

MLT-SERIES



MLT 1000 MB

Headlight Tester

Original Operating Instructions

BA380801_001-en



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1 Safety

1.1 Introduction

Thoroughly read this manual before operating the equipment and comply with the instructions. Always display the manual in a conspicuous location.

Personal injury and property damage incurred due to non-compliance with these safety instructions are not covered by the product liability regulations.

1.2 Intended Use

This device only serves to check and adjust the alignment of vehicle headlights.

This device cannot be modified without the express, written consent of the manufacturer. Any infringement renders the conformity declaration invalid.

1.3 Safety Instructions

- This device must only ever be operated within its performance limits.
- All service work must be performed by service technicians employed by the manufacturer or by authorized service partners.
- Never expose the lens to direct sunlight. The bundling of light may cause fire damage inside the housing.
- Only ever clean the lens with a soft cloth and a glass cleaning agent.

2 Description

2.1 Requirements for the Place of Installation

Please observe your national guidelines and specifications.

2.2 Specifications

Measuring range

below	0...600 mm / 10 m (0...6 %)
left	0...1000 mm / 10 m (0...10 %)
right	0...1000 mm / 10 m (0...10 %)
Height of luminous centre	240...2000 mm
Measuring distance	100...500 mm

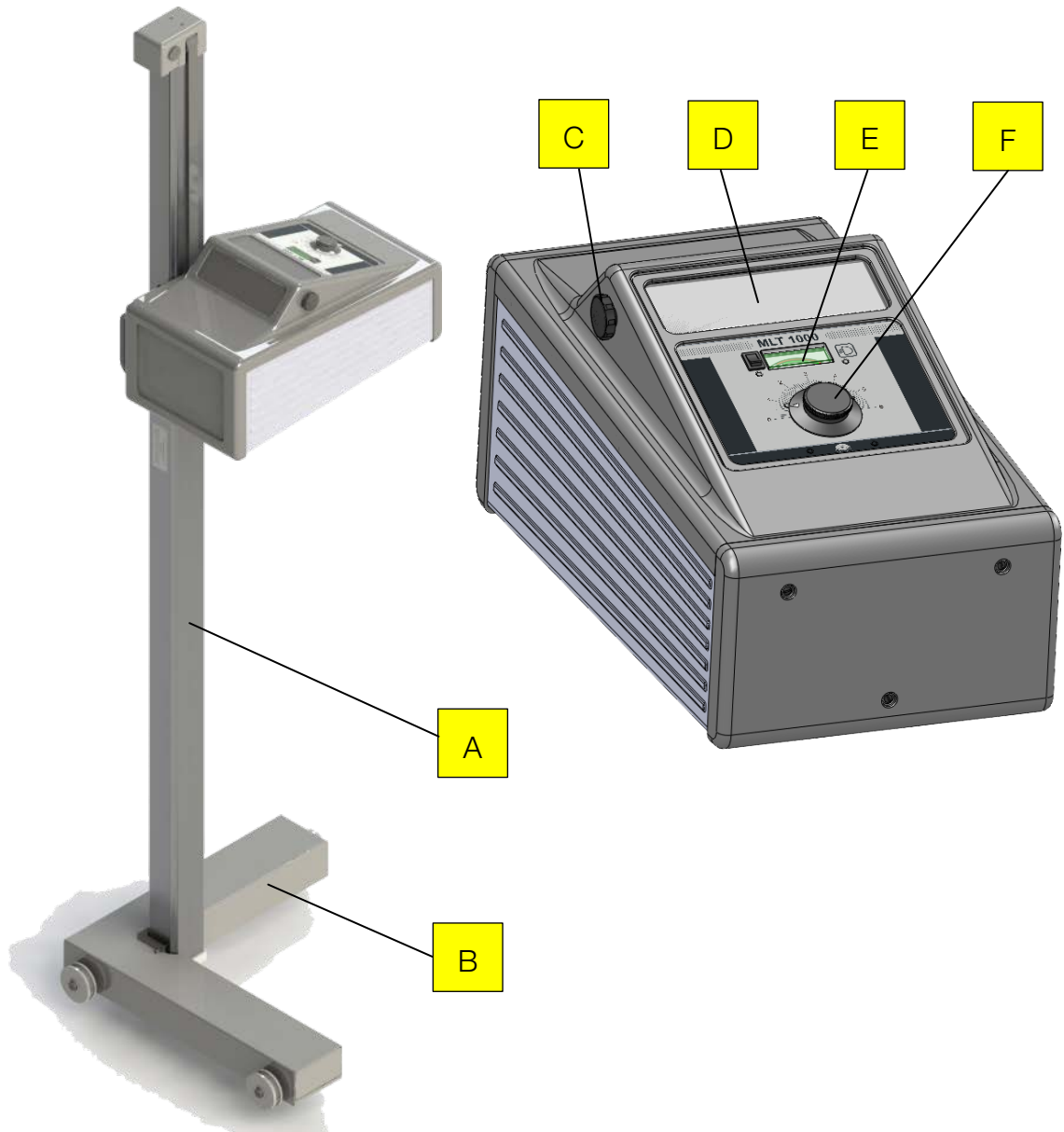
Intensity

Luminous intensity	0...40 000 cd (Candela)
Illuminance	0...64 lx (Lux)

Operating range

Temperature	+5...+40 °C
Relative humidity	20...80 %
Dimensions (W x H x D)	655 x 2240 x 720 mm
Weight	65 kg

2.3 Equipment Overview



A	Column	The column envelops a precision profile which carries the slide rails. The counterweight which can be used to set the housing to the desired test height is located in the interior of the column (automatic locking).
B	Carriage	The carriage can be moved on two rails perpendicular to the vehicle's approach direction.
C	Knob for Folding Mirror	The projection screen in the housing can be observed in the folding mirror.

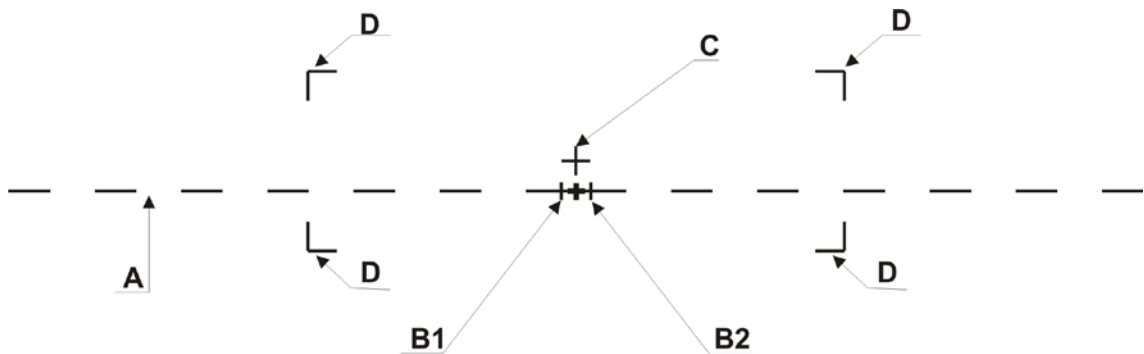
D	Viewing Window	The projection screen in the housing can be viewed through the viewing window.
E	Light Measurement Unit	The luminous intensity or illuminance of the headlights can be checked using the light measurement unit. When performing a light measurement, the colour filter must be removed.
F	Setting Dial	Use the setting dial to move the projection screen up and down in the housing to achieve the desired inclination value.

2.4 Projection Screen

The projection screen is based on the test condition that the distance between headlight and test surface is 10 m.

Use the folding mirror or the viewing window to observe the projection screen in the housing on which the headlight beam is reproduced.

The image on the projection screen is displayed 20 times smaller than the original.



- A Dividing line = Reference axis for light-dark border of low beam
- B1 Tolerance mark (left) for inflection point of asymmetrical European low beams
- B2 Tolerance mark (right) for inflection point of asymmetrical European low beams
- C Central mark = Elementary point for setting the high beams
- D The outlined corners indicate the size of the test surface which is binding based on the directives for vehicle headlight settings (e.g. in Germany).

2.5 Setting Wheel

Use the setting wheel to move the projection screen up or down in the housing.

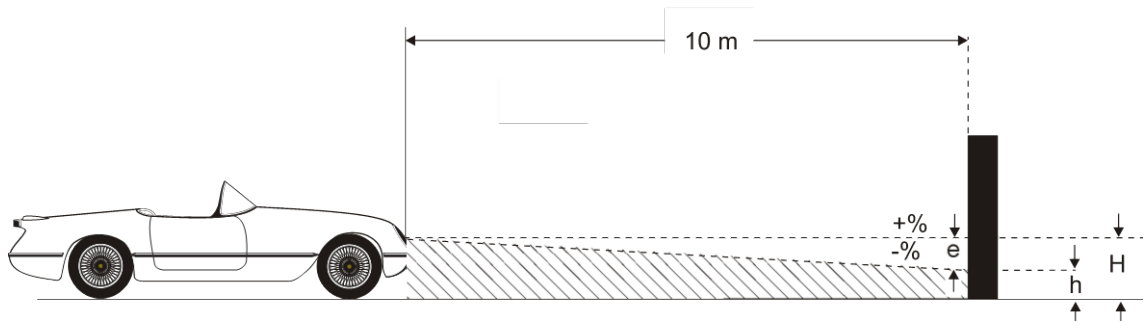
As the inclination of the headlight hot spot in relation to the driving surface is usually expressed in percentage, the setting wheel has a percentage (%) dial.

The inclination values (light-dark border of the vehicle headlights) can be set from 0 to -6 % using the dial.



2.6 Definition of Technical Terms

2.6.1 Pitch Angle

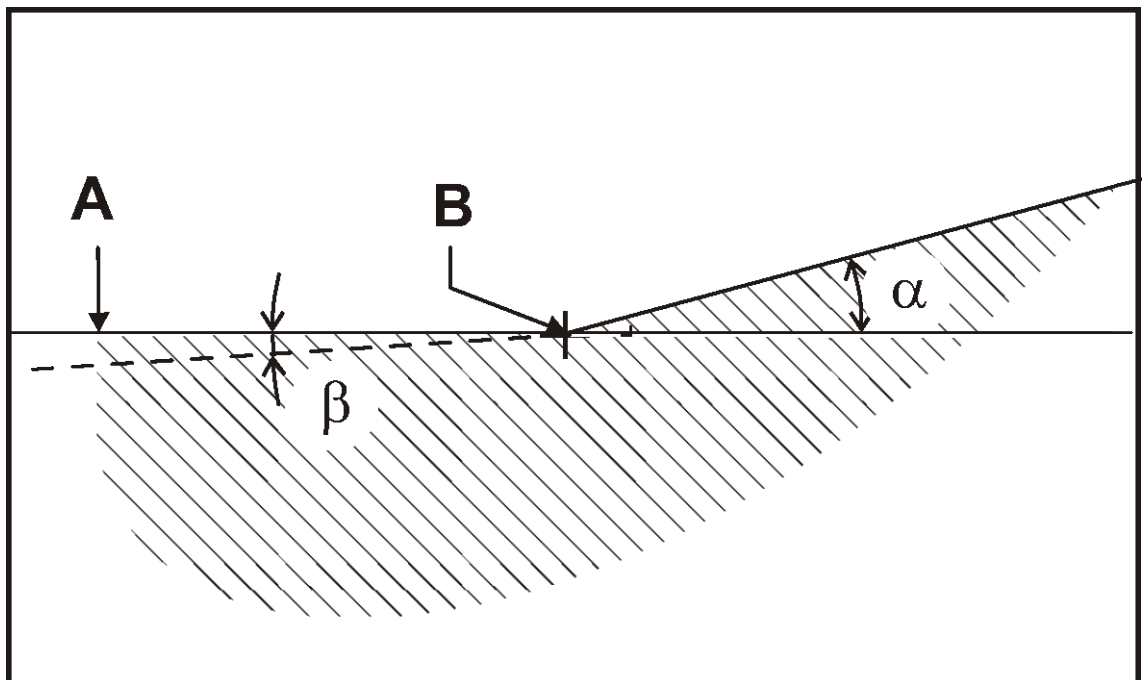


Angle of inclination of light-dark limit against the test surface.

The inclination of headlight lighting bundle against the test surface is expressed as a percentage, using 10 m as a reference parameter:

$$\frac{H-h}{1000} \times 100$$

2.6.2 Low Beam



Light-dark limit

- A Boundary for light distribution between 'top dark' and 'bottom light' for low-beam lights.

Inflection point

- B Synonymous with the light-dark limit for asymmetric low-beam lighting. The deviation of the inflection point is expressed in %. 10 meters is used as the reference dimension.

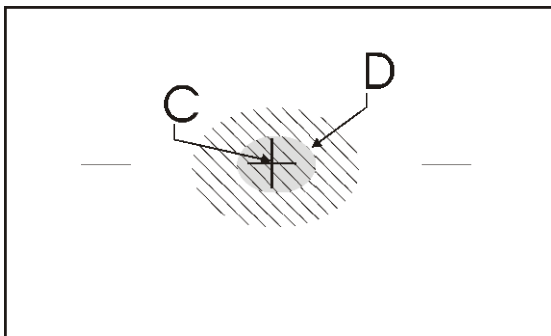
Yaw angle

- ☑ Angle between the inflection point on the rising component of the light-dark limit and the horizontal line for asymmetric low-beam light.

Rolling angle

- ☑ Angle between the left component of the light-dark limit and the horizontal, usually 0°.

2.6.3 High Beam

**Central mark**

- C From the central mark, the deviation of hot-spot is specified in X and Y directions.

Hot spot

- D Center of light beam for high-beam. The deviation of hot spot from central mark is expressed in %. 10 meters is used as the reference dimension.

3 Operation

3.1 Positioning the Vehicle

- An adhesive film is stuck to the floor at a right angle to the guide rails as an approach marking (see fig.). Length: 7 m (+2 m, -0.3 m), recommended length for testing transporters and commercial vehicles: 9 m.

NOTE:

It is advisable to apply the approach marking with paint on floors with a non-slip coating.

- Position the vehicle's left front wheel at the start of the approach marking. Drive along the approach marking and precisely maintain the distance from the left front wheel while doing so. Park the vehicle once the measuring distance (100 to 500 mm) has been reached.

NOTE:

The position of the left rear wheel does not have to be taken into consideration. It varies due to differences in track width, mixed tyres, the rear axle angle, etc.

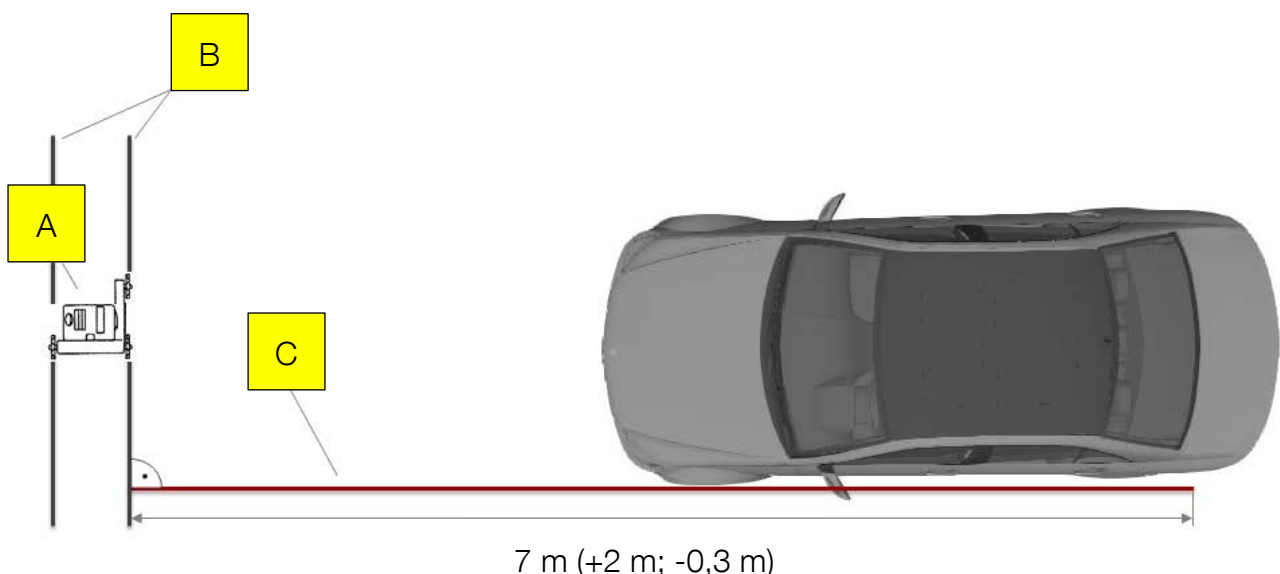
In the case of right-hand drive vehicles, carry out the procedure for the right front wheel with the approach marking back-to-front.

- A mirror (not included in the scope of delivery) can be used to help with positioning.
- Slide the headlight tester in front of the headlight to be adjusted.

A Headlight tester

B Guide rails

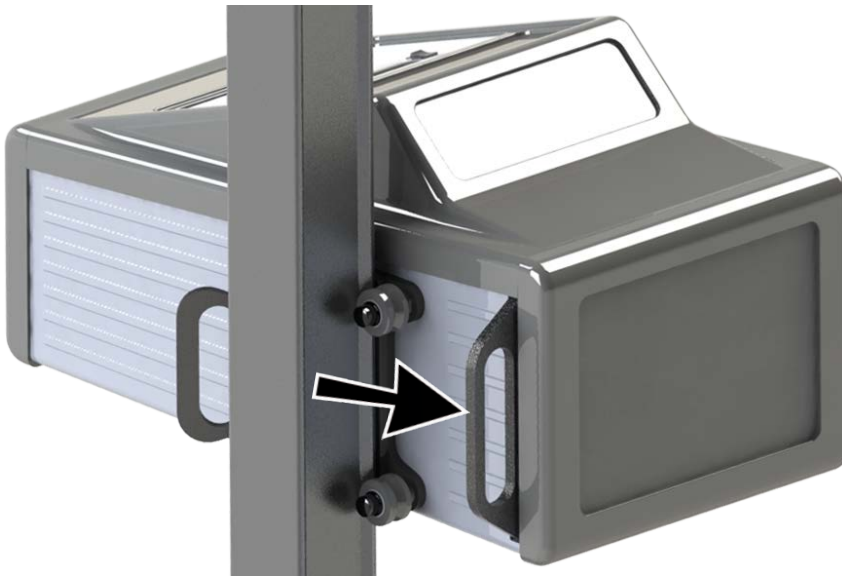
C Approach marking



3.2 Using the Colour Filter

The “Orange” colour filter (Lee 105) has the **LED1** marking.

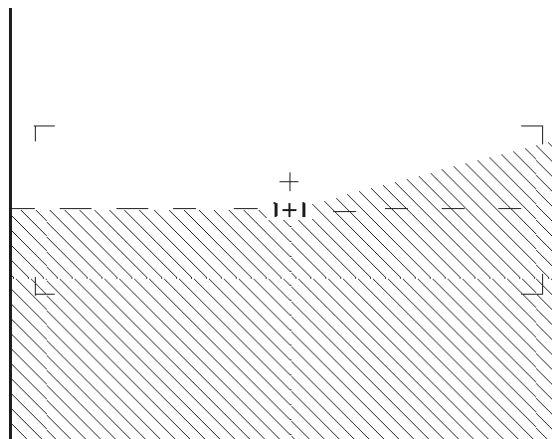
The colour filter must be removed when measuring the intensity (luminous intensity / illuminance).



3.3 Setting the Headlights

- 1 Switch on the headlights.
- 2 Set the projection screen to the required inclination value using the setting dial.
- 3 The headlights should be tested individually, the other(s) should be turned off or covered if necessary.
- 4 Observe the projection screen. If the headlight setting is checked through the folding mirror, note that all screen markings are displayed mirror-inverted.
- 5 Adjust the headlights until they match the applicable statutory directives.

Example: When setting the low beam, the dividing line is the reference line for the inclination point of the light-dark border.



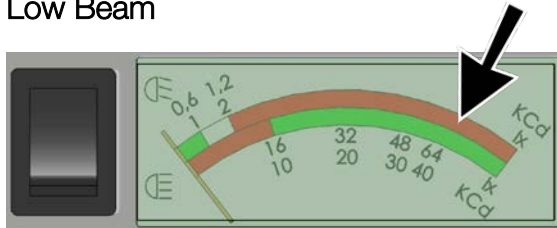
3.4 Measuring the Luminous Intensity / Illuminance

The luminous intensity or illuminance of the dipped beam and full beam are displayed in lux (lx) and kilocandelas (kCd) with the light measuring equipment.

Observe the following to maintain correct values:

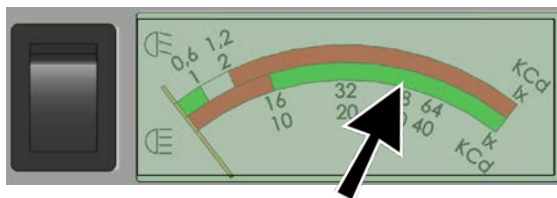
- The colour filter must be removed for the light measurement
- The headlight tester must be aligned to the headlight
- The headlights must be adjusted correctly
- The vehicle battery must be fully charged
- Leave the vehicle engine running at a medium rotational speed

3.4.1 Low Beam



- 1 Switch on the low beams.
- 2 Position the toggle switch to low beam position (upwards).
- 3 Set the projection screen using the dial so that the dividing line lies on the light-dark border.
- 4 Read the value: The incoming light is extrapolated to 25 m and can be read off the upper scale.

3.4.2 High Beam



- 1 Switch on the low beams.
- 2 Set the projection screen using the dial so that the dividing line lies on the light-dark border of the low beams.
- 3 Switch on the high beams.
- 4 Position the toggle switch to high beam position (downwards).
- 5 Read the value: The incoming light is extrapolated to 25 m and can be read off the lower scale.

4 Maintenance

4.1 Installing the Cover Hood

Attach the supplied cover hood when the tester is not being used. The hood is used to protect against sunlight and other environmental influences.



4.2 Cleaning

This headlight tester is an optical measuring device and must therefore be handled accordingly (i.e. with care).

The lens needs to be wiped regularly with a clean cloth and commercial glass cleaner. In all other respects, this is a zero-maintenance device.

5 Disposal

If you want to dispose of the equipment, please contact your MAHA dealer or the following address, indicating equipment type, date of purchase and serial number:

MAHA Maschinenbau Haldenwang GmbH & Co. KG
Hoyen 20
87490 Haldenwang
Germany

Phone: +49 (0) 8374 585 0
Fax: +49 (0) 8374 585 500
Email: altgeraete@maha.de

Alternatively, you may take the equipment to a specialised waste management plant to ensure that all components and operating liquids are properly disposed of.

6 Inspection Equipment Monitoring

6.1 Vertical and Horizontal Alignment of Headlight Tester

- Align the laser beam parallel to the approach marking.
- Slide the headlight tester so that the centre of the lens is in the laser beam.
- Precisely place the setting wheel's pointer into the zero position.
- If it does not match the centre cross on the rear panel of the headlight tester, correct the vertical / horizontal alignment (see below).

A Headlight tester

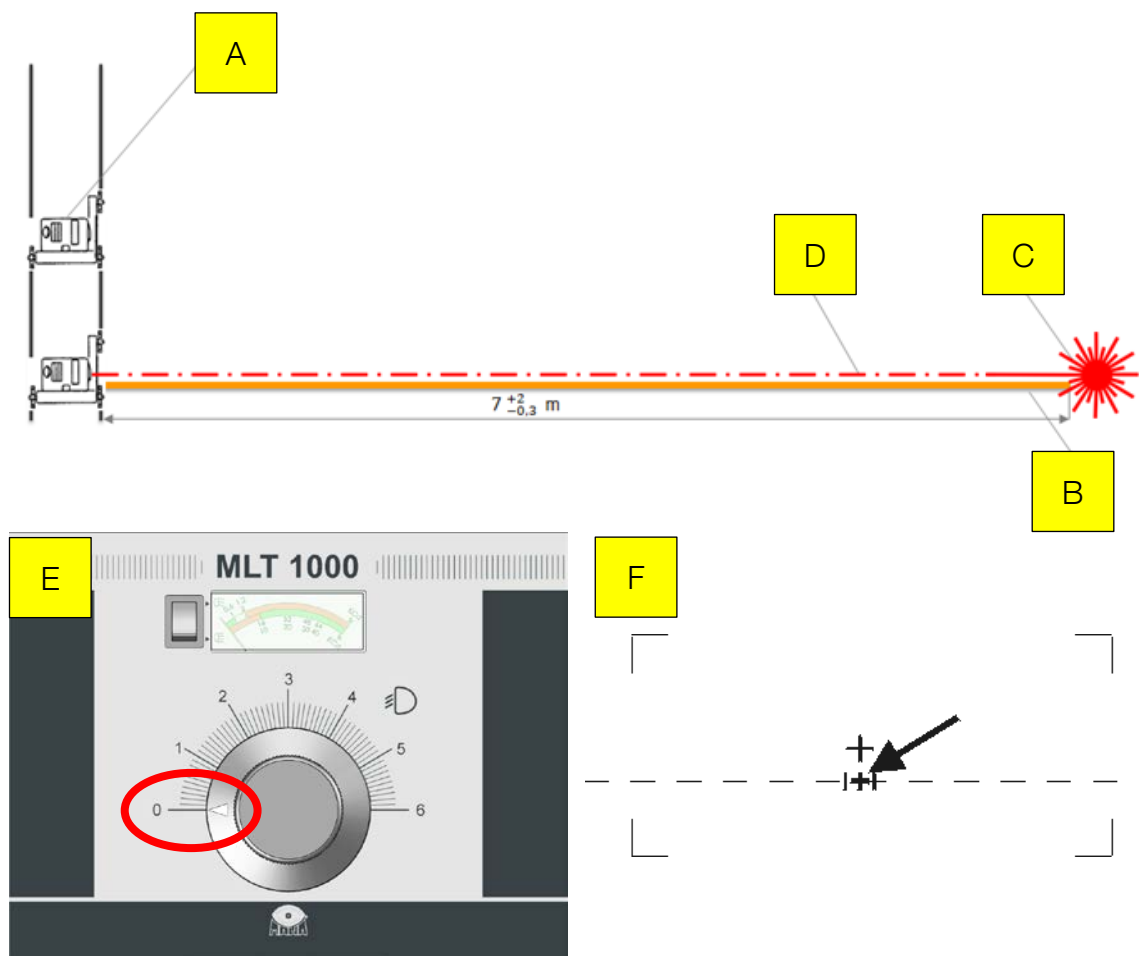
C Laser

E Setting wheel

B Approach marking

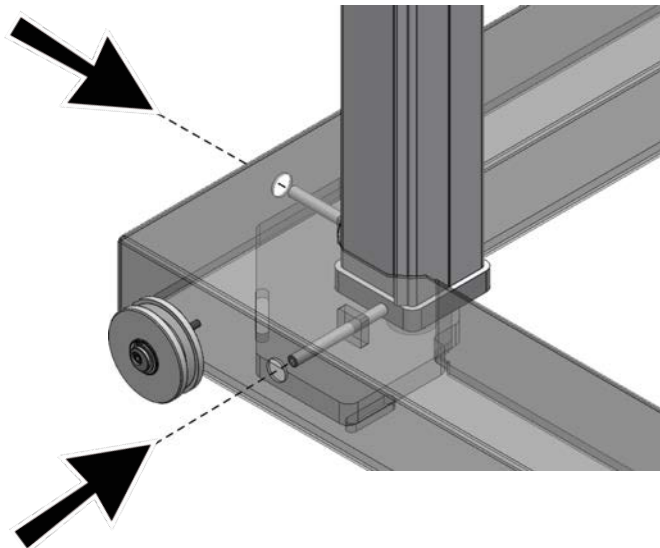
D Laser beam

F Centre cross

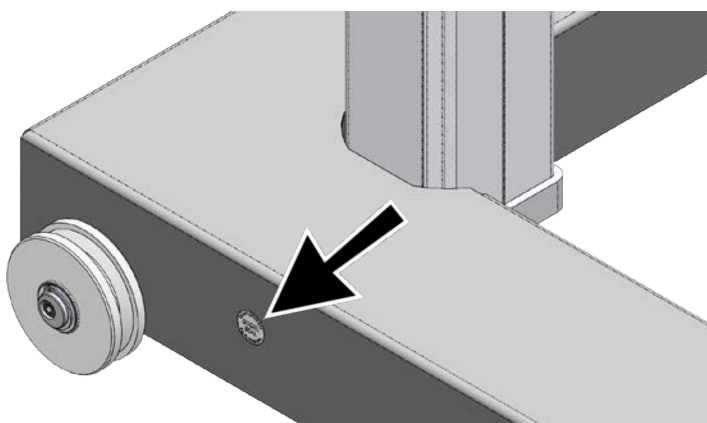


6.1.1 Vertical Alignment

- Loosen the fixing screws with an Allen key WAF 5.
- Adjust the column position.
- Carefully tighten the fixing screws at intervals.
- Check that they match the centre cross again.

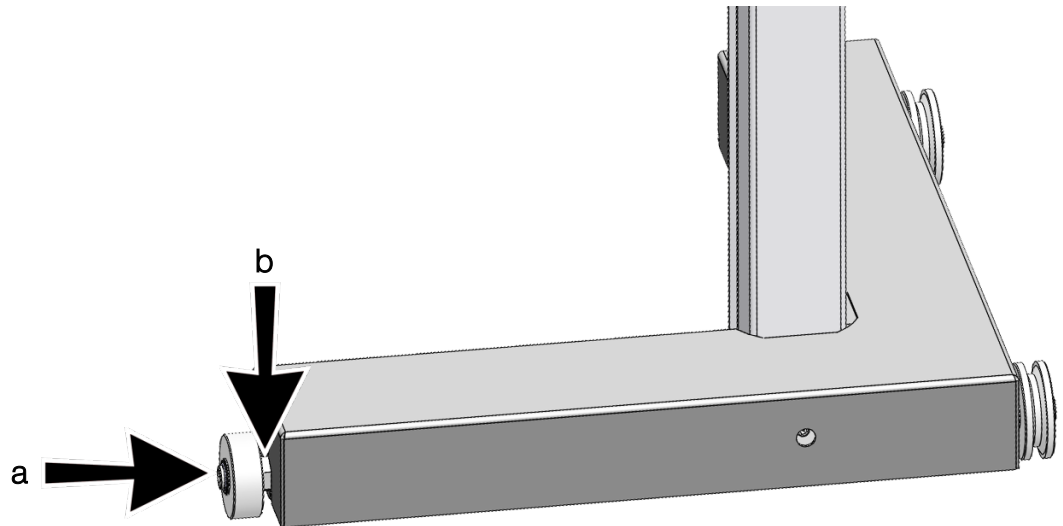


- After vertical alignment, close the openings of the fixing screws using seal labels to prevent unauthorised changes. When performing maintenance, the seals can be destroyed and replaced by new ones (part #+ 54 2694).



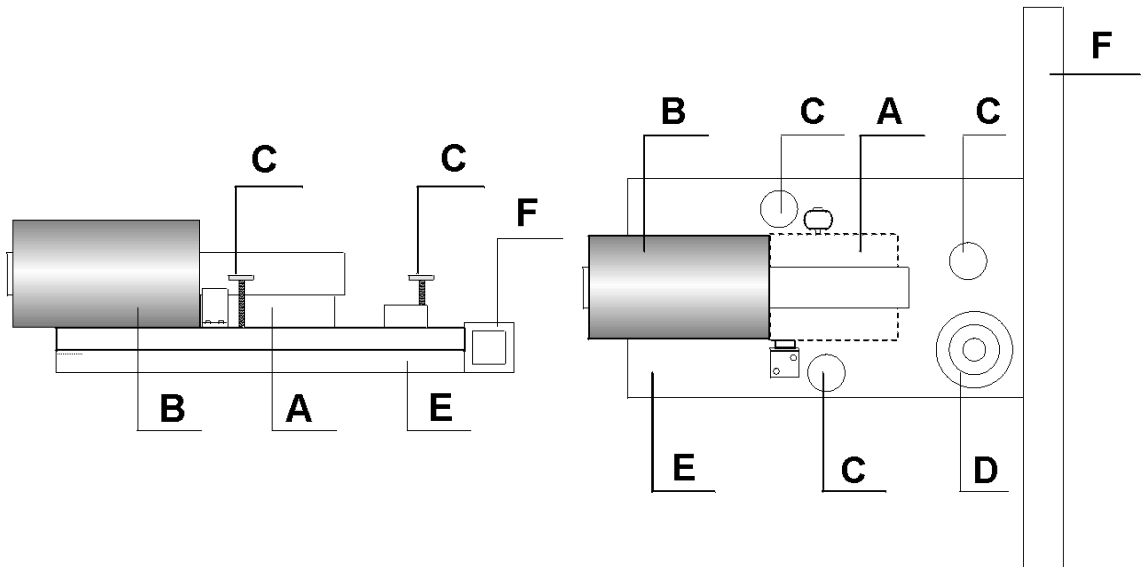
6.1.2 Horizontal Alignment

- Loosen the fixing screw (a) with an Allen key WAF 5.
- Adjust the tappet's setting screw (b) with an open-ended wrench WAF 27.
- Carefully tighten the setting screw and fixing screw.
- Check that they match the centre cross again.

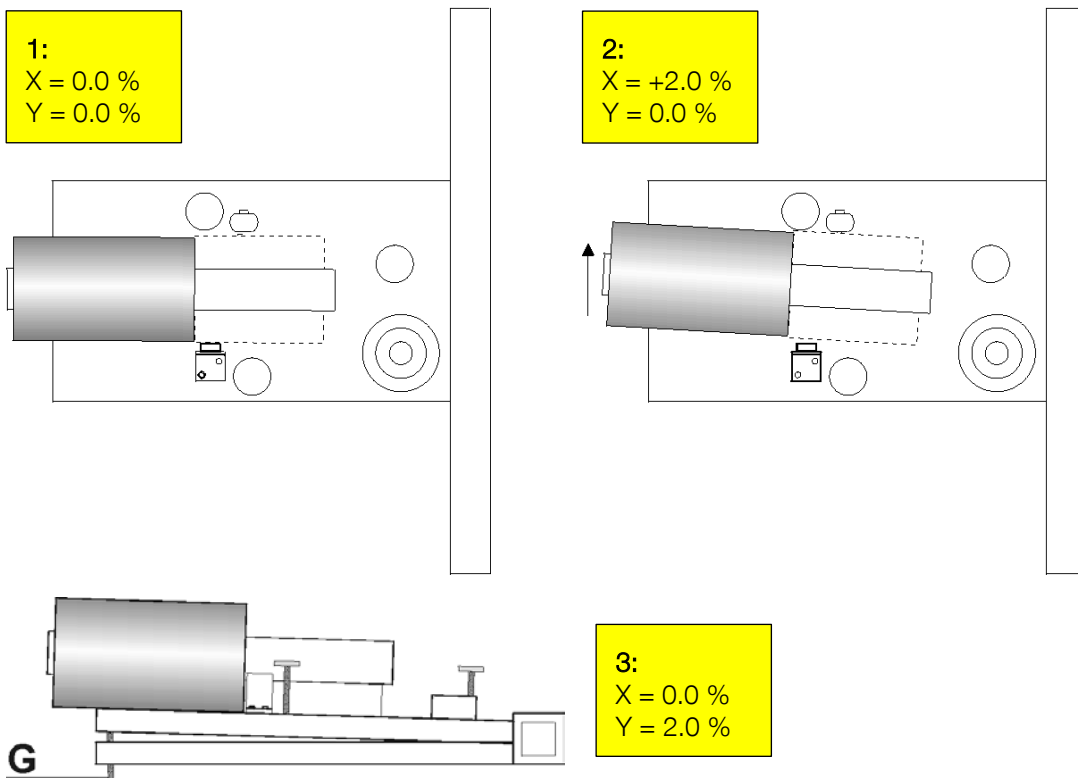


6.2 Laser Calibration Set

- | | | | |
|---|-------------------|---|---------------------|
| A | Prism | D | Circle spirit level |
| B | Battery housing | E | Base plate |
| C | Adjustment screws | F | Alignment rail |



6.3 Laser Positions





Never stare into the laser beam. Wear safety goggles. Observe occupational safety and accident prevention regulations for laser radiation.



Precise measurements can only be taken if the measuring station is absolutely level. The base surface for the vehicle and the light tester must form a horizontal plane (for tolerances, see below).

The laser beam calibration unit allows the measurement accuracy of the headlight tester to be checked and corrected as needed on site.

Accuracy of the measuring equipment ± 2 mm / 10 m

Permissible unevenness of light tester base surface max. 1 mm / 1 m

Permissible unevenness of vehicle base surface

..... see country-specific road traffic licensing regulations

6.4 Checking the Precision of the Laser Calibration Set

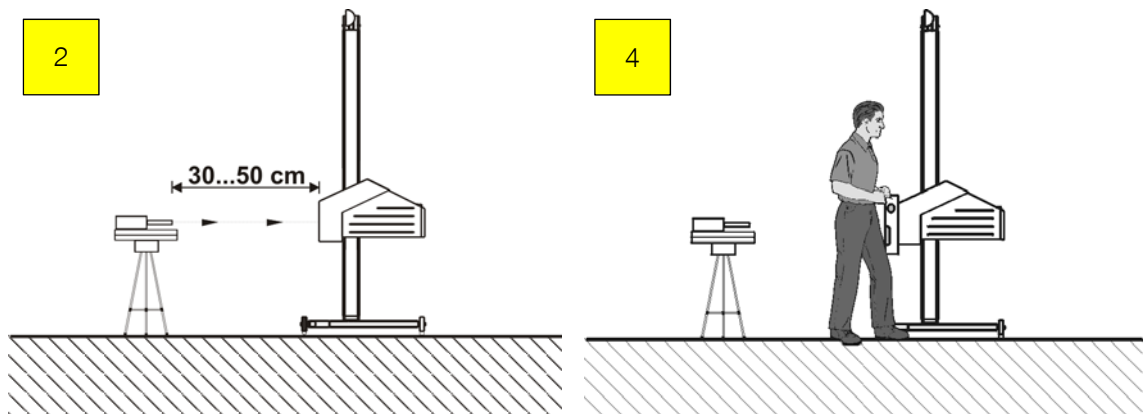
- 1 Mount the laser calibration set on the tripod and position it in front of a screen at a distance of 10 m (± 0.5 cm).
- 2 Use the spirit level to align the laser unit and then switch on the laser.
- 3 Rotate the laser 180° around its axis in the basic position in the prism (position 1, no setting angle).
The laser point on the screen must always remain in the same place and must not perform any rotation (± 1 mm).
- 4 Move the laser to position 1 and mark the laser point on the screen.
- 5 Move the laser to position 2 and mark the new position.
The new laser point (position 2) on the screen must be 20 cm (± 4 mm) to the right. This corresponds to an angle of 2%.
- 6 Move the laser back to position 1.
- 7 Use the adjustment screw to move the laser to position 3.
- 8 Mark the new laser point on the screen.
The new laser point (position 3) on the screen must be 20 cm (± 4 mm) vertically below the original setting (pos. 1). This corresponds to an angle of 2%.
- 9 Dismount the laser calibration set.



If the laser point changes position when it rotates around its axis or the distances between the various positions are different to those specified, the calibration set is faulty and must not be used for calibration. The calibration set needs to be realigned by the manufacturer.

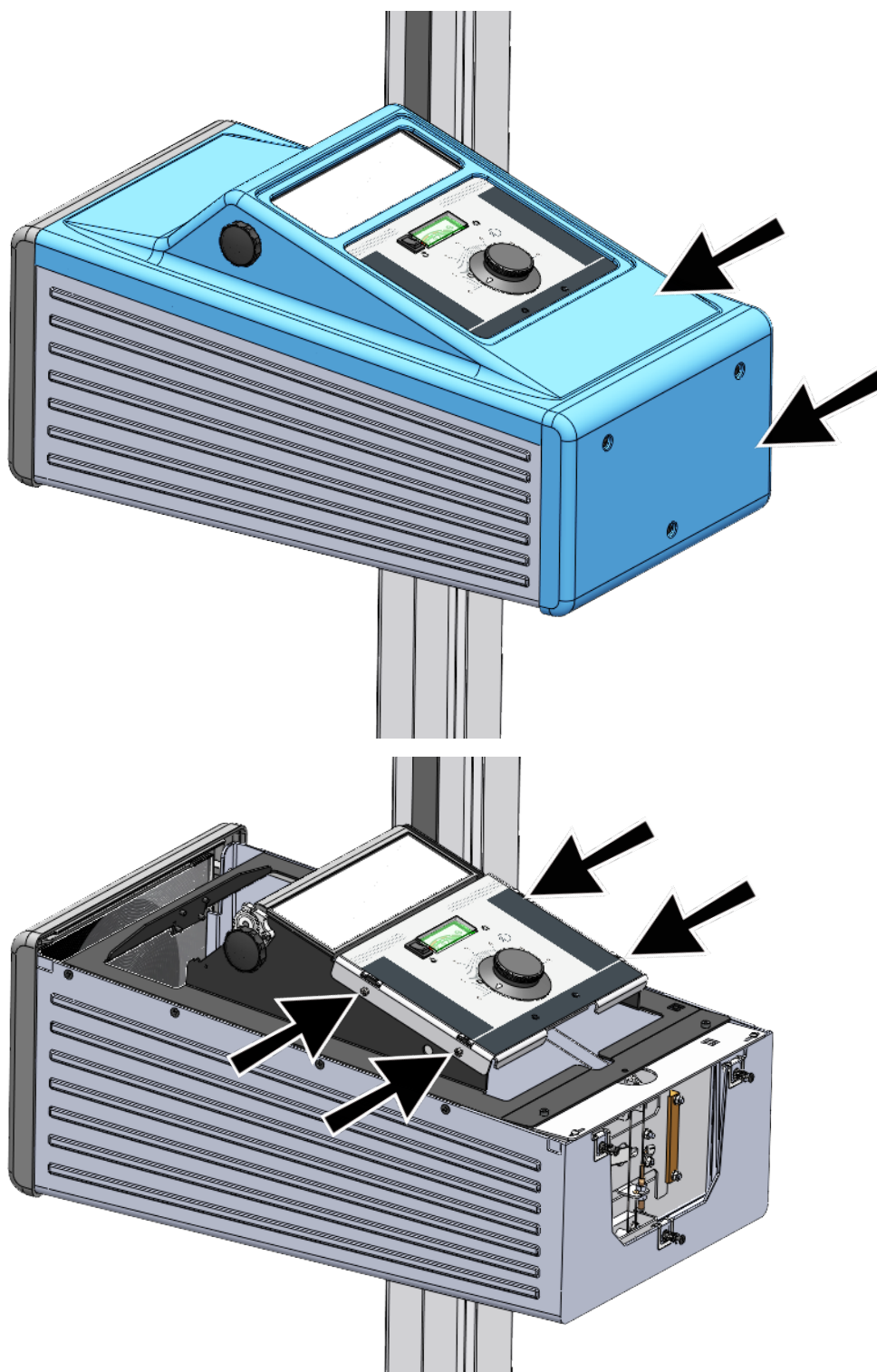
6.5 Mechanical Inspection

- 1 Check that the base surfaces of the light tester and the laser tripod are even.
- 2 Mount the laser calibration set on the tripod and position it opposite the MLT: insert laser mount with the battery housing (B) into prism (A).
- 3 Move the laser and prism to position 1 (right endpoint). The prism with the laser is held in the correct position by the magnet.
- 4 Check the vertical alignment of the MLT. Apply the spirit level to the lens and read it.
- 5 Use adjustment screws (C) and a circle spirit level (D) to align the base plate so that the laser is horizontal.
- 6 Check that the lens is aligned parallel to the rail by measuring the distance between the alignment rail (F) and the lens at two points.
- 7 Switch on the laser. The laser beam should hit the centre of the Fresnel lens.

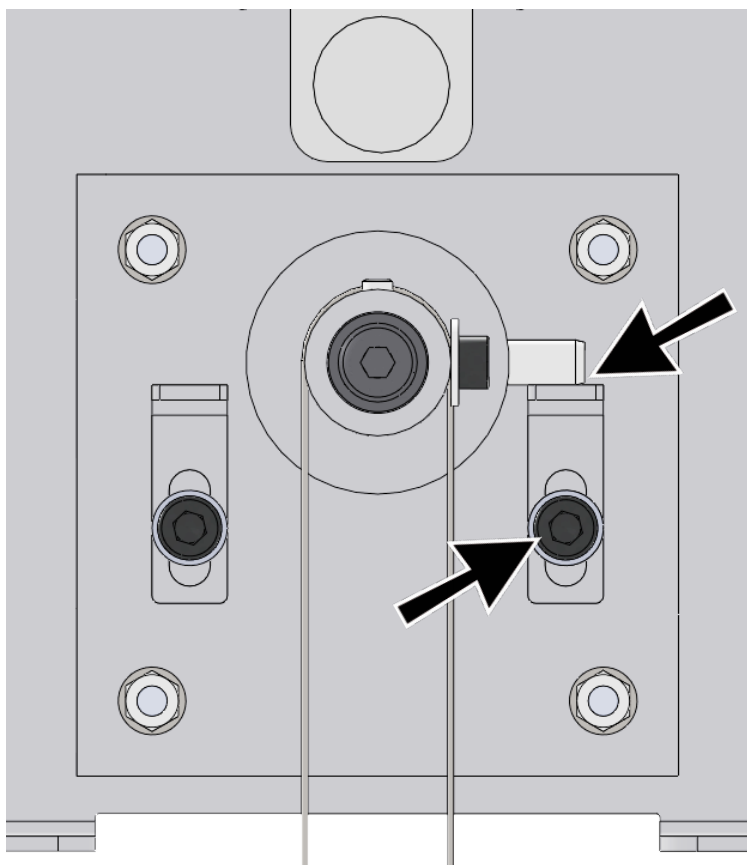
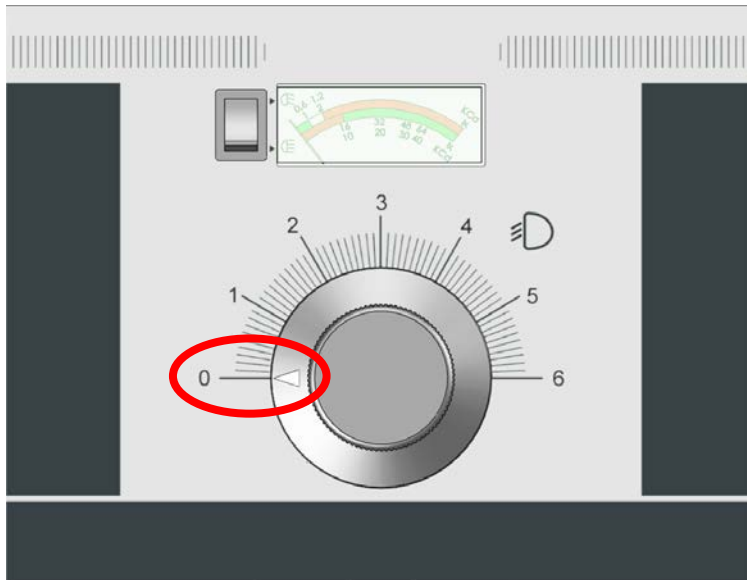


6.6 Adjusting the Pointer Position

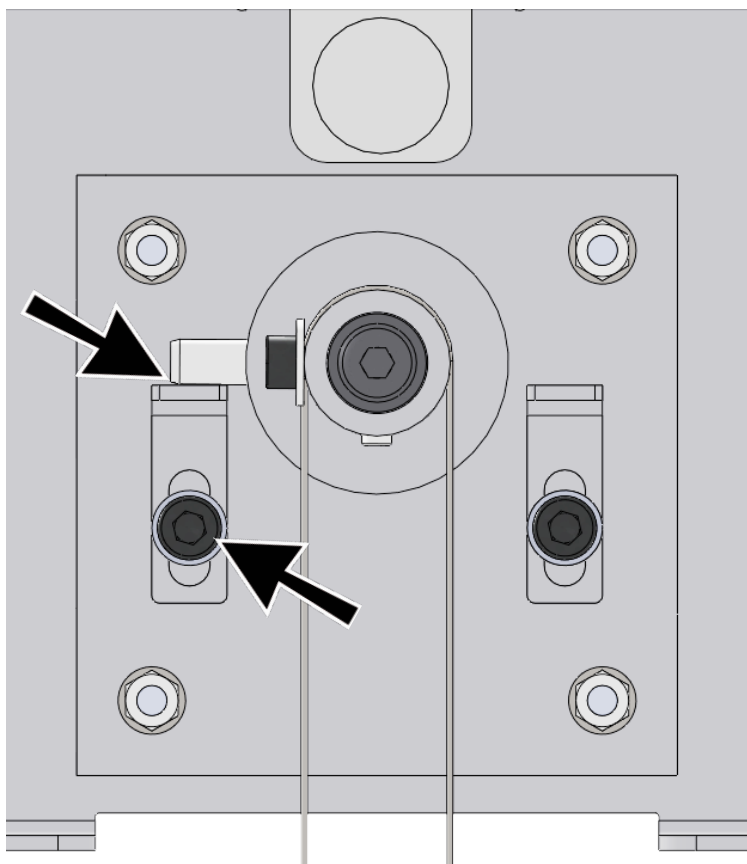
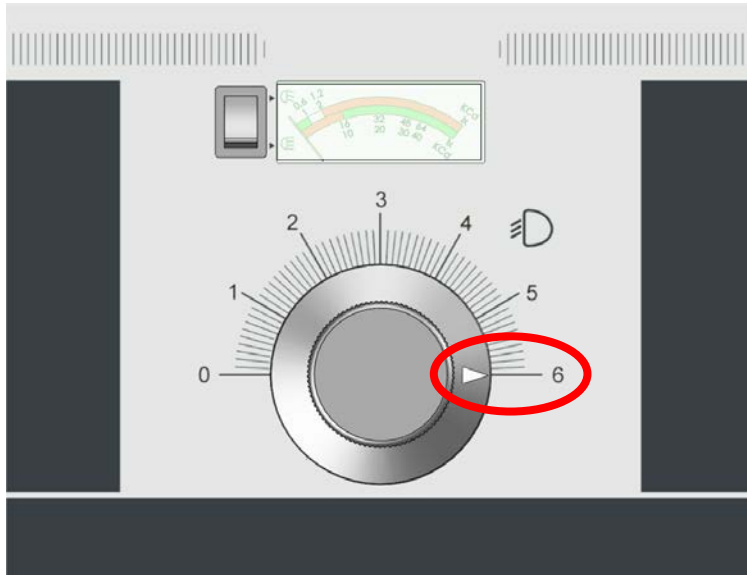
- Remove the cover and rear panel from the tester.
- The control panel can also be removed for better accessibility. To do this, remove the four fillister head screws.



- Precisely place the pointer into the zero position.
- The pin must be at a right angle to the endpoint. Loosen the fastening screw and move the endpoint if necessary. Retighten the fastening screw.
- Check the pointer position again.

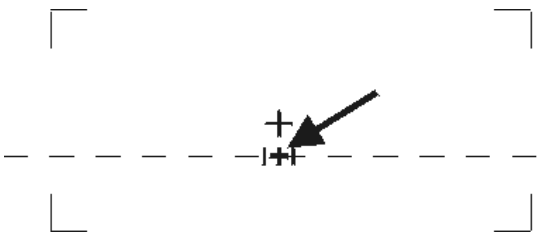
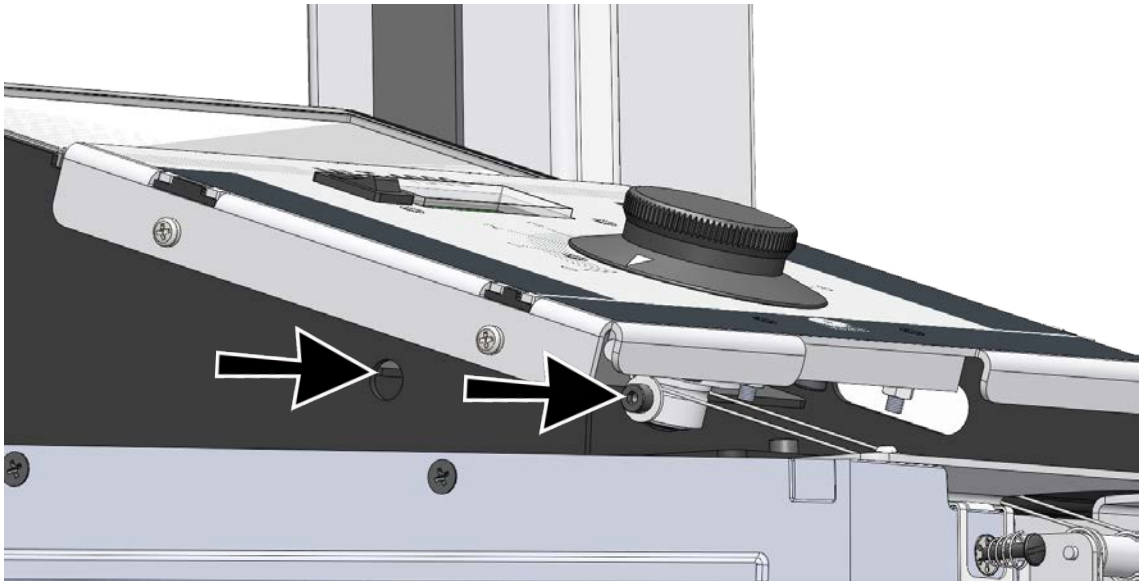


- Precisely place the pointer into the endpoint position.
- The pin must be at a right angle to the endpoint. Loosen the fastening screw and move the endpoint if necessary. Retighten the fastening screw.
- Check the pointer position again.



6.6.1 Adjusting the Projection Area

- An assembly opening on the housing is used to adjust the projection area.
- Open the clamping screw, adjust the cable and retighten the screw.
- The laser beam must now match the centre cross on the rear panel of the headlight tester.



6.6.2 Calibration of the Luminous Intensity

Inaccuracy

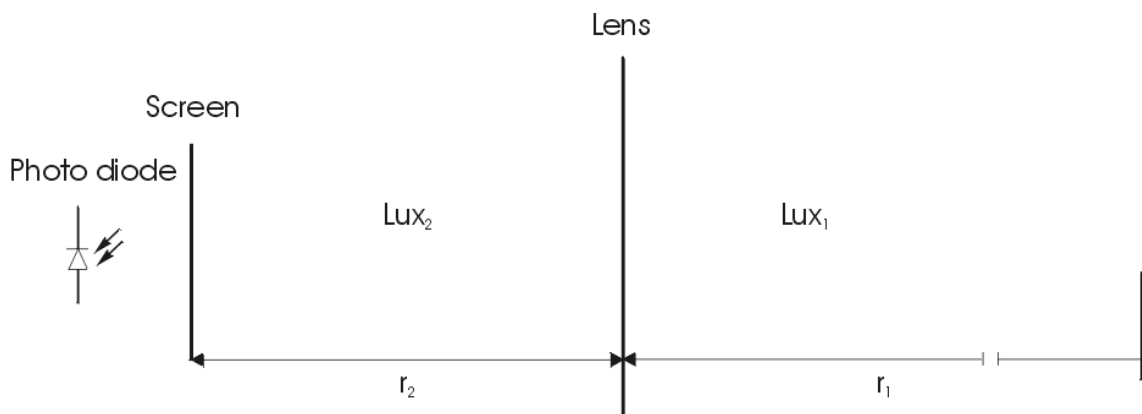
Luxmeter: $\pm 1 \text{ lx} \cong \text{approx. } 5 \%$

Test device: Photometer Polytec IL 1400 A $\cong \text{approx. } -2 \%$

Display Range

High beam: 0 to 64 lx

Low beam: 0 to 2 lx



Lux_1 : Luminous intensity at the lens in lx (lm/m^2)

Lux_2 : Luminous intensity at screen in lx (lm/m^2)

r_1 : Distance referring to 25 m based on § 50 StVO (German Road Traffic Licensing Regulations)

r_2 : Distance Lens to Screen = 0.5 m

Calculation

$$\text{Lux}_2 = \text{Lux}_1 \frac{r_2^2}{r_1^2}$$

6.7 Inspection Certificates (Inspection Interval: Annually)

Inspection Certificate

The following items have been inspected:

- Column fixation.....OK
- Adjustment of projection area at headlight tester.....OK
- Accuracy of laser calibration unit.....OK
- Calibration of light intensity/illuminance measurementOK
- Adjustment of headlight tester to approach markingOK
- Adjustment of guide rails.....OK

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Name

Signature

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The contents of this edition have been checked with great care. However, errors cannot be fully excluded. Subject to technical change without notice.

Document

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