

ADAS

Radars – Spare Parts

Installation Instructions



Original document:

The English version is the original document.

Translation of the original document:

All non-English language editions of this document are translations of the original document.

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List of abbreviations

1 List of abbreviations

Abbreviation	Description
ADAS	Advanced Driver Assistance System
AEBS	Advanced Emergency Braking System
ACC	Adaptive Cruise Control
UDT	Unifed Diagnostic Tool
DTC	Diagnostic Trouble Code
VIN	Vehicle Identification Number
ECU	Electronic Control Unit
AM	Aftermarket
OEM	Original Equipment Manufacturer
PN	Part Number

2 Information about this document

2.1 Validity

This document applies to the following WABCO part numbers:

- 446 067 300 0
- 446 067 301 0
- 446 067 302 0
- 446 067 303 0
- 446 075 300 0

2.2 Symbols used



Important information, notes and/or tips

Descriptive text

► For individual action steps

1. Action step 1

2. Action step 2

↪ Consequence of an action

- Listing

2.2.1 Explanation of the warning notes

CAUTION

Indicates a hazard that may result in slight or moderately serious injury if not avoided.

NOTICE

Indicates a hazard that may result in material damage if not avoided.

2.3 Structure and explanation of the warning notes

Warnings are structured as follows:

- Signal word and pictogram
- Correct naming of the hazard
- Description of the consequences if the hazard is ignored
- Description of the measure(s) to prevent the danger

3 Basic safety instructions

3.1 Intended use

The radars are spare parts (replacements) for OEM radars already installed in IVECO and DAF trucks.

The relationships between the replacement parts and the OEM parts are described in detail in chapter "5.1 Radar replacements", page 12.

NOTICE

Risk of material damage.

Medium to extensive material damage possible.

- Do not install spare parts that do not correspond to the OEM equivalents, see chapter "5.1 Radar replacements", page 12.
- Do not install spare parts in vehicles initially not equipped with OEM radars.

3.2 Obvious misuse

Any use other than that described in the intended use is not in accordance with this intended use and is therefore not permitted.

WABCO/ZF accepts no liability for damage caused by improper use. The risks of improper use lie solely with the user.

Basic safety instructions

3.3 Qualification and knowledge of the personnel

The activities described in this documentation require basic knowledge of mechanics, electrics, pneumatics and knowledge of the associated technical terms.

Workshop staff must have experience and detailed knowledge of operating diagnostic software and performing the dynamic calibration.

3.4 General safety instructions

- ▶ Follow all safety information, instructions and notices in this document to avoid personal injury and material damage.
- ▶ Follow regional and national regulations on accident prevention.
- ▶ Ensure cleanliness throughout the application.
- ▶ Keep this document and other documentation supplied with the product.
- ▶ Make sure your workplace is dry as well as adequately lit and ventilated.
- ▶ Repairs may only be carried out by authorised personnel of the manufacturer or by authorised workshop personnel.

3.5 Personal protective equipment

- ▶ To prevent injury, wear personal protective equipment suitable for the intended activity according to the instructions at the workplace, e.g.:
 - Safety boots
 - Safety goggles
 - Ear protection

4 Product description

In 2009, the European Union published the General Safety Regulation that makes AEBS mandatory for trucks for medium to heavy-duty road transport and coaches from 10/2013 (with new type approval) and 10/2015 (new registrations).

According to this regulation, AEBS is a system that automatically detects an emergency situation and activates the vehicle's braking system to brake the vehicle and avoid or mitigate a collision. A technical definition of an AEBS is available in the European Commission Regulation.

All AEBS radars use a 77 GHz radar sensor with a mechanical scan antenna. The radar has a maximum target detection range of 200 - 250 m. In order to reduce incorrect responses for distant objects, the AEBS radar uses a reduced range depending on the speed of the host vehicle. The vehicle speed is divided into 3 areas to represent city traffic, country roads and motorways. The range and vehicle speed threshold values have been selected to achieve the best compromise between ACC and AEBS performance and incorrect object responses.

4.1 Technical data

For radar numbers 446 067 300 0, 446 067 301 0, 446 067 302 0 and 446 067 303 0:

Weight	0.467 kg
Operating temperature	-40 °C to +85 °C
Nominal supply voltage	12/24 V
Current consumption	250 mA @ 28 V
Dimensions	142 mm x 98 mm x 46 mm
IP protection	IP6K9K
Mounting	3 x M6
Radar performance	Identical to OEM

For radar number 446 075 300 0:

Weight	0.295 kg
Operating temperature	-40 °C to +85 °C
Nominal supply voltage	12/24 V
Current consumption	238 mA @ 24 V
Dimensions	137 mm x 91 mm x 31 mm
IP protection	IP6K9K
Mounting	3 x screw holes
Radar performance	Identical to OEM

4.2 Product maintenance and warning statements

- ▶ Read this publication carefully.
- ▶ Adhere to all instructions, information and safety information to prevent injury to persons and damage to property.
- ▶ Always abide by the vehicle manufacturer's specifications and instructions.
- ▶ Observe all accident regulations of the respective company as well as regional and national regulations.

WABCO will only guarantee the safety, reliability and performance of their products and systems if all the information in this publication is adhered to.

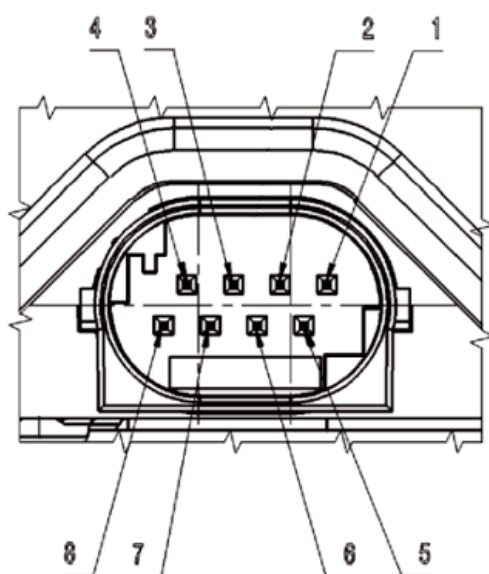
Driver assistance systems do not release the driver from his duty to actively follow the traffic regulations.

Product description

4.3 Electrical connectors

Radar pin assignment for the devices in the table below:

PN WABCO OE	PN DAF	PN WABCO AM
446 067 032 0	2109324	446 067 301 0
446 067 035 0	2264066	446 067 302 0
446 067 070 0	2121837	446 067 303 0
PN WABCO OE	PN IVECO	PN WABCO AM
446 067 064 0	5802133230	446 067 300 0



The pin assignment is shown below:

Pin	Name	Connection
1	UBAT	Terminal 15 or 30
2	WAKE_UP	Terminal 15 or open
3	CAN1_HI	J1939 CAN High
4	CAN0_LO	Optional
5	SW_OUT	Optional
6	CAN1_LO	J1939 CAN Low
7	CAN0_HI	Optional
8	GND	Ground

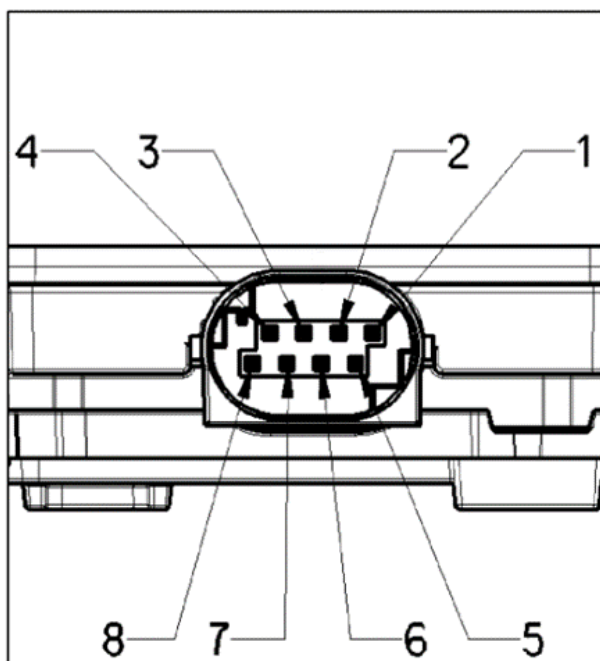


The sealing between the connector and the housing and the sheathing of each individual wire in the connector is also sealed in an environmentally compatible manner. Additional sealing (e.g. by greasing) is not permitted.

Product description

Radar pin assignment for the device in the table below:

PN WABCO OE	PN DAF	PN WABCO AM
446 075 036 0	2328901	446 075 300 0



The pin assignment is shown below:

Pin	Name	Connection
1	TI. 30	UBAT (either terminal 15 or terminal 30)
2	NC	Not connected
3	CAN-GND1	CAN Ground 1
4	CAN_L	J1939 CAN Low
5	NC	Not connected
6	CAN-GND2	CAN Ground 2
7	CAN_H	J1939 CAN High
8	TI. 31	GND

i The sealing between the connector and the housing and the sheathing of each individual wire in the connector is also sealed in an environmentally compatible manner. Additional sealing (e.g. by greasing) is not permitted.

5 Device installation/component replacement

5.1 Radar replacements

PN WABCO OE	PN DAF	PN WABCO AM
446 067 032 0	2109324	446 067 301 0
446 067 035 0	2264066	446 067 302 0
446 067 070 0	2121837	446 067 303 0
446 075 036 0	2328901	446 075 300 0
PN WABCO OE	PN IVECO	PN WABCO AM
446 067 064 0	5802133230	446 067 300 0

In order to select the correct AM spare parts, it is first necessary to check which OEM radar is appropriate for the vehicle.

This can be checked via the DAF ePortal (Repair and Maintenance Information) or the IVECO POWER parts catalogue.

Then you can select the spare part based on the OEM radar number (see table above).

The further installation process is described in chapter "5.3.1 Installation in DAF vehicles", page 13 and chapter "5.3.2 Installation in IVECO vehicles", page 15.

AM spare parts have the same backward compatibility as OEM devices.

For example:

The OEM radar **2109324** can replace the older radar versions **2004330** and **1953597**.

This means that the spare part **446 067 301 0** can also replace these older versions (spare parts have the same functionality as their OEM equivalents).

i This chapter must be always considered together with chapter "5.3.1 Installation in DAF vehicles", page 13 and chapter "5.3.2 Installation in IVECO vehicles", page 15.

5.2 Installation position

- The specified installation position is located at the centre of the vehicle front.
- The selected lateral offset position must be communicated to the sensor via parameter setting.
- The sensor must be mounted so that the antenna points in the direction of travel. Currently, the sensor is installed in the centre line of the vehicle and mounted with the connector on the left as seen from the driver's perspective.
- The selected alignment must be communicated to the sensor via parameter setting.
- The sensor module can be attached to the rear with its fastening bolts.

In any case, the vent hole on the back of the sensor housing must be covered by the bracket or frame to ensure sufficient resistance to high-pressure cleaning

- The area to be covered is the vent hole itself. The air gap between the bracket or frame and the vent hole must be 2 - 3 mm.
- The accuracy of the mounting position must ensure an alignment tolerance in azimuth and elevation of approximately $\pm 3^\circ$ with respect to the driving position of the vehicle. An additional mechanical alignment is not required. The final alignment within these limits can be carried out by the sensor itself or by self-learning during operation.

Device installation/component replacement

5.3 Installation

This chapter and its sub-chapters (chapter "5.3.1 Installation in DAF vehicles", page 13 and chapter "5.3.2 Installation in IVECO vehicles", page 15) should be regarded as a general guide for the replacement of spare parts.



- Always check the match between the OEM radar and its AM equivalent, see chapter "5.1 Radar replacements", page 12.

Spare parts have the same functionality as their OEM equivalents, i.e. their installation can be carried out in the same way.

5.3.1 Installation in DAF vehicles

Installation steps:

1. Switch the transmission to neutral and activate the park brake.
2. Secure the vehicle with brake wedges.

CAUTION

Risk of electric shock, malfunction and damage to electrical components or abnormal operation.

Minor to moderate injuries possible.

- Make sure that the engine and ignition are turned off before disconnecting the battery clamp (negative pole).
- Always wait two minutes between switching off the engine and ignition and disconnecting the battery clamp.

3. Remove battery cover box.



- Always check that the driver card is ejected before disconnecting the battery clamp (negative pole).

4. Disconnect the battery clamp (negative pole).
5. Remove the lower grille.



6. Disassemble the old radar unit.

Device installation/component replacement

NOTICE

Risk of material damage.

Medium to extensive material damage possible.

- Ensure that only trained and qualified personnel are allowed to replace the radar on the vehicle.

7. Assemble the new radar unit (spare part).
8. Connect the battery clamp (negative pole).
9. Install the battery box cover.
10. Run the diagnostic program (DAVIE).

- i** – Ensure a stable internet connection.

11. Program the new radar unit (spare part).

WABCO AM radars are equipped with a pre-installed functional software version (without specific vehicle parameters).

The first thing to do before the installation via DAVIE is to check which OEM radar (hardware number) fits the vehicle and then select the correct AM spare part (based on chapter "5.1 Radar replacements", page 12) .

Also check that there are no bulletins (e.g. PB00534) for the OEM hardware number in the DAF Repair and Maintenance Information (DAF ePortal).

In some cases (based on the information provided in the bulletin), the software ID card may have to be changed before the installation to provide the appropriate SW version for the new radar unit. In order to change the SW ID card (software component), the workshop must send the ticket to the DAF support centre.

- i** Always indicate the OEM hardware number on the ticket, even if a spare part will be installed instead of an OEM unit.

NOTICE

Risk of blocked radars.

Medium to extensive material damage possible.

- Never start programming the new ECU if there is no compatibility between the SW versions. In this case, the software ID card must be updated via the DAF ePortal/support centre.

If the SW compatibility is given, you can start the programming.

12. Start a dynamic calibration of the new radar unit during the test drive.

Device installation/component replacement

5.3.2 Installation in IVECO vehicles

Installation steps:

1. Switch the transmission to neutral and activate the park brake.
2. Secure the vehicle with brake wedges.

⚠ CAUTION

Risk of electric shock, malfunction and damage to electrical components or abnormal operation.

Minor to moderate injuries possible.

- Make sure that the engine and ignition are turned off before disconnecting the battery clamp (negative pole).
- Always wait two minutes between switching off the engine and ignition and disconnecting the battery clamp.

3. Remove the battery cover box.



- Always check that the driver card is ejected before disconnecting the battery clamp (negative pole).

4. Disconnect the battery clamp (negative pole).
5. Remove the lower grille.



6. Disassemble the old radar unit.

NOTICE

Risk of material damage.

Medium to extensive material damage possible.

- Ensure that only trained and qualified personnel are allowed to replace the radar on the vehicle.

7. Assemble the new radar unit (spare part).
8. Connect the battery clamp (negative pole).
9. Install the battery box cover.
10. Run the diagnostic program (UDT IVECO).



- Ensure a stable internet connection.

Device installation/component replacement

11. Program the new radar unit (spare part).

WABCO AM radars are equipped with a pre-installed functional software version (without specific vehicle parameters).

The first thing to do before the installation via UDT or EASY is to check which OEM radar (hardware number) fits the vehicle and then select the correct AM spare part (based on chapter "5.1 Radar replacements", page 12).

You will find the matching OEM radar in the IVECO POWER parts catalogue (the search is based on the VIN).

The IVECO diagnostic tool checks whether the appropriate radar is installed (during installation) - if not, the installation is aborted.

12. Start a dynamic calibration of the new radar unit during the test drive.



After the installation, the VIN (vehicle identification number) is permanently assigned to the radar and the radar cannot be installed in another vehicle.

6 Calibration and diagnostics for DAF and IVECO

The spare parts diagnostics is the same as for the OES (OEM) devices. The Diagnostic Trouble Code (DTC) and its meaning are also the same.

No special tools or alignment knowledge are required for calibration.

The radar sensor must always be aligned when the sensor has been removed from the vehicle or a new sensor is installed.

If a sensor has already been aligned for operation and was then removed from the vehicle, it also requires alignment, which must be started via a diagnostic tool in the workshop.

When a new AEBS ECU is fitted, the service adjustment (calibration) is also started with the diagnostic tool.

The calibration process is identical to the OES (OEM) DAF and IVECO processes.

The error codes that may appear are the same as for OES (OEM) DAF and IVECO.

The calibration process carried out after the installation.

The vehicle must be stationary.

The service adjustment can correct the horizontal and vertical alignment by up to $\pm 3^\circ$.

Therefore, the physical alignment of the AEBS ECU bracket with respect to the thrust angle must be within $\pm 3^\circ$.

Description of the calibration process:

1. Start the calibration (with DAVIE diagnostic tool for DAF or UDT diagnostic tool for IVECO). When the service alignment is started, the AEBS ECU places a yellow indicator light on the instrument panel.
2. Drive the vehicle according to the information in the diagnostic tool (e.g.: drive at a constant speed of more than 50 km/h - best speed > 60 km/h).
3. Drive a section of road for at least 10 min. The duration of the procedure depends on the volume of traffic, the type of road (straight or winding) and the surface conditions (dry or wet).

If the alignment was successful, the yellow warning goes off automatically.

i If the calibration was successful, the EBS, AEBS and icons on the instrument panel disappear as soon as the key is turned to the OFF/ON position.

If the service alignment fails, the AEBS ECU will set an ACTIVE fault code (DTC).

6.1 Troubleshooting

If the calibration fails, carry out the following checks:

- Were the speed and duration of the ride appropriate and correctly calibrated?
- Does the vehicle have any other faults that affect the calibration procedure?
- Is the radar installed correctly?
- Repeat the procedure until the calibration is completed successfully.

7 WABCO contact

You can find your local WABCO contact via the following page:
<http://www.wabco.info/i/1489>

WABCO contact



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ZF Friedrichshafen AG

ZF is a global technology company and supplies systems for passenger cars, commercial vehicles and industrial technology, enabling the next generation of mobility. ZF allows vehicles to see, think and act. In the four technology domains Vehicle Motion Control, Integrated Safety, Automated Driving, and Electric Mobility, ZF offers comprehensive solutions for established vehicle manufacturers and newly emerging transport and mobility service providers. ZF electrifies different kinds of vehicles. With its products, the company contributes to reducing emissions and protecting the climate.

ZF, which acquired WABCO Holdings Inc. on May 29, 2020, now has 162,000 employees worldwide with approximately 260 locations in 41 countries. In 2019, the two then-independent companies achieved sales of €36.5 billion (ZF) and \$3.4 billion (WABCO).

With the integration of WABCO, the leading global supplier of braking control systems and other advanced technologies that improve the safety, efficiency and connectivity of commercial vehicles ZF will create a new level of capability to pioneer the next generation of solutions and services for original equipment manufacturers and fleets globally. WABCO, with almost 12,000 people in 40 locations worldwide, will now operate under the ZF brand as its new Commercial Vehicle Control Systems division.



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