S. Bleyer GmbH
www.s-bleyer-gmbh.de

User manual for

Wheel Hub Fixation

Keep for future reference.
Edition V5.6 / as of 12-2022

For your notes:

Contents

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1. General

1.1 Purpose of the user manual

This user manual "Wheel Hub Fixation" describes the design and function, mounting, dismounting, maintenance and cleaning as well as transport and storage of the wheel hub fixation.
The described wheel hub fixation is for fixing the test vehicle by using adapters, bearings, rods and anchors onto a roll or belt dynamometer.

The wheel hub fixation was developed and manufactured by S. Bleyer GmbH.

1.2 Target group

The user manual "Wheel Hub Fixation" is intended for operators of dynamometers for automobiles with adequate technical knowledge.

1.3 Version

The footer on each page contains the current version and the date of printing of this document User manual "Wheel Hub Fixation".

You can download the latest version of this user manual at any time from www.s-bleyer-gmbh.de.

1.4 Safekeeping

Make sure that you keep the user manual safely!

1.5 Copyright

The content of this edition has been carefully checked for accuracy. Nevertheless, errors cannot be completely excluded.

Subject to change without prior notification.

Layout and texts: S. Bleyer GmbH. All photos and drawings are the property of S. Bleyer GmbH. Photos and drawings need not represent the current production status as long as the function illustrated is the same.

Printed on 100% recycled paper.

1.6 Language of the user manual

The original version of this user manual has been written in the EU official language of the manufacturer (German).
Translations into other languages are translations of the original version.
The legal stipulations of the Machinery Directive are applicable.

1.7 Address of manufacturer

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1.8 Explanation of the symbols

Levels of danger are identified according to ISO 3864 or ANSI Z535.4

 **Danger**	The triangular warning symbol with the signal word "Danger" stands for an *imminent danger* that definitively leads to *serious injuries or death*.
 **Warning**	The triangular warning symbol with the signal word "Warning" stands for a *potentially hazardous situation*, that could lead to *serious injuries or death*.
 **Caution**	The triangular warning symbol with the signal word "Caution" stands for a *potentially hazardous situation*, that could lead to *minor injuries*. The triangular warning symbol with the signal word "Caution" also stands for a *hazardous situation* in which the product or an object in the vicinity can be damaged *(material damage).*
 **Notice**	The round warning symbol with the signal word "Notice" stands for a *potentially hazardous situation* in which the product or an object in the vicinity could be damaged (*material damage*).
 **Note**	The hand with the signal word "Note" gives advice and hints for use.

2. Description of the wheel hub fixation

2.1 Important notes

2.1.1 General view

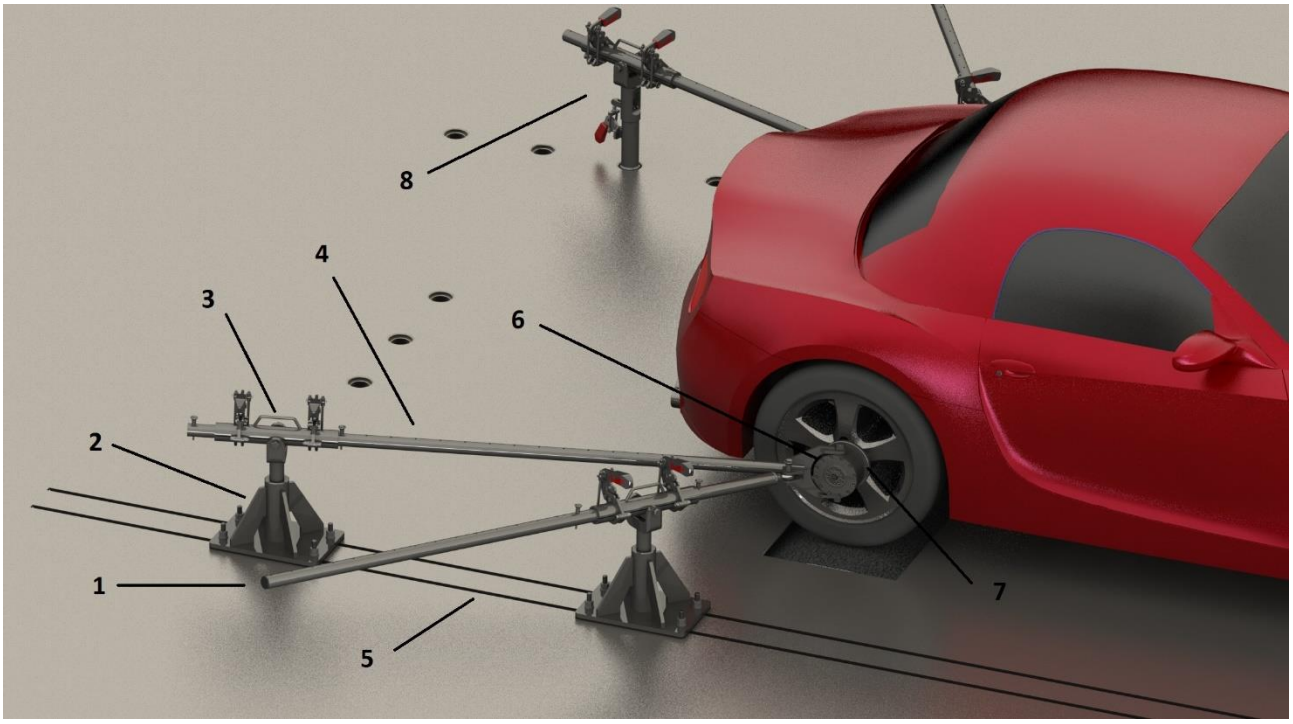

Figure 1: Fully fixed wheel

[1] diagonal wheel hub rod (DRST)
[2] Sliding anchor (SA)
[3] Clamping collet (KR)
[4] Wheel hub rod (RST)
[5] Rail system
[6] Fixation bearing (FL)
[7] Rim adapter (FA) with Thread adapter (GA)
[8] Alternative plug-in anchor (STA)

2.2 Intended use

The task of the wheel hub fixation is the fixation of passenger cars fast, safe and without any tension with front wheel, rear wheel or four-wheel drive on various roller or belt dynamometers using the wheel hub as fixation point.

The following vehicle types can be fixated:
- Standard passenger cars
- Prototypes
- Test vehicles
- Vehicles without towing eyes

Possible areas of use are:
- single roller dynamometers in uniaxial and biaxial use (e.g. 48-inch roller)
- double roller dynamometers in uniaxial and biaxial use (e.g. 20-inch roller)
- belt dynamometers

Intended use:
Only use the wheel hub fixation to secure vehicles on a roller or belt dynamometer in accordance with the intended use and the Technical Data.

Intended use also includes:
- note and comply with the user manual
- follow maintenance instructions

 **Danger**	**Danger of life and risk of material damage around the vehicle!** Death, serious injuries or material damage due to improper use of the wheel hub fixation! Follow all instructions for mounting and dismounting, maintenance and cleaning precisely, as well as all safety instructions!

2.2.1 Limits for tractive load for hook fixations and wheel hub fixations

 **Danger**	**Limits of tractive load:** **Range up to max. 10,000N tractive load:** Here it is usually sufficient to use a hook fixation. **Range up to max. 20,000N tractive load:** A mixed use of hook fixation and wheel hub fixation is allowed, if: ⇨ one axle is equipped with a wheel hub fixation and ⇨ the opposite side is restrained with a hook fixation. **Range over 20,000N up to max. 35,000N tractive load:** Here it is essential that the wheel hub fixation is used on both axles.

2.2.2 Danger Zone

The following areas are part of the danger zone:

- area of 1m distance around the side of the fixed vehicle
- vicinity of the fixation triangles
- in front of and behind the vehicle

 **Danger**	**Danger to life within the danger zone during test operation!** People are caught by the vehicle and thereby killed or seriously injured if the vehicle breaks loose due to improper fixation or breakage of the thread adapters! Legs cut off or broken through deforming rods or rods breaking away. Remain outside the danger zone during test operation!

2.2.3 Identification marking

The individual components are marked by an engraving as follows:

Component	Marking	Location of engraving
Wheel hub rod (RST)	RST05 / number	at fork head
diagonal wheel hub rod (DRST)	DRST05 / number	at swivel head
Sliding anchor 300mm	SA03 / number	on base plate
Sliding anchor 400mm	SA03L / number	on base plate
Sliding anchor 500mm	SA03LL / number	on base plate
Sliding anchor, height adjustable 320–480mm	SA05HM / number	on base plate
Sliding anchor, height adjustable 360–520mm	SA05HL / number	on base plate
Sliding anchor console	SAK-SA / number	on base plate
Plug-in anchor 320mm Locking pedal	STA18 / number	on main body
Plug-in anchor 400mm	STA03L / number	on main body
Plug-in anchor 500mm	STA03LL / number	on main body

2.3 Configuration

2.3.1 Scope of Delivery

Per rotating axle the following components are included within the scope of delivery:

- 2 wheel hub rods (RST)
- 2 diagonal wheel hub rods (DRST)
- 4 plug-in
  or 4 sliding anchors (without T-head bolts)
- 2 wheel rim adapters with thread adapters in the version as per agreement (more versions upon request)
- 2 fixation bearings
- 1 adjusting tool for correctly adjusting the clamping force of the anchor clamping collets

Note	The system is delivered with 2.0-m-long rods. You can shorten the rods individually to the required length if necessary and desired. The free end of the rods must protrude at least 10cm from the clamping collet (KR) in all applications.

2.3.2 Accessories

In addition, the following components can be delivered as accessories:

- **Transport trolley for sliding and/or plug-in anchors**
  (Anchors are not included in the scope of delivery)

Figure 3: Sliding anchor cart

Figure 2: Plug-in anchor cart

Suitable for transporting or storing 4 pieces of sliding anchors
or plug-in anchors at a time.
Configurations other than this or special requests are also possible at any time on request.

- **Rod holder**
  (Rods are not included in the scope of delivery)

Figure 4: Rod holder with fixation bearing mount

Figure 5: Rod holder simple

Fixation rods insert safely and ready-to-use in holders, e.g. directly within the test cell next to the test bench.
The rod holders are available in various versions, depending on the type and number of rods to be stored

Original floor bushings with cover
(Anchors are not included in the scope of delivery) in the

T-rail
(Anchors are not included in the scope of delivery)

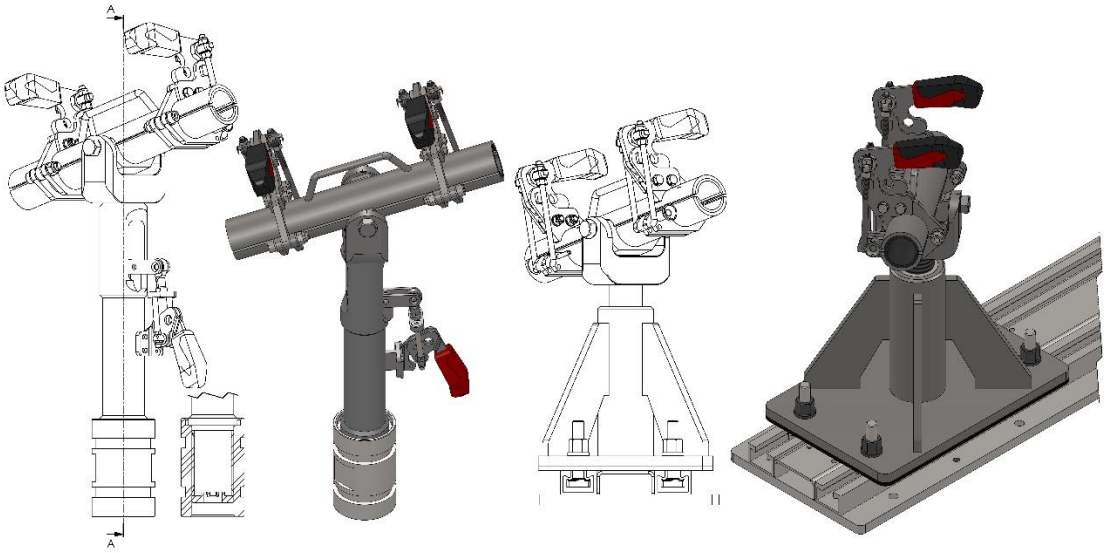

Figure 6: Floor bushings and rails

Are permanently installed in the test bench floor.

Mounted in or on the test bench floor.

- **Wall panels with mounting & safety instructions in short form**

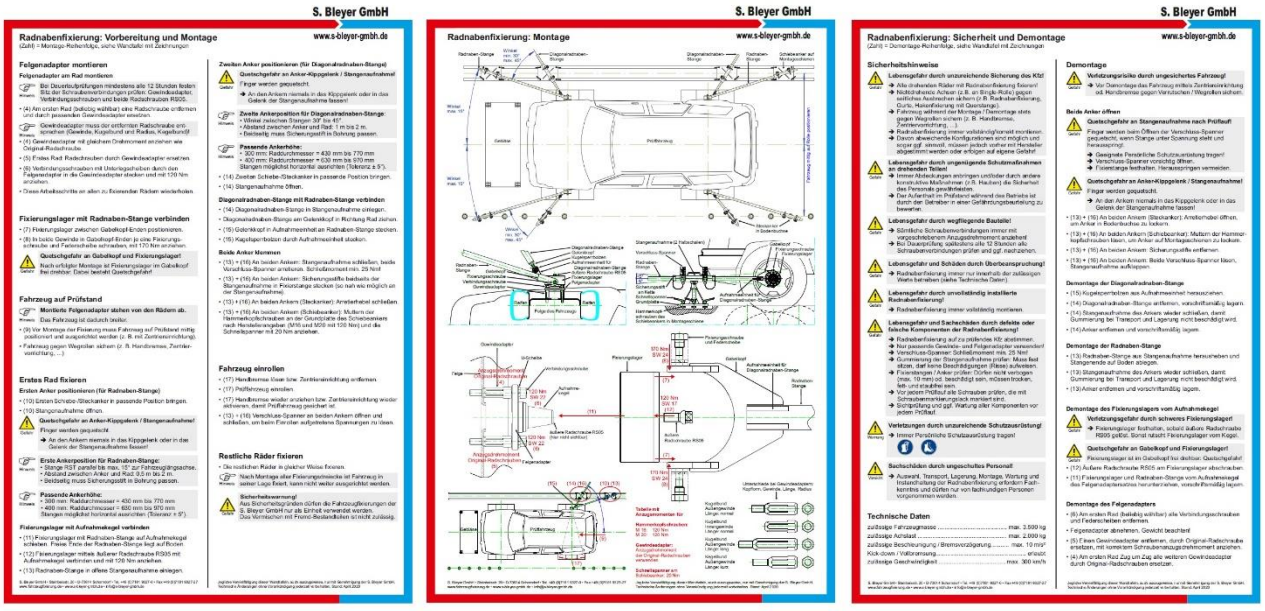

Figure 7: Wall charts

3. Safety instructions

Danger

Danger of life through inadequate securing of the vehicle!

Vehicle could break away, killing or injuring persons and causing material damage if the wheel hub fixation is mounted incorrectly or inadequately.

- ➔ Secure at least one axle with a wheel hub fixation!
- ➔ Secure the second axle (e.g. on single rollers) against lateral movement (e.g. by wheel hub fixation, belt fixation, hook fixation with QST).
- ➔ Secure vehicle with handbrake during mounting/dismounting.
- ➔ Always mount wheel hub fixation completely and correctly.

- ➔ **Alternative fixation configurations are possible and may even make sense (e.g. in the case of only one power-transmitting axle on all-wheel rollers) but must always be agreed upon with the manufacturer or implemented at own risk.**

Always mount the vehicle fixation completely.

Danger

Danger of life through inadequate protective measures on rotating parts!

Hands, arms or feet get crushed or severed if they come into contact with rotating parts (wheels, roller).

- ➔ Always install covers and/or use other structural measures (e.g. hoods) to ensure the safety of personnel.
- ➔ The operator must assess the risk of remaining in the test bench during operation by conducting a risk analysis!

Danger

Danger to life due to components flying off!

Component parts can fly off, injuring people and causing material damage if bolted connections become loose during test operation.

- ➔ Always tighten all bolted connections with the required tightening torque!
- ➔ In the case of endurance tests check all bolted connections at least every 12 hours and re-tighten them if necessary. Any deviating arrangements in individual cases must always be agreed upon in advance with the manufacturer.

Danger

Danger of life and material damage through overstraining!

Vehicle breaks loose, killing or injuring people and causing material damage if a component of the vehicle fixation is unable to withstand the stress and breaks.

Always ensure that the vehicle fixation is used exclusively within permissible values.

Danger

Danger of life and material damage through faulty or incorrect components of the wheel hub fixation!

Vehicle breaks loose, killing or injuring people and causing material damage if components of wheel hub fixation are faulty or used incorrectly.

- ➔ Make sure that the wheel hub fixation is matched to the vehicle to be tested.
- ➔ Only use thread adapters and rim adapters that are compatible with the vehicle wheel rims!
- ➔ Check latch clamp: These must have a closing torque of at least 25Nm, see also p.53!
- ➔ Check rubber coating of clamping collet (KR): Must be firmly seated and have no damage (cracks, notches).
- ➔ Check fixation rods and anchors: Must not be deformed or damaged, must be free of dirt and grease.
- ➔ Before every test run, visually check all screws that are marked with screw marking lacquer.
- ➔ Perform visual inspection and, if necessary, maintenance of the components in accordance with chapter "Maintenance and cleaning" before every test run.

Warning

Injuries due to inadequate personal protective equipment!

Hands and feet can get crushed by heavy components of wheel hub fixation or at anchor joints.

- ➔ Always wear personal protective equipment (gloves, safety shoes)!


Caution

Material damage caused by untrained personnel!

The wheel hub fixation, the body of the vehicle, the test bench or equipment of the test cell will be damaged if an accident occurs due to untrained personnel.

- ➔ Selection, mounting, dismounting, maintenance and cleaning, transportation and storage of the wheel hub fixation requires expert knowledge and must be performed only by trained personnel.

Note

Single roller dynamometers: Position the vehicle exactly on the crest of the rollers and align it to the driving direction before mounting the wheel hub fixation. See chapter 5.5

Note

Only use connecting elements (screws, nuts, latch clamps, locking levers etc.) that are approved by the manufacturer.

4. Setup and function

4.1 Basics

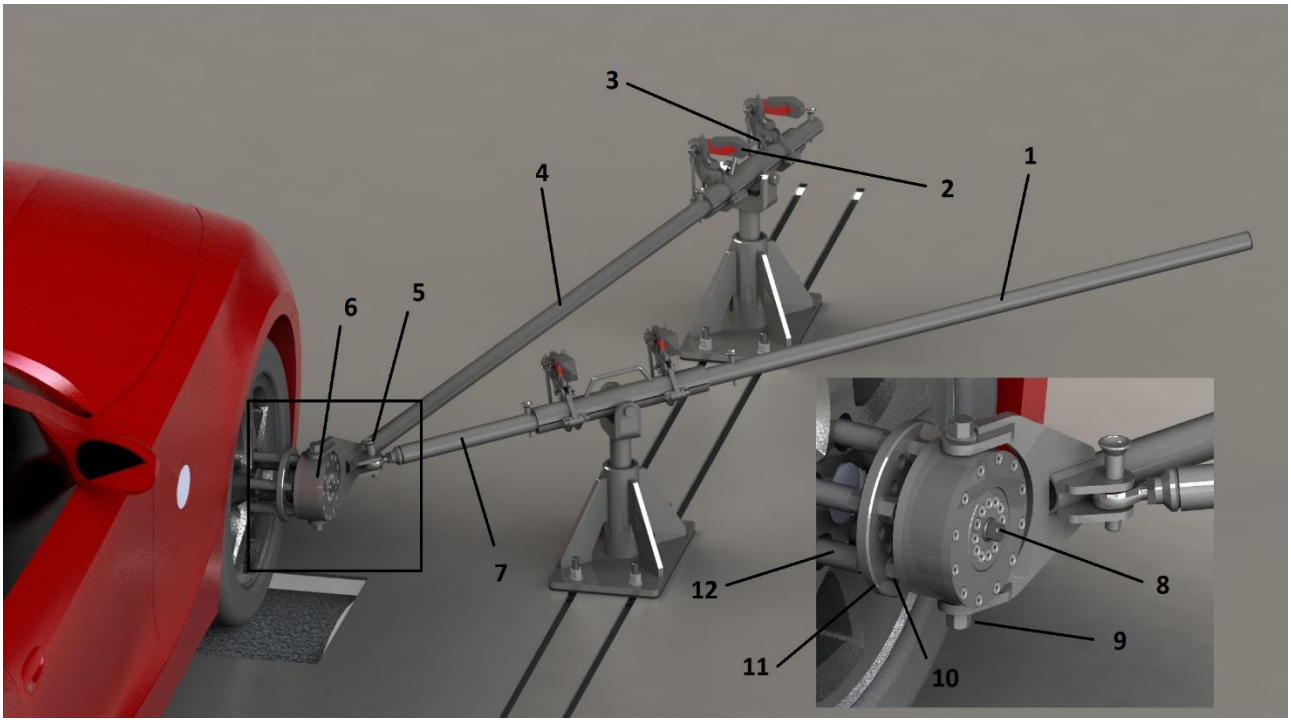

Figure 8: Wheel hub fixation mounted to a wheel

[1] diagonal wheel hub rod (DRST)
[2] latch clamp (BS)
[3] Clamping collet (KR) at the sliding anchor
[4] Wheel hub rod (RST)
[5] Ball lock pin
[6] Fixation bearing (FL)
[7] Securing pin
[8] external wheel bolt RS05 (1×)
[9] fixation screw FS05 (2×)
[10] connecting screw VS05
[11] Wheel rim adapter (FA)
[12] Thread adapter (GA)

With the wheel hub fixation, the vehicle is fastened to the roller or belt dynamometer, quickly and safely and without any pre-tension.

To secure the vehicle, two fixation rods are attached to each rotating wheel via the wheel rim adapter and the fixation bearing. These rods are held by plug-in or sliding anchors by being clamped in the rubber-coated clamping collet (KR).

The fixation bearing together with the two fixation rods (wheel hub rod, diagonal wheel hub rod) form the fixation triangle.

4.2 Fixation rods

4.2.1 Wheel hub rod

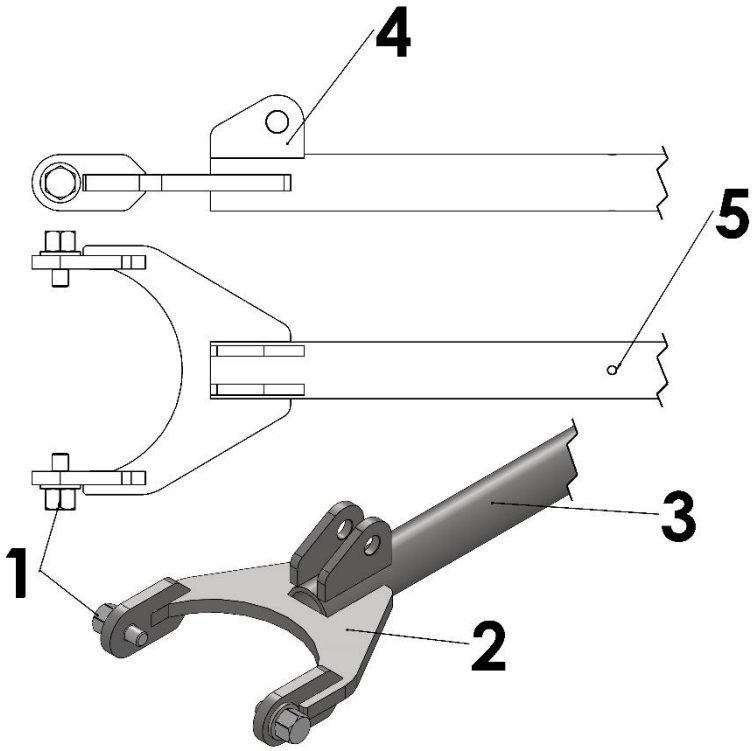

Figure 9: Wheel hub rod

[1] fixation screw and spring washer for fixation bearing
[2] Fork head
[3] Wheel hub rod (RST)
[4] docking unit for diagonal wheel hub rod
[5] drill-hole for securing pin

The fixation bearing, inserted in the fork head, is attached with the fixation screws.

Note	**The tightening torque of the fixation screws is 170Nm**

4.2.2 Diagonal wheel hub rod

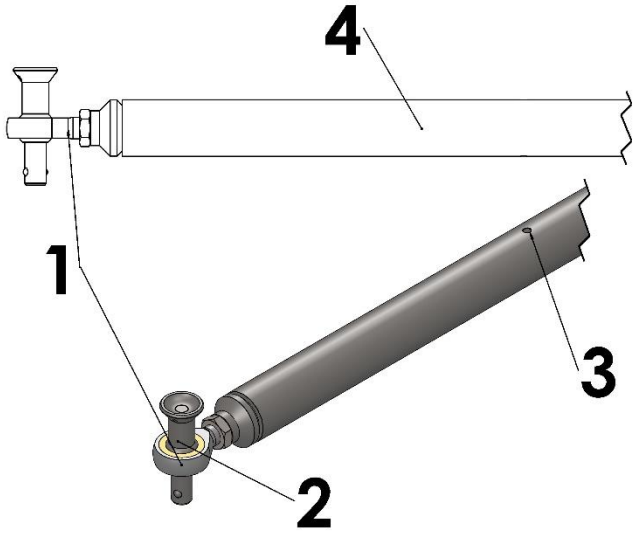

Figure 10: Diagonal wheel hub rod

[1] Swivel head
[2] Ball lock pin
[3] drill-hole for securing pin
[4] diagonal wheel hub rod

4.3 Anchor for rod fixation

There are two different types of anchors for the fixation: The plug-in anchor for floor bushings and the sliding anchor for T-rails.

4.3.1 Plug-in anchor

Installation Height = distance between middle of the clamping collet and the floor of test bench

Caution	**Material damage to extra-long plug-in anchor (STA03LL, 500mm overall height) and to vehicle!** The STA03LL plug-in anchor can break at the bottom if it is overloaded. ➔ Only use the STA03LL plug-in anchor *parallel or transverse (90°)* to the longitudinal axis of the vehicle! ➔ **Never insert the STA03LL plug-in anchor *diagonally (45°)* to the longitudinal axis of the vehicle!**

Note

Maximum allowed inclination of the fixation rod (see Figure 27): 5°
(9cm height difference within 1m horizontal distance between anchor and vehicle).

Anchor installation height	Wheel diameter between
320mm	430mm to 770mm
400mm	630mm to 970mm

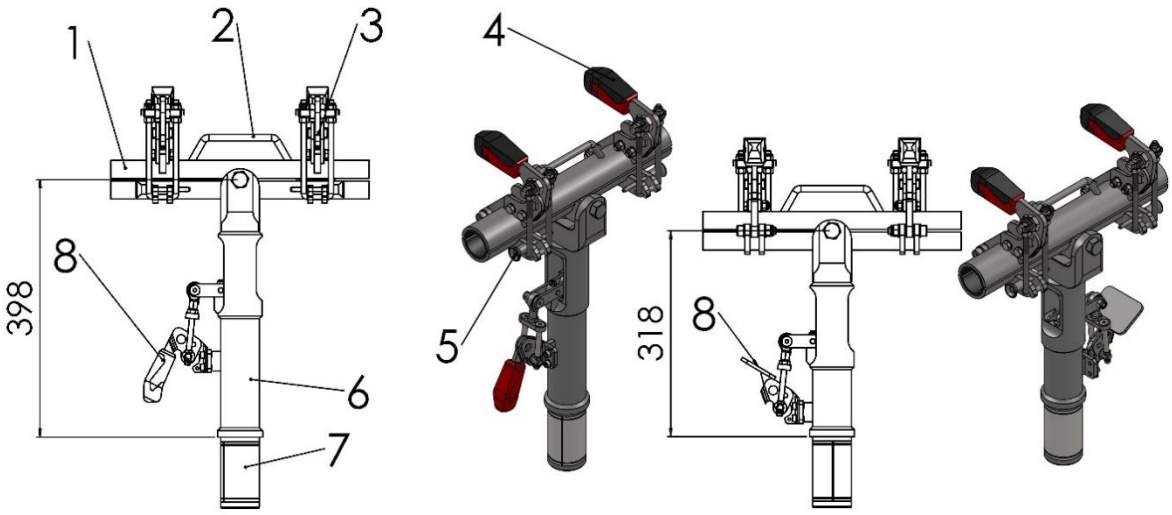

Figure 11: Plug-in anchor

[1] Clamping collet (KR) with rubber coating
[2] Carrying handle
[3] Latch clamp
[4] Latch clamp handle
[5] Securing pin
[6] Main body of plug-in anchor
[7] clamping sleeve (operated by locking lever)
[8] Locking lever (or locking pedal)

4.3.2 Sliding anchor

The sliding anchor is screwed tightly to the floor T-rails with T-bolts.

Note	**The tightening torque for the T-bolts:** • M16 ➔ 120Nm • M20 ➔ 120Nm

The installation height is 300mm or 400mm.
Installation Height = distance between middle of the clamping collet and the floor of test bench

Note

Maximum allowed inclination of the fixation rod (see Figure 27): 5°
(9cm height difference within 1m horizontal distance between anchor and vehicle).

Anchor installation height	Wheel diameter between
300mm	430mm to 770mm
400mm	630mm to 970mm

For an accurate horizontal alignment of the fixation rod, use the height adjustable sliding anchor (SA05HM).
When using plug-in anchors: Observe notes from page 20 about plug-in anchors!

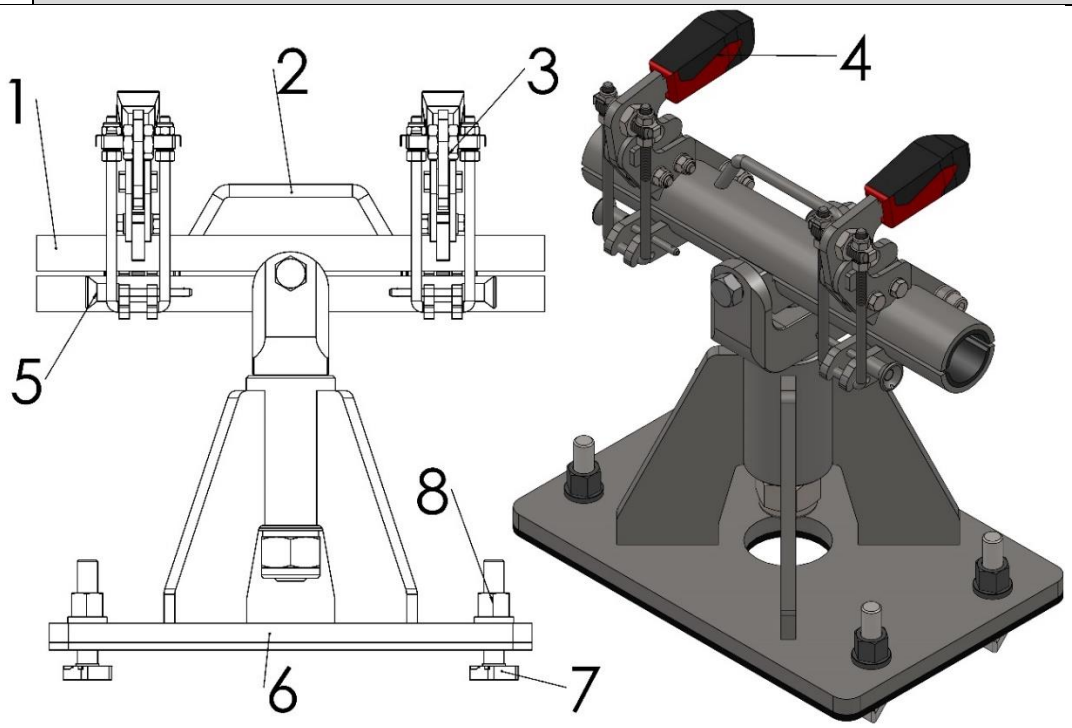

Figure 12: Sliding anchor

[1] Clamping collet (KR) with rubber coating
[2] Carrying handle
[3] latch clamp
[4] Latch clamp handle
[5] Securing pin
[6] base plate of sliding anchor
[7] t-bolt for T-rail (not within the scope of delivery)
[8] nut for T-bolt (not included in the scope of delivery)

4.3.3 Sliding anchor, height adjustable

The height-adjustable sliding anchor is screwed tightly into the T-rails of the test bench floor using T-bolts.

Note	**The tightening torque for the T-bolts:** • M16 ➔ 120Nm • M20 ➔ 120Nm

It has a variable height from 320mm to 480mm (SA05HM) or from 360mm to 520mm (SA05HL).

Installation Height = distance between middle of the clamping collet and the floor of test bench

Note

Maximum allowed inclination of the fixation rod (see Figure 27): 5°
(9cm height difference within 1m horizontal distance between anchor and vehicle).

Anchor installation height	Wheel diameter between
320mm to 480mm	450mm to 950mm
360mm to 520mm	490mm to 990mm

For an accurate horizontal alignment of the fixation rod, use the height adjustable sliding anchor (SA05HM).
When using plug-in anchors: Observe notes from page 20 about plug-in anchors!

The height adjustable sliding anchor can be adjusted in height (5mm elevation difference per rotation) by turning the clamping collet.

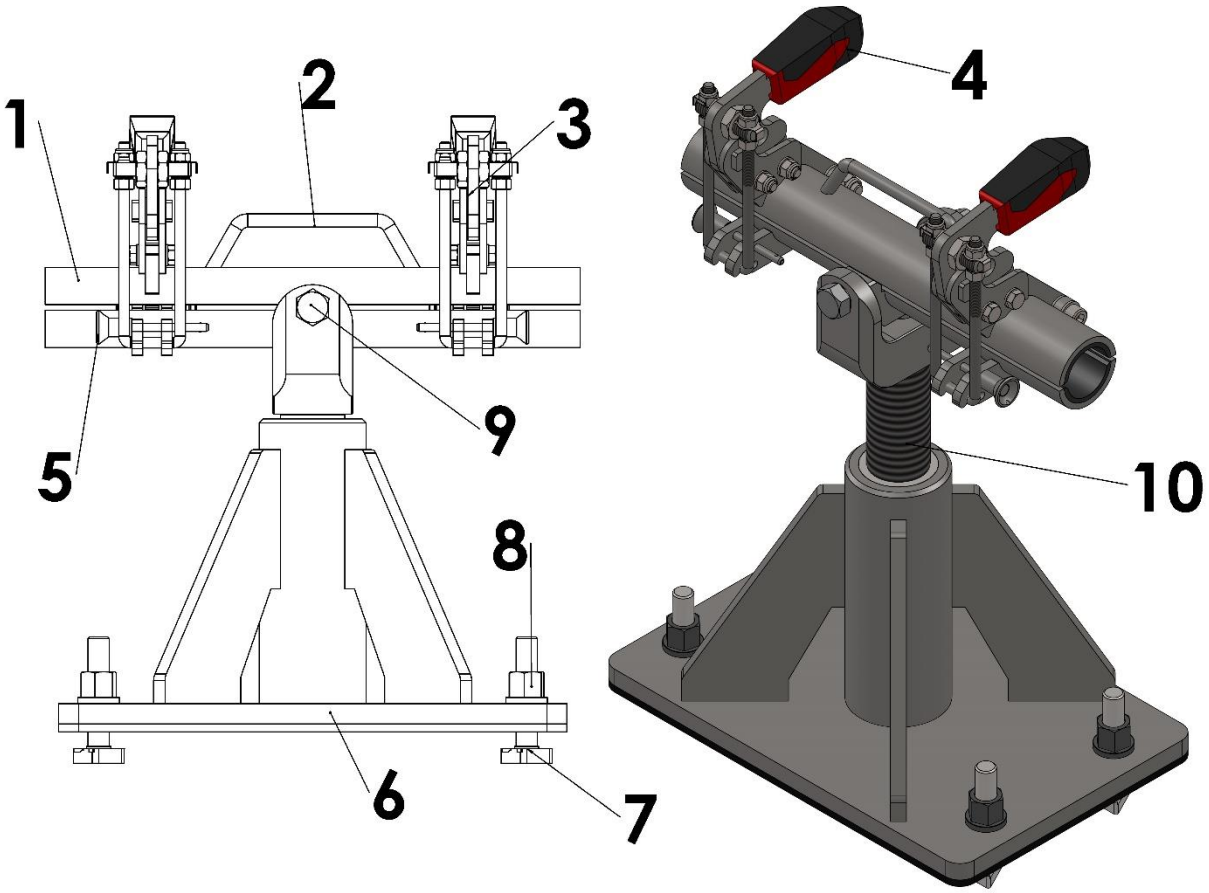

Figure 13: Sliding anchor, height adjustable

[1] Clamping collet (KR) with rubber coating
[2] Carrying handle
[3] latch clamp
[4] Latch clamp handle
[5] Securing pin
[6] base plate of sliding anchor
[7] t-bolt for T-rail (not within the scope of delivery)
[8] nut for T-bolt (not included in the scope of delivery)
[9] connecting screws between clamping device and fork head of anchor base
[10] thread in upper position

4.3.4 Sliding anchor with quick clamps

General notice
The sliding anchor with quick clamps can be ordered with fixed height or adjustable height.

Figure 15: Quick clamps right (red)

Figure 14: Quick clamps left (blue)

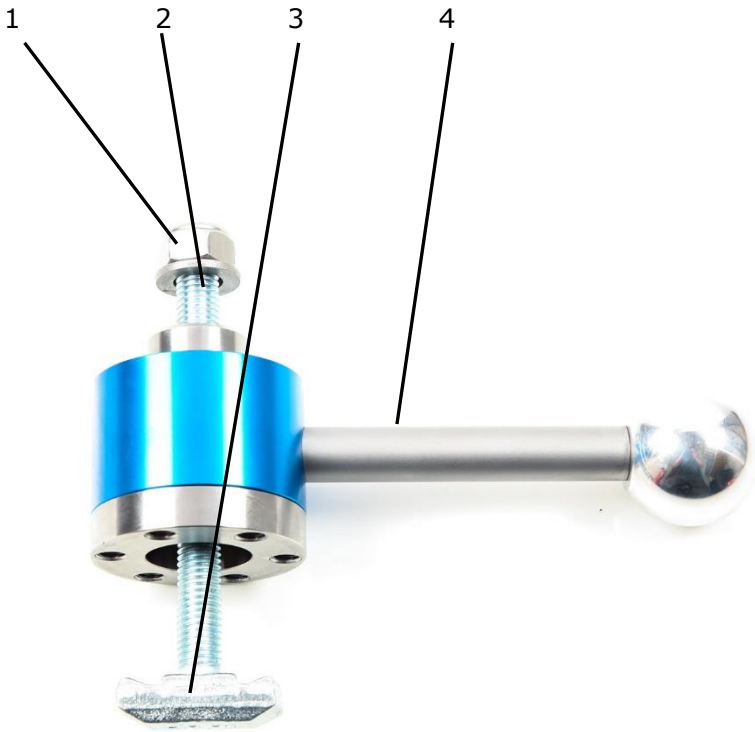

Figure 16: Quick clamp with slide block

[1] stop nut
[2] screw
[3] slide block
[4] quick clamp lever

First installation

1. Insert the sliding anchor into the T-rail.
2. Turn the sliding block at each quick clamp in the T-rail by 90°. The sliding block is in the correct position when it can no longer be lifted out of the T-rail.
3. Position the levers of all 4 quick clamps at right angles to the T-rail.
4. Screw the stop nut on each of the 4 quick clamps down with a torque of 20Nm.

 **Note**	**The tightening torque for the stop nut is 20Nm.**

 **Note**	**A clean and intact T-rail is the prerequisite for the proper functioning of the quick release!** Notches and other damage in the T-rail lead, for example, to the fact that pre-tensioning force of the quick-release clamps is not reliably and reproducibly achieved and thus the necessary holding force of the system may not be guaranteed. **Regularly check the condition of the rail and the tightening torque of the stop nut!**

 **Danger**	**Danger to life and damage to property in the case of improper tightening of the stop nut!** If the stop nuts have not been properly tightened with the right torque at the first installation, the car can break free from the fixation. It is possible that personnel could be killed or injured and property could be damaged.

Release of the sliding anchor

Turn all 4 quick clamp levers by 90° so that they are parallel to the T-rails. See Figure.

Then the sliding anchor can be pushed to the new position on the T-rails or lifted out of the T-rails.

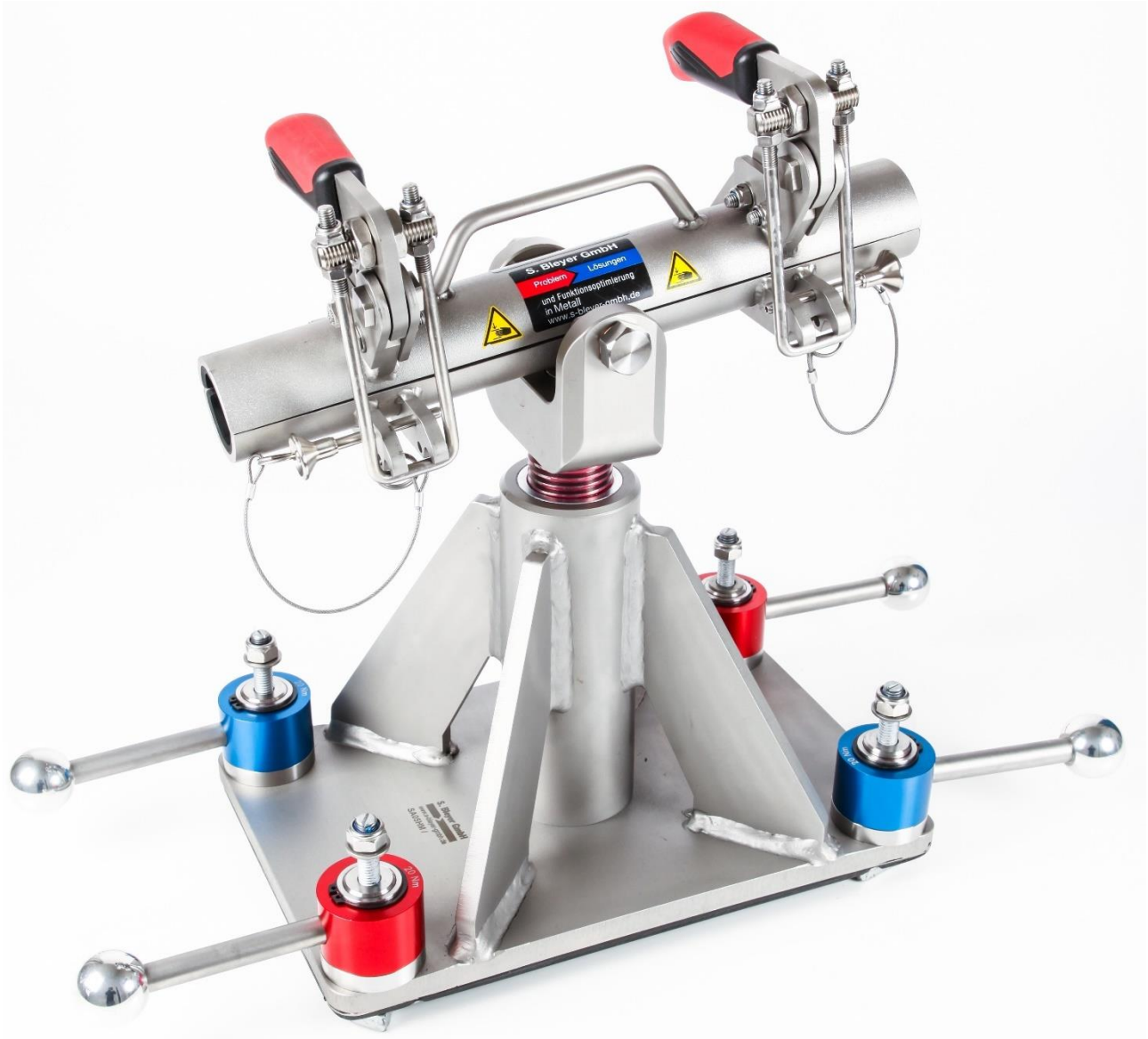

Figure 17: Sliding anchor with quick clamps

Fastening the sliding anchor
Turn all 4 quick clamp levers by 90° so that they are at right angles to the T-rail direction.

Danger	**Danger to life and damage to property in the case of improper tightening of the quick clamps!** If the quick clamps have not been closed to the stipulated end position at 90° to the T-rails, the car can break free from the fixation. It is possible that personnel could be killed or injured and property could be damaged.

4.3.5 Sliding anchor console

Figure 18: Sliding anchor console

The sliding anchor console is used to raise existing sliding anchors.

Installation Height = 100–200mm

Note	The sliding anchor consoles are used to raise existing sliding anchors. The hole pattern of the consoles must therefore correspond to the hole pattern of the sliding anchors to be placed on top. The consoles must not exceed a maximum height of 200mm, otherwise the forces on the T-rails below will become too great. The strength of the T-rails must be ensured on site. The consoles are ideally restrained with long hammerhead screws together with the sliding anchors standing on them. It is not recommended to use the quick-release clamps in combination with consoles. **The height of the consoles can be chosen between 100 and 200mm.**

4.3.6 Plug-in anchor with 320mm with locking pedal

The plug-in anchors 320mm with locking pedal are the lowest standard plug-in anchors available. They are used, for example, in combination with wheel hub fixations or also for connection to the vehicle via hook fixation in the case of deep-seated towing eyes or other connection points.

Overall height = 320mm with locking pedal

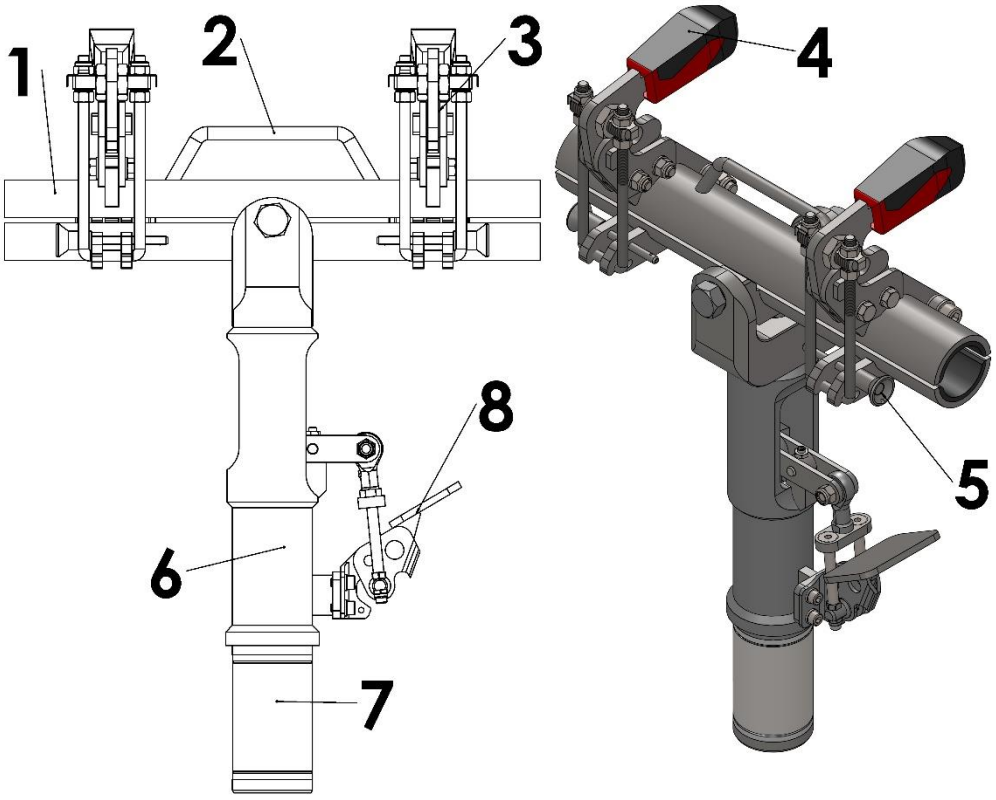

Figure 19: Plug-in anchor with locking pedal

[1] Clamping collet with rubber coating
[2] Carrying handle
[3] latch clamp
[4] Latch clamp handle
[5] Securing pin
[6] Main body of plug-in anchor
[7] Clamping sleeve
[8] Locking pedal

4.4 Fixation bearing

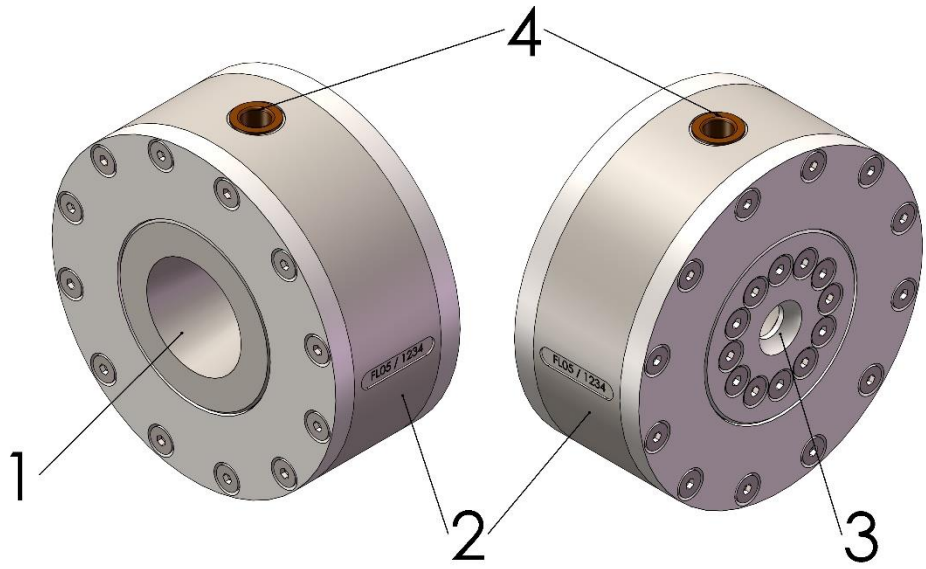

Figure 17: Fixation bearing

[1] connection of adapter cone

[2] Fixation bearing
Rear view (left)
Front view (right)

[3] connection of external wheel bolt RS05

[4] connection of the fixation screw

The fixation bearing is attached to the fork head of the wheel hub rod with two fixation screws. Then it is plugged onto the adapter cone of the wheel rim adapter and tightened with the external wheel bolt.

4.5 Wheel rim adapter

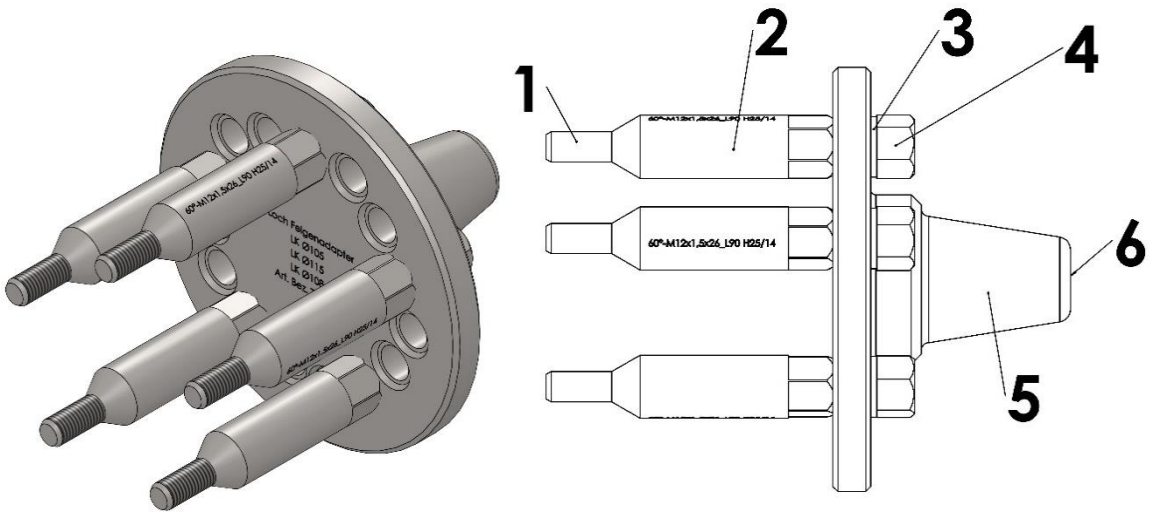

Figure 20: Mounted wheel rim adapter

[1] Thread in rim
[2] Thread adapter
[3] washer
[4] connecting screw
[5] Wheel rim adapter
[6] External wheel bolt RS05 (not visible here)

4.5.1 Variants

Wheel rim adapters can be manufactured in different versions depending on the rims of the test vehicle.

The following parameters can be selected:

- diameter of hole circle (e.g. 100mm, 112mm, 120mm, 145mm)
- pitch (e.g. 3-hole, 4-hole, 5-hole, 6-hole)

Further wheel rim adapters can be manufactured and supplied upon request.

4.6 Central Screw Adapter

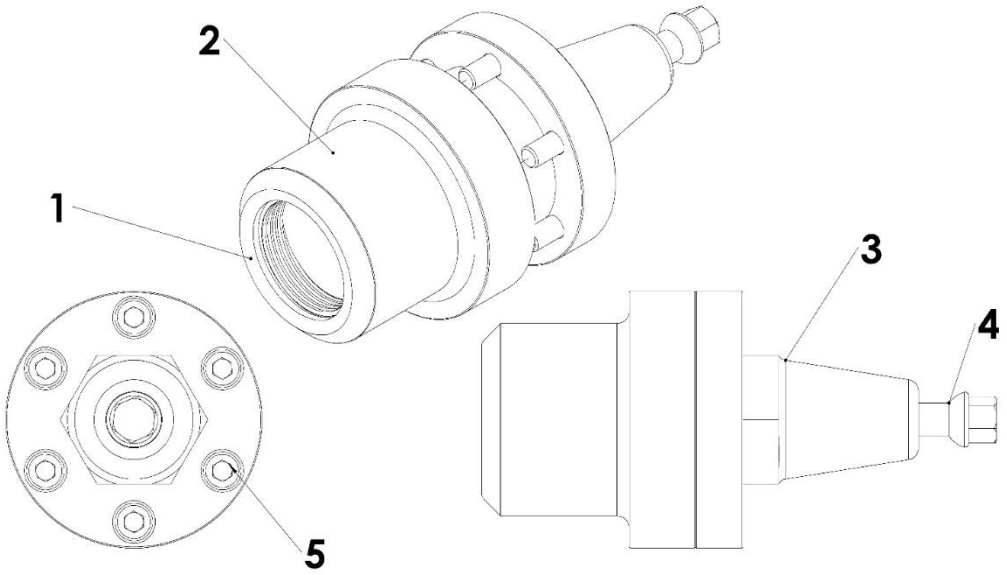

Figure 21: Central Screw Adapter

[1] Replicated thread and shape of the original central screw
[2] Basic adapter
[3] cone adapter for the fixation bearings
[4] External wheel bolt RS05
[5] DIN912 M10×25 connection screw

The central screw adapter enables the fixation of sports vehicles where the rim is held by a central screw or nut.
The central cone adapter is used instead of the thread and rim adapter.
The central screw is reproduced on the rim/hub side and mounted in an identical way. On the cone adapter then, as usual, the fixation bearing is attached.

These adapters must be designed and manufactured individually for each vehicle type. For this purpose, we require samples of the central screw from the customer side or the CAD data.

Note	**Torques:** - Central screw or nut adapter [1]	**- Torque like original part**
	- Connection screws DIN912 M10x25 [5]	**- 55 Nm**

Note

Usage:

1. The vehicle side of the central screw or nut adapter [1] is used like the original part. This includes the torque and the use of any safety device that may be present.
2. If existing: remove mounting support
3. Set up the Cone adapter [3], add the connection screws [5] and tighten them to 55 Nm.
4. The following usage is like the procedure in chapter 5.4.2 and the following pages.

4.7 Thread adapter

The thread adapters guarantee the correct and secure connection of the wheel hub fixation to the vehicle rim. Thread adapters can (and must) be manufactured in different versions depending on the wheel rims of the test vehicle.

The following parameters can be selected:

- shaft length
- thread diameter and length, internal or external thread
- head shape (spherical collar and radius or conical collar and angle)

Note

There are multiple thread adapters to suit different types of vehicles and rims, bolts, and nuts. These differ in internal or external thread, thread diameter, thread length, shaft length and head shape (spherical collar or conical collar). The standard length of the thread adapter without the threaded part is 90mm.

Additional lengths and versions of thread adapters are provided upon request to suit the wheel rim shape of the respective test vehicle.

It is important that the head shape and thread of the thread adapter correspond to the head shape and thread of the original wheel bolt/nut. The clean reproduction and replication of this geometry is an essential prerequisite for clean running of the adaptation on the rim and thus for safe test operation!

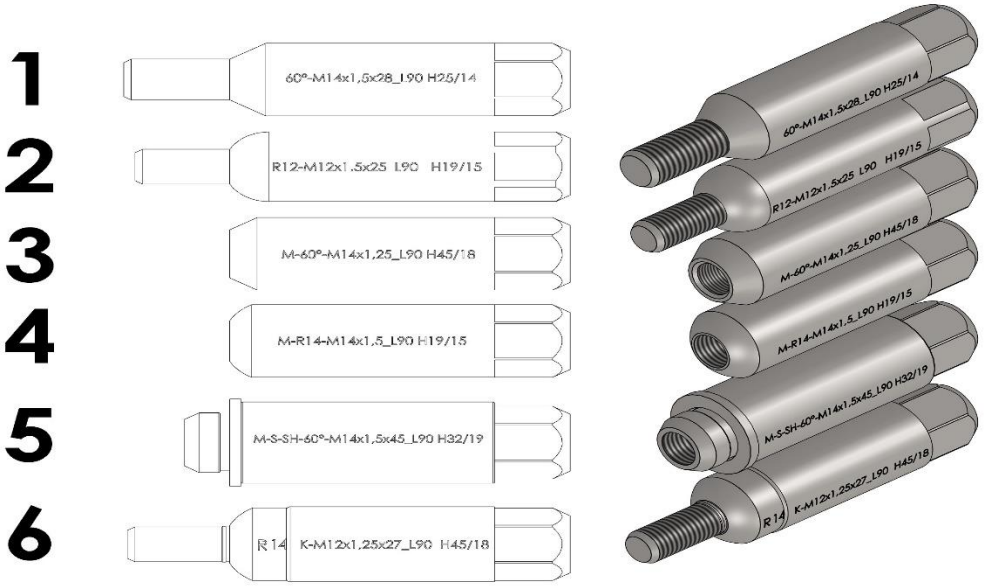

Figure 22: Examples of thread adapters

[1] external thread
Head shape, conical collar
e.g. 60°

[2] internal thread
head shape, spherical collar
e.g. R12, R13, R14

[3] internal thread
Head shape conical collar e.g. 60°

[4] external thread
head shape, spherical collar
e.g. R12, R13, R14

[5] internal thread
Head shape, bolt
Integrated washer

[6] external thread
decoupled head (captive)

5. Mounting of the wheel hub fixation

The wheel hub fixation is mounted on all wheels that are operated/rotated by the vehicle or by the test bench.

5.1 Vehicle on test bench

 **Note**	Before mounting the wheel hub fixation, position the vehicle on the test bench and align it (e.g. with centering device and jogging mode). In doing so, observe the applicable procedural and safety regulations!

 **Warning**	**Risk of injury due to unsecured vehicle during mounting!** In case of single rollers, the vehicle could roll off the crest of the roll, injuring people and causing material damage if it is not secured against slipping or rolling away during mounting. Before mounting the wheel hub fixation, secure vehicle to prevent it slipping or rolling away (handbrake, centering device).
 **Danger**	**Danger of life and material damage through faulty or incorrect components of the wheel hub fixation!** Vehicle breaks loose, killing or injuring people and causing material damage if components of wheel hub fixation are faulty or used incorrectly. ➔ Make sure that the wheel hub fixation is matched to the vehicle to be tested (speed, weight, tractive forces). ➔ Only use thread adapters and rim adapters that are compatible with the vehicle wheel rims and bolts/nuts! ➔ Check latch clamp: These must have a closing torque of at least 25Nm, see also p.53. ➔ Check rubber coating of clamping collet (KR): Must be tight and show no damage (cracks, notches). ➔ Check fixation rods and anchors: Must not be deformed or damaged, must be dry and free of dirt and grease. ➔ Before every test run, visually check all screws that are marked with screw marking lacquer. ➔ Inspection/maintenance of the components according to chapter 7 "Maintenance and cleaning" before each test run.

 **Danger**	**Material damage due to a wider vehicle!** Mounted rim adapter sets with adapter cones protrude from the wheels. The vehicle is wider as a result. ➔ Move vehicle with mounted wheel rim adapters with great caution and care.

Caution

Injuries due to falling components!

The vehicle wheel detaches completely from its mounting and the vehicle tilts, injuring people and causing material damage if all original wheel bolts are removed at once.

➔ Replace the original wheel bolts always only 1-by-1 with the thread adapters!

➔ Never remove all wheel bolts at once!

Caution

Material damage due to incorrect thread adapters!

Incorrect thread adapters (shaft length, thread diameter, thread length, head shape) may break. This can lead to subsequent damage of the wheel hub fixation and the vehicle.

Check existing wheel rim adapter set for proper connection.
If this is not the case, replace the rim adapter set or component parts.

The wheel hub fixation secures the wheels in their preset positions during the test operation. Exceptions to this are the axle height and the toe.
This influences the dynamic behaviour of the chassis and can lead to unusual structural vibrations as well as increased tire abrasion during the test operation. Therefore align the vehicle as precisely as possible on the test bench before attaching the wheel hub fixation.

5.2 Fitting the wheel rim adapter

5.2.1 Wheel rim adapter Overview

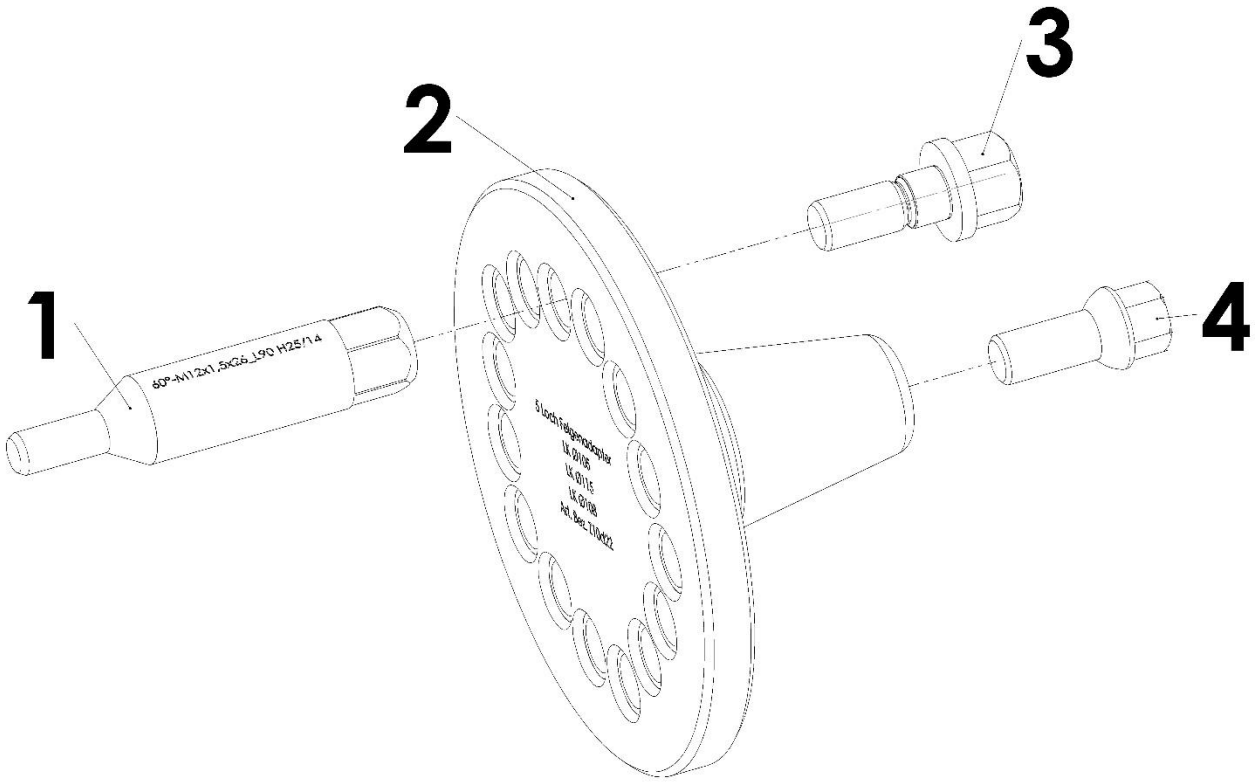

Figure 23: Wheel rim adapter

[1] Thread adapter
[2] non-removable wheel rim adapter with adapter cone
[3] connecting screw with captive washer
[4] External wheel bolt RS05

Note	The hole circle of the wheel rim adapter must correspond to the hole circle of the rim of the test vehicle (number of holes, hole circle diameter). Ensure proper connection.
Note	Ensure that each wheel bolt is replaced sequentially with a thread adapter and tightened with the original tightening torque for the vehicle!

Caution	**Material damage due to a wider vehicle!** Mounted rim adapter sets with adapter cones protrude from the wheels. The vehicle is wider as a result. ➔ Move vehicle with mounted wheel rim adapter sets with great caution and care.

5.2.2 Fitting the wheel rim adapter to the wheel

 **Danger**	**Danger to life due to loose screws during endurance tests!** People may be injured and material damage may occur if bolted connections at the wheel hub fixation loosen during endurance tests. This occurs through increased loads that deviate from normal driving operation. The safe and proper performance of the test operation is thereby impaired. ➔ **In the case of endurance tests check firm connection of all bolted connections at least every 12 hours: thread adapters, connecting screws and both wheel bolts RS05.**

The wheel rim must meet the technical standards regarding alignment and concentricity. The wheel rim adapter set is mounted on every wheel to be secured, in the following steps:

1. On the first wheel (arbitrarily selected), remove one wheel bolt/nut and replace it with an appropriate thread adapter.

 **Note**	The thread adapter must correspond to the screw thread and the head shape (spherical shoulder and Radius or conical collar and angle) of the wheel bolt/nut removed!

2. Tighten thread adapters with correct tightening torque (as original wheel bolt or dependent on the thread dimension)
3. Replace all of the other wheel bolts on the first wheel, step by step with thread adapters.
4. Insert the connecting screws [3] with washers [2] through the wheel rim adapter into the thread adapters [1], (seeFigure 23) and tighten with 120Nm.

Repeat these mounting steps on all wheels to be secured.

 **Note**	**<u>Important:</u>** after mounting the thread adapter and rim adapter unit, the radial and axial run-out of the adapter unit must be checked. Some radial run-out is normal due to tire influence and does not affect strength and testing **(maximum 0.2mm).** Wobbling of the rim adapter unit is not permissible and must be avoided. If, after mounting of the rim adapter unit, a longitudinal or transverse impact of the adapter disc of **0.2mm** is detected on the outside, the cause of this must be determined and eliminated. We will be glad to help you with the analysis of such a problem. → **Please contact us in this case!**

5.3 Connecting the fixation bearing with the wheel hub rod

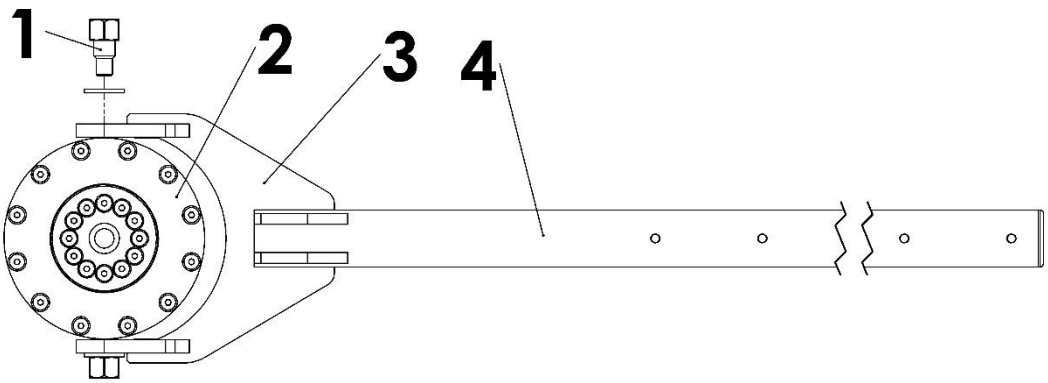

Figure 24: Fixation bearing and wheel hub rod

[1] Fixation screw and spring washer
[2] Fixation bearing
[3] Fork head
[4] Wheel hub rod

1. If the wheel hub rod is already connected to fixation bearing: check for secure connection of the fixation screws (170Nm).

2. Move fixation bearing into position as per Figure 24.

3. Screw one fixation screw and one spring washer each into both screw threads in fork head ends and tighten with 170Nm.

 **Danger**	**Danger of injuries!** Fingers can be crushed because once mounted, the fixation bearing in the fork head can rotate freely. ➔ Do not reach into the fork head, in order to avoid danger of injuries.

5.4 Fixing the first wheel

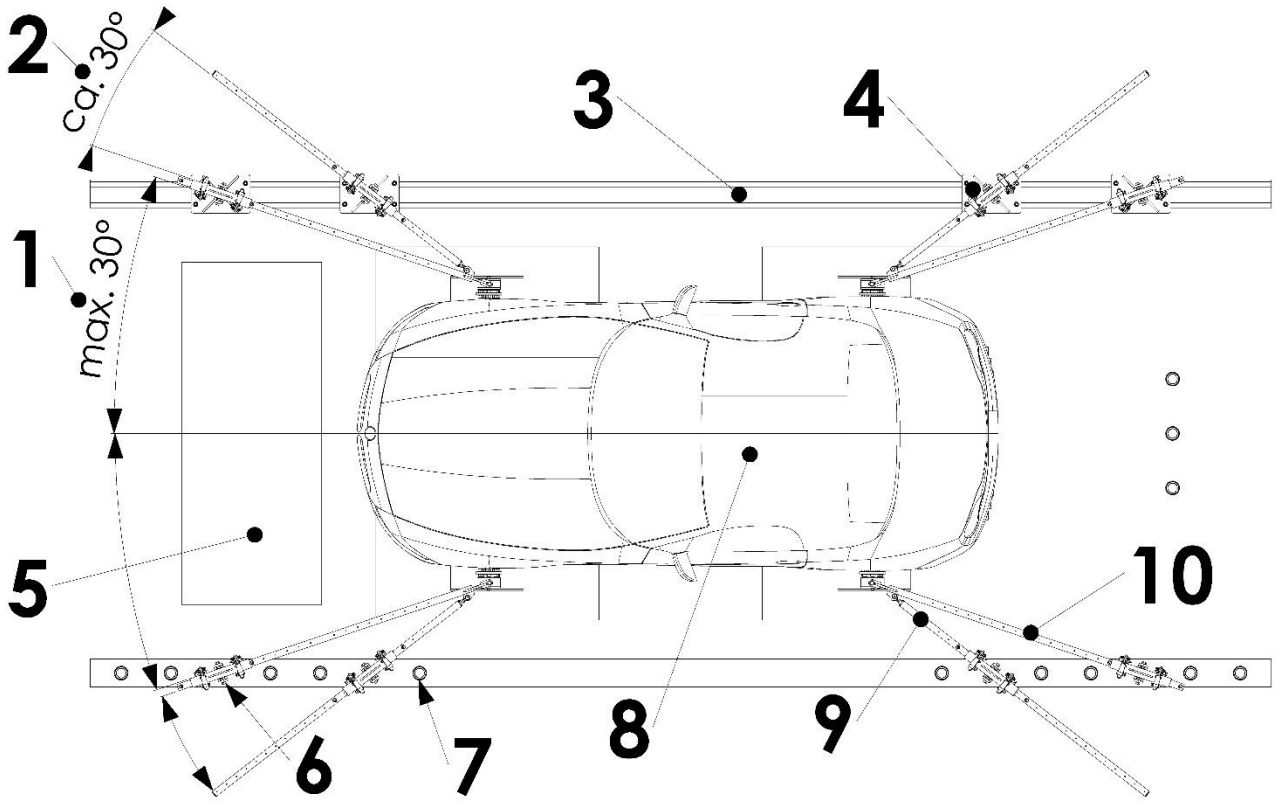

Figure 25: Installation schematic with sliding or plug-in anchors

[1] Wheel hub rod as parallel as possible to the longitudinal axis of the vehicle max. 30°
[2] Diagonal wheel hub rod angle approx. 30°
[3] T-rail
[4] Sliding anchor on T-rail
[5] Driving wind blower
[6] Plug-in anchor in ground socket
[7] additional floor bushing
[8] test vehicle on test bench
[9] diagonal wheel hub rod
[10] Wheel hub rod

Note	Using plug-in anchors: Original floor bushings must be installed. Using sliding anchors: T-rails must be installed. Delivery and mounting upon request.

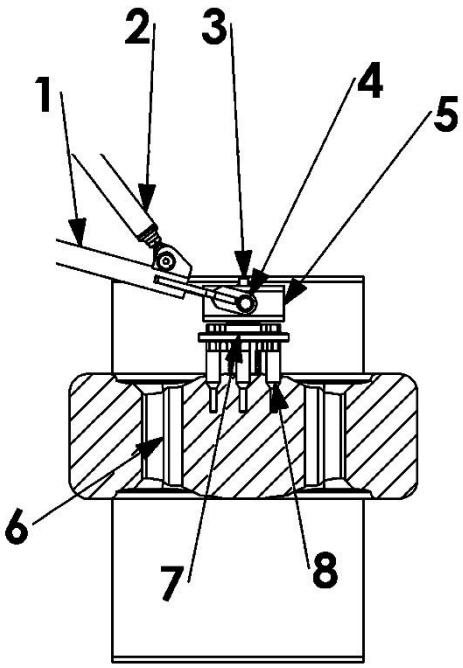

Figure 26: Finished, assembled wheel hub fixation, plan view

[1] Wheel hub rod with fork head
[2] Diagonal wheel hub rod with ball lock pin
[3] External wheel bolt RS05
[4] Fixation screw
[5] Fixation bearing
[6] Wheel rim with tire
[7] Wheel rim adapter
[8] Thread adapter

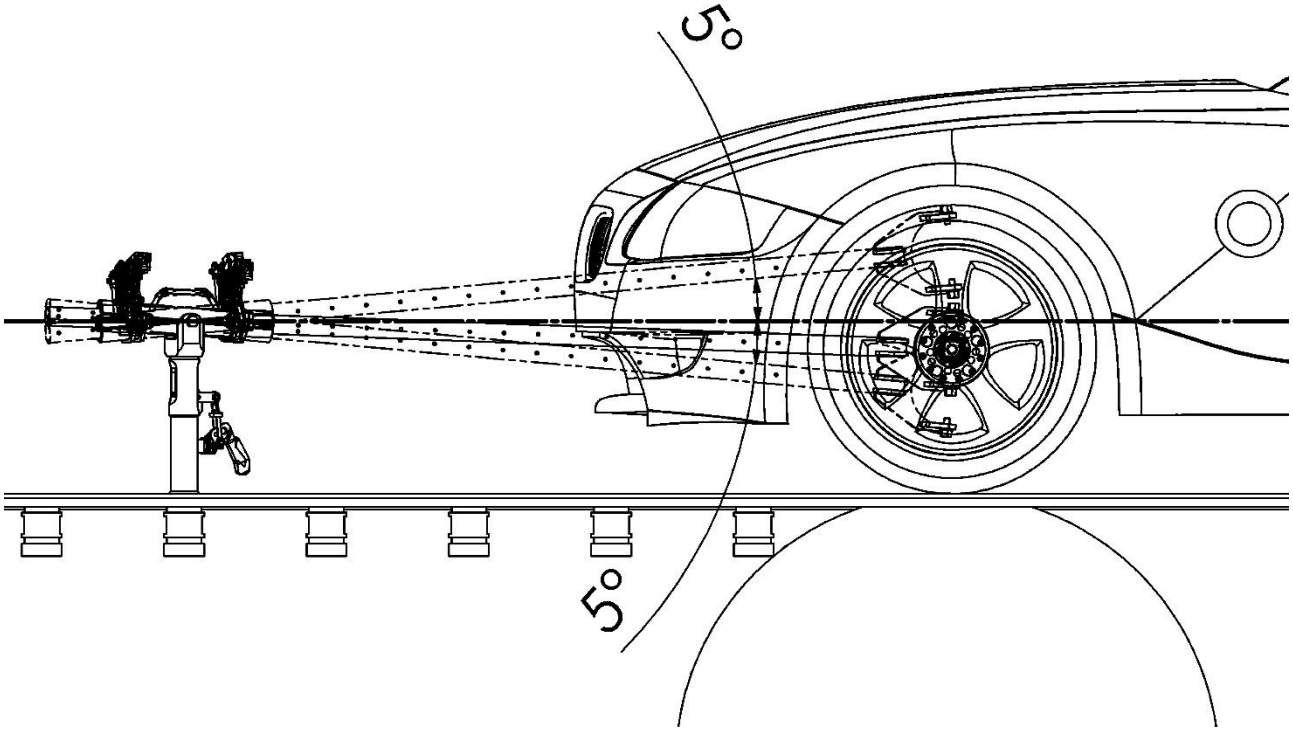

Figure 27: Finished, assembled wheel hub fixation, side view

5.4.1 Positioning the first anchor (for wheel hub rod)

Danger

Danger of injuries at pivoted joint and at clamping collet (KR)!

Fingers could be crushed.

Never reach into the pivoted joint or the joint of the clamping collet (KR) at the anchors!

1. Slide the first sliding anchor into the appropriate position on the T-rail or insert the first plug-in anchor into appropriate floor bushing.
2. Open clamping collet (KR).

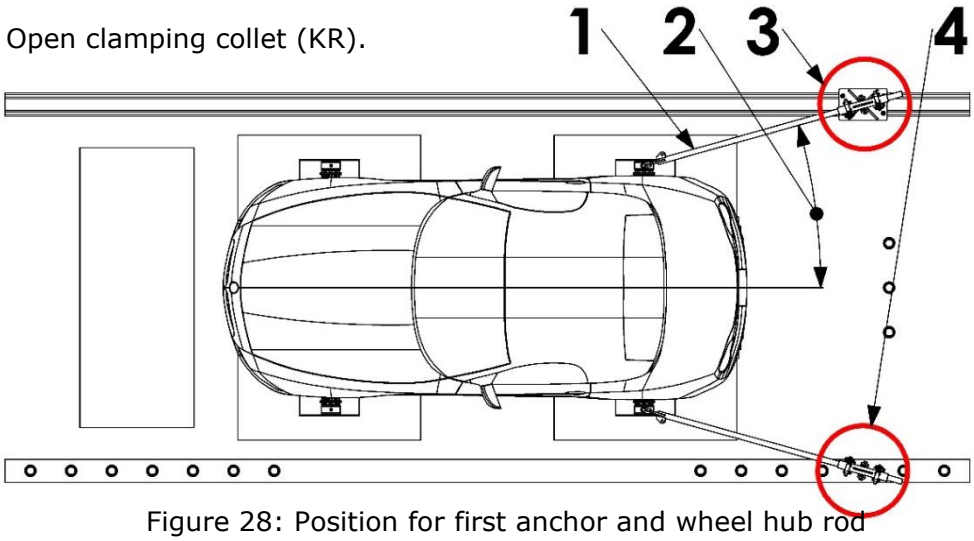

Figure 28: Position for first anchor and wheel hub rod

[1] Wheel hub rod with Fixation bearing
[2] Wheel hub rod as parallel as possible to vehicle longitudinal axis max. 30°
[3] Position for first sliding anchor
[4] Position for first plug-in anchor

Note

Conditions for the **position of first anchor** (circle in **Fehler! Verweisquelle konnte nicht gefunden werden.**):

- The wheel hub rod runs as parallel as possible to longitudinal vehicle axis (max. 30°).
- Distance between anchor and wheel: between 1m and 2m.

On both sides of the clamping collet (KR) the securing pin must fit into the hole of the wheel hub rod (RST).

Note

Maximum allowed inclination of the fixation rod (see Figure 27): 5°
(9cm height difference within 1m horizontal distance between anchor and vehicle).

Anchor installation height	Wheel diameter between
300mm	430mm to 770mm
400mm	630mm to 970mm

For an accurate horizontal alignment of the fixation rod, use the height adjustable sliding anchor (SA05HM).
When using plug-in anchors: Observe notes from page 20 about plug-in anchors!

5.4.2 Connecting the wheel hub rod and the fixation bearing with the adapter cone

Danger	**Danger of injuries at fixation bearing and at fork head!** Fingers could be crushed because the fixation bearing is free to rotate in the fork head! ➔ Do not reach into the fork head.

Danger	**Risk of injury due to slipping of the fixation bearing!** Feet could be injured due to an untightened fixation bearing slipping off. ➔ Hold the fixation bearing securely until wheel bolt RS05 is inserted. Otherwise, the fixation bearing (heavy!) can slip off the adapter cone.

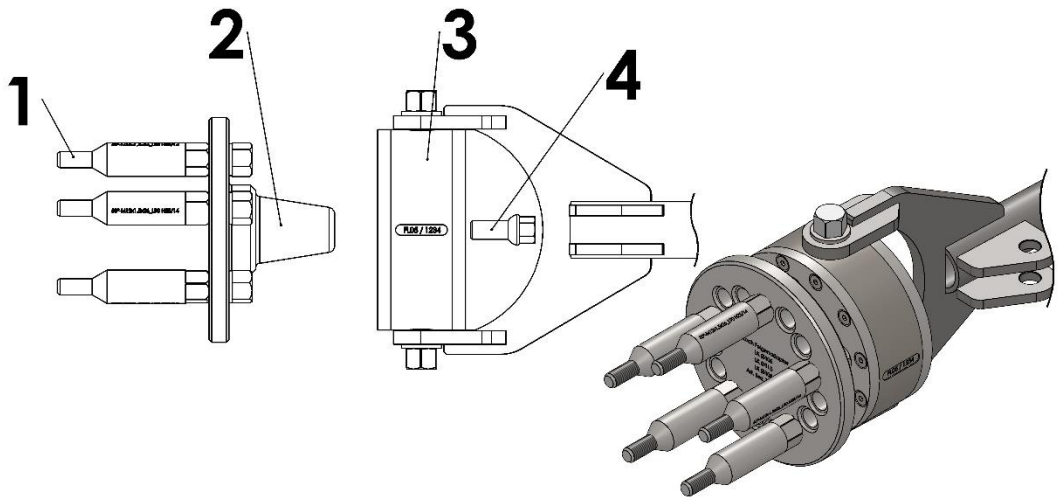

Figure 29: Connect adapter cone and fixation bearing

[1] Wheel rim of the test vehicle
[2] Adapter cone
[3] Fixation bearing at fork head of the Wheel hub rod
[4] External wheel bolt RS05

1. Slide fixation bearing with pre-assembled wheel hub rod onto adapter cone. Free end of wheel hub rod may rest on the floor.

2. Connect the fixation bearing with adapter cone using the external wheel bolt RS05 and tighten with 120Nm.

Note	First eliminate moisture and dirt (dust, oil, grease) from the rubber coating or Fixation rod using a soft cloth and a pH-neutral degreasing agent (all-purpose cleaner) if necessary!

3. Insert wheel hub rod into the open clamping collet (KR).

5.4.3 Positioning the second anchor (for diagonal wheel hub rod)

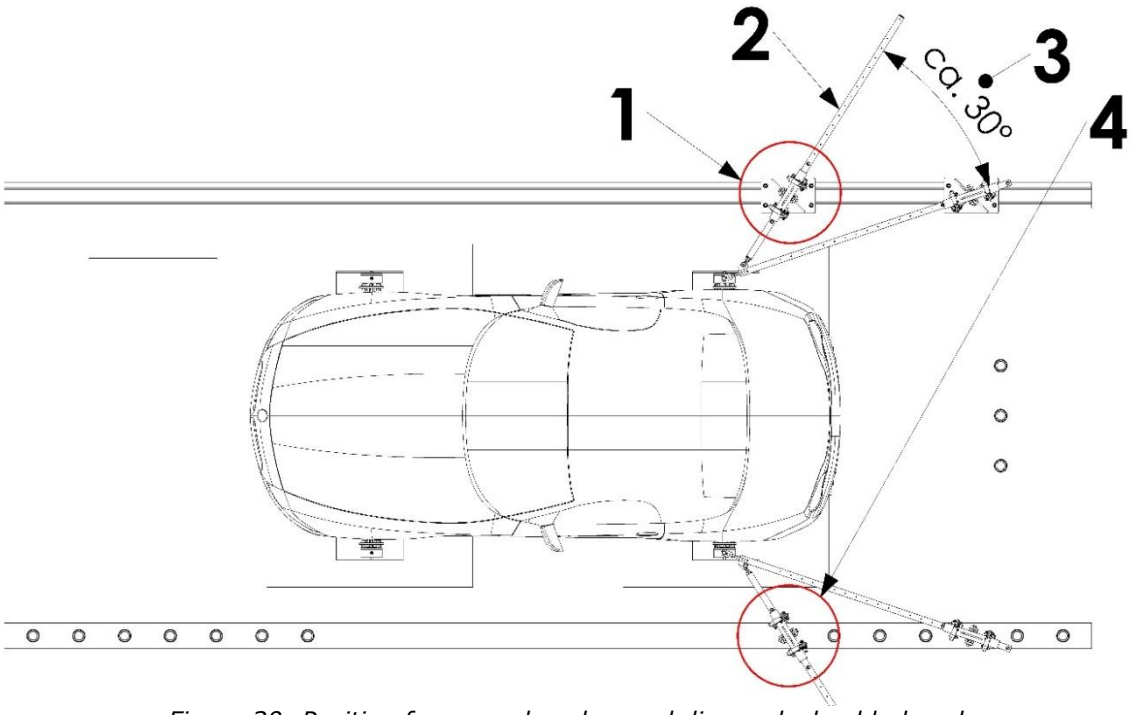

Figure 30: Position for second anchor and diagonal wheel hub rod

[1] Position of the second sliding anchor
[2] Diagonal wheel hub rod with Ball lock pin
[3] Diagonal wheel hub rod angle approx. 30°
[4] Position of the second Plug-in anchor

Note

Conditions for the **position of second anchor** (circle in Figure 30Figure 30):

- Angle between the wheel hub rod and diagonal wheel hub rod shall be approx. 30°.
- Distance between anchor and wheel: between 1m and 2m.
- On both sides of the clamping collet (KR), the securing pin must fit into the hole of the wheel hub rod.

Note

Maximum allowed inclination of the fixation rod (see Figure 27): 5°
(9cm height difference within 1m horizontal distance between anchor and vehicle).

Anchor installation height	Wheel diameter between
300mm	430mm to 770mm
400mm	630mm to 970mm

For an accurate horizontal alignment of the fixation rod, use the height adjustable sliding anchor (SA05HM).
When using plug-in anchors: Observe notes from page 20 about plug-in anchors!

1. Slide second sliding anchor into appropriate position on the T-rails or insert the second plug-in anchor into appropriate floor bushing.

2. Open clamping collet (KR).

5.4.4 Connecting the diagonal wheel hub rod with the wheel hub rod

Note	First eliminate moisture and dirt (dust, oil, grease) from the rubber coating or Fixation rod using a soft cloth and a pH-neutral degreasing agent (all-purpose cleaner) if necessary!

1. Insert the diagonal wheel hub rod into the open clamping collet (KR).
2. Pull the diagonal wheel hub rod at swivel head in direction of fixation bearing.
3. Insert swivel head into docking unit on the wheel hub rod.
4. Insert ball lock pin through docking unit and swivel head to connect both of the rods with each other.

Figure 31: Correctly mounted ball lock pin

5.4.5 Clamping both anchors

1. On both anchors: Close the clamping collet (KR) and lock both locking clamps.

   The closing torque must be at least 25 Nm (see p.53).

2. On both anchors: Insert one locking pin each on both sides of the clamping collet (KR) through the hole in the fixation rod. Locking pins must be as close as possible to the clamping collet (KR).
3. At both anchors (plug-in anchors): Close locking lever to fix anchor in floor bushing by clamping.

   At both anchors (sliding anchor): Tighten all nuts of T-bolts at the base plate of the sliding anchor, as per manufacturer's instructions, to fix anchor onto the T-rails.

The first wheel is now completely fixed.

5.5 Fixing the second wheel

The procedure for the second wheel is identical to the first wheel.
The second wheel is fixing the first axle of the vehicle.

 **Note**	If the dynamometer is not equipped by a centering aid, than a manual centering should be performed. E.g. with the jogging mode.

5.5.1 Rolling in/aligning the test vehicle

One possibility to align the vehicle is the jogging mode, which allows to run the roll with low speed. During that the vehicle can align itself to the driving direction.
Basically the procedure of aligning is a task of the operator.
One common procedure is described below:

1. Release hand brake.
2. Roll in/align the test vehicle in jogging mode
3. Reapply the handbrake so that the test vehicle is secured.
4. Open latch clamps on both anchors and close them again. This allows any tension that may have arisen when during in/aligning to be released.

 **Caution**	When running the vehicle on the roller care should also be taken to ensure that the vehicle does not tend to run to one side or the other after the run-in process is completed. The wheel hub fixation allows small steering movements of the vehicle due to its kinematics. This prevents undesired tensioning of the vehicle steering during the course of the test but requires an explicit fixation of the steering on the part of the operator.

5.6 Fixing the remaining wheels

Fix the remaining wheels in the same way.

After mounting the two fixation triangles, the vehicle is fixed in its position and cannot be further aligned.

Notice

Material damage at wheel hub fixation and vehicle!

Rods can bend and become unusable when fixed vehicle is moved.

The wheel hub, rim or other components on the vehicle may be damaged in the process.

➔ Before every movement of the fixed vehicle (e.g. raising or lowering of the roller) loosen the latch clamps of all anchors.
➔ After this movement of the vehicle, lock the latch clamps of all anchors again.

5.7 Running the driving cycle

Caution

Material damage at wheel hub fixation and vehicle!

Screw connections can become loose if they have not been tightened correctly.

➔ After completely setting up the wheel hub fixation, test-run the vehicle.

➔ Then check all screw connections (e.g. thread adapters, connecting screws, fixation screws) for tight fit and correct tightening torque.

Note

When operating the vehicle with the wheel hub fixation, it is necessary to ensure that the driver permanently controls and, if necessary, stabilizes the steering wheel, as in real road operation, or that it is permanently fastened in place in the case of operating with a driving robot. The steering dynamics of the vehicle generally ensure that a vehicle runs in a straight line autonomously but in the event of disturbances (flat tires, etc.) careful fixation and checking of the steering system must be assured.

Caution

If there are unusually high levels of vibrations on the test vehicle during operation after the wheel hub fixations are fitted, it is recommended to measure the concentricity of the installed wheel rim adapters. As a result of wrong/inappropriate adapters used and/or also manufacturing inaccuracies or wear and tear of the vehicle rims used, misalignment may occur when the wheel hub restraints are fitted, resulting in a wobbling motion of the wheel rim adapters and this in turn can lead to undesired high vehicle excitations and thus vibrations. The manufacturing tolerances of the wheel hub fixation components are around 1/100mm. The concentricity of the wheel hub unit is ca. 0.1mm. The concentricity error of the assembly installed on the vehicle wheel rim should not be more than 0.2mm (measured at the wheel rim adapter in horizontal and sideward direction) for a smooth test run.
With measured values >0.2mm it may be necessary to have the vehicle rims reworked.

6. Disassembling of the wheel hub fixation

6.1 Preparation for disassembly

Warning

Risk of injury due to unsecured vehicle during disassembly!

In case of single rollers, the vehicle could roll off the crest of the roll, injuring people and causing material damage if it is not secured against slipping or rolling away during dismantling.

➔ Before removing the wheel hub fixation, secure the vehicle against slipping or rolling away (centering device, handbrake).

Dismounting of wheel hub fixation in reverse order of mounting.

6.2 Open both anchors

Danger

Danger of injuries at clamping collet (KR) after test run!

Fingers could be crushed during opening of latch clamp if the rod is under mechanical tension after test run and jumps off.

➔ Use appropriate personal protective equipment (gloves).
➔ Open latch clamp carefully.
➔ Hold the fixation rod tight so it cannot jump off.

1. At both anchors (plug-in anchors): Open locking lever to release anchor from the floor bushing.
2. At both anchors (sliding anchor): Loosen all nuts of T-bolts at the base plate of sliding anchor to loosen anchor on T-rails.
3. On both anchors: Remove securing pins from the fixation rod.

Danger

Danger of injuries at clamping collet (KR)!

Fingers could be crushed.

➔ Never reach into the joint of the clamping collet (KR) at the anchors!

4. On both anchors: Loosen both locking clamps and open the clamping collet (KR).

6.3 Dismantling the diagonal wheel hub rod (DRST)

1. Withdraw ball lock pin from docking unit.
2. Remove the diagonal wheel hub rod and store it in accordance with instructions.
3. Close clamping collet (KR) again so that rubber coating is not damaged during transportation or storage.
4. Remove anchor and store it in accordance with instructions.

 **Danger**	**Danger of injuries at pivoted joint!** Fingers could be crushed. Never reach into the pivoted joint at the anchors!

6.4 Dismounting the wheel hub rod (RST)

1. Remove the wheel hub rod from the clamping collet (KR) and place the end of the rod on the floor.
2. Close clamping collet (KR) again so that rubber coating is not damaged during transportation or storage.
3. Remove anchor and store it in accordance with instructions.

6.5 Disassembly of the fixation bearing

 **Danger**	**Risk of injury due to slipping of the fixation bearing!** ➔ Hold the fixation bearing securely as soon as wheel bolt RS05 is removed. Otherwise the fixation bearing can slip from the adapter cone. ➔ The fixation bearing is heavy and can seat tightly.
 **Danger**	**Danger of injuries at fixation bearing and at fork head!** Fingers could be crushed because the fixation bearing is free to rotate in the fork head! ➔ Do not reach into the fork head.

1. Unscrew external wheel bolt RS05 at fixation bearing.
2. Pull off fixation bearing together with the wheel hub rod from the rim adapter cone of the wheel rim adapter set and store in accordance with instructions. In case of a tight fit of the fixation bearing on the rim adapter cone, use a plastic hammer to loosen the bearing fit.

Dismount the remaining fixation triangles in the same way.

6.6 Dismounting the wheel rim adapter

Material damage due to a wider vehicle!

Mounted wheel rim adapters with adapter cones project from the wheels. As a result, the vehicle is wider and can cause property damage when passing by.

➔ Move vehicle with mounted wheel rim adapters with great caution and care.

Risk of adapter cone corrosion!

If the wheel rim adapter sets are not dismounted immediately after the test operation, the adapter cones may corrode.

➔ It is imperative that the adapter cones are protected from humidity!

1. Remove all connecting screws and spring washers at first wheel (arbitrarily selectable).

2. Remove wheel rim adapter including adapter cone - consider its weight whilst doing so!

Injuries due to falling components!

The vehicle wheel detaches completely from its mounting and the vehicle tilts, injuring people and causing material damage if all thread adapters are removed at once.

➔ Replace the thread adapters individually with the original wheel bolts!

➔ Never remove all thread adapters at once!

3. Remove a thread adapter and replace it with an original wheel bolt.
   Tighten original wheel bolt with correct screw torque (as original wheel bolt or in accordance with thread dimensions)

4. Replace all further thread adapters with original wheel bolts on the first wheel, step by step.

Deal with the remaining wheels in the same way.

7. Maintenance and cleaning

7.1 General maintenance notes

Perform the inspections and, if necessary, the maintenance work described here on all components of the wheel hub fixation regularly before each mounting.

This chapter only describes inspection, maintenance and cleaning work that can be performed directly by the operator of the test bench.
Further maintenance jobs must be carried out by specially trained service personnel or by the manufacturer.

Always keep all components of the wheel hub fixation clean and dry and free of grease for mounting and during storage. Always use fixation rods and rubber-coated clamping collets in clean, dry and grease-free condition. Check the height adjustment of the anchors regularly for proper operation; clean & re-grease if necessary.

Screws and nuts that are marked with screw marking lacquer must not be adjusted or re-tightened by the operator.

If the screw marking lacquer is damaged, return the whole anchor to the manufacturer for checking and re-adjustment.

7.2 Maintenance of anchors

7.2.1 Plug-in anchor

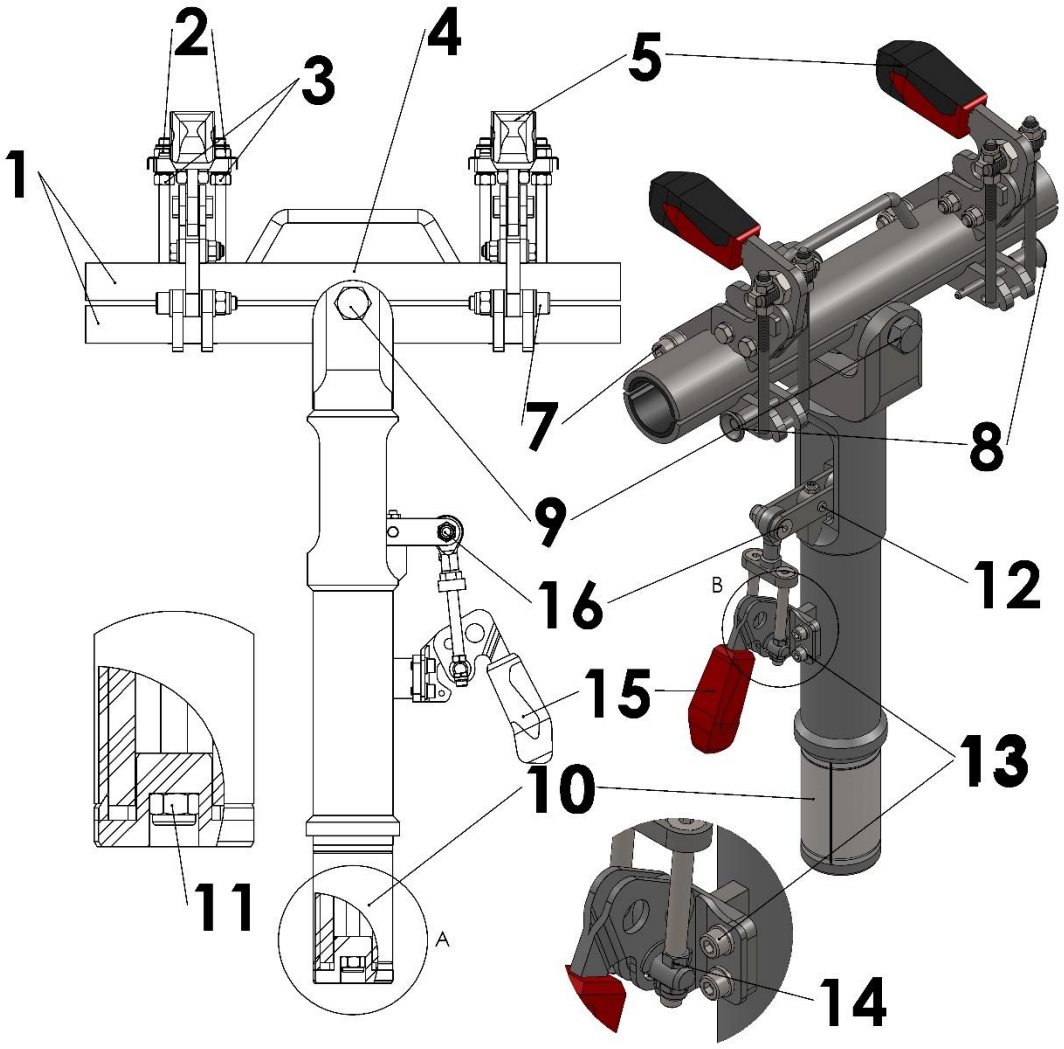

Figure 32: Plug-in anchor maintenance

[1] Clamping collet (KR)
[2] Stop nuts
[3] Nuts
[4] Warning sticker "danger of injuries"
[5] Latch clamp handle
[6] Fastening screws (4×)
[7] Joint screw
[8] Securing pin
[9] Shoulder screw on pivoted joint
[10] Clamping sleeve for floor bushing
[11] Stop nuts for clamping sleeve
[12] Cylindrical pin and screw
[13] Fastening screws (4×)
[14] Nuts and stop nuts (2 pcs.)
[15] Locking lever
[16] Screw for locking lever

Note

The following bolted connections are marked with screw marking lacquer: [12], [13], [14] and [16].

Before mounting always check screw marking lacquer for damage.
Do not rotate the screws or move the nuts out of position!

7.2.2 Sliding anchor

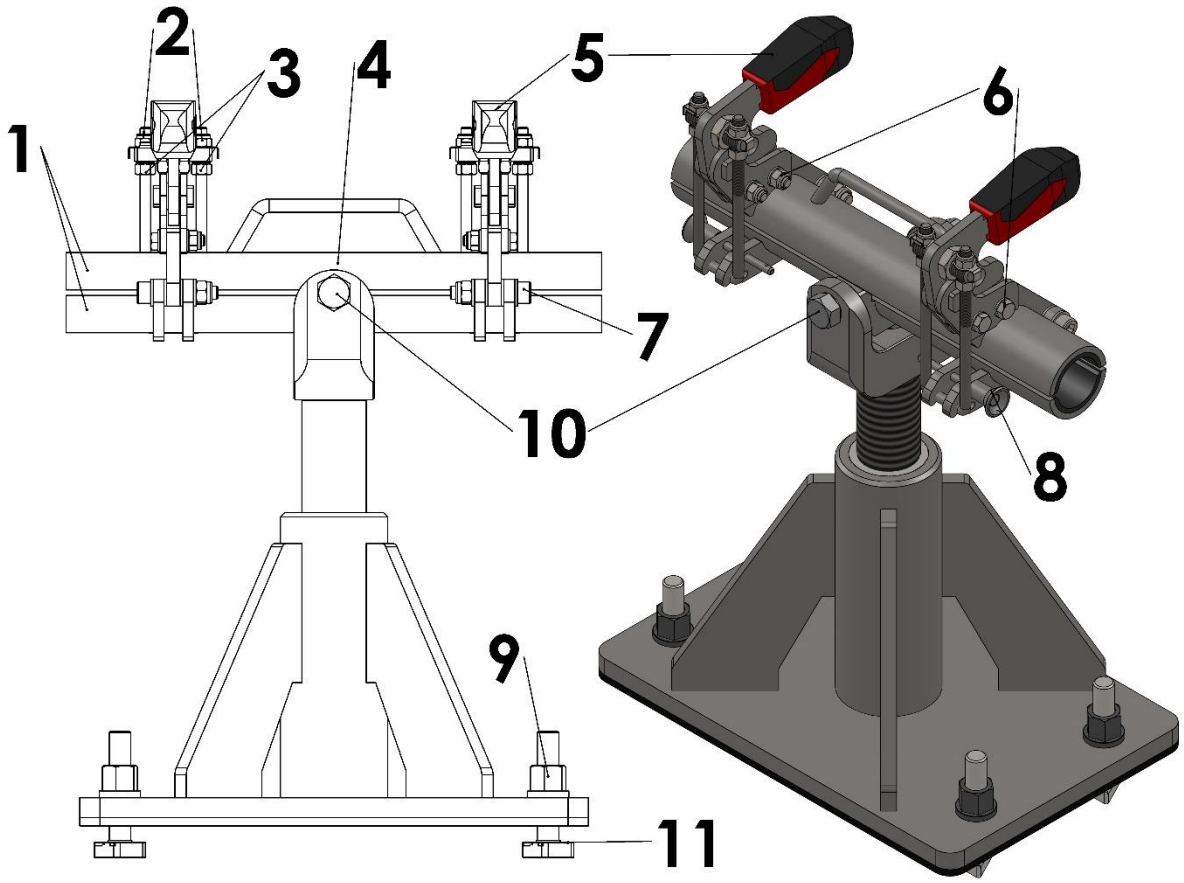

Figure 33: Sliding anchor maintenance

[1] Clamping collet (KR)
[2] Stop nuts
[3] Nuts
[4] Warning sticker "danger of injuries"
[5] Latch clamp handle
[6] Fastening screws (4×)
[7] Joint screw
[8] Securing pin
[9] nuts for T-bolts (not in the scope of delivery)
[10] Shoulder screw on pivoted joint
[11] t-bolt for T-rail (not within the scope of delivery)

7.2.3 Maintenance of individual anchor components

The majority of the components of the plug-in anchors and sliding anchors should be serviced in the same manner. This is described hereafter.

7.2.3.1 Clamping force of the latch clamps

Note	The latch clamps of the anchors must have a closing torque of at least 25Nm to ensure the correct clamping force. This is adjusted via the latch fasteners using nuts and stop nuts. Nuts and stop nuts are secured with screw marking lacquer. Required for adjusting the closing torque: Special adjusting tool (included in the scope of delivery), torque wrench, size 19mm attachment. If the operator cannot adjust the clamping force on their own, return the anchor to the manufacturer for maintenance.

1. Set the torque wrench to 25Nm (SW19)
2. Open latch clamp.
3. Insert adjusting tool.
4. Apply torque wrench and check closing torque. Make sure, a fixation rod is properly positioned inside the clamping collet during this adjustment process.
5. Adjust nuts and stop nuts until the closing torque is at least 25Nm.

   ➔ Compare Figure 34.
6. Replace tab washers and stop nuts with new ones if their functionality can no longer be guaranteed (if they are worn out).

Note	**Ensure that when adjusting a latch clamp the other one is open. This ensures that each latch clamp transfers the correct clamping force.**

Figure 34: Adjusting tool for setting the clamping force

7.2.3.2 Screw and nut connections with screw marking lacquer

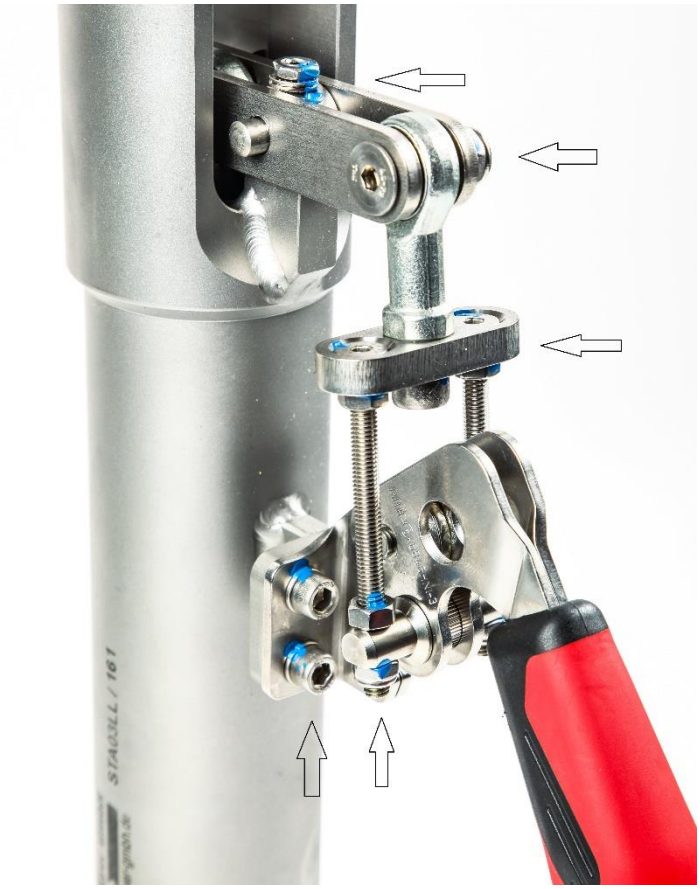

Figure 35: Screw marking lacquer at locking lever

7.2.3.3 Screw marking lacquer

Inspection (defect described)	Maintenance work
Check if screw marking lacquer is damaged at one or more nuts or the marking is no longer aligned (also see Figure 35)	Replace whole anchor.

7.2.3.4 Clamping collet (KR)

Inspection (defect described)	Maintenance work
Check if rubber coating is damaged.	Replace the clamping collet or the whole anchor.
Check if rubber coating is dirty, greasy or moist.	Clean and dry rubber coating. Do not use steam jet cleaning machines or aggressive agents, only water and pH-neutral all-purpose cleaner.
Regularly check rubber hardness	The rubber coating must have a Shore hardness of 62–73. If the rubber hardness becomes too high over time, the clamping force setting loses precision and there is a risk of functional failure. The rubber coating must then be renewed by the manufacturer.
Check for other damages.	Replace the clamping collet or the whole anchor.
Check if warning sticker "danger of injuries" is damaged or missing.	Replace warning sticker "danger of injuries".

7.2.3.5 Securing pins

Inspection (defect described)	Maintenance work
Check if securing pins are missing or damaged.	Replace securing pins.

7.2.3.6 Cylinder pin DIN 7 with securing ring DIN 471 at pivoted joint

Inspection (defect described)	Maintenance work
Check if cylinder pin is missing or incorrectly seated.	Replace whole anchor.

7.2.3.7 Clamping sleeve for floor bushing

Inspection (defect described)	Maintenance work
Check if clamping sleeve is tight despite locking lever being released.	Replace whole anchor.
Check if screw marking lacquer on stop nut is damaged.	Replace whole anchor.

7.2.3.8 Locking lever

Inspection (defect described)	Maintenance work
Check if locking lever is hard to move or does not snap into locking position.	Replace the locking lever, clamping collet, or the whole anchor.
Check if rubber-coated grip plate is missing or loose.	Replace grip plate.

7.2.3.9 T-bolts and nuts for T-rails (not included in the scope of delivery)

Inspection (defect described)	Maintenance work
Check if T-bolts incl. nuts are missing or damaged.	Replace T-bolts incl. nuts.

7.2.3.10 Height adjustment sliding anchor

Inspection (defect described)	Maintenance work
Check if height adjustment is damaged, stiff or no longer adjustable.	If the height adjustment is difficult to move, clean and re-grease the thread. To do this, unscrew the height adjustment to max. height, clean, re-grease (e.g. Mobilith SHC 100 or comparable grease), then screw it all the way in (min. height) and then set to working height again. If necessary, repeat the procedure until smooth running again. If the height adjustment is defective or stuck, replace the anchor and send the defective one to the manufacturer for repair of the height adjustment.

7.3 Maintenance of fixation rods

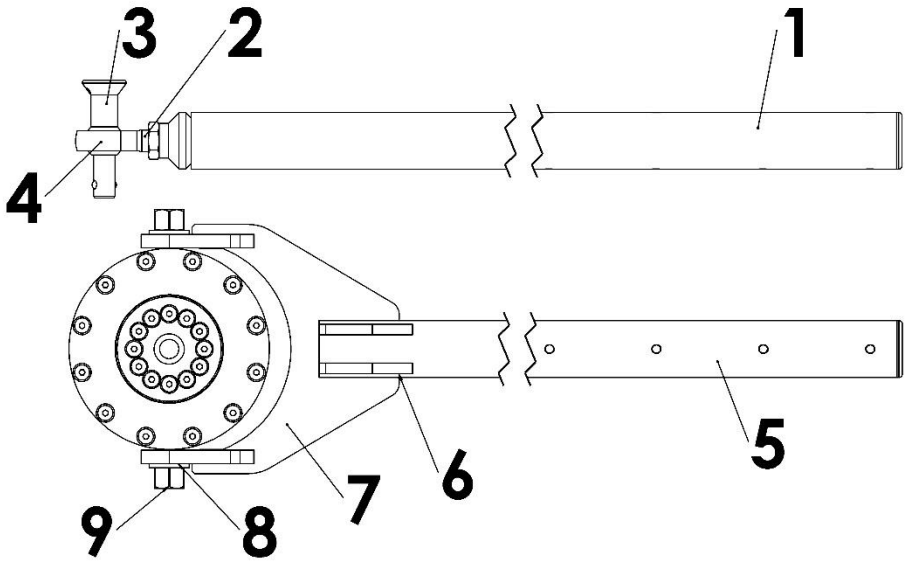

Figure 36: Maintenance of fixation rods

[1] diagonal wheel hub rod
[2] Thread with stop nut
[3] Ball lock pin
[4] Swivel head
[5] Wheel hub rod
[6] Docking unit for diagonal wheel hub rod
[7] Fork head
[8] Spring washer
[9] Fixation screw

Note

Detecting deformed fixation rods:

- Place the fixation rod on a flat surface, e.g. calibration table/surface plate.
- Roll the fixation rod on the surface, the rod head projects beyond table edge.
- Look out for any differences from the longitudinal axis (deformation).
- If largest deviation from the longitudinal axis is more than 10mm, then the fixation rod is deformed beyond its tolerance (danger of buckling).

Do not use deformed fixation rods for safety reasons!

7.3.1 Diagonal wheel hub rod

Carry out visual and functional check before every mounting!

Inspection (defect described)	Maintenance work
Check if the rod is dirty, greasy or moist.	Clean and dry the rod. Do not use steam jet cleaning machines or aggressive agents, only water and pH-neutral all-purpose cleaner.
Check if the rod is damaged or deformed by more than 10mm.	Replace the whole rod.
Check if swivel head is damaged or deformed.	Replace the whole rod.
Check if ball lock pin is missing or deformed.	Replace ball lock pin.

7.3.2 Wheel hub rod

Carry out visual and functional check before every mounting!

Inspection (defect described)	Maintenance work
Check if the rod is dirty, greasy or moist.	Clean and dry the rod. Do not use steam jet cleaning machines or aggressive agents, only water and pH-neutral all-purpose cleaner.
Check if the rod is damaged or deformed by more than 10mm.	Replace the whole rod.
Check if the docking unit for the diagonal wheel hub rod is damaged or deformed.	Replace the whole rod.
Check if fork head is damaged or deformed.	Replace the whole rod.
Check if fixation screws are damaged or loose (if fixation bearing is attached to fork head).	Replace or tighten with 170Nm.

7.4 Maintenance of wheel rim adapter set and the fixation bearing

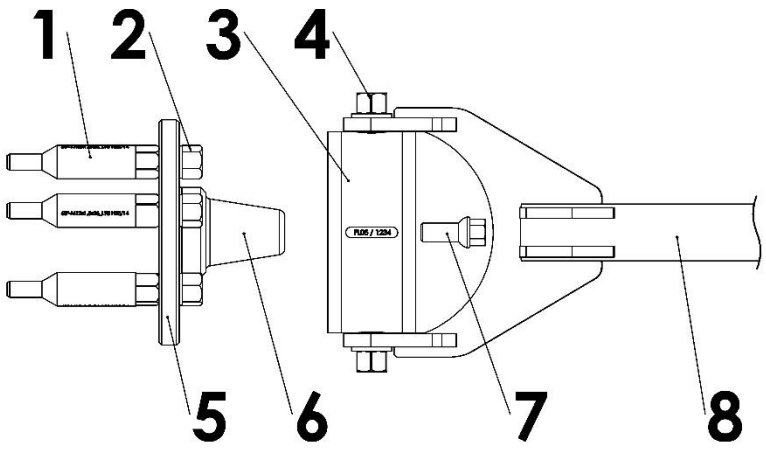

Figure 37: Maintenance of wheel rim adapter and fixation bearing

[1] Thread adapter
[2] connecting screw
[3] Fixation bearing
[4] Fixation screw
[5] Wheel rim adapter
[6] Adapter cone
[7] External wheel bolt RS05
[8] Wheel hub rod

7.4.1 Bolted connections

Before every mounting check all bolted connections for secure connection.

Inspection (defect described)	Maintenance work
Check if screws are damaged or loose.	Tighten or replace. See chapter 335 ff. for tightening torques.

7.4.2 Fixation bearing

 **Note**	Maintenance of the fixation bearing after 15,000 hours of operation or 1 million kilometers, but at least every 3 years. Never service fixation bearings yourself!

Inspection (defect described)	Maintenance work
Check if fixation bearing is dirty or damaged.	Clean externally (wipe off only). Replace complete bearing.
Check if warning sticker "danger of injuries" is damaged or missing.	Replace warning sticker.
Acoustically check fixation bearing for bearing condition.	e.g. stethoscope or bearing condition diagnosis

7.4.3 Wheel rim adapter

Carry out visual and functional check before every mounting!

Inspection (defect described)	Maintenance work
Check if wheel rim adapter is damaged.	Replace wheel rim adapter.

7.4.4 Adapter cone

Carry out visual and functional check before every mounting!

Inspection (defect described)	Maintenance work
Check if adapter cone is dirty or greasy.	Clean adapter cone. Do not use steam jet cleaning machines or aggressive agents, only water and pH-neutral all-purpose cleaner.
Check if adapter cone is damaged.	Replace adapter cone or non-removable wheel rim adapter set.

7.5 Cleaning

Always keep the wheel hub fixation clean and dry. This guarantees operational safety and fault-free long-term functional capability of the wheel hub fixation as well as of the test bench.

 **Note**	Wipe the wheel hub fixation periodically with a soft, lint-free cleaning cloth. Only use water and a pH-neutral all-purpose cleaner. After cleaning, wipe off remaining moisture thoroughly or allow to dry. *Do not* use steam jet cleaning machines, high-pressure cleaning equipment or chemically aggressive agents to clean the components of the wheel hub fixation!

8. Transportation and storage

Danger

Danger of injuries at pivoted joint and at clamping collet (KR)!

Fingers could be crushed.

➔ Never reach into the pivoted joint or the joint of the clamping collet (KR) at the anchors!

Caution

Material damage caused by untrained personnel!

The wheel hub fixation, the body of the vehicle, the test bench or equipment of the test cell will be damaged if an accident occurs due to untrained personnel.

➔ Selection, mounting, dismounting, maintenance and cleaning, transportation and storage of the wheel hub fixation requires expert knowledge and must be performed only by trained personnel.

➔ Transportation only with suitable transport equipment.

Caution

Risk of injury and risk of material damage due to falling rods!

People can suffer head or limb injuries from falling rods. Material damage can occur.

➔ Secure the rods to prevent them falling if they are stored upright.

Note

Avoid impacts and shocks during transportation and storage!

In particular, the rubber coating of the clamping collet (KR) must not be damaged! Therefore, only transport the anchor with the clamping collet (KR) closed.

Store the wheel hub fixation in weather-protected, clean and dry rooms! Ensure low fluctuation of temperature because otherwise the components are prone to accelerated aging.

The packaging is only provided for shipping and not for storage!

9. Replacement parts and accessories

Replacement part/accessory part	Order number
Standard Thread Adapter (Wheel Bolt)	500-GA-RS
Standard Thread Adapter (Wheel nut)	500-GA-RM
Thread adapter decoupled cone	500-GA-EK
Thread adapter with washer	500-GA-S
Connecting screw and washer	500 108 VS05
Rim adapter (bolt circle upon request)	FA05K-
External wheel bolt	500 107 RS05
Fixation bearing	507 001 FL05
Fixation screw and spring washer	500 109 FS05
Wheel hub rod with fork head (RST)	506 001 RST05
Diagonal wheel hub rod with swivel head (DRST)	506 002 DRST05
User Manual Wheel Hub Fixation	SBHF17-84
Wall panel set wheel hub fixation (1 set = 3 panels)	SBHF17-85
Circular spirit level 5°	700-DL
Sliding anchor, fixing height 300mm	300 003 SA03
Sliding anchor with quick clamps, fixing height 300mm	300 003 SA03+S
Sliding anchor long, fixing height 400mm	300 018 SA03L
Sliding anchor with quick clamps, fixing height 400mm	300 018 SA03L+S
Sliding anchor extra long, fixing height 500mm	300 041 SA03LL
Plug-in anchor, fixing height 320mm with locking pedal	300 000 STA03
Plug-in anchor long, fixing height 400mm	300 002 STA03L
Plug-in anchor extra long, fixing height 500mm	300 025 STA03LL
Transport trolley for sliding/plug-in anchors	700120
T-socket wrench SW 24mm	700-T-S
Floor bushing for plug-in anchor	BB03
Hammer head bolts + High nuts	300 050 HS + HM
Hammer head bolts + High nuts for sliding anchor console	700-SAK-HS+HM
Sliding anchor console	700-SAK-SA
Rod holder for 2 rods	700102
Rod holder for 3 rods	700103
Rod holder for 4 rods	700110
Rod holder for 5 rods	700104
Rod holder for 2 rods incl. 1 bearing bracket	700106
Rod holder for 4 rods incl. 2 bearing brackets	700107
U-bolt tensioner on clamping collet (KR12)	SBHF17-04

Replacement part/accessory part	Order number
Locking lever on the plug-in anchor	SBHF17-05
Handle shell replacement for bow clamp on clamping collet (KR12)	SBHF17-06
Handle shell replacement for locking lever	SBHF17-07
U-bolt replacement on the U-bolt tensioner	SBHF17-08
Retaining rope with fastening ring and screw-on eyelet	SBHF17-15
Retaining rope with 2 key rings	SBHF17-16
Securing pin	SBHF17-18
Locking bolt	SBHF17-19
Ball lock pin	SBHF17-20
Dowel pin for clamping collet KR12	SBHF17-26
Dowel pin for base body of plug-in anchors	SBHF17-27
Tube end caps for vehicle fixation rods	SBHF17-38
Clamping collet KR03 or KR12 (with all components)	SBHF17-46
Clamping collet KR03 or KR12 without attachments	SBHF17-48
Renewal of rubber coating on clamping collet KR03/KR12	SBHF17-50
Warning sticker “danger of injuries”	SBHF17-02
Threaded spindle M48	SBHF17-52
Fork head	SBHF17-53
Stop plate	SBHF17-58
Hammerhead screw for quick release M12	SBHF17-65
Quick clamps right (red)	SBHF17-69
Quick clamps left (blue)	SBHF17-70
Locking pedal for plug-in anchor	SBHF17-71
Torque wrench 25Nm	SBHF17-91
Adjustment tool for clamping force 25Nm	SBHF17-96

Danger

Safety warning!

For safety reasons, the vehicle fixation devices from S. Bleyer GmbH may only be used as a complete unit.

Mixing with components from other manufacturers is not permitted.

10. Technical information

10.1 Vehicle and testing parameters

Permissible vehicle mass	max. 3,500kg
Permissible axle weight	max. 2,000kg
Permissible acceleration/braking deceleration	max. 10.0m/s²
Permissible tractive force	max. 35,000N
Kick-down	permitted
Full braking	permitted
Anchor height	300mm up to 400mm
Permissible speed	max. 300km/h
Wheel rim diameter of the vehicle	10-inch to 22-inch
Distance between vehicle and plug-in anchor or sliding anchor	min. 1.0m max. 2.0m
Temperature range	-40°C to +60°C

10.2 Fixation rods

10.2.1 Wheel hub rod

Length of rod without fork head	2,000 or 2,500mm
Length of fork head	135mm
Mass	Approx. 9.5kg

10.2.2 Diagonal wheel hub rod

Length of rod without swivel head	2,000mm
Length of swivel head	70mm
Mass	Approx. 7.5kg

10.3 Anchors

Installation Height = distance between middle of the clamping collet and the floor of test bench

Length of clamping collet (KR) (same for all anchors)	400mm

10.3.1 Plug-in anchor

Plug-in anchor with locking pedal (STA18)	
Overall height with locking pedal	320mm
Mass	Approx. 15kg

Long plug-in anchor (STA14L)	
Installation Height	400mm
Mass	Approx. 16kg

Extra long plug-in anchor (STA14LL)	
Installation Height	500mm
Mass	Approx. 17kg

10.3.2 Sliding anchor

Dimensions of base plate	250mm × 380mm or per customer's wishes
Axis dimension of holes for T-rails	120mm or per customer's wishes
Diameter of drill holes for T-rails	for M16 hammer-head screw or as desired

Sliding anchor (SA03)	
Installation Height	300mm
Mass	Approx. 18kg

Long sliding anchor (SA03L)	
Installation Height	400mm
Mass	Approx. 20kg

Extra long sliding anchor (SA03LL)	
Installation Height	500mm
Mass	Approx. 22kg

Height adjustable standard sliding anchor (SA05HM)	
Installation Height	320–480mm
Height difference per rotation	5mm
Mass	Approx. 31kg

Height adjustable sliding anchor (SA05HL)	
Installation Height	360–520mm
Height difference per rotation	5mm
Mass	Approx. 32kg

10.3.3 Sliding anchor console (700-SAK-SA)

Installation Height	100–200mm
Mass	15kg

10.4 Wheel rim adapter and fixation bearing

10.4.1 Thread adapter

Shaft length, thread diameter, thread length, head shape	matched to wheel rim shape of the respective test vehicle
Screw quality	8.8
Screw tightening torque	See Chapter 5 ff.

10.4.2 Wheel rim adapter

External diameter	Matched to wheel rim size and hole circle diameter of the respective test vehicle
Number of drill holes for connecting screws	Matched to wheel rim of the respective test vehicle
Mass	Approx. 3.5kg

10.4.3 Fixation bearing

Mass	Approx. 7.5kg
Drill hole for temperature measuring sensor optional	Position and diameter of drill hole depending on the desired temperature sensor

11. Declaration of conformity

S. Bleyer GmbH

www.s-bleyer-gmbh.de

Declaration of Conformity

according to the European Machine Directive 2006/42/EC, Annex II A

We,

S. Bleyer GmbH
Steinbeisstraße 20
73614 Schorndorf

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Fax: +49 (0)7181 9327-27

herewith declare

that the equipment manufactured by us

- ***Hook Fixation / Wheel Hub Fixation***
- *Function: Vehicle fixation on Chassis Dynamometers*

complies with the requirements of the EC Machinery Directive 2006/42/EC.

Note: the equipment will be delivered with a user manual that contains important instructions for the intended use, possible limitations of use, assembly, mounting, operation and maintenance as well as important safety instructions that must strictly be followed!

Name of person or organization which is authorized at **S. Bleyer GmbH** to compile and make available the technical file:

- Stefan Bleyer / Managing Director

Schorndorf, 27.04.17
Place, Date

Signature

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Steuer-Nr.: 82120/43532
USt-Id-Nr.: DE 814464233
Registergericht Stuttgart HRB 282215
Gedruckt auf 100% Altpapier

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