



**BOSCH**

Invented for life

# DAS 3000

The new universal computer based calibration and adjustment device for ADAS



# Proper camera calibration as a key factor for safe driving



Drivers have a wide range of driver assistance solutions at their disposal on the highway and on main roads. Cars have radar sensors and video cameras, allowing them to detect other road users even in complex traffic situations. The system will warn the driver and even intervene if necessary. This is achieved in defined situations through the communication and interaction of a variety of components. The end result is the avoidance of, or at least a reduction in, the number of accidents in city traffic.

With the new technologies around driver assistance systems, workshops especially are facing challenges. Therefore Bosch offers the right equipment in order to calibrate sensors and cameras.

Typical ADAS components relevant for camera calibration:

## Lane assist systems



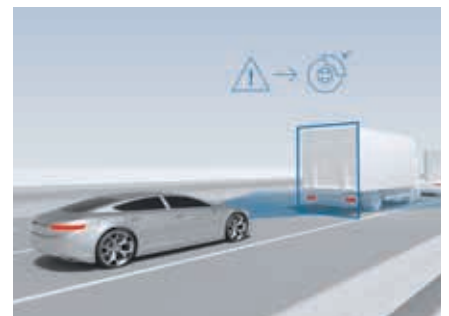
Detect unintended departure from the lane, and warn the driver at an early stage, actively help to keep the vehicle in the lane or help changing lanes.

## Road sign recognition



Evaluates road sign recognition data and displays relevant information in the instrument cluster, enabling a range of warning functions for the driver.

## Automatic emergency braking



Can avoid collisions with other vehicles as well as with vulnerable road users. If an accident is not avoidable, the system at least reduces the speed of the vehicle and the risk of injury.

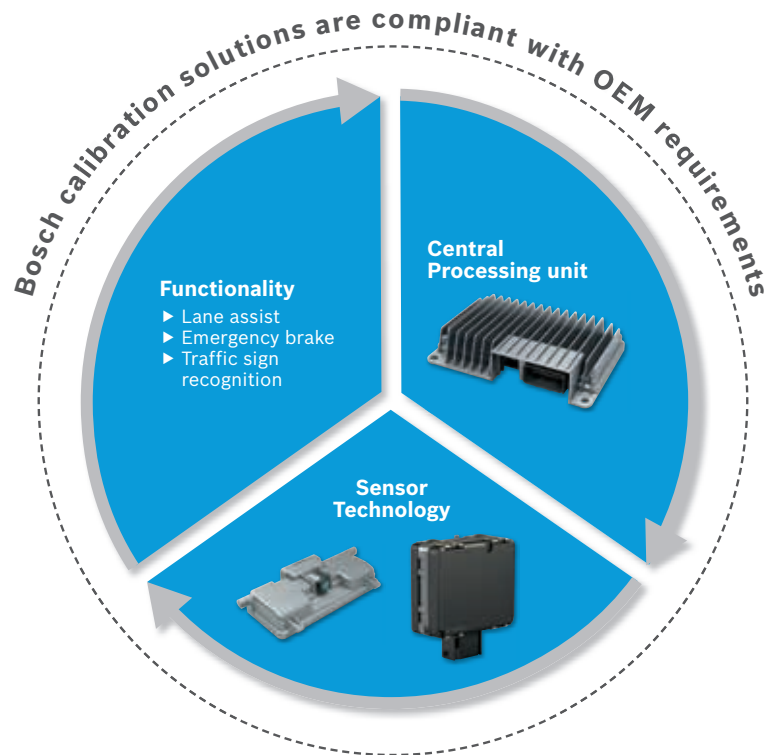
# Replace – Calibrate – Drive safely

## Good to know:

Calibration of driver assistance systems can be divided into static and dynamic processes.

During the static calibration procedure, a specific calibration board and a suitable diagnostic system are required (e.g. DCU 220). Depending on sensor and system there may also be a mixture of dynamic and static calibrations (e.g. Honda, Mercedes-Benz and Hyundai).

Usually, the static calibration procedure is carried out first and then completed with a dynamic calibration procedure (service drive). The ESI[tronic] 2.0 diagnostic software guides you through the necessary steps.



### ECU (electronic control units)

- Safety control (i.e. ESP, ACC)
- Central computing unit for sensor data fusion
- Engine and transmission control
- Brake and lighting control



### Front camera unit

- Lane assist
- Speed limit display
- Adaptive light
- Rain/sun sensor



### Surround view cameras

- Rear camera
- 360° cameras



### LIDAR Sensors

- ACC
- Lane assist
- Stop & Go function



### Infrared camera

- Night vision



### Front radar sensors

- ACC
- Emergency brake assist
- Stop & Go function



### Steering angle sensor



### Corner sensors

- Lane change assist
- Cross traffic warning



# DAS 3000: The system solution for ADAS professionals with focus on efficiency, precision and technology trends

Pitch angle adjustment device

Large tray for diagnostic-PC, Bosch Software Windows 7 and 10 capable

Robust spring loaded stamp brake applied by a lever, 2 times (left & right)

**Innovative Multi-Function-Carriage:**

- ▶ Adjustment height offset of measurement platform
- ▶ Carry XL-Targets and precision measurement bar
- ▶ Precision measurement bar for targets



Spring loaded stamp brake



VW Target for front camera: Setup is a matter of seconds by using the green brackets and clicking them into pre-defined height positions. Covers also Alfa-Romeo and Ferrari.



Radar: VW Target vertically installed. Lateral shift to reach preferred measurement position. Plug in red bracket and ready. Covers besides of VAG also BMW, Mini, Nissan, Fiat, Suzuki .



Subaru Targets for front camera: Simply plug in blue brackets and intall target. Fix from above. Ready.





Optional camera for software based placement of device referring to vehicle center line



Additional carriage for XL-Targets (e.g. VW Crafter)

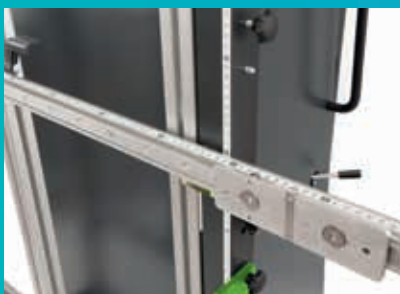
Universal carriage

Precision measurement bar for installation of target boards

Distance measurement and line-up to driving axis fully digital



Extra large wheels for comfortable maneuvering



Precision measurement bar for installation of target boards and rapid roll angle adjustment.

- ▶ Magnetic fixations
- ▶ Displaceable for flexible height adjustment



Pitch angle adjustment with turning knob. Very ergonomic and comfortable Radar 3-point calibration ( $-2^\circ / 0^\circ / +2^\circ$ ): Lift spindle rod quickly and snap precisely in the desired positions for tilting.



Distance measurement and line-up to driving axis fully digital. Cameras build-in fixture and therefore perfectly protected.

# DAS 3000: Scalable solution for Glass Fitter, Collision Repair and professional Workshops



## Technical data

### Front Radar calibration:

- ▶ Coverage of vertical radar mounting positions on vehicle: 260 – 1,000 mm
- ▶ Largest offset of lateral mounting position: +/- 750 mm

### Front camera calibration with Multi-Target-Shop:

- ▶ Offset-adjustment for measurement platforms: 0 – 300 mm
- ▶ Height adjustment measurement bar: 700 mm – 1.850 mm
- ▶ Traveling range target carriage: +/- 800 mm
- ▶ Predefined fixation of brackets holding XL-Target:
  - VW/Audi\* car (1,200 mm) and Subaru Typ 3
  - VW/Audi\* car (1,300 mm) and Subaru Typ 2
  - VW/Audi\* SUV (1,400 mm) and Alfa-Romeo
  - VW/Audi\* Transporter (1,850 mm)

### Working range computer vision positioning:

- ▶ Track width of vehicle: 1,650 mm – 2.200 mm
- ▶ Distance measurement: 0,4 – 6 m
- ▶ Virtual center line: max. 6 m
- ▶ Measurement driving axis: max. 8 m
- ▶ Wheel clamping range: 13 – 22"
- ▶ Extension for clamping range (optional): 23" – 28"

### Calibration device:

- ▶ Dimensions H x W x D: 2,090 mm x 2,030 mm x 730 mm
- ▶ Net weight: approx. 120 kg

\* Volkswagen-Group

	DAS 3000 S10	DAS 3000 S20
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### Calibration function

Front camera	Yes	Yes
Front radar	Optional	Yes
LIDAR	In preparation	In preparation
Night vision	In preparation	In preparation

### Placement

Yaw angle setting of target boards	Vehicle center line	driving axis
Digital distance measurement	Yes	Yes

### Scope of Delivery

Calibration device	Yes	Yes
VW target / multi radar reflector	Yes	Yes
Camera "virtual vehicle center line"	Yes	No
Distance measurement aid (post with reference panel)	Yes	Yes
Camera-Set "Driving axis"	No	Yes
Universal wheel clamp with target (Set)	No	Yes
Software package ADAS Positioning (download also via DDM)	Yes	Yes

### Accessories / Retrofitting

Multi-Target-Shop Starter kit	Optional	Optional
Upgrade kit Radar (only for S10). Includes crossbar with integrated cameras and wheel clamps with targets. SNR: 1 687 001 650	Yes	n.a.
Camera "virtual vehicle center line": SNR: 1 687 001 651	n.a.	Yes
Brackets for Target Alfa-Romeo (magenta) SNR: 1 685 720 383	n.a.	Yes

**DAS 3000 S10** ☎ 0 684 300 108

**DAS 3000 S20** ☎ 0 684 300 109

# **DAS 3000:** Sensor calibration conform with all OEM requirements. Significant time savings during placement due to Bosch software workflow



BMW/Mini and VW-Group: Highly precise placement towards the driving axis including specific distance setting. VW-Target installed vertical and centred in front of Radar sensor.



Toyota front camera: Sequential calibration with one or multiple targets. Highly precise positioning of the distance measurement aid according to OEM requirements.



Nissan front radar + camera: The software based distance measurement shows it's full advantage especially at distances of 2-4 meter. That's a gain of workshop efficiency. Distance measurement aid with pointer for wheel centre reference.



3-point radar calibration: Tilting positions according to OEM requirements: +2°, 0°, -2°



**DAS 3000:** Also applicable on OEM conform working bays – all calibration targets stored in trolley



Audi: Double-Radar calibration with short setup time. Attach VW-Target to match with left and right radar axis. Lateral adjustment with a sense of proportion. Thanks to innovative product design, no height adjustment required.



Headlight aimer bay: trouble-free placement between the rail systems. Ensured by large wheels, distance measurement aid and roll/pitch angel setting directly on the measurement bar.



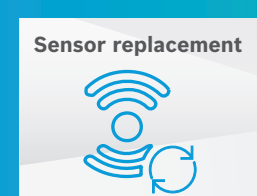
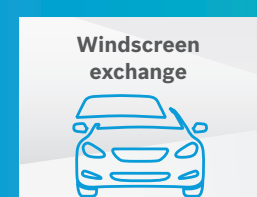
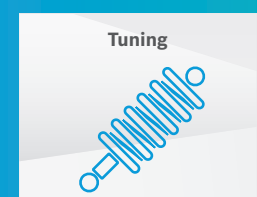
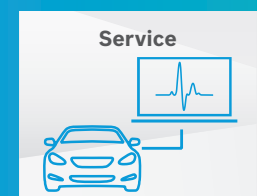
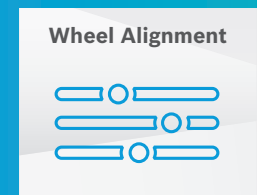
Above floor lifts: Program routine for permanent yaw angle display for monitoring if target is perpendicular to driving axis.



## Which use case requires ADAS services or sensor calibration?

Manufacturer	Front camera		Front Radar		
	Lane assistance functions		ACC, emergency assistance functions		
	Service track	Static calibration with targets	Service track	Static calibration with targets	
		DAS 3000		DAS 3000	SCT 815
Alfa Romeo	—	•	—	•	—
Audi	—	•	—	—	—
BMW	•	—	—	•	—
Chrysler	•	—	•	—	—
Citroën	—	• <sup>2)</sup>	•	—	—
Daihatsu	—	•	—	•	—
Fiat	—	•	—	• <sup>2)</sup>	—
Ford	•	—	•	—	—
Honda	—	• <sup>1)</sup>	—	—	•
Hyundai	—	• <sup>2)</sup>	—	—	• <sup>2)</sup>
Jaguar	•	—	•	—	—
Jeep	—	• <sup>2)</sup>	• <sup>3)</sup>	—	—
KIA	—	• <sup>2)</sup>	—	—	• <sup>2)</sup>
Land Rover	—	—	—	—	•
Mazda	—	•	—	—	•
Maserati	—	○	—	•	—
Mercedes-Benz	—	• <sup>1)</sup>	•	—	—
Mitsubishi	—	•	—	•	—
Nissan	—	•	—	•	—
Opel	—	• <sup>2)</sup>	•	—	—
Peugeot	—	• <sup>2)</sup>	•	—	—
Porsche	—	•	—	•	—
Renault	—	•	• <sup>3)</sup>	—	—
Seat	—	•	—	•	—
Škoda	—	•	—	•	—
Smart	—	•	•	—	—
Subaru	—	• <sup>1)</sup>	—	—	—
Suzuki	—	•	—	•	—
Toyota	—	•	—	—	•
Volkswagen	—	•	—	•	—
Volvo	•	—	•	—	—

- 1) Combined with service track (dyn. calibration)  
2) For some vehicles types also service track (dyn. calibration)  
3) For some vehicles types also static calibration  
— Not applicable  
○ In preparation



# Multi-Target-Shop: Calibration targets for the following vehicle manufacturers



**Calibration target XL-universal for Kia, Hyundai, Fiat, Type 1.1**  
 ☎ 1 688 130 261



**Calibration targets universal for Renault, Smart, Infiniti, Type 1 (Set)**  
 ☎ 1 690 381 142



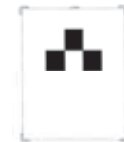
**Honda, Type 1**  
 ☎ 1 690 381 143



**Honda, Type 2**  
 ☎ 1 690 382 297



**Honda, Type 3**  
 ☎ 1 690 382 349



**Kia/Hyundai, Type 2**  
 ☎ 1 690 382 320



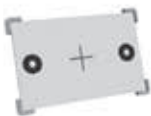
**Kia/Hyundai, Type 3**  
 ☎ 1 690 382 316



**Mazda, Type 1**  
 ☎ 1 690 382 318



**Mazda, Type 2 (Set)**  
 ☎ 1 690 381 234



**Mercedes-Benz, Type 1 (Pkw)**  
 ☎ 1 690 382 312



**Mercedes-Benz, Type 2 (Sprinter)**  
 ☎ 1 690 382 319



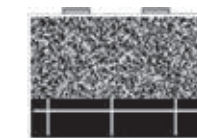
**Mitsubishi, Type 1 (Set)**  
 ☎ 1 690 381 218



**Nissan, Type 1 (Set)**  
 ☎ 1 690 381 139



**Nissan, Type 2 (Set)**  
 ☎ 1 690 381 140



**Subaru, Type 2.1 + 3.1**  
 ☎ 1 688 130 258



**Toyota, Type 1**  
 ☎ 1 690 382 287



**Toyota/Lexus, Type 2**  
 ☎ 1 690 382 328



**Toyota, Type 3**  
 ☎ 1 690 382 355



**Included in DAS 3000 scope of delivery**



**Storage container for targets (empty)**  
 ☎ 1 690 381 216



**Integrated Multi-Target-Shop container:** individual storage position of calibration targets. Within immediate reach.  
 ☎ on request

**Note:** Set = 2 targets

# ESI[tronic] 2.0: Diagnostic software for controlling vehicle specific calibration and adjustment procedures

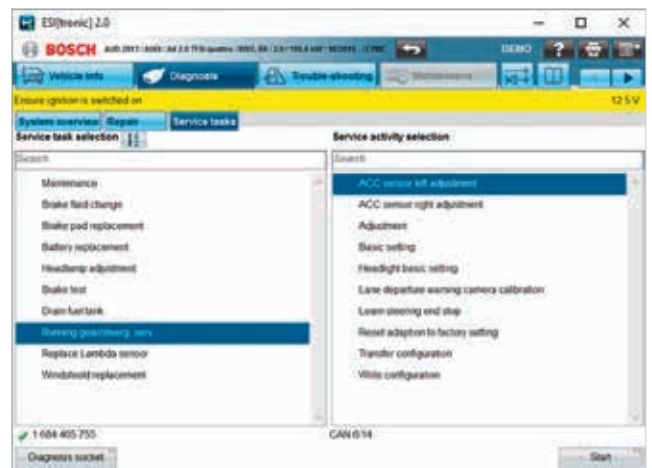


ESI[tronic] 2.0 Online and the new generation of vehicle communication interface KTS 560/590 provides fast access to the diagnostic routines needed for an ADAS system calibration:

- ▶ diagnosis of control unit and sensors combined with system pre/post scan including DTC listings
- ▶ troubleshooting
- ▶ repair and maintenance

Supports besides all common OBD vehicle interfaces as well all current and future vehicle interfaces based on Ethernet (DoIP).

The KTS 5xx series includes also a PassThru interface for programming the control units on the portals of the vehicle manufacturer as per Euro 5/Euro 6.



Powerful Windows 10 PC systems from Bosch control the diagnostics software ESI[tronic] 2.0 online with the Bosch KTS 5xx series:

- ▶ DCU 100 is a portable and robust tablet PC with touchscreen (10")
- ▶ DCU 220 is a combined notebook and tablet PC (11,6") and provides flexible and comfortable working conditions – especially in the rough workshop environment

### Alternative:

KTS 350 – the mobile all-round solution with integrated KTS module and OBD cable connector

# Driven by efficiency

Bosch technologies are used worldwide in almost all vehicles. People, and assuring their mobility, is what we are focused on.

Therefore, we have dedicated the last 125 years of pioneering spirit and expertise in research and manufacturing to achieving this.

We continue to work on our unique combination of solutions for spare parts, diagnostic devices, workshop equipment and services:

- ▶ Solutions for efficient vehicle repairs
- ▶ Innovative workshop equipment and software
- ▶ The world's most comprehensive range of new and replacement parts
- ▶ Large network of wholesale customers, for quick and reliable parts supply
- ▶ Competent hotline support
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**Robert Bosch GmbH**  
Automotive Aftermarket  
Business Unit Automotive Service Solutions

73201 Plochingen  
Germany  
**[bosch-werkstattwelt.de](https://bosch-werkstattwelt.de)**



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