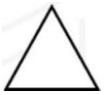
SYSTEM INSTALLATION AND USER MANUAL

AZIMUT DVS-PSS 2024

IMPORTANT SAFETY INSTRUCTIONS.

READ AND SAVE THESE INSTRUCTIONS

	**WARNING** This manual describes operating instructions and important safety precautions for the use and installation of the DVS kit supplied by Azimut Electronics.

Index

General system information 3

Specifications of the warranty 4

Product introduction 5

System components 6

Operating logic 7

DVS System Installation 10

Installation of the monitor 10

Installation of the cameras 11

Installation of the AP120 LED visual warning device for the driver 14

Installation of the BA097B outdoor speaker 15

DVS system calibration 16

System User Manual 20

Maintenance 22

Technical sheets 23

Datasheet: 7" DM70MR Monitor 23

Datasheet: Front CS50RA-130 and side CS50RA-180 cameras 24

Datasheet: GPS sensor 25

Datasheet: Visual warning device for the AP120 driver 25

Datasheet: External speaker for warning vulnerable users 26

Installation of the DVS system 9 10System Calibration 14 16Technical data sheet: Visual warning device for the AP120 driver 24 25

General system information

Before installing the DVS system, read all instructions and warning notices in this manual.
Pay particular attention to the wiring connection and install protection fuses as indicated in this manual.
To ensure that the system complies with DVS/PSS, the installation position of each component is critical. Be sure to install according to the product assembly instructions.
Although this product has the function of blind spot monitoring, the driver must take full responsibility for driving. Please make sure to drive the vehicle carefully and pay attention to the surroundings.
The detection chambers of the system, if dirty or covered by foreign objects, will affect its proper operation. Please clean them regularly to ensure normal operation.
The use of non-original spare parts or accessories not supplied by Azimut Electronics may cause risk of fire, short circuit, irreversible damage to equipment and even personal injuries.
Make sure all cables are properly installed and in good electrical condition and that the size of the wire is large enough for the system's expected consumption.
Except at the DVS system connection points, the boxes must not be opened or disassembled under any circumstance. There are no parts that can be changed inside the units. The opening thereof voids the system warranty. In case of problems or malfunction, please contact a skilled installer.
Short circuits and reverse polarity can cause serious damage to the system, wiring and accessories. Fuses cannot prevent damage caused by reverse polarity. This damage is not covered by the warranty.

Specifications of the warranty

Azimut Electronics guarantees that the components that make up the DVS kit have been manufactured in accordance with the legally applicable standards and specifications.
Work that is not in accordance with the guidelines, instructions and specifications in the user and installation manual may result in damage and/or the failure of the unit to perform its functions.
All of these issues may void your warranty.
The warranty is limited to the costs of repair and/or replacement of the product.

This warranty does not cover the costs of installation or shipping of defective parts.

Product introduction

From 28 October 2024, the Direct Vision Standard (DVS)—formerly known as the Safety Licence—will be significantly changed to the Progressive Security System or PSS. The new regulations still apply to heavy vehicles over 12 tonnes operating in the Greater London area but include a number of new requirements.

One of the key changes is the minimum star requirement, which will increase from one to three stars. This adjustment means a greater emphasis on safety, especially for vehicles that do not meet the star rating. In order to be licensed and allowed to operate in the Greater London area, these vehicles will need to be fitted with additional safety systems with the aim of reducing risks and road accidents. The new DVS PSS regulations introduce the latest technological developments, meaning some operators may need to replace existing equipment with new, more advanced technology.

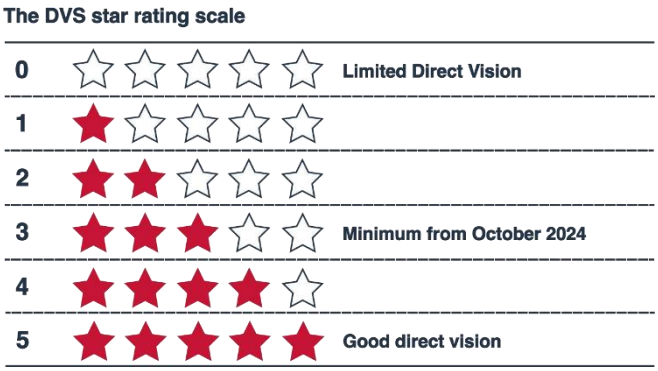


Figure 1

You can consult all the information about the new DVS PSS 2024 regulations at the following link:

https://tfl.gov.uk/info-for/deliveries-in-london/delivering-safely/direct-vision-in-heavy-goods-vehicles

The new regulations require detection and warnings to drivers when there is a risk of running over vulnerable road users (VRUs, as they are referred to in the regulations: pedestrians, cyclists, scooters, motorcycles and other two-wheeled vehicles) and not objects in general, which is what the old DVS regulations referred to.

Therefore, it is necessary to use systems that allow us to distinguish between inanimate objects and people.

The new Azimut PSS kit provides the perfect solution for complying with the new regulations and significantly increases safety in vehicle fleets. It is based on the use of two cameras with artificial intelligence that automatically identify the presence of VRUs in a risk zone, both on the front and on the right side of the vehicle, warning the driver in advance and thus avoiding accidents.

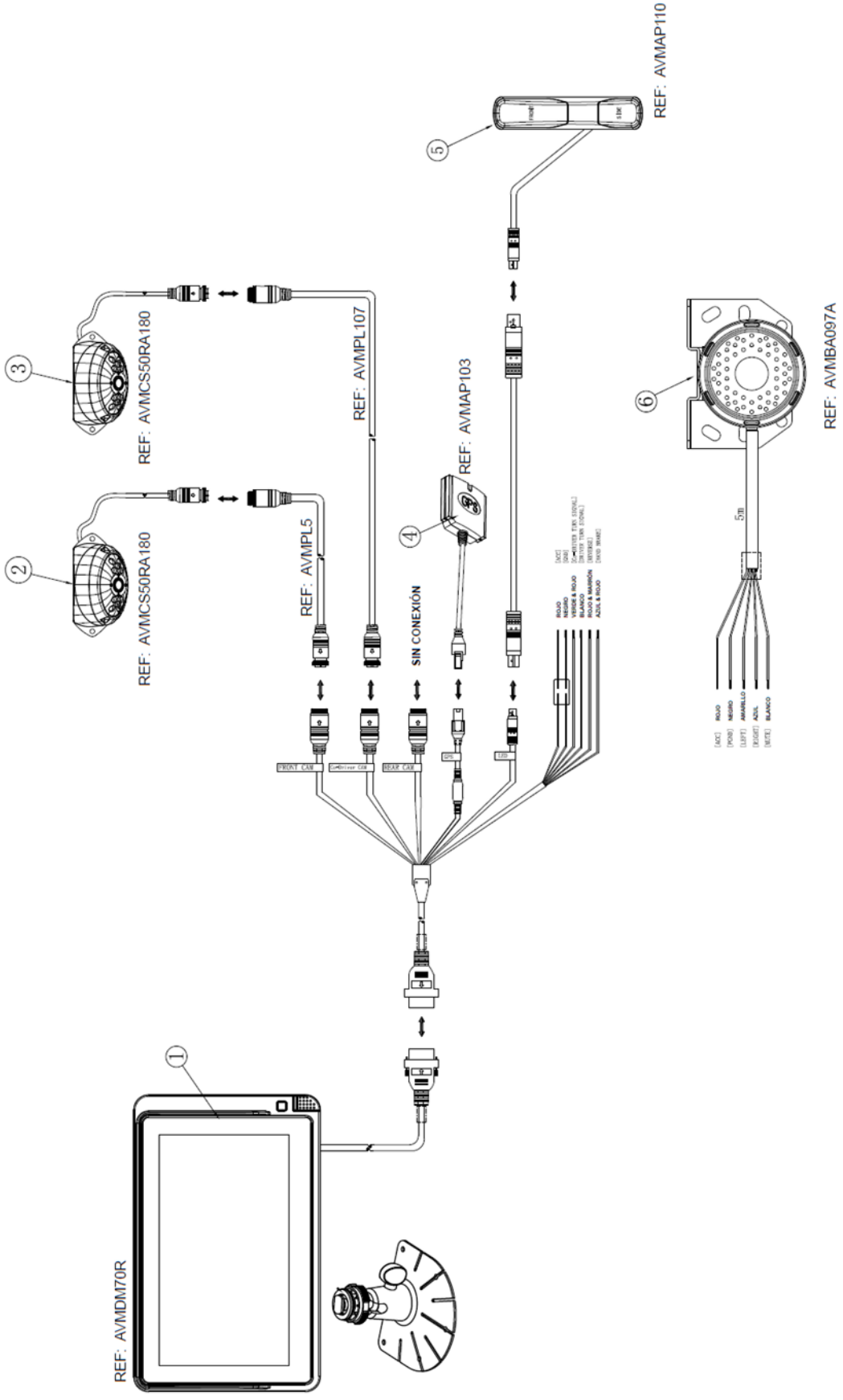
Two cameras are supplied. The first is responsible for monitoring the front area of the vehicle during the vehicle start-up manoeuvre, and the second is responsible for monitoring the right side of the vehicle. Both cameras are connected to a 7" touch screen monitor that is responsible for displaying the image of these and visually and acoustically warning the driver when there is an imminent risk of running over VRUs. According to the regulations, the system must warn in a different way when there is an imminent risk of running over VRUs (Warning Signal or WS) and when there is danger, but this is not imminent (Information Signal or IS). Therefore, a visual LED warning device is also supplied that emits light alerts, so that when there is danger, but it is not imminent, the driver is only warned visually and only when the danger of running over a VRU is imminent is the driver warned both visually and acoustically. The LED visual warning device has two LEDs, one at the top and one at the bottom, making it possible to differentiate when the alert is on the front (top) or on the side of the vehicle (side).

System components

Figure 2

1. Monitor to colour 7" with three DM70MR video entries
2. CS50RA-130 colour front camera
3. CS50RA-180 colour side camera
4. GPS sensor
5. Visual warning device for the AP120 driver
6. External speaker for warning vulnerable users
7. "Blind Spot" sticker

Connection diagram



Operating logic

The **front camera's** operating logic is as follows. The system will only issue alerts when the vehicle's speed is between 0 and 10 km/h and the reverse gear is not engaged. If these conditions are met, two types of signals can be issued, as established by the regulations: one that is visual only (IS) and another that is visual plus acoustic (WS).

- **Visual only signal** (the visual warning LED will be red, and the monitor will show the detection area in yellow):
  - VRUS within detection area + brake applied + vehicle stopped.
- **Visual signal** (the visual warning LED will be red, and the monitor will show the detection area in red) + **acoustic** ("Caution! Person in front"):
  - VRUs within detection area + brake NOT applied.
  - VRUs within detection area + brake applied + vehicle moving

The operating logic of the **side camera** is slightly different. On the one hand, the detection area is divided into two zones, such that the closest one (between 0 and 1 m from the side of the vehicle) is considered an imminent collision zone and the furthest one (between 1 m and 2.2 m) is considered a non-imminent risk zone (the area of these zones is adjustable if the user wishes to change them). However, if the right indicator is activated, the entire detection area will be considered an imminent collision zone.

In addition, the side monitoring system will only issue alerts when the vehicle's speed is between 0 and 35 km/h and reverse gear is not engaged. If this is the case, two types of signals can be issued, as established by the regulations: one that is purely visual and another that is visual and acoustic.

- **Visual only signal** (the LED visual warning will be red, and the monitor will show the detection area in yellow):
  - VRUS within the risk zone + brake activated + right indicator not activated
  - VRUS within the risk zone + brake NOT activated + right turn signal not activated
- **Visual signal** (the LED visual warning in red and the monitor will show the detection area in red) + **acoustic** ("Caution! Person on the side"):
  - VRUs within the risk zone + brake activated + right indicator activated
  - VRUs within the risk zone + brake NOT activated + right flasher activated
  - VRUs within imminent collision zone + brake applied + vehicle moving
  - VRUs within the imminent collision zone + brake NOT applied

As for the monitor image, it will display the image from the side camera as long as there is no alarm. While if only the front camera alarm is activated, only the front camera will be displayed. If both alarms, the front and the side, are activated at the same time, the monitor will be split into two, showing both cameras at the same time.

The external speaker, as specified by the regulations, will alert the VRUs every time the vehicle turns right (for those vehicles driven on the left).

DVS System Installation

Figure 3

Installation of the monitor

Install the 7" monitor in the vehicle cabin, just in front of the driver or on the right side. The monitor comes with a mounting base for easy installation. We recommend that the monitor be within 120cm of the driver's eye. The speaker on the back of the monitor should not be covered or placed too close to any surface that could attenuate its volume, otherwise the audible warnings will not be heard properly.

Once the monitor is installed in its final position, the different accessories, signals and power supply must be connected to the monitor. The front camera must be connected to the wiring labeled "**FRONT CAM**" and the side camera to the wire labeled "**LEFT CAM**" (the wiring labeled "**REAR CAM**" will be left free, which allows a rear-view camera to be added to the system as an optional extra). The GPS device must be connected to the wire labeled "**GPS**" and the visual warning for the driver to the wire labeled "**LED**". To power the monitor, a voltage source must be connected to the **"VBAT"** wire (supports between 9.5V-36V) and the negative pole to the wire labeled "**GND**".

Finally, it is necessary to connect the right turn signal and the brake signal to the cables marked "**RIGHT**" and "**BRAKE**" respectively.

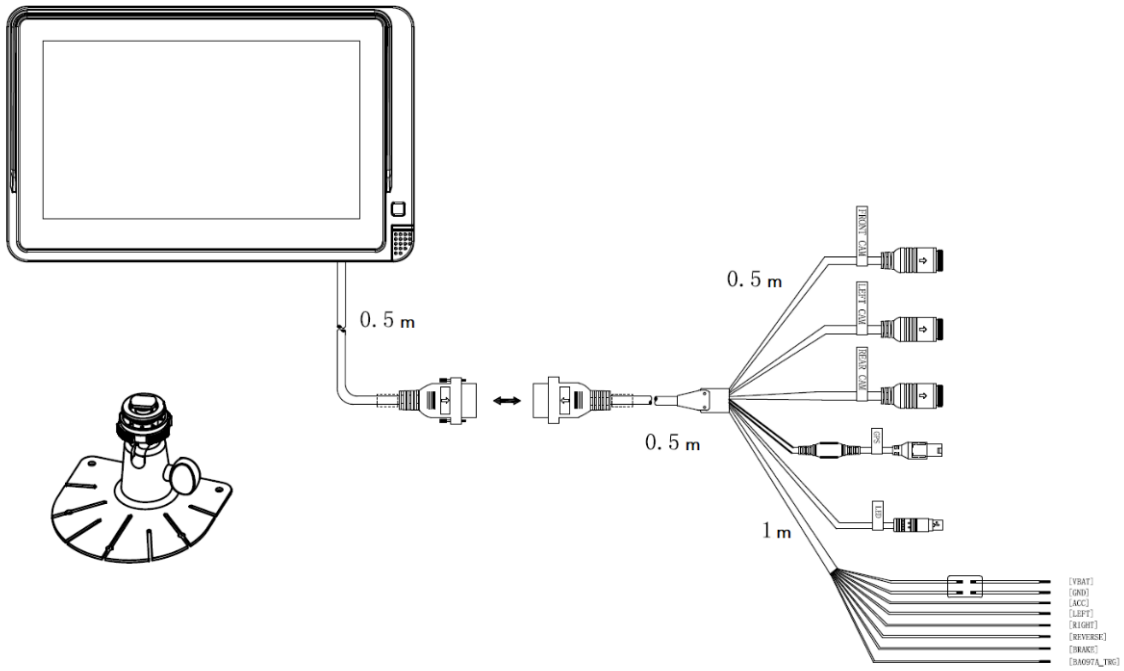


Figure 4

Installation of the cameras

The field of view of the cameras must not be blocked by the bodywork or other parts of the vehicle.

For the CS50RA-130 **front camera**, the DVS PSS regulation defines the detection range as the width of the vehicle + 0.5 m on each side, and 2.0 metres in front of the frontal plane of the vehicle. The recommended installation height should be between 1.5 to 3.5 metres. Depending on the installation height, the camera should be tilted at an angle between 17° and 37° above the horizontal plane to ensure the correct field of view. The camera should be installed horizontally centred on the front of the vehicle.

Installation height	Recommended tilt angle
1.5 m	32° - 37°
2 m	26° - 37°
2.5 m	22° - 37°
3 m	17° - 37°
3.5 m	17° - 37°

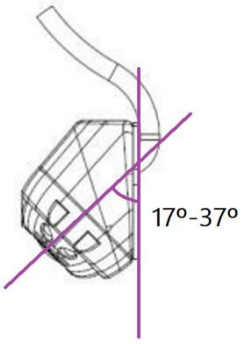


Figure 5

Figure 6

As for the CS50RA-180 side camera, the DVS PSS regulation defines the side detection area as between 0-2.2m from the side of the vehicle and 9m from the front of the vehicle to the rear.

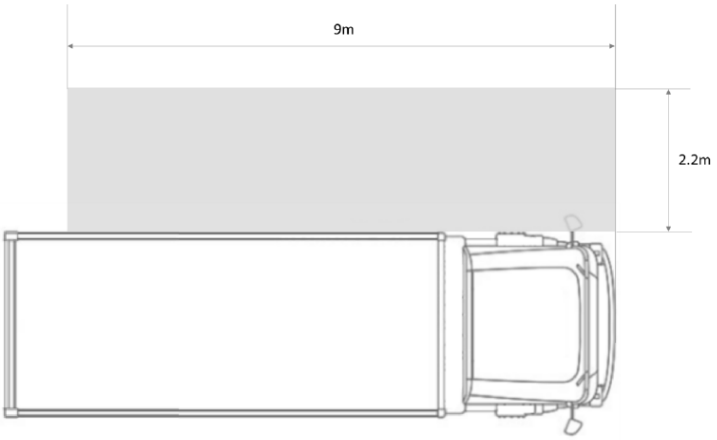


Figure 7

The installation height must be more than 1.5 metres from the ground and between 1 and 7 metres back from the front of the vehicle. Depending on the distance to the rear, we recommend tilting the camera to a greater or lesser degree with respect to a plane perpendicular to the longitudinal axis of the vehicle. The camera is mounted at an angle of inclination of 16 to 40 degrees with respect to a plane parallel to the ground.

Installation height	1 metre	2 metres	3 metres	4 metres	5 metres	6 metres	7 metres
1.5 m	18°-40°	18°-40°	18°-40°	18°-40°	0°-40°	6°-40°	20°-40°
2 m	8°-40°	8°-40°	8°-40°	8°-40°	8°-40°	8°-40°	16°-40°
2.5 m	8°-40°	8°-40°	8°-40°	8°-40°	8°-40°	8°-40°	8°-40°
3 m	0°-40°	0°-40°	0°-40°	0°-40°	0°-40°	0°-40°	0°-40°
3.5 m	0°-40°	0°-40°	0°-40°	0°-40°	0°-40°	0°-40°	0°-40°

Installation of the AP120 LED visual warning device for the driver

The AP120 LED visual warning device provides IS (information signals as they are called in the legislation). The device must be located in the driver's cabin and at an angle slightly greater than 30° in relation to the driver's vision direction in order to direct the driver's vision towards the side where the detection has occurred. The warning device must be wired to the monitor through the monitor cable labeled "LED".

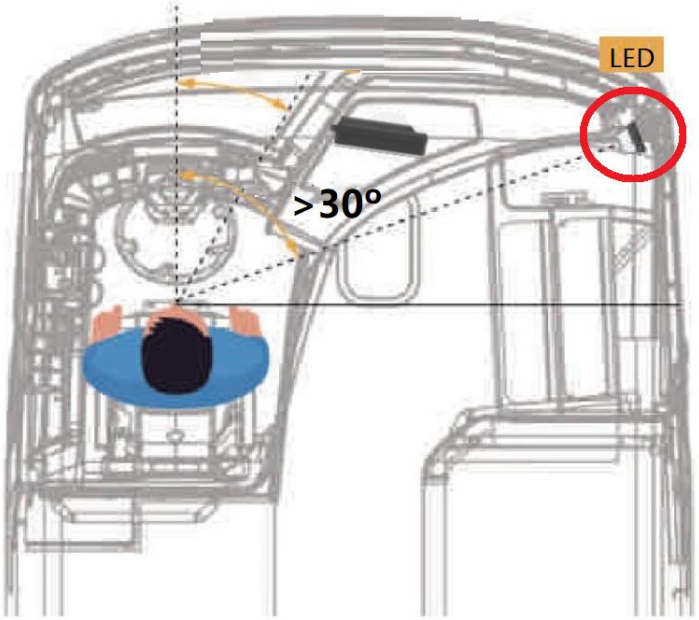


Figure 8

Installation of the BA097B outdoor speaker

The BA097B voice speaker must be installed outside the vehicle. We recommend installing it on the right side of the tractor unit (for vehicles driven from the left seat) and avoid covering the speaker with any surface to avoid sound attenuation. The speaker must be connected to a power source (9-32V), taking into account the correct polarity of the wiring. On the other hand, the vehicle's right turn signal must be connected to the "Trigger" wiring. According to the regulations, the device must be activated and emit an acoustic warning signal when the vehicle turns to the right (activation of the right turn signal).

Figure 9

DVS system calibration

Once the system is installed, it is necessary to set up the VRU detection areas for each of the cameras through the monitor settings menu. To do this:

1. Access the main screen **menu** by tapping anywhere on the touch screen. A menu with 4 icons will then appear at the bottom, where you must tap on the settings icon (highlighted in red in the image below):

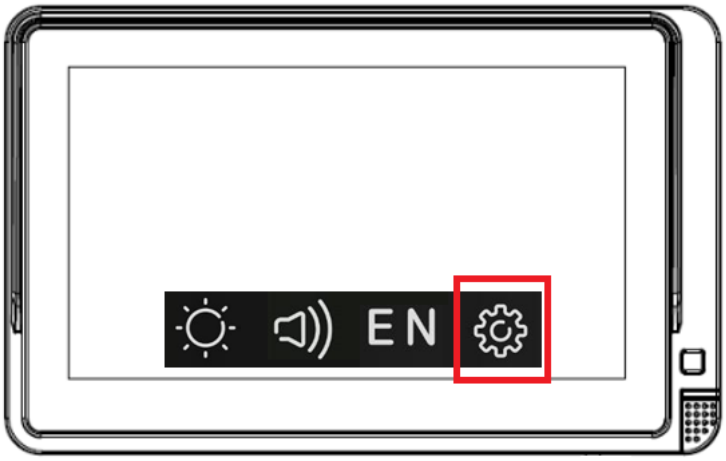


Figure 10

2. Enter the **password** to access settings (the default is **8888**, but it can be modified). This will take you to the device settings menu.

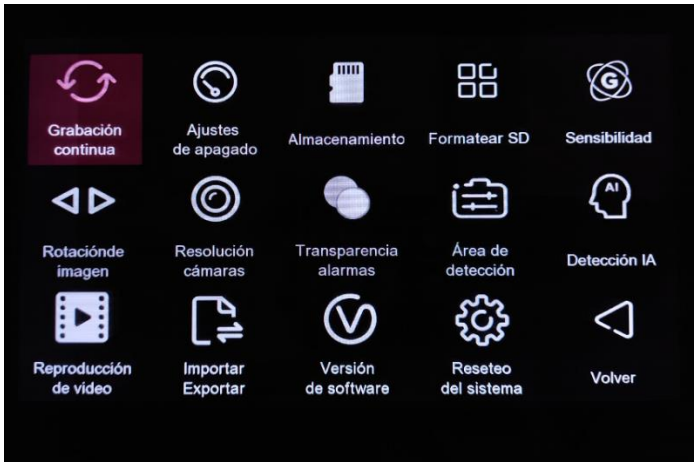


Figure 11

3. In this menu, you must click on the  icon (**Detection area)** to define the areas that the system must monitor in each zone (front and side).

4. First, the settings of the **side camera's** detection area appear, defined through the 6-point position as can be seen in the image below:

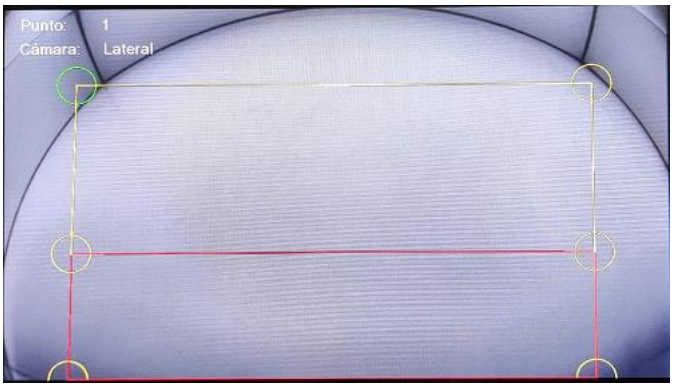


Figure 12

According to the regulations, the lateral area to be monitored must be formed by the two rectangles and their 6 vertices, as defined in the following figure:

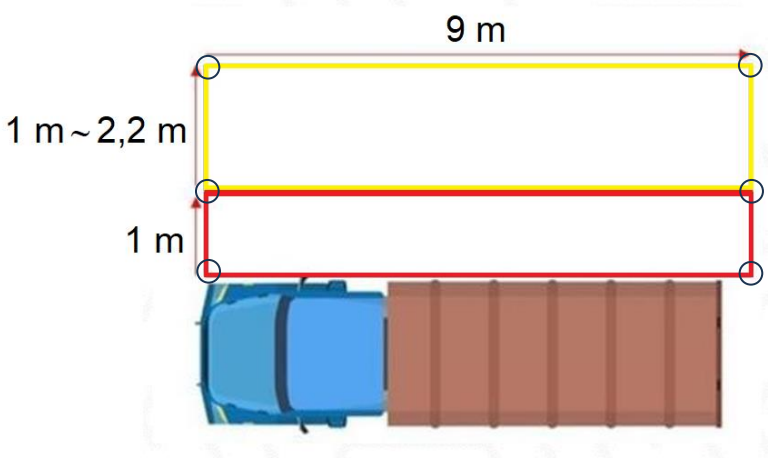


Figure 13

In which two distinct areas are distinguished depending on whether a collision with a VRU is imminent or not:

- **One closer to the vehicle** (in the red box) up to 1 m wide, which corresponds to the imminent collision zone.
- **A more distant one** (in the yellow box) that will occupy the position between 1 and 2.2 m from the side of the vehicle, which corresponds to the non-imminent risk zone.

5. Measure the distances established in the previous point on the ground, positioning the 6 points previously defined on the ground (it may be helpful to use some object to mark them).

6. Drag the points on the monitor so that they coincide with the 6 points marked on the floor and draw the two rectangles defined in figure X (red and yellow). To position the points, you can also use the bottom menu that appears when you click on any position on the monitor:

Figure 64

7. This completes the calibration of the side camera.

8. Once the side detection area has been defined, click anywhere on the screen to bring up the bottom menu. In this menu, click on the icon to change the camera and configure the **front camera** detection area. The process is the same as above, but in this case, the area we need to draw is made up of only 4 points. These points must define the area shown in figure X, that is, a rectangle with a total width equal to the width of the vehicle plus 0.5 metres on each side and a forward length of 2 metres.

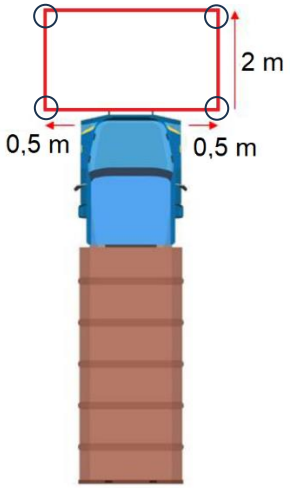


Figure 15

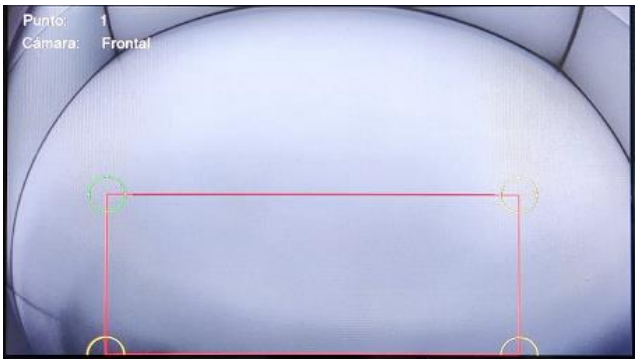


Figure 16

9. We measure on the ground the distances shown in the inner figure with the 4 marked points.

10. As in the previous case, we drag the 4 points on the monitor placing them on top of the 4 points measured on the floor.

11. This brings the calibration to an end, and we just have to click on the exit icon in the menu (which reappears after clicking anywhere on the screen).

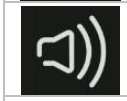
System User Manual

The 7" touch screen monitor has 3 video inputs: front, side and rear. Although the rear camera is not required by the new DVS PSS regulations, it can be optionally added to the system to allow rear vision when reversing. In addition, all cameras can detect the presence of VRUs in their fields of vision according to the detection area defined by the user. The monitor also has a slot to insert an SD card of up to 512 GB, which allows video to be recorded continuously and/or specifically when an alarm is triggered.

After clicking on any point on the monitor we access the menu of the main screen of the monitor:

Figure 77

The menu consists of 4 functions.

Icon	Description	Options
	BRIGHTNESS: Allows you to adjust the screen brightness to three different levels.	Low, medium, high
	VOLUME: Allows you to adjust the alarm sound volume to three different levels.	Low, medium, high
	LANGUAGE: Allows you to switch between the different languages available in the interface.	Spanish, English
	SETUP: Allows you to access the device settings menu by entering the access password.	-

Within the system settings menu you can access the settings of different additional options:

Icon	Description	Options
	CONTINUOUS RECORDING: This option only works when an SD card is inserted. It allows you to define the maximum duration of videos that are recorded continuously (Standard Video).	1, 2, 3 minutes
	SHUTDOWN SETTINGS: Allows you to define the length of time that the system will remain active when the vehicle engine is turned off (ACC signal).	5, 15, 30 seconds
	STORAGE: Displays the free and used capacity on the SD card distinguishing between ordinary video, alarm video and images.	Spanish, English
	FORMAT SD: Makes it possible to format the installed SD card.	-
	SENSITIVITY: The system can store both continuous recording from the cameras (regular video) and event recording (alarm video). Alarm videos are recorded when the accelerometer detects a sudden acceleration (e.g. a crash). This option allows you to configure the sensitivity of the accelerometer to trigger the recording of alarm videos that last 20s.	Off (no alarm videos recorded), Low, Medium and High
	IMAGE ROTATION: Makes it possible to rotate the image from the different video cameras displayed on the screen.	Rotation of the 3 cameras both horizontally and vertically
	CAMERA RESOLUTION: Makes it possible to define the working resolution of the cameras	Automatic (camera native resolution), 1080p 25fps, 1080p 30fps, 720p 25fps, 720p 30fps, CVBS.
	ALARM TRANSPARENCY: Makes it possible to define the transparency level of the menus and on-screen warnings so that they are not so visible, and the background image can still be seen.	1, 2, 3, 4, 5
	DETECTION AREA: This is the calibration tool to define the detection area of the front, side and rear cameras through a set of points that represent the vertices of the detection area.	-
	AI DETECTION: It enables VRU detection by artificial intelligence algorithms. If not activated, no alerts are generated, and the system operates only as a monitoring system.	On, Off

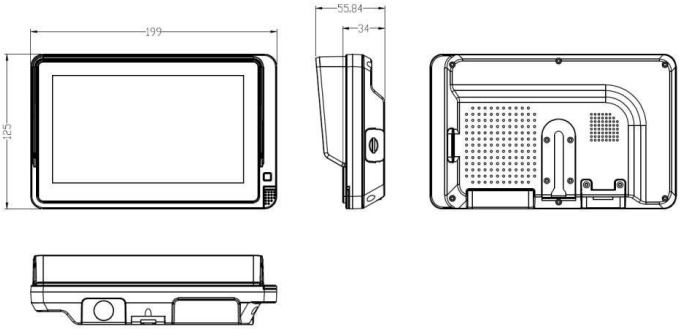
	VIDEO PLAYBACK: Access to the playback window of ordinary and alarm videos stored in the SD card.	-
	IMPORT/EXPORT: Allows you to export and import the “Detection Area” and “Image Rotation” settings of the current device.	Import, Export
	SOFTWARE VERSION: Displays the current software version code.	-
	SYSTEM RESET: Makes it possible to return the settings to the factory values.	-
	RETURN: Close the menu and return to the main screen.	-

Maintenance

The system does not require a specific maintenance process beyond regular cleaning of the camera lenses to ensure proper operation, since the system is based on artificial vision to detect the presence of VRUs. For this purpose, we recommend using a soft cloth with non-abrasive cleaning products.
In normal operation, the camera automatically removes any frost, snow or fog from the lens, preventing blurred or obscured vision.

Technical sheets

Datasheet: 7” DM70MR Monitor



System	Available languages	English, Spanish
	Operation interface	On-screen menu
	Method of operation	Touch and physical buttons
Screen	Size	7 inches
	Resolution	1024*600*3 (RGB)
	Contrast	800:1
	Glow	450 cd/m2
Video	Video input	3-channel CVBS or AHD (720P/1080P) at 25/30fps
	Video output	Single 3-channel unsplit display
Audio	Audio input	A microphone input
	Audio output	One output, built-in amplifier
	Speaker output	8 Euro 1-2W
I/O Control	Control signals	3-way I/O
Power supply	Power input	Supports input voltage between 11V~34V. Low and high voltage protection circuit functions.
	Power cables	ACC / B+ / GND
Consumptions	Power consumed	< 24W
Operating parameters	Operating voltage	9.5V - 36V
	Boot time	15 seconds
	Response time	≤ 200 ms
	Storage temperature (ºC)	-30ºC - 80ºC
	Operating temperature (ºC)	-20ºC - 70ºC
	Operating humidity (%)	15 - 65 % RH
	Degree of protection	IP54

Datasheet: Front CS50RA-130 and side CS50RA-180 cameras

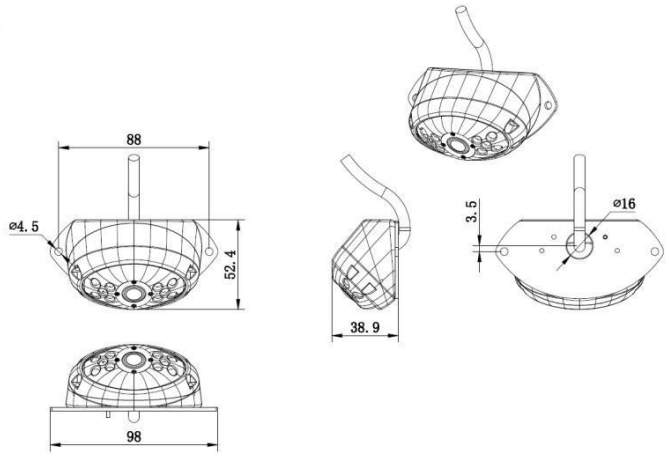
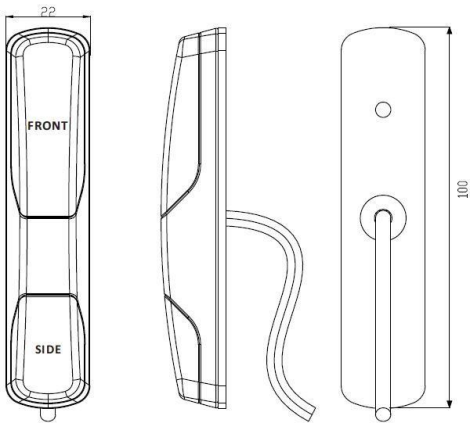


Image type	1/2.8'
Resolution (pixels)	1920(H) x 1080(W)
Effective pixels	AHD: 2 megapixels
Colour system	PAL/NTSC
Lens size	1.9 mm
Viewing angle	Horizontal 130° (front camera CS50RA-130) Horizontal 180° (side camera CS50RA-180)
Video output format	AHD 1080P
Dynamic range	>120dB
Minimum illumination	0.1 lux
Degree of protection	IP68
Power supply	12V DC/150mA.
Energy consumption	<1.8W
Signal-to-noise ratio	42dB
Working temperature	-30°C ~ +70°C
Storage temperature	-40°C ~ +80°C
Working voltage	8 - 16V
Dimensions	80(length)*37(width)*52(height) mm

Datasheet: GPS sensor

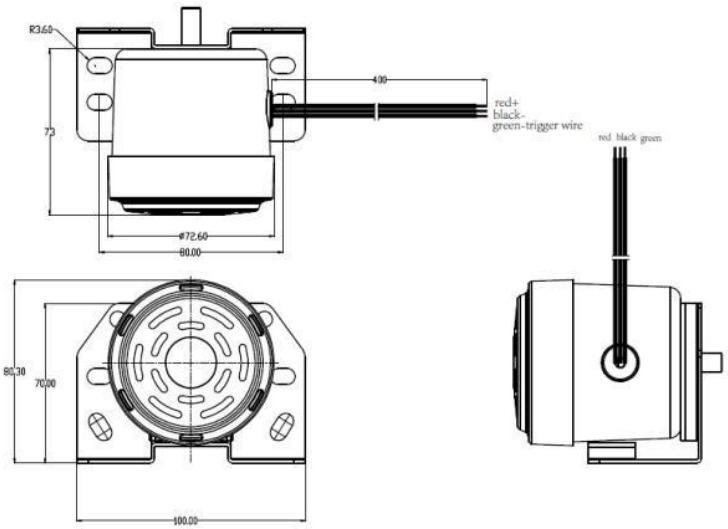
GPS Sensitivity	-165dBm
Transmission speed	115200.10Hz
Working voltage	3.0V~5.5V
Energy consumption	50 mA @ 3.3 V
Antenna size	35*35*4mm
Form Factor	55+0.5*50+0.5*18.4+0.3mm
Type of communication	UART/TTL

Datasheet: Visual warning device for the AP120 driver



Energy consumption	150 mA at 12 V
Operating temperature (ºC)	-20ºC ~ +70ºC
Storage temperature (ºC)	-30ºC ~ +80ºC
Weight	50 grams

Datasheet: External speaker for warning vulnerable users



Nominal working voltage	DC 12V
Working voltage range	DC 9–32 V
Energy consumption	< 3W
Degree of protection	IP66
Shockproof protection grade	5G
Frequency response	960Hz ~ 1440Hz
Volume	97 dB, 102 dB, 107 dB, 112 dB
Operating temperature	-20°C to +70°C