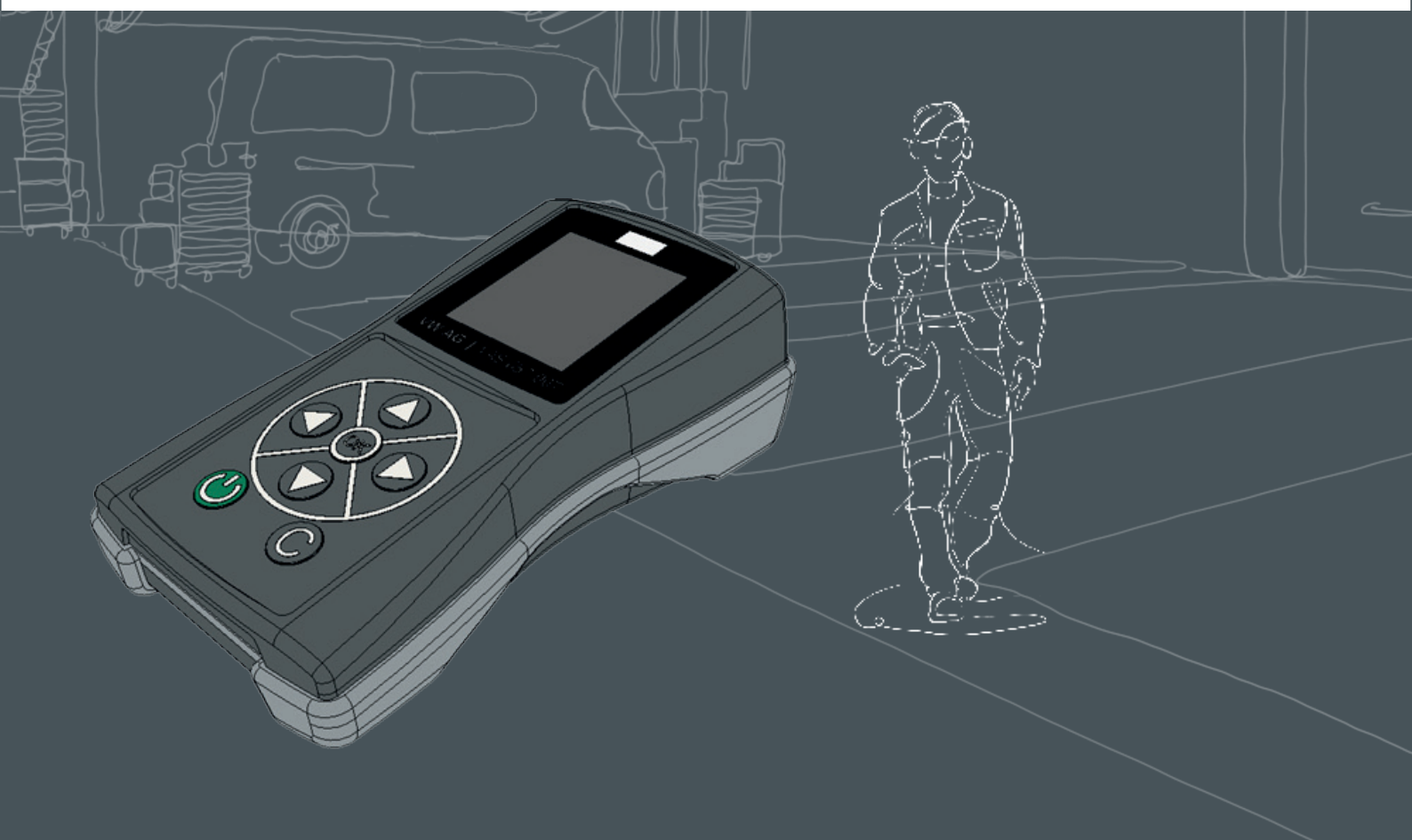


VOLKSWAGEN

AKTIENGESELLSCHAFT



Operating Manual

Calibration device for camshaft sensors VAS 652 007 (ASE 652 007 00 000)

swoboda
technologies



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Dear customer,

This manual contains information and important notes on commissioning the device and the device itself. It is a key component of the device.

READ MANUAL

Please observe the safety instructions!

Read this manual carefully before commissioning. This will help ensure you use the device properly and prevent possible damage.

Observe the warning and safety instructions. Failure to do so may result in damage and/or serious injury. This document must be kept for the duration of use of the device.

Due to ongoing product refinement, illustrations and contents may deviate slightly. If you notice any errors, please inform us. We reserve the right to make technical changes.

All product names, images, companies or other trademarks used in this document remain the property of their respective owners.

Original user manual (German):

Bedienungsanleitung Kalibriergerät Nockenwellensensor VAS 652 007

Version: 1.0

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2 | Explanation of Symbols

DANGER		Danger, risk of death or very severe injury
WARNING		Warning, risk of minor injuries
CAUTION		Attention, risk or likelihood of property damage
NOTE		Important information /note
READ MANUAL		Observe operating instructions
		WEEE marking (according to Directive 2012/19/EU)
		Warning - read operating instructions
		DC current indicator

2 | Explanation of Symbols

Scope of Delivery

The scope of delivery of the calibration device for camshaft sensors VAS 652 007 comprises:

- a. 1 ea base unit VAS 652 007/1
- b. 1 ea charging cable VAS 652 007/2
- c. 1 ea sensor cable VAS 652 007/3
- d. 1 ea update cable VAS 652 007/4
- e. 3 ea accumulator NiMh AAA
- f. 1 ea operating manual on a USB stick
- g. 1 ea carrying case
- h. 1 ea safety instructions

NOTE

An external 5V charger is not included and must be purchased separately.

WARNING

For this purpose, observe the requirements for the charger as set out in the technical data.

Check the delivery for completeness and ensure the contents are undamaged.

If the delivery is incomplete or the device or the enclosed parts show evidence of damage in transit, please contact the supplier.

WARNING

Never operate a damaged device.

Type designation

Type: Calibration device for camshaft sensors VAS 652 007

The identification plate is located on the accumulator compartment cover on the underside of the device.

Validity/product version

This operating manual is exclusively valid for the following device versions:

- Revision 1.2

Manufacturer

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General function

The calibration device for camshaft sensors VAS 652 007 is exclusively intended for calibrating camshaft sensors.

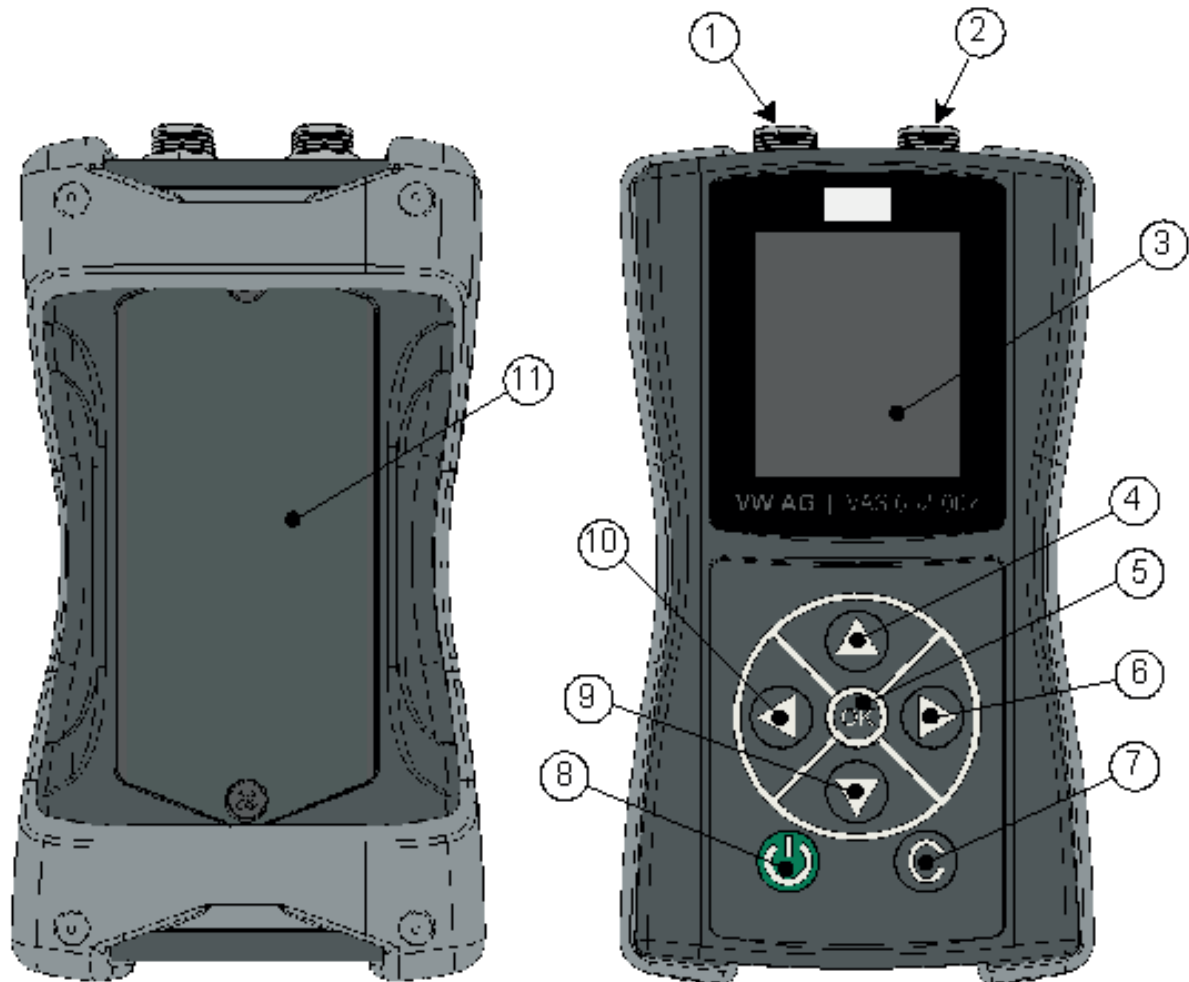
The accumulators can be charged in the device via the charging cable supplied. The device can be configured with any available software updates via the update cable supplied.

The calibration device VAS 652 007 switches off automatically when not used for ten minutes.

NOTE

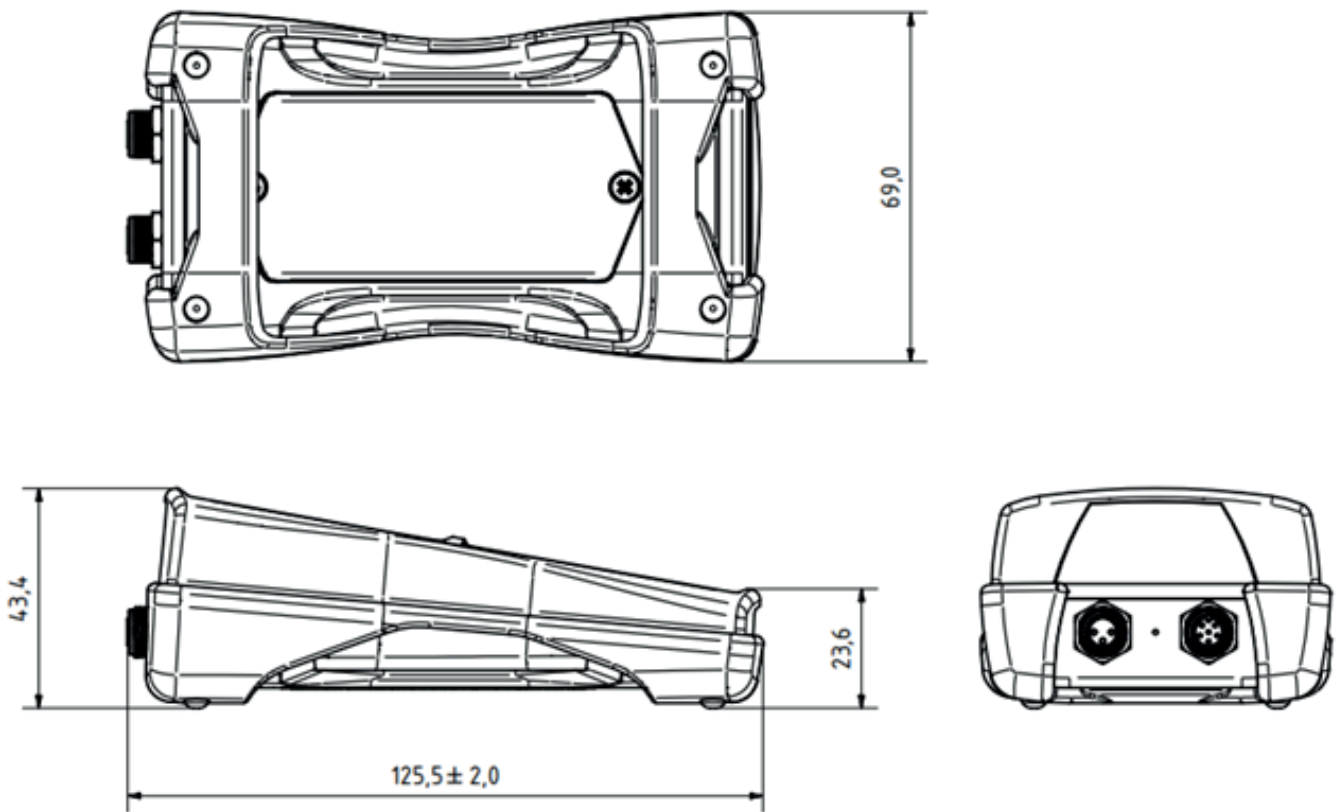
Preparation of the vehicle or engine is not part of this operating manual – please refer to the relevant workshop manual for more information.

Operating and display elements



- | | |
|---|-----------------------------|
| 1. Connecting socket for sensor cable (VAS 652 007/3) or update cable (VAS 652 007/4) | 6. "Right" button |
| 2. Connecting socket for charging cable (VAS 652 007/2) | 7. "C/Reset" button |
| 3. Display | 8. "On/Off" button |
| 4. "Up" button | 9. "Down" button |
| 5. "OK" button | 10. "Left" button |
| | 11. Accumulator compartment |

Dimensions



Note: All dimensions in mm

Technical data

Accumulator operation:	3x AAA NiMH accumulators (rechargeable batteries)	
Input voltage:	5V DC for connecting an external 5V charger** with a USB-A socket USB 2.0 (High Powered Port) min. 4.75 V - max. 5.25 V Overvoltage protection with TVS diode, reverse polarity protection	
Input current:	Nominal:	300 mA
Internal frequency:	Maximum:	48 MHz
Operating environment:	Operating temperature:	0 °C to +45 °C, in charging mode 10 °C to 40 °C
	Relative humidity:	10 to 80 [% rF] at 25°C, no dew
	Pollution level:	2
	Operating height above sea level:	-500 m – 5,000 m
Storage conditions:	Storage temperature:	-20 °C to +55 °C
	Relative humidity:	up to 100% [% rF] at 25°C, no dew
Output voltage/current:	Nominal:	+5V / 150 mA
	All sensor outputs (signal, supply) are permanently short-circuit proof	
Cable lengths:	Update cable (VAS 652 007/4):	200 mm
	Sensor cable (VAS 652 007/3):	1200 mm
	Charging cable (VAS 652 007/2):	800 mm
Dimensions (L, W, H):	125.5 mm x 69.0 mm x 43.4 mm	
Weight incl. accumulators:	Approx. 190 g	
Protection class:	IP54*	

WARNING

Only UL listed chargers** can be connected to the device.

CAUTION

Only the following accumulators (rechargeable batteries) may be used for operation: GP 30085AAAHC. The use of other accumulators, especially lithium, can lead to damage or even injury.

* Not evaluated by UL ** Class 2 (NEC) /LPS (UL60950-1 /UL62368-1 and IEC 62368-1, EN 62368-1 and DIN EN 62368-1)

Accumulator types, handling instructions

WARNING		Overcharging, short-circuiting, charge reversal, mutilation or burning of the accumulator may lead to one or more of the following phenomena: release of toxic substances, release of hydrogen and/or oxygen gas or increase in surface temperature.
WARNING		If an accumulator has leaked, it must be replaced immediately while wearing protective gloves.
WARNING		If necessary, accumulators must be replaced with identical new accumulators made by the same manufacturer. It is always recommended to replace all accumulators with new ones at the same time.
WARNING		Avoid installing the accumulators in the device with reverse polarity.
WARNING		Only the following accumulator type is usable in the device: GP Batteries - Type GP 30085AAAHC.

Target group/staff qualifications

This description is exclusively intended for trained specialists who are experienced in the use of electronic workshop equipment and in commissioning and diagnosing electronic assemblies and devices.

These are persons who have had the right training and experience to identify risks and prevent possible hazards that may arise when operating or maintaining a product.

Intended use, foreseeable misuse

The calibration device VAS 652 007 documented in this operating manual is intended exclusively for calibrating Swoboda sensors by trained specialists. The calibration is prepared according to the workshop manual.

The device may only be operated indoors (in workshops, factories, etc.).

The device must not be simultaneously used for calibration and charged via the 5V power supply.

Foreseeable misuse:

- Operation on an incorrect or reversed supply voltage
- Operation in a location outside the scope of the specified ambient conditions
- Opening or disassembly (also partial) of the device
- Connection of sensors/control via unsuitable cables
- Use of incorrect accumulator types
- Incorrect insertion of the accumulators (polarity reversal)
- Ingress of dirt and liquids via the accumulator compartment
- Use of the device with simultaneous charging of the accumulator

Residual risks

Residual risks are those impossible to exclude, even when the device is used as intended.

Residual risk	Source	Consequences
Defective accumulator (short circuit)	Accumulator	Fire, melting or dripping plastic, formation of toxic fumes.
Incorrect accumulator type inserted	Accumulator	Fire, melting or dripping plastic, formation of toxic fumes.
Ingress of foreign substances (solid, liquid) through the open accumulator compartment.	Device, accumulator compartment	Device is destroyed or functionally impaired.
Storage temperature too high	Accumulator	Leakage of acids and alkalis from the accumulators. Device is destroyed. Burns.
Leaking chemicals	Accumulator	Leakage of acids and alkalis from the accumulators. Device is destroyed. Burns.
Device is not disposed of in an environmentally friendly manner after decommissioning.	Operator, owner	Environmental pollution.

Personal protective equipment

Personal protective equipment need not be worn when operating the device.

NOTE

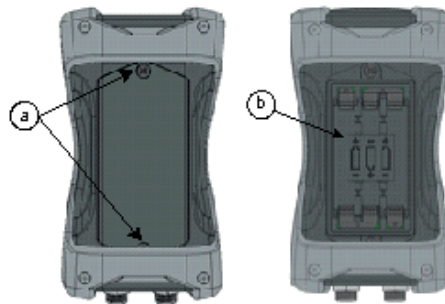
It should be noted that depending on the place of use (workshops, production lines, etc.), additional requirements governing the use of personal protective equipment (e.g. wearing safety shoes in industrial environments) may apply.

Commissioning, inserting accumulators

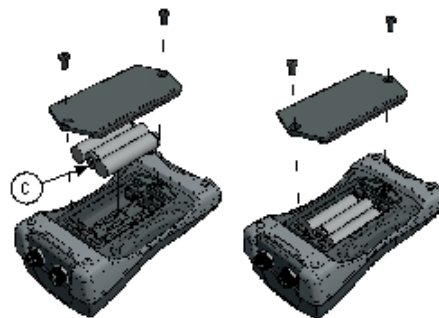
WARNING

Read this operating manual thoroughly before commissioning to avoid operating errors and damage to the device.

- 1.) Remove the device from the carrying case.
- 2.) Open the accumulator compartment (Phillips screwdriver required) by unscrewing the two screws (a). One of the screws is slightly covered by a rubber seal, which can be carefully lifted to allow it to be unscrewed.



- 3.) Insert the accumulators (c) into the accumulator compartment, ensuring the orientation is correct. The correct orientation is indicated in the accumulator compartment (b).



- 4.) Close the accumulator compartment again with the screws (Phillips screwdriver required).

WARNING





Only use the rechargeable NiMH accumulators approved for this device. Lithium accumulators must not be used under any circumstances.

WARNING

If the accumulators are inserted incorrectly, the device will not work and the accumulators may be damaged.

5.) Charge the accumulators in the device using the supplied charging cable on the charger (excluded from the delivery scope).

The status line shows the charging state in the top left corner as follows:

-  The accumulators are empty and need charging.
-  The accumulators are being charged (the green part indicates the current charge level).
-  The accumulators are fully charged.
-  Power is being supplied via the external power supply unit.

- 6.) After charging, disconnect the device from the charger and remove the charging cable.
- 7.) Press the green start button on the device to switch it on and display the start screen.
- 8.) The device is now ready for use and can be connected to the sensor to be calibrated with the supplied sensor cable.

NOTE

Charging is temperature-monitored and interrupted for safety reasons at an accumulator temperature of $> 42\text{ }^{\circ}\text{C}$. If the temperature drops below $42\text{ }^{\circ}\text{C}$ again, the charging process will automatically resume.

Protections – emergency stop, emergency shut-off

The device does not include emergency stop or emergency shut-off functions.

The device has an internal temperature monitor, which switches off the device or the charging function when the maximum operating temperature is reached or when the accumulator temperature is excessive.

Operation

Operation may only take place under the conditions specified in this document.

Maintenance, cleaning

The device is maintenance-free.
The accumulators may need to be replaced when the capacity declines.

For cleaning, the device must first be disconnected from all plug connections and switched off and the accumulator compartment must be closed. The device can then be wiped off with a damp cotton cloth.

WARNING	When the accumulator compartment is open, it is important to ensure no ingress of parts or liquids into the device through the open accumulator compartment.
WARNING	The use of cleaning agents may impair the visual aspects of the product (e.g. causing discoloration) and/or adversely affect the visibility via the protective display screen. Accordingly, test such agents before use on a small corner of the housing or display screen.

Decommissioning, disassembly, disposal

If the device is put out of operation, accumulators must be removed to prevent damage from liquids that may leak.

NOTE	Before disassembly, ensure the supply voltage is switched off. Remove the accumulators and dispose of them separately in an environmentally friendly manner.
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Electrical and electronic equipment often contain valuable materials. They also contain certain substances, mixtures and components that were necessary for their function and safety. If disposed of as residual waste or improperly treated,

they can harm human health and the environment. Instead, it is important to use officially established collection and return points when delivering and recycling electrical and electronic equipment in your municipality.

NOTE	The device does not store any data, so there is no need to delete data before disposal for the purpose of data protection.
------	--

Duty of care of the operator/user

In particular, the operator must ensure that:

- The calibration device VAS 652 007 is only used for the intended purpose,
- The calibration device VAS 652 007 is only operated when in a perfect, functional condition,
- Only adequately qualified and authorized personnel install, commission, operate and decommission the device.

Instruction and training

In particular, the operator must ensure that:

- The personnel are instructed in all applicable questions of occupational safety and environmental protection before initially starting work as well as a minimum of once a year thereafter,
- The operating manual remains legible and complete at all times at the place of use of the calibration device VAS 652 007,
- The personnel are familiar with the operating instructions, particularly the safety instructions contained therein,
- The attached safety and warning notices are not removed and remain legible.

Operator's duty of care:

The operator must:

- Check the device for visible damage,
- Report any defects found immediately.

Risks from materials used



This product may expose you to chemicals including arsenic, antimony trioxide, acrylonitrile, lead and lead compounds, cadmium, cobalt, nickel (metallic), nickel hydroxide, nickel oxide and carbon black, which are recognized as carcinogenic by the state of California, as well as 1,3-butadiene, lead and lead compounds, and cadmium recognized by the state of California as the cause of birth defects and other reproductive harm. For more information, please visit www.P65Warnings.ca.gov.

Transportation and storage

Transportation

The device is transported in a carrying case, which must be used whenever shipping the device, including e.g. for return. The carrying case must be packed such that it can withstand falling from a height of 2 m. This can be done, for example, by packing the carrying case in a transport box (cardboard, min. double-walled) with padding material.

Storage

The device must be stored in its carrying case and protected from environmental influences. Storage conditions -> see chapter "Technical Data"

Safety measures before use

Check delivery.

- 1.) Check whether the delivery is complete
-> see section "Scope of Delivery".
- 2.) Check whether the device or the cables show any signs of damage.

WARNING

Never operate a damaged device.

Disposing of the packaging

The packaging must be disposed of in an environmentally friendly manner and in accordance with local laws and regulations.

Ensure all the necessary preparations regarding the vehicle and engine have been made.
The camshaft must be in the defined position.

WARNING

If the camshaft is not in the defined position or an incorrect motor type has been selected, the calibration will result in incorrect settings, which the calibration device cannot detect. Incorrect calibration may lead to engine damage.

NOTE

Attention, the accumulators must be charged to at least 30% capacity. Charge the calibration device VAS 652 007 accordingly before the calibration process.

Calibration

After the camshaft has been aligned accordingly, connect the calibration device VAS 652 007 to the sensor using the corresponding cable VAS 652 007/3.

Briefly press the "On/Off" button to switch on the calibration device VAS 652 007. During start-up, the VW logo appears. If the calibration device is not operated, it switches off automatically after ten minutes. To switch off manually, press the "On/Off" button until the display goes off.






Unless a USB stick for software update is connected, the application is started.



The status line in the top left of the display shows the charging status of the accumulators.



- 1)  Accumulator is charging, current capacity approx. 30%
- 2)  Accumulator is not charging and has full capacity
- 3)  The power supply via the external 5 V charger is connected

NOTE

If the charging symbol does not appear, check the voltage supply.

If several engine variants are supported, first select the corresponding engine variant for calibration. Please refer to the respective workshop manual for the vehicle to select either number “1” or “2”.



The motor variant can be selected using the “up” or “down” arrow buttons.

NOTE

If the motor variant has been changed, the display briefly shows a prompt to ensure the correct selection in the workshop manual.



After selecting or checking the correct motor variant, the calibration device VAS 652 007 is ready to calibrate the sensor.

Press "OK" and the calibration process is completed in around 2-3 seconds. Provided the calibration was successful, the following confirmation is shown on the display:



Please remove the sensor cable from the sensor, switch off the calibration device and follow the workshop manual.

Errors during calibration

Unsuccessful calibration may be due to the following errors:

1. The sensor is defective. The display shows the following indication:



Switch the calibration device VAS 652 007 off and on again and recalibrate. If the recalibration is not completed successfully, the sensor is defective and must be replaced.

2. The sensor cable is defective, the sensor is incorrectly connected or the sensor is defective. The display shows the following indication:



Please check whether the sensor and all plugs are connected correctly.

Switch the calibration device VAS 652 007 off and on again and recalibrate.

If the recalibration is not completed successfully, either the sensor cable VAS 652 007/3 or the sensor is defective and must be replaced.

3. Camshaft misaligned or magnet on camshaft incorrectly positioned.



Please check the correct alignment of the camshaft.
Switch the calibration device VAS 652 007 off and on again and recalibrate.

If the recalibration is not completed successfully, the camshaft or the magnet position on the camshaft is out of tolerance. In this case, please refer to the workshop manual.

4. Accumulators are not sufficiently charged.



The accumulators must be charged to at least 30% capacity.

As soon as the accumulators are fully charged, the charging process is terminated and the charging indicator in the accumulators symbol disappears. The charging process occurs independently of whether the calibration device is switched on or off.

As soon as the charging process has finished, please disconnect the calibration device VAS 652 007 from the power supply.

When the calibration result is displayed, the sensor is de-energized and can be disconnected from the calibration device. For further steps, please refer to the workshop manual.

Software update

If a software update is available, proceed as follows:

The software is updated using the USB memory stick that comes with the calibration device.

NOTE

To ensure the power supply during the software update, the update must be performed with the 5 V supply voltage connected. Please use the USB stick supplied or a stick with FAT32 formatting.

Copy the provided software file
“SwobodaFW VWNWSHT.bin”
onto the supplied USB stick.

NOTE

The software file must not be copied to a folder, but must be located in the root directory of the USB stick!

To ensure the power supply during the software update, connect the charging cable VAS 652 007/2 to the calibration device and the external 5 V charger and connect the USB stick to the calibration device using the update cable VAS 652 007/4.

Switch on the calibration device by pressing the green “On/Off” button.



The update process starts automatically, including several phases, which are illustrated by a corresponding progress indicator.



If the update has been successful, the calibration device automatically starts the new application. Please switch off the calibration device and remove the USB stick and the update cable VAS 652 007/4.

Software update failures

Failure to update may be due to one of the following errors:

1. No valid USB stick recognized or the update cable VAS 652 007/4 is defective:



Please recheck the USB stick is correctly connected to the calibration device.

If the software update does not start automatically, please switch the calibration device VAS 652 007 off and on again.

2. The USB stick is incorrectly formatted, the update file is corrupt or no valid software file exists:



Please remove the USB stick and check the correct formatting or use the supplied USB stick.

Please check whether the software file “SwobodaFW VWNWSHT.bin” has been correctly copied into the root directory. Connect the USB stick to the calibration device using the update cable VAS 652 007/4.

If the software update does not start automatically, please switch the calibration device VAS 652 007 off and on again.

3. In case of a USB stick without an update file, the following image is briefly displayed:



After that, the application will start automatically.



Please check that the USB stick is correctly connected to the calibration device and the USB stick is correctly formatted or use the supplied USB stick.

Please check, whether the software file **“SwobodaFW_VWNWSHT.bin”** has been correctly copied to the root directory.

Please switch the calibration device VAS 652 007 off and on again and restart the software update.

Force software update

If the software update does not start automatically after switching on, although the USB stick has been connected correctly and there is a correct software file **“SwobodaFW_VWNWSHT.bin”** on the USB stick, you can force the update to start.

To do this, connect the charging cable VAS 652 007/2 to the calibration device and connect the USB stick to the calibration device using the update cable VAS 652 007/4. Switch on the calibration device and wait until the calibration menu is displayed.

In the calibration menu, press and hold the right button for at least eight seconds.



The software update starts if a valid software file **“SwobodaFW VWNWSHT.bin”** is detected.



Please do not remove the USB stick and wait until the software update is started. After a successful update the application will start automatically.



After a successful update, the calibration device automatically starts the new application. Please switch off the calibration device and remove the USB stick and the update cable VAS 652 007/4.

Maintenance cycles for safe operation

The device is maintenance-free and also needs not be regularly calibrated itself. It is important to ensure the accumulators are sufficiently charged before calibrating the camshaft sensor.

Troubleshooting, diagnosing faults and repairs

1. No display indication
 - a. No accumulators inserted and the external 5V supply not connected.
 - i. Insert accumulators or connect the external 5V supply
 - b. Accumulators are not sufficiently charged and the external 5V supply is not connected
 - i. Connect the external 5V supply and charge accumulators
 - c. The charging cable VAS 652 007/2 is not connected or defective
 - i. Check the charging cable connection and the external 5V supply voltage
 - ii. Insert charged accumulators
 - d. Accumulators are defective
 - i. Replace all three accumulators (approved accumulator type: GP 30085AAAHC)
 - e. Calibration device defective
 - i. Replace calibration device
2. Display flickers
 - a. Accumulators are not sufficiently charged and the external 5V supply is not connected
 - i. Connect the external 5V supply and charge accumulators
 - b. Accumulators are defective
 - i. Replace all three accumulators (approved accumulator type: GP 30085AAAHC)
 - c. The external 5V supply voltage is too low
 - i. Check or replace the external 5V supply
3. When starting the calibration process, the calibration device restarts
 - a. Accumulators are not sufficiently charged
 - i. Connect the external 5V supply and charge accumulators
 - b. Accumulators are defective
 - i. Replace all three accumulators (approved accumulator type: GP 30085AAAHC)
4. Error messages after calibration
 - a. See chapter "Operation"
5. Error messages during software update
 - a. See chapter "Software Update Errors"
6. Accumulators are not charged
 - a. Please check the connection with the charger
 - b. Ensure the charger meets the specifications
 - c. The accumulators are not charged at accumulator temperatures > 42 °C

Packing before re-transportation

It is recommended to use the original packaging.

Volkswagen Aktiengesellschaft

K-AVO-LW

Konzern After Sales

Group Service, Literatur und Systeme

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