



SERVICE NOTES

- Please read these assembly instructions completely before starting assembly.
- These installation instructions are intended for workshops and attachment manufacturers. Appropriate background knowledge is therefore assumed in these assembly instructions. It should be noted that some work may only be carried out by appropriately qualified personnel in order to avoid the risk of injury and to achieve the quality required for construction work.
- When making product improvements, we reserve the right to make technical and optical changes.
- If you have any questions or installation problems, call Aspöck customer service, the dealer or contact your authorized workshop.

LIABILITY PROVISIONS



General information:

- National mounting, installation and operating regulations must be observed.
- The product may only be used in accordance with the enclosed instructions and safety notes. Instructions can be found online at **www.aspoeck.com**.
- No modifications may be made to the product unless only the original spare parts intended for this purpose or spare parts approved by Aspöck are used and installed by professionally qualified personnel.

Exclusion of warranty:

- Warranty for any product damage is excluded in the event of non-compliance with the instructions, with the product data sheet or in the event of use outside of the intended purpose or operating conditions.
- The warranty also does not cover products that have been damaged or are in poor operating condition due to hazards (including environmental hazards, road traffic hazards, hazards caused by third parties or circumstances beyond the control of Aspöck).
- Repair or replacement of a defective product does not result in the start of a new warranty period.
- Other warranty provisions can be found in item 10 of the Terms of Sales and Delivery (TSD) **www.aspoeck.com**.

Exclusion of liability:

- Aspöck Systems accepts no liability for indirect damage, consequential damage and financial losses.
- Other (limiting) liability provisions can be found in item 11 of the Terms of Sales and Delivery (TSD) **www.aspoeck.com**.
- Limiting product liability provisions are laid down in item 12 of the Terms of Sales and Delivery (TSD) **www.aspoeck.com**.



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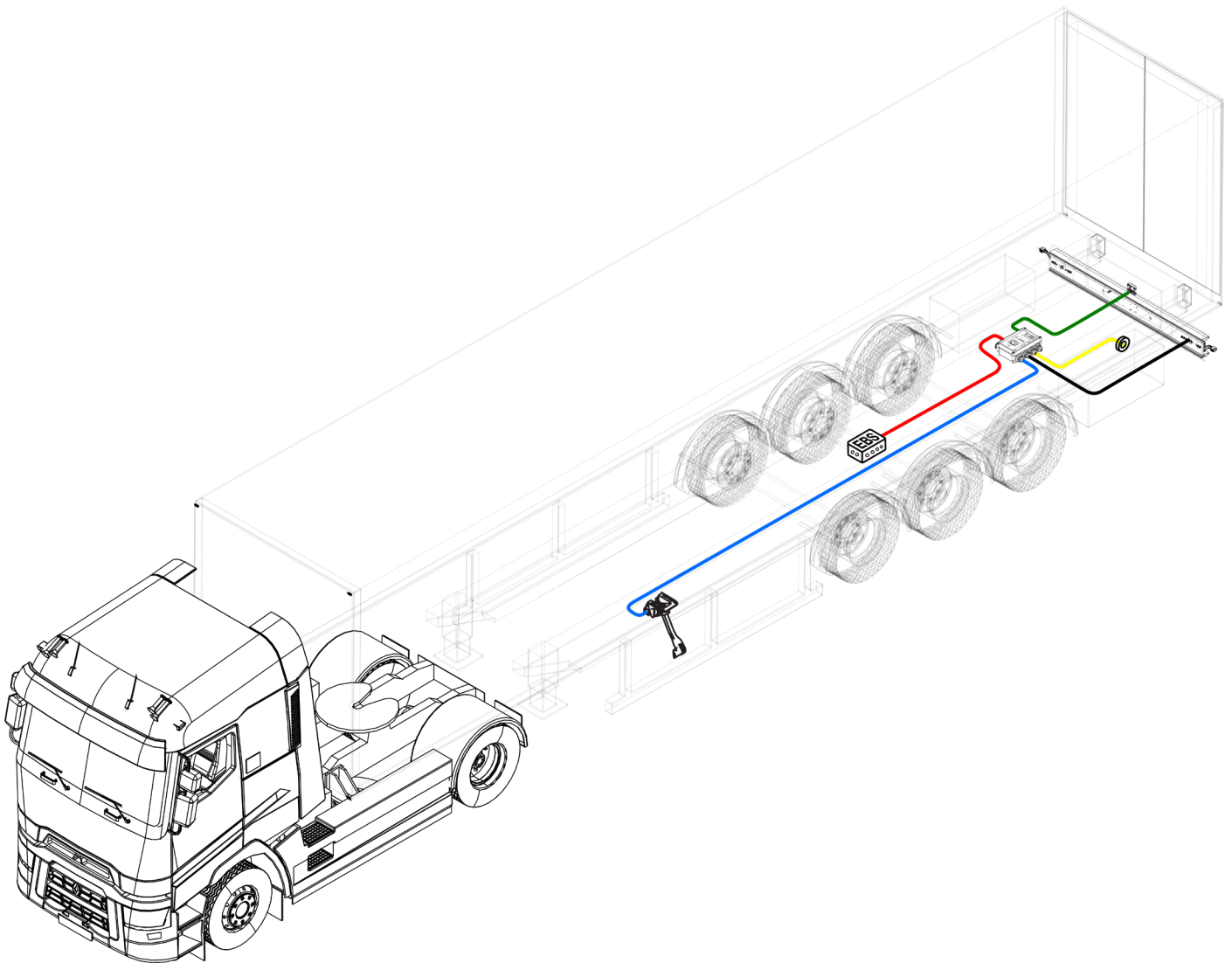
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1. PRODUCT DESCRIPTION

The RADC 1.0 system is a ramp approach assistance and is only intended to be an addition to existing safety systems. The vehicle operator is always the first line of defense when it comes to safety when operating the equipment.

This new system provides more safety when backing up by detecting objects it does not provide pedestrian protection.



CAUTION

Do not assemble components and cables along heat sources or through areas that may cause abrasion due to impact or dirt damage.



2. GENERAL INFORMATION

2.1 TARGET GROUP

This document is intended for vehicle manufacturers and workshops.

2.2 INTENDED USE

The system may only be used to monitor the area behind the trailer when reversing commercial vehicles (class O3/O4). Any other use shall be deemed improper use. The manufacturer shall not be liable for any damage resulting from improper use.

The risk of such damage shall be borne by the driver of the vehicle. Proper use also includes compliance with the operating, maintenance and servicing instructions prescribed by the manufacturer.

Use of the system shall be subject, without exception, to the country-specific traffic regulations applicable to the vehicle. The manufacturer shall not be liable for any damage resulting from unauthorized modifications to the system.

2.3 USED PICTOGRAM

These instructions contain information that must be observed for personal safety and to prevent personal injury and damage to property. These are highlighted by warning triangles and shown below depending on the degree of danger.

DANGER

The signal word indicates a hazard with a **high** level of risk which, if not avoided, could result in death or serious injury.

WARNING

The signal word indicates a hazard with a **medium** level of risk which, if not avoided, could result in death or serious injury.

CAUTION

The signal word indicates a hazard with a **low** level of risk which, if not avoided, could result in a minor or moderate injury.

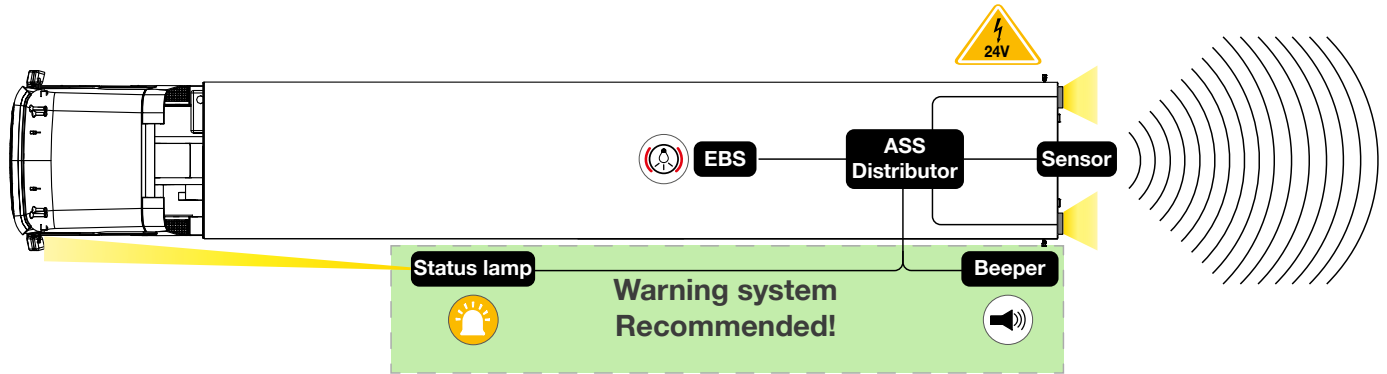
NOTE

A note in the context of these instructions is important information, a technical note, about the product or the relevant part of the instructions to which particular attention is to be paid.



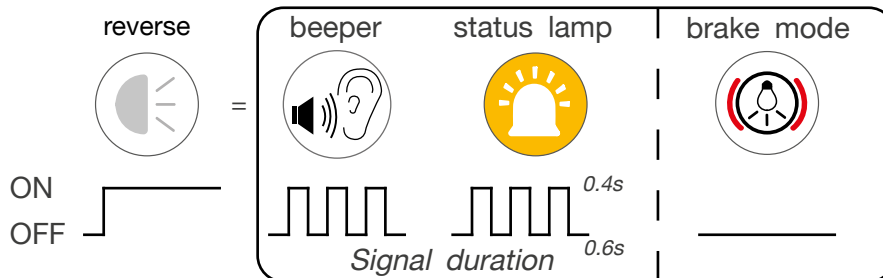
3. SYSTEM DESCRIPTION

The RADC 1.0 without warning systems for the vehicle owner is not recommended.

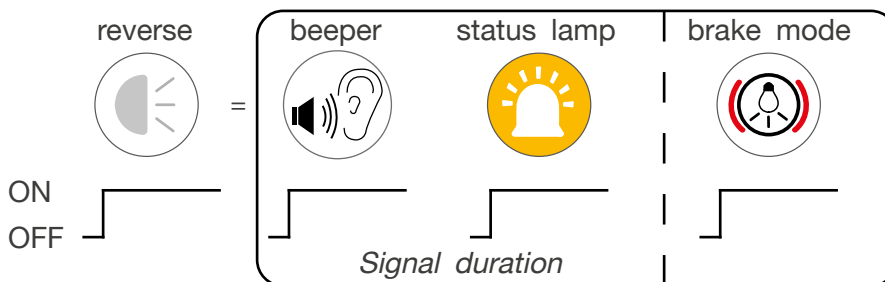


3.1 OPERATING DIAGNOSTICS

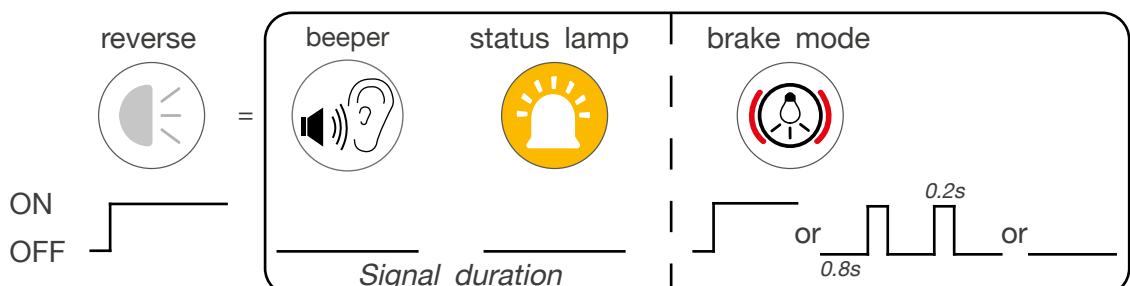
1. Mode: "OK", no object in detection zone



2. Mode: "OK", object in the detection zone



3. Mode: "NOK" system error



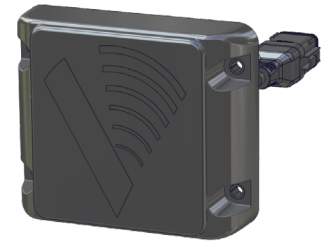


A component of the system has failed, is damaged and/or soiled.
Possible sources of error:

- The RADC 1.0 sensor is soiled and cannot send and receive any signal.
- A cable break, problems with the distributor or individual components of the system are damaged.
- Incorrect programming from the sensor to the EBS system.

4. SENSOR INSTALLATION

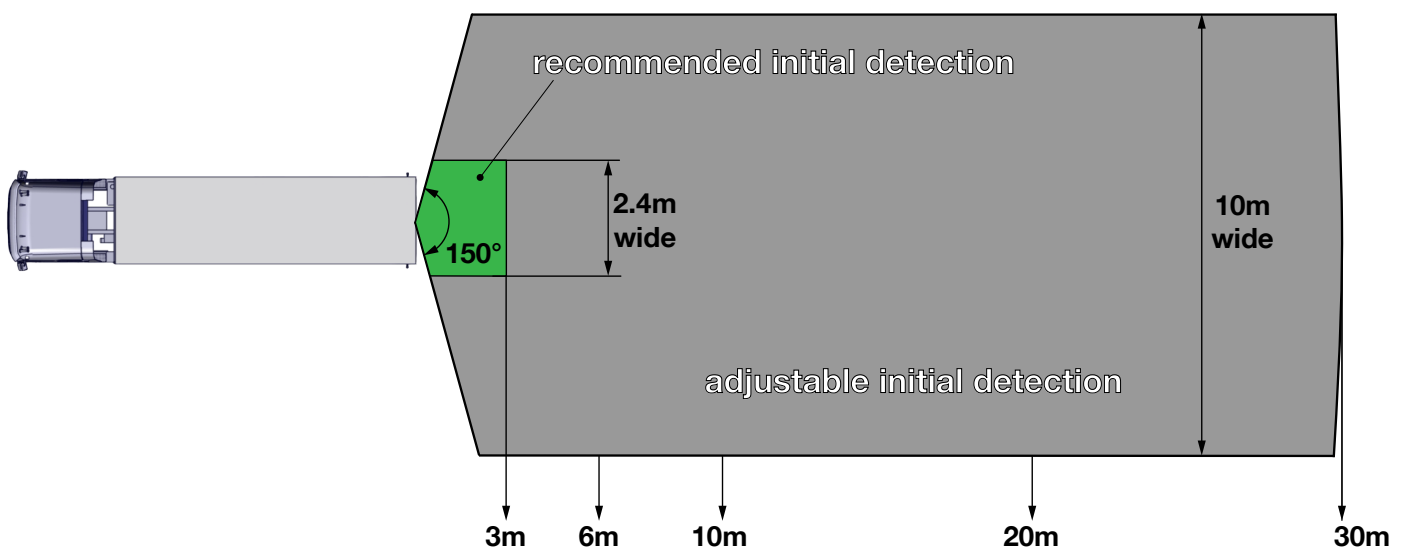
Take the time to familiarize yourself with all documents and the system components before installing the RADC 1.0 object detection system.



4.1 SENSOR DETECTION RANGE

The sensor transmits and receives low power 24 GHz radar signals. This frequency band is legal throughout most of the world, but check your country's regulations before purchasing. It then processes the returned signals to determine if an object has reflected any energy back to the sensor.

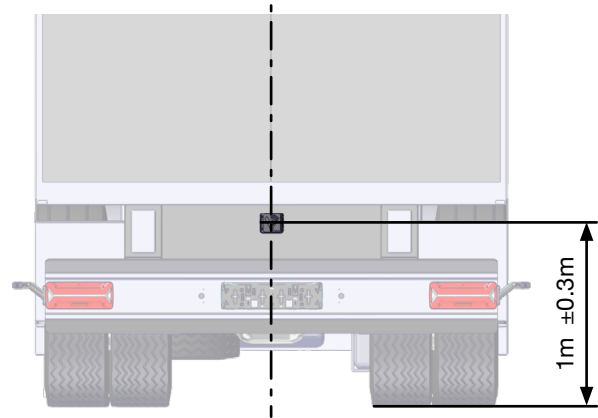
The sensor is designed to process and report detections within 240 milliseconds (ms) allowing the operator to quickly respond to any object within the detection zone. Using the RADC 1.0 measures radial range, speed and angle, reflectivity, and other parameters of multiple stationary and moving targets simultaneously. This radar sensor has a wide horizontal field of view up to $\pm 75^\circ$ (150°).





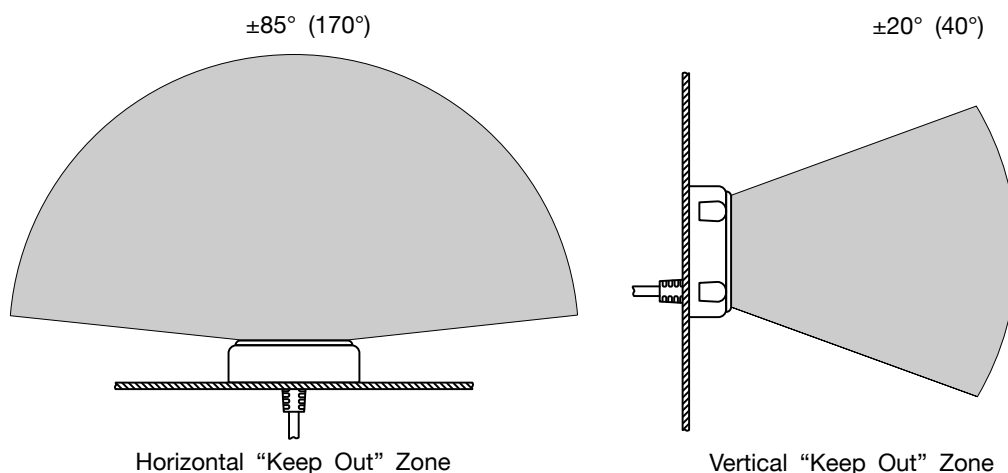
4.2 RECOMMENDED SENSOR LOCATION

The installation location of the sensor is critical for proper operation. The sensor face should be positioned vertically to the ground and properly aligned. Mount the sensor in a location where it is well protected from debris and impact, but at the same time allows an unobstructed field of view that covers the targeted blind spot.



4.3 KEEP OUT / INTERFERENCE ZONES

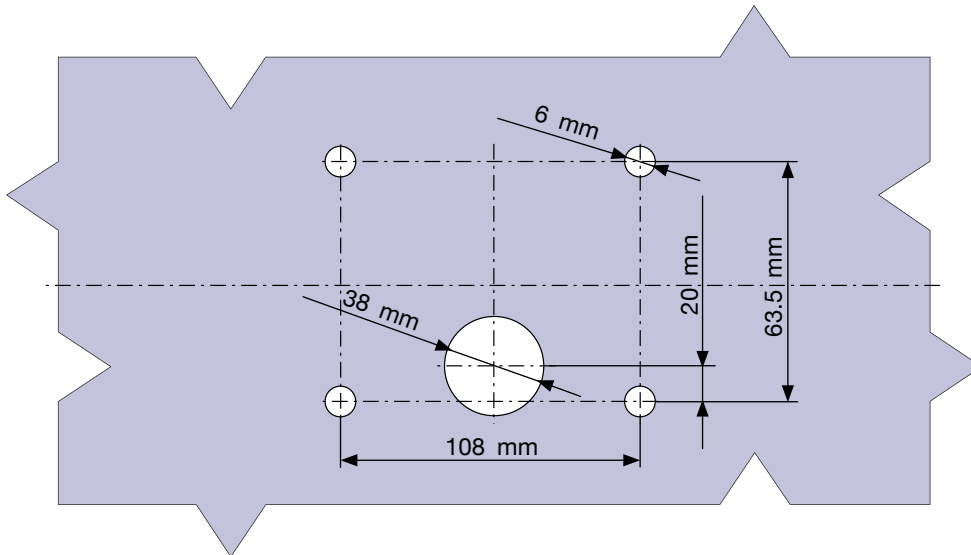
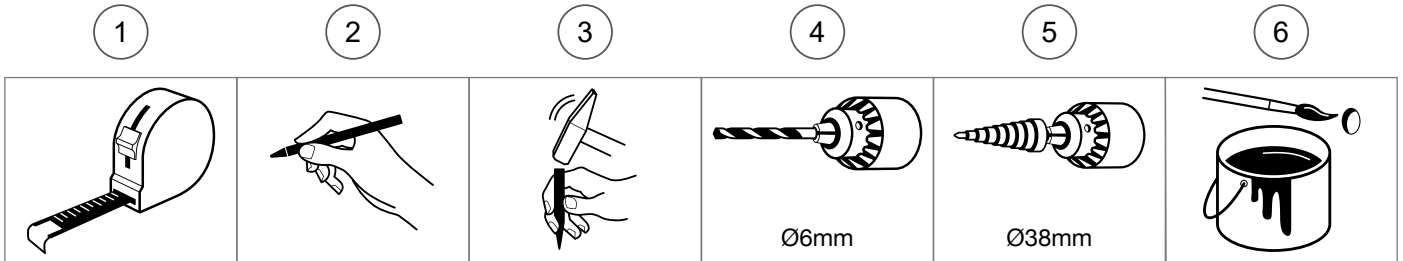
For optimal performance, the sensor should protrude beyond any other portion of the vehicle. If this is not possible, it is important to understand how surrounding objects can impact the sensor's performance. The sensor's horizontal field of view is $\pm 75^\circ$ (150°) and the vertical field of view is $\pm 10^\circ$ (20°); however, metallic and other strong radar reflecting objects outside but near this field of view can cause interference. These objects must remain outside the expanded area shown as the "Keep Out Zones" below. If your specific implementation requires radar reflecting objects to reside in the Keep Out Zones, testing must be performed to determine their influence on the sensor's performance.



Before the RADC 1.0 is permanently installed on the equipment, verify the selected location provides a clear detection zone. Move the equipment to an open field with no objects in the sensor's field of view, temporarily attach the sensor to the equipment in the proposed location, apply power and activate the system. Verify that nothing is being detected.



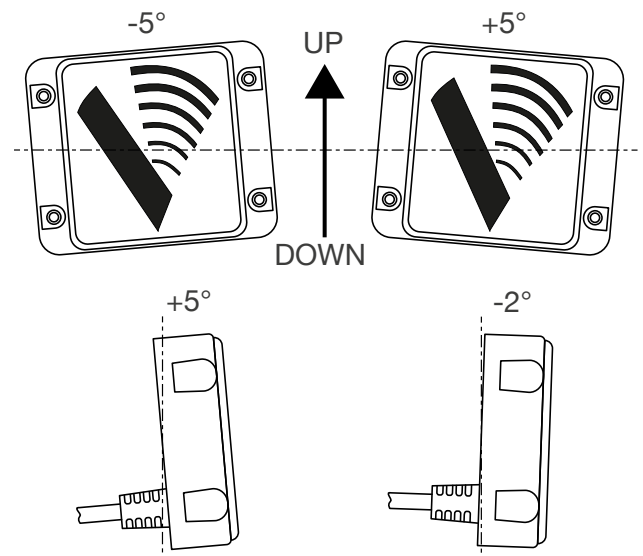
4.4 HOLE PATTERN



4.5 MOUNTING TOLERANCES

Exceptions: When mounting at a height of more than 1.3m, the sensor can be angled downward a few degrees if necessary (less than 5° in most applications).

The performance of the sensor can be negatively affected if the sensor is tilted downward, resulting in false detection from the ground. Any time the sensor must be mounted outside of the mounting tolerances, performance should be tested. In some cases, especially with longer range models, it may be necessary to tilt the sensor upward to avoid false detections from the ground.





4.5 OBJECT DETECTION CAPABILITY

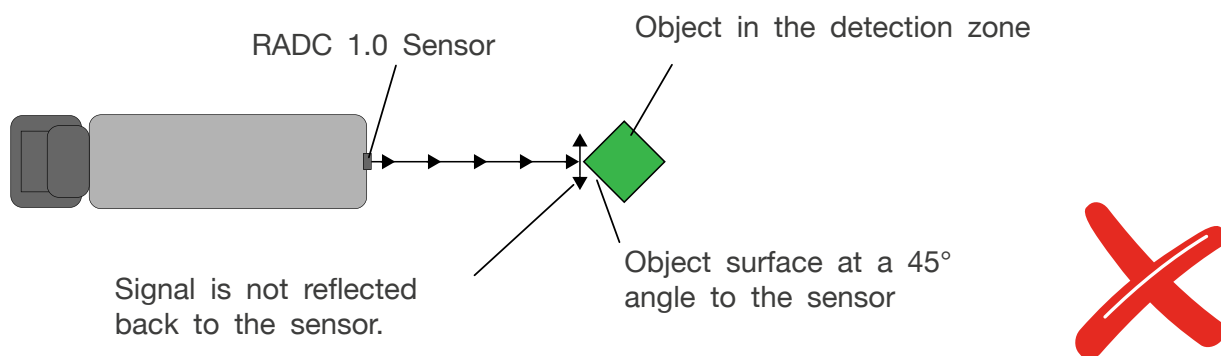
⚠ WARNING

The RADC 1.0 system is a ramp approach assistance and is only intended to be an addition to existing safety systems. The vehicle operator is always the first line of defense when it comes to safety when operating the equipment.

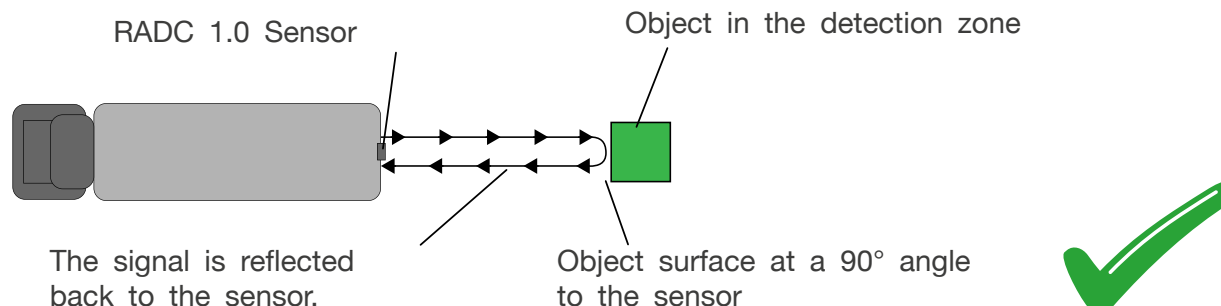
The amount of energy returned is based on a few factors:

- **Angle** – an object flat side perpendicular to the sensor will reflect more energy than an object at an angle. For an example of how angle can affect return energy.
- **Scattering** – a solid object reflects more energy than a non-solid object such as tree branches, gravel, bushes, etc.
- **Size** – a large object usually reflects more energy than a smaller object.
- **Composition** – a metal object typically reflects more energy than a non-metallic object.
- **Shape** – complex shapes cause energy to be returned in a very non-uniform way. Very small variations or movement can change detection status.

4.5.1 MINIMAL REFLECTION



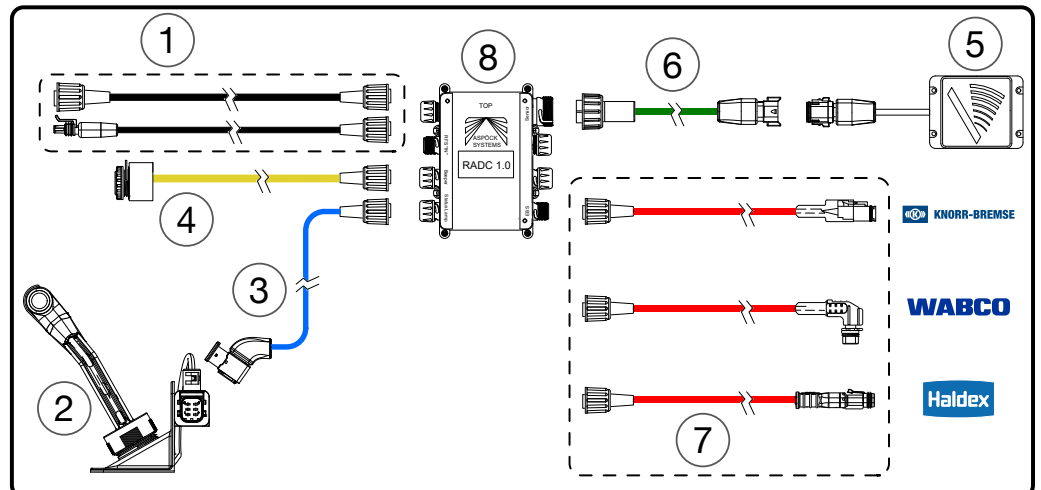
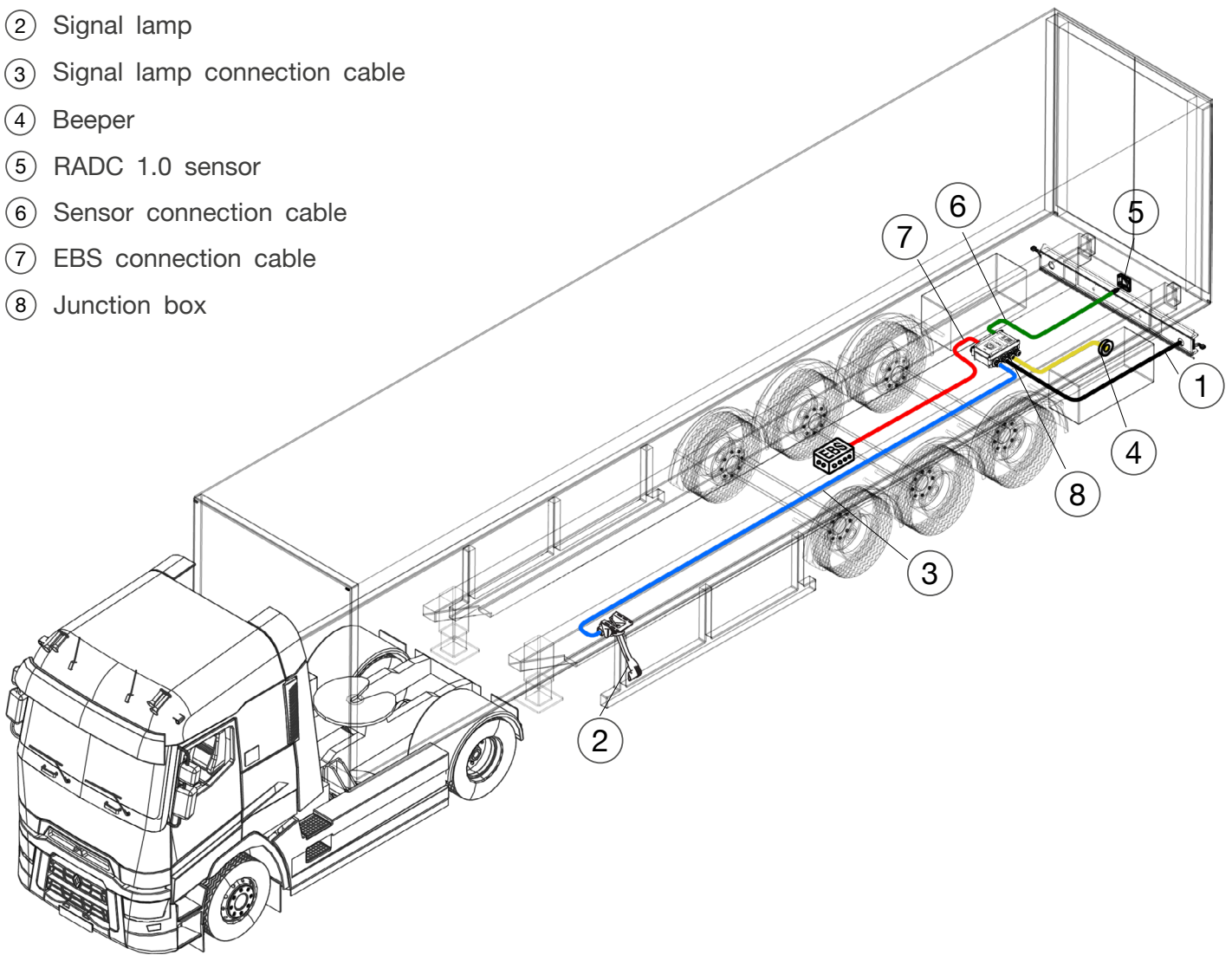
4.5.2 FULL REFLECTION





5. SYSTEM OVERVIEW

- ① Supply cable
- ② Signal lamp
- ③ Signal lamp connection cable
- ④ Beeper
- ⑤ RADC 1.0 sensor
- ⑥ Sensor connection cable
- ⑦ EBS connection cable
- ⑧ Junction box





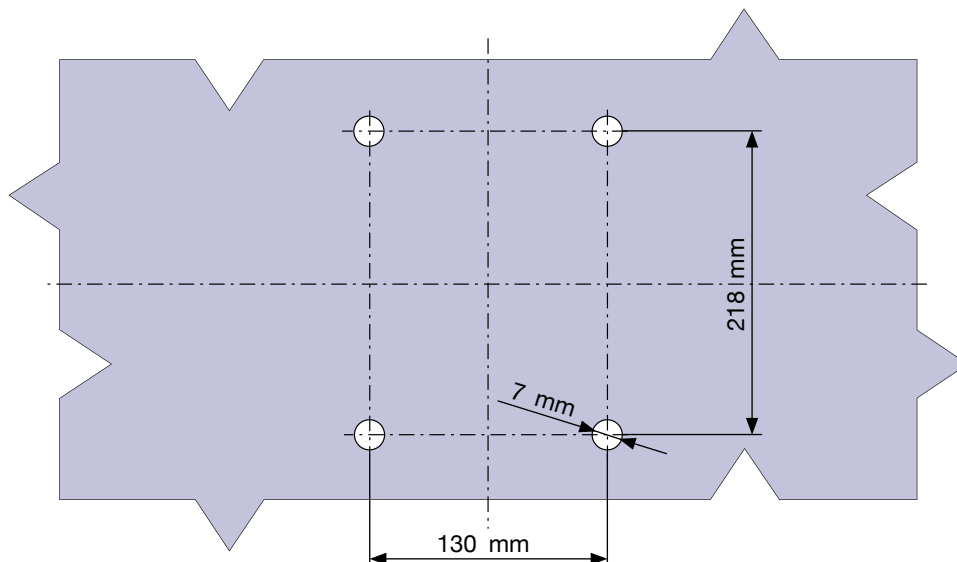
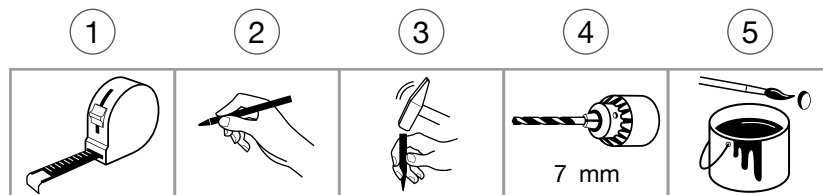
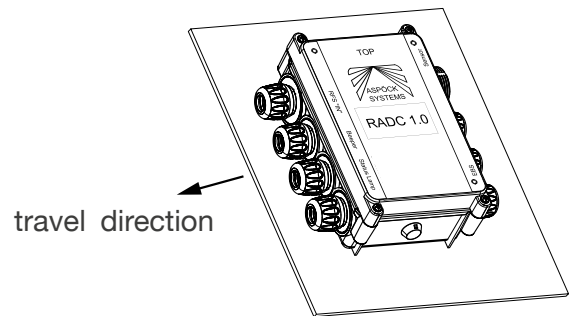
6. INSTALLATION OF CABLE HARNESS AND JUNCTION BOX

The respective interface outputs are labelled on the junction box. All outputs are pre-wired and fully equipped as standard. Optional outputs on the junction box are closed with sealing caps and can be unscrewed if necessary.

1. Assemble the junction box close to the rear of the vehicle. Observe the assembly direction of the junction box. [Fig.1]
2. Connect the junction box by means of the supply cable [no. 1] to reversing signal "S" L and ground 31. With Aspöck lighting systems, you can connect the supply cable directly to an Aspöck rear lamp equipped for this purpose at additional output RFS.
3. Connect the sensor connection cable [no. 6] to the junction box and the sensor [no. 5].
4. There are specific connection cables for the different EBS manufacturers. Connect the selected EBS connection cable [no. 7] to the junction box and the EBS system.

⚠ CAUTION

The EBS manufacturer-specific operating and assembly instructions must be observed! Contact the respective manufacturer for this purpose.





6.1 OPTION WITH STATUS LAMP AND BEEPER

The system can also be equipped with a status lamp or a beeper. If a status lamp is used, the assembly position should preferably be between the first and second side marker lamp on the left side of the vehicle. The status lamp must be installed on the vehicle like a side marker lamp. The beeper should be assembled in the centre area of the vehicle so that the driver can easily hear the acoustic tone.

If a status lamp [no. 2] is to be installed, connect it to the connection cable [no. 3] and the junction box.

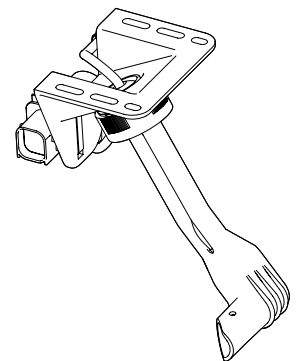
If a beeper [no. 4] is provided, connect it to the junction box at the respective output.

⚠ DANGER

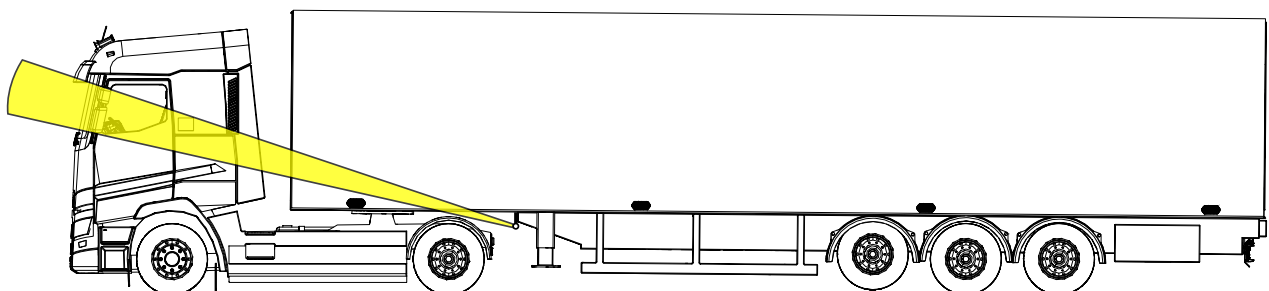
Sound overlap with a possible mandatory legally compliant reversing warning device on the vehicle may occur. The beeper of this system is not a replacement for a legally compliant reversing warning device.

6.1.1 INSTALLATION OF STATUS LAMP

Mounting the status lamp between the first and second side marker lamps on the left side of the vehicle is preferable. If trailers are long, the status lamp can also be mounted further back due to the available cable harness length. Install the status lamp on the vehicle just like a side marker lamp.

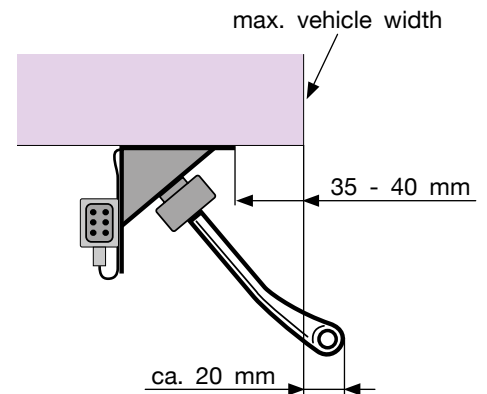


- The status lamp must not obstruct the visibility of the side marker lamp.
- The beam angle of at least 45° in front of and behind side marker lamps must be kept clear.
- Side marker lamps must not be disassembled or relocated.
- The status lamp is not a substitute for a side marker lamp or other lights. It is not part of the vehicle lighting according to regulation UN ECE R 48.

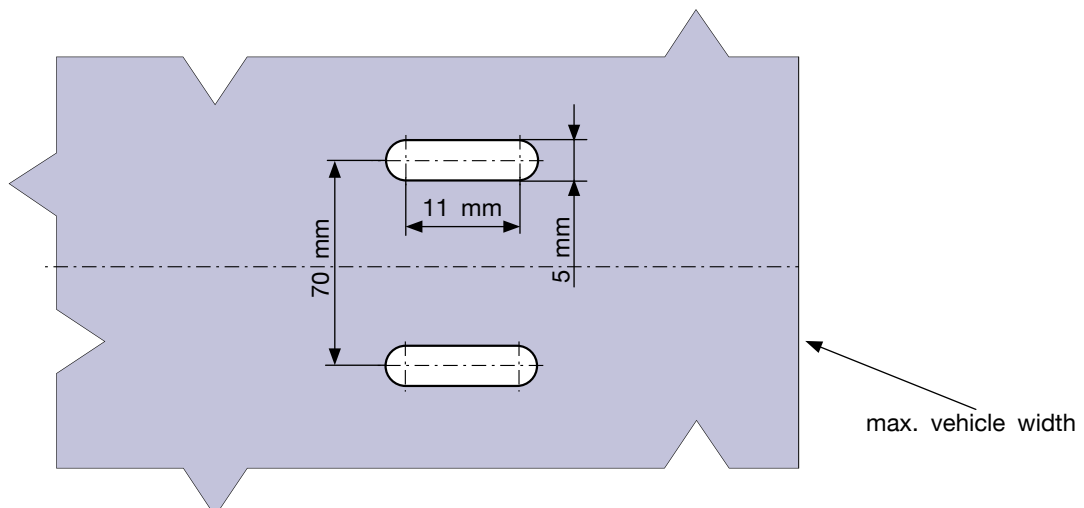
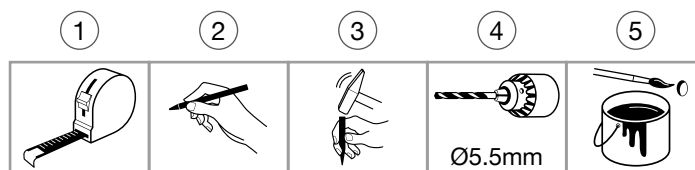




- For good adjustability, position the status lamp approx. 30 – 40 mm from the outer edge of the vehicle. When the rubber arm is in the centre position, the status lamp looks approx. 20 mm beyond the edge of the vehicle.
- The status lamp can also be located further inside, for example on tanker vehicles. In this case, visibility must be guaranteed in the rear-view mirror when driving straight ahead. Mount the status lamp holder in a horizontal position.
- If it is not possible to attach the status lamp directly to the frame parts of the vehicle, a corrosion-protected adapter (for instance made of sheet aluminium) must be made. The adapter should be dimensioned in such a way that the status lamp cannot swing. The size and shape of the adapter can be designed similar to the adapters for the side marker lamps of the respective vehicle. Observe the slotted hole dimensions on the status lamp holder.
- Provide corrosion protection for all holes to be drilled in the vehicle frame.



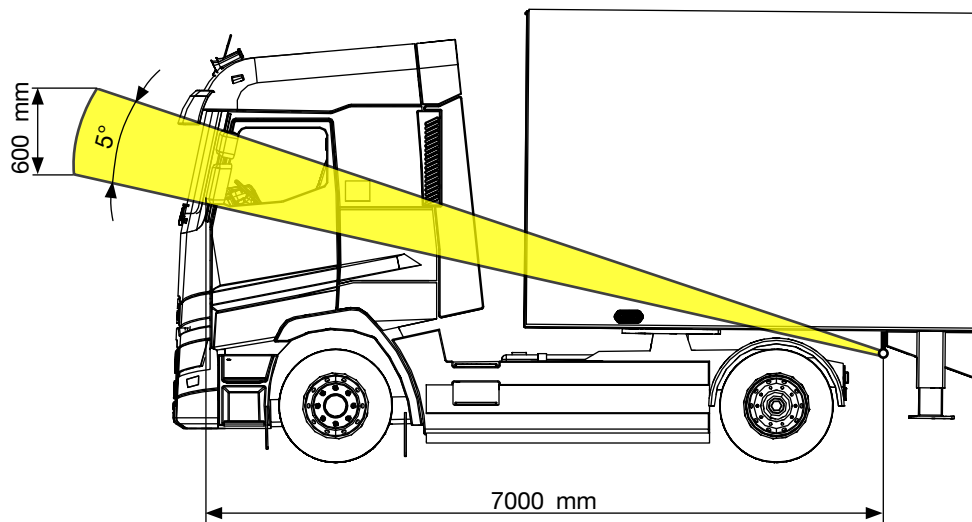
- Drill 2 Ø5.5 mm holes in the frame or adapter at a distance of 70 mm.
- Then fasten the status lamp with Ø5 mm screws. Screw design: self-locking with spring pretension.
- Use Ø 15 mm washers to fix the status lamp holder.





6.1.1.1 ALIGNMENT OF THE STATUS LAMP

The status lamp has a beam angle of 5°. It has the optimum luminous intensity in this range. Outside this radiation pattern, the luminous intensity decreases very quickly. The diameter of the radiation pattern is approx. 600 mm at a distance of 7000 mm.



- Straighten the vehicle.
- Switch on the status lamp.
- Loosen the locking nut on the status lamp holder.
- Detach the sliding ring from the rubber arm for optimal adjustment of the status lamp.
- Roughly align the status lamp with the main rear-view mirror in the cab.
- Align the status lamp so that the driver can optimally see it in the rear-view mirror. Make sure that the centre axis of the signal lamp's light cone is in the upper-right area of the mirror. Then check this as follows.
- Check the alignment:

| Testing | Result |
|--|--------------------------------|
| Deform the rubber arm slightly upwards and towards the vehicle | Luminosity decreases slightly. |
| Movement in opposite direction | Luminosity stays the same. |

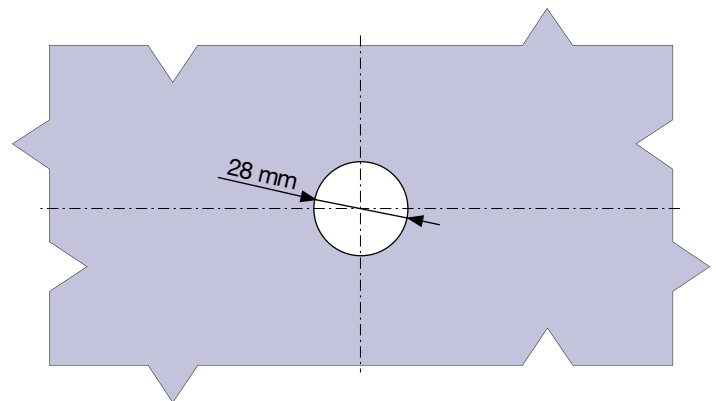
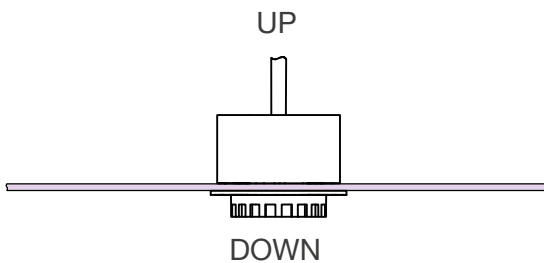
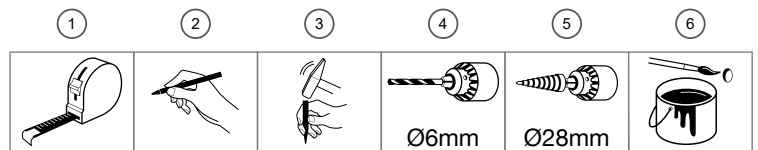
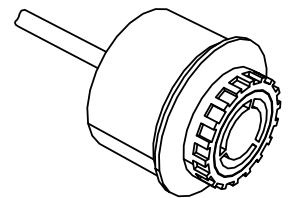


- If necessary, correct the alignment of the status lamp.
- Tighten the locking nut with 2Nm (hand-tight) so that the ball joint of the rubber arm can no longer move inside the mount.
- Check the visibility of the status lamp during the test drive and correct the alignment if necessary.

6.1.2 INSTALLATION OF THE BEEPER

Mount the beeper at the back of the trailer. The sound output has to point directly towards the road.

Drill a hole with a diameter of 28mm. Then attach the beeper with the help of the washer and the plastic nut.





7. DAILY MAINTENANCE

- Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death. It is necessary to read, understand and follow all instructions shipped with the product.
- Systems on operating equipment must be tested each day prior to the equipment operation. The equipment operator must check for proper operation at the beginning of every shift or safety inspection period.
- The RADC 1.0 system is intended as an Object Detection System and should not be relied upon as your first line of defense for the safe operation of the equipment. It should be used in conjunction with established safety programs and procedures to augment the safe operation of the equipment, ground personnel, and adjacent property.
- People's lives depend on the proper installation of this product in conformance with these instructions. Should the system become inoperative, it could jeopardize the safety or lives of those who depend on the system.
- The RADC 1.0 Object Detection System is intended for commercial use. Proper installation of the object detection system requires a good understanding of equipment electrical systems and procedures, along with proficiency in the installation.
- Store these instructions in a safe place and refer to them when maintaining and/or reinstalling the system.



8. TESTING AND MAINTENANCE

NOTE

A walk around test shall be performed every day to verify proper function of the system and to familiarize the operator with the zone of detection. More frequent inspections should be performed when:

- The equipment is operating in a particularly dirty or harsh environment.
- The operator has reason to suspect the system has been damaged.

This test should be performed with two people, the operator who remains in the cab, and the assistant who walks through the sensor field (detection zone).

8.1 INITIAL COMMISSIONING AND TEST

Move the vehicle to an open space larger than the detection zone to be tested. Activate the system by switching on the vehicle ignition and activating the reversing lamp when the engine is at a standstill.



If the system detects after activating a detection and there are no moving objects in the detection zone, check if there are any objects near the sensor that may restrict the field of view. If this is the case, position the sensor so that it does not detect them. If the status lamp or beeper indicates an error, refer to the Troubleshooting section in the manual to determine the error and possible causes.

System operation can be tested by quickly moving towards the sensor in the detection zone. When you enter the detection zone, the status lamp outputs a continuous light instead of a flashing light and/or the beeper outputs a continuous tone instead of a pulsating tone.

If the system is connected to the vehicle braking system and configured correctly, you should also notice the EBS system/braking system becoming active when you enter the detection zone. You can check the exact detection range of the detection zone by repeatedly moving into and out of the detection zone from all directions.



9. SPECIFICATIONS

| | |
|--|--|
| NOMINAL VOLTAGE | 24V DC |
| VOLTAGE RANGE | 9 – 33V |
| POWER CONSUMPTION (TOTAL SYSTEM) | > 1A |
| WORKING TEMPERATURE RANGE | -40°C — +50°C |
| STORAGE TEMPERATURE RANGE | -40°C — +80°C |
| INTERNATIONAL PROTECTION RATING (IP) (ASS-JUNCTION-BOX) | IP68 |
| INTERNATIONAL PROTECTION RATING (IP) (CONNECTORS + SENSOR) | IP6K9K |
| HOMOLOGATION |  10R-05 1774 |
| EMC APPROVAL |  10R-05 15387 |



10. PROGRAMMING

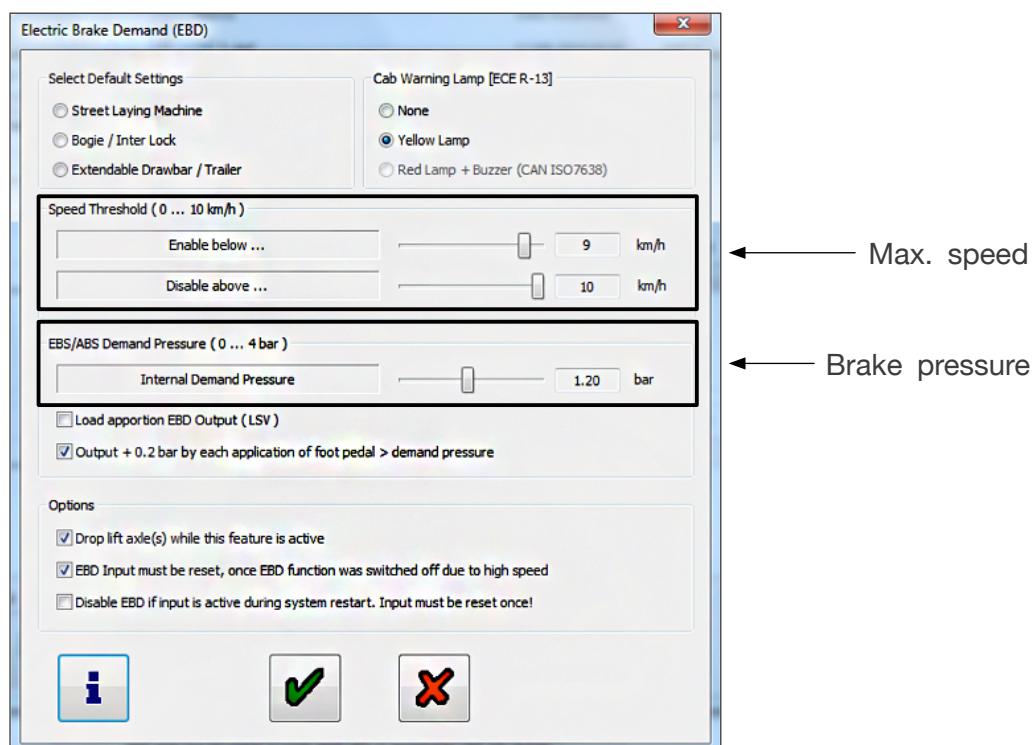
⚠ WARNING

The change of brake- and radar settings, must be executed exclusively by qualified and well-trained specialist operators!

To change brake settings, the corresponding hardware and software from the brake manufacturer are needed. Be sure that you are using the most recent software. There are three compatible EBS manufacturers and they must be programmed differently. The recommended brake pressure is 1.2 bar.

11. BRAKE CONFIGURATION (EXAMPLES)

11.1 HALDEX



The screenshot shows the 'Electric Brake Demand (EBD)' configuration window. It contains the following sections:

- Select Default Settings:** Radio buttons for 'Street Laying Machine', 'Bogie / Inter Lock', and 'Extendable Drawbar / Trailer'.
- Cab Warning Lamp [ECE R-13]:** Radio buttons for 'None', 'Yellow Lamp' (selected), and 'Red Lamp + Buzzer (CAN ISO7638)'.
- Speed Threshold (0 ... 10 km/h):** Two sliders. The first is labeled 'Enable below ...' with a value of 9 km/h. The second is labeled 'Disable above ...' with a value of 10 km/h. An arrow points to the 9 km/h value with the text 'Max. speed'.
- EBS/ABS Demand Pressure (0 ... 4 bar):** A slider labeled 'Internal Demand Pressure' with a value of 1.20 bar. An arrow points to the 1.20 bar value with the text 'Brake pressure'.
- Options:** Checkboxes for 'Load apportion EBD Output (LSV)', 'Output + 0.2 bar by each application of foot pedal > demand pressure', 'Drop lift axle(s) while this feature is active', 'EBD Input must be reset, once EBD function was switched off due to high speed', and 'Disable EBD if input is active during system restart. Input must be reset once!'.

At the bottom of the window are three icons: an information icon (i), a green checkmark, and a red X.



11.2 KNORR-BREMSE

Configuration Wizard

Function Group 1 | Function Group 2

Parameters

- Maximum speed [km/h]: 10
- Demand pressure [bar]: 2
- RLF by iTAP: No
- Assigned level: None

RLF

- Input: TBM SENS_IN1
- Momentary: Permanent:

RLF (2)

- Input: None
- Momentary: Permanent:

Annotations:

- Max. speed (points to Maximum speed [km/h])
- Brake pressure (points to Demand pressure [bar])
- System input (points to RLF Input: TBM SENS_IN1)

Buttons: Previous, Next, OK, Cancel

11.3 WABCO

Paramètres

(1) Démarrage (2) Véhicule (3) Données de freinage (4) Fonctions standard (5) Fonctions de freinage (6) Modules de fonction (7) Connecteur

Fonctions de freinage

- Simulateur (SM)
- Self-Start (Sécurité au démarrage) (TSB)
- Fonction desserrage (BR-SW)
- Frein finisseur / Remorque extensible (FB)
- Bounce Control (Fonc. relâchem. freins) (TR-SW)
- Frein parking Electronique (EPB)

Frein finisseur / Remorque extensible

- Fonction active jusqu'à: 10 km/h
- Pression de test (pm): 12 bar

Annotations:

- Max. speed (points to Fonction active jusqu'à: 10 km/h)
- Brake pressure (points to Pression de test (pm): 12 bar)

Buttons: << Retour, Suivant >>, Annuler, Aide



12. RECYCLING

- **Decommissioning and disposal:**
Please observe the applicable legal regulations for the decommissioning and disposal of this product. In particular, observe the regulations on the disposal of batteries, equipment and electrical systems.
- **Electrical appliances:**
Collect electrical appliances separately from household or commercial waste. These can be recycled or disposed of properly. If possible, pass on the old appliance for in-house disposal or contact the manufacturer for specific instructions.
- **Environmental protection:**
Electrical and electronic equipment must be collected separately from unsorted municipal waste and disposed of or recycled properly. Improper disposal can damage health and the environment. Contact specialised waste disposal companies or the responsible authorities for detailed information.
- **Packaging:**
Packaging must be disposed of separately. Paper, cardboard and plastics can be recycled.

THE ART OF LIGHTS

ASPÖCK Systems GmbH

Enzing 4, 4722 Peuerbach, AUSTRIA

Office: +43 7276 2670-0

E-Mail: office@aspoeck.com

aspoeck.com



ASPÖCK.COM