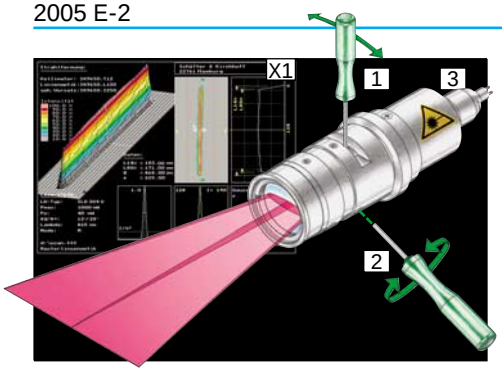
Schäfter + Kirchhoff




**Laser micro line generator 13LR.../13LRM...**
1 Focussing the laser line to the working distance
2 Locking/unlocking of the focus position, 3 Potentiometer for laser output power, X1 Line shape

The line lengths and line widths listed in table 1 and table 3 are valid for the nominal working distance of the line optics. Deviating working distances can be reached by refocussing, considering the given focussing range. The line length and line width approximately change proportional with the working distance.

# Laser Micro Line Generator 13LR...

**Laser fan with homogeneous intensity distribution and constant line width**

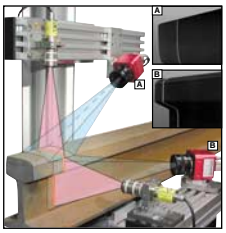
# Laser Macro Line Generator 13LRM...

**Laser line with extended depth of focus**

- Fan angle 12°, 25°, and 40°
- Intensity profile homogeneous in direction of line, perpendicular Gaussian (type 13LRM... approx. Gaussian)
- Constant line width along the entire line length (s. Fig. X1)
- Line width starting at 0.04 mm (1/e²)
- Line length from 26 mm to 2840 mm
- Integrated focussing mechanism
- Metal housing ∅ 25/28 mm
- Laser output power up to 100 mW
- Laser wavelength 635 to 980 nm optional 408 nm or 1064 – 1550 nm
- Integrated power control
- Output power adjustable <1 - 100 %
- External modulation TTL up to 250 kHz and analog up to 100 kHz
- Supply voltage 5V DC

Laser micro line generators 13LR... and laser macro line generators 13LRM... are characetrized by a homogeneous intensity distribution and a constant line width along the entire line length. In addition, type 13LRM... has an extended depth of focus. The laser line generators have an integrated electronics and can be modulated externally. The beam shaping optics define the beam parameter fan angle and line length, the optimum working distance, and the focussing range, see table 1 and table 3 respectively. The used laser module defines the wavelength and the output power and so the laser safety class, see table 2 and table 4 respectively.

**Application**




**3D profile measurement**
with laser light section method

**Line width factor F**

Properties of the laser diode beam source, like beam diameter and wavelength, affect width and Rayleigh range/ depth of focus of the laser line:
line width: multiply by $F$
Rayleigh range/ depth of focus: multiply by $1/F^2$

## Laser Micro Line Generator 13LR...

**Order Code** 13 LR 25 S500 + 55CM - 660 - 26 - M01 - T12 - C - 6

**Table 1** — Beam Parameters / Line Optics 13LR

| Line Optics 13LR... | Line Length $L$ [mm] | Line Width $B$ [mm] | Working Distance A [mm] | Rayleigh Range $2z_R$ [mm] | Focusing Range [mm] | Convergence β [Deg] | Dim. $X$ [mm] | Order Code |
|---|---|---|---|---|---|---|---|---|
| Table 1.1 | 26 | 0.043 | 120 | 3.0 | 100 - 205 | 1.4 | 12 | 13LR12M125 |
| | 52 | 0.072 | 248 | 12.2 | 205 - 415 | 0.7 | 8 | 13LR12S250 |
| | 103 | 0.144 | 496 | 48.8 | 415 - 815 | 0.3 | 8 | 13LR12S500 |
| Fan angle α = 12° | 201 | 0.288 | 977 | 195 | 815 - 1300 | 0.2 | 8 | 13LR12S1000 |
| | 409 | 0.580 | 2000 | 788 | 1300 - ∞ | 0.1 | 8 | 13LR12S000 |
| Table 1.2 | 55 | 0.043 | 119 | 3.0 | 100 - 205 | 1.4 | 12 | 13LR25M125 |
| | 109 | 0.072 | 249 | 12.2 | 205 - 415 | 0.7 | 8 | 13LR25S250 |
| | 217 | 0.144 | 496 | 48.8 | 415 - 815 | 0.3 | 8 | 13LR25S500 |
| Fan angle α = 25° | 425 | 0.288 | 977 | 195 | 815 - 1300 | 0.2 | 8 | 13LR25S1000 |
| | 1300 | 0.868 | 3000 | 1767 | 1300 - ∞ | 0.06 | 8 | 13LR25S000 |
| Table 1.3 | 90 | 0.065 | 120 | 3.0 | 100 - 205 | 1.4 | 15 | 13LR40M125 |
| | 180 | 0.108 | 245 | 12 | 205 - 410 | 0.7 | 10.5 | 13LR40S250 |
| | 357 | 0.216 | 492 | 49 | 410 - 815 | 0.3 | 10.5 | 13LR40S500 |
| Fan angle α = 40° | 698 | 0.433 | 973 | 195 | 815 - 1290 | 0.2 | 10.5 | 13LR40S1000 |
| | 2840 | 1.735 | 4000 | 3136 | 1290 - ∞ | 0.04 | 10.5 | 13LR40S000 |

**Each line optics can be combined with all laser modules**

**Table 2**

| curr. no. | Laser Diode Source | Wavelenght [nm] | $P_{out}$ [mW] | LD Code | Lens | Electronics | Cable | Safety Classification | Edge Intensity [%] | Line Width Factor $F$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 55CM | - 635 | - 10 - | H10 | - T12 | - C | - ... | 3B | >80 | 0.95 |
| 2 | 55CM | - 638 | - 22 - | N09 | - T12 | - C | - ... | 3B | >80 | 1.09 |
| 3 | 55CM | - 660 | - 26 - | M01 | - T12 | - C | - 6 | 3B | >80 | 0.79 |
| 4 | 55CM | - 660 | - 100 - | M25 | - T12 | - P | - ... | 3B | >80 | 0.79 |
| 5 | 55CM | - 660 | - 44 - | M26 | - T12 | - C | - ... | 3B | >80 | 0.88 |
| 6 | 55CM | - 685 | - 26 - | M21 | - T12 | - C | - ... | 3B | >80 | 0.86 |
| 7 | 55CM | - 780 | - 39 - | H06 | - T12 | - C | - ... | 3B | >80 | 0.98 |
| 8 | 55CM | - 785 | - 7 - | Y03 | - T12 | - C | - ... | 3B | >80 | 0.72 |
| 9 | 55CM | - 785 | - 61 - | N08 | - T12 | - C | - ... | 3B | >80 | 1.17 |
| 10 | 55CM | - 830 | - 105 - | N07 | - T12 | - C | - ... | 3B | >80 | 1.42 |
| 11 | 55CM | - 980 | - 9 - | W01 | - T12 | - C | - ... | 3B | >80 | 1.46 |

**Electr. Cable:**
- 1.5 m shielded conn. cable 4xAWG 26CUL 0.14 mm² . . . 1
- as 1, with connector type Lumberg SV50 **6**
- cabel specified by customer. . . . . 5

Y03: Laser diodes with low coherence lengths in the lower power range
Further wavelengths/ output powers on request.

## Laser Macro Line Generator 13LRM...

**Order Code** 13 LRM 25 S500-1,5 + 55CM - 660 - 23 - M01 - T12 - C - 6

**Table 3** — Beam Parameters / Line Optics 13LRM

| Line Optics 13LRM... | Line Length $L$ [mm] | Line Width $B$ [mm] | Working Distance A [mm] | Depth of Focus [mm] | Focusing Range [mm] | Convergence β [Deg] | Dim. $X$ [mm] | Order Code |
|---|---|---|---|---|---|---|---|---|
| Table 3.1 | 26 | 0.08 | 113 | 21 | 95 - 195 | 0.69 | 18.9 | 13LRM12M125-1,5 |
| | 52 | 0.16 | 236 | 83 | 195 - 355 | 0.34 | 18.9 | 13LRM12S250-1,5 |
| | 103 | 0.32 | 412 | 332 | 355 - 780 | 0.17 | 18.9 | 13LRM12S500-1,5 |
| Fan angle α = 12° | 201 | 0.65 | 965 | 1327 | 780 - 1330 | 0.09 | 18.9 | 13LRM12S1000-1,5 |
| | 409 | 1.31 | 2000 | 3000 | 1330 - ∞ | 0.04 | 18.9 | 13LRM12S000-1,5 |
| Table 3.2 | 55 | 0.08 | 111 | 21 | 95 - 195 | 0.69 | 18.9 | 13LRM25M125-1,5 |
| | 109 | 0.16 | 238 | 83 | 195 - 355 | 0.34 | 18.9 | 13LRM25S250-1,5 |
| | 217 | 0.32 | 413 | 332 | 355 - 780 | 0.17 | 18.9 | 13LRM25S500-1,5 |
| Fan angle α = 25° | 425 | 0.65 | 966 | 1327 | 780 - 1330 | 0.09 | 18.9 | 13LRM25S1000-1,5 |
| | 1300 | 1.96 | 3000 | 4500 | 1330 - ∞ | 0.03 | 18.9 | 13LRM25S000-1,5 |
| Table 3.3 | 90 | 0.08 | 111 | 21 | 105 - 195 | 0.69 | 23.4 | 13LRM40M125-1,5 |
| | 180 | 0.16 | 240 | 83 | 195 - 355 | 0.34 | 18.9 | 13LRM40S250-1,5 |
| | 357 | 0.32 | 415 | 332 | 355 - 785 | 0.17 | 18.9 | 13LRM40S500-1,5 |
| Fan angle α = 40° | 698 | 0.65 | 968 | 1327 | 785 - 1340 | 0.09 | 18.9 | 13LRM40S1000-1,5 |
| | 2840 | 2.61 | 4000 | 6000 | 1340 - ∞ | 0.02 | 18.9 | 13LRM40S000-1,5 |

**Each line optics can be combined with all laser modules**

**Table 4**

| curr. no. | Laser Diode Source | Wavelenght [nm] | $P_{out}$ [mW] | LD Code | Lens | Electronics | Cable | Safety Classification | Edge Intensity [%] | Line Width Factor $F$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 55CM | - 635 | - 7 - | H10 | - T12 | - C | - ... | 3B | >80 | 0.95 |
| 2 | 55CM | -638 | - 16 - | N09 | - T12 | - C | - ... | 3B | >80 | 0.95 |
| 3 | 55CM | - 660 | - 23 - | M01 | - T12 | - C | - 6 | 3B | >80 | 0.99 |
| 4 | 55CM | - 660 | - 53 - | M25 | - T12 | - P | - ... | 3B | >80 | 0.99 |
| 5 | 55CM | - 660 | - 28 - | M26 | - T12 | - C | - ... | 3B | >80 | 0.99 |
| 6 | 55CM | - 685 | - 16 - | M21 | - T12 | - C | - ... | 3B | >80 | 0.86 |
| 7 | 55CM | - 780 | - 24 - | H06 | - T12 | - C | - ... | 3B | >80 | 1.16 |
| 8 | 55CM | - 785 | - 3 - | Y03 | - T12 | - C | - ... | 3B | >80 | 1.17 |
| 9 | 55CM | - 785 | - 42 - | N08 | - T12 | - C | - ... | 3B | >80 | 1.17 |
| 10 | 55CM | - 830 | - 79 - | N07 | - T12 | - C | - ... | 3B | >80 | 1.24 |
| 11 | 55CM | - 980 | - 6 - | W01 | - T12 | - C | - ... | 3B | >80 | 1.46 |

**Electr. Cable:**
- 1.5 m shielded conn. cable 4xAWG 26CUL 0.14 mm² . . . 1
- as 1, with connector type Lumberg SV50 **6**
- cabel specified by customer. . . . . 5

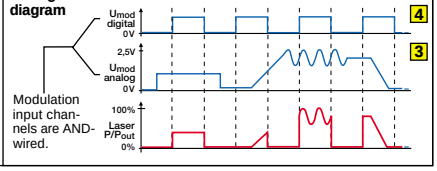
Y03: Laser diodes with low coherence lengths in the lower power range
Further wavelengths/ output powers on request.

**Integrated electronics**

| Electronics type | | P | C |
|---|---|---|---|
| Supply voltage | | +5 V ± 0.2 V | |
| Current consumption | max. | 250 mA | |
| Max. modulation frequency | analog | 10 Hz | 100 kHz |
| | TTL | 250 kHz | 100 kHz |
| With potentiometer adjustable outp. power | | <5-100% | <1-100% |
| TTL modulation logic | Laser ON | TTL high | |
| Analog control voltage | Pmin to Pmax | 0...2.5 V | |

**Modulation:** The laser has two AND-wired modulation input channels, $U_{analog}$ 3 and $U_{TTL}$ 4.
The laser is OFF in case of an open modulation input. Using the digital modulation input the laser can be modulated. If only one modulation input channel is used the other has to be set to +5 V, (see timing diagram).
The voltage $U_{analog}$ at analog modulation input 3 linearly controles the laser output power between ≤ 1% and 100% of the optical power set with the potentiometer.

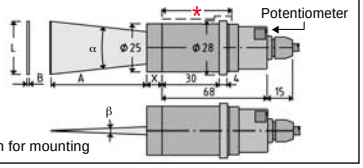
**Timing diagram**




**Dimensions**

**Laser micro line generator 13LR...**
**Laser macro line generator 13LRM...**

A = working distance
B = line width L = line length
α = fan angle
β = beam convergence

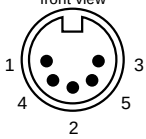



* = Clamping region for mounting

**Pin-out**

| Cable | Conn. | |
|---|---|---|
| black | 1 | GND |
| red | 2 | +5V |
| br | 3 | $U_{mod}$ analog |
| or | 4 | $U_{mod}$ TTL |
| | 5 | n.c. |
| shield | case | ⏚ |

Connector (male) front view




Circular connector Lumberg SV50 (IEC-60130-9) for power supply and external modulation (pin $U_{mod}$).
Cable shielding and housing are connected. Both are galvanically decoupled from the laser diode and electronics.

Laserlinien_05_E-2