Operating manual

Optical Adjustment System for ADAS

(Advanced Driver Assistance Systems)

SAD500

Sensor Adjustment Device

(Translation of the original manual)

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GEB 001 182

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1 General Safety Instructions

1.1 Operator's duty of care

Device safety can only be implemented during practical operation if all required applicable measures have been taken.
The operator's duty of care includes planning such measures and checking their implementation.

In particular, the operator has to ensure that

- the optical adjustment system SAD500 (referred to in the following only as SAD500) is only used as determined
- the SAD500 is only used in a fully functioning state and free from defects
- the complete operating instructions are permanently available in a readable condition at the operating location of the device
- the device is only operated by accordingly qualified and authorised personnel
- all operating instructions and warning notices attached to the device have not been removed and are legible

The SAD500 may only be structurally modified with written authorisation by the manufacturer!

1.2 Explanation of symbols

These operating instructions contain specific safety instructions. The following symbols are used for this purpose:

This symbol does not indicate a safety instruction; it labels information provided for a better understanding of work procedures.

The symbols attached to the laser housings are mounted so that they are positioned in the immediate vicinity of the emerging laser beam.

Warning - laser radiation

This symbol indicates potential danger, primarily to persons.

Notice with laser class marking.

1.3 Basic safety precautions

Prior to each use of the SAD500, it must be checked for visible damage and it must be ensured that the system is only operated when free from defects! Any defects that are identified have to be reported to a superior immediately!

Laser product
CLASS 2
TYPE 1

Some basic instructions must be followed for all lasers:

- **Never look directly into the beam!**
- Define beam paths precisely, avoiding drifting laser beams!
- Dangerous reflections can be caused especially by the mirror panels on the crosshead or other shiny surfaces. Particular attention should therefore be paid to the position of the mirror panels on the crosshead before switching on.
- The trajectory of the laser beam must not lie within the work area or where people are present. If this is unavoidable, ensure that the laser area is clearly recognisable and marked with the stipulated warning notices.
- Turn off the laser after work is completed!

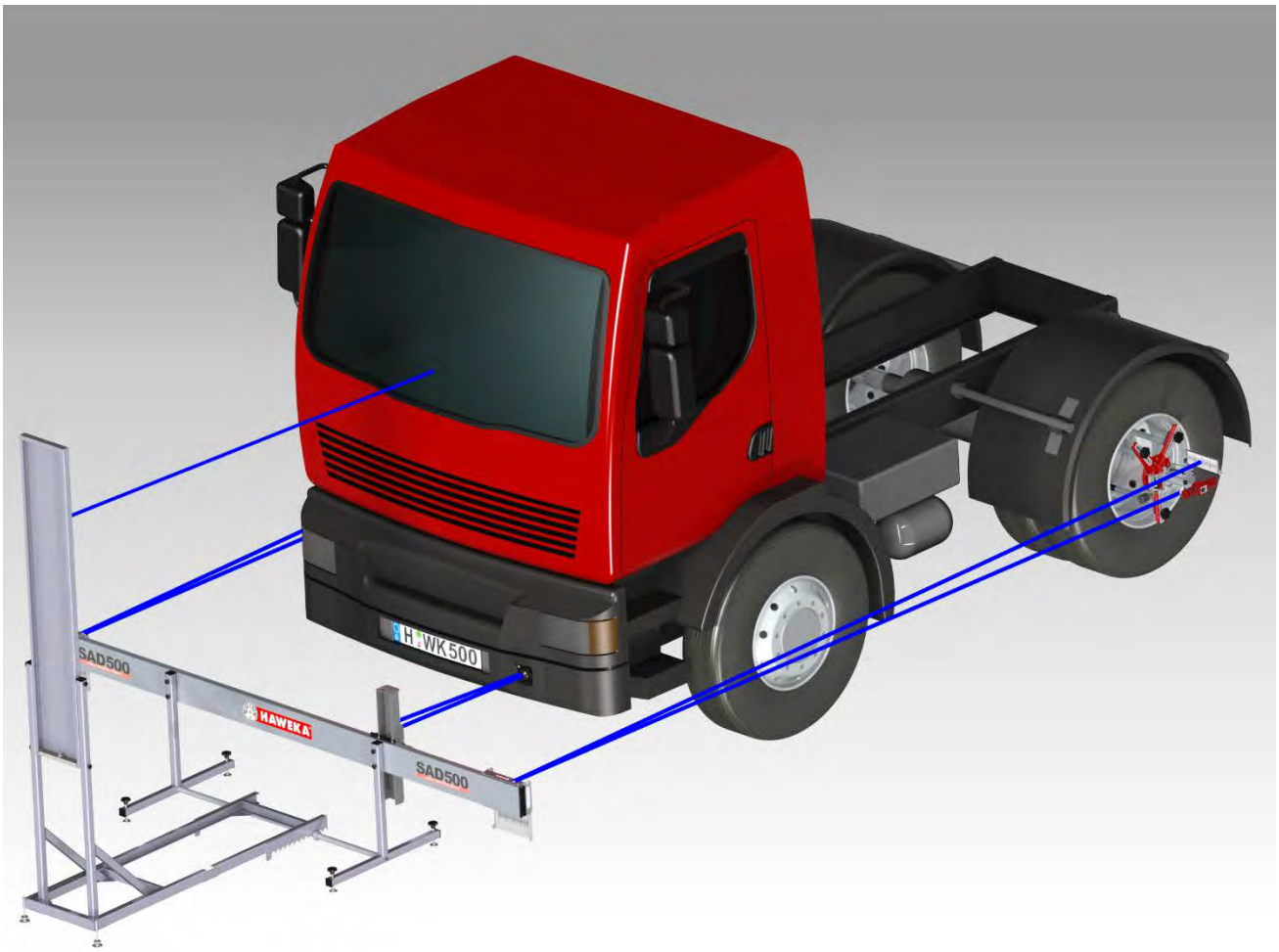
Please refer to the accident prevention regulations (VGB 93 Laser radiation) for further safety instructions for working with lasers.

The user is independently responsible for proper operation and compliance with safety regulations.

2 Product Description

Optical Adjustment System SAD500

Item No. 922 000 013



Subject to technical modifications.

3. version 09/2017

2.1 Authorised intended use

- The **SAD500** has been developed in order to be able to carry out a check and for the adjustment of an Adaptive Cruise Control sensor (ACC sensor) on commercial vehicles.
- The **SAD500** is an additional module that, in combination with the wheel alignment system **AXIS500**, is used to measure the ACC sensor and for aligning the calibration panel for multi-function cameras of drive assist systems (ADAS).
- Testing and adjustment of the ACC sensor can be carried out quickly and reliably in the "drive position" on all vehicle types (with the required accessories in each case).

The operator, and not the manufacturer of the optical adjustment system SAD500 is responsible for all injury to persons and damage caused to property by incorrect use!

The laser used in the laser housing is a Class 2 laser product. The laser radiation generated is not hazardous to the eyes for short periods of exposure (up to 0.25 s). If you should accidentally look into the laser beam for a short period, the eye will be protected by the blink reflex.

NEVER INTENTIONALLY LOOK INTO THE LASER BEAM!

If you have reason to believe that your eyes have been damaged by the laser beam, seek the advice of an eye specialist immediately.

2.2 Technical Data

Measuring accuracy:
Scale division in the measuring field for the ACC laser is +/- 2°.
The ACC sensor on the vehicle can be set with an accuracy of up to 10'.

Measuring range:
The distance between the ACC sensor on the vehicle and the measuring field on the crosshead has to be exactly 100 cm!

Deviations from the stipulated measuring distance of 100 cm result in incorrect setting values!

Laser:

Model LG650-7(80)	
Input voltage	3 volts (2 x 1.5 volt AA batteries)
Radiated power P_o	0.91 mW
Wavelength λ	650 nm
Operating range	20 m
Laser class	2 DIN EN 60825-1:1994-07

3 Equipment

3.1 Parts list for SAD500

2 × scales with gripping jaws for laser measuring heads

2 × item no. 913 012 009

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2 × mirrors (included in the item “measuring crosshead”)

Mirror left
(with cover)

1 × item no. 913 051 025

Mirror right
(with cover)

1 × item no. 913 051 026

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1 × laser with scale

1 × item no. 913 001 053

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1 × laser guide carriage

1 × item no. 913 052 132

NOTE:
(unit = case including carriage, complete laser and mirrors L+R) item no. 922 001 014

1 × crosshead (incl. mirrors)

1 × item no. 922 001 015

1 × device storage case

1 × item no. 900e008 383

1 × operating Instructions

1 × item no. GEB 001 182

1 × CD Rom

(measurement protocol + operating manual)

1 × item no. VID 922 004

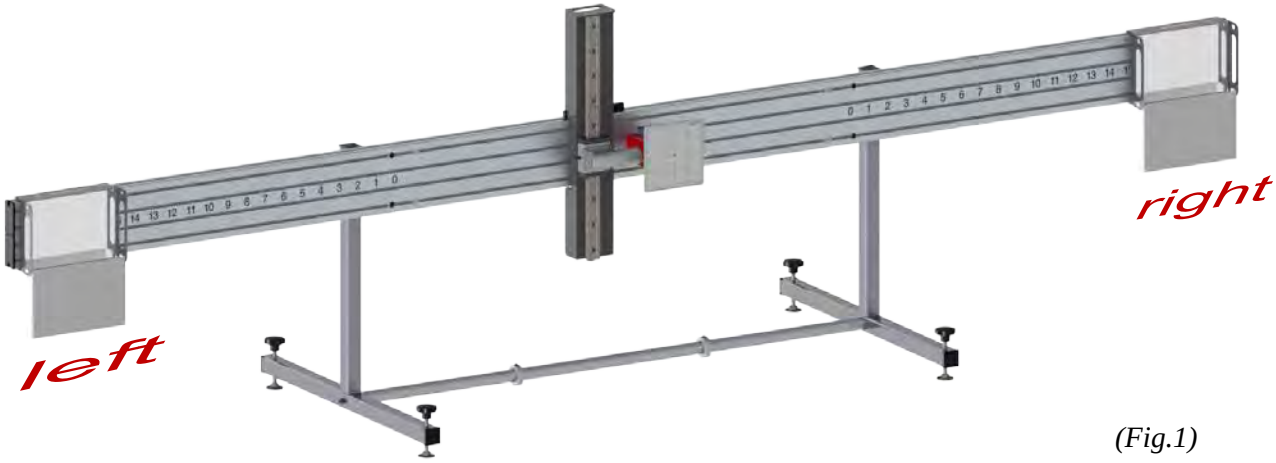
3.2 Optional accessories for SAD500

1 × adapter mirror

1 × item no. 922 001 011

4 Preparatory measures

4.1 Assembly of the crosshead



(Fig.1)

The crosshead consists of: 2 device supports, 1 central part, 2 side elements (left and right), 2 mirrors, 1 receiving bars, 1 carriage and laser with scale.

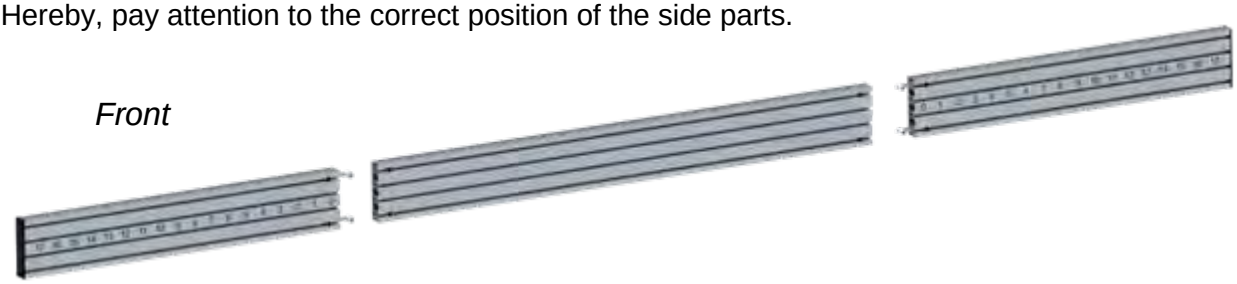
Step 1:

Assembly of the slide rails.

The two side parts must be connected to the left and right side of the central part.

Hereby, pay attention to the correct position of the side parts.

Front



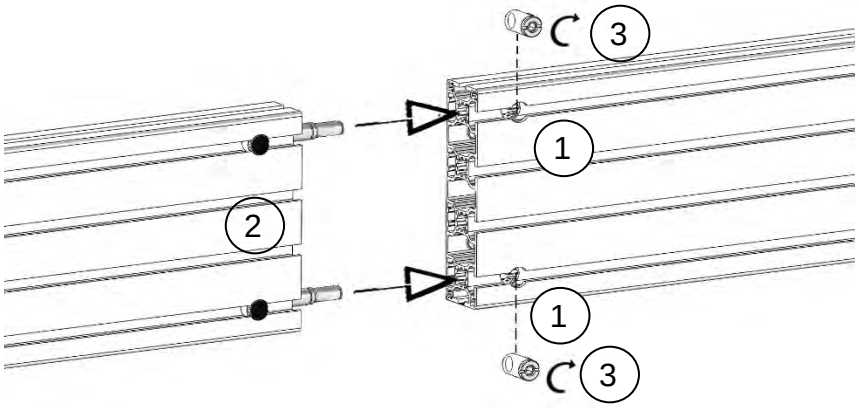
The counter beam of 0 – 17 can be seen on the left and right at the front

Rear

(Fig.2)

On the rear, all logos must be in the same direction.

Step 2:



(Fig. 3)

1.) Insert the fixing screws into the holes in the central part.
2.) Slide the side part with the centring pins into the central part until the pins are seated in the fixing screws.
3.) Use an Allen key to firmly lock the fixing screws on the pins.

- Check the surfaces in the slide rails at the transition points. These must be aligned, otherwise the carriage could jam. As necessary, release the connection and realign the elements.
- Repeat the process for the other side part.

Step 3:

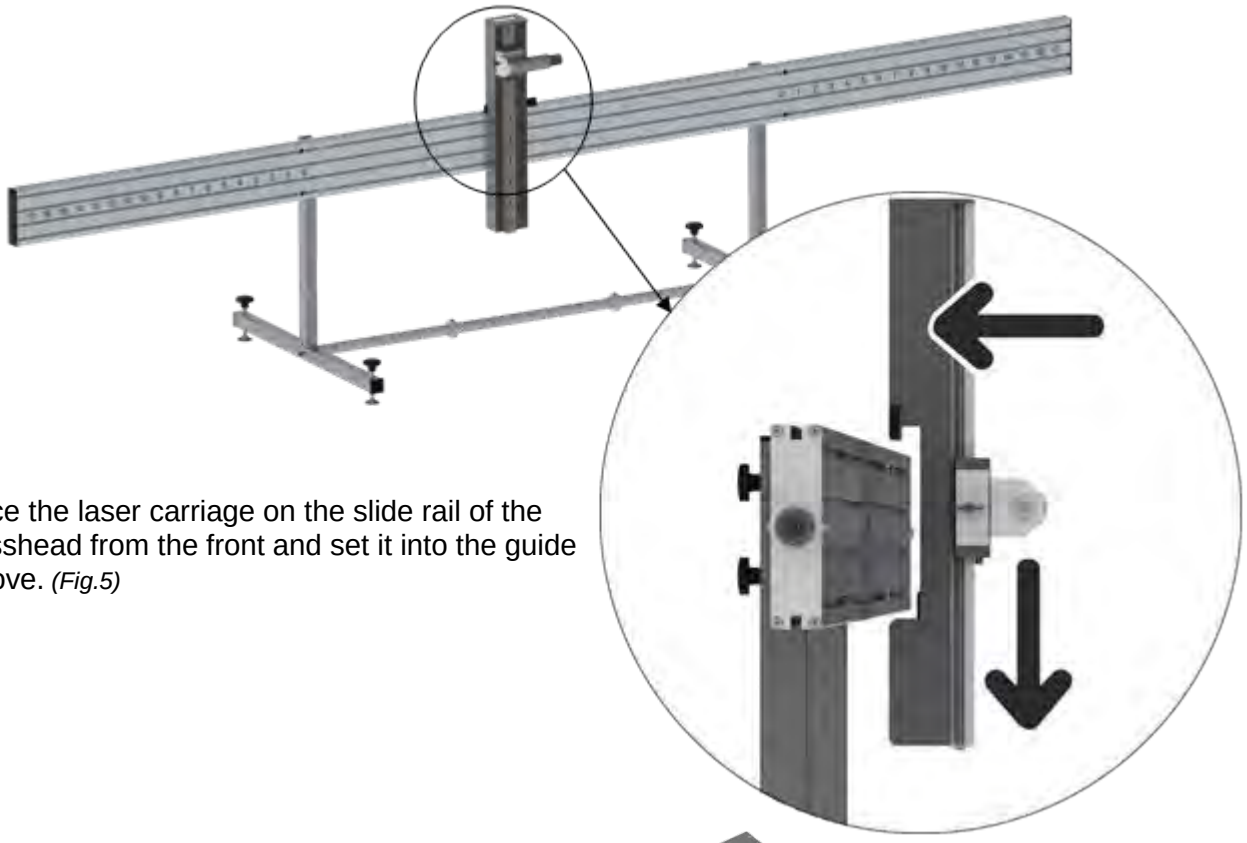
1.) Slide the star grip screws through the holes in the support.
2.) Guide the device support to the side part and manually fasten to the side part by tightening the star grip screw.
3.) Repeat the process for the second device support.

Step 4:

Using 2 bolts M8 x 50, connect the central rod between the device support.

(Fig.4)

Note For the assembly of the calibration reflector, refer to Page 16.

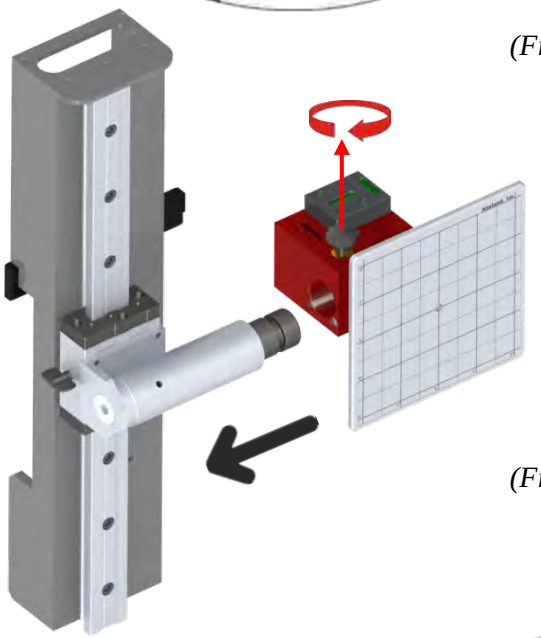


Place the laser carriage on the slide rail of the crosshead from the front and set it into the guide groove. *(Fig.5)*

(Fig.5)

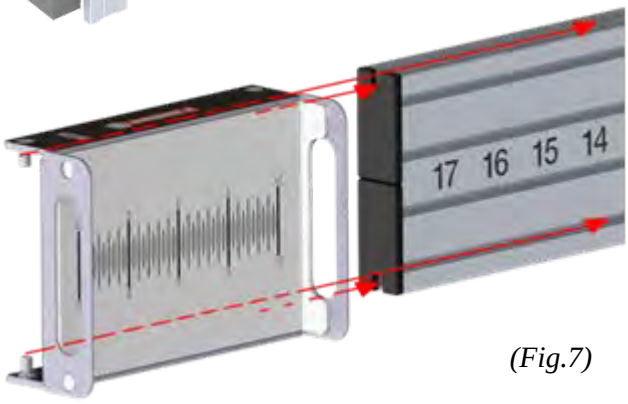
Slightly release the fixing screw on the laser housing and pull upwards.

Place the laser housing on the pin on the carriage and then tighten the fixing screw far enough so that the laser unit including the scale can still be rotated on the pin. *(Fig.6)*



(Fig.6)

Slide each mirror with its guide bolts into the groove on the crosshead from either side.



(Fig.7)

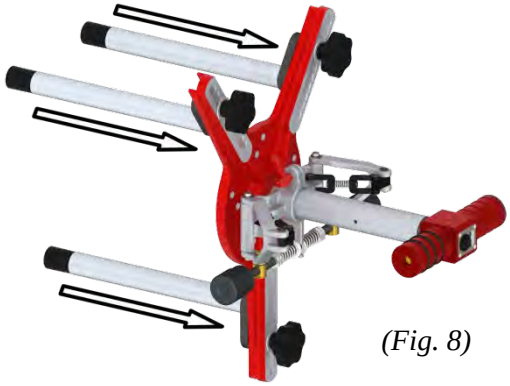
Note

Observe the mirror identification **Left** "**L**" and **Right** "**R**" to avoid reversing the mirrors.

4.2 Setting up laser measuring heads and scales

Note

The wheel alignment clamps have to be converted for the rear wheels using the long magnetic feet (310 mm). *(Fig. 8)*

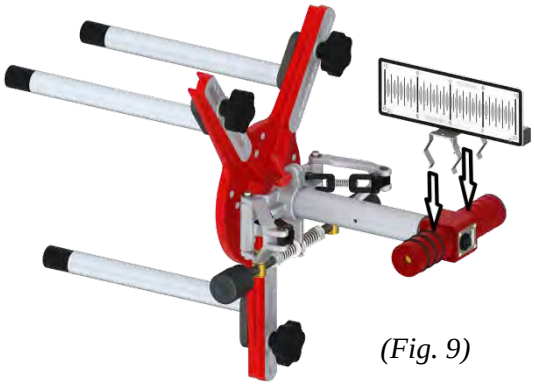


(Fig. 8)

- Place a scale on the measuring column of the wheel alignment clamp with the clamping jaws.

Note

The scale points in the direction of the laser outlet opening. *(Abb.10)*



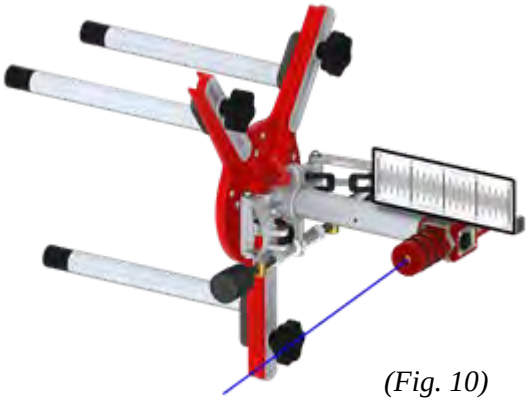
(Fig. 9)

- Repeat the process for the second measuring head.

4.3 Mounting the laser measuring heads on the vehicle

Note

Ensure that the measurement is carried out on a level workshop floor.



(Fig. 10)

- The magnetic holders on the 3-arm clamping star must be adjusted to the correct rim diameter.

Attention

- Check the contact surfaces of the magnets and the rim! They have to be free from dirt and metal filings!

(Fig. 11)

- Attach the measuring heads to the rim flange using the magnets. Two magnets should be located above the centre of the wheel and one magnet below it. *(Fig. 11)*

Note

The scale can be mounted above or below the laser housing.

4.4 Aligning crosshead with the vehicle

The crosshead must be installed in the centre in front of the vehicle and parallel to the rear driving axle.

Make sure that the laser with the measuring scale is positioned at the same height on the vehicle as the ACC sensor.

(Fig. 12)

(Fig. 13)

Note

Thereby, the distance between the laser with the measuring scale and the sensor on the vehicle must be exactly 100 cm. *(Fig. 14)*

Initial alignment of the crosshead to the centre of the vehicle is carried out using the number scale.

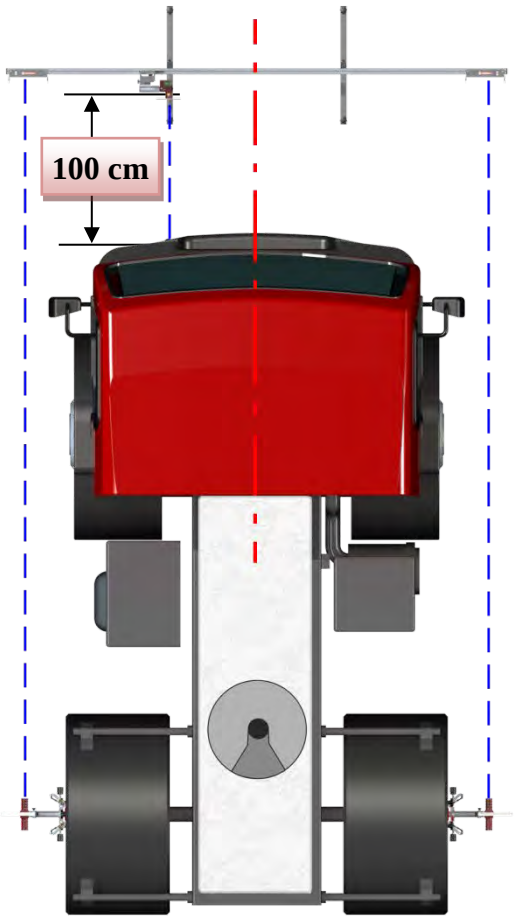
- Both mirrors left and right are set at the same distance on the slide rail and, subsequently, the complete crosshead is pushed until the mirrors each point to the laser on the rear axle. *(Fig. 12)*

The two lasers on the rear vehicle axle are switched on and pointed at the scales of the mirror covers on the crosshead.

- The complete crosshead is now pushed to the left or right so that the laser point points to the same line on the scales on the mirror covers. Hereby, the mirrors must not be displaced. *(Fig. 13)*

The crosshead must now be aligned parallel to the vehicle axle.

- For this, the mirror covers are folded up.
- The complete crosshead is rotated about its imaginary centre point until the reflecting laser beam points to the same value on the scales on the left and right on the rear axle.



(Fig. 14)

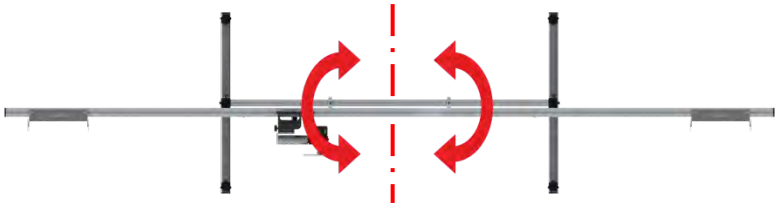
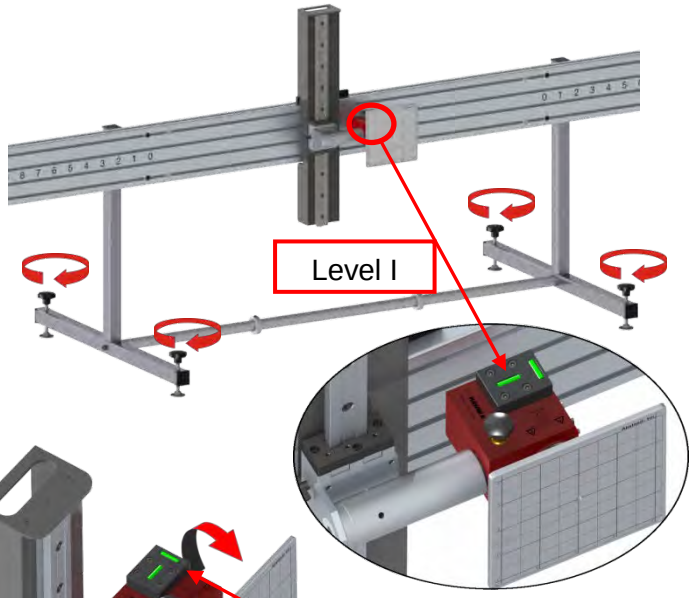


Figure 15 shows the laser beam now on the same line on the left and the right scale.

- When the crosshead is aligned and, subsequently, the distance to the sensor, 100 cm, is rechecked.

(Fig. 15)

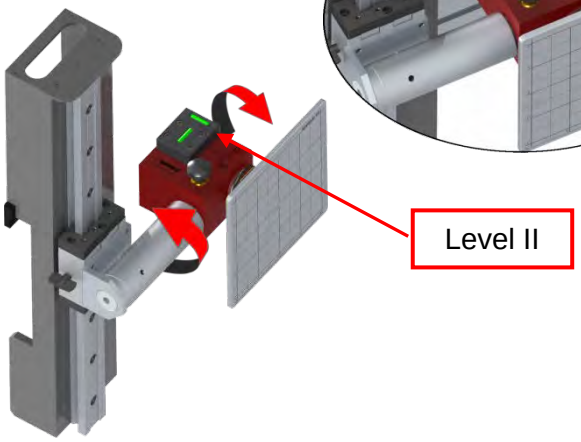
- The horizontal alignment of the crosshead on the laser housing must be checked using the **level I** , readjust if required.
- The crosshead can be aligned horizontally with the setting screws. *(Fig. 16)*
- Slide the guide carriage in the crosshead sideways until the laser beam indicates on the mirror of the radar sensor of the vehicle.



(Fig. 16)

- Use **level II** to align the laser housing horizontally by rotating around the mounting pin. *(Fig. 17)*

Once the crosshead and the laser housing have been aligned, the laser beam finally has to hit the reference mirror of the ACC sensor. Re-align if necessary.

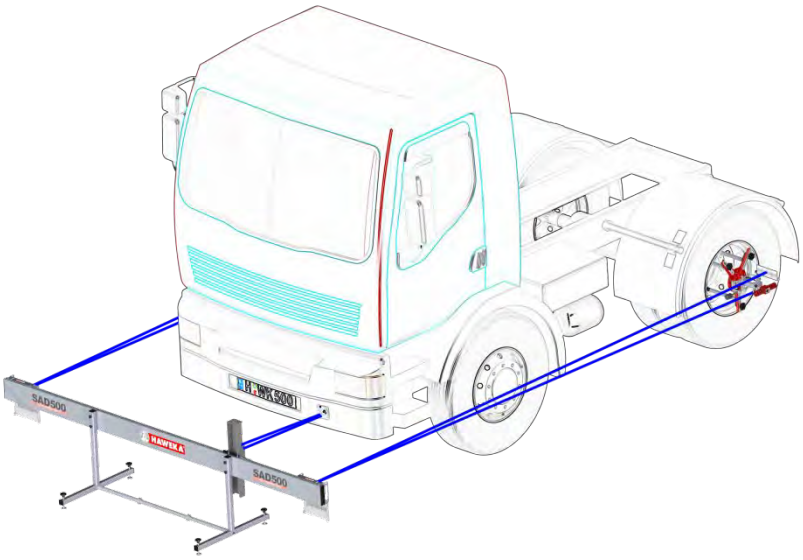


(Fig. 17)

Assembly of the crosshead is complete

when:

- ✓ the crosshead is aligned **central** to the centre line of the vehicle.
- ✓ the crosshead is aligned **parallel** to the vehicle axle.
  (The reflecting laser beams indicate the same values on the left and right scales of the rear axle)
- ✓ the crosshead is aligned horizontally (**level I**).
- ✓ The laser housing is aligned (**level II**) and the laser beam hits the mirror of the ACC sensor on the vehicle.
- ✓ The distance between the ACC sensor on the vehicle and the measuring scale on the laser housing is exactly 100 cm.

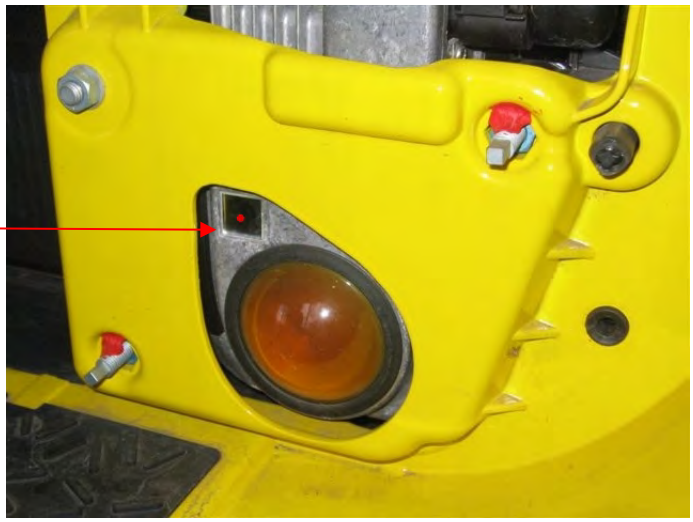


5 Measuring and adjusting the ACC sensor

5.1 Measuring the ACC sensor with reference mirror

- The crosshead is aligned and is in the centre in front of the vehicle and parallel to the vehicle driving axle.

The laser on the crosshead is switched on and pointing directly at the reference mirror of the ACC sensor. *(Fig. 18)*



(Fig. 18)

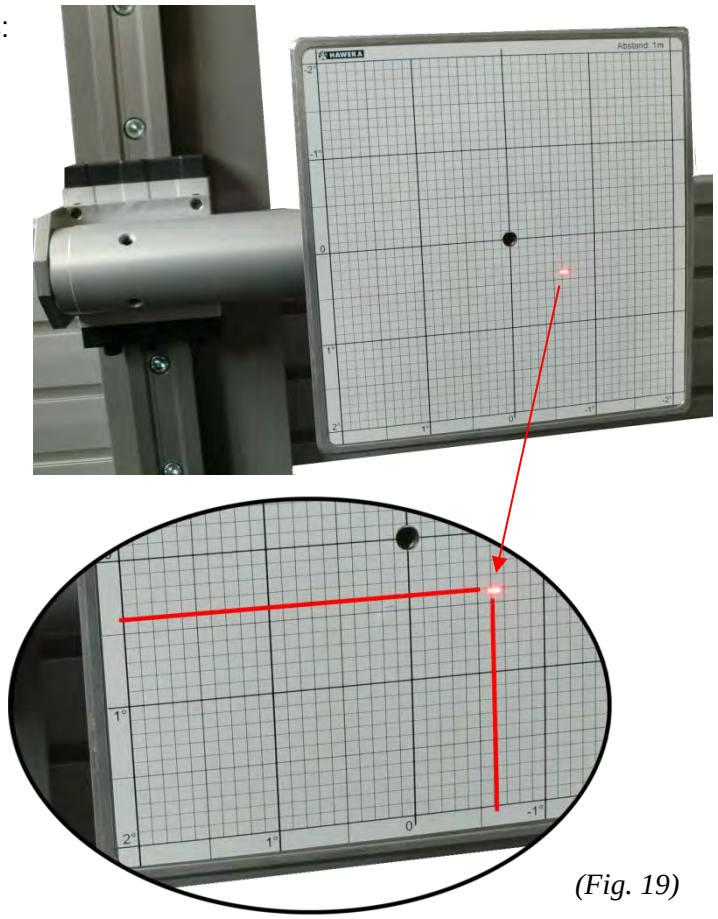
- The reflecting laser beam is projected back at the scale on the crosshead via the reference mirror.
- The currently set value of the ACC sensor can now be read from the scale. *(Fig. 19)*

Note

The division on the scale is as follows:

1 scale division = 0.1 degrees

- Compare the values read with the NOMINAL values from the manufacturer and, as necessary, the ACC sensor must be set to the nominal values using the adjustment screws.



(Fig. 19)

5.2 Measuring the ACC sensor without reference mirror

For checking an ACC sensor without reference mirror *(Fig. 21)*, the optional adapter mirror 922 001 011 *(Fig. 20)* must be mounted in front of the ACC sensor on the vehicle before the check.

(Fig. 20)

(Fig. 21)

- The adapter mirror is suspended in front of the ACC sensor on the vehicle and secured with the knurled screws. *(Fig. 22 + 23)*

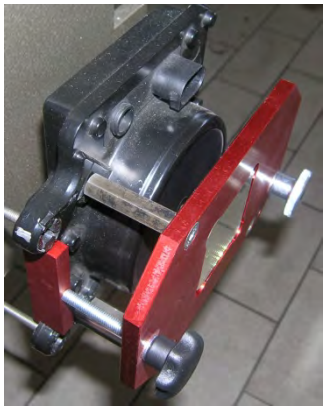
Note

If the adapter mirror is mounted correctly it will rest parallel to the radar output area of the ACC sensor. *(Fig. 24)*

The laser on the crosshead is switched on and pointing directly at the adapter mirror of the ACC sensor.

The reflecting laser beam is projected back at the scale on the crosshead via the adapter mirror.

(Fig. 22)



(Fig. 23)

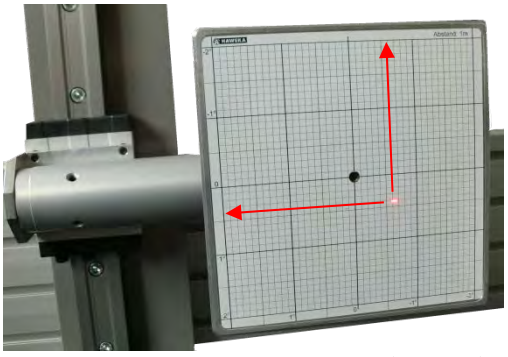
- The currently set value of the ACC sensor can be read from the scale. *(Fig. 25)*

Note

- The division on the scale is as follows:
- **1 scale division = 0.1 degrees**

(Fig. 24)

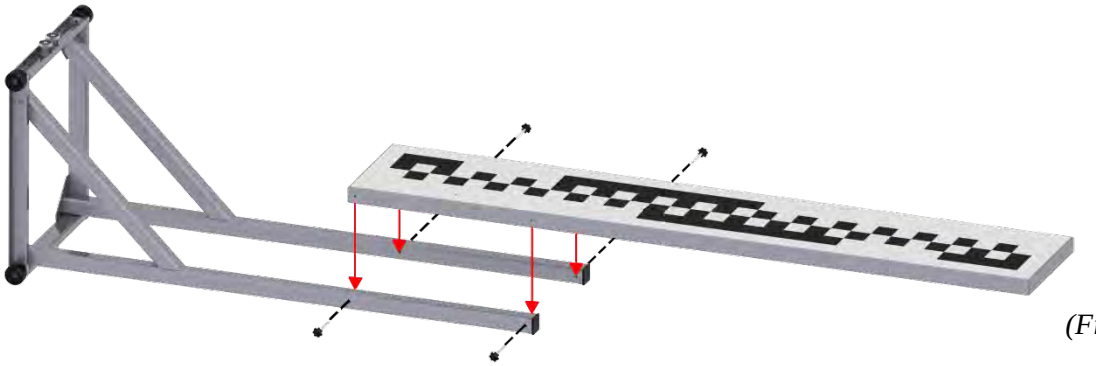
- Compare the values read with the NOMINAL values from the manufacturer and, as necessary, the ACC sensor must be set to the nominal values using the adjustment screws.



(Fig. 25)

6 Calibration Reflector for the Lane-Keeping Assistant

6.1 Assembly of the calibration reflector



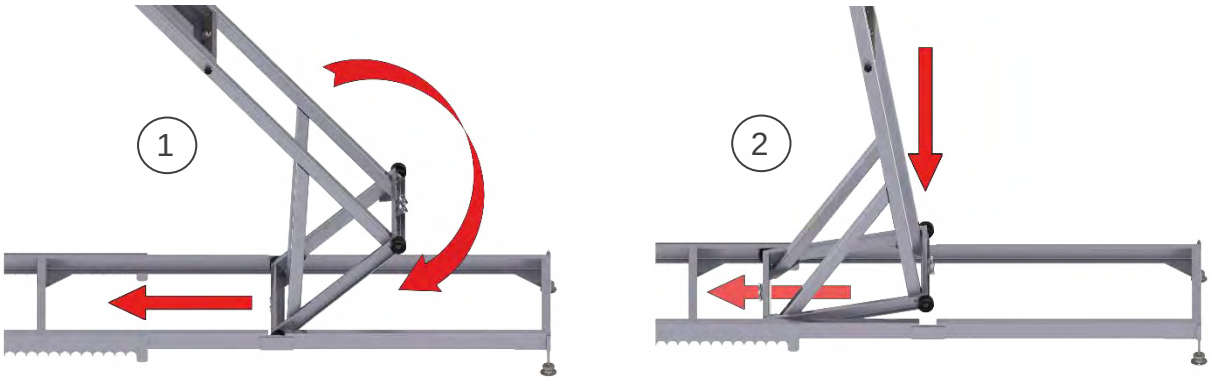
(Fig. 26)

Step 1:

Using 4 star grip screws M6 x 60, attach the reflector panel to the stand.

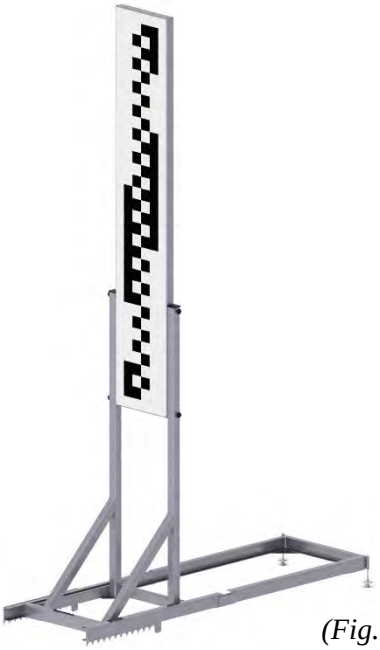
Step 2:

Insert the stand, with the reflector panel, into the base frame.



(Fig. 27)

- Tilt the reflector panel and then insert with the rear rollers.
- Subsequently, push the reflector panel to the rear and insert the front rollers.
- Push the reflector stand and check for ease of movement.



(Fig. 28)

Note

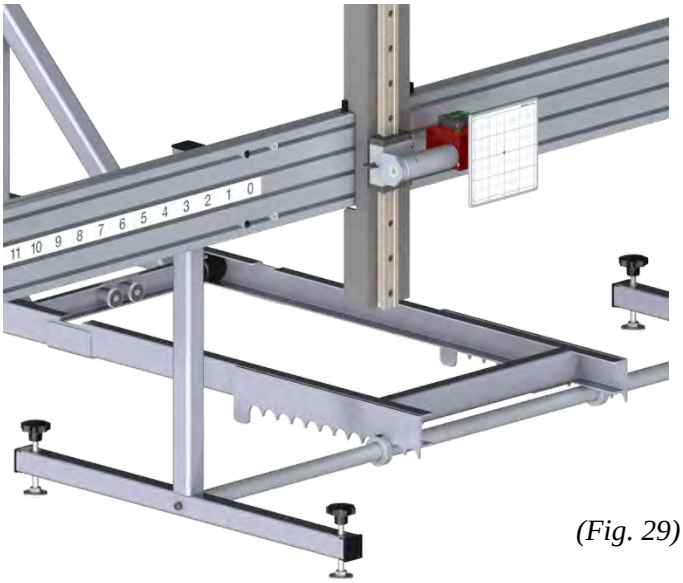
Make sure that the running surfaces of the base frame are always clean and free from grease and dust.

6.2 Setting the calibration reflector

Aligning the position:

Before the lane-keeping camera of the vehicle is put in position, the calibration reflector must be at a distance specified by the vehicle manufacturers.

- For this, the base frame of the calibration reflector is hung into the central rod of the previously aligned crosshead. *(Fig. 29)*



(Fig. 29)

The base frame of the calibration reflector has different positions to engage.

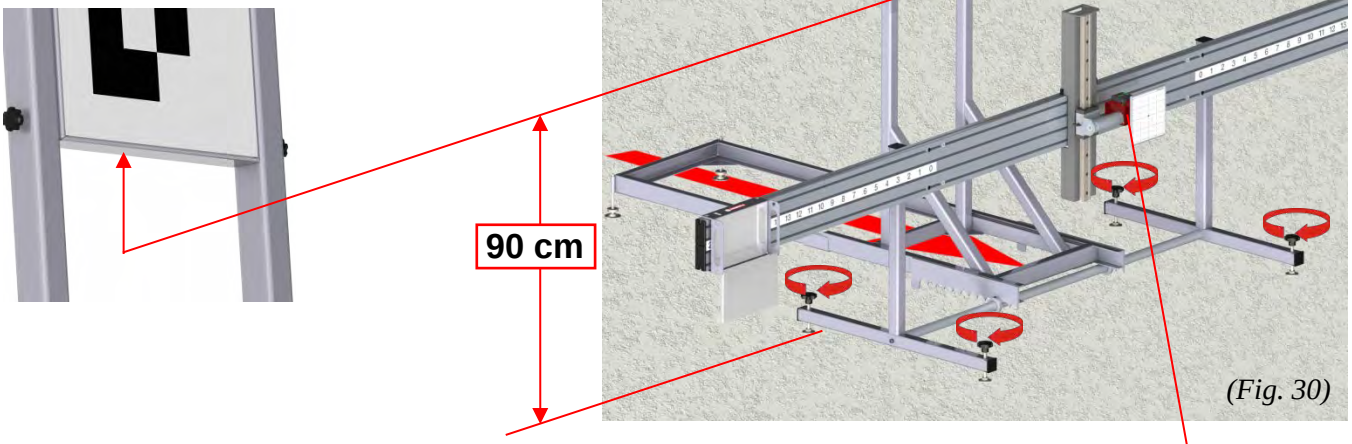
- Depending on the type of vehicle, select a position to engage for the specified distance.

Aligning the height:

- The reflector stand is pushed to the front position until the magnets rest on the base frame. *(Fig. 30)*

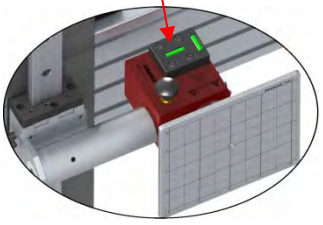
The lower edge of the reflector panel* must be a distance of exactly 90 cm from the floor.

* Lower edge of the reflector panel



(Fig. 30)

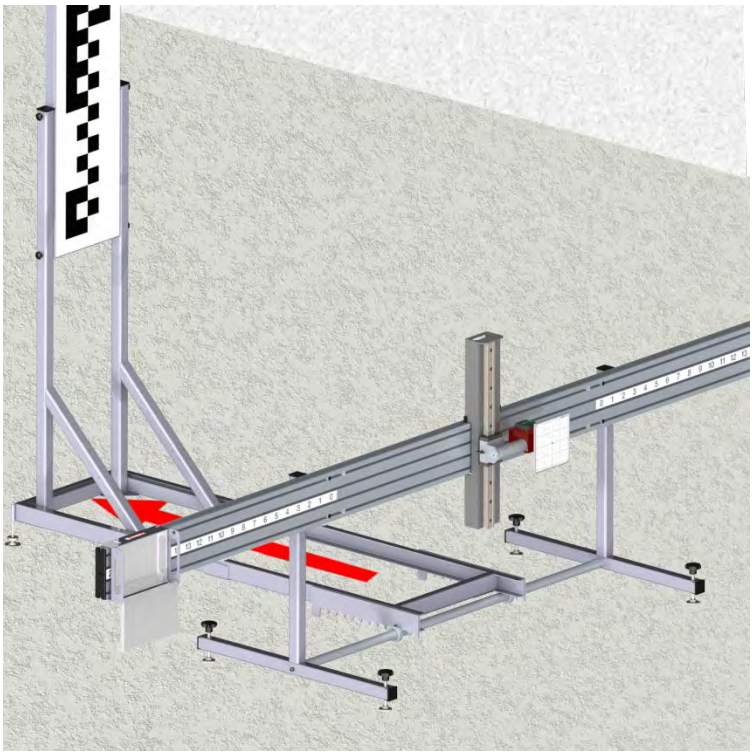
- Correction of the height is carried out using the setting screws of the crosshead.
- When the crosshead has been adapted in height, it must be checked using the level l and, as necessary, readjusted.
  Also refer to Figure 16, Page 13.



Aligning horizontally:

Subsequently, the reflector panel must be aligned into a horizontal position.

- For this, the reflector stand is put into the rear position until the magnets rest on the base frame. *(Fig. 31)*



(Fig. 31)

There is a spirit level located on the rear of the reflector.

- Using the spirit level, the reflector panel is aligned by the rear setting screws of the base frame. *(Fig. 32)*

(Fig. 32)

Thus, setting the calibration reflector is completed and calibration of the lane-keeping camera can be carried out in accordance with the specifications from the vehicle manufacturer.

7 Servicing

7.1 Maintenance and Care

Please note that the laser measuring heads including the scales and wheel alignment clamps with their accessories are precision components.
These components must be used and maintained with great care at all times.

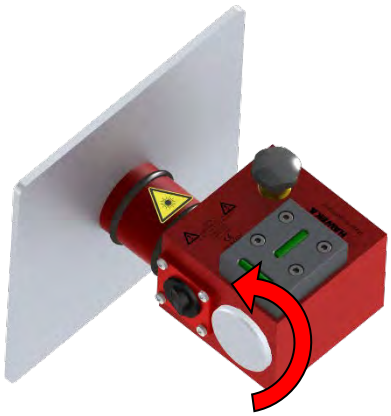
Note

The laser lens is generally maintenance-free.
If dirty, the components can be cleaned with a dry, soft cloth.
Do not use solvent or other liquids for cleaning!

7.2 Replacing the batteries in the laser housing

To replace the batteries open the covering cap *(Fig. 33)* on the laser housing and pull out the battery compartment. *(Fig. 34)*

Battery: 2 x Mignon Type AA 1.5 V



(Fig. 33)

(Fig. 34)

Used batteries have to be disposed of into special recycling containers.

8 Error description

Operators may only redress errors that are clearly the result of operating or maintenance errors!

8.1 Description and causes of errors

Description	Possible causes	Troubleshooting
The laser beam becomes weaker shortly after switching on the system.	There is insufficient battery power in the laser housing	Turn off the system! Replace the batteries
Wheel alignment clamp does not sit securely on the rim	• Dirty rim surface • Dirty magnetic feet • Magnets on the rim are not fully in contact	Turn off the system! • Clean the rim surface • Clean the magnet surface • Realign the magnetic feet
Measurement results cannot be repeated	• Measuring head alignment is damaged • Incorrect calibration	Alignment of measuring head required. Please contact your HAWEKA sales partner
	• Level I + II on the laser housing are not aligned horizontally	Check and realign measuring system according to no. 4.4

9 EC Declaration of Conformity

The manufacturer:	**HAWEKA AG** **Kokenhorststr. 4** **D-30938 Burgwedel** **Germany**
herewith declares that the following described system:	**Optical Adjustment System SAD500**
Item number:	**922 000 013**
conforms to the requirements of the following directive:	**RoHS Directive 2011/65/EU**

Applicable harmonised standards:

Safety of laser products	DIN EN 60825 - Part 1 7/1994

National standards and technical specifications applied:

Laser radiation	VBG 93
Technical documentation	VDI 4500 Sheet 1

Structural modifications which affect the data provided in the Operating Instructions and the intended use invalidate this Declaration of Conformity!

Board of Management
Dirk Warkotsch

Burgwedel, 15/01/2016

CE

(Signature)

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