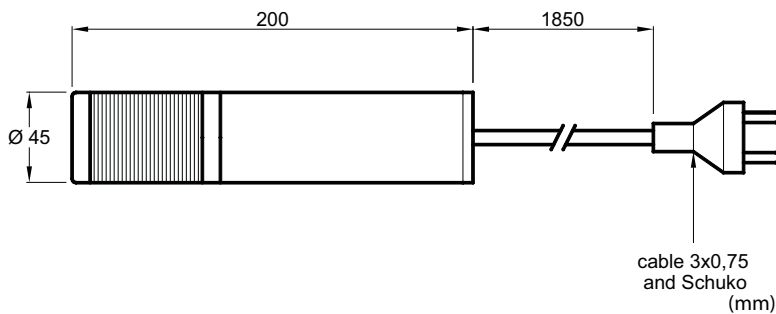
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LASER POINTER LSA45 SERIE - RED LIGHT - $\varnothing 45$ - 15mW

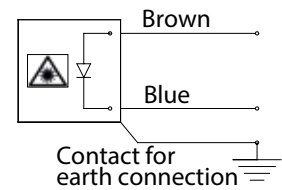


Laser pointer made of a high quality red laser diode, available with 635 nm wavelength and a power of 15mW.

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



Cable connection



The brightness of the lines depends on the ambient light and on the color of the object on which they are projected.

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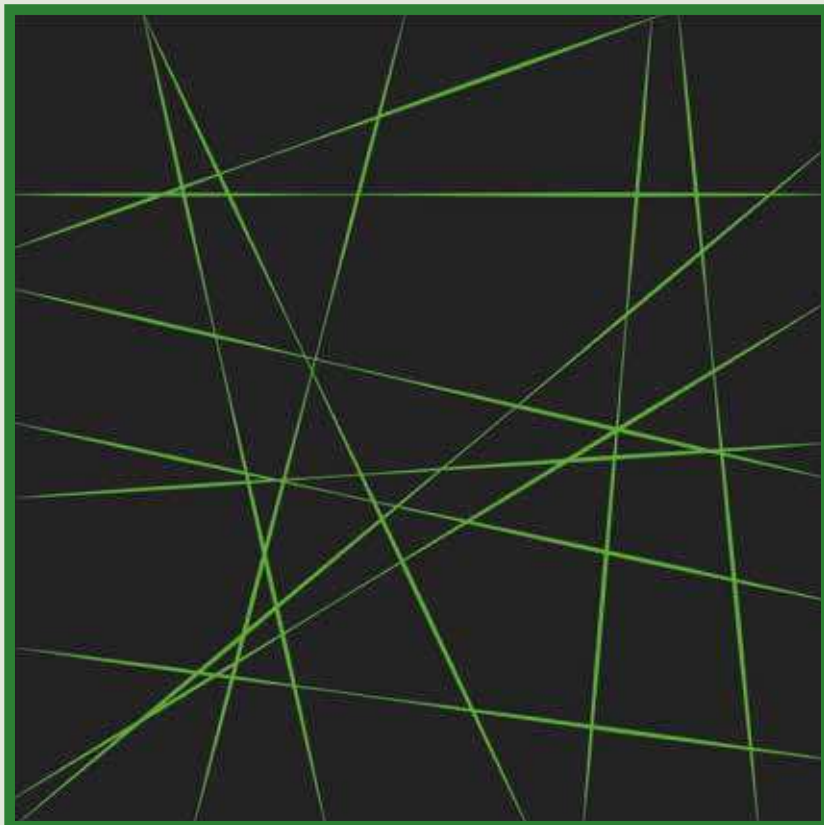
Type	LSA45-635-15-T20-100
Art. no.	SM311002
Lens type	line with lens 100° Glass Rod Lens
Line length at 1 m (mm)	4.000
Power supply	120...275 Vdc / 85...264 Vac
Power	15 mW
Wave length	635 nm
Life time	≥ 20.000 h
Permitted temperature	-10°...+50°C
Focus adjustment	no
Tolerance of the lens for line	± 15%
Current consumption	< 300 mA
Housing material	aluminium
Connection	cable 1850 mm - 3x0,75 and Schuko
Degree of protection	IP67
Safety 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	
In event of electrostatic discharges connect the grounding plug to the nearest possible earth.	

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LASER POINTERS

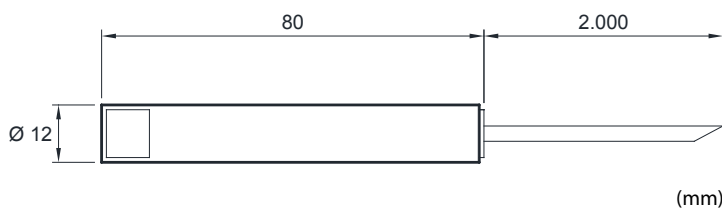
GREEN LIGHT



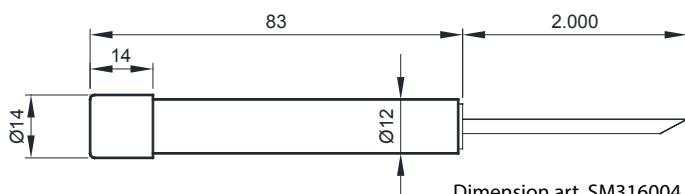
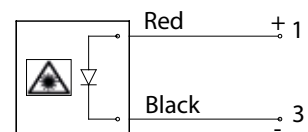
LASER POINTER LS12 SERIE - GREEN LIGHT - $\varnothing 12$ - 1mW



Laser pointer made of a high quality green laser diode, available with 532 nm wavelength and a power of 1 mW.



Cable connection



Dimension art. SM316004 and SM316003 (**) (mm)

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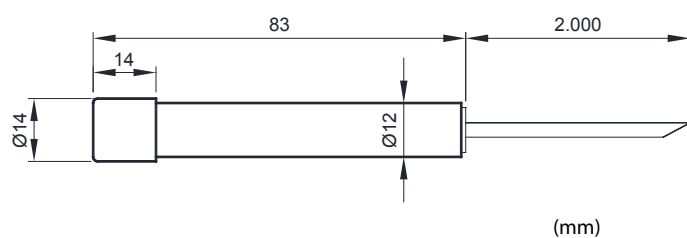
Type	LS12-532-1-T10-P	LS12-532-1-T10-X	LS12-532-1-T10-60
Art. no.	SM315006	SM316004 (**)	SM316003 (**)
Lens type	point	cross Plastics Diffractive Lens	line with lens 60° Plastics Diffractive Lens
Point diameter at 1 m (mm) ~	$\varnothing < 2,0$	-	-
Cross dimension at 1 m (mm)	-	150 x 150	-
Line length at 1 m (mm)	-	-	1.200
Power supply	5,0 Vdc		
Power	1 mW		
Wave length	532 nm		
Life time	≥ 10.000 h		
Permitted temperature	0°...+40°C		
Focus adjustment	no	yes	yes
Tolerance of lens for line	$\pm 15\%$		
Min. line thickness	~ 1 mm		
Current consumption	< 200 mA		
Automatic control of the output power	yes		
Reverse polarity protection and overvoltage protection	yes		
Housing material	anodized aluminium		
Cable connection	2.000 mm		
Degree of protection	IP67		
Safety 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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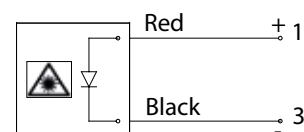
LASER POINTER LS12 SERIE - GREEN LIGHT - Ø12 - 5mW



Laser pointer made of a high quality green laser diode, available with 532 nm wavelength and a power of 5 mW.



Cable connection



Accessories at page 41

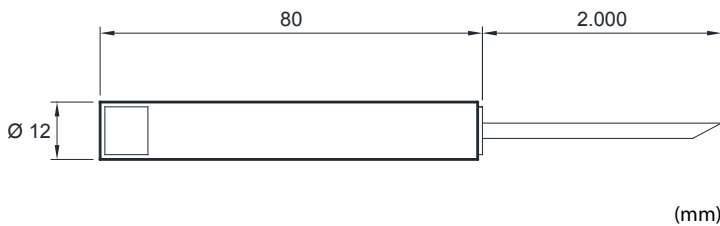
Type	LS12-532-5-T10-60
Art. no.	SM316013
Lens type	line with lens 60° Plastics Diffractive Lens
Line length at 1 m (mm)	1.200
Power supply	5,0 Vdc
Power	5 mW
Wave length	532 nm
Life time	≥ 10.000 h
Permitted temperature	0°...+40°C
Focus adjustment	yes
Tolerance of lens for line	± 15%
Min. line thickness	~ 1 mm
Current consumption	< 200 mA
Automatic control of the output power	yes
Reverse polarity protection and overvoltage protection	yes
Housing material	anodized aluminium
Cable connection	2.000 mm
Degree of protection	IP67
Safety 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	

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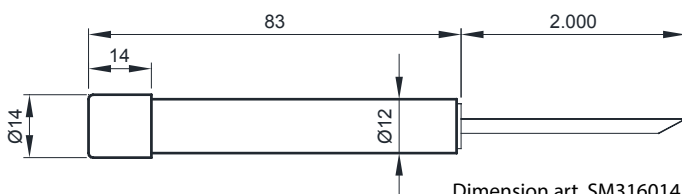
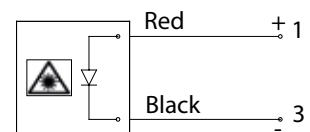
LASER POINTER LSV12 SERIE - GREEN LIGHT - Ø12 - 5mW



Laser pointer made of a high quality green laser diode, available with 532 nm wavelength and a power of 5 mW.



Cable connection



Dimension art. SM316014 and SM316015 (**) (mm)

Accessories at page 41

Type	LSV12-532-5-T10-P	LSV12-532-5-T10-X	LSV12-532-5-T10-60
Art. no.	SM316006	SM316014 (**)	SM316015 (**)
Lens type	point	cross Plastics Diffractive Lens	line with lens 60° Plastics Diffractive Lens
Point diameter at 1 m (mm) ~	Ø 2,5	-	-
Cross dimension at 1 m (mm)	-	150x150	-
Line length at 1m (mm)	-	-	1.200
Power supply	5...36 Vdc		
Power	5 mW		
Wave length	532 nm		
Life time	≥ 10.000 h		
Permitted temperature	0°...+40°C		
Focus adjustment	no	yes	yes
Tolerance of lens for line	± 15%		
Min. line thickness	~ 1,5 mm		
Current consumption	< 80 mA		
Automatic control of the output power	yes		
Reverse polarity protection and overvoltage protection	yes		
Housing material	anodized aluminium		
Cable connection	2.000 mm		
Degree of protection	IP67		
Safety 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			

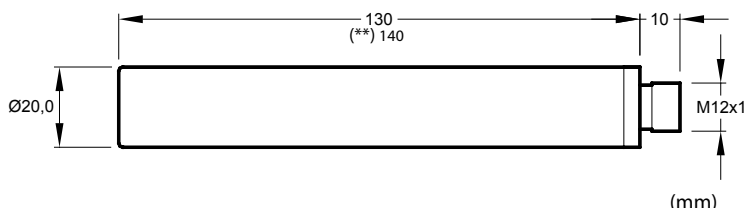
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LASER POINTER LSV20 SERIE - GREEN LIGHT - Ø20 - 1mW

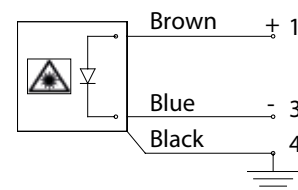


Laser pointer made of a high quality green laser diode, available with 532 nm wavelength and a power of 1mW. This laser pointer can generate a point, a line or a cross. On request different powers.

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



Connection M12x1 connector



Accessories at page 41

Type	LSV20-G1-P	LSV20-G1-X	LSV20-G1-L
Art. no.	SM312007	SM314011 (**)	SM314012
Lens type	point	cross Plastics Diffractive Lens	line Glass Rod Lens
Point diameter at 1 m (mm) ~	Ø 3,0	-	-
Cross dimension at 1 m (mm)	-	150x150	-
Line length at 1 m (mm)	-	-	< 500
Power supply	6...24 Vdc/6...12 Vac		
Power	1 mW		
Wave length	532 nm		
Life time	≥ 10.000 h		
Permitted temperature	0°...+40°C		
Focus adjustment	no	no	no
Current consumption	< 30 mA		
Reverse polarity protection and overvoltage protection	yes		
Housing material	anodized aluminium		
Connection	M12x1 connector		
Degree of protection	IP67		
Safety 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			
In event of electrostatic discharges connect the laser pointer with the shielded cable and the earth, article SM515001.			

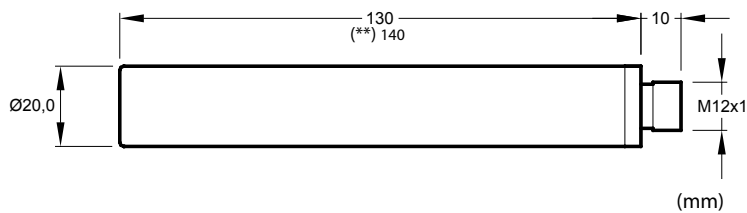
Ed. 06/17 - All specifications are subject to change without notice

LASER POINTER LSV20 SERIE - GREEN LIGHT - $\varnothing 20$ - 5mW

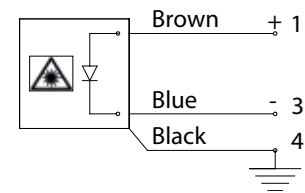


Laser pointer made of a high quality green laser diode, available with 532 nm wavelength and a power of 5mW. This laser pointer can generate a point, a line or a cross. On request different line lengths and powers.

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



Connection M12x1 connector



Accessories at page 41

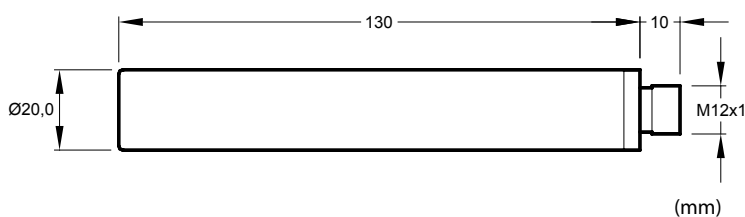
Type	LSV20-G5-P	LSV20-G5-X (**)	LSV20-G5-L
Art. no.	SM312003	SM312004	SM312005
Lens type	point	cross Plastics Diffractive Lens	line Glass Rod Lens
Line length at 1m (mm)	-	-	< 1.000
Point diameter at 1 m (mm) ~	$\varnothing 4,0$	-	-
Cross dimension at 1 m (mm)	-	150x150	-
Power supply	6...24 Vdc/6...12 Vac		
Power	5 mW		
Wave length	532 nm		
Life time	≥ 10.000 h		
Permitted temperature	0°...+40°C		
Focus adjustment	no		
Current consumption	< 100 mA		
Reverse polarity protection and overvoltage protection	yes		
Housing material	anodized aluminium		
Connection	M12x1 connector		
Degree of protection	IP67		
Safety 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			
In event of electrostatic discharges connect the laser pointer with the shielded cable and the earth, article SM515001.			

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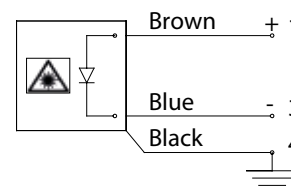
LASER POINTER LSK20 SERIE - GREEN LIGHT - Ø20 - 5mW



Laser pointer made of a high quality green laser diode, available with 532 nm wavelength and a power of 5mW. This laser pointer generates a line.
On request different line lengths and powers.
Thanks to the plastic housing and the protection glass, it is suitable for harsh applications or ambient with water.
This laser pointer offers a better resistance to noises.



Connection M12x1 connector



Accessories at page 41

Type	LSK20-G5-L-45
Art. no.	SM315008
Lens type	line with lens 45° Glass Rod Lens
Line length at 1 m (mm)	< 1.000
Power supply	6...24 Vdc / 6...12 Vac
Power	5 mW
Wave length	532 nm
Life time	≥ 10.000 h
Permitted temperature	0°...+40°C
Focus adjustment	no
Current consumption	< 100 mA
Reverse polarity protection and overvoltage protection	yes
Housing material	PVC
Connection	M12x1 connector
Degree of protection	IP67
Safety 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	
In event of electrostatic discharges connect the laser pointer with the shielded cable and the earth, article SM515001.	

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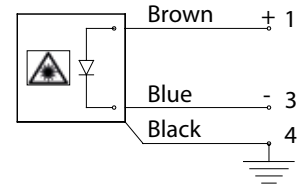
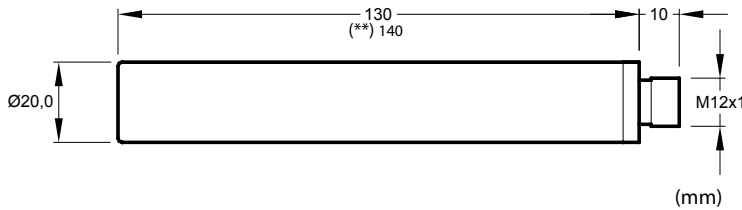
LASER POINTER LSV20 SERIE - GREEN LIGHT - Ø20 - 20mW



Laser pointer made of a high quality red laser diode, available with 532 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

Connection M12x1 connector



Accessories at page 41

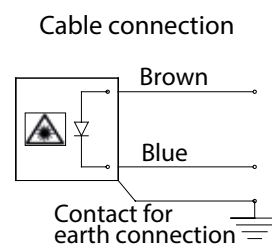
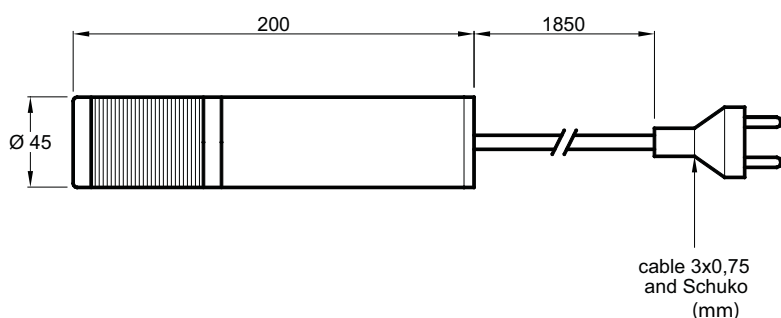
Type	LSV20-G20-P	LSV20-G20-X (**)	LSV20-G20-VLL
Art. no.	SM314022	SM314007	SM314023
Lens type	point	cross Plastics Diffractive Lens	line with lens 90° Glass Powell Lens
Point diameter at 1 m (mm) ~	< Ø 5,0	-	-
Cross dimension at 1 m (mm)	-	150x150	-
Line length with 90° tilted laser pointer	-	-	1.100 mm at 500 mm of distance from the plane 2.100 mm at 1.000 mm of distance from the plane
Line length with 45° tilted laser pointer	-	-	4.000 mm at 500 mm of distance from the plane 7.000 mm at 1.000 mm of distance from the plane
Power supply	6...24 Vdc / 6...12 Vac		
Power	20 mW		
Wave length	532 nm		
Life time	≥ 10.000 h		
Permitted temperature	0°...+40°C		
Focus adjustment	no		
Warm-up	~ 5 minutes		
Line thickness	< 2 mm		
Current consumption	< 100 mA		
Reverse polarity protection and overvoltage protection	yes		
Housing material	anodized aluminium		
Connection	M12x1 connector		
Degree of protection	IP67		
Safety class	3B	3R	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			
In event of electrostatic discharges connect the laser pointer with the shielded cable and the earth, article SM515001.			

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LASER POINTER LSA45 SERIE - GREEN LIGHT - Ø45 - 5mW



Laser pointer made of a high quality red laser diode, available with 532 nm wavelength and a power of 5mW. 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 brightness of the lines depends on the ambient light and on the color of the object on which they are projected.

Accessories at page 41

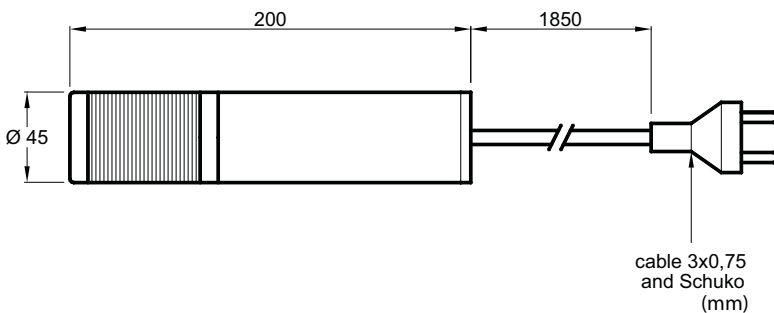
Type	LSA45-532-5-T10-X	LSA45-532-5-T10-45	LSA45-532-5-T10-90
Art. no.	SM314013	SM311008	SM311001
Lens type	cross Plastics Diffractive Lens	line with lens 45° Glass Rod Lens	line with lens 90° Glass Powell Lens
Cross dimension at 1 m (mm)	150x150	-	-
Line length at 1 m (mm)	-	< 1.000	< 1.500
Power supply	120...275 Vdc/85...264 Vac		
Power	5 mW		
Wave length	532 nm		
Life time	≥ 10.000 h		
Permitted temperature	0°...+40°C		
Focus adjustment	no		
Tolerance of lens for line	± 15%		
Current consumption	< 300 mA		
Housing material	aluminium		
Degree of protection	IP67		
Connection	cable 1850 mm - 3x0.75 and Schuko		
Safety 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			
In event of electrostatic discharges connect the grounding plug to the nearest possible earth.			

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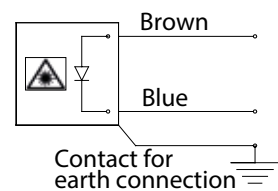
LASER POINTER LSA45 SERIE - GREEN LIGHT - Ø45 - 20mW



Laser pointer made of a high quality red laser diode, available with 532 nm wavelength and a power of 20mW. 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 permits to generate a long and uniform line.



Cable connection



The brightness of the lines depends on the ambient light and on the color of the object on which they are projected.

Accessories at page 41

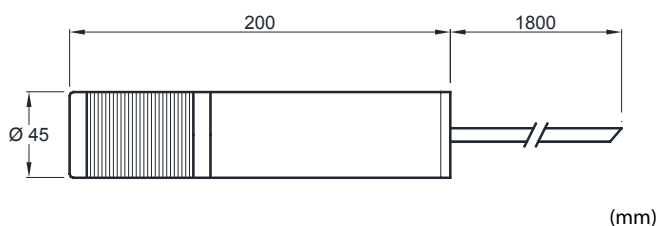
Type	LSA45-532-20-T10-60	LSA45-532-20-T10-90	LSA45-532-20-T10-90-CV2	LSA45-532-20-T10-90-CV5
Art. no.	SM315005	SM310001	SM315001	SM316016
Lens type	line with lens 60° Glass Powell Lens	line with lens 90° Glass Powell Lens	line with lens 90° Glass Powell Lens	line with lens 90° Glass Powell Lens
Line length at 1 m (mm)	1.200	2.000	2.000	2.000
Max. line length (mm)	10.000			
Linearity error	N.D.	N.D.	1 mm every 2.000 mm	1 mm every 5.000 mm
Power supply	120...275 Vdc/85...264 Vac			
Power	20 mW			
Wave length	532 nm			
Life time	≥ 10.000 h			
Permitted temperature	0°...+40°C			
Focus adjustment	no			
Line thickness	< 2 mm			
Warm-up	after 5 min. at +25°C			
Current consumption	< 300 mA			
Housing material	aluminium			
Connection	cable 1850 mm - 3x0,75 and Schuko			
Degree of protection	IP67			
Safety 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				
In event of electrostatic discharges connect the grounding plug to the nearest possible earth.				

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

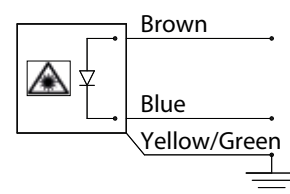


Laser pointer made of a high quality red laser diode, available with 532 nm wavelength and a power of 20mW. This laser pointer can generate a point, a line or a cross. Thanks to the hermetic housing and the protection glass, it is suitable for harsh applications or ambient with water, as in the marble sector. The brightness of the green light allows to see the line on dark surfaces. The special lens permits to generate a long and uniform line.



(mm)

Cable connection



The brightness of the lines depends on the ambient light and on the color of the object on which they are projected.

Accessories at page 41

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Type	LSV45-532-20-T10-90
Art. no.	SM314010
Lens type	line with lens 90° Glass Powell Lens
Line length at 1 m (mm)	2.000
Max. line length (mm)	~ 10.000
Power supply	12...48 Vdc / 12...24 Vac
Power	20 mW
Wave length	532 nm
Life time	≥ 10.000 h
Permitted temperature	0°...+40°C
Focus adjustment	no
Line thickness	< 2 mm
Warm-up	after 5 min. at 25°C
Current consumption	< 300 mA
Housing material	aluminium
Connection	cable 1.800 mm - 3x0,75
Degree of protection	IP67
Safety 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	
In event of electrostatic discharges connect the grounding cable (yellow/green) to the nearest possible earth.	



Production:  Made in Italy

Certificate:  

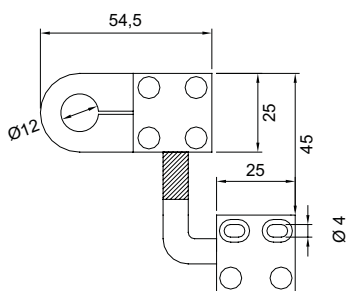
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ACCESSORIES

Brackets for laser pointers

Type

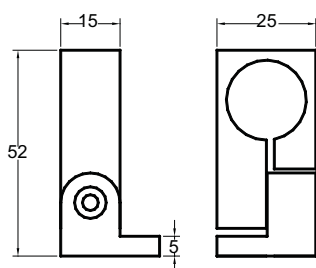
SF010418



Features

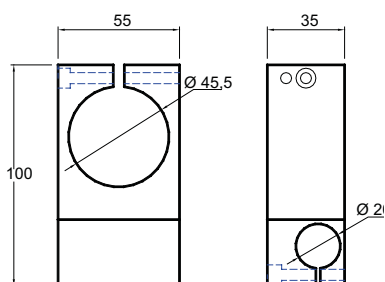
Bracket for laser pointer Ø 12, with adapter included in the package.

SF010423



Bracket for laser pointer Ø 20.

SF010419



Bracket for laser pointer Ø 45.

Glasses for laser pointers

Type

OP001



Features

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

SM516001



Features

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

SM516002

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

Female connectors

Type

C8IF3A 5M



Features

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

C8LF3A 5M



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

C12IF4A 5M



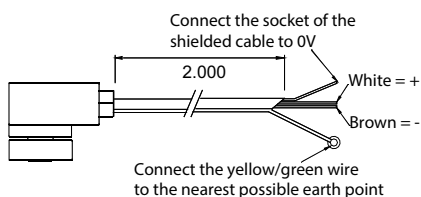
M12 - 4 poles - straight - 5 m PVC 4x0,25

C12LF4A 5M



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

SM515001



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

SAFETY PRECAUTIONS

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 are available in english language on page 45.

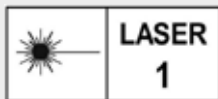
OBLIGATIONS OF THE PRODUCER

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

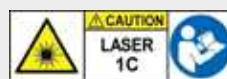
CLASS 1 LASER PRODUCT
or as alternative the following label:



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



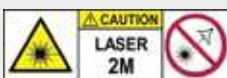
LASER RADIATION
FOLLOW INSTRUCTIONS
CLASS 1C LASER PRODUCT
or as alternative the following label:



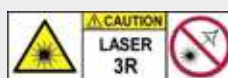
LASER RADIATION
DO NOT STARE INTO BEAM
CLASS 2 LASER PRODUCT
or as alternative the following label:



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



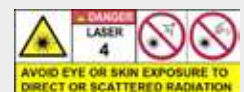
LASER RADIATION
AVOID DIRECT EYE EXPOSURE
CLASS 3R LASER PRODUCT
or as alternative the following label:



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



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



SAFETY PRECAUTION

2/2

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.

ACCESS PANELS AND SAFETY SWITCHES

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

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

Laser pointer Class	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

DESCRIPTION OF THE CLASSES

1/2

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 recognize 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 1 400 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 4 000 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.

DESCRIPTION OF THE CLASSES

2/2

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

Ed. 06/17 - All specifications are subject to change without notice



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