

# Roadscope LX

User's Manual(Ver.1.0)



Save your life, Save your car !



PLK TECHNOLOGIES

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## Your Smart Vision, Roadscope LX!

- ▶ **Forward Collision Warning (FCW)** function warns a driver when the vehicle detects an imminent crash of the front vehicle.
- ▶ **Lane Departure Warning (LDW)** function warns a driver when the vehicle moves out of its lane on the roads.
- ▶ **High Beam Assist (HBA)** function turns the vehicle's high-beam lights on and off by detecting oncoming/front vehicles.
- ▶ **Beep & Watch (B&W)** function will be activated when the driver's vehicle is static. Detecting the front movement and informing the driver of it by alarm sound, Roadscope LX helps the driver check the front movement.

## This product is the on road safety device with the following functions to help drivers.

- ◇ The product is a safety driving support system, so it isn't responsible for the accidents caused by driver's failure of attention or violation of traffic law.
- ◇ Malfunction due to improper operation or repair is not qualified for warranty service.
- ◇ Read this manual carefully to get full benefit of the product.

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## Notice

**Please read this manual carefully to use the product properly and safely.**

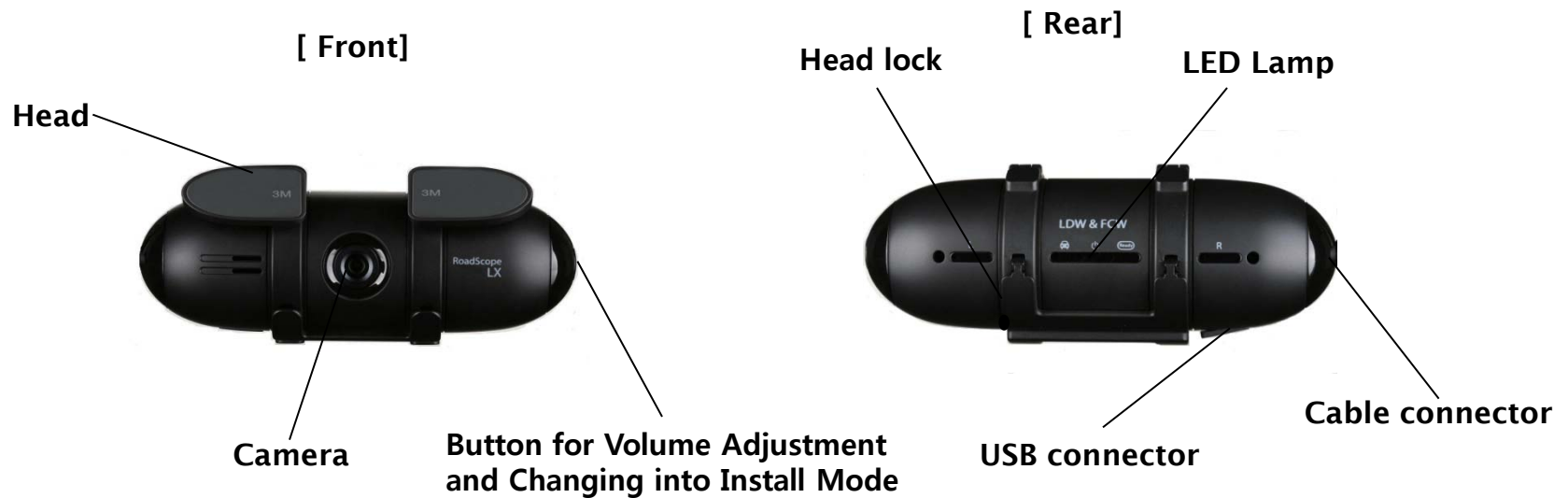
1. Please NEVER disassemble, repair or rework the product.  
It can cause a malfunction and, in the worst case, serious damage not only to the product but also to the vehicle. And if these works turn out to be responsible for the breakdown, the product will be ineligible for after-service.
2. Please avoid sprinkling liquid on Roadscope LX while cleansing the interior of the vehicle.  
Water can damage the internal electronic circuits and cause fire or shock.  
Keep Roadscope LX away from chemicals and detergents, because they can deteriorate the surface and cause damage to the internal circuits.
3. Please keep Roadscope LX away from mechanical shock, which can damage the mechanical and electronic components and result in permanent damage and functional deterioration.

# Introduction

4. Roadscope LX cannot be operated properly in case of any obstacle blocks its sight. Please keep windshield glass clean. Do not attach any objects around Roadscope LX because objects near Roadscope LX can cast reflected shadow and degrade its performance.
5. Even though Roadscope LX operates correctly at the time of its installation, there may be performance degradation if the position of Roadscope LX deviates from original setting. Please assure that Roadscope LX is firmly fixed and not exposed to external shock.
6. Please protect Roadscope LX from moisture, salt and oil, etc. which can damage the inside/outside of the device.  
Please be careful of external forces, because pressure and shock can deviate the device from original position and lead to unintended operation.
7. Roadscope LX may not be operated properly under the adverse conditions such as moisture formed on the surface of the windshield and the backlight.
8. Please don't place the display module right under the main unit.  
The reflection of lights of the display module on the windshield may cause malfunction.
9. Please note that this manual can be modified without notification.

## Main Body

Roadscope LX includes the following components:



# Introduction

1. The **head** has double-sided tape for attaching the device on windshield.
2. The **camera** recognizes the lanes, front/on-coming vehicle.
3. **Head lock** holds the main body.
4. On the backside, there are **LED Lamps** for driving information.
5. The **USB connector** is for the after service only. DO NOT use it for other purposes.

## LED Display



- **FCW LED** : This LED will be turned on when the driver's vehicle is driven over the speed which is set (Default FCW speed value is 20km/h) and the device will detect the front vehicles. In case of collision risks, it will blink. The LED light is blue color.  
**LED light is turned on when the vehicle speed is over the set value and the preceding vehicle is detected.**



# Introduction



- **LDW LED** : LDW LED will be turned on when the driver's vehicle is driven over the speed which is set(Default LDW speed value is 60km/h) . In case of lane departure, it will blink. If the driver uses turn signal, the LED will be turned off. The LED light is green color.

# Introduction



- **POWER LED** : This LED will be turned on when the vehicle comes into the **KEY ON status**. The LED light is green color. If there is any defect of Roadscope LX, the color will be changed according to the defect.

# Introduction



- **READY LED** : This LED will be turned on when the GPS is normal and sends the speed signal to Roadscope LX. The LED light is blue color.

## Functions

### 1. Forward Collision Warning (FCW)

1-1. FCW function warns a driver when the vehicle detects an imminent crash of the front vehicle.

1-2. Roadscope LX makes alarm sound with FCW LED blinking.

1-3. FCW function is not operated when the vehicle is driven below the warning threshold setting.  
(Default warning threshold setting of FCW is 20km/h)

1-4. The warning signal is generated when the preceding vehicle gets close.

1-5. If the TTC remains below FCW setting for more than 2 seconds, although the preceding vehicle doesn't get closer, the warning signal is generated.



- $TTC = \text{distance between the preceding vehicle and the driver's vehicle} / \text{the speed of the driver's vehicle}$
- Second Warning : below TTC 0.7 (default value, changeable )
- Third Warning : below TTC 0.4 (not changeable)



## 2. Lane Departure Warning (LDW)

2-1. LDW function makes alarm sound when the vehicle departs Left/Right lanes unintentionally.

2-2. If the user uses the turn signal of the vehicle, LDW function is not activated.

2-3. Roadscope LX makes alarm sound with LDW LED blinking.

2-4. LDW function is not activated when the vehicle is driven below the vehicle speed set.  
(Default LDW speed value is 60km/h)

2-5. LDW function is helpful for a driver who wants to keep the lane or for a sleepy driver.



### 3. High Beam Assist (HBA)

3-1. HBA function turns the vehicle's high-beam lights on and off by detecting oncoming/front vehicles.

3-2. When the vehicle is on the dark road and the driver needs high beams, this function is useful for the driver's convenience.

3-3. This function is operated over the speed 30 Km/h.











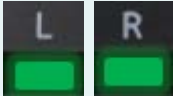






## 4. Beep & Watch (B&W)

4-1. B&W function will be activated when the driver's vehicle is static.

Detecting the front movement and informing the driver of it by alarm sound, Roadscope LX helps the driver check the front movement.

4-2. B&W function is very useful while waiting at a traffic signal or driving in a congested area.

## LED Display

LED	Status	LED Status	Remarks
	ON		Operating status with power.
	OFF		Power off status.
	ERROR		Abnormal state on the device.
	ON		FCWS function is ready for operation. -> When the preceding vehicle is detected.
	BLINK		FCWS is operated when set value(TTC) agree with forward vehicle's distance.
	OFF		FCWS is not active or speed is under set value. -> When the preceding vehicle is not detected and the vehicle speed is below the warning threshold setting.
	ON		LDWS function is ready for operation.
	BLINK		LDWS is operated when vehicle depart from lane.
	OFF		LDWS is not active or speed is under set value.
	ON		GPS signal is normally operated.
	OFF		GPS communication is no active



## Optional Devices



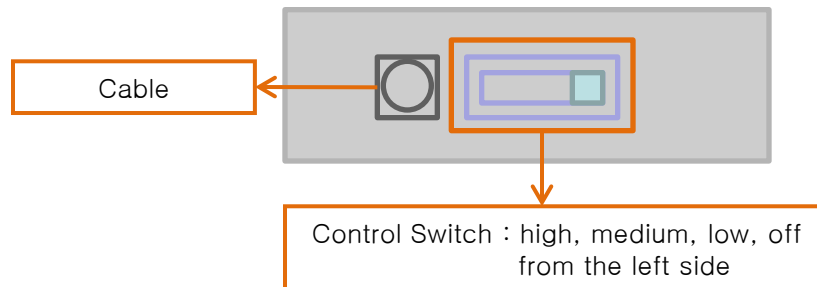
### 1. Vibrator

1-1. The Vibrator can make haptic warning for LDW and FCW.

1-2. The Vibrator will be installed on the seat belt.

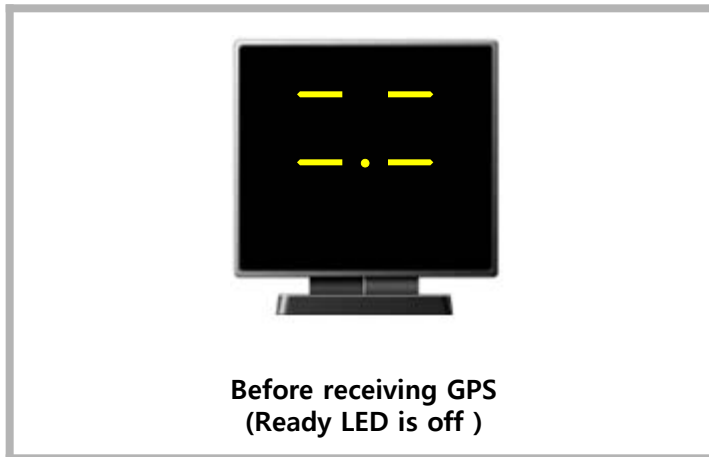
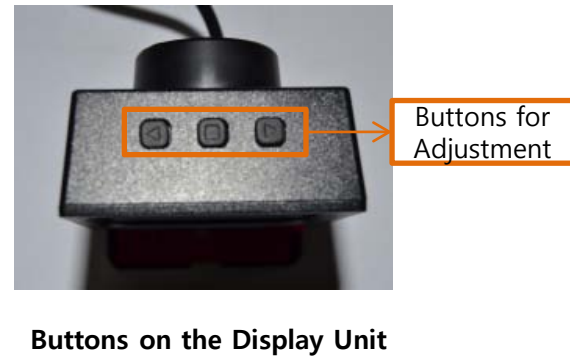
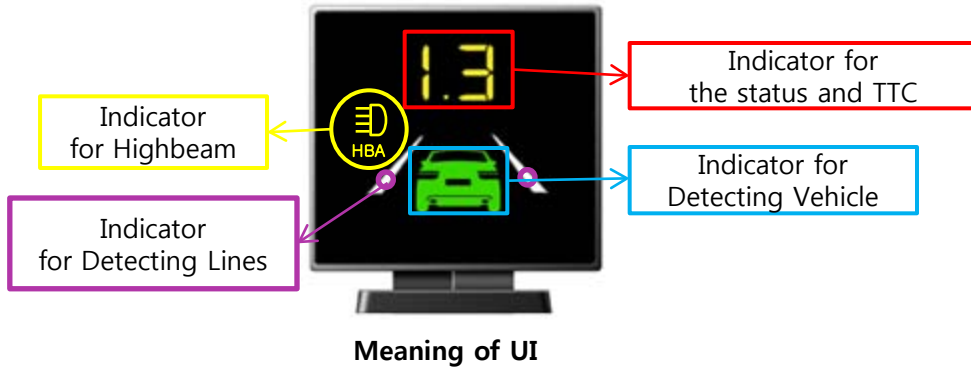
1-3. If the user is not satisfied with the alarm sound, Vibrator which gives strong warning signal is recommended.

1-4. The intensity level of vibrator can be adjusted from off to high.





## 2. Display Module \_ Basic





## 2. Display Module \_ FCW



In the case of detecting the preceding vehicle with the vehicle speed above the FCW threshold setting (Dark green vehicle icon when exceeding TTC 2.0)



In the case of detecting the preceding vehicle with the vehicle speed above the FCW threshold setting (Bright green vehicle icon and TTC)



In the case of the second warning with the vehicle speed above the FCW threshold setting (Red blinking vehicle icon with TTC)  
The second TTC start point can be changed through the manager program or smart phone App.



In the case of the third warning with the vehicle speed above the FCW threshold setting (Red vehicle icon with TTC)  
The third TTC start point is fixed.



## 2. Display Module \_ LDW



In the case of the left lane departure with the vehicle speed above the LDW threshold setting

(Blinking left line)



In the case of the right lane departure with the vehicle speed above the LDW threshold setting

(Blinking right line)



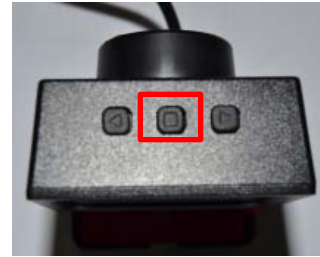
## 2. Display Module \_ HBA / Beep & Watch

HBA



In the case of the high beam is on  
( High beam icon + HBA )

HBA



By pressing the ■ button, HBA function can be  
ON/OFF.

B&W



Status of Stop and Standby  
(Sequential lighting)

B&W



In the case of detecting the front vehicles' move  
( **Blinking** green vehicle icon)



## 3. Smartphone APP

3-1. The Blue Tooth installed in Main Body send information to the user's smart phone.

3-2. The user can monitor each functions in real time through the Smartphone APP.

3-3. The user can set up the startpoint of the functions, language, etc. and turn on/off the functions.

3-4. The user can use the Smartphone APP as follow. :

# Optional Devices



## 3-3-1. Home

The screenshot shows the Roadscope LX app interface. At the top, the text "Roadscope LX" is displayed. Below it, the current vehicle speed is shown as "70 Km/h". A central view shows a car on a road with lane markings. At the bottom, there is a dashboard with a tachometer on the left and a speedometer on the right. A navigation bar at the very bottom contains four buttons: "HOME", "Settings", "Install", and "Info".

Callouts and their descriptions:

- HBA Function is started.** This icon will be displayed when the HBA function is on. (Points to the HBA icon in the top left corner)
- Present vehicle speed** (Points to the "70 Km/h" display)
- Front car is detected.** (Points to the car icon in the center of the road view)
- Lane Departure** (Points to the blue circles on the lane markings)
- Turn signal** (Points to the left and right arrow icons on the dashboard)
- HOME** (Points to the home button in the bottom navigation bar)



## 3-3-2. Setting 1 \_ Functions On/Off & Sound control

The screenshot shows the 'Setting' menu with three tabs: 'Setting 1' (circled in red), 'Setting 2', and 'Setting 3'. The 'Setting 1' tab is active. Below the tabs are two sections: 'Functions' and 'Sound'.

**Functions Section:** A purple box highlights the 'Functions' section, which includes four rows of controls:

Function	Icon	on	off
LDW		<input checked="" type="checkbox"/>	<input type="checkbox"/>
FCW		<input checked="" type="checkbox"/>	<input type="checkbox"/>
HBA		<input checked="" type="checkbox"/>	<input type="checkbox"/>
B&W		<input checked="" type="checkbox"/>	<input type="checkbox"/>

A purple callout box points to the 'on/off' checkboxes with the text: "Function ON/OFF".

**Sound Section:** A blue box highlights the 'Volume' control bar, which is a slider with a green bar and a speaker icon. A blue callout box points to it with the text: "Use the control bar to change the volume value (0~15)".

Below the volume control is a 3x4 grid of sound type icons (musical notes and microphones). An orange box highlights this grid, and an orange callout box points to it with the text: "Personalize sound types".

On the left side, two callout boxes provide additional information:

- A green box: "Sound change is available in secondary warning." (points to the FCW row)
- A red box: "It can be changed only warning sound. There are 4 different warning sound." (points to the B&W row)

At the bottom of the screen, a 'Settings' icon (a gear) is circled in red.

\* When you click the 'SAVE' button, the changes of setting will be applied immediately.





## 3-3-2. Setting 2 \_ Timing setting of each functions

### LDW Function Timing Setting

Start point : for setting the LDW threshold

warning point (-5~+5) : for adjusting warning spot / Whenever you change the bar by one, warning point will be changed by 10 cm from the default value. The Default value of left/right warning point is '0'.

If you want to change this value, please move the control bar or enter the value in the box.

### Beep&Watch warning timing setting

If you want to change B&W warning point, please move the control bar or enter the value in the box.

The values can be adjusted from 0.0 to 3.0 by 0.1.



### FCW Function Timing Setting

Start point : for setting FCW threshold

TTC : the expected time to collision (The second warning point can be set up.)

The smaller TTC set value is, the faster the warning is generated. The bigger TTC set value is, the slower the warning is generated. If you want to change this value, please move the control bar or enter the value in the box.

You can select the displaying method between KPH and MPH.

\* When you click the 'SAVE' button, the changes of setting will be applied immediately.



## 3-3-2. Setting 3 \_ Setting of Language



Please, select Voice Language and click "SAVE" icon to finish settings.

There are English, Spanish, Korean, Japanese and Chinese languages.

# Optional Devices



## 3-3-3. Install



These items are for the vehicle information. These are registered when installing Roadscope LX at first.

Height – measure height from installed LX lens and ground and input value.

Width - measure width between front two tire of vehicle and input value

After entering the height and width of the vehicle, please click the 'SAVE' button.

Check which signal is turned on.

The user can set up the active status of blinkers and wiper.

The user can click the camera icon to capture the front image. The captured image will be used for analysis.



## 3-3-4. Information

Error Code
0x00000001 : SDRAM error
0x00000002 : NOR Flash error
0x00000004 : NAND Flash error
0x00000010 : AUDIO error
0x00000020 : CAMERA error
0x00000040 : CAMERA DATA error
0x00000100 : ACC error
0x00000200 : GPS error
0x00010000 : SOUND DATA error
0x00100000 : ON/OFF button error



Version information

Product serial number

Company information

## Trouble Shooting

Q: No sound comes out of Roadscope LX.

- ▶ Check if the power cable is correctly connected. If the power is not connected, no display comes out and POWER LED is turned off.
- ▶ Check if all the functions are disabled.
- ▶ Check if the sound level is minimized. If the sound level is low in noisy environment, the sound may not be heard.

Check the power LED on the main unit is green for seeing if the unit is normal.

Q: No warning occurs for lane departure.

- ▶ The Lane Departure Warning function starts to be operated after 2 seconds of watching road lines. So, the warning will come out 2 seconds later after passing crossroads or no-mark region.
- ▶ According to the design of Roadscope LX, while the warning message is coming out, another warning message will not occur, even though your vehicle crosses lines again.
- ▶ According to the design of Roadscope LX, if the road is narrow, the warning sound comes out later for the driver's convenience.

Check the power LED on the main unit is green for seeing if the unit is normal.

Q: Warning occurs without lane departure.

- ▶ Check the setting of warning timing. If set to earlier modes, the driver may feel that the warning is too fast or occurs without crossing lines.
- ▶ In case of bad weather, roads under construction or line-erased roads, Roadscope LX may not recognize the road lines appropriately.

Q: Beep & Watch function is not operated.

- ▶ This function is available when the vehicle is stopped. Make sure the vehicle is completely stopped.  
Please check that the color of 'ready' LED on the main unit is blue.

Q: The device gets hot sometimes.

- ▶ In hot summer or under direct sun light, the device may get heat from the outside. The internal electronic circuit and speaker may generate some heat even without a breakdown. However, in case of preserving Roadscope LX without use, please keep the device not exposed to sunlight directly.

## <Compliance statement>

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

- ▶ Changes/modifications not approved by the responsible party could void the user's authority to operate the equipment.
  
- ▶ This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
  - Reorient or relocate the receiving antenna.
  - Increase the separation between the equipment and receiver.
  - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
  - Consult the dealer or an experienced radio/TV technician for help.

## Certification

- ▶ Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

This equipment complies with FCC radiation exposure set forth for an uncontrolled environment.

This equipment should be installed and operated with minimum 20 cm between the radiator and your body.

This transmitter must not be collocated or operating in conjunction with any other antenna or transmitter unless authorized to do so by the FCC.



## Specification

1. Normal Operation Voltage	12/24V
2. Min. Operational Voltage	9V
3. Max. Operational Voltage	36V
4. Max. Power Consumption	3W
5. Operation Temperature	-20~ +85(C)
6. Storage Temperature	-40~ +105(C)
7. Camera Type	Color CMOS
8. GPS	Built-in GPS
9. Size	145 X43 (mm)
10. Weight	135g