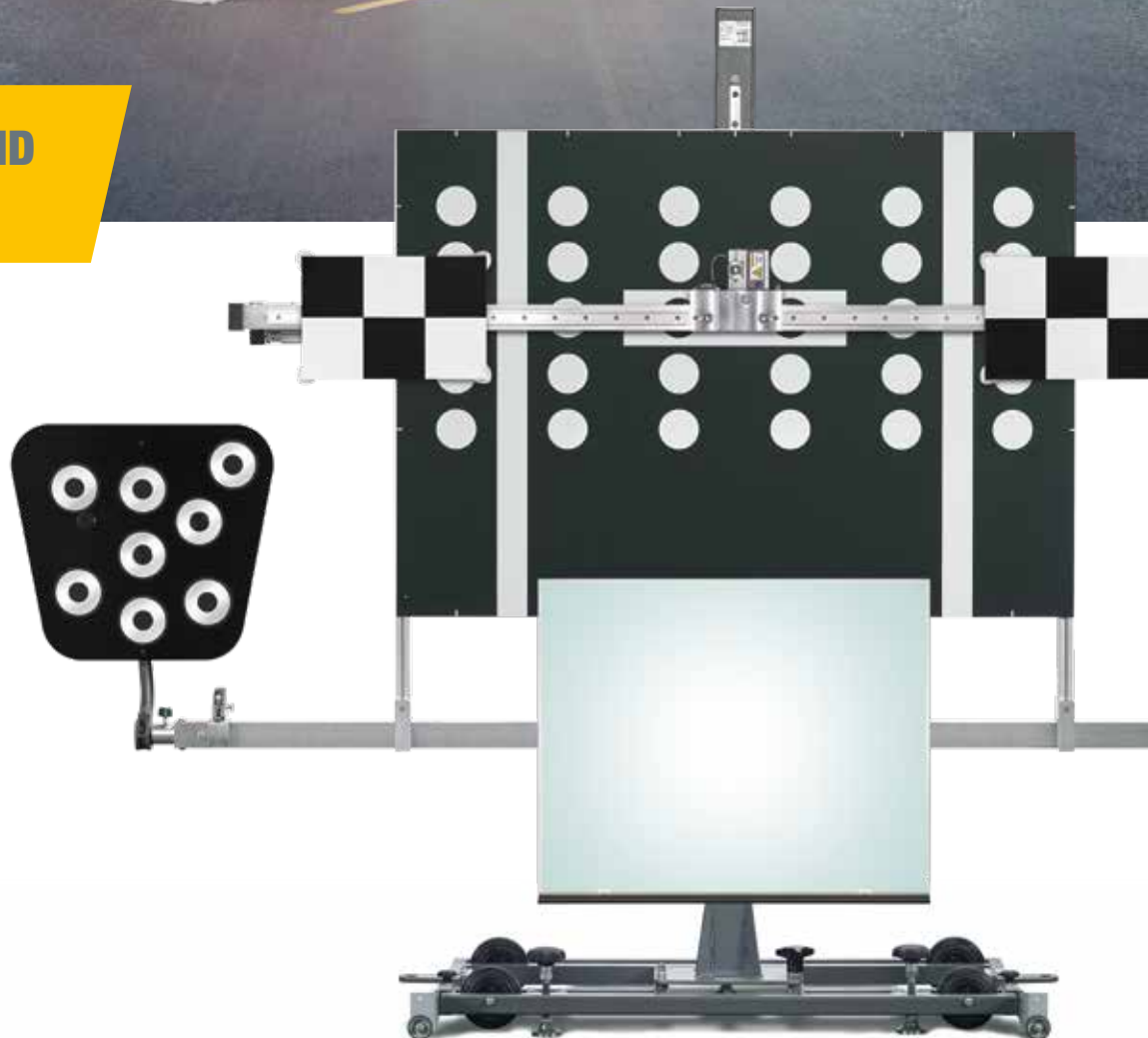


# DAS ADJUSTMENT

COMBINED WITH WHEEL ALIGNMENT  
AND RUNOUT COMPENSATION



WITH MULTI-BRAND  
ADJUSTMENT



# Adjustment of driver assistance systems (DAS) combined with wheel alignment



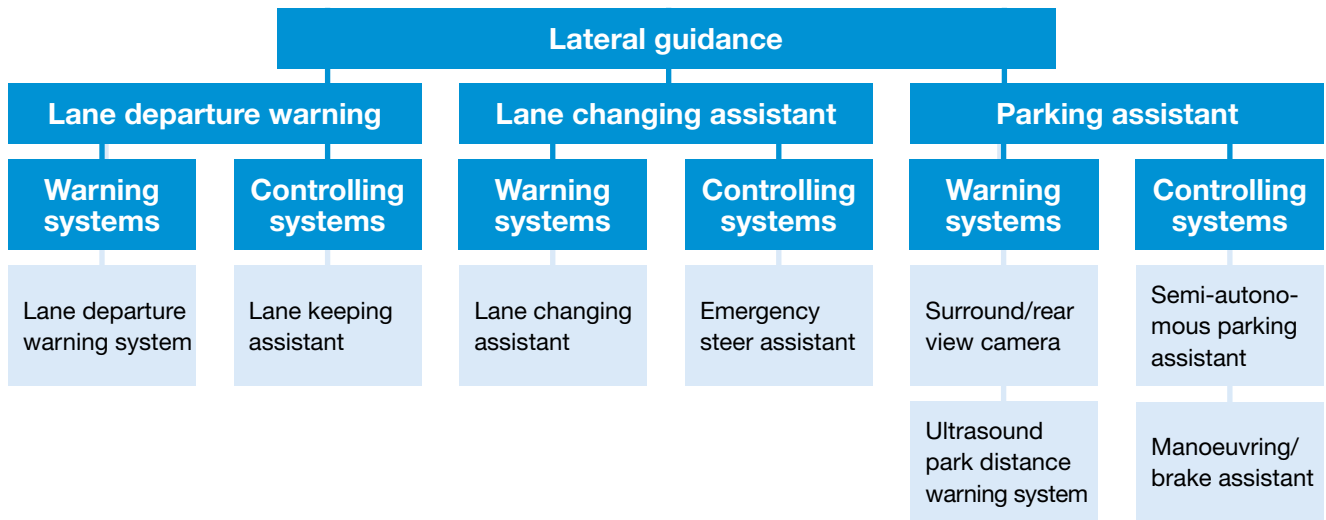
- WITH RUNOUT COMPENSATION
- ORIENTATION TOWARDS THE GEOMETRIC DRIVING AXIS
- WITH ROLL ANGLE ADJUSTMENT



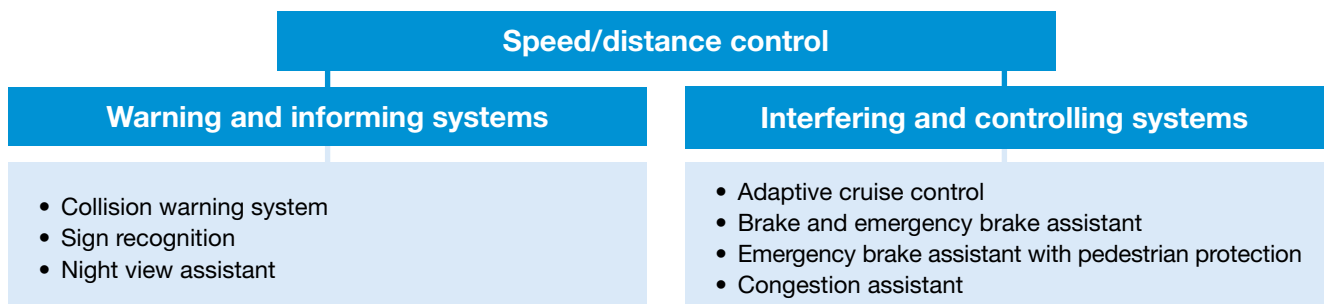
#### **Beissbarth DAS adjustment for independent and brand workshops**

- BBFAS 1000** Manufacturer-compliant calibration for Volkswagen Group vehicles (camera and radar)
- BBFAS 1410** Calibration beam for BBFAS 1000 retrofitting (multi-brand calibration)
- BBFAS 1415** Calibration beam laser upgrade for the alignment towards the symmetrical axis
- BBFAS 415** Stand-alone camera calibration solution

# DAS functions: speed, distance and lateral control

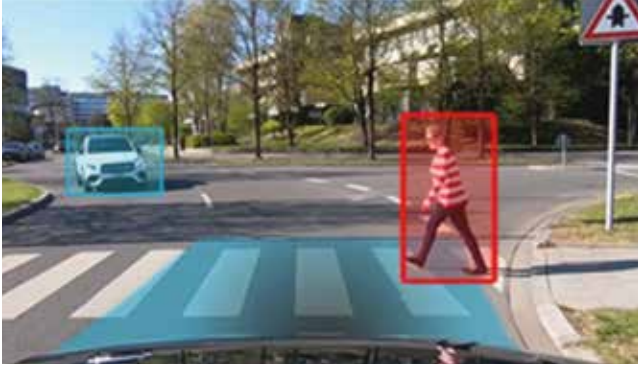


## Front cameras and radar sensors provide DAS with data about the area in front of the vehicle



# Safety for all road users

Correct: vehicle and dangerous situation spotted



Error: neither vehicle nor pedestrian were detected

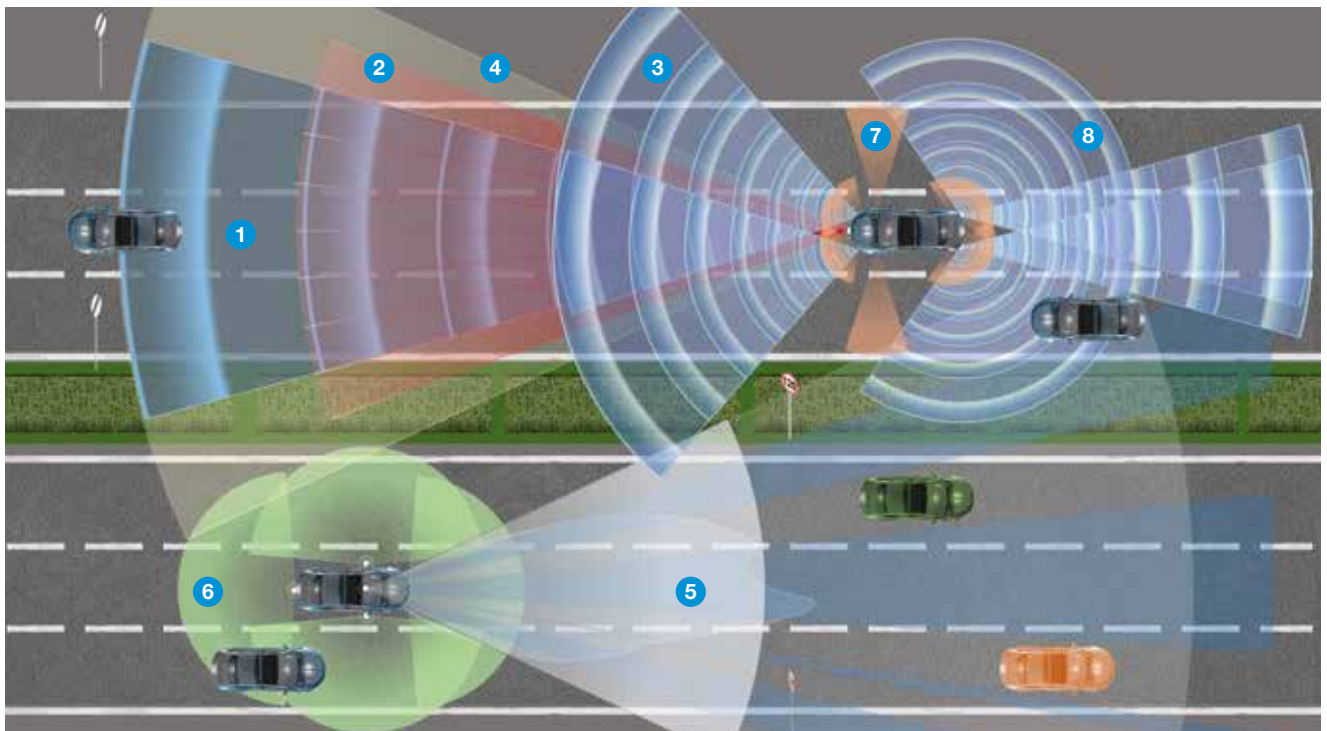


## High calibration precision:

Driver assistance systems can only provide protection, if they are calibrated properly and with high precision.

## Compulsory DAS recalibration needs to be performed

- in the event an accident
- in the event of windscreen replacement
- after replacing DAS sensors
- after performing a chassis adjustment



### 1 Long-range radar sensor

Adaptive cruise control

### 2 LIDAR

- Brake/emergency brake assistant
- Emergency brake assistant with pedestrian protection
- Collision warning system

### 3 Short/medium-range radar sensors

Oncoming lane mitigation

### 4 Infrared camera

- Pedestrian detection
- Obstacle detection
- Night view assistant

### 5 Front camera

- Adaptive cruise control
- Brake/emergency brake assistant
- Lane changing assistant
- Lane keeping assistant
- Sign recognition
- Dazzle-free full beams

### 6 Surround view camera

- Blind spot assistant
- Parking assistant
- Surround view
- Mirrorless vehicle
- Collision warning system
- Recognition of the registration number

### 7 Ultrasound sensors

- Parking assistant
- Park distance warning system

### 8 Short/medium-range radar sensors

- Rear collision warning system
- Blind spot assistant
- Parking assistant

# Three methods of DAS calibration

## Static, dynamic or combined calibration

### Static calibration

The static calibration can only be performed on specifically designed and equipped stations. The advantage: The calibration is performed in a controlled environment and independent from the weather conditions as the vehicle remains inside the workshop throughout the event.

This calibration procedure requires specific calibration tools.

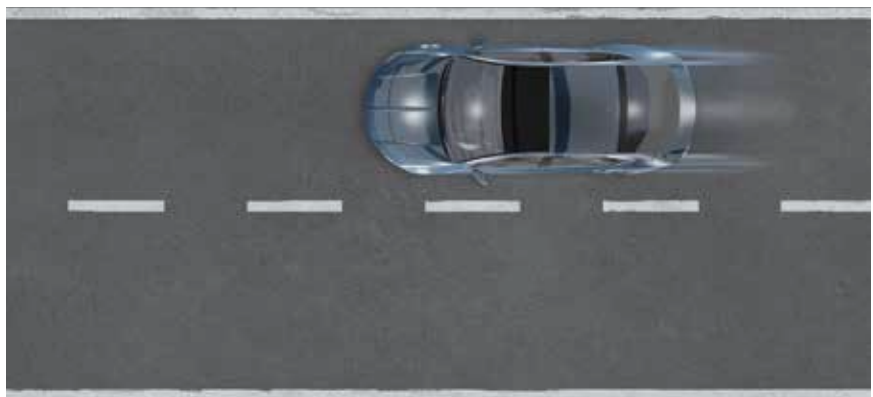


Static calibration

### Dynamic calibration

The calibration is initiated via OBD interface by means of a diagnostic tester.

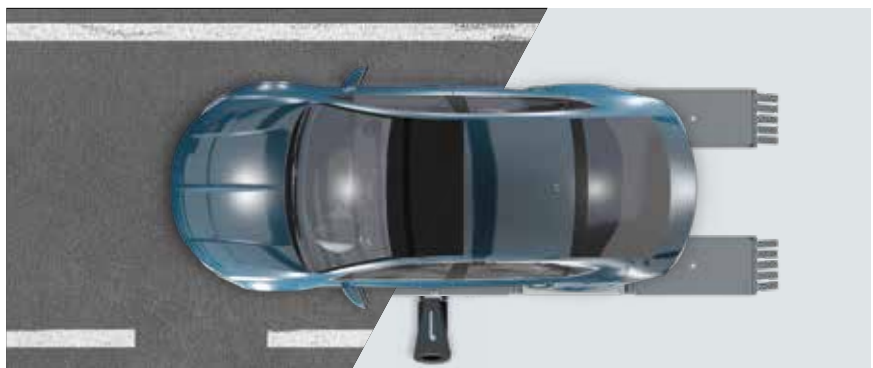
Once the calibration process has been activated, the technician has to perform a calibration drive on the road.



Dynamic calibration

### Combined static and dynamic calibration

Following a static preadjustment at the workshop, the fine adjustment is made at a calibration drive.



Combined static/dynamic calibration

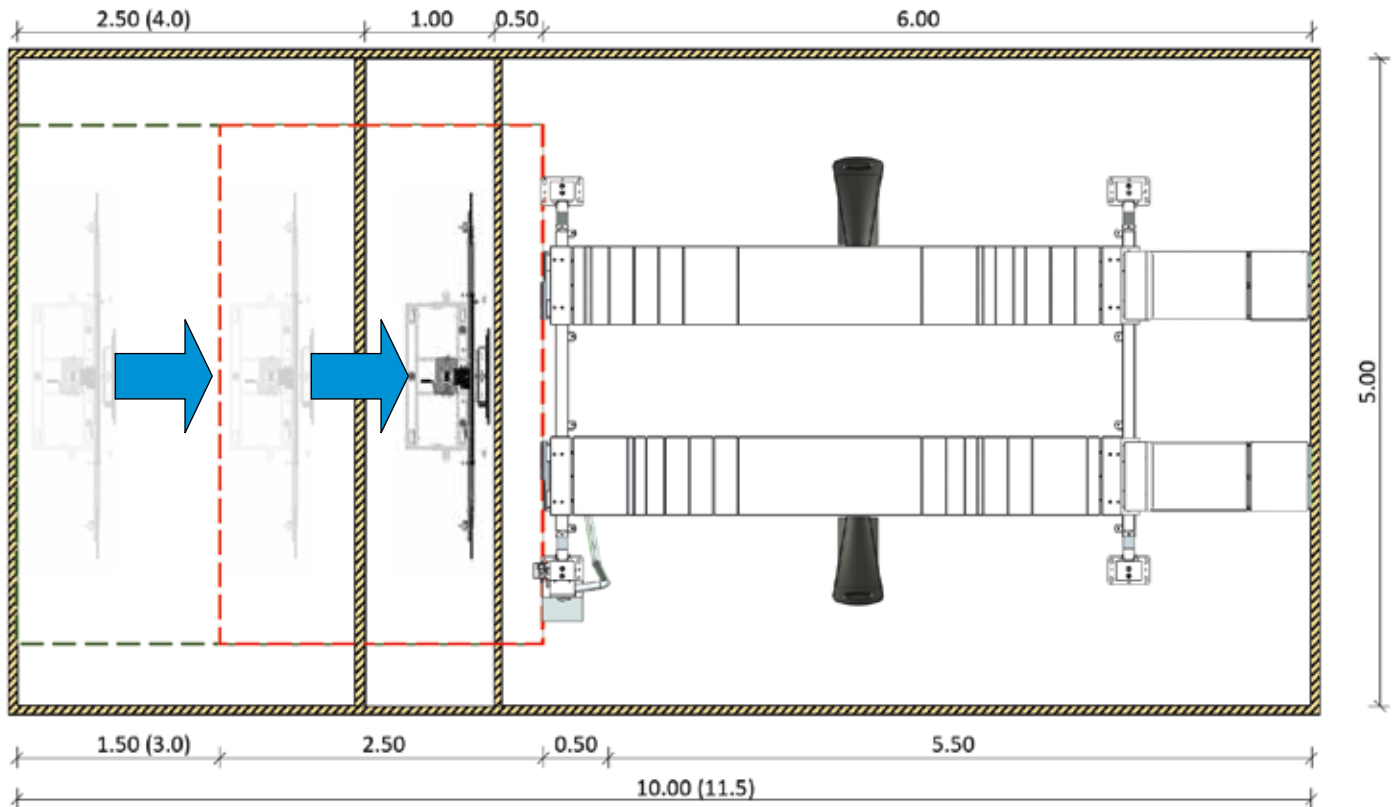
The calibration method depends on the vehicle manufacturer. It can be static, dynamic or either one of those.



Attachment for basic mechanical adjustment of radar sensors prior to a calibration drive

# Test bay requirements for static DAS calibration

Enough space (50–80 m<sup>2</sup>) with wheel-alignment platform or levelled test bay



**Legend:**

- - - Vehicle coverage of 86%
- - - Vehicle coverage of 98%



Calibration with levelled LTB 300 test bay

# DAS adjustment combined with wheel alignment



## Beissbarth wheel alignment: alignment of the calibration system with the wheel aligner

- **Process reliability:** Guided routine leads user to the calibration via software
- **Repeating accuracy:** Human mistakes are minimized
- **Permanent self-monitoring** via Beissbarth reference system
- The workshop manuals and routines **provided by the vehicle manufacturers** can be integrated
- **Guided offset:** automatic compensation of height differences between platform and calibration system
- **Rolling runout compensation** via 3D and CCD

## Camera and radar calibration on a wheel alignment platform



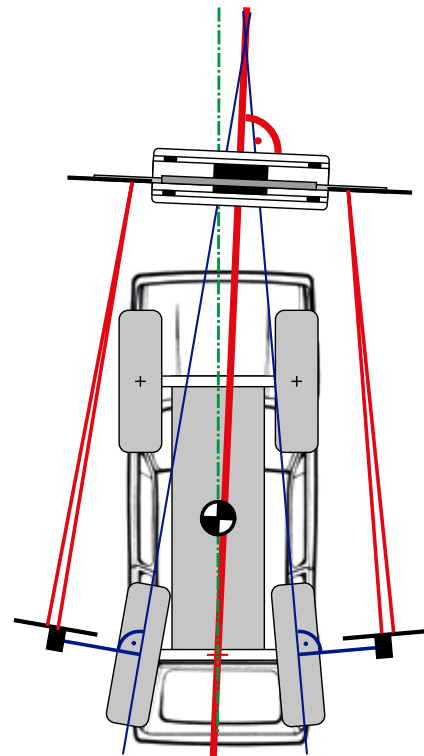


# The rear axle determines the geometric driving axis

Beissbarth Easy 3D+ or Easy CCD+ wheel alignment is a technical prerequisite for proper adjustment of radar sensors and front camera calibration.

The wheel alignment software intuitively guides the user through the whole wheel alignment and calibration process. The runout compensation demanded by the vehicle manufacturers is **already integrated into the routine**. In addition to the wheel runout, additional fault tolerances such as potential sensor bracket clamping faults or unintentional mechanical modification of the bracket (e.g. bumping or falling) are also detected and compensated right away.

The permanent **Beissbarth reference system** even detects and compensates short-term interruptions of optical measuring sections. Short and temporary visual interruptions have no effect on the overall measurement.



For DAS adjustment, the rear axle is the decisive one

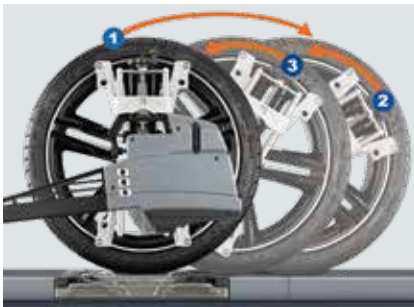


Since Beissbarth wheel alignment systems are installed next to the vehicle, **the space in front of the vehicle** remains clear for the detection of front cameras and radar sensors.

**Important:** Camera and calibration systems for the determination of the geometric driving axis are always oriented towards the rear axle.

Distance measurement between calibration system and vehicle as well as the height adjustment of the calibration targets are performed automatically and in real time. As a result, **no mechanical tape measures** nor any readout of laser distance meters are needed.

# Rolling runout compensation already included



## Rolling runout compensation (RROC) included:

**Step 1:** 30° back,

**Step 2:** 30° ahead,

**Step 3:** 30° ahead,

**Step 4:** 30° back again

Advantages of Beissbarth DAS adjustment	Alignment via Beissbarth wheel aligner	Alignment via wheel laser
Alignment towards the rear axle	Automatic	●
Runout compensation	Automatic	Manual
Compensation of installation errors	Automatic	-
Compensation of mechanical deformation of the bracket	Automatic	-
Compensation of mechanical deformation by the measurement device	Automatic	-
Digital live monitoring of the alignment	Automatic	-

## DAS adjustment at the workshop: easy and quick handling



Neat arrangement at the workshop



Integration into the workshop set-up



Measurement board for 3D wheel alignment



Easy 3D+ at the wheel alignment



Accurate height adjustment of the target



Alignment of the DAS calibration system



Data output on diagnostic tester (not within scope of delivery)



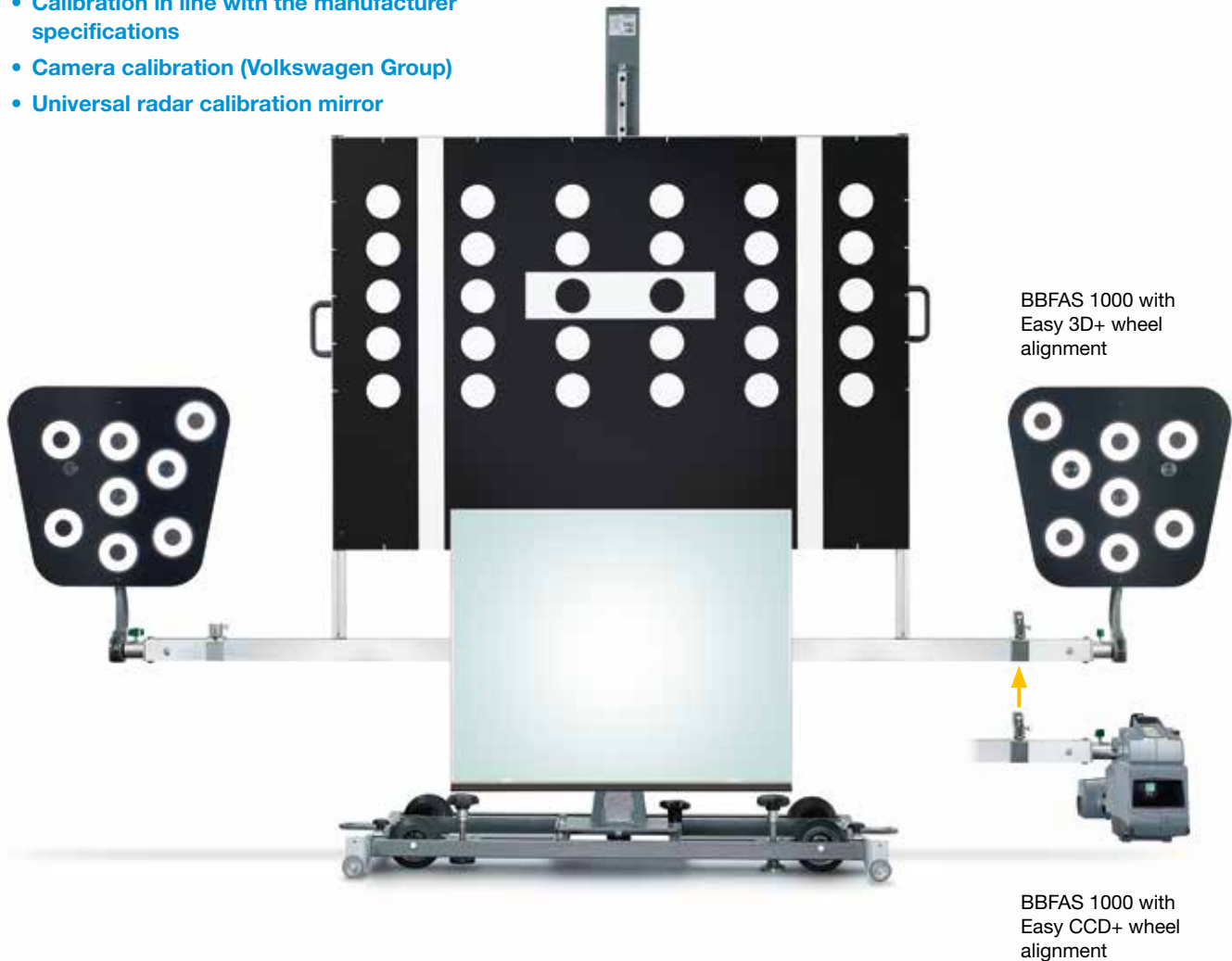
Calibrated front camera



Software

# Basic BBFAS kit: DAS adjustment with wheel alignment

- Orientation towards the geometric driving axis
- Calibration in line with the manufacturer specifications
- Camera calibration (Volkswagen Group)
- Universal radar calibration mirror



## Mobile, quick and precise – manufacturer-compliant DAS adjustment using BBFAS 1000 calibration device:

- 100 % compliant with the vehicle manufacturer specifications if combined with Beissbarth 3D+ wheel alignment (alignment towards the geometric driving axis)
- Static calibration of cameras (e.g. lane keeping assistant) and distance radar sensors
- Upgrade for Lidar and night view cameras is possible
- Multi-brand upgrade is possible – suitable for the calibration of other makes
- Robust and torsion-free carriage for mobile application at different work stations
- Precise levelling by robust feet adjustable in height and precision levellers – with an accuracy of up to one angular minute. The triangular design requires just a single adjustment bolt per compensation axis.

- High levelling precision on the rotational axis: 3 angular minutes
- Accurate yaw angle adjustment
- Longitudinal alignment via drawbar and guided wheels – no readjustment required after transversal positioning

## Broad vehicle coverage with optional multi-brand system:

- The BBFAS 1000 calibration device can be complemented by an additional calibration beam and modular calibration targets (e. g. BBFAS 141x kit)
- Alignment with the vehicle symmetrical axis, the track width or floor markings is possible

**Order number:** 8 900 380 003

### Notes:

For the adjustment of driver assistance systems, an OBD diagnostic tester is required. Performing a wheel alignment upfront is recommended and useful.

# BBFAS 1000: scope of delivery

- Base frame on wheels
- Height-adjustable column with high-precision calibration beam
- Calibration target for front camera calibration
- ACC reflector mirror

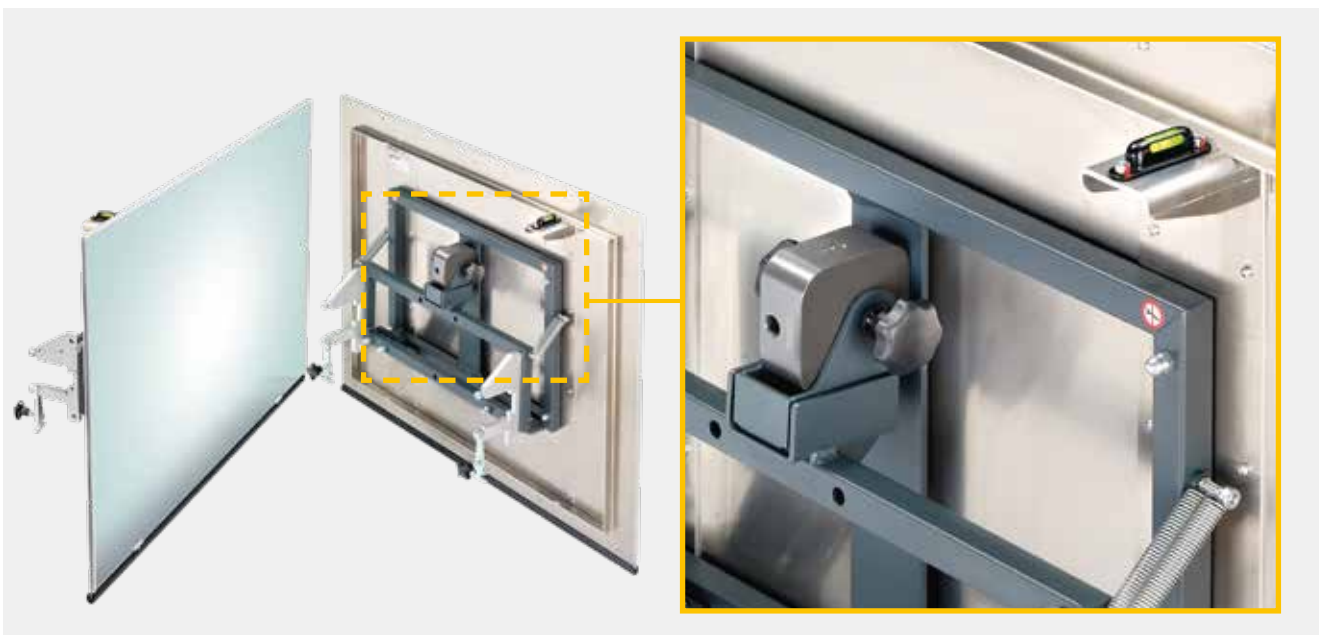


Precise height adjustment winch



BBFAS 1000

**Order number:** 8 900 380 003



Reflector mirror with folding mechanism for vertical alignment

# BBFAS 1000: accessories



## Individual DAS calibration targets for 3D wheel aligner

- The BBFAS 1000 base frame can be aligned accurately with the vehicle's geometric driving axis
- Moreover, the distance and the height of the calibration frame can be measured accurately by means of the 3D+ add-on features

**Order number:** 1 690 701 120 (left calibration target)

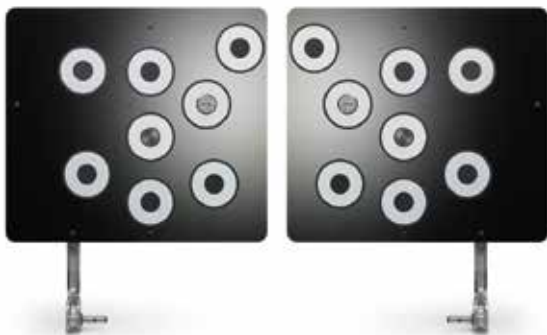
**Order number:** 1 690 701 121 (right calibration target)



## Standard targets for the DAS calibration device

For the alignment of the DAS calibration device combined with Beissbarth Easy 3D+

**Order number:** 1 690 701 119



## 2 special targets for DAS calibration device and 4-post lifts

- Allows the alignment of the DAS calibration device combined with Beissbarth Easy 3D+
- Specifically for 4-post lifts with a clear span of less than 2.8 metres

**Order number:** 1 690 701 152

## Basic unit of the mobile BBFAS 1000 calibration device

The mobile calibration device forms the basis of BBFAS 1000. It serves as a basic rack for calibration targets for lane departure warning systems

**Order number:** 8 900 381 137



## BBFAS 1000 ACC reflector mirror

ACC reflector mirrors are used for the adjustment of ACC sensors.

**Order number:** 8 900 381 150



## BBFAS 1000 calibration target for lane departure warning systems of Volkswagen Group vehicles

Calibration device for the adjustment of the image sensor of lane departure warning systems on Volkswagen Group vehicles

**Order number:** 8 900 381 147

# BBFAS 1410 high-precision calibration beam: upgrade for additional OEMs



## BBFAS 1410 high-precision calibration beam: BBFAS 1000 upgrade kit for use of calibration targets of additional vehicle manufacturers

- Upgrading by means of BBFAS 1410 results in complete coverage for front camera calibration. Combined with optionally available calibration targets, the service can be expanded making it suitable for all important European, Japanese and Korean vehicle makes.
- The BBFAS 1410 high-precision calibration beam is installed into the brackets attached to the BBFAS 1000 base frame and serves as mount for the calibration targets required for the measurement.
- Beissbarth 3D and CCD wheel alignment systems are used for the alignment.

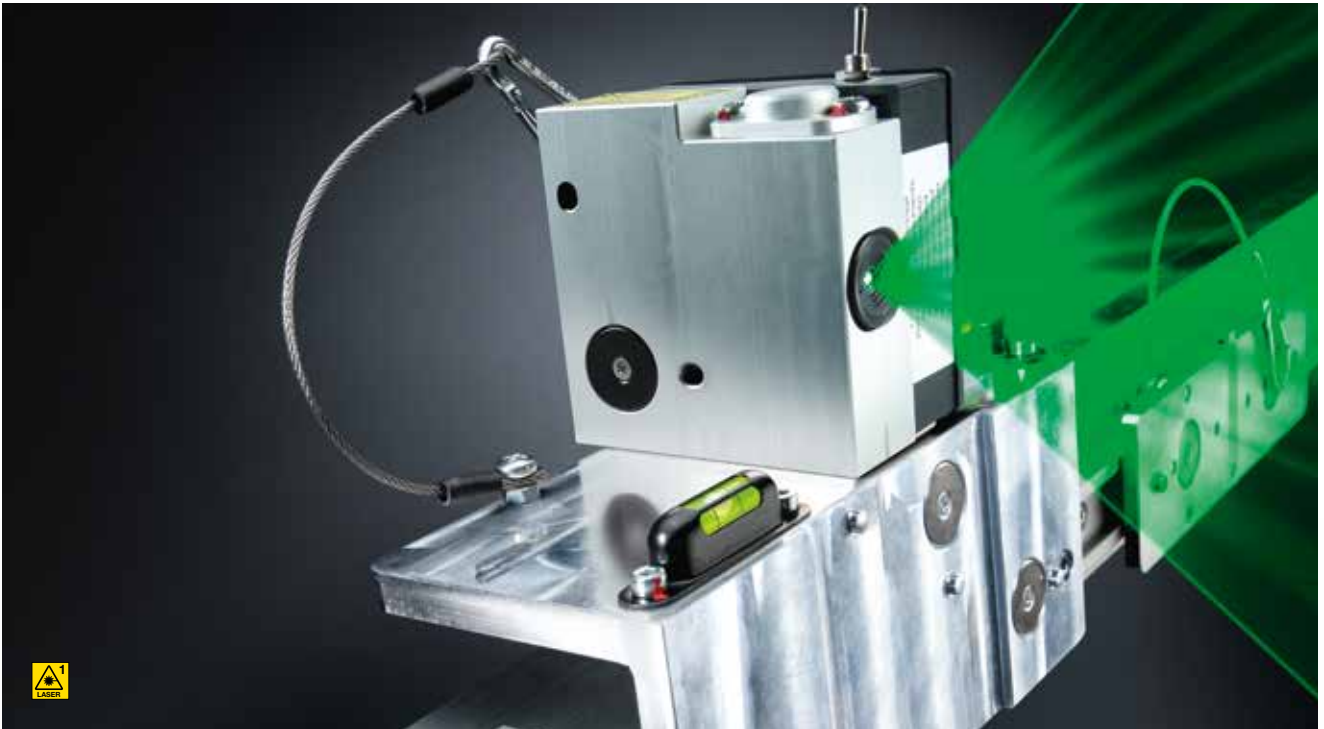
**Order number:** 8 900 380 006



BBFAS 1410

BBFAS 1415

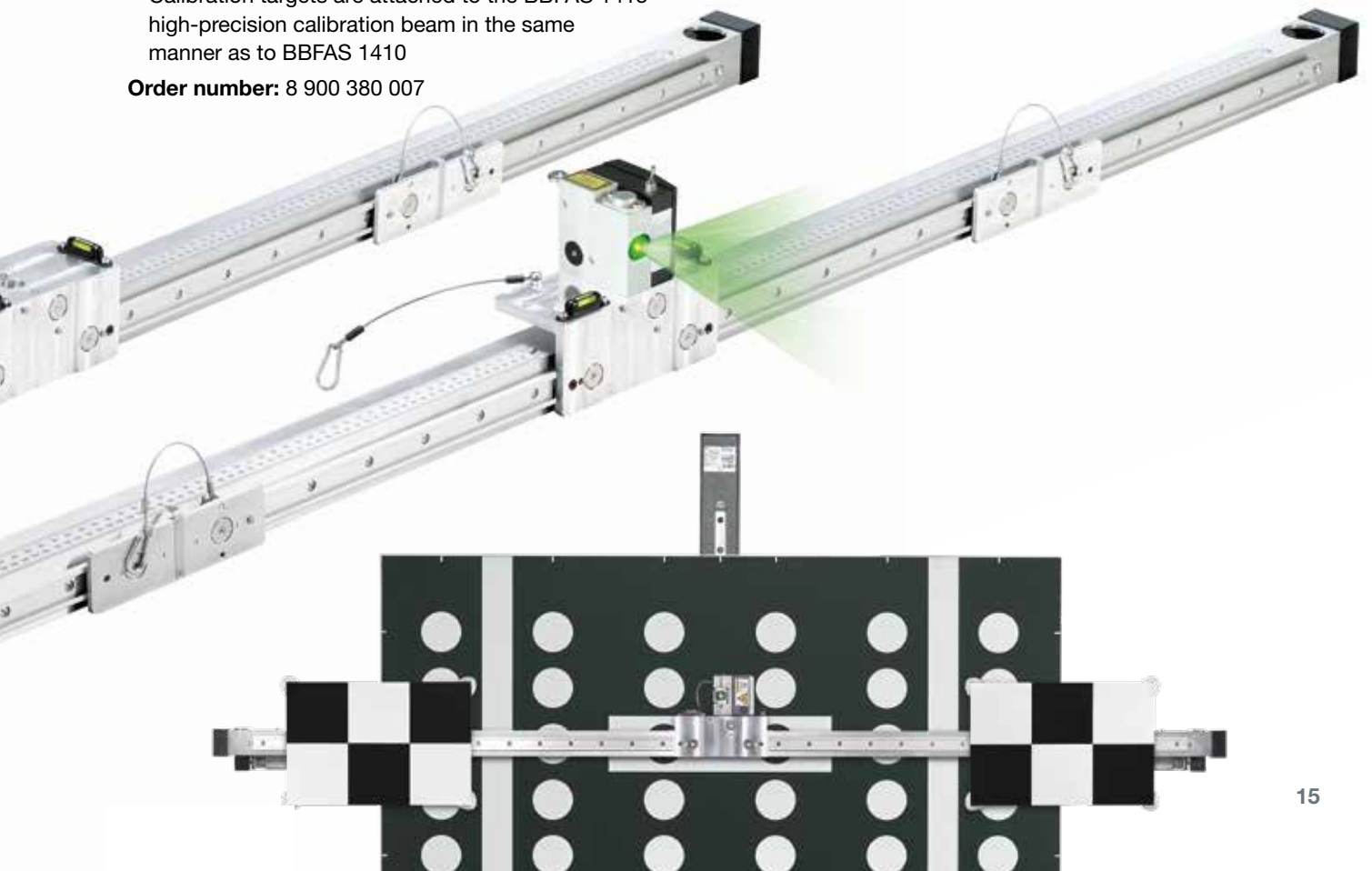
# BBFAS 1415 high-precision calibration beam with laser for vehicle symmetrical axis



**BBFAS 1415 high-precision calibration beam: technically similar to BBFAS 1410, but additionally equipped with P-Assist S5 laser.**

- Orientation towards the vehicle's symmetrical axis
- Calibration targets are attached to the BBFAS 1415 high-precision calibration beam in the same manner as to BBFAS 1410

**Order number: 8 900 380 007**



# Multi-target shop

## Calibration targets for additional vehicle makes

### Target storage box with calibration targets for multi-brand calibration at the workshop

In order to protect them against dirt and to store them safely and without of risk of damage, Beissbarth offers calibration target sets stored within a robust box. The targets can be placed both easily and quickly. The box content can be complemented by additional calibration targets to be ordered separately hence allowing workshops to perform DAS calibration tasks on a numerous different vehicle makes.







#### Multi-target basic set 1 for BBFAS 141x

Multi-target starter kit 1 with storage box for BBFAS 1410/15 and BBFAS 415

##### Scope of delivery

##### calibration targets / storage box:

- Nissan set type 1 (order number: 8 900 381 139)
- Toyota type 1 (order number: 8 900 382 287)
- Mercedes-Benz type 1 (order number: 8 900 382 312)
- Mazda type 1 (order number: 8 900 382 318)
- Honda type 3 (order number: 8 900 382 349)
- Toyota type 3 (order number: 8 900 382 355)
- Universal type 1S (order number: 8 900 382 570)
- (Empty) storage box (order number: 1 690 381 217)

**Order number:** 8 900 381 001



#### Multi-target basic set 2 for BBFAS 141x

Multi-target starter kit 2 with storage box for BBFAS 1410/15 and BBFAS 415

##### Scope of delivery

##### calibration targets / storage box:

- Mercedes-Benz 1/Infiniti 2 (order number: 8 900 382 312)
- Mercedes-Benz 2 (order number: 8 900 382 319)
- Universal type 1S (order number: 8 900 382 570)
- (Empty) storage box (order number: 1 690 381 217)

**Order number:** 8 900 381 002



#### Empty target storage box

Empty storage box for multi-brand calibration targets for front camera calibration

**Order number:** 1 690 381 217

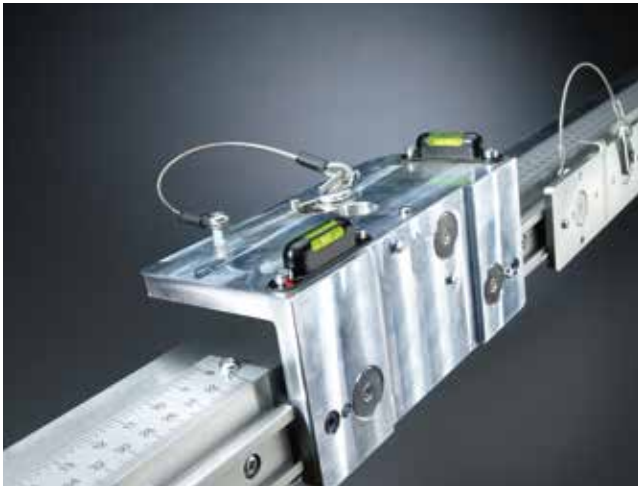


# Multi-target shop: overview of calibration target sets\*

Beissbarth provides a wide range of calibration targets for multi-brand calibration at automotive workshops

Whether neatly arranged in a robust box or as individual sets, the calibration targets are designed for quick

application and can easily be attached to the calibration beam. For workshops this means saving precious time when performing DAS calibration without beam on vehicles of different makes.



BBFAS 1410 high-precision calibration beam



Attaching calibration targets to the sliders of the BBFAS 1415 calibration beam by means of magnetic adapters

## Nissan calibration target set type 1

Order number: 8 900 381 139



## Nissan calibration target set type 2

Order number: 8 900 381 140



## Universal calibration target set type 2

Order number: 8 900 381 142



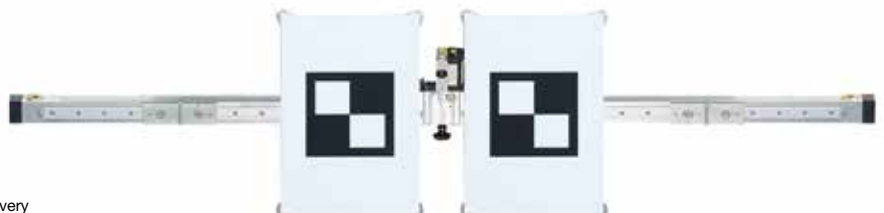
## Honda calibration target set type 1

Order number: 8 900 381 143



## Mitsubishi calibration target set type 1

Order number: 8 900 381 218



\*High-precision calibration beam not included in scope of delivery

**Mazda calibration target set type 2**

Order number: 8 900 381 234



**Toyota calibration target type 1**

Order number: 8 900 382 287



**Honda calibration target type 2**

Order number: 8 900 382 297



**Mercedes-Benz calibration target type 1**

Order number: 8 900 382 312



**Kia/Hyundai calibration target type 3**

Order number: 8 900 382 316



**Mazda calibration target type 1**

Order number: 8 900 382 318



**Mercedes-Benz/Infinity calibration target type 2**

Order number: 8 900 382 319



**Kia/Hyundai calibration target type 2**

Order number: 8 900 382 320



\*High-precision calibration beam not included in scope of delivery

# Multi-target shop: calibration targets for important vehicle makes

## Toyota calibration target type 2

Order number: 8 900 382 328



## Honda calibration target type 3

Order number: 8 900 382 349



## Toyota calibration target type 3

Order number: 8 900 382 355



## Universal calibration target type 1S

Order number: 8 900 382 570



## Subaru calibration target type 3S

Order number: 8 900 382 590



## Subaru calibration target type 2S

Order number: 8 900 382 608



\*High-precision calibration beam not within scope of delivery

# No matter which diagnostic tester: easy step-by-step calibration

en Brief instructions **Beissbarth BBFAS front camera calibration data** **BBFAS 415**  
**BBFAS 1000**  
**BBFAS 1410 / 1415**

Honda [EU]													
Model	Series	Year	Comment	D1 [mm]	H [mm]	D2 [mm]	D3 [mm]	SL [mm]	SR [mm]	Set number	Target number	Target Typ	Setup
Accord	CR	2014 -	( 9 )	3000 (2995 - 3005)	1100 (1095 - 1105)	--	70	1400	1400	--	8 900 382 349	Honda 3	11
Civic		2012 - 2016	( 9 )	3000 (2995 - 3005)	1100 (1095 - 1105)	--	70	1400	1400	8 900 381 143	8 900 382 292	Honda 1	11
Civic Typ KG		2016 - 2017	( 10 )	4000 (3995 - 4005)	1500 (1495 - 1505)	--	--	1260	1260	8 900 381 143	8 900 382 292	Honda 1	07
Civic		2016 - 2017	( 10 ) Type No KG	3000 (2995 - 3005)	1100 (1095 - 1105)	--	0	1400	1400	--	8 900 382 349	Honda 3	11
CR-V				3000 (2995 - 3005)	1100 (1095 - 1105)	--	70	1400	1400	--	8 900 382 349	Honda 3	
							0	1400	1400				

Just select the respective vehicle from the list of stored vehicles to see details on the set-up on the right side

**Setup** Nr. 11

**Beissbarth BBFAS front camera calibration setups**

1. D3  
2. RHD / LHD / Center Offset  
3. H  
4. Target  
5. SL / M / SR  
6. OBD  
7. X  
8. OBD  
9. X  
10. OBD  
11. Steering wheel

BBFAS 415      BBFAS 1415

Target number	Target type	Pattern
8 900 382 292	Honda 1	
8 900 382 349	Honda 3	
Diagnostic jig		Accessories
8 900 380 003	8 900 380 006	
8 900 380 003	8 900 381 292	
	8 900 380 007	

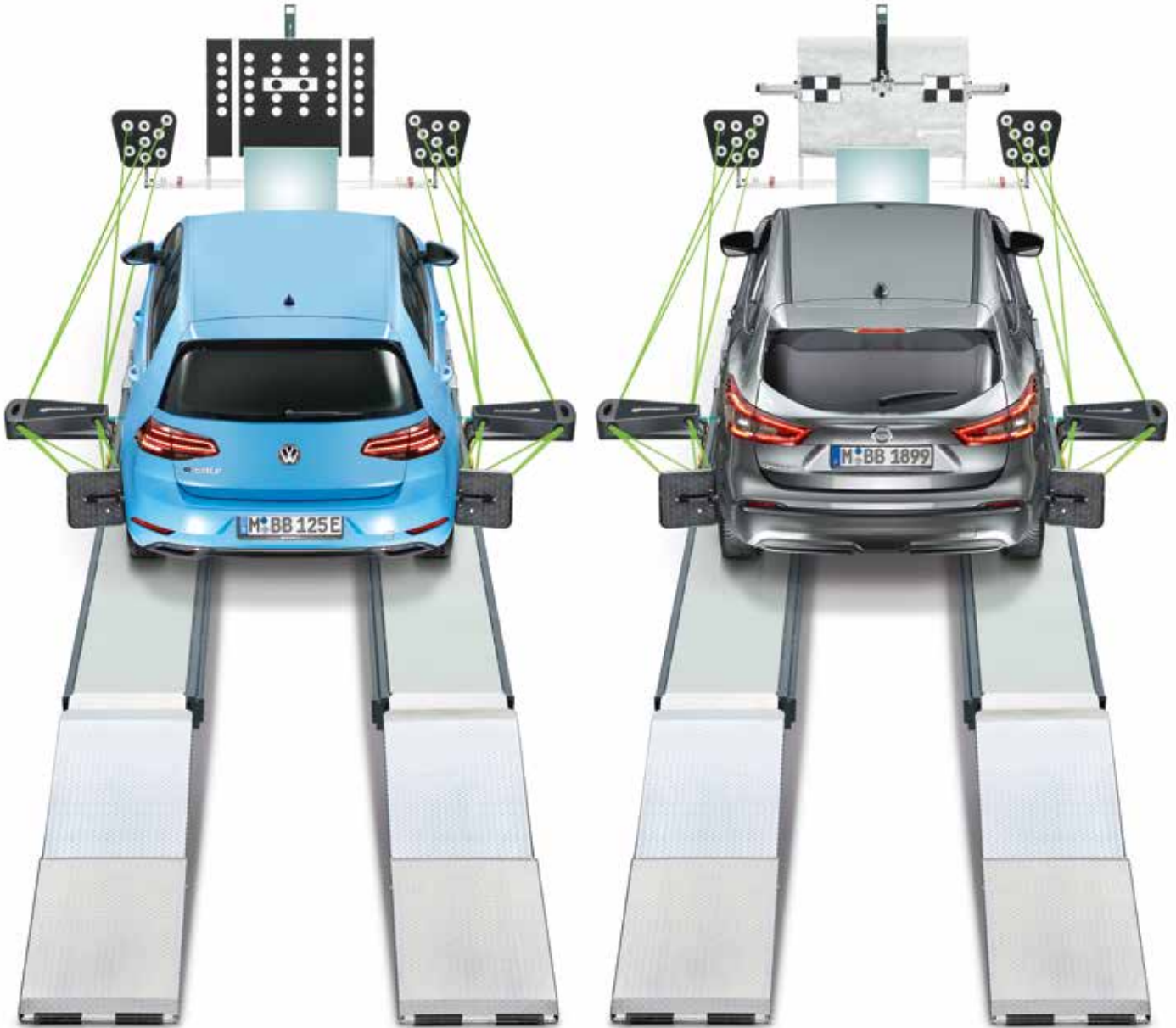
Use the set-up number to quickly find the matching set-up instructions and calibrate step by step as shown.

## User-friendly vehicle information including set-up instructions

- Vehicle specifications as specified by the manufacturer – can be processed with most of the diagnostic testers commercially available\*
- Alignment of the calibration device with the vehicle by means of easily understood step-by-step instructions
- Latest information available at any time at the Beissbarth Download Center:  
[www.base-downloadcenter.com/beissbarth](http://www.base-downloadcenter.com/beissbarth)

\* except for Mahle TechPro diagnostic tester

# DAS adjustment using BBFAS 1000 and 1410/1415



**Volkswagen E-Golf**  
with BBFAS 1000  
with calibration target for Volkswagen Group lane keeping systems

**Nissan Qashqai**  
with BBFAS 1000  
with BBFAS 1410 retrofitting kit  
with Nissan calibration target type 1



# Wheel alignment on the rear axle: alignment towards the geometric driving axis



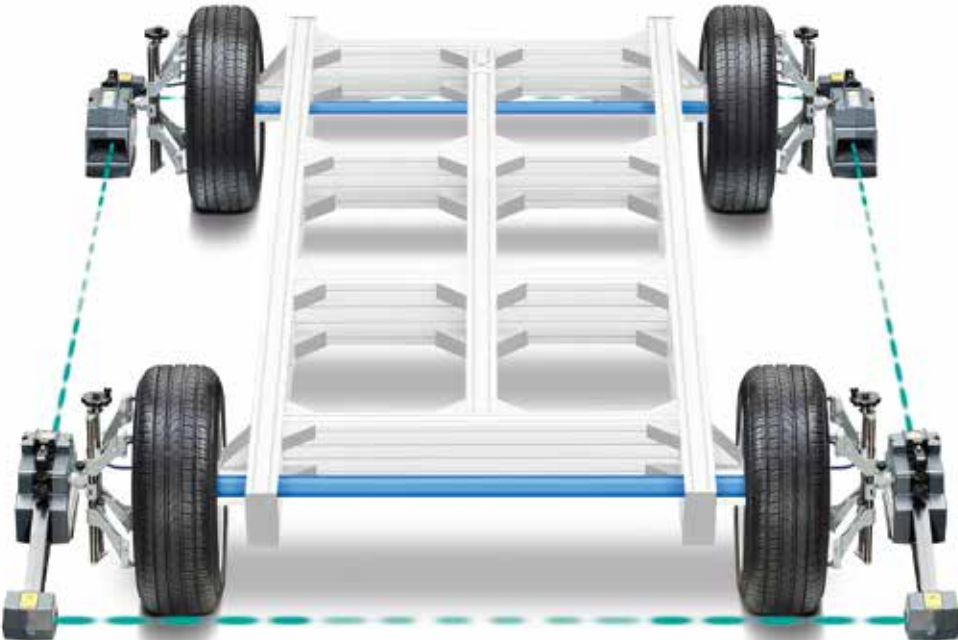
**Honda HRV**  
with BBFAS 1000  
with BBFAS 1415 retrofitting kit  
Honda calibration target type 1



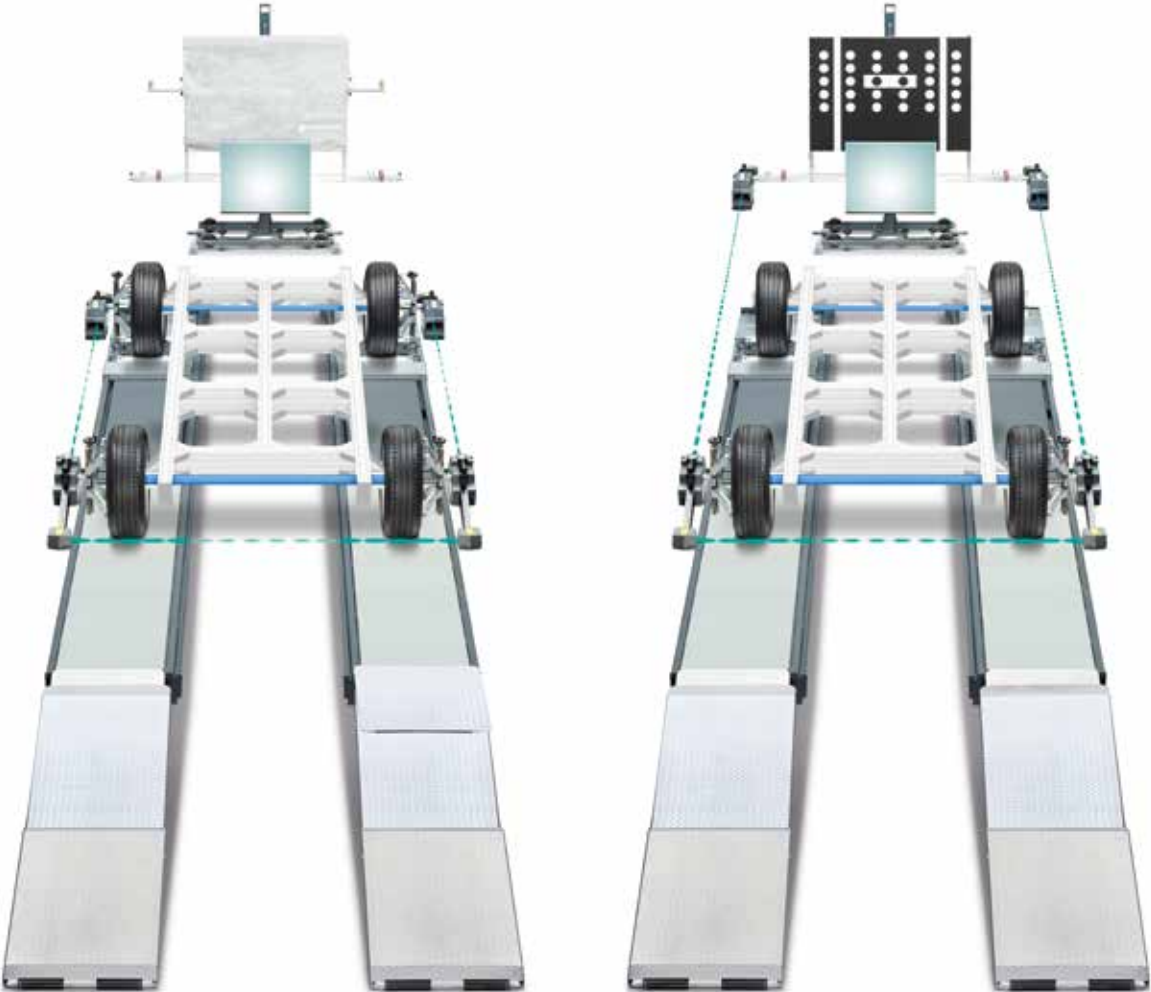
**Hyundai**  
with BBFAS 415  
Universal calibration target type 1S



# Wheel alignment and DAS adjustment using Easy CCD+



CCD wheel alignment measurement principle with 8 cameras and Beissbarth reference system



Set-up for wheel alignment

Set-up for DAS adjustment



# DAS adjustment using Easy CCD+



CCD sensor head on the wheel

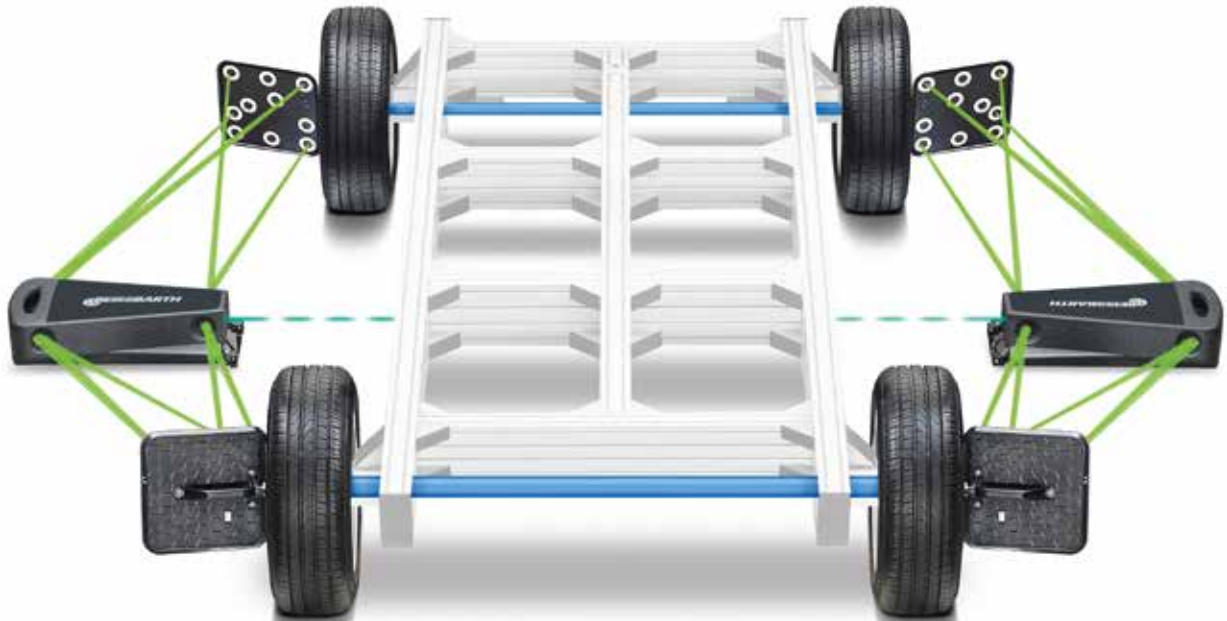


CCD camera technology

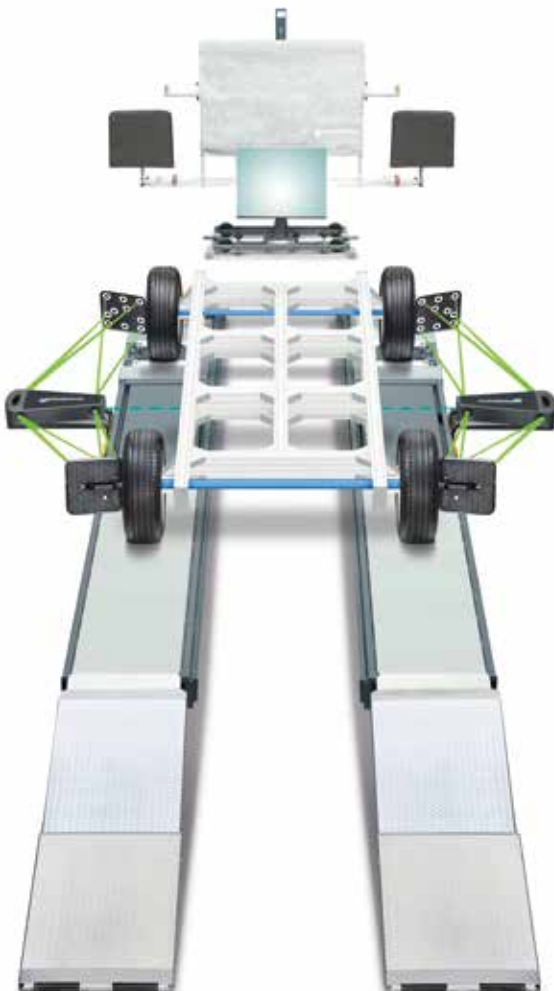


DAS adjustment using Easy CCD+

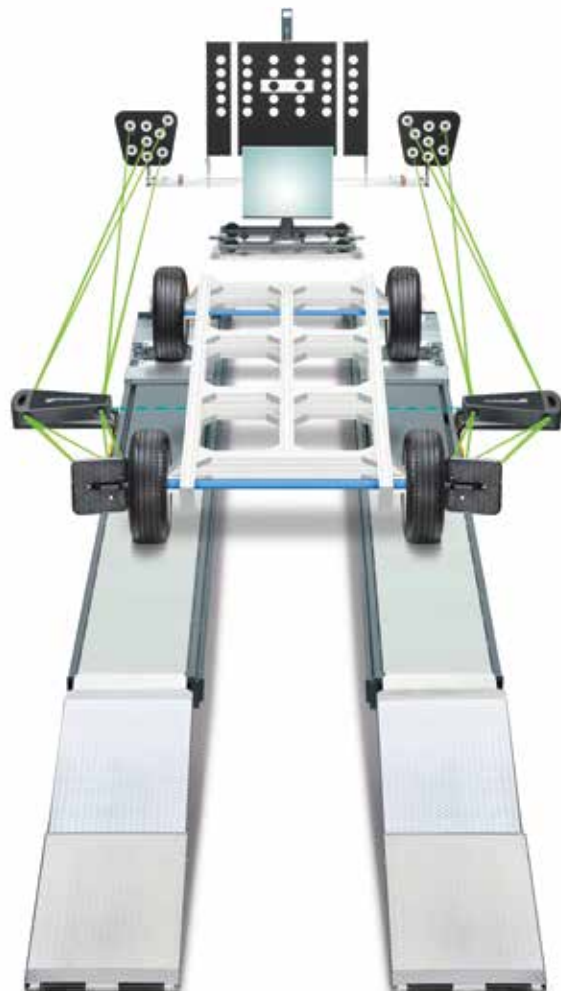
# Wheel alignment and DAS adjustment using Easy 3D+



3D wheel alignment measurement principle (triangulation with DualView camera technology)



Set-up for wheel alignment

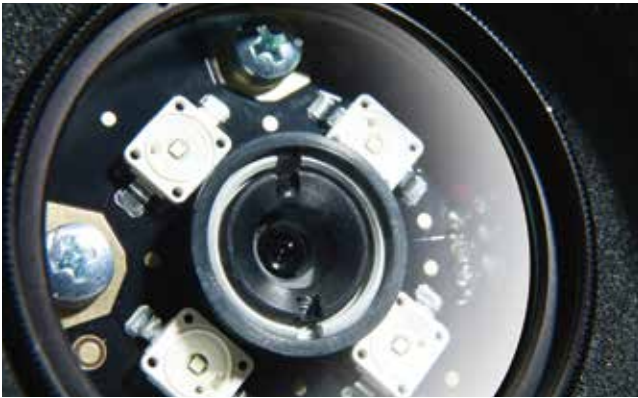


Set-up for DAS adjustment

# DAS adjustment using Easy 3D+



Magnetic clamp for calibration targets



Stereo camera for triangulation measurement



DAS adjustment using Easy 3D+

# BBFAS 415 stand-alone solution: DAS adjustment without wheel alignment

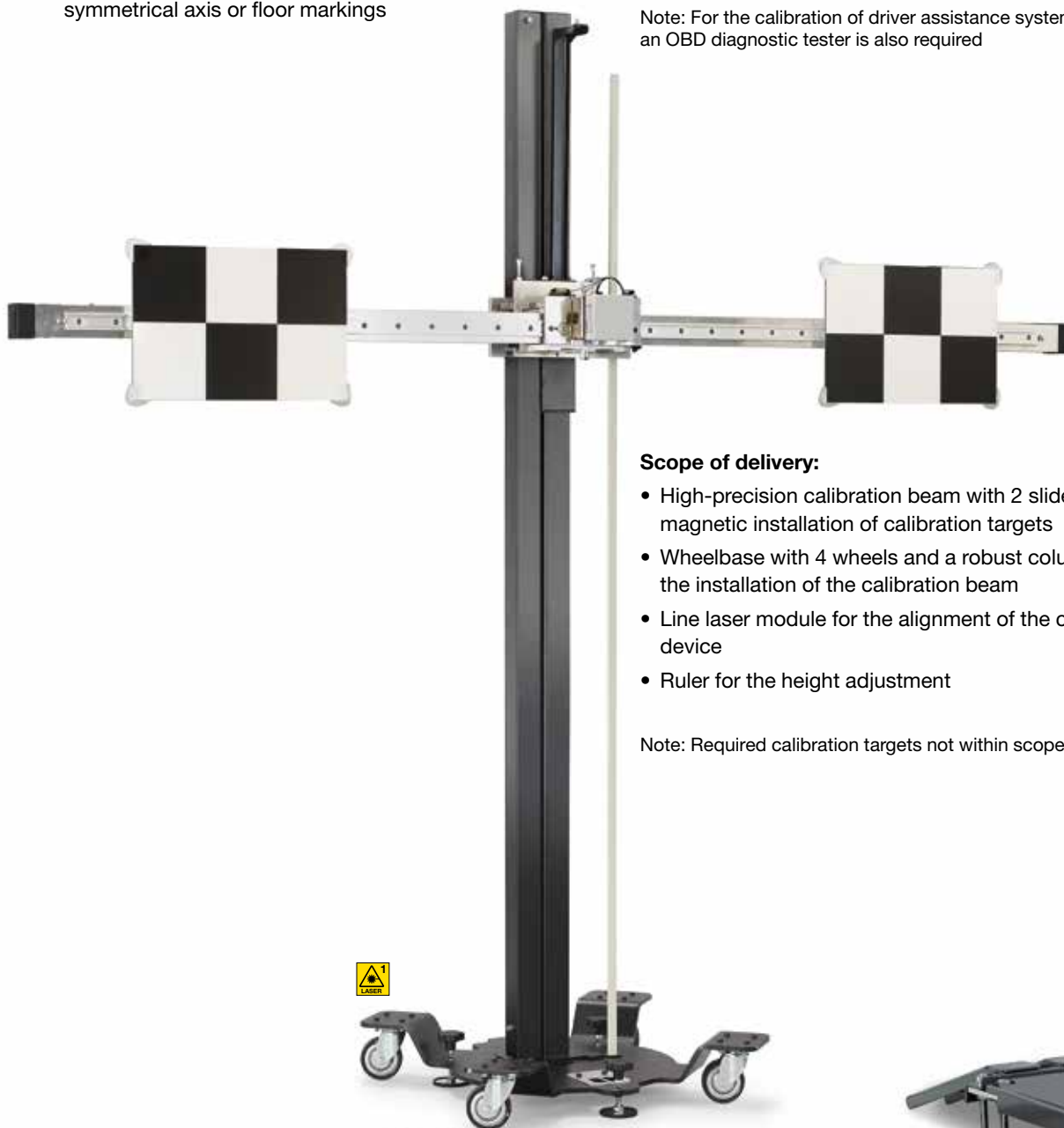
- Orientation towards the geometric driving axis
- Calibration device for front cameras
- Without wheel alignment
- Calibration targets attached onto the BBFAS 1415 calibration beam

## Front camera calibration using the BBFAS 415 calibration device: flexible, easy and precise

- Static camera calibration e. g. lane keeping cameras, multi-functional cameras
- Broad vehicle coverage by optional calibration targets
- Quick and straightforward alignment with the vehicle's symmetrical axis or floor markings

- Alignment via track width is possible using optional accessories
- Horizontal set-up by means of precision levellers and three height-adjustable feet
- High-precision calibration beam with sliders for transversal correction and fine adjustment bolts for yaw angle compensation
- Magnetic clamps for multi-brand calibration targets
- High-contrast line laser module with low laser category (1M). Green laser light can be identified particularly well by human eyes since their maximum spectral sensitivities lies within the range of green colours.

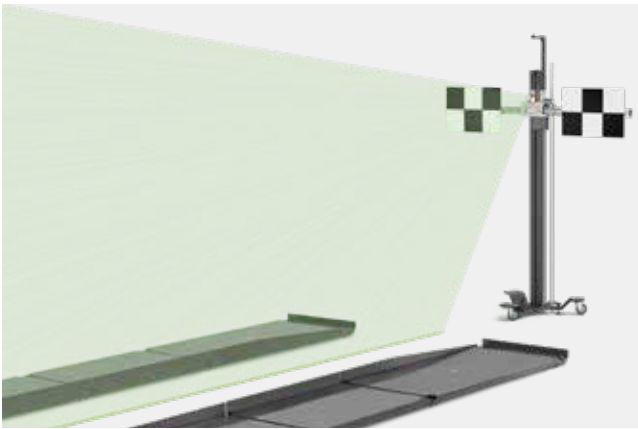
Note: For the calibration of driver assistance systems, an OBD diagnostic tester is also required



## Scope of delivery:

- High-precision calibration beam with 2 sliders for magnetic installation of calibration targets
- Wheelbase with 4 wheels and a robust column for the installation of the calibration beam
- Line laser module for the alignment of the calibration device
- Ruler for the height adjustment

Note: Required calibration targets not within scope of delivery



Alignment with the vehicle's symmetrical axis



High-precision calibration beam



Laser P-Assist S5



Target for roof antennas for the alignment with the vehicle's symmetrical axis (order number: 8 900 381 292)



# Functional overview

## Wheel alignment and DAS adjustment

Function	with wheel alignment		without wheel alignment
Product	Easy 3D+	Easy CCD+	BBFAS 415
Suspension test and adjustment complying with the manufacturer specifications	•	•	–
Live values concerning distance and height of the camera calibration target	•	–	–
Alignment of the camera calibration tool with the centre of the driving axis	•	•	–
Alignment of the camera calibration tool with the geometric driving axis	•	•	–
High-precision levels for the adjustment of pitch and roll angles	•	•	•
Adjustment of the calibration frame's transversal position without modifying the distance towards the vehicle	•	•	•
Universal radar sensor calibration mirror	•	•	–

# Overview of makes for the calibration of front cameras and radar sensors

Manufacturer	Front camera (lane assistance)				Radar sensor (ACC, emergency brake assistant)	
	Calibration drive	Static with calibration targets			Calibration drive	Static with reflectors
		BBFAS 1000	BBFAS 1415 BBFAS 1410	BBFAS 415		BBFAS 1000
Alfa Romeo		●				●
Audi		●				●
BMW	●					●
Chrysler	●				●	
Citroën			● <sup>2)</sup>	● <sup>2)</sup>	●	
FIAT			●	●		●
Ford	●				●	
Honda			● <sup>1)</sup>	● <sup>1)</sup>		
Hyundai			●	●		
Jaguar	●				●	
Jeep			● <sup>2)</sup>	● <sup>2)</sup>		● <sup>2)</sup>
KIA			●	●		
Land Rover	●				●	
Mazda			●	●		
Maserati		●				●
Mercedes-Benz			● <sup>1)</sup>	● <sup>1)</sup>	●	
Mitsubishi			●	●		●
Nissan			●	●		●
Opel			● <sup>2)</sup>	● <sup>2)</sup>	●	
Peugeot			● <sup>2)</sup>	● <sup>2)</sup>	●	
Porsche		●				●
Renault			● <sup>2)</sup>	● <sup>2)</sup>		
SEAT		●				●
Škoda		●				●
Smart			●	●		
Subaru			● <sup>3)</sup>	● <sup>3)</sup>		
Suzuki			○	○		●
Toyota			● <sup>2)</sup>	● <sup>2)</sup>		
Volkswagen		●				●
Volvo	●				●	

<sup>1)</sup> Depending on the system with or without calibration drive;

<sup>2)</sup> For some vehicle types also with dynamic calibration;

<sup>3)</sup> Static calibration followed by a calibration drive;

○ in preparation

\* in preparation

# Beissbarth MLD 9000

Digital headlight aiming tester

## Ideal for all headlights

- For all light sources and vehicle types
- Glare-free high-beam systems (see page 7)
- Alignment and positioning laser (class 2)
- Optional: vertical laser (class 1)
- With optional tilt measurement
- Time-saving quick measurement
- 7" touch screen
- Digital image processing in real time
- CMOS camera (5 megapixels)
- Interfaces: LAN, USB, RS 232



**TÜV certificate in line with StVZO § 50:**  
MLD 9000 is TÜV-certified by prototype technical release examination in accordance with the directives for testing headlight adjustment/test equipment (German Road Traffic Type-Approval Law StVZO § 50 paragraph 5 – TPN 100148827).



Digital headlight aiming tester with 4 lasers

## Safety information/laser warning:

Always observe the currently valid safety regulations for handling lasers!

Product	Symbol*	Laser class	Description	Warning
BBFAS 415		Laser 1M		 Laser radiation! Do not view directly with optical instruments!

\*Symbolic representation of the laser class used in the brochure

### Beissbarth GmbH

Hanauer Str. 101 · 80993 München  
Germany

Telephone: +49-(0)89-14901-0

Telefax: +49-(0)89-14901-246

sales@beissbarth.com