Electronics, Power Supply, Dimensions, Tools, and Mounting Consoles
Electronics, Power Supply, Dimensions, Tools, and Mounting Consoles

Electronics
Details and features of the different electronics types for all laser line, micro focus, macro focus, laser pattern generators and collimators with integrated electronics

Switch Box and Power Supply
Switch Box SBN 050501/040401/040402
Switch Box SBS 070701-USB
Switch Box with integr. Power Supply SBP-

Switch Accessories
Connector Types
Power Supply / Linear Power Supply

Dimensions of all laser modules with integrated electronics
Adjustment Tools for all laser modules
Mounting brackets for laser modules
Electronics for Laser Line, Laser Spot and Laser Pattern Generators

### Electronics for 25CM / 29CM (Electronics type S/B)

#### Integrated Electronics type S

<table>
<thead>
<tr>
<th></th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>+5 V ± 0.5 V</td>
</tr>
<tr>
<td>Current consumption</td>
<td>max. 250 mA</td>
</tr>
<tr>
<td>Max. modulation</td>
<td>analog 50 kHz</td>
</tr>
<tr>
<td>frequency</td>
<td>TTL 1 MHz</td>
</tr>
<tr>
<td>Laser power output potentiometer</td>
<td>TTL high: Laser ON, open or low: Laser OFF</td>
</tr>
<tr>
<td>TTL modulation logic</td>
<td>TTL high</td>
</tr>
<tr>
<td>TTL or analog input</td>
<td>open or low</td>
</tr>
<tr>
<td>Analog control voltage</td>
<td>P_min to P_max 0...2.2 V</td>
</tr>
<tr>
<td>Cable type</td>
<td>LIY(st)CY 4x0.08mm²</td>
</tr>
</tbody>
</table>

#### Pin-out for electronics S

Circular connector Lumberg SV50 (IEC-60130-9) for power supply and external modulation (pin Umod).
Cable shielding and casing are connected and galvanically decoupled from the laser diode and the electronics.

```plaintext
Pin-out S

<table>
<thead>
<tr>
<th>Cable</th>
<th>Conn.</th>
<th>Connector (male)</th>
</tr>
</thead>
<tbody>
<tr>
<td>black</td>
<td>1 GND</td>
<td>front view</td>
</tr>
<tr>
<td>red</td>
<td>2 +5 V</td>
<td></td>
</tr>
<tr>
<td>brown</td>
<td>3 U_mod anal</td>
<td>1 4 2 3</td>
</tr>
<tr>
<td>orange</td>
<td>4 U_mod TTL</td>
<td></td>
</tr>
<tr>
<td>shield</td>
<td>case</td>
<td></td>
</tr>
</tbody>
</table>
```

#### Modulation for electronics S

The laser has two AND-wired modulation input channels, U_{analog} \[^1\] and U_{TTL} \[^2\].
The laser is OFF in case of an open modulation input.
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 \[^1\] linearly controls the laser output power between ≤1% and 100% of the optical power set with the potentiometer.

![Timing diagram](image)

Connecting analog voltage (U_{analog} ranging from 0 to 2.2 V) to modulation input \[^1\] gives linear control of the laser output power from approximately zero to the power level given by the potentiometer setting (see plot).

#### Integrated Electronics type B

<table>
<thead>
<tr>
<th></th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>with connector +12 V ± 0.5 V</td>
</tr>
<tr>
<td>Current consumption</td>
<td>w/o connector +9 V ± 0.5 V</td>
</tr>
<tr>
<td>Max. modulation frequency</td>
<td>TTL 250 mA</td>
</tr>
<tr>
<td>Laser power output potentiometer</td>
<td>TTL high: Laser ON, open or low: Laser OFF</td>
</tr>
<tr>
<td>TTL modulation logic</td>
<td>TTL high</td>
</tr>
<tr>
<td>TTL or analog input</td>
<td>open or low</td>
</tr>
<tr>
<td>Cable type</td>
<td>LIYCY 3x0.08mm²</td>
</tr>
</tbody>
</table>

#### Pin-out for electronics B

Circular connector Lumberg SV40 (IEC-60130-9) for power supply and external modulation (pin Umod).
Cable shielding and casing are connected and galvanically decoupled from the laser diode and the electronics.

```plaintext
Pin-out B

<table>
<thead>
<tr>
<th>Cable</th>
<th>Conn.</th>
<th>Connector (male)</th>
</tr>
</thead>
<tbody>
<tr>
<td>white</td>
<td>1 GND</td>
<td>front view</td>
</tr>
<tr>
<td>brown</td>
<td>2 +12 V</td>
<td></td>
</tr>
<tr>
<td>green</td>
<td>3 U_mod TTL</td>
<td></td>
</tr>
<tr>
<td>shield</td>
<td>case</td>
<td></td>
</tr>
</tbody>
</table>
```

#### Modulation for electronics B

Laser modules with electronics B have one modulation input channel U_{TTL} \[^2\] and no analog modulation input.
The laser is OFF in case of an open modulation input.

![Timing diagram](image)

Laser input channels are AND-wired.
## Electronics for Laser Line, Laser Spot and Laser Pattern Generators

### Electronics for 55CM/55CR, 56CM, 90CM/90CR, 91CM, 95CM/95CR and 96CM, (Electronics type P/C/H/HP/CS/PS)

#### Integrated Electronics type:

<table>
<thead>
<tr>
<th></th>
<th>C</th>
<th>P</th>
<th>H</th>
<th>HP</th>
<th>CS</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>+5 V ± 0.2 V</td>
<td>+5 V ± 0.2 V</td>
<td>+11...12 V</td>
<td>+5 V ± 0.2 V</td>
<td>+5 V ± 0.2 V</td>
<td>+5 V ± 0.2 V</td>
</tr>
<tr>
<td>Current consumption</td>
<td>max. 250 mA</td>
<td>250 mA</td>
<td>250 mA</td>
<td>1 Hz</td>
<td>1 Hz</td>
<td>1 Hz</td>
</tr>
<tr>
<td>Max. modulation frequency</td>
<td>TTL</td>
<td>100 kHz</td>
<td>100 kHz</td>
<td>1 Hz</td>
<td>1 Hz</td>
<td>1 Hz</td>
</tr>
<tr>
<td>Laser power output potentiometer</td>
<td>&lt; 1-100 %</td>
<td>&lt; 1-100 %</td>
<td>&lt; 1-100 %</td>
<td>&lt; 1-100 %</td>
<td>&lt; 1-100 %</td>
<td>&lt; 1-100 %</td>
</tr>
<tr>
<td>TTL modulation logic</td>
<td>TTL high</td>
<td>Laser ON</td>
<td>Laser OFF</td>
<td>Laser ON</td>
<td>Laser ON</td>
<td>Laser ON</td>
</tr>
<tr>
<td>TTL or analog input</td>
<td>open or low</td>
<td>Laser OFF</td>
<td>Laser OFF</td>
<td>Laser OFF</td>
<td>Laser OFF</td>
<td>Laser OFF</td>
</tr>
<tr>
<td>Analog control voltage</td>
<td>P&lt;sub&gt;min&lt;/sub&gt; to P&lt;sub&gt;max&lt;/sub&gt;</td>
<td>0 ... 2.5 V</td>
<td>0 ... 2.5 V</td>
<td>0 ... 2.5 V</td>
<td>0 ... 2.5 V</td>
<td>0 ... 2.5 V</td>
</tr>
<tr>
<td>Modulation Input Resistance [Ohm]</td>
<td>22k</td>
<td>9k</td>
<td>22k</td>
<td>9k</td>
<td>9k</td>
<td>9k</td>
</tr>
<tr>
<td>Cable type</td>
<td>4xAWG 26CUL</td>
<td>4xAWG 26CUL</td>
<td>LIY(st)CY</td>
<td>6xAWG 26CUL</td>
<td>6xAWG 26CUL</td>
<td>6xAWG 26CUL</td>
</tr>
<tr>
<td>Cable shielding and casing</td>
<td>connected and galvanically decoupled from the laser diode and the electronics.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Pin-out for electronics C/P/H

**Circular connector Lumberg SV50 (IEC-60130-9) for power supply and external modulation (pin U<sub>mod</sub>).**

- Cable shielding and casing are connected and are galvanically decoupled from the laser diode and the electronics.

**Pin-out C/P/H**

<table>
<thead>
<tr>
<th>Cable</th>
<th>Conn.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>black</td>
<td>1</td>
<td>GND</td>
</tr>
<tr>
<td>red</td>
<td>2</td>
<td>+5 V</td>
</tr>
<tr>
<td>brown</td>
<td>3</td>
<td>U&lt;sub&gt;mod&lt;/sub&gt; analog</td>
</tr>
<tr>
<td>orange</td>
<td>4</td>
<td>U&lt;sub&gt;mod&lt;/sub&gt; TTL</td>
</tr>
<tr>
<td>yellow</td>
<td>5</td>
<td>n.c.</td>
</tr>
<tr>
<td>green</td>
<td>6</td>
<td>RS232Tx</td>
</tr>
<tr>
<td>shield</td>
<td>case</td>
<td></td>
</tr>
</tbody>
</table>

#### Pin-out for electronics HP

**Circular connector Lumberg SV40 (IEC-60130-9) for power supply and external modulation (pin U<sub>mod</sub>).**

- Cable shielding and casing are connected and are galvanically decoupled from the laser diode and the electronics.

**Pin-out HP**

<table>
<thead>
<tr>
<th>Cable</th>
<th>Conn.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>black</td>
<td>1</td>
<td>GND</td>
</tr>
<tr>
<td>red</td>
<td>2</td>
<td>+12 V</td>
</tr>
<tr>
<td>brown</td>
<td>3</td>
<td>U&lt;sub&gt;mod&lt;/sub&gt; analog</td>
</tr>
<tr>
<td>orange</td>
<td>4</td>
<td>U&lt;sub&gt;mod&lt;/sub&gt; TTL</td>
</tr>
<tr>
<td>shield</td>
<td>case</td>
<td></td>
</tr>
</tbody>
</table>

#### Pin-out for electronics CS/PS

**Circular connector Lumberg SV70 (IEC-60130-9) for power supply and external modulation (pin U<sub>mod</sub>) and RS232 interface.**

- Cable shielding and casing are connected and are galvanically decoupled from the laser diode and the electronics.

**Pin-out CS/PS**

<table>
<thead>
<tr>
<th>Cable</th>
<th>Conn.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>black</td>
<td>1</td>
<td>GND</td>
</tr>
<tr>
<td>red</td>
<td>2</td>
<td>+5 V</td>
</tr>
<tr>
<td>brown</td>
<td>3</td>
<td>U&lt;sub&gt;mod&lt;/sub&gt; analog</td>
</tr>
<tr>
<td>orange</td>
<td>4</td>
<td>U&lt;sub&gt;mod&lt;/sub&gt; TTL</td>
</tr>
<tr>
<td>yellow</td>
<td>5</td>
<td>n.c.</td>
</tr>
<tr>
<td>green</td>
<td>6</td>
<td>RS232Tx</td>
</tr>
<tr>
<td>shield</td>
<td>case</td>
<td></td>
</tr>
</tbody>
</table>

#### Software Parameters for RS232 interface (electronics CS/PS)

The RS232 interface (or the USB connection using the switchbox SBS 070701-USB) allows laser control and reading out of laser data:

**Input parameters:**
- laser power
- laser power limit
- mode of operation

**Output parameters:**
- laser current (mA)
- photo diode current (µA)
- temperature
- laser output power (%)
- operating voltage
- hours of operation
- min./max. temperature

**Modulation**

The laser has two AND-wired modulation input channels, U<sub>analog</sub> and U<sub>TT</sub>. The laser is OFF in case of an open modulation input. If only one modulation input channel is used, the other has to be set to +5 V. (see timing diagram).

Connecting analog voltage (U<sub>analog</sub> ranging from 0 to 2.5 V) to modulation input [1] gives linear control of the laser output power from approximately zero to the power level given by the potentiometer setting (see plot).

The voltage U<sub>analog</sub> at analog modulation input [1] linearly controls the laser output power between ≤1% and 100% of the optical power set with the potentiometer.

**Timing diagram**

The timing diagram shows the relationship between the modulation input (U<sub>mod</sub>) and the laser diode output power (P<sub>out</sub>).
Attachment: Switchbox and Power Supply

Interlock chain for the remote deactivation of the laser

The switchbox is the interface between power supply and laser diode beam source. The integrated key switch and interlock mechanism ensure concordance with laser safety regulations. In addition, the inputs for analog and TTL modulation are made available via simple BNC connectors, so that the time-consuming wiring of a special adapter cable is avoided.

Without the switchbox Schäfter+Kirchhoff laser diode beam sources are off if either one or both modulation inputs are open. Internal pull-up resistors in the switchbox however ensure that the beam source is instantly ready for use without having to apply 5 V(DC) to the input ports just to turn it on. Once modulation is applied using the BNC connectors, the voltage of the modulation dictates if the laser is on or off.

The switchbox can be grounded using either a clamping screw or a 4 mm phone jack. With a grounded switchbox, the phone jack can also be used to connect an antistatic wristband or mat. The shielded metal housing also isolates the contents from electro-magnetic irradiation.

The operation of a laser source must conform to EN 60825 and this switchbox also provides the following safety features:

- **Interlock chain for the remote deactivation of the laser**
- **Laser power-up is only possible using the key switch**
- **LED status indicator for “Laser ON”**
- **Switch also provides output for external status indicator “Laser ON” (only with type SBP).**

### Laser Interlock:

An external laser interlock is mandatory in most countries for laser class 3B and beyond, so that a break in the laser interlock chain will cause an immediate shutdown of the laser power. An automatic shutdown system (e.g., a door or enclosure-opening switch) has to be used for the immediate disconnection of the interlock chain in order to prevent any exposure of an unprotected person to the hazardous laser radiation.

The interlock mechanism in the Schäfter+Kirchhoff laser beam sources requires no external power supply and its absence is detected by an integral surge tripswitch that must be bridged by the interlock chain before the laser source can be used!

### Choosing the right switchbox and power supplies for the laser diode modules depending on electronics type

<table>
<thead>
<tr>
<th>Electronics type:</th>
<th>S</th>
<th>B</th>
<th>C and P (standard)</th>
<th>CS and PS (RS232 interface)</th>
<th>H</th>
<th>HP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Power Supply</td>
<td>5V</td>
<td>12V (with conn.)</td>
<td>5V</td>
<td>5V</td>
<td>5V</td>
<td>11...12V</td>
</tr>
<tr>
<td>Key features: (For details see page 68)</td>
<td>5V / 2.6A 5-pin KV 50 connector, female</td>
<td>12V / 1.25A 4-pin KV 40 connector, female</td>
<td>5V / 2.6A 5-pin KV 50 connector, female</td>
<td>5V / 2.6A 7-pin KV 70 connector, female</td>
<td>5V / 2.6A 5-pin KV 50 connector, female</td>
<td>12V / 1.25A 4-pin KV 40 connector, female</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power Cords (EU, USA/Can and GB see page 68)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switchbox</td>
</tr>
<tr>
<td>Key features: (For details see below)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switchbox with integrated Power Supply</th>
<th>SBP-05-...</th>
<th>SBP-12-...</th>
<th>SBP-05-...</th>
<th>SBP-05-...</th>
<th>SBP-12-...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key features: (For details see page 68)</td>
<td>Desk or 19” version</td>
<td>115 or 230 V input</td>
<td>Two separate modulation input connectors (BNC)</td>
<td>Desk or 19” version</td>
<td>115 or 230 V input</td>
</tr>
</tbody>
</table>
Attachment: Switchbox SBN 050501 / 040401 / 040402

The switchbox is the interface between the power supply and laser diode beam source.

Features:
- Reverse voltage protection
- key switch
- “Laser ON” LED
- grounding connector
- one/two separate modulation input connectors (BNC)
- interlock and Lumberg input and output connectors according to IEC 60130-9.

Switchbox SBN050501
with two separate modulation inputs for laser diode beam sources of electronics type S/C/P/H and 5 V power supply. Recommended power supply module PS051003E.

Switchbox SBN040401
with one separate modulation input for laser diode beam sources of electronics type B and 12 V power supply. Recommended power supply module: PS120516E.

Switchbox SBN040402
with two separate modulation input for laser diode beam sources of electronics type HP and 12 V power supply. Recommended power supply module: PS120516E.

Attachment: Switchbox SBS 070701-USB

The switchbox is the interface between the power supply and laser diode beam source.

Switchbox SBS 070701-USB
for laser diode beam sources with 5 V power supply and RS232 interface (electronics type CS/PS).

Recommended power supply module PS051007E.

Features:
- Mini USB 2.0 connection for laser control and reading out of laser data, e.g. hours of operation
- reverse voltage protection
- key switch
- “Laser ON” LED
- grounding connector
- two separate modulation input connectors (BNC)
- interlock and Lumberg input and output connectors according to IEC 60130-9
Attachment: Switchbox with integrated Power Supply SBP-...

Low-noise linear power supply

Specifications:
- IN: 115 or 230 V AC, OUT: 5 V or 12 V DC, 250 mA
- Interlock
- key switch
- “Laser ON” LED
- switch provides output for external status indicator “Laser ON”
- ground connector
- two separate modulation input connectors (BNC),
- metal housing for protection against electromagnetic irradiation
- Lumberg input and output connectors, according to IEC 60130-9

<table>
<thead>
<tr>
<th>Specification</th>
<th>Output voltage</th>
<th>max. output current</th>
<th>Supply voltage (VAC)</th>
<th>Line frequency (Hz)</th>
<th>Power consumption</th>
<th>Input resistance</th>
<th>Switching contact: max. voltage / current</th>
<th>Fuse</th>
<th>Ambient temperature</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V DC</td>
<td>250 mA</td>
<td>100 - 130</td>
<td>200 - 250</td>
<td>50 - 60</td>
<td>&lt; 7 W</td>
<td>8.2 kΩ</td>
<td>48V / 1A</td>
<td>2x 0.16 AT</td>
<td>5 - 40°C</td>
<td>0.65</td>
</tr>
</tbody>
</table>

Switchbox Accessories

Control cable for external output power adjustment SBCTRL-50

Control cable for external output power adjustment for the laser beam sources of series 13 and 90.
Remote precision potentiometer with BNC connector. Shielded coaxial cable with 500 mm cable length (as standard, other cable lengths on request).

Accessories: Connector types

Order Options for Lumberg Connector types

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC 01 09 F</td>
<td>Lumberg IEC 60130-9 connector type: KV 50 (female 5-pin). For connection between a customer power supply and laser (with connector SV30 and SV60) or switchbox.</td>
</tr>
<tr>
<td>BC 01 05 M</td>
<td>Lumberg IEC 60130-9 connector type: SV 50 (male 5-pin). For connecting a customer laser to the switchbox.</td>
</tr>
<tr>
<td>BC 01 04 F</td>
<td>Lumberg IEC 60130-9 connector type: KV 40 (female 4-pin). For connection of a customer power supply to the laser or switchbox.</td>
</tr>
</tbody>
</table>

Switchbox SBN050501

Desk switchbox B 106 x H 40 x D 120 mm

19"-rack switchbox 3 U x 10 HP W 51 x H 129 x D 120 mm

Output voltage and Housing

<table>
<thead>
<tr>
<th>Output voltage</th>
<th>Housing</th>
<th>Supply voltage</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V: 05</td>
<td>Desktop: B</td>
<td>230V 2</td>
<td>standard 1</td>
</tr>
<tr>
<td>12V: 12</td>
<td>19&quot; Cassette: C</td>
<td>115V 1</td>
<td>potentiometer 2</td>
</tr>
</tbody>
</table>

Order Code SBP - 05 - B - 2 + 1

Connecting scheme

coaxial cable

analog modulation input of switchbox

Remote control: potentiometer for power adjustment
Accessories: Power Supply

Specification:
IN:  100-240 V AC, Class 1 protective ground, IEC320-C14 chassis plug
OUT: 1.5 m shielded cable with connector (IEC 60130-9) Lumberg series KV (female)

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Output</th>
<th>Order Code</th>
<th>Connector/female</th>
</tr>
</thead>
<tbody>
<tr>
<td>for lasers w/o RS232 interface and operation with or without switchbox SBxxx</td>
<td>5 V / 2.6 A</td>
<td>PS051003E</td>
<td>5-pin, KV 50</td>
</tr>
<tr>
<td></td>
<td>12 V / 1.25 A</td>
<td>PS125016E</td>
<td>4-pin, KV 40</td>
</tr>
<tr>
<td>for lasers with RS232 interface and operation with or w/o switchbox SBS-xx</td>
<td>5 V / 2.6 A</td>
<td>PS051007E</td>
<td>7-pin, KV 70</td>
</tr>
</tbody>
</table>

Order Options for Power Supply

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS051003E</td>
<td>5V</td>
</tr>
<tr>
<td>PS125016E</td>
<td>12V</td>
</tr>
<tr>
<td>PS051007E</td>
<td>5V for lasers with RS232 interface and operation with or without switchbox SBSxxx</td>
</tr>
</tbody>
</table>

Order Options for Linear Power Supply

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS050302E</td>
<td>for operation with switchbox SBN-xxx or laser without switchbox</td>
</tr>
</tbody>
</table>

Accessories: Linear Power Supply

Linear Power Supply for mounting rail EN60715 (TH35) 230 V AC, 5 V DC, 0.3 A with 1.5 m cable and Lumberg connector type KV50 female IEC 60130-9 (H 76 x W 45 x D 100 mm)
Laser Diode Modules

Dimensions: Laser Modules with Laser Diode Collimator 55CM and 55CR

- **A** 55CM
  - A = working distance
  - Ø = beam diameter perpendicular
  - Ø = beam diameter parallel
  - * = Clamping region for mounting

- **B** 55CR
  - A = working distance
  - L = line width
  - α = fan angle
  - * = Clamping region for mounting

- **A1** 13LR / 13LRM + 55CM
  - A = working distance
  - B = line width
  - L = line length
  - α = fan angle
  - * = Clamping region for mounting

- **B1** 13LR / 13LRM + 55CR
  - A = working distance
  - L = line width
  - * = Clamping region for mounting

- **A2** 5L... / 5L...M + 55CM
  - A = working distance
  - B = line width
  - L = line length
  - α = fan angle
  - * = Clamping region for mounting

- **B2** 5L... / 5L...M + 55CR
  - A = working distance
  - B = line width
  - L = line length
  - * = Clamping region for mounting

- **A3** 5LT / 5LTM + 55CM
  - A = working distance
  - B = line width
  - L = line length
  - * = Clamping region for mounting

- **B3** 5LT / 5LTM + 55CR
  - A = working distance
  - B = line width
  - L = line length
  - * = Clamping region for mounting

- **A4** 13M / 13LMM + 55CM
  - A = working distance
  - W = focus width
  - H = focus height
  - * = Clamping region for mounting

- **B4** 13M / 13LMM + 55CR
  - A = working distance
  - B = line width
  - L = line length
  - * = Clamping region for mounting

- **A5** 13P + 55CM
  - A = working distance
  - B = line width
  - L = line length
  - α = fan angle
  - * = Clamping region for mounting
Laser Diode Modules

Dimensions: Laser Modules with Laser Diode Collimator 25CM and 29CM

**C1 25CM**

<table>
<thead>
<tr>
<th>A</th>
<th>29</th>
<th>31</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

Ø = beam diameter perpendicular  
Ø = beam diameter parallel  
A = working distance  
* = Clamping region for mounting

**C1 5LM / 5LMM + 25CM**

<table>
<thead>
<tr>
<th>A</th>
<th>29</th>
<th>31</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

A = working distance  
B = line width  
L = line length  
α = fan angle  
β = convergence angle  
* = Clamping region for mounting

**C1 5LT / 5LTM + 25CM**

<table>
<thead>
<tr>
<th>A</th>
<th>29</th>
<th>31</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

A = working distance  
B = line width  
L = line length  
β = convergence angle  
* = Clamping region for mounting

**C1 5M / 5MM + 25CM**

<table>
<thead>
<tr>
<th>H</th>
<th>12</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

A = working distance  
W = focus width  
H = focus height  
β = convergence angle  
* = Clamping region for mounting

**C1 5MC + 29CM**

<table>
<thead>
<tr>
<th>A</th>
<th>64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø</td>
<td>31</td>
</tr>
</tbody>
</table>

A = working distance  
Ø = spot diameter  
β = convergence angle  
* = Clamping region for mounting

Laser Modules with Laser Diode Collimator 90CM/90CR and 95CM/95CR

**E1 13LN / 13LNM + 90CM**

<table>
<thead>
<tr>
<th>A</th>
<th>75</th>
<th>98</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>129</td>
<td></td>
</tr>
</tbody>
</table>

A = working distance  
B = line width  
L = line length  
α = fan angle  
* = Clamping region for mounting

**E1 13LT / 13LTM + 90CM**

<table>
<thead>
<tr>
<th>A</th>
<th>76</th>
<th>98</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>129</td>
<td></td>
</tr>
</tbody>
</table>

A = working distance  
B = line width  
L = line length  
* = Clamping region for mounting

**E1 13MC + 95CM**

<table>
<thead>
<tr>
<th>A</th>
<th>75</th>
<th>98</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø</td>
<td>129</td>
<td></td>
</tr>
</tbody>
</table>

A = working distance  
Ø = spot diameter  
β = convergence angle  
* = Clamping region for mounting

**F1 13LN / 13LNM + 90CR**

<table>
<thead>
<tr>
<th>A</th>
<th>75</th>
<th>98</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>129</td>
<td></td>
</tr>
</tbody>
</table>

A = working distance  
B = line width  
L = line length  
* = Clamping region for mounting

**F1 13LR / 13LRM + 55CR**

<table>
<thead>
<tr>
<th>A</th>
<th>76</th>
<th>98</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>129</td>
<td></td>
</tr>
</tbody>
</table>

A = working distance  
B = line width  
L = line length  
* = Clamping region for mounting

**F1 13MC + 95CR**

<table>
<thead>
<tr>
<th>A</th>
<th>75</th>
<th>98</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø</td>
<td>129</td>
<td></td>
</tr>
</tbody>
</table>

A = working distance  
Ø = spot diameter  
β = convergence angle  
* = Clamping region for mounting
Laser Diode Modules LNC-Series

Dimensions: Low noise Laser Diode Collimator LNC-56CM and LNC-56CR

LNC-5LT / 5LTM + 56CR

LNC-5L... / 5L...M + 56CM

LNC-13M / 13MM + 56CM

A = working distance
B = line width
L = line length
α = fan angle
★ = Clamping region for mounting

Polentiometer

A = working distance
B = line width
L = line length
α = fan angle
★ = Clamping region for mounting

A = working distance
W = focus width
H = focus height
★ = Clamping region for mounting
Laser Diode Modules LNC-Series

Dimensions: Low noise Laser Diode Collimator LNC-91CR and LNC-96CR

**K1** LNC-13LN / LNC-13LNM + 91CM

**K2** LNC-13LT / 13LTM + 91CM

**L1** LNC-13LN / LNC-13LNM + 91CR

**L2** LNC-13LT / LNC-13LTM + 91CR

**M** LNC-96CM

**N** LNC-96CR

**M1** LNC-13MC + 96CM

**N1** LNC-13MC + 96CR

- A = working distance
- B = line width
- Ω = spot diameter
- α = fan angle
- β = convergence angle
- L = line length
- = Clamping region for mounting

A  = working distance
B  = line width
λ = tan angle

---

Schäfer + Kirchhoff

info@SuKHamburg.de | www.SuKHamburg.com

Electronics, Power Supply, Dimensions, Tools, and Mounting Consoles
### Adjustment Tools for Laser Modules

#### Adjustment Tools for Laser Modules based on 55CM/55CR and 56CM/56CR

1. **Focussing of the laser line to the working distance**  
   Tool: Hex key WS 1.5  
   [Order Code: 50HD-15](#)

2. **Locking/unlocking of the focus setting**  
   Tool: Hex key WS 1.5  
   [Order Code: 50HD-15](#)

3. **Screwdriver for the adjustment of laser power potentiometer**  
   Tool: Screwdriver WS 1.2  
   [Order Code: 9D-12](#)

#### Adjustment Tools for Laser Modules based on 25CM, 29CM

1. **Focussing of the laser line to the working distance**  
   Tool: Eccentric key  
   [Order Code: 60EX-4](#)
   as an alternative:  
   Eccentric key with long handle  
   [Order Code: 60EX-4-L](#)

2. **Locking/unlocking of the focus setting**  
   Tool: Screwdriver WS 1.2  
   [Order Code: 9D-12](#)

3. **Screwdriver for the adjustment of laser power potentiometer**  
   Tool: Screwdriver WS 1.2  
   [Order Code: 9D-12](#)

#### Adjustment Tools for Laser Modules based on 90CM/90CR, 91CM/91CR, 95CM/95CR and 96CM/96CR

1. **Focussing of the laser line to the working distance**  
   Tool: Eccentric key  
   [Order Code: 55EX-5](#)
   as an alternative:  
   Eccentric key with long handle  
   [Order Code: 55EX-5-L](#)

2. **Locking/unlocking of the focus setting**  
   Tool: Screwdriver WS 1.2  
   [Order Code: 50HD-15](#)

3. **Screwdriver for the adjustment of laser power potentiometer**  
   Tool: Screwdriver WS 1.2  
   [Order Code: 9D-12](#)
### Choosing the Adequate Adjustment Tools

<table>
<thead>
<tr>
<th>Row</th>
<th>Beam-shaping optics</th>
<th>Laser Diode Module</th>
<th>System used in</th>
<th>Tool 50HD-15</th>
<th>Tool 60EX-4 / 60EX-4-L</th>
<th>Tool 55EX-5 / 55EX-5-L</th>
<th>Tool 9D-12</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5L... or 5L...M</td>
<td>25CM</td>
<td>5L+25CM</td>
<td>x</td>
<td>x</td>
<td>24/25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5LT... or 5LT...M</td>
<td>25CM</td>
<td>5LT+25CM</td>
<td>x</td>
<td>x</td>
<td>32/33</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>5M...</td>
<td>25CM</td>
<td>5M+25CM</td>
<td>x</td>
<td>x</td>
<td>42/43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5MC...</td>
<td>29CM</td>
<td>5MC+29CM</td>
<td>-</td>
<td>x</td>
<td>38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5L... or 5L...M</td>
<td>55CM, 56CM</td>
<td>5L+55CM</td>
<td>x</td>
<td>x</td>
<td>26/27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
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<td>55CM, 56CM</td>
<td>5LT+55CM</td>
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<td>x</td>
<td>34/35</td>
<td></td>
<td></td>
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<tr>
<td>7</td>
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<td>x</td>
<td>22/23</td>
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<td></td>
</tr>
<tr>
<td>8</td>
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<td>56CM, 55CM</td>
<td>13MM+55CM</td>
<td>x</td>
<td>x</td>
<td>40/41</td>
<td></td>
<td></td>
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<tr>
<td>9</td>
<td>13LN... or 13LNM...</td>
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<td>x</td>
<td>28/29</td>
<td></td>
<td></td>
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<tr>
<td>10</td>
<td>13LT... or 13LTM</td>
<td>90CM</td>
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<td>x</td>
<td>30/31</td>
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<tr>
<td>11</td>
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<td>95CM, 90CM</td>
<td>13MMC+95CM</td>
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<td>x</td>
<td>36/37</td>
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<td>x</td>
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<tr>
<td>14</td>
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<td>LNC-56CM</td>
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<td>62</td>
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<tr>
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<td>-</td>
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<td>x</td>
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<tr>
<td>16</td>
<td>-</td>
<td>91CM</td>
<td>LNC-91CM</td>
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<td>63</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Accessories: Mounting console 13MK

**for Laser Diode Beam Sources Series 55BC / 55CM (Housing Ø 25/28 mm)**

The mounting consoles 13MK-25-36-10 allow a precise and mechanically rugged alignment of the laser beam sources 13xx. The lasers are held by indirect clamping and the focussing and focus locking mechanisms remain accessible in the clamped state.

The mounting consoles 13ML-25-36-.. supports two degrees of freedom:
1. Rotation 0 – 360° around the optical axis (roll angle $\rho$)
2. In-plane rotation 0 – 360° (azimuth angle $\Phi$)

**Hex key WS 2**

Order Code: 50HD-20

**Hex key WS 2.5**

Order Code: 50HD-25