

# NBS Cam

Avoid vehicle blind spots

## User Guide



## Radar detection system

Please read this manual thoroughly before operating the unit,  
and keep it for future reference.

V0720.01

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[www.nbs-cam.com](http://www.nbs-cam.com)

# CONTENT

1. Precautions .....	3
2. Product .....	4
3. Technical specifications .....	4
4. Accessories .....	5
5. Parts identification .....	6
6. Installation overview .....	7
7. Object detection capability .....	10
8. Testing and maintenance .....	13
9. Troubleshooting .....	14

# 1. PRECAUTIONS

## ● Storage and keeping

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1. Do not expose the device to excessive heat or cold. The storage temperature of this device is -30~+80°C, and the operating temperature is -20~+70 °C. At maximum humidity of RH90%.
2. Never use this device in environments with excessive moisture, dust, or smoke.
3. Avoid dropping or striking this device.
4. Never puncture, scratch, or use abrasive cleaning materials on this device.
5. Do not place cables where they may be pinched or stepped on.

## ● Operating precautions

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1. The device may be powered by a 12 or 24 volt automotive battery or vehicle electrical system.
2. Improper connection of the system or power supply will damage the sensor and control box.
3. The units on operating vehicles must be tested each day prior to the vehicle's operation. Results of this test should be recorded in a maintenance log.
4. The radar detection system is intended for use on commercial vehicles and machinery equipment. Proper installation requires a good understanding of vehicle/machine electrical systems and procedures, along with proficiency in the installation process.

### WARNING!

1. Do not open the equipment's enclosure. This can cause damage, short-circuiting or electrical shocks that could lead to serious injury or death.
2. The equipment is not an alternative to safe driving practices.
3. Must use a plug sealer if a port is not used.
4. The loose wire reserved on E-cable should be isolated to avoid short-circuiting.



This symbol is intended to alert the user not to dispose of electrical and electronic equipment

## 2. PRODUCT

1. The product uses advanced microwave sensing technology.
2. Automatically activated when the driver shifts vehicle into reverse status.
3. The detection zones and alarm trigger are configured through USB to UART cable on a computer.
4. The configuring and updating of the system can be done by android mobile phone or computer through Wi-Fi (optional functions). It can be used when the control box has the Wi-Fi module.
5. The device is capable of visualizing the radar-zones on the display. As soon as an object enters the detection zone it will activate a transparent colored visualization alert in the monitor to make the driver aware of the potential danger. (Green - Far, Yellow - Middle, Red - Close).
6. Detect moving objects including any transportation vehicles, motorcycles, bicycles, pedestrians, etc.
7. Work effectively in harsh environment and in poor visibility including darkness, smoke, fog and dust.

## 3. TECHNICAL SPECIFICATIONS

1. Frequency of Radar sensor: 24.00...24.20GHz.
2. Transmitter Type: FMCW.
3. Power Supply: 10 to 32V DC.
4. Detection Range: 0.1...20m, up to 5 detection zones (distance of each zone can be configured), width of  $\pm 0.1$  to  $\pm 10$ m (0.2 to 20m) adjustable.
5. Detection Zone Visualization: Green (furthest), Yellow (middle), Red (closest).
6. Detection Tolerance: +/-30cm.
7. Antenna Beam Angle: 56° (Horizontal), 40° (Vertical).
8. Trigger Input  $\times 1$  : Trigger from vehicle, high active  
Range above +10Vdc, up to supply voltage.
9. Alarm Output  $\times 1$ : Switched to Ground when activated  
Loading up to 1.0A.
10. Video format: 720P 25fps/30fps, 1080P 25fps/30fps
11. Wi-Fi module: 2.4GHz (Optional)
12. Operating Temperature: -20 to +70°C.
13. Storage Temperature: -30 to +80°C.
14. IP Protection: IP69K (sensor), IP66(Control Box)
15. Vibration Rating: 5.9G
16. Dimensions: Sensor: 106.6(W)  $\times$  72.6(H)  $\times$  32.4(D) mm.  
Control Box: 152.6(W)  $\times$  89.2(H)  $\times$  53.8(D) mm.
17. Weight: 154.6Grams (sensor) 240Grams (control box)
18. Mounting: Two (4.5mm) diameter mounting holes (sensor)  
Four (6mm) diameter mounting holes (control box)

### SPECIAL NOTICE

All specifications are subject to change  
without notice.

## 4. ACCESSORIES



Sensor Transition Cable  
(4 pin aviation interface, female to male) 3m red



Monitor Transition Cable  
(4 pin aviation interface, female to female) 3m



Camera Cable  
(4 pin aviation interface, female to male) 3m (Optional)



Extension Cable  
(4 pin aviation female interface to 4 wires) 1.5m



Plug Sealer



Buzzer



Silicone Pad



USB to UART Cable



Dual Sensors Transition cable  
(4 pin aviation interface, one female to two male) 3m red  
(Optional)

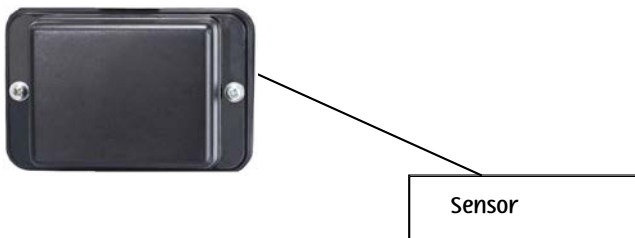
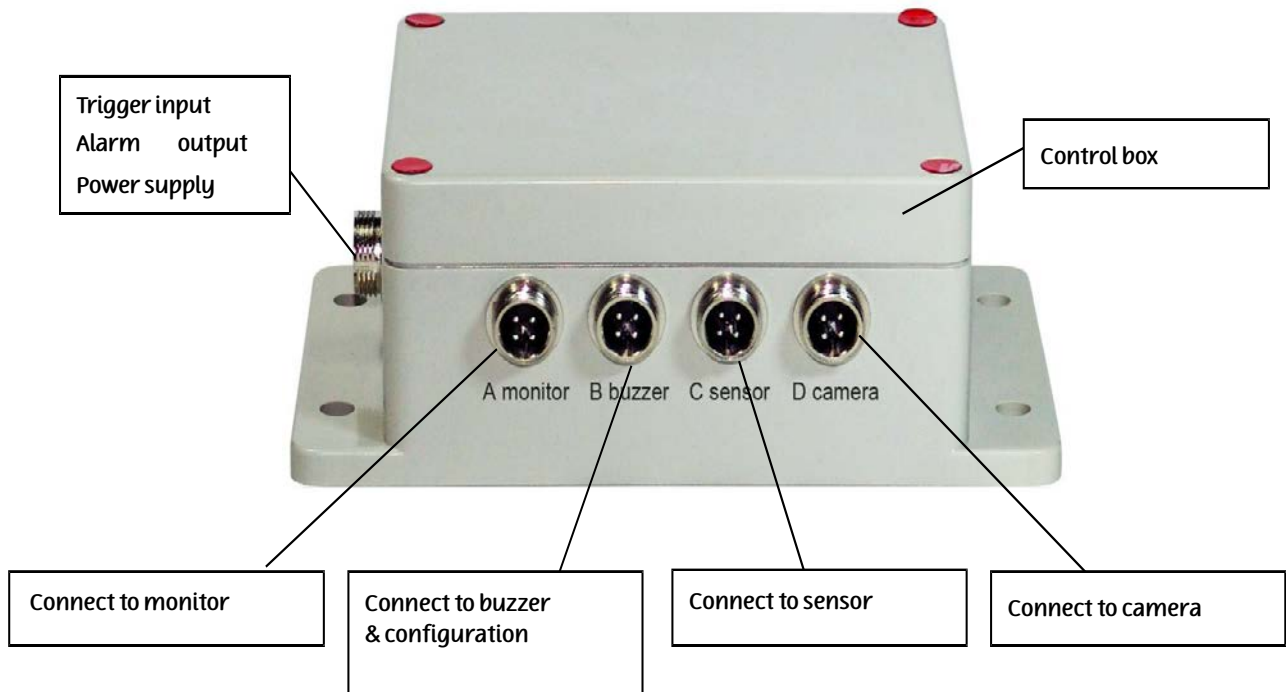


Sensor mounting Bracket (Optional)

### SPECIAL NOTICE

"Optional" means that this is an optional accessory.

## 5. PARTS IDENTIFICATION

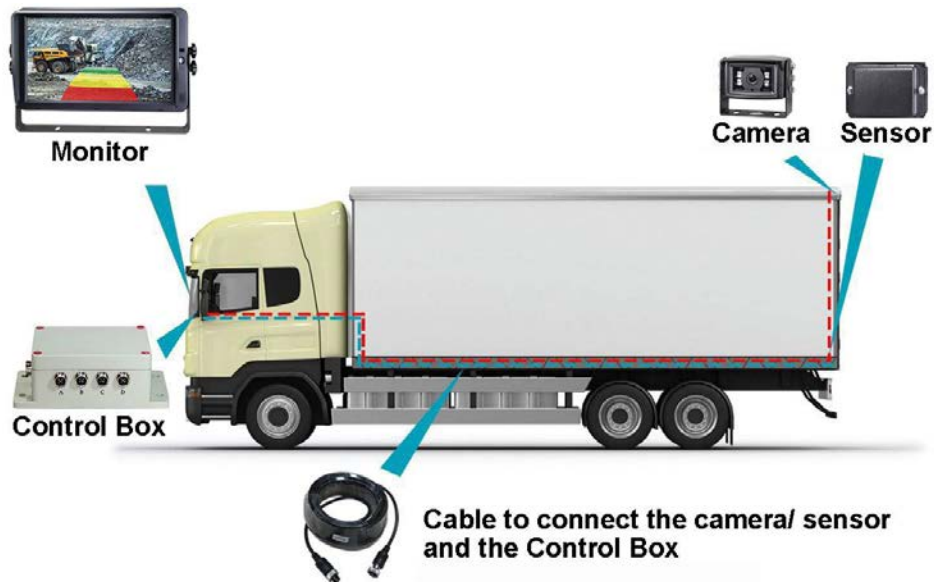


## 6. INSTALLATION OVERVIEW

Firstly, check the contents of the shipping package and make sure the following items are included:

- 1(or 2) – Sensor(s)
- 1 - Control Box
- 1 – Buzzer
- 1 - Cable 1.5m Extension Cable
- 1 - Cable 3m Monitor Transition Cable
- 1 - Cable 3m Sensor Transition Cable red
- 1 - Cable 0.9m USB to UART Cable

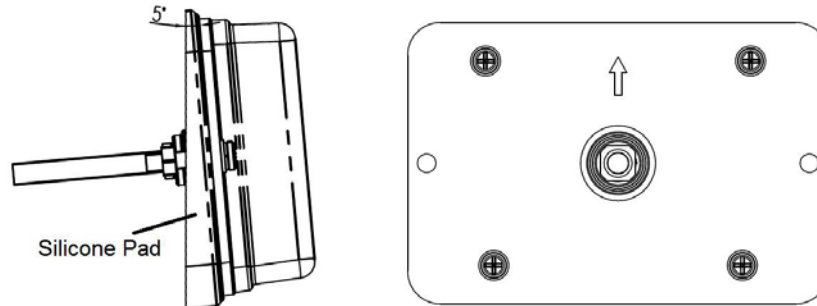
Operation Manual & some installation accessories, some accessories may be excluded if they are optional.



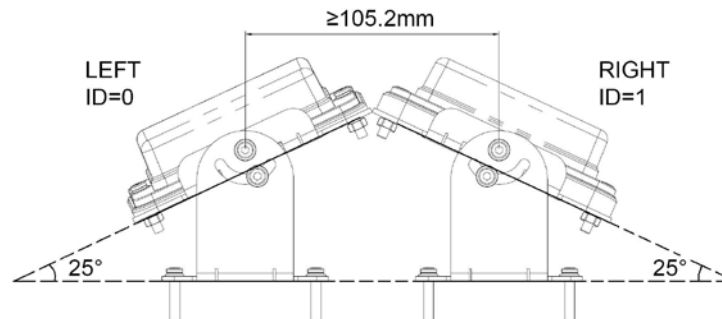
## 6. INSTALLATION OVERVIEW

### ● Sensor installation

The radar sensor mounting location is important for proper operation. Ideally the sensor should be mounted on the rear enter of the vehicle at roughly 1m +/- 0.3m above the ground and upward 5 degree elevation angle with the provided Silicone Pad to reduce ground interference. The arrow on the back of the sensor must be placed upward.



If two sensors need to be combined to detect a wider area, sensors should be mounted at 25 degrees horizontally as shown in the following figure.



The sensor can also be tilted horizontally at a certain angle with the mounting bracket (optional).

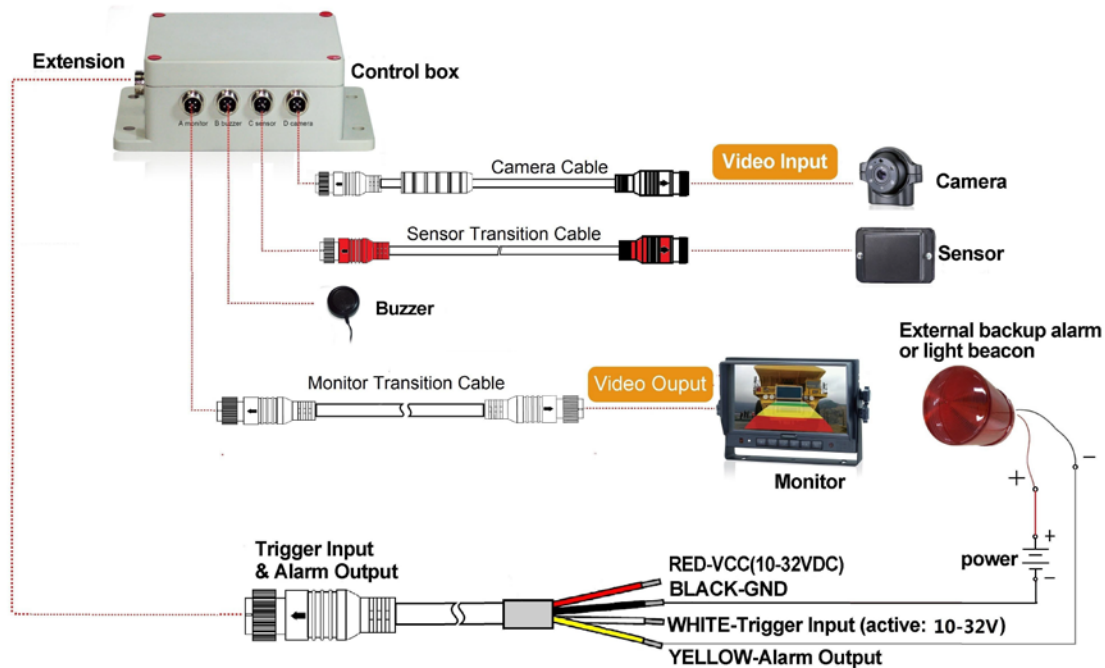




# 6. INSTALLATION OVERVIEW

## ● System Connection Diagram (2 Ways)

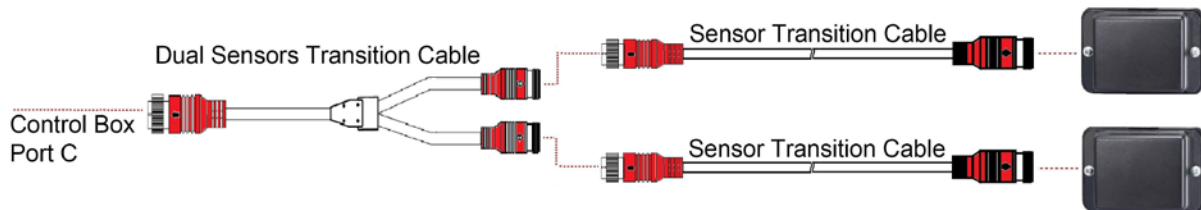
### Integrating with Vision System



Port A for connecting the monitor (through Cable 3m Monitor Transition Cable (optional))

Port B for connecting the buzzer

Port C for connecting the radar sensor (through Sensor Transition Cable for one sensor, and dual Sensors Transition cable for two sensors, and each sensor can be extended with Sensor Transition Cable)



The connection of two sensors (Optional)

Port D for connecting backup camera (through Cable 3m Camera Cable)

Port E for connecting extension cable (through Cable 1.5m Extension Cable, Red: 10-32VDC, Black: Ground, White: Trigger input, Yellow: Alarm output)

The whole system is powered by vehicle battery through DC Wire or Cigarette Lighter.

## 6. INSTALLATION OVERVIEW

- Trigger Input

The system provides an auxiliary input that allows an external signal input to change the sensor status between standby and active. As a backing sensor application, single white wire of extension cable connects to positive power wire of the back-up light.

- Alarm Output

The system provides an auxiliary output that triggers an external device whenever the sensor detects an object. This output can be used to activate an external backup alarm or a light beacon. The output is switched from a high impedance state to ground when activated and is protected against over-current or short-circuit. The maximum operating current is approximately 1 amp. The power supply for alarm can't exceed 24V.

# 7. OBJECT DETECTION CAPABILITY

## ● Tips for Users

Radar works on the principle of line of sight and relies on some of the electromagnetic energy transmitted by the sensor being reflected back from the object to the sensor. If an object does not reflect enough electromagnetic energy back to the sensor it will not be detected.

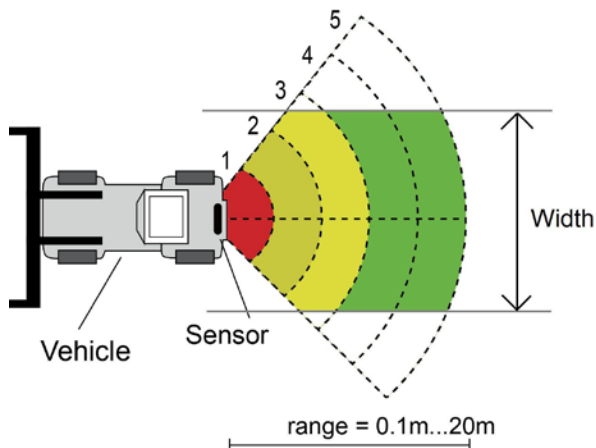
In the case where there are multiple objects in the detection area at various distances and/or angles, the sensor detects the closest object, which is the most important one for collision avoidance.

The object nature, location and direction are key influences in determining if an object is detected or not. The influencing factors are listed below.

- Size: Larger surfaces are detected better than smaller surfaces.
- Material: Metal is detected better than non-metal materials, e.g. wood, plastic.
- Surface: A smooth and solid surface is detected better than rough, uneven, porous, fragmented or liquid surfaces, e.g. bushes, gravel, water.
- Shape: A flat object is better detected than a complex shape.
- Angle: An object facing directly towards the sensor (perpendicular, orientation head on to the sensor) is detected better than an object that is located towards the edges of the detection area or at an angle.
- Distance: An object closer to the sensor is better detected than one that is further away.

## ● Alerts Description

The system provides the operator both visual and audible indications of a detected object. As soon as an object enters the zones it will activate a transparent visualization to make the operator aware of the potential danger. Distance to the detected object is displayed with five colored zones on monitor. Distance of each zone and the width can be both customized.

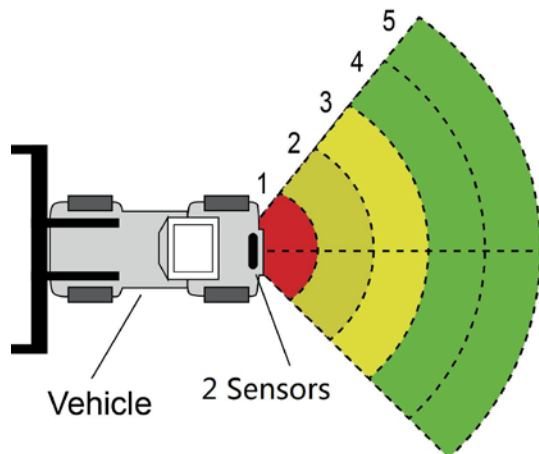


## 7. OBJECT DETECTION CAPABILITY

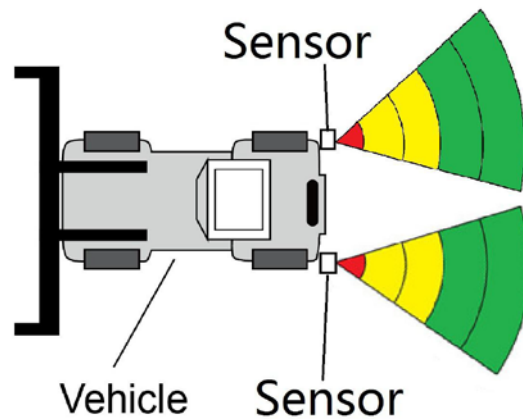
The buzzer can provide an audible alert through "Beep" that will increase in rate as an object becomes closer, alerting the operator that an object is being detected. The monitor's internal buzzer can provide an audible alert too.

Conditions	Visual	Buzzer
No Object Detected	None	Off
Object in Zone 5	Green	Bi-Bi-Bi
Object in Zone 4	Green	BiBi-BiBi-BiBi
Object in Zone 3	Yellow	BiBiBi-BiBiBi-BiBiBi
Object in Zone 2	Yellow	BiBiBiBi-BiBiBiBi-BiBiBiBi
Object in Zone 1	Red	Constant tone

Two Sensors example:



Combination detection



Independent detection

## 8. TESTING AND MAINTENANCE

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 vehicle 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, one who remains in the cab (the operator), and one who walks through the sensor detection field (the assistant).

1. Clean the sensor face of any accumulation of dirt, mud, snow, ice, or debris.
2. Visually inspect the attached wiring and cable and verify that they are properly secured and not damaged. Inspect the Radar Sensor and control box and verify that they are securely attached to the vehicle.
3. Set the park brakes, start the vehicle, depress and hold the vehicle brake, and place the vehicle in reverse.
4. The area to the rear of the vehicle should be clear of obstacles for a distance greater than the sensor range. If the monitor shows any overlay or buzzer sounds, then there are objects to the rear of the vehicle that will interfere with the test. Move the vehicle to a clear area and proceed.
5. The assistant should move to just behind the rear corner of the vehicle in sight of the operator's mirrors. He should then walk toward the center line of the vehicle parallel to the rear, while the operator notes when the monitor shows an overlay and buzzer sounds, signifying the sensor has detected the object.
6. The assistant should continue walking through the area at the rear of the vehicle while the operator notes the area where detection occurs.
7. Next, walk from the center of the rear of the vehicle straight back, away from the vehicle. When the buzzer quits sounding or overlay disappears, the detection limit has been reached.
8. The assistant should walk the complete rear of the vehicle while the operator notes the detection edges of the entire coverage area.
9. After the test, the operator and the assistant need to communicate the details on the detection zone and keep a record

## 9. TROUBLESHOOTING

The symptoms described below do not necessarily mean a failure within the system. Please check the following items before you initiate request for repair.

Symptoms	Causes	Solutions
No reaction from the system while the gear is switched to reverse.	No power input or no trigger input.	Check whether the power and activation input cable are well connected.
No reaction on display while there are obstacles within the detecting area.	Improper connection of the sensor or monitor etc.	Check whether the connections are loose.
No audible alert while there are obstacles within the detecting area.	The monitor sound volume is turned off or set too low.	Turn on or turn up monitor sound volume.
Monitor shows "No Sensor Detected".	Improper connection of the sensor.	Check whether the connections are loose.
There is no obstacle within the detecting area, but constant warning occurs.	The ground is detected.	Adjust the angle of sensor.