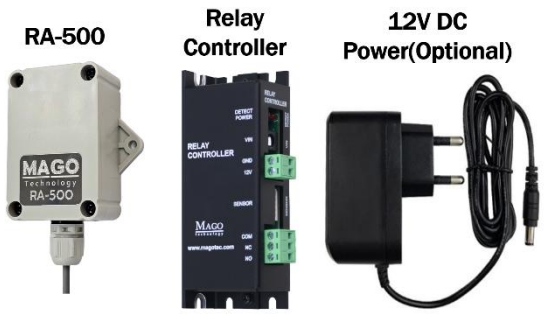
RA-500 Installation Manual

MAGO Technology

2025.04.10



☑ Do **NOT MOVE** or **TOUCH RA-500** sensor when the sensor is working. It uses a calibrated magnetic map of the surroundings.

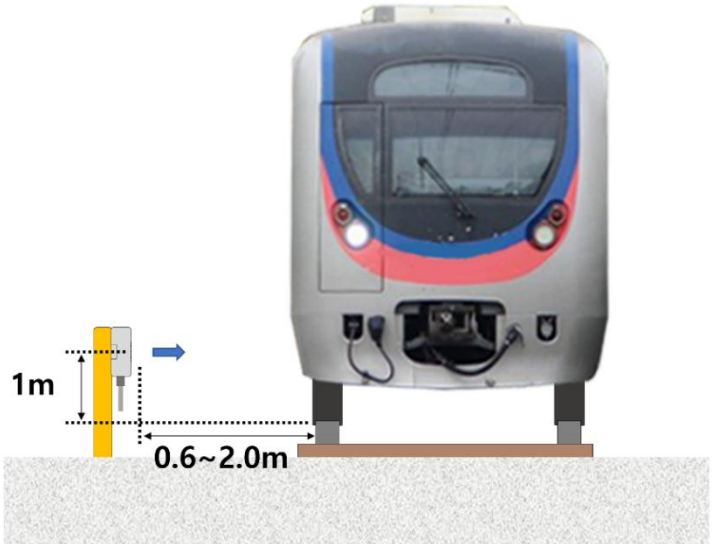
1. Characteristics of RA-500

RA-500 consists of a specially designed **radar, dielectric lens (patent pending),** an elaborate **magnetic** sensor and **signal processing unit** to eliminate various noise on a railroad. The sensor has multi-step protective technical layers against heavy noises in a railroad.

2. Installation Guide

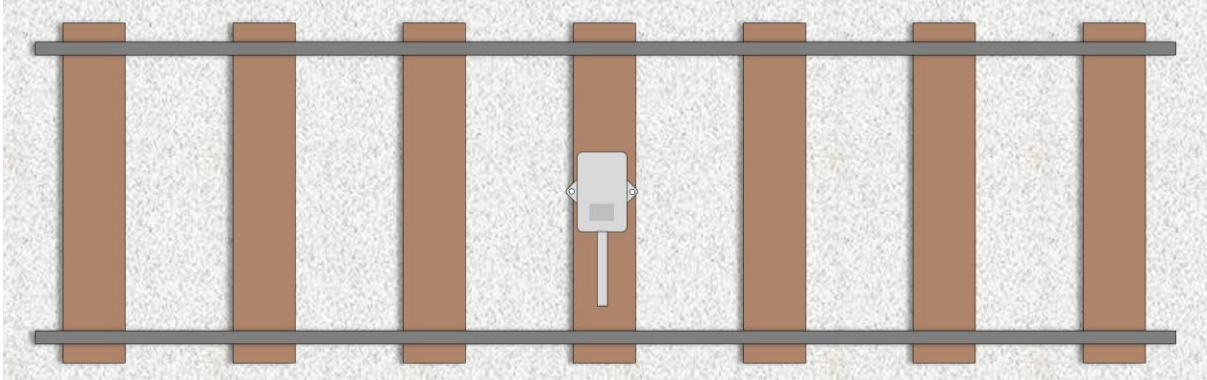
User can install a **RA-500** in two ways as follows; **Side** of the railway or **Center** of the railway.

① Side of the railway(recommended)



- Installation Height: **1.0 m** (±0.1m),
- Distance between **RA-500** and the railroad track: **0.6 ~ 2.0m**

② Center of the railway



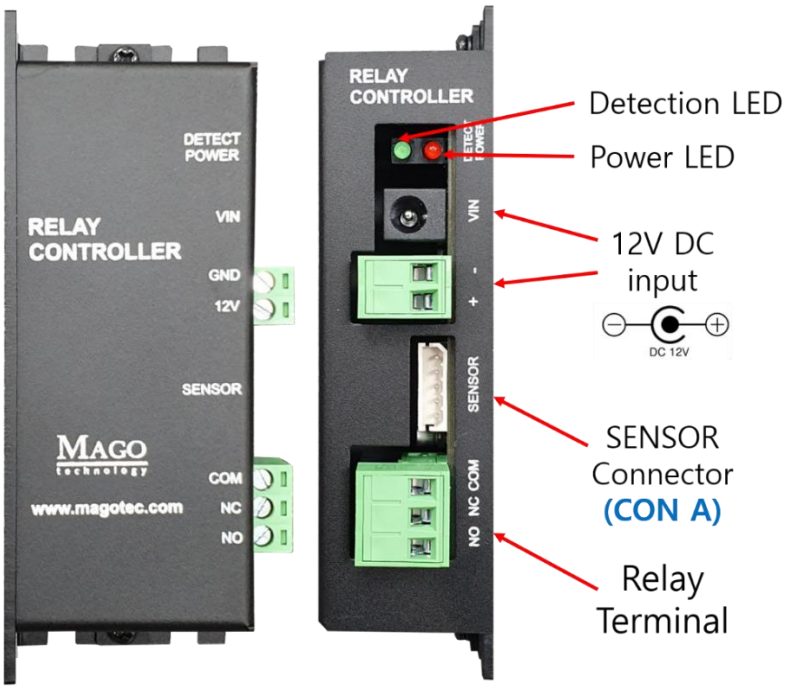
- **Firmly place** the sensor on a sleeper.
- The direction of the sensor **should be toward the sky**.
- In this case, please make sure that the sensor is not damaged by gravels or is covered by snow or falls.

3. Cautions

1. **RA-500** should be **fixed before the power is on**. It starts a calibration once during 3 seconds as soon as the power is ON. During the calibration (3 seconds), a train should not pass on the sensor because it distorts the magnetic map of surroundings.
2. Thick obstacles such as wet leaves may disturb the operation of the sensor. A light and thin material may be OK, but for safe operation, **please keep the sensor clean**.
3. Be sure to **tighten the plastic nut** of the cable grand on the sensor head before the installation.

4. Connection to a relay controller

- Basic set of a **RA-500** includes a relay controller that can easily be used to control a user's device by a dry switch inside the relay controller.
- **RED LED**: Power indicator
- **GREEN LED**: Detection indicator



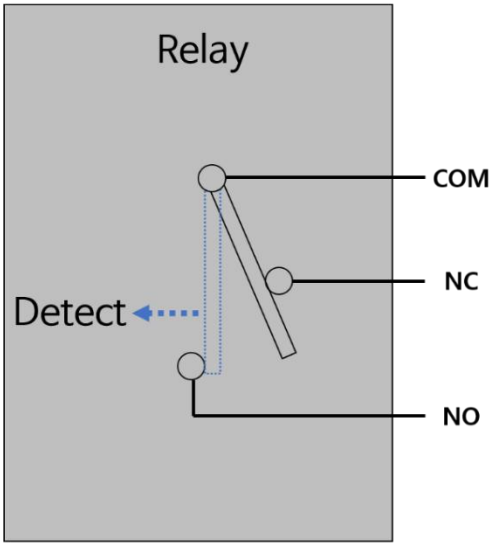
- Fix the sensor head first, and connect it to the relay controller, and finally put the power to the relay controller, then the sensor start calibration during 3 seconds. After 3 seconds, the GREEN LED will be off, and the sensor is ready to work.

- The maximum voltage and current that can be controlled by the relay inside the relay controller are as follows. The correct wiring and load connection is the consumer's responsibility.

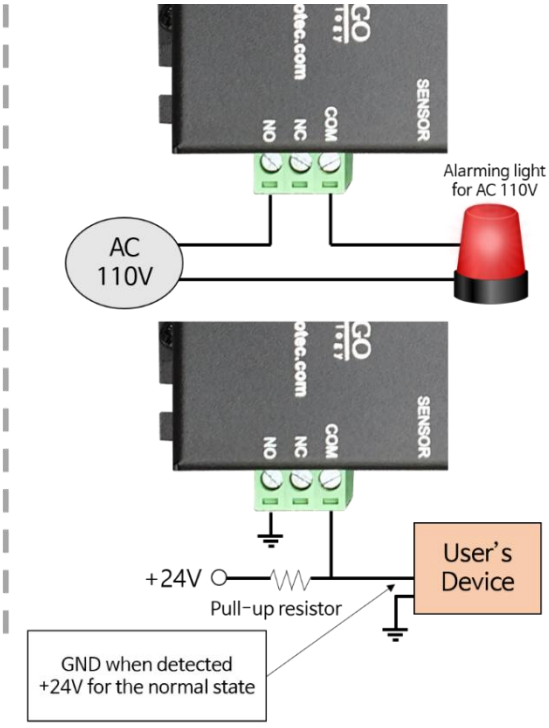
power	Max. voltage	Max. current	Max. Watt
DC	30V	3A	90W
AC	220V	2A	440W

- The **NC**(Normally Closed) terminal of the relay controller is normally connected to the **COM**(Common) terminal. When a train is detected, then the **NO**(Normally Open) terminal will be connected to the **COM** terminal.

- User can easily make a device **ON and OFF** such as alarming light using the relay controller.



- Relay connection

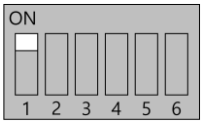
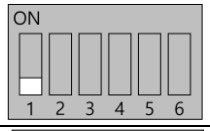
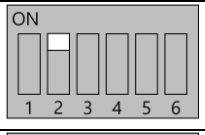
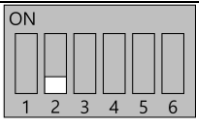


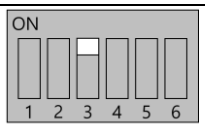
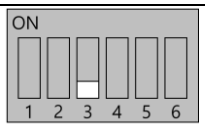
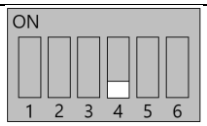
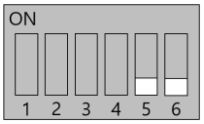
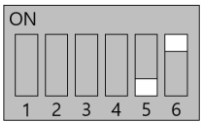
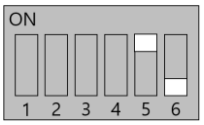
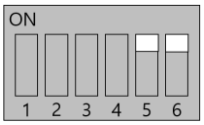
- Connection examples

☑ Please place the relay controller **far away from the sensor head more than 1 meter**, because the relay makes a large electromagnetic noise when it works.

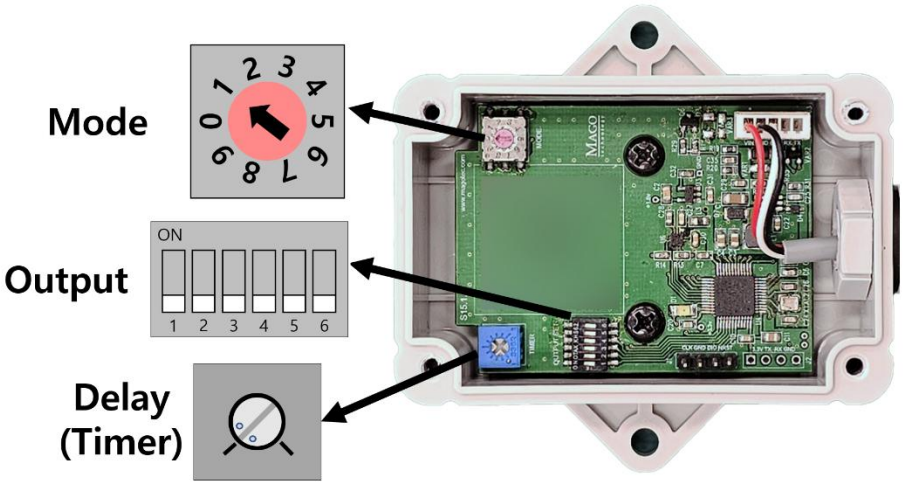
Output type (DIP S/W)

If user open the sensor case, a 6P DIP S/W can be found in the PCB. Please check the information below and change the settings if only necessary.

DIP Num.	Function	setting	Description of sensor output
1	MAGNETIC SENSOR ON/OFF		**Magnetic sensor is OFF** RA-500 operate based only on RADAR sensor
			**Magnetic sensor is ON** (Magnetic + RADAR sensor, default)
2	SHORT PULSE		**Output is ON only for a set time when a train is detected** Short fixed pulse setting: min. 0.2 ~ max. 60 seconds
			**Output is ON continuously while a train is detected.** The time delay of OFF can be adjusted (max. 10 sec., default)

3	**INVERTED OUTPUT**		A train detected : **OFF**, No-detected: **ON** (output inversely)
			A train detected : **ON**, No-detected: **OFF** (default)
4	**Reserved**		Default(OFF)
5 **6**	**MAGNETIC SENSITIVITY**		Magnetic sensitivity **2** (**Default**)
			Magnetic sensitivity **1** (**LOW sensitivity**)
			Magnetic sensitivity **3** (**HIGH sensitivity)**
			Magnetic sensitivity **4** (**HIGHEST sensitivity)**

❖ **Magnetic sensitivity:** Higher digit is more sensitive.



- Time control can be adjusted by the **small volume** in the lower PCB (related to #2 **SHORT PULSE** of DIP S/W)

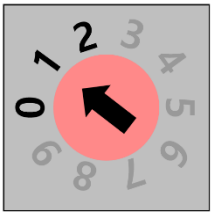
Noise Reduction Mode (Rotary S/W)

There are certain locations along the railway tracks where very strong electromagnetic noise exists. The **RA-500** is equipped with a specially designed noise reduction filter to ensure reliable operation even in such environments.

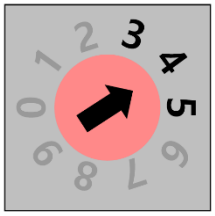
If the sensor remains **ON** and does not turn **OFF** after resetting in the absence of a train, adjust the rotary switch as instructed below to change the mode before installation.

Noise reduction	Number	Operation	Remark
Low	**0-2**	**Noise reduction mode: LOW** **0**(Low) – **1**(Medium sensitivity) – **2**(High)	Default : **1**
Mid	**3-5**	**Noise reduction mode: MID** **3**(Low) – **4**(Medium sensitivity) – **5**(High)	
High	**6-8**	**Noise reduction mode: HIGH** **6**(Low) – **7**(Medium sensitivity) – **7**(High)	
-	**9**	**RESERVED**	

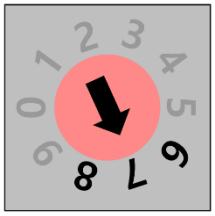
- Some place near the railway has **big noise sources**, in this case please **level up** the noise reduction mode(LOW➔MID➔HIGH)
- In each mode, user can adjust the **sensitivity of the sensor**.(ex, 0-1-2)
- If the output does not turn OFF when it has reset, please increase the noise reduction level.



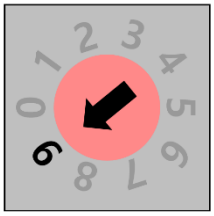
Noise Reduction mode: **LOW**



Noise Reduction mode: **MID**



Noise Reduction mode: **HIGH**



Reserved (Not Used)

5. Characteristics of the initial value of the sensor

During a **RA-500** is doing calibration (after power-on), the output of the sensor is ON during 3 seconds. Please make sure that the initial value of the sensor is considered when the sensor is power-on.

6. Specification

RA – 500 Sensor Specification					
Characteristics	**Min.**	**Typical**	**Max.**	**Unit**	**Remark**
Power supply		12		Volt	
Current consumption		40		mA	Sensor head only
Operation temp.	-20		+85	Degree	
Detection distance from the sensor head	0.6	1.5	2.0	m	
Max. cable distance		5	50	m	with 12W power source

7. Cautions and warning

- **RA-500** uses **Earth magnetic field** and **electro-magnetic wave**, so motors, cars, high-powered noise nearby can disturb the operation of the sensor. **The safe of the whole system is the customer's responsibility**. The manufacturer or seller is not responsible for the user's system.

- Please contact to sales@magotec.com

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