An universal and compact modular system for customer-specific electronics
# Laser Diode Collimators

**Type 21/22P, 20/24PX**  
**Type 50BM and 55BC**

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Laser Diode Collimators Type 20

Compact modular system for customer-specific electronics

- Designed for use with customer-specific electronics
- Ideal for self-assembly: Modular assembly system for the quick and precise mounting, adjustment and collimation of laser diodes
- Suitable for diodes of Ø 9 mm with wavelengths 375 – 1600 nm (Ø 5.6/3.8 mm with adapter)
- Adjustment of focus setting using an eccentric key
- Optional combination with a wide range of beam-shaping optics for the generation of micro focus and laser lines

Laser Diode Collimators Type 21

Compact modular system for customer-specific electronics

- Designed for use with customer-specific electronics
- Compact Design
- Mounted and aligned by Schäfter+Kirchhoff
- Allows attachment of beam-shaping optics.
- Suitable for diodes of Ø 9 mm with wavelengths 375 – 1600 nm (Ø 5.6/3.8 mm with adapter)
- Adjustment of focus setting using an eccentric key
- Optional combination with a wide range of beam-shaping optics for the generation of micro focus and laser lines

Laser Diode Collimators Type 22P

Compact modular system for customer-specific electronics

- Designed for use with customer-specific electronics
- Compact design Ø 11 mm, short
- Mounted and aligned by Schäfter+Kirchhoff
- Allows attachment of beam-shaping optics.
- Suitable for diodes of Ø 9 mm with wavelengths 375 – 1600 nm (Ø 5.6/3.8 mm with adapter)
- Adjustment of focus setting using an eccentric key
- Optional combination with a wide range of beam-shaping optics for the generation of micro focus and laser lines

Laser Diode Collimators Type 24PX

Compact modular system for customer-specific electronics

- Designed for use with customer-specific electronics
- Ideal for self-assembly: Modular assembly system for the quick and precise mounting, adjustment and collimation of laser diodes
- Suitable for diodes of Ø 9 mm with wavelengths 375 – 1600 nm (Ø 5.6/3.8 mm with adapter)
- Adjustment of focus setting using an eccentric key
- Short design

Ideal for self-assembly, short design. For details see p. 100.

How to order / Please select:
1. The laser diode: either a customer-specific diode, in any case with the adequate laser diode adapter (p.102)
2. The collimation optics (page 101) according to wavelength and designated beam diameter
3. Adjustment tools and equipment (p.104)
4. If desired, a cable connection system (page 103) and then from the following options: Beam-shaping optics series 5

All of these items require separate order codes.
### Overview of Collimators

<table>
<thead>
<tr>
<th>20C/20P</th>
<th>21C/21P</th>
<th>22P</th>
<th>24PX</th>
<th>Type 50BM</th>
<th>Type 55BC</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="20C/20P" /></td>
<td><img src="image" alt="21C/21P" /></td>
<td><img src="image" alt="22P" /></td>
<td><img src="image" alt="24PX" /></td>
<td><img src="image" alt="Type 50BM" /></td>
<td><img src="image" alt="Type 55BC" /></td>
</tr>
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<td>page 100</td>
<td>page 100</td>
<td>page 106</td>
<td>page 108</td>
</tr>
</tbody>
</table>

#### Laser diodes

- Ø = 9 mm
- Ø = 5.6 mm
- Ø = 3.8 mm

#### Collimation Lens

- 20CL
- 50CL / 90CL

#### Mounting and Alignment / Casing

<table>
<thead>
<tr>
<th>Type</th>
<th>20C / 20P</th>
<th>21C / 21P</th>
<th>22P</th>
<th>24PX</th>
<th>50BM</th>
<th>55BC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustable focus setting</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>LD Customer Mounting / Alignment</td>
<td>x</td>
<td>-</td>
<td>-</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Casing Ø [mm]</td>
<td>12(24.5)</td>
<td>12</td>
<td>11</td>
<td>12(24.5)</td>
<td>25/(30)</td>
<td>25</td>
</tr>
<tr>
<td>Focal Length [mm]</td>
<td>4 - 8</td>
<td>4 - 8</td>
<td>4 - 8</td>
<td>4 - 8</td>
<td>4 - 60</td>
<td>4 - 60</td>
</tr>
<tr>
<td>Galv. isolation of laser diode</td>
<td>x / -</td>
<td>x / -</td>
<td>-</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Flange</td>
<td>x / x</td>
<td>-</td>
<td>-</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Focusable</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Attachable beam shaping optics</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

#### Attachment optics

<table>
<thead>
<tr>
<th>Type</th>
<th>20</th>
<th>21</th>
<th>22</th>
<th>24</th>
<th>50BM</th>
<th>55BC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attachment optics</td>
<td>Series 5</td>
<td>Series 5</td>
<td>Series 5</td>
<td>Series 5</td>
<td>Series 5, 13</td>
<td>Series 5, 13</td>
</tr>
<tr>
<td>Fiber optics</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Anamorphic beam shaping</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

#### Cable Connection System

- 20CS/20PS
- 21CS/21PS
- 21PS
- 20PS
- 50CS
- 20CS
Laser Diode Collimator Bases, Type 20

Compact modular laser diode collimator systems for customer-specific electronics

The laser diode collimators type 20 are compact modular laser diode collimator systems that allow modular assembly for the rapid and precise mounting, adjustment and collimation of laser diodes. Because of the ease of assembly and accessibility of adjustment and locking it is ideal for self assembly and for customer specific electronics.

Main specifications:
- Designed for self-assembly: easy and accessible adjustment of laser diode, collimating optics
- Can be used with consumer specific electronics
- Wide range of collimating optics
- Compatible with a wide range of beam shaping optics
- For laser diodes with 9 mm (5.6 mm or 3.8 mm casing with adapter)
- Integrates laser diode, collimation lens and solderless cable connection system for the laser current supply
- Diode galvanically isolated (type C), or diode potential on casing (type P)
- Precise x/y-adjustment of the laser diode using a screwdriver. Laser diode is fastened using a threaded ring.

Option:
- Cable connection system 20CS/20PS for solderless contact of pins

Self-Mounting and Adjustment tools

1. Laser diode mounting:
   - fixed with threaded ring for Ø 9mm diodes
   For collimator type 20C:
   Tool: Assembly key Order Code 50LD-C
   For collimator type 20P:
   Tool: Assembly key Order Code 50LD9.0
   For Ø5.6 / 3.8 mm a different assembly key and additional adapters are needed (Details p.102)

2. Lens focussing
   Tool: Eccentric key Order Code 60EX-4

3. Lens locking (indirect clamping)
   Tool: Screwdriver Order Code 9D-12

4. Direct mounting and locking of beam-shaping optics using radially located grub screws.
   Tool: Screwdriver Order Code 9D-12

Order Options

Order Code 20C - A8 - 07 - LD
optional: LD-Code  
Lens Code: (Table 2, page 101)
Laser diode mounting
20C = galvanically isolated
20P = diode potential on casing

Collimation Lenses Type 20CL

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Beam parameters Collimation Lens Type 20CL</th>
</tr>
</thead>
<tbody>
<tr>
<td>row</td>
<td>curr. no</td>
</tr>
<tr>
<td>1</td>
<td>Lens code</td>
</tr>
<tr>
<td>2</td>
<td>Focal length f'</td>
</tr>
<tr>
<td>3</td>
<td>Numerical aperture NA</td>
</tr>
<tr>
<td>4</td>
<td>Clear aperture [mm]</td>
</tr>
<tr>
<td>5</td>
<td>Max. active area [mm]</td>
</tr>
<tr>
<td>6</td>
<td>Lens for UHV application</td>
</tr>
</tbody>
</table>
Laser Diode Collimator Bases, Type 21

Compact modular laser diode collimator systems for customer-specific electronics

The collimator type 21 is a compact modular laser diode collimator system. It is ideal for costumer specific electronics.

Main specifications:
- Compact Ø 12 mm casing
- Can be used with consumer specific electronics
- Wide range of collimating optics
- Compatible with a wide range of beam shaping optics
- For laser diodes with 9 mm (5.6 mm or 3.8 mm with adapter)
- Diode galvanically isolated (type C), or diode potential on casing (type P)
- Lens tube with cylindrical fit. Focus setting using an eccentric key: fine adjustment of the collimation or focus of the laser beam, even with attached beam-shaping optics.
- Frontal system mounting Ø 8 mm with locking screws for the attachment of beam-shaping optics.
- Not suited for customer mounting and alignment

Option:
- Cable connection system 21CS/21PS for solderless contact of pins

Order Options
- Order Code 21P - A8 - 07 - LD
  - optional: LD-Code
  - Lens Code: (Table 2, page 101)
  - Laser diode collimator base
  - 21C = galvanically isolated
  - 21P = diode potential on casing

Order Code
- 21P - A8 - 07 - LD
- optional: LD-Code
- Lens Code: (Table 2, page 101)
- Laser diode collimator base
- 21C = galvanically isolated
- 21P = diode potential on casing

Adjustment tools

1. Lens focussing
   - Tool: Eccentric key
   - Order Code 60EX-4

2. Lens locking (indirect clamping)
   - Tool: Screwdriver
   - Order Code 9D-12

3. Direct mounting and locking of beam-shaping optics using radially located grub screws.
   - Tool: Screwdriver
   - Order Code 9D-12

Please note:
The laser diode collimators type 21C and 21P are not suited for customer mounting and alignment of the laser diode.

Collimation Lenses Type 20CL

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Beam parameters Collimation Lens Type 20CL</th>
</tr>
</thead>
<tbody>
<tr>
<td>row</td>
<td>curr. no</td>
</tr>
<tr>
<td>1</td>
<td>Lens code</td>
</tr>
<tr>
<td>2</td>
<td>Focal length $f'$</td>
</tr>
<tr>
<td>3</td>
<td>Numerical aperture NA</td>
</tr>
<tr>
<td>4</td>
<td>Clear aperture [mm]</td>
</tr>
<tr>
<td>5</td>
<td>Max. active area [mm]</td>
</tr>
<tr>
<td>6</td>
<td>Lens for UHV application</td>
</tr>
</tbody>
</table>

Please note:
For Ø 5.6 / 3.8 mm diodes additional adapters and an additional assembly key is needed (Details page 102)
Laser Diode Collimator Type 22P

Special Configuration of Laser Diode Collimator 21P

Compared to the laser diode base type 21P the housing is shorter so that there is a direct access to the laser diode pins.

Main specifications:
• Compact Ø 11 mm casing
• Direct access to the laser diode pins
• X/y-adjustment of laser diode with special tool
• Focus setting using an eccentric key
• Frontal cylinder mounting for the attachment of beam-shaping optics.
• Direct access to the laser diode pins.
• Not suited for customer mounting/alignment

Dimensions

Order Options

Adjustment tools

1. Lens focussing
   Tool: Eccentric key
   Order Code: 60EX-4

2. Lens locking (indirect clamping)
   Tool: Screwdriver
   Order Code: 9D-12

3. Direct mounting and locking of beam-shaping optics using radially located grub screws.
   Tool: Screwdriver
   Order Code: 9D-12

Please note:
The laser diode collimators type 21C and 21P are not suited for customer mounting and alignment of the laser diode.

Collimation Lenses Type 20CL

<table>
<thead>
<tr>
<th>row</th>
<th>curr. no</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lens code</td>
<td>A4</td>
<td>A4</td>
<td>A4.5</td>
<td>A6.2</td>
<td>A7.5</td>
<td>A8</td>
</tr>
<tr>
<td>2</td>
<td>Focal length f'</td>
<td>4</td>
<td>4</td>
<td>4.5</td>
<td>6.2</td>
<td>7.5</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>Numerical aperture NA</td>
<td>0.6</td>
<td>0.6</td>
<td>0.55</td>
<td>0.4</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>4</td>
<td>Clear aperture [mm]</td>
<td>4.8</td>
<td>5</td>
<td>4.95</td>
<td>5</td>
<td>6.5</td>
<td>4.8</td>
</tr>
<tr>
<td>5</td>
<td>Max. active area [mm]</td>
<td>0.05</td>
<td>0.05</td>
<td>0.18</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
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<tr>
<td>6</td>
<td>Lens for UHV application</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

Please note:
For Ø 5.6 / 3.8 mm diodes additional adapters and an additional assembly key is needed (Details page 102)
Laser Diode Collimator Type 24PX

Modular system for customer mounting and alignment of laser diodes short design e.g. for ECL

Compared to the laser diode base type 20P the housing is shorter at front side. This short design makes the laser diode collimators appropriate for laser diode systems with an external resonator.

Main specifications:
- Designed for self-assembly; easy and accessible adjustment of laser diode, collimating optics
- Can be used with consumer specific electronics
- Wide range of collimating optics
- Short design
- For laser diodes with 9 mm (5.6 mm or 3.8 mm casing with adapter)
- Integrates laser diode, collimation lens and solderless cable connection system for the laser current supply
- Diode potential on casing
- Precise x/y-adjustment of the laser diode using a screwdriver. Laser diode is fastened using a threaded ring.

Option:
- Cable connection system 20CS/20PS for solderless contact of pins

Self-Mounting and Adjustment tools

1. Laser diode mounting:
   - fixed with threaded ring for Ø 9 mm diodes
   - Tool: Assembly key
   - Order Code: 50LD-C
   - For collimator type 20C:
   - Tool: Assembly key
   - Order Code: 50LD9.0
   - For Ø5.6 / 3.8 mm a different assembly key and additional adapters are needed (Details p.102)

2. Lens focussing
   - Tool: Eccentric key
   - Order Code: 60EX-4

3. Lens locking (indirect clamping)
   - Tool: Screwdriver
   - Order Code: 9D-12

4. Direct mounting and locking of beam-shaping optics using radially located grub screws.
   - Tool: Screwdriver
   - Order Code: 9D-12

5. x/y-adjustment of the laser diode
   - Tool: Screwdriver
   - Order Code: 9D-12

Adjusment screws (set = 3 pcs.) for type 20C
WS Ø 1.5 mm
Order Code: 20AS-01

Collimation Lenses Type 20CL

Table 2: Beam parameters Collimation Lens Type 20CL

<table>
<thead>
<tr>
<th>row</th>
<th>curr. no</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lens code</td>
<td>A4</td>
<td>A4</td>
<td>A4.5</td>
<td>A6.2</td>
<td>A7.5</td>
<td>A8</td>
</tr>
<tr>
<td>2</td>
<td>Focal length f’</td>
<td>4</td>
<td>4</td>
<td>4.5</td>
<td>6.2</td>
<td>7.5</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>Numerical aperture NA</td>
<td>0.6</td>
<td>0.6</td>
<td>0.55</td>
<td>0.4</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>4</td>
<td>Clear aperture [mm]</td>
<td>4.8</td>
<td>5</td>
<td>4.95</td>
<td>5</td>
<td>6.5</td>
<td>4.8</td>
</tr>
<tr>
<td>5</td>
<td>Max. active area [mm]</td>
<td>0.05</td>
<td>0.05</td>
<td>0.18</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>6</td>
<td>Lens for UHV application</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>
Collimating the radiation of laser diodes

Collimated Beam Diameter

Collimation optics transform a divergent beam into a collimated beam, retaining both its Gaussian intensity distribution and elliptical beam profile.

The beam diameters $\phi_1$ and $\phi_2$ at the collimator are defined at the $1/e^2$-level and are given by the focal length $f$ of the collimating lens and the divergence $\alpha$ and $\alpha_2$ (FWHM) of the laser diode.

$$\phi_{1/2} = 2f \cdot \sin \left( \frac{1}{2} \alpha_{1/2} \cdot \frac{1}{1.7} \right)$$

The factor 1.7 in the equation accounts for different definitions of the Gaussian beam profiles.

Divergence

Even a collimated beam has a non-vanishing divergence. The beam diameter varies (for large distances) with the distance $A$ from the laser diode collimator linearly.

The resulting beam divergences $\theta_1$ and $\theta_2$ of the collimated beam depend on the beam diameter at the collimator $\phi_1$ and $\phi_2$, respectively and on the wavelength $\lambda$ of the emitted radiation.

For an ideal Gaussian beam ($M^2 = 1$):

$$\theta_{1/2} = \frac{2 \cdot \lambda}{\pi \cdot \phi_{1/2}}$$

Accessories:
Adapters for Mounting Laser Diodes $\phi$ 5.6 / $\phi$ 3.8 mm

Laser diodes of $\phi$ 5.6 / $\phi$ 3.8 mm size can be inserted into the slot for laser diodes of $\phi$ 9 mm size without altering the active area nor its position: the laser diode beam axis and the position of the emitter are unchanged.

Adjustment and tools

Order Options for Adapters and Assembly key

2 parts:
- A outer casing $\phi$ 9 mm and
- B retaining ring for laser diode
- Adapter Order-Code 50AL-5.6
- Adapter Order-Code 50AL-3.8
- C laser diode with housing $\phi$ 5.6 or $\phi$ 3.8 mm
- D assembly key Order-Code 50LD5.6 (for 50AL-5.6 and 50AL-3.8)
- Adapters for other diode casings on request.

Laser Diodes

Laser diodes are available on request.

The laser diode collimators of series 20... and 21... can be supplied with customer-owned laser diodes. Please contact Schäfter+Kirchhoff if these are not part of our product portfolio since specific features (e.g. point of emission, etc.) about the laser diode need to be known before hand in order to ensure compatibility with the laser diode collimator.
Attachment: **Cable Connection System 21CS / 21PS**

Electrically isolated, solderless, spring contacts for the laser diode.

**Dimensions**

Collimators Type 21 with attached beam shaping optics and cable connection system

**Order Options for Cable Connection System 21CS / 21PS**

**Order Code** 21 CS - 3 - 150 - 4

- **Type:**
  - 21CS = for coll. type 21C
  - 21PS = for coll. type 21P

- **Connector:**
  - 4 = with 4-pin connector for Power Supply (Type LEMO = FGG.0B.304)
  - 5 = customer-specified configuration
  - 0 = cable end shortened

- **Cable length:** Length in cm (standard = 150)

- **Diode Pin-Out/Cable:**
  - 3 = for 3-pin diode (see Pin-out p. 96) shielded cable (Type 3x AWG 26C UL sw, 0.14mm²)
  - 4 = for 4-pin diode (see Pin-out p. 96) shielded cable (Type 4x AWG 26C UL sw, 0.14mm²)

---

Attachment: **Cable Connection System 20CS/20PS**

Electrically isolated, solderless, spring contacts for the laser diode.

**Dimensions**

Collimators Type 20 with attached beam shaping optics and cable connection system

**Order Options for Cable Connection System 20CS / 20PS**

**Order Code** 20 CS - 3 - 150 - 4

- **Type:**
  - 20CS = for coll. type 20C
  - 20PS = for coll. type 20P

- **Connector:**
  - 4 = with 4-pin connector for Power Supply (Type LEMO = FGG.0B.304)
  - 5 = customer-specified configuration
  - 0 = cable end shortened

- **Cable length:** Length in cm (standard = 150)

- **Diode Pin-Out/Cable:**
  - 3 = for 3-pin diode (see Pin-out p. 96) shielded cable (Type 3x AWG 26C UL sw, 0.14mm²)
  - 4 = for 4-pin diode (see Pin-out p. 96) shielded cable (Type 4x AWG 26C UL sw, 0.14mm²)
Universal Laser Diode Collimators 50BM

for self assembly and with customer electronics

The collimator type 50BM is a universal laser diode collimator system that allows modular assembly for the rapid and precise mounting, adjustment and collimation of laser diodes. Because of the ease of assembly and accessibility of adjustment and locking it is ideal for self assembly and for customer specific electronics.

Main features include:

- Ideal for self-assembly: Modular assembly system for the quick and precise mounting, adjustment and collimation of laser diodes
- Designed for use with customer-supplied electronics
- All laser diode beam source configurations can be realized using the appropriate beam-shaping optics.
- Suitable for diodes of Ø 9mm (Ø 5.6/3.8mm with adapter)

Optional:

- Combination with a wide range of beam-shaping optics for the generation of micro focus and laser lines
- Laser beam coupling into polarization-maintaining singlemode fiber cable with mode field diameters

Universal Laser Diode Collimators 55BC

for self assembly and with customer electronics

The collimator type 55BC is a universal laser diode collimator system that allows modular assembly for the rapid and precise mounting, adjustment and collimation of laser diodes. Because of the ease of assembly and accessibility of adjustment and locking it is ideal for self assembly and for customer specific electronics.

Main features include:

- Designed for self-assembly: easy and accessible adjustment of laser diode, collimating optics
- Can be used with consumer specific electronics
- Wide range of collimating optics
- Compatible with a wide range of beam shaping optics
- Galvanically decoupled high precision laser diode adjustment
- Good heat dissipation: Suitable for powers P<120 mW or >120 mW and diodes UV-NIR
- For laser diodes with 9mm (5.6mm or 3.8mm casing with adapter)

Applications

Collimation lenses transform the divergent laser radiation into a collimated beam

The universal laser diode collimator systems 50BM and 55BC with attached beam-shaping and fiber optics from Schäfter+Kirchhoff provide a range of laser system configurations with 1000s of combinations of laser beam-shaping optics for data transmission, medical applications, industrial measurement and sensor techniques, analysis, biosensors and nanotechnology.

All laser diode beam source configurations can be realized.
Universal LD Collimator Base Type 50BM

Designed for self-assembly: easy and accessible adjustment of laser diode, collimating optics

Main specifications:
- Can be used with consumer specific electronics
- Wide range of collimating optics
- Compatible with a wide range of beam shaping optics
- For powers < 120 mW and wavelengths > 600 nm
- For laser diodes with 9 mm (5.6 mm or 3.8 mm casing with adapter) Integrates laser diode, collimation lens and solderless cable connection system for the laser current supply.
- Galvanically decoupled laser diode mounting with ball bearing (no backlash). Precise x/y-adjustment of the laser diode, which is fastened using a threaded ring.
- Lens tube with cylindrical fit and finethread. Internal lens focussing of 50CL: left or right-hand turn of the collimation lens provides a fine adjustment of the collimation or focus of the laser beam, even with attached beam-shaping optics.
- Frontal cylinder mounting with locking screws for the attachment of beam-shaping optics. The beam-shaping optics provides laser lines, micro focus optics or laser beam coupler for singlemode fiber cables.
- The laser module can be integrated into the microbench system (30 mm cage system) or with a mounting console.

How to order

Please select:
1. The laser diode with the adequate laser diode adapter (page 110)
2. Proof if collimator base is the right choice (for P>120 mW please chose the 55BC page 108)
3. The collimation optics (page 109) according to wavelength and designated beam diameter
4. If desired, a cable plug system 50CS (page 112)

and then from the following options:
- Beam-shaping optics, series 5 or 13 (page 111)
- Consoles and mounting brackets (page 113)
- Anamorphic correction (page 126)
- Faraday isolator (page 128)
- Fiber optics (see fiber optics catalogue),
- Adjustment tools (see below) and equipment (p.128)

All of these items require separate order codes.

Self-Mounting and Adjustment Tools

1. Laser diode mounting: fixed with threaded ring for Ø 9 mm diodes
   Tool: Assembly key  Order Code  50LD9.0
   For Ø 5.6/3.8 mm additional adapters are needed

2. Lens mounting and focussing
   Tool: Focussing key  Order Code  50LF-03

3. x/y-adjustment of the laser diode:
   Adjustment screws
   WS Ø 1.5 mm  Order Code  50AS-01
   (set = 3 pcs.)
   Tool: Allen hex key  Order Code  50HD-15

4. Lens locking (indirect clamping)
   Tool: Allen hex key  Order Code  50HD-15

5. Lens focussing with attached beamshaping optics by left and right-hand turns of the collimation lens.
   Tool: Allen hex key  Order Code  50HD-15

6. Direct mounting and locking of beam-shaping optics or laser beam coupler using radially located grub screws.
   Tool: Allen hex key  Order Code  50HD-15
Universal LD Collimator Base Type 55BC

Designed for self-assembly: easy and accessible adjustment of laser diode, collimating optics

The collimator type 55BC is a universal laser diode collimator system that allows modular assembly for the rapid and precise mounting, adjustment and collimation of laser diodes. Because of the ease of assembly and accessibility of adjustment and locking it is ideal for self assembly and for customer specific electronics.

Main specifications:

• Can be used with consumer specific electronics
• Wide range of collimating optics
• Compatible with a wide range of beam shaping optics
• Galvanically decoupled high precision laser diode adjustment
• Good heat dissipation: Suitable for powers P<120 mW or >120 mW and diodes UV-NIR
• For laser diodes with 9 mm (5.6 mm or 3.8 mm casing with adapter)

How to order

Please select:

1. The laser diode with the adequate laser diode adapter (page 110)
2. Proof if collimator base 55BC is the right choice (else chose the 50BM page 106)
3. The collimation optics (page 109) according to wavelength and designated beam diameter
4. If desired, a cable plug system 50CS (page 112)

and then from the following options:

• Beam-shaping optics, series 5 or 13 (page 111)
• Consoles and mounting brackets (page 113)
• Anamorphic correction (page 126)
• Faraday isolator (page 128)
• Fiber optics (see fiber optics catalogue),
• Adjustment tools (see below) and equipment (p.128)

All of these items require separate order codes.

Self-Mounting and Adjustment Tools

1. Laser diode mounting: fixed with threaded ring for Ø 9 mm diodes
   Tool: Assembly key **Order Code** 50LD-C
   For Ø 5.6 / 3.8 mm additional adapters are needed

2. Lens mounting and focussing
   Tool: Focussing key **Order Code** 50LF-03

3. x/y-adjustment of the laser diode:
   Adjustment screws (set = 3 pcs.)
   Tool: Allen hex key WS Ø 1.5 mm **Order Code** 55AS-01

4. Lens locking (indirect clamping)
   Tool: Allen hex key WS Ø 1.5 mm **Order Code** 50HD-15

5. Lens focussing with attached beamshaping optics by left and right-hand turns of the collimation lens.
   Tool: Allen hex key WS Ø 1.5 mm **Order Code** 50HD-15

6. Direct mounting and locking of beam-shaping optics or laser beam coupler using radially located grub screws.
   Tool: Allen hex key WS Ø 1.5 mm **Order Code** 50HD-15
Collimation lenses transform the divergent laser radiation into a collimated beam. The beam parameters are determined by the focal length of the lens, its numerical aperture and the divergence of the initially emitted radiation. The original beam characteristics of the laser diode (elliptical or circular beam profile) are preserved.

### Table 3: Beam parameters: Collimation Lens 50CL / 90CL

<table>
<thead>
<tr>
<th>Row</th>
<th>Collimation lens type</th>
<th>50CL</th>
<th>90CL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lens code 1)</td>
<td>A4</td>
<td>A4</td>
</tr>
<tr>
<td>2</td>
<td>Focal length 'f'</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Numerical aperture NA</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>4</td>
<td>Clear aperture [mm]</td>
<td>4.8</td>
<td>4.95</td>
</tr>
<tr>
<td>5</td>
<td>Max. active area [mm]</td>
<td>0.05</td>
<td>0.18</td>
</tr>
<tr>
<td>6</td>
<td>Lens for UHV application</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>7</td>
<td>Spectral range</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>8</td>
<td>Code No. of AR-Coating</td>
<td>01</td>
<td>01</td>
</tr>
</tbody>
</table>

### Order Options for Collimation Optics 50CL / 90CL

- **Order Code**: 50CL - T 12 - 05
- **AR-coating**, see Table 3
- **Lens Code**, see Table 3

Collimation lens type: 50CL, 90CL

---

* Lens no. 3 and 10: special lenses, optics design for laser diodes without terminating windows
** IR chalcogenide lens
*** Dimensions of fully assembled collimator differs

---

Beam parameter for the collimated laser beam using a 670 nm laser diode with beam divergence 10°x 30° (FWHM), beam-Ø 1/e² (13.5%)

<table>
<thead>
<tr>
<th>Row</th>
<th>Parameter</th>
<th>50CL</th>
<th>90CL</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>beam-Ø</td>
<td></td>
<td>[mm] (1/e²)</td>
</tr>
<tr>
<td>21</td>
<td>beam-Ø ^</td>
<td>[mm] (1/e²)</td>
<td>3.4</td>
</tr>
<tr>
<td>22</td>
<td>divergence</td>
<td></td>
<td>[mrad]</td>
</tr>
<tr>
<td>23</td>
<td>divergence ^</td>
<td>[mrad]</td>
<td>0.12</td>
</tr>
</tbody>
</table>

# beam cross-section restricted by lens aperture
**Attachment Fiber Coupling**

The universal LD collimators 50BM and 55BC can also be used for fiber-coupling the laser diode radiation. In order to be successful the right combination of laser diode, collimating optics and coupling optics needs to be found. The laser beam coupler type 60SMS is mounted directly onto the front of the collimator.

Other features include:

- Wide range of coupling optics Type 60SMS (Details see fiber optics catalogue)
- Coupling into single-mode, multi-mode or polarization-maintaining single-mode fibers (Details see fiber optics catalogue)
Beam-Shaping Optics

The universal LD collimators type 50BM and 55BC can be equipped with a large variety of beam shaping optics. The universal laser diode collimators type 50BM- and 55BC- can be equipped with all beam shaping optics (including micro and macro configurations) that can be found in the catalogue (page 34 - 61). All configurations are thus also available without integrated electronics. Beam shaping optics include:

**Line optics with fan angle**

Laser line generators with homogeneous intensity distribution
Type 13LR/13LRM page 34f

Laser line generators with Gaussian intensity distribution
Type 5L page 36f

Laser line generators with homogeneous intensity distribution and very thin lines
Type 13LN page 40f

**Semi-telecentric laser lines**

Semi-telecentric laser line generators with constant line length 15 mm
Type 13LT page 42f

Semi-telecentric laser line generators with constant line length 4.8 mm / 2.4 mm
Type 5LT page 44f

**Focus optics**

Laser Focus Generators with circular Gaussian beam profile and smaller spots
Type 13MC page 48f

Laser Focus Generators with elliptical Gaussian beam profile (Micro) or circular (Macro) spots
Type 5MC page 50f
Type 13MM page 53f
Type 5M page 54f

**Collimator type**

Telecentric laser beam
with homogeneous intensity distribution in both directions and with low divergence
flatbeam® page 59f
Attachment: **Cable Connection System 50CS**

Electrically isolated, solderless, spring contacts for the laser diode.

**Dimensions**

![Collimator Type 5BMC with cable connection system](image)

**Order Options for Cable Connection System 50CS**

<table>
<thead>
<tr>
<th>Order Code</th>
<th>50 CS - 3 - 150 - 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type:</td>
<td>50CS = for coll. type 50BM</td>
</tr>
<tr>
<td>Connector:</td>
<td>4 = with 4-pin connector for Power Supply (Type LEMO = FGG.0B.304)</td>
</tr>
<tr>
<td></td>
<td>5 = customer-specified configuration</td>
</tr>
<tr>
<td></td>
<td>0 = cable end shortened</td>
</tr>
<tr>
<td>Cable length:</td>
<td>Length in cm (standard = 150)</td>
</tr>
<tr>
<td>Diode Pin-Out/Cable:</td>
<td>3 = for 3-pin diode (see Pin-out p. 96) shielded cable (Type 3x AWG 26C UL sw, 0.14mm²)</td>
</tr>
<tr>
<td></td>
<td>4 = for 4-pin diode (see Pin-out p. 96) shielded cable (Type 4x AWG 26C UL sw, 0.14mm²)</td>
</tr>
</tbody>
</table>

Attachment: **Cable Connection System 20CS**

Electrically isolated, solderless, spring contacts for the laser diode.

**Dimensions**

![Collimator Type 55BC with cable connection system](image)

**Order Options for Cable Connection System 20CS**

<table>
<thead>
<tr>
<th>Order Code</th>
<th>20 CS - 3 - 150 - 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type:</td>
<td>20CS = for coll. type 55BC</td>
</tr>
<tr>
<td>Connector:</td>
<td>4 = with 4-pin connector for Power Supply (Type LEMO = FGG.0B.304)</td>
</tr>
<tr>
<td></td>
<td>5 = customer-specified configuration</td>
</tr>
<tr>
<td></td>
<td>0 = cable end shortened</td>
</tr>
<tr>
<td>Cable length:</td>
<td>Length in cm (standard = 150)</td>
</tr>
<tr>
<td>Diode Pin-Out/Cable:</td>
<td>3 = for 3-pin diode (see Pin-out p. 96) shielded cable (Type 3x AWG 26C UL sw, 0.14mm²)</td>
</tr>
<tr>
<td></td>
<td>4 = for 4-pin diode (see Pin-out p. 96) shielded cable (Type 4x AWG 26C UL sw, 0.14mm²)</td>
</tr>
</tbody>
</table>
**Accessory Bracket 48MB-25-60**

Microbench compatible (30 mm cage system)

**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 13Lx.
- 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 $\Phi$)

**Dimensions**

- **Adjustment and tools**
  - Hex key WS 2
    - Order Code: 50HD-20
  - Hex key WS 2.5
    - Order Code: 50HD-25

**Order Options**

- Mounting console, flat base plate
  - Order Code: 13MK-25-36-10-F

- Mounting console, base plate with Montech profile (www.montech.com):
  - Order Code: AP-46-5
Laser Diode Collimators
Type 48TE, 48-0, and 44TE,
universal modular system
for self-assembly
Laser Diode Collimators
48TE, 48-0, and 44TE,
Laser Diode Base Unit 44TE

LD Collimators Types 48TE, 48-0 and 44TE
How to Order
Overview
Associated Products
LD Base Unit 48TE-SOT
Adapters for Mounting Laser Diodes Ø 5.6 / Ø 3.8 mm
LD Base Units 48-0
Attachment Optics and Accessories:
Collimation Lenses 60CL or 50CL
Collimator Flanges 48CFS or 48FCL
Fundamentals
Consoles and Flanges, Fan 48L
Laser Diode Base Units 44TE
Laser Diode Collimators Types 48TE, 48-0, and 44TE

Universal modular system for self-assembly

The Laser diode collimators of type 48 and 44 are modular systems designed for various laser diode casing types. They can be supplied with or without integrated thermo-electric cooling (depending on the laser diode choice). It is compatible with the multicube system and can be extended according to need.

These systems are provided for self-assembly but can be supplied pre-assembled and pre-adjusted according to customer requirements.

Main features include:
- Designed for self-assembly: easy and accessible adjustment of laser diode, collimating optics
- Can be used with consumer specific electronics
- For laser diode types: Ø 9 mm (3.8 mm and 5.6 mm casing with adapter), TO2, TO3, TO5 and TO46
- Wide range of collimating optics
- Compatible with a wide range of beam shaping optics
- With and without integrated TE-cooling
- Various extension possibilities including Faraday isolator or anamorphic beam shaping optics, fiber-coupling or attachable beam-shaping optics

How to order

1. Determine the casing type of your laser diode A
2. In case of Ø 9 mm, Ø 5.6 mm, or Ø 3.8 mm choose the laser diode unit base 48TE-SOT B with additionally the appropriate adapter C (Ø 5.6 mm, or Ø 3.8 mm only)
3. For all other laser diode casing types choose a laser diode base unit of series 48-0 or 44TE
4. In case of laser diode unit base 48TE and 48-0, you will need the lateral adjustment tool 48AD D
5. Determine a collimating focal length
6. In case of laser diode unit base 48TE and 48-0, select a collimating lens E of series 60CL or 50CL. For the base unit 44TE choose series 50CL

In case of laser diode unit base 48TE and 48-0, choose the right collimating flange F 48CFS or 45CFL with rods G and the right adjustment tool H

Additionally there are the following options:
- Mounting consoles and mounting brackets
- Beam-shaping optics
- Anamorphic correction
- Faraday isolator
- Fiber optics
- Fan 48L or 44L H
- Adjustment tools and equipment.

All of these items require separate order codes.
Overview Laser Diode Collimators Types 48 and 44TE

Modular System for temperature-stabilized Laser Diodes

<table>
<thead>
<tr>
<th>Laser Diode Collimator 48TE</th>
<th>Compact System for Laser Diodes</th>
<th>Laser Diode Collimator 44TE</th>
</tr>
</thead>
<tbody>
<tr>
<td>with TE cooling</td>
<td>Collimator basic unit without TE cooling</td>
<td>Collimator basic unit with TE cooling</td>
</tr>
<tr>
<td>48TE-SOT</td>
<td>48-0-TOW2</td>
<td>44TE-TO8</td>
</tr>
<tr>
<td></td>
<td>48-0-TO3</td>
<td>44TE-2</td>
</tr>
<tr>
<td></td>
<td>48-0-TO5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>48-0-TO8</td>
<td></td>
</tr>
</tbody>
</table>

Laser diodes

<table>
<thead>
<tr>
<th>Ø = 9mm</th>
<th>Ø = 5.6mm</th>
<th>Ø = 3.8mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOW2</td>
<td>TO3</td>
<td>TO5</td>
</tr>
<tr>
<td>TO8</td>
<td>TO8</td>
<td>TO3</td>
</tr>
</tbody>
</table>

Collimator Flange

| 48CFS   | 48CFL     | integrated |

Collimation Lens

| 60CL    | 50CL      |

Attachment Optics and Accessories

- Laser diode adapters (page 118)
- Consoles and flanges (page 122)
- Anamorphic beam shaping optics 5AN (page 44)
- Fiber couplers (see Fiber Optics Catalogue)
- Polarization-maintaining fiber cable PMC (see Fiber Optics Catalogue)
- Faraday isolator (page 128)
- Line and micro focus optics
- Laser safety (page 135)
Laser Diode Base Unit 48TE-SOT

with integrated TE-Cooling, for laser diodes Ø = 9 mm (Ø = 5.6 mm and Ø = 3.8 mm with adapter)

The laser diode base unit type 48TE-SOT is used when the laser diode has to be temperature controlled externally.

The main specifications are:

- x/y-centering of the laser diode onto the optical axis with adjustment tool 48AD
- Designed for laser diodes with Ø 9 mm can
- Adapters for laser diodes with Ø 5.6 mm can or Ø 3.8 mm can
- Focus setting adjustable by means of a lens tube hold in a collimation flange 48FCS or 48FCL
- Solderless spring-loaded connectors isolate the laser diode galvanically from the collimator casing
- Integrated Peltier element and temperature sensor for thermo-electric closed-loop control of the laser diode temperature
- Peltier element provides up to 2 W of heat transfer capacity: \( I_{\text{max}} = 1.5 \text{ A, } U_{\text{max}} = 2.8 \text{ V} \)
- Temperature sensor: thermistor (NTC 10 k\( \Omega \))
- Separate connection cables for the power supply, the monitoring of the laser diode and temperature control
- Connectors and pinning for many types of laser diode controllers or customized
- Optional fan 48L for increased thermal transfer efficiency
- Multicube compatible (30 mm cage system)
- The components are adjusted and locked into place using radially located grub screws
- An elastomere sealing encloses the laser diode, to prevent laser light from exiting, and dust contamination

Order Information

Laser diode base unit

Order Code: 48TE-SOT

Accessories: Adapters for Mounting Laser Diodes Ø 5.6 / Ø 3.8 mm

To use with the laser diode base 48TE-SOT

The adapters have an outer diameter such as Ø 9 mm laser diode casings and are mounted to the laser diode base 48TE-SOT

- Available for laser diodes with Ø 5.6 mm or with Ø 3.8 mm can.
- The adapters consist of a casing \( A \) and a retaining ring \( B \).
- Key for an polarization axes alignment

Adjustment and tools

Order Options for Adapters and Assembly key

<table>
<thead>
<tr>
<th>Adapter</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 5.6 mm</td>
<td>50AL-5.6</td>
</tr>
<tr>
<td>Ø 3.8 mm</td>
<td>50AL-3.8</td>
</tr>
<tr>
<td>Assembly key</td>
<td>50LDS.6</td>
</tr>
</tbody>
</table>
Laser Diode Base Unit 48-0

without integral TE Cooling, for laser diodes in casing TO3, TOW2, TO5, and TO8 (laser diodes already equipped with TE-Cooling)

The laser diode bases unit type 48-0 are used when the laser diode already has an integrated temperatur sensor and Peltier element

The main specifications are:
- x/y-centering of the laser diode onto the optical axis with adjustment tool 48AD
- Focus setting adjustable by means of a lens tube hold in a collimation flange 48FCS or 48FCL
- Solderless spring-loaded connectors isolate the laser diode galvanically from the collimator casing
- Separate connection cables for the power supply, the monitoring of the laser diode and temperature control
- Modular fan 48L for increased thermal transfer efficiency
- multicube™s compatible (30 mm cage system)
- The components are adjusted and locked into their final position using radially located grub screws
- An elastomere sealing encloses the laser diode, to prevent laser light from exiting, and dust contamination

Order Options for Laser diode base unit 48-0

1. for laser diode casings of type TO3
   Order Code 48-0-TO3
2. for laser diode casings of type TOW2
   Order Code 48-0-TOW2
3. for laser diode casings of type TO5
   Order Code 48-0-TO5
4. for laser diodes casings of type TO8
   Order Code 48-0-TO8

Order Options for Laser diode base unit 48-0

Dimensions Laser Diode Base Unit 48-0

Unit base 48- with collimator flange (Rods not shown)

Unit base 48- with collimator flange and mounting console (Rods not shown)
Collimation Lenses 60CL or 50CL

Focal lengths \( f' = 4 \text{ mm} - 60 \text{ mm} \)

Collimating lenses by Schäfter+Kirchhoff are manufactured from high quality glass. Beam collimation and beam shape are more stable compared to plastic lenses showing variation in refractive index and shape caused by temperature changes. Bi-asphere lenses used for collimating monochromatic radiation show the same correction and imaging quality compared to microscope lenses with three and four elements. Caused by their specific manufacturing process, these lenses have micro structures on their surfaces, which also appear in the collimated beam, but not in a focussed spot. Triplet lenses are three lens systems with spherical elements and high surface quality. The lenses are characterized by a very good spherical correction and a high numerical aperture.

For wavelengths in the range 370–2300 nm the lenses are provided with anti-reflex coatings of a few hundred nm bandwidth, respectively.

The collimator flanges 60CL and 50CL are attached to the laser diode unit bases by means of the collimator flanges 48CFS and 48CFL, respectively.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Beam parameters Collimation Lens 60CL / 50CL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Collimation lens type</td>
</tr>
<tr>
<td>row</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Lens code</td>
</tr>
<tr>
<td>2</td>
<td>Focal length ( f' )</td>
</tr>
<tr>
<td>3</td>
<td>Numerical aperture NA</td>
</tr>
<tr>
<td>4</td>
<td>Clear aperture [mm]</td>
</tr>
<tr>
<td>5</td>
<td>Max. active area [mm]</td>
</tr>
<tr>
<td>6</td>
<td>Lens for UHV application</td>
</tr>
<tr>
<td>Spectral range</td>
<td>Code No. of AR-Coating</td>
</tr>
<tr>
<td>9</td>
<td>600 - 1050 nm</td>
</tr>
<tr>
<td>10</td>
<td>1050 - 1550 nm</td>
</tr>
<tr>
<td>11</td>
<td>1300 - 1750 nm</td>
</tr>
<tr>
<td>12</td>
<td>1550 - 1550 nm</td>
</tr>
<tr>
<td>13</td>
<td>390 - 670 nm</td>
</tr>
<tr>
<td>14</td>
<td>600 - 1020 nm</td>
</tr>
<tr>
<td>15</td>
<td>980 - 1550 nm</td>
</tr>
<tr>
<td>16</td>
<td>1550 - 1550 nm</td>
</tr>
<tr>
<td>17</td>
<td>1550 - 1550 nm</td>
</tr>
<tr>
<td>18</td>
<td>1750 - 2300 nm</td>
</tr>
<tr>
<td>19</td>
<td>1750 - 3000 nm</td>
</tr>
</tbody>
</table>

Order options for collimation optics 50CL/60CL

** Example: Beam parameters for a collimated laser beam using a 670 nm laser diode with beam divergence 10° x 30° (FWHM), beam-Ø 1/e² (13.5%)

Adjustment tools for collimation optics 50CL and 60CL

- For lens type 60CL: Tool: Eccentric key 60EX-4
- For lens type 50CL with focal length ≤ 15 mm: Tool: Eccentric key 50LF-03
- For lens type 50CL with focal length ≤ 20 mm: Tool: Eccentric key 55EX-5

Collimation Lenses 60CL or 50CL

Schäfter+Kirchhoff
Collimating the radiation of laser diodes

Collimated Beam Diameter
Collimation optics transform a divergent beam into a collimated beam, retaining both its Gaussian intensity distribution and elliptical beam profile. The beam diameters $\Omega_1$ and $\Omega_2$ at the collimator are defined at the 1/e²-level and are given by the focal length $f$ of the collimating lens and the divergence $\alpha_1$ and $\alpha_2$ (FWHM) of the laser diode.

$$\Omega_i = 2 \cdot f \cdot \sin \left( \frac{1}{2} \cdot \alpha_i \cdot 1.7 \right)$$

The factor 1.7 in the equation account for different definitions of the Gaussian beam profiles.

Divergence
Even a collimated beam has a non-vanishing divergence. The beam diameter varies (for large distances) with the distance $A$ from the laser diode collimator linearly. The resulting beam divergences $\theta_1$ and $\theta_2$ of the collimated beam depend on the beam diameter at the collimator $\Omega_1$ and $\Omega_2$, respectively and on the wavelength $\lambda$ of the emitted radiation.

For an ideal Gaussian beam ($M^2 = 1$):

$$\theta_{\perp} = \frac{2 \cdot \lambda}{\pi \cdot \Omega_{\perp}}$$

Laser diode Adjustment / x/y-Centering of the Laser Diode Basic Unit type 48TE and 48-0

For the optimum collimation of the laser beam free from aberration (e.g. coma), it is necessary to align the emission point onto the optical axis of the collimator optics. With the tripartite x/y-centering fixture 48AD the mounting plate of the laser diode can be adjusted laterally. Lateral displacement is performed using two screws, while the third part provides the necessary counteractive force.

Order Options
1 Hex screwdriver SW Ø 1.5 mm  Order Code 50HD-15
2 Adjustment fixture  Order Code 48AD

Collimator Flange 48CFS or 48FCL

for multicube™ system and system mounting Ø 19.5 mm

The collimator flanges 48CFS and 48FCL are attached to the laser diode bases unit type 48TE-SOT and 48-0 by means of four multicube™ rods. The system is compatible to the 30 mm cage system or to the microbench system.

The common specifications are:
- Locking mechanism for the lens
- Ø 19.5 mm system mount for mounting attachment optics. Any extra optical components can be accommodated and adjusted rotationally before their final position is locked using the radially located grub screws.
- Attachment to the laser diode base unit by four multicube™ rods.
- By using long rods, further optics mount to multicube™ components can be attached

Collimator flange 48CFS / For lens types 60CL
Focus setting: collimation of the laser diode is performed using an eccentric key, even then when other optical components already are attached.

Collimator flange 48CFS / For lens type 50CL
Focus setting: a left or right-handed turn of the collimator lens provides a fine focussing and collimation of the laser beam, even then when other optical components already are attached.

Order Options for Collimation Flanges
- Collimating lens series 60CL  Order Code 48CFS
- Collimating lens series 50CL  Order Code 48FCL
Accessories Consoles and Flanges

multicube components designed for the laser diode base units 48TE-SOT and 48-0

The laser diode systems can be composed by a large variety of multicube components. Particularly for these systems there are multicube components such as mechanical attenuators, shutters and mounting plates and mounting consoles.

Accessories multicube™ Rods

The collimator flanges 48CFS and 48CFL are attached to the laser diode bases unit type 48TE-SOT and 48-0 by means of four multicube™ rods. These rods are available in different lengths.

Order Options for multicube™ Rods

Order Code 48MC-6-L

\[ L = \begin{align*}
30 \\
75^* \\
150 \\
\text{xxx} = \text{length of choice}
\end{align*} \]

* Standard length for assembling unit base with collimator flange and mounting console

Accessory Fan 48L

To use with the laser diode base units 48TE and 48-0

- Can be attached to the base directly
- Supply voltage 12V DC
- Power consumption 0.6 W

Order Code 48L
The laser diode unit base type 44TE is used for high power laser diodes in TO-3 or TO-8 casings. 

Main specifications:
- Electrical isolation of the laser diode from the collimator casing
- Temperature sensor: thermistor (or alternative upon request)
- Separate connection cables for the power supply, the monitoring of the laser diode and temperature control
- Connectors and pinning for many types of laser diode controllers or customized
- Solderless spring-loaded connectors for the laser diode isolates it galvanically from the diode casing.
- Peltier element with a 15 watt heat transfer capacity ($I_{\text{max}} +3.9 \, \text{A}, \, \, U_{\text{max}} 11.5 \, \text{V}$).
- Integrated x/y-adjustment mechanism. Adjustment range of the laser diode by up to 0.5 mm
- Included flange for collimating lens of series 50CL, see p.120. A left or right-hand turn of the collimating lens provides a fine-focussing and collimation of the laser beam, even with attached beam-shaping optics.
- Ø 19.5 mm system mount for beam-shaping optics and/or for a fiber coupling
- Optional fan 44L for increased thermal transfer efficiency
- Compatible to the multicube system or 30 mm cage system

Details

- Laser diode unit base
- Laser diode
- Frontally attached rectangular flange with Ø 6 mm bore-holes for attachment of microbench components / cage system
- Collimation lens
- Bracket 44LM
- optional: 44L fan module
- Hex key 50HD-25 for lateral adjustment

Order Options for Laser diode base unit 44TE

Laser diode casings of...

<table>
<thead>
<tr>
<th>Type</th>
<th>Order Code</th>
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<tbody>
<tr>
<td>TO-3</td>
<td>44TE-2</td>
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<tr>
<td>TO-5</td>
<td>44TE-TO5-02</td>
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<tr>
<td>TO-8</td>
<td>44TE-2-TO8</td>
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Accessories Bracket 44LM / Fan 44L

Bracket 44LM for laser diode base unit series 44TE
- Base plate 80 x 100 mm

Fan 44L to use with the laser diode base units 44TE
- Can be attached to the base directly
- Supply voltage 12V DC
- Power consumption 1.2 W