CARDET-501 Operation description

①	**CARDET-501** Head
②	Relay Controller
③	12V 1A Power(optional)

Sensor Characteristics

CARDET-501 sensor is a synthetic smart vehicle detector that is comprised of a **magnetic** sensor and a cutting edge **RADAR** sensor. It was designed to detect the side wall of a vehicle which can replace a conventional loop coil.

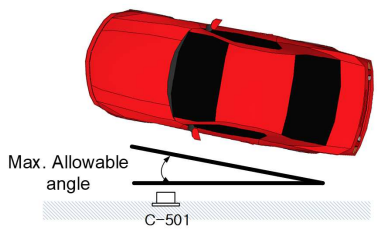
Sensing distance of a C-501

Operation Mode	Detection distance	Sensing method	Feature
LPR mode	0.1 ~ **2.5m**	**RADAR + Magnetic**	Fast detection
Bar control mode	0.1 ~ **2.5m**	**RADAR + Magnetic**	Reliability priority
Long distance mode	0.1 ~ **4.5m**	**RADAR**	Long distance detection

☑ In the long-distance mode, people can also be detected.

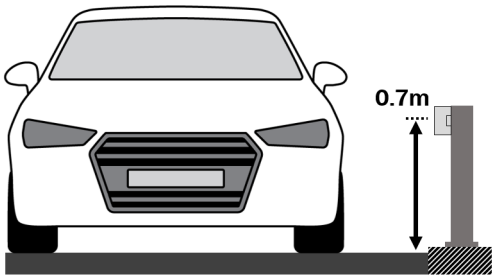
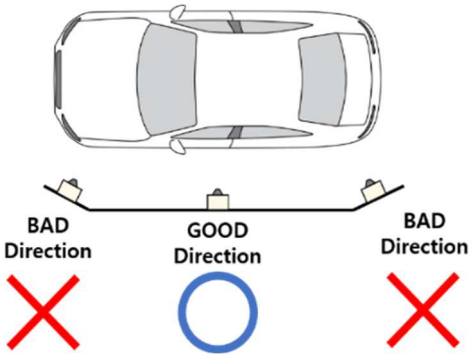
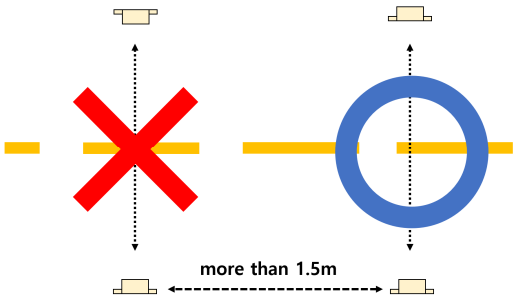
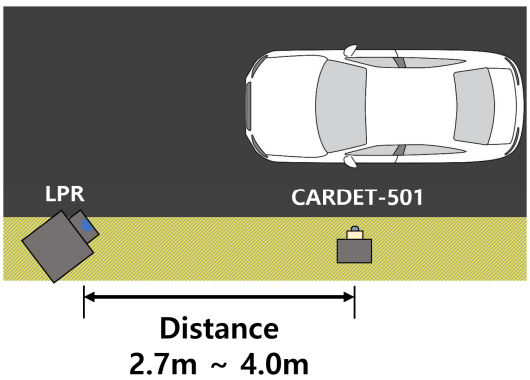
Allowable detection angle

Operation mode	Allowable detection angle	
	0.1 ~ 2.5m	**2.5 ~ 4.5m**
LPR mode	**± 25°**	
Long distance mode	**± 25°**	**± 10°**



⚠ Caution: Never touch or move a working sensor.

Installation

parameters	Description
Height	✓ The installation height will be good at **0.7 m** from the surface of the road. 
Direction	 ✓ The direction of C-501 must be orthogonal with the side wall of vehicle.  ✓ Do not rotate the sensor which makes false detection characteristics.
Caution	✓ Do not install C-501 sensors face to face. ✓ Keep the distance between sensors at least 1.5m. ✓ Keep the distance between sensor and relay controller at least 0.5m 
Tigger for a LPR	✓ For LPR trigger mode, install the sensor **2.7m ~ 4.0m** in front the LPR box. (Distance may vary depending on vehicle speed.) 

Check before operation

- ✓ After fixing the sensor first, turn on the power with no people or vehicle in front of the sensor, then initialization will proceed for about 1 second.
- ✓ Do not move the sensor while it is in operation. The sensor must be fixed (do not attach it to a revolving door.)
- ✓ Please check the magnetic disturbance such as a big motor or a relay near the sensor.
- ✓ You can test the sensor by a large steel plate (30cm x 30cm or more) in an open space. In this case, **the detection distance can be shortened**, but there is no problem in real vehicles.
- ✓ Radar sensor frequency is 57-64 Ghz and EIRP is 11 dBm.
- ✓ The CARDET-501 can be operated in at least one Member State without infiringing applicable requirements on the use of radio spectrum.

Caution for external case

- ✓ If you want to insert the sensor in user's additional case, then the case should have a wide hole for RADAR sensor in **CARDET-501**(upper 60%).
- ✓ If there is no hole for RADAR sensor, then the sensor does not operate.
- ✓ **Do not rotate** a **CARDET-501**, because the sensor has a horizontal radiation direction.

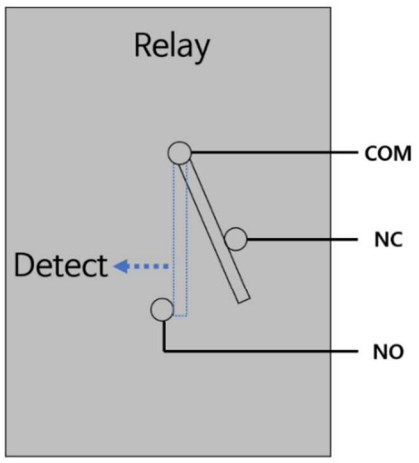
Connection to a Relay controller

✓ If user wants to extend the cable between the sensor head and the relay controller more than 80m, then user should use an adaptor that has a bigger current capacity (more than 2A). Please check the supply voltage drop inside the sensor head for the case of the cable extension.

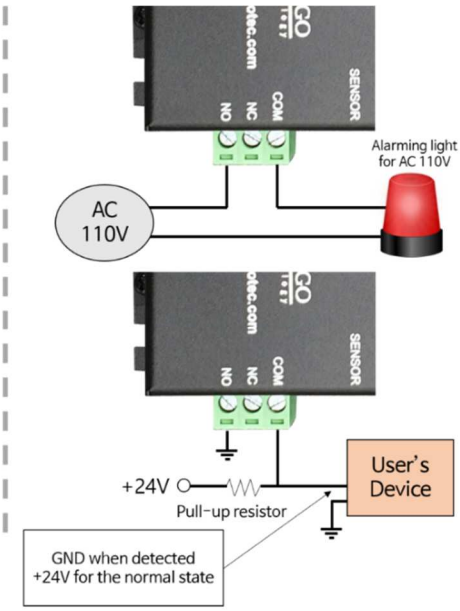
✓ The relay controller has a **RELAY (**dry contact switch**)** that makes it easy to interface it to the user's device. The **RELAY** has a following maximum electrical capability (following table). Users can use both of **AC** and **DC** for the RELAY.

	Max voltage	Max current	Max power
DC	30V	3A	90W
AC	220V	2A	440W

✓ Here are two connection examples of the relay controller, the dry contact (RELAY) will enable you to interface easily **CARDET** to your system.



- Relay connection

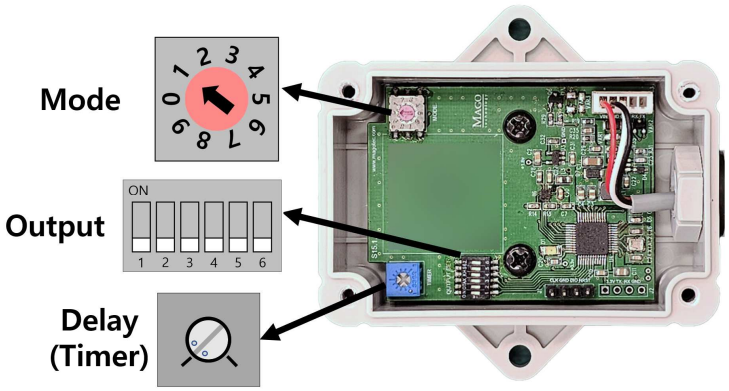


- Connection examples

✓ Normally (no vehicle) terminals **COM** and **NC** are connected, and if there is a vehicle to detect, then terminal **COM** and **NO** are connected (**COM** and **NC** are separated.)

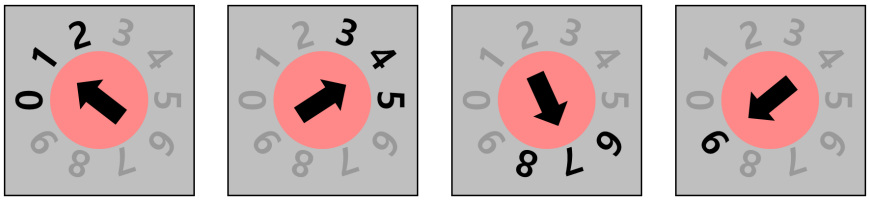
Change of operation mode

- ✓ If you open the upper cover of **CARDET-501** sensor head, then you can find a rotary and a DIP switches and a small volume as following. User can choose the mode of operations among following 4 modes (table 2).
- ✓ Power must be off when the switches are changed.



- ✓ User can change the operation mode and sensitivity of the sensor by following instruction.
- ✓ **CARDET-501** has four kind of operation modes (**LPR / Bar control / Long distance / parking**)
- ✓ Please be careful when adjust the small switch.

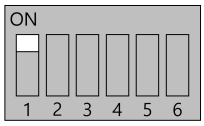
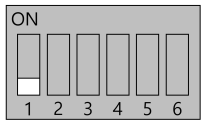
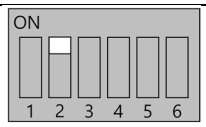
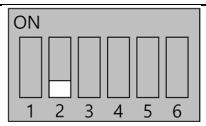
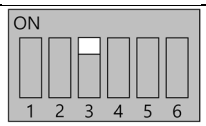
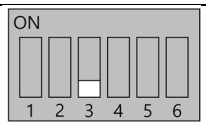
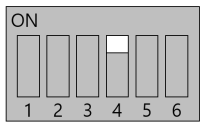
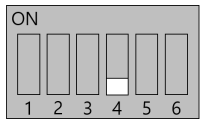
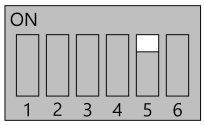
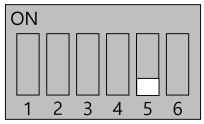
Mode	Number	Operation	Characteristic
LPR	**0-2**	**LPR mode** **0**(Low) – **1**(Medium sensitivity) – **2**(High)	Default
Bar Control	**3-5**	**Bar control mode** **3**(Low) – **4**(Medium sensitivity) – **5**(High)	Mode for bar-control (Rebound function is ON)
Long distance	**6-8**	**Long Distance mode** **6**(Low) – **7**(Medium sensitivity) – **7**(High)	Max. distance: **4.5m** Magnetic sensor is **OFF**
Parking	**9**	**Parking mode** **9**(Medium sensitivity)	Mode for parking (slow detection)



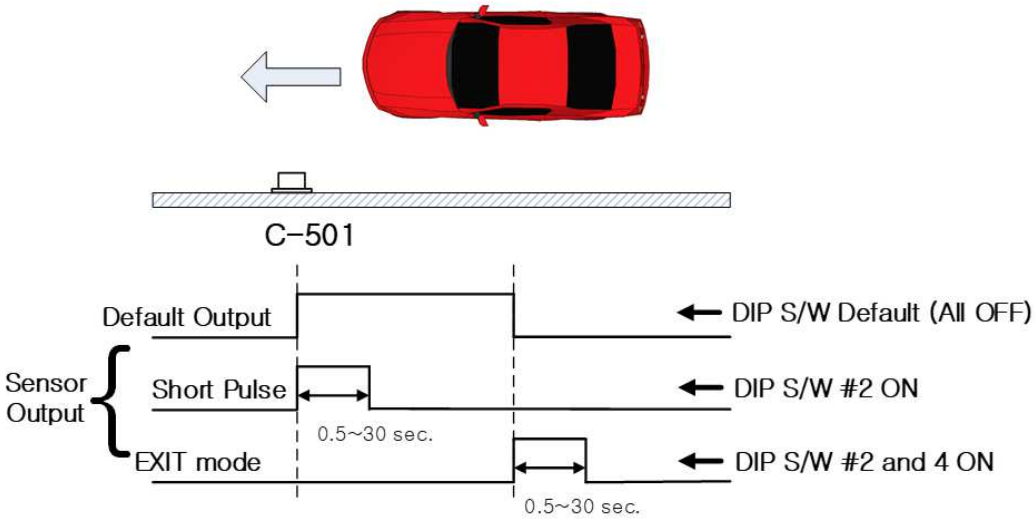
LPR | **Parking bar control** | **Long Distance** | **Parking**

Output type

Please check the information below and change the settings if necessary.

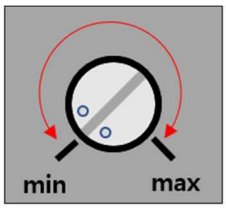
DIP Num.	Function	setting	Description of sensor output
1	MAGNETIC SENSOR ON/OFF		**Magnetic sensor is OFF** Magnetic detection distance: Max. 2.5m
			**Magnetic sensor is ON** (In long distance mode, magnetic sensor is automatically OFF)
2	SHORT PULSE		**Output is ON only for a set time when a car is detected** Short pulse setting: min. 0.5 ~ max. 30 seconds
			**Output is ON continuously while a car is detected.** The time delay of OFF can be adjusted (max. 10 sec.)
3	INVERTED OUTPUT		Car detected : **OFF**, Non-detected: **ON** (output inversely)
			Car detected : **ON**, Non-detected: **OFF** (default)
4	REBOUND/ EXIT		**Num. 2 is ON: EXIT mode(it makes a short fixed pulse output)**
			Num. 2 is OFF: REBOUND is ON
			**Rebound is OFF** (In bar control mode, **REBOUND** is automatically **ON**)
5	MAGNETICS ENSITIVITY		Magnetic sensitivity is **HIGH**.
			Magnetic sensitivity is **DEFAULT**.
6		**Reserved**	

❖ **REBOUND mode:** Even if the sensor is momentarily **turned off,** the sensor output **turns on immediately** when an object is detected (safety function for closing a parking bar)



[Timing diagram of the sensor output]

Setup for delay or timer



- ✓ You can adjust the OFF delay time or timer of the output signal by adjusting the parts below.
- ✓ Adjust by turning clockwise or counterclockwise using a small flat screwdriver.
- ✓ Turning it counterclockwise (left) decreases it, and turning it clockwise (right) increases it.

Sensor Initialization

- ✓ When a **CARDET-501** is powered on, the sensor executes the automatic calibration to make the magnetic map around it on the spot (approx. 1 sec.), so during the calibration, human or car should not be in front of the sensor.

Specification

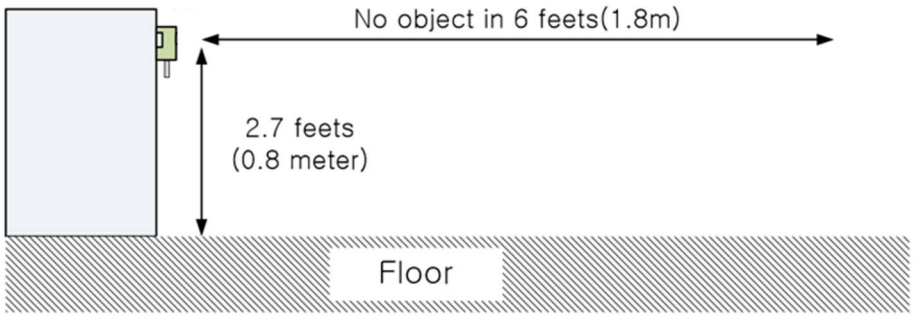
Input voltage	**12V**	
Current consumption	SENSOR HEAD	**30mA**
	Relay Controller	**70mA (Max.)**
Operation temp.	**-20 ~ 85°**	
Time for booting	**1 second**	
Detection distance	**Max. 4.5m**(In long distance mode)	
Max cable length	**Max. 80m** (Power capacity must be more than 2A)	

Cautions

- ✓ CARDET-501 use Earth magnetic field, so it might make an incorrect operation against severe electromagnet noises, motorcycles, a large size truck, a motor beside the sensor, etc. User should design the whole system will be safe even if the sensor makes a false operation. There is no responsibility for the makers and distributors for safety issues.

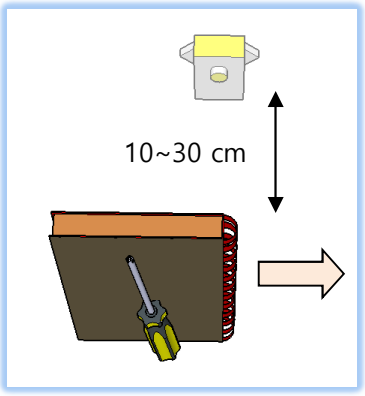
CRADET-501 Quick Test Guide

1. Fix the sensor in a clear space



- Please secure a wide area for the test. The max. sensing distance of it is 4.5m(in long distance mode). Do not move the sensor after turned on.

2. After turn on the sensor, attach a magnet for driver to the iron plate(or notebook) and pass it in front of the sensor.



Bad test

- CARDET-501 is a synthetic sensor designed to detect the side of a car, so it needs **a wide reflection area** to detect, so please use **a big iron plate(or notebook) with a driver** for the basic operation test.
- With a small iron object, the detection distance **will be shortened.** This is for filtering out an another object except a car, so **do not worry about the shortened** detection distance in this test.
- For the case of **a real car**, **CARDET-501 can detect a car from 2.5meters away with a high reliability. (Up to 4.5 meters when set in long distance mode)**

FCC Part 15.105

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 the 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.

FCC Part 15.19

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.

FCC Part 15.21

Any changes or modifications (including the antennas) to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment.

RF Radiation Exposure Statement

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