

Guardian Generation 3 – User Interface Guide

Software Version 2.12.41



Guardian Generation 3 in-cabin warning system

Guardian Generation 3 is an early warning driver fatigue alerting system that is installed in the vehicle cabin. The Guardian system helps drivers to avoid incidents by recognising, predicting, and alerting them to dangerous driving behaviours.

How it works

When the Guardian system detects drowsiness, microsleep or distraction, it will:

- Warn the driver of the danger via an audio alert and or vibration of the driver's seat.
- Notify the driver of the type of danger detected via the display screen.

Elements of the alerting system:

AUDIO / VISUAL ALERTS

Display Screen
displays symbols for driver alerts /
information on system functionality

Status Indicator Light (LED)
indicates whether the system is
operating / protecting the driver



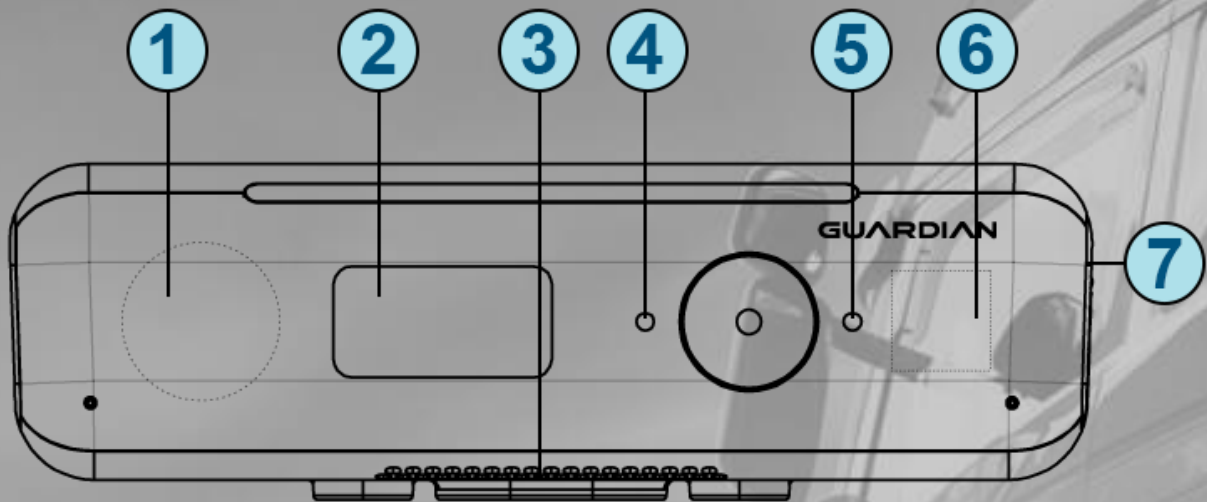
Speaker
plays audio alerts to warn of
dangerous driver behaviour

HAPTIC ALERTS

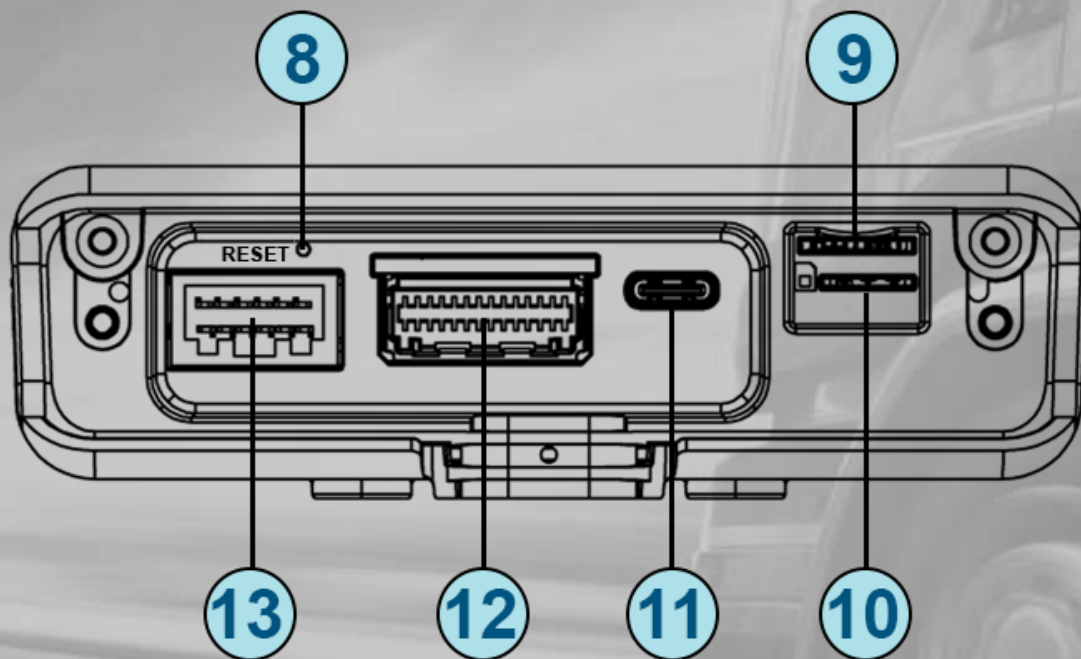


Vibration Motor
Vibrates the driver's seat to alert them
to a microsleep or distraction event.

FRONT VIEW



REAR VIEW



1. Optical Sensor
2. Display Screen
3. Speaker
4. Status Indicator Light (LED)
5. Ambient Light Sensor
6. IR Illumination
7. Maintenance Button

8. Factory Reset Button
9. SD Card Slot
10. SIM Card Slot
11. Programming Port
12. Data signals Connector
13. Power and Vibration Motor Connector

Audio and Haptic alerts (Vibration Motor)

Audio and haptic alerts (via the optional vibration motor) are the primary alert warning mechanisms. The vibration motor will vibrate the driver's seat to provide haptic alerts when installed. These alerts are used to warn the driver and attempt to change driver behaviour. The system also plays a warning sound when the In Cab Sensor has lost sight of the driver's face, or when a critical system error has occurred.

The audio settings for audio alerts have been configured to ensure that they will be heard in the cab environment above road noise and other equipment.

The Guardian alert system:

The Driver Monitoring System assesses the driver state and uses audio and haptic (vibration) alerts in the following scenarios:



Drowsy Alert

This alert will be triggered when a driver is assessed to have entered a 'drowsy' state. It acts as a light 'tap on the shoulder' using an audio alert. The pre-emptive alert warns drivers to, at a minimum, consider taking a break to stop them moving into more dangerous sleep states.



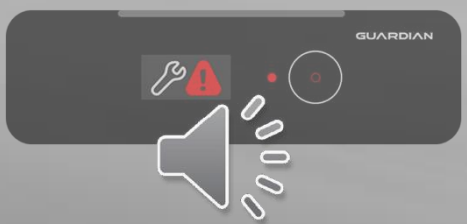
Microsleep Alert

An audio alert will sound when the system detects that the driver's eyes are closed for more than 1.5 seconds. If the vibration motor is installed, it will also vibrate the driver's seat during this alert.



Distraction Alert

An audio alert will sound when the system detects that the driver's eyes have been off the road for 4 seconds. If the vibration motor is installed, it will also vibrate the driver's seat during this alert.



Critical Error

An audio alert will sound if the Guardian system enters an error state where the driver needs to be notified. This alert cautions the driver that there is an issue, such as a Field of View (FOV) error, and the Guardian system is no longer able to detect and alert the driver.

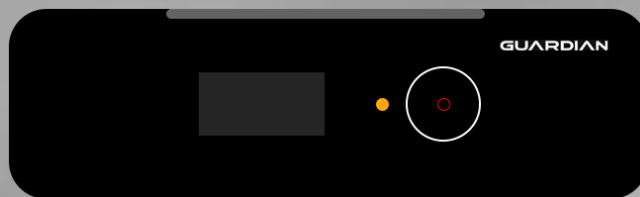
Visual Indicators

Display screen symbols

Informational symbols provide visual notifications that alert the driver and explain the reason for the alert. The symbol displayed will depend on the danger that the driver is in.

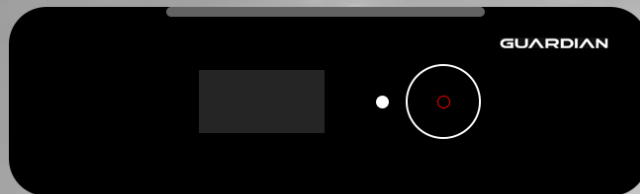
Status Indicator Light (LED)

The LED provides a visual indication of the current system state. It indicates whether the system is operational and guarding the driver, inactive, or if there is an error. When the device is turned off there will be no LED active, and the LED will also turn off during a normal power down process.



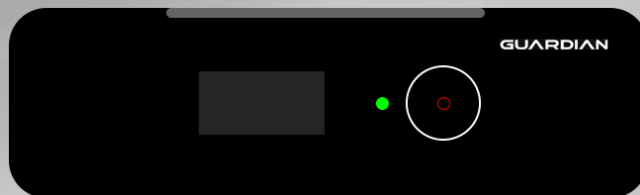
Starting Up

At ignition, the status light LED turns red before switching to amber as the system starts. This start-up process takes around 2 minutes. During this period the driver is not being guarded.



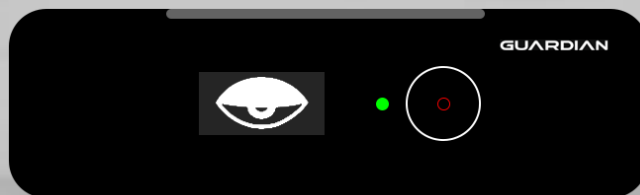
Preparing to Guard

When the LED turns white the system is ready to start the learning phase. The learning phase begins when speed is above 10 km/h and takes around 2 minutes. Audio and haptic alerts are not yet active. The LED will remain white until speed thresholds are reached.



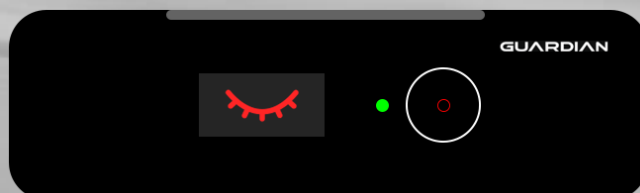
Guarding Driver

Guardian system is active as the vehicle is above the drowsy or distraction speed thresholds. The driver is currently being guarded and audio and haptic alerts are active. (Note: if the speed goes below threshold, the LED returns to white and alerts are deactivated.)



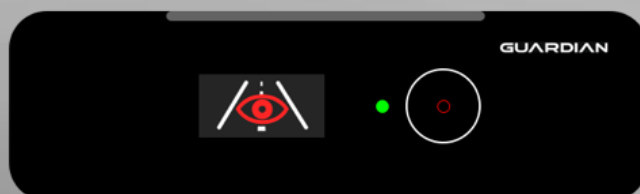
Drowsy Driver Alert

The 'eye half closed' or 'droopy eye' icon is the symbol used to notify a driver that they have entered a drowsy state. The symbol will disappear when the driver recovers to an 'alert' state.



Microsleep Alert

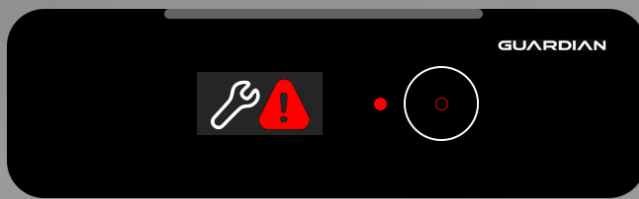
The 'eye closed' icon notifies the driver that a microsleep has been detected (driver's eyes closed for more than 1.5 seconds). If installed, the vibration motor also vibrates the driver's seat. Displays for 10 min (from last microsleep) if above speed threshold.



Distraction Alert

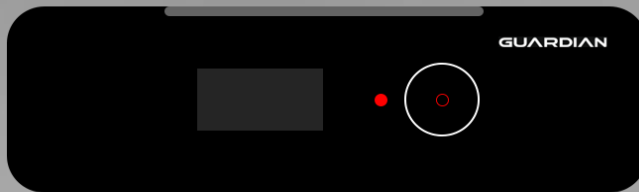
The 'eye on the road' icon notifies the driver of a distraction event. It is triggered when the system detects that the driver's eyes have been off the road for 4 seconds. Displays for 10 seconds by default.

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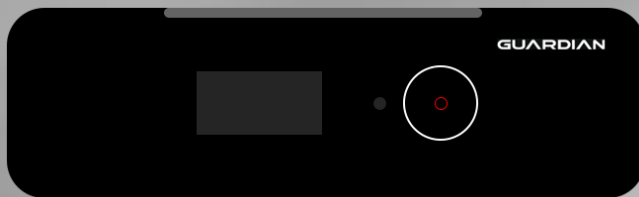
Error Alert

These symbols inform the driver of a serious error with the system and that they may not be receiving protection. Errors include: (1) Electrical / mechanical issues (10s display). (2) Optical Sensor obstruction detected (displayed until situation resolved).



Continuous Red LED

If the Status Indicator Light (LED) remains RED for the vehicle's entire journey, it signifies a critical error with the Guardian unit. Contact Seeing Machines' technical support for further assistance.















Blank State

If the display screen is blank and the Status Indicator Light (LED) is not illuminated, this indicates a critical error with the Guardian unit. Contact Seeing Machines' technical support for further assistance.

When are alerts activated, and how long will they stay on?

Once a vehicle's ignition has been turned on and the Guardian system has initialised, alerts become active at different speed and time thresholds. The duration and deactivation of alerts will vary based on the type of alert. The KSS (Karolinska Sleepiness Scale) is an industry standard measure of drowsiness.

| Alert | Trigger | Warning | Icon Display Duration | Icon Display End |
|----------------|--|---|--|---|
| Drowsy | KSS above 7 and above speed threshold |   | Screen display stays on as long as vehicle above speed threshold and KSS is above 7. * | Typically, a minimum of 10 minutes after drowsiness is triggered. |
| FOV | After 10 min of lost tracking of driver face/eyes when above FOV speed threshold |   | Displays whilst unable to track the driver. | When tracking resumes, critical error or trip end |
| Critical Error | Critical system error (active at any speed) or optical Sensor obstruction detected |   | Stays on screen for a short time after error detected (default is 10 seconds). | 10 seconds after the error is triggered. |
| Microsleep | Eyes closed for 1.5 seconds, (and above the impairment speed threshold). |    | Displays until the driver's condition improves from last microsleep. * | Minimum of 10 minutes |
| Distraction | Eyes off road for 4 seconds, (and above the engagement speed threshold). |    | Default is display for 10 seconds. | 10 seconds after distraction is triggered. |

*If you go below the speed threshold the icons turn off

How long does the system take to boot up?

The Guardian system activates upon vehicle ignition and boots up as follows:

- 'Ignition on' signal detected - LED turns red before turning amber as the system starts up.
- System boots up for approximately 3 min, and when complete the status light (LED) turns white.
- The Driver Monitoring Engine (DME) and its drowsy detecting algorithm starts assessing driver drowsiness when the vehicle speed exceeds 10 km/h, requiring about 2 minutes to initialize.

How long does the system take to shut down?

When the vehicle's ignition is turned off, it can take up to 1 minute for the Guardian system to shut down. Before shutting down, the system will check and if authorised, will apply software updates which can take several minutes to install.

