



User Manual

For Wireless Access Point **WAP-348x**



STATEMENT

General Statement

All the contents of this document are protected by law, without permitted by ROSIM, any organization or individual should not copy or transmit this document in any way. We've tried our best to make this specification accurate, but mistakes are still unavoidable. The contents of this document are being checked periodically, your suggestion will be appreciated.

The contents of this specification are accordant to the corresponding products. Please keep attention to our website www.rosimits.com for any updating information, which may not be informed of you in advance.

To make sure operation correctly, please read this user manual carefully before installing. We are not responsible for any problems or damage caused by incorrect operation.

Operation specifications issued by traffic department or related authorities should be followed when installing, for example place traffic barriers and traffic indicator correctly, operators wear special cloth, etc. We are not responsible for the personal security of products installation.

ROSIM reserves all the rights of final interpretation.

Federal Communication Commission Interference Statement

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.

FCC Caution:

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.

Non-modification Statement:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTICE

This document is intended for system integrators to provide operation guidance. Please read carefully before using.

It should be known that before the sensor installing, the Wireless Access Point is required to be installed previously, considering the verifying of the sensor online status depends on the network established by them.

Keep away from fire, strong electric field, strong magnetic field, and avoid strong shock, otherwise a permanent damage might be caused.

Do not take apart without permission, as it may cause damage to the product..

Please note that in this document, the Wireless Vehicle Detector (WVD) is also called Sensor, the Wireless Access Point (WAP) is also called Collector or shorted in AP.

VERSION

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1. Introduction

ROSIM Wireless Access Point (WAP-348X) is used to collect real-time traffic information from Wireless Vehicle Detector (WVD) installed on the road, and transmit to host application systems. The WAP-348X, acting as a gateway between this wireless sensor network and user system, provides system integrators a variety of data communication interface. Besides of this, WAP-348X is responsible for the wireless network management and transmits commands between host platform and WVDs. And also, the WAP-348X runs the system algorithm and outputs control signal according to different applications.

2. Dimension



3. Application

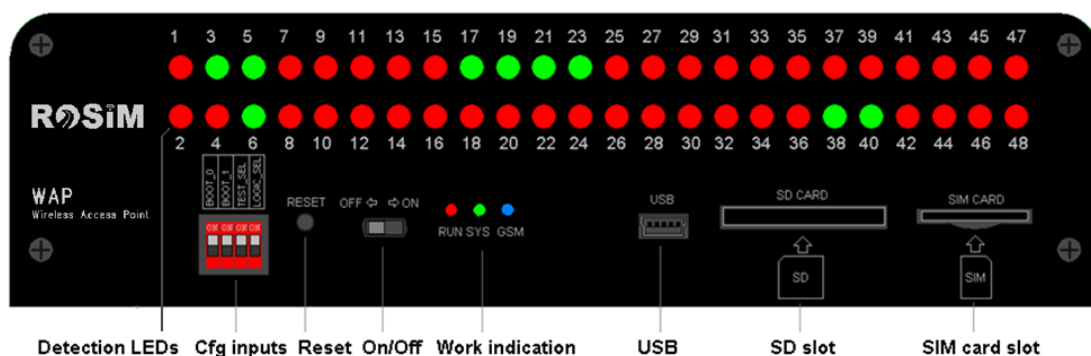
ROSIM provides various types of WAP products that can be used in many kinds of traffic systems like signal light optimization, traffic flow monitoring, travel information guidance and red light and speed enforcement, etc. Please select the suitable model before order.

Note that for different application system , the WAP-348X and WVD need different configurations. Customers are expected to use the configure software tool SensorManager provided by ROSIM to complete the configuration of these devices according to the actual situation.

4. Operation panel

This WAP-348X has front panel and rear panel. Front panel is used for operation, status indication, system configure and upgrade. Rear panel is used for communication, signal output and power supply interface.

4.1.Front panel



1) Detection LEDs

WAP-348X has 48 LEDs for detection indication, and supports 48 detection channels. This almost meets all application requirements. These 48 LEDs are numbered from 1 to 48. Each LED is relevant to a certain WVD, or not used. The LED number and the relevant WVD ID are identical. The LED status represents the relevant WVD's detection result. This is described as the following table:

Status of LED	Description
Off	No WVD is bound to this LED, or the WVD is out of work.
Red	A vehicle is detected by WVD installed in this channel.
Green	No vehicle detected.
Green flash	WVD warning.

If there is no WVD or the WVD has not connected to the WAP-348X, the corresponding LED will be OFF. In this situation, customers need to check whether the WVD out of works. If the status of LED is green flash, which indicates the relevant WVD has fault, it needs repair or replacement. If WVD connects to WAP-348X and works normally, the LED will be green, and it turns to red when a vehicle detected. Please note that if a WVD is just installed, the corresponding LED on the WAP-348X will keep red, even if there is no vehicle detected. This is a normal calibration process for a newly installed WVD, and will be finished in a few minutes.

2) Configure input

WAP-348X has 4 toggle switches on the front panel. These are used to select operation model.

Bit of switch	Description
BOOT_0	Use for factory debug. Keep it to "ON" position.
BOOT_1	Use for factory debug. Keep it to "ON" position.
TEST_SEL	Test mode selection. Keep it to "ON" position for normal work mode.
LOGIC_SEL	Selection for output signal logic level. OFF(0): Output high level when vehicle detected (OC); ON(1): Output low level when vehicle detected.

Normally, for customers the only available selection is LOGIC_SEL.

3) Reset

Reserved.

4) USB

The USB port is mainly used for purpose of maintenance and debug, but also can be used as a data transmission interface.

Note that this USB port is a virtual serial port with baud rate 115200bps, 8 digit bits , 1-digit stop bit and no parity bit.

5) ON/OFF

Power ON/OFF of WAP-348X.

6) Work indication

Indication LED	Description
RUN LED	Indicating WAP-348X communicate status. Once WAP-348X receives wireless signal, this light flashes.
SYS LED	Indicating WAP-348X running status. Flashing once per second means device work normally. If it stop flashing, the device out of run.
GSM LED	Indicating the working state of GPRS network. Rapid flashing: Network abnormal or invalid SIM card detected. Slow flashing: Work normally. <i>Note: This feature is only available to WAP-348X with GPRS function.</i>

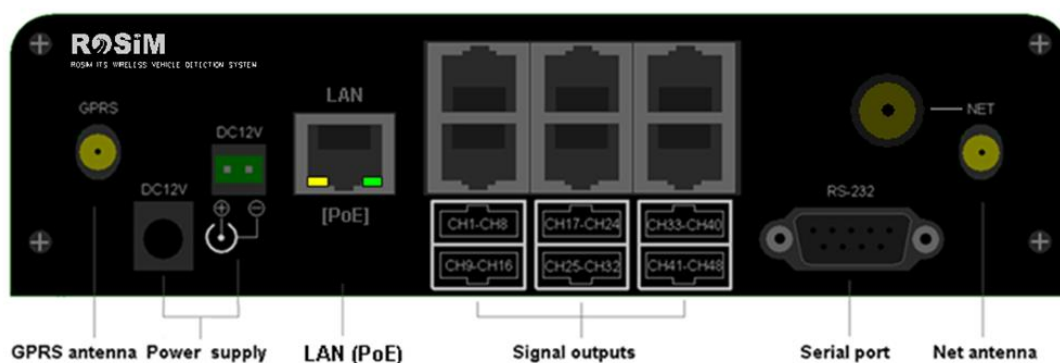
7) SIM card slot

This is only for WAP-348X with GPRS function; there is a SIM card slot in the front panel. Before using GPRS communication, a valid SIM card should be inserted in this slot. It is an auto-eject slot. Please pay attention to the direction of card when insert a card.

8) SD card slot

This is only for WAP-348X with data save function; they have a SD card slot in the front panel. Please pay attention of the direction of card when insert a card.

4.2.Rear panel



Rear panel of WAP-348x

1) GPRS antenna

For WAP-348X with GPRS function, this interface is used to connect GPRS antenna.

2) DC12V socket

The WAP-348X is powered by an external 9-12V/2A DC supply. It is recommended for users to use manufacturer original power supply adapter. If a special power adapter is needed, please select adapters with DC12V and at least 2A output. The input voltage range of adapter depends on the power supply that can be available from the roadside case.

Please note that the plug's outer ring diameter is 5.5 mm, inner ring diameter is 2.1mm, inner core is positive pole, and outer ring is negative pole.

3) DC12V terminal

Besides of the power socket, for customers' convenience, WAP-348X also provides a wiring terminal which connected parallel to the socket inside WAP-348X. Users can select any of the two connections for power supply. Also it is usually used as common GND signal between user system and WAP-348X since the signal outputs terminals are connected.

4) LAN (PoE)

WAP-348x provides a 10/100 Mbps Base Ethernet port with optional PoE 802.3af/at available. Through the LAN port, WAP-348x can be connected to the TCP/IP network for data transmission as well as powered through Ethernet cable, which makes it very easy to use. In these applications, a data server IP should be set to WAP-348X.

The Ethernet port can be used for data transmission to user system or for system configuration as what mini-USB does. If the LAN port is used for data transmission between detection system and user application, the Ethernet IP configuration should be set firstly through mini-USB port as:

The screenshot shows a window titled "IP Config" with the following fields and values:

- Mac Address: 04 · 02 · 35 · 00 · 00 · 01
- WAP IP: 192 · 168 · 1 · 123
- Mask Address: 255 · 255 · 255 · 0
- GateWay IP: 192 · 168 · 1 · 1
- Server IP: 192 · 168 · 1 · 200
- Server Port: 6000

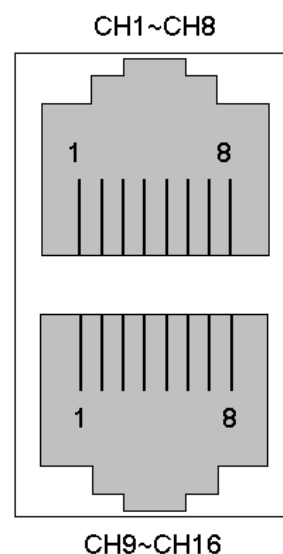
At the bottom, there are two buttons: "Set" and "Get".

Where Mac address should keep unchanged; WAP IP, Mask Address and Gateway IP should be set according to the IP configuration of LAN where WAP is connected. The Server IP and port name should be set according to the server IP where user applications run. But if a demo system is expected by connecting WAP to a PC directly, a cross Ethernet cable should be used

After Ethernet IP being configured, the LAN port could also be used for system configuration as mini-USB port.

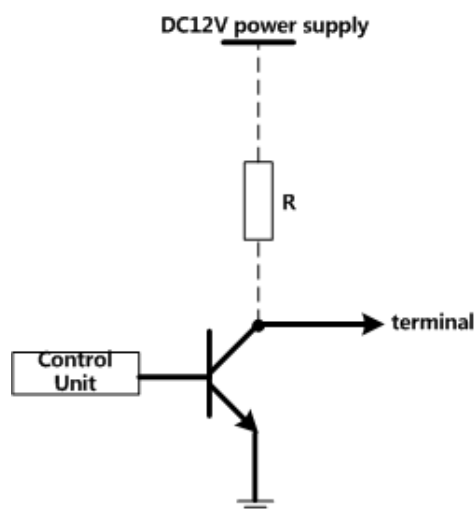
5) Signal outputs

WAP-348X has 48 output terminals in the rear panel. They correspond with the 48 LEDs in the front panel according to the number. These terminals and LEDs also correspond with 48 detect channels. These 48 terminals are grouped in 6 RJ45 sockets. The number of the terminals is equal to the number of LEDs in the front panel, and also they correspond with WVDs which are bound previously. When the WVD detect a vehicle, the corresponding LED will turn from green to red, and the corresponding output terminal outputs a high (or low) voltage signal. The output terminal signal logic depends on the selection switch LOGIC_SEL as following table.



Detection status	LED status	Terminal (OC) status	
		LOGIC_SEL=ON	LOGIC_SEL=OFF
Vehicle detected	Red	Connect	Disconnect
No vehicle	Green	Disconnect	Connect
WVD Warning	Green flash	Disconnect	Disconnect
WVD off line	Off	Disconnect	Disconnect

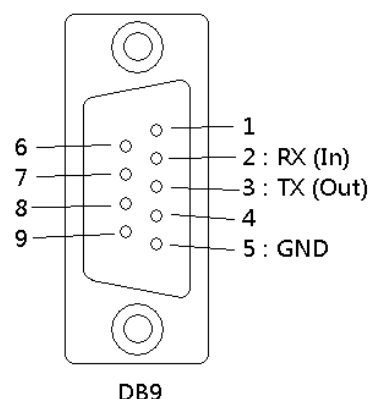
These terminals can output signal to other devices for controlling, for example traffic light optimization system, or camera trigger signal. The internal electronic structure of each output terminal of WAP-348X is shown as the right picture. The control unit gives a buffer output through an OC structure. These terminals, outside of the rear panel, can be pulled up to any supply voltage from 0 to 50V in order to achieve an acceptable output voltage. When using outside pull up, it needs a matched resistance. Also, inner pull up is supported by WAP-348X. But the inner pull up is disabled by default. It can be customized. The power supply of the inner pull up is the DC12V supply of WAP-348X. The peak sink current of each single terminal is 500mA, and the average current of all the 48 terminals is 70mA. It is recommended that the pull up power supply should not exceed DC36V, and the sink driving current of each single terminal should not exceed 70mA.



6) Serial port

WAP-348X provides a standard DB9 port for serial RS232 data communication. Pin 2 is data receive line (to WAP-348X) , and pin 3 is data transmit line (from WAP-348X). The serial port is mainly used for data communication between WAP-348X and host systems. The baud rate is 38400bps with 8 data bits and 1 stop bit, no parity bit. All the detected results from WVDs could be collected by WAP-348X and transmitted to user system through this serial port.

Note that the detection results are output from serial port, USB port, (Ethernet port if available) and signal terminals simultaneously. System integrators can select any of these communication methods to acquire the real time traffic information.



7) Net antenna

Net antenna interface is used to connect with an external antenna. WAP-348X uses this antenna to communication with all the WVD sensors that are installed in the application site.

5. Functions

5.1.Information collection

WAP-348X collects all the information detected by WVDs installed on each lane of the road. The information is then transmitted immediately and simultaneously to host system through serial port, USB port and Ethernet port if available, as well as signal terminals. WAP-348X supports 48 channels of information collection at most. Each channel is relevant to a WVD.

5.2.Network manager

As a gateway of local wireless sensor network, besides of collecting and processing all the sensor data, WAP-348X manages and maintains the network to guarantee data communication in real time and correctly. WAP-348X also accepts commands from host system and transmits them to WVD. A WAP-348X can manage 48 WVDs at most. It is necessary to bind all the ID of WVDs to a WAP-348X if these WVDs are ready to use together with this WAP-348X in one application site.

5.3.Data transmission

The WAP-348X acts as a gateway of the local wireless sensor network. It is responsible for data exchange between the local network and external systems. WAP-348X provides system integrator a variety of data communication interface including RS-232 serial port, USB port, 10/100Mbps Base Ethernet port and GPRS as well. All these data interface ports are functionally equivalent and data output from them simultaneously when used as data output port connecting to user system. The RS-232 port and Ethernet port is mainly used for detection result information output to user system, while the USB port is mainly used for detection system configuration as well as detection result output for purpose of monitoring. Besides of using as data transmission to user system, the Ethernet port could also be used to connect WAP with PC for configuration. But because the LAN port will not be available until the IP configuration is set successfully, if it is the first time to use WAP, the configuration can only be implemented through the USB port of WAP.

5.4.Detection indication

WAP-348X has 48 LEDs which are corresponding to 48 WVDs. The status of these each LED indicates the status of corresponding WVD.

5.5.Detection result output

There are 48 output terminals in the rear panel of WAP-348X. They are numbered from 1 to 48 and are corresponding to 48 detect channels and LEDs in the front panel respectively. The signal outputs are parallel with data output from COM2, USB and Ethernet if available. These outputs represent the detection result by WVD. The different is that output from terminals is a voltage signal, and the other is data packet.

5.6.Region filter

Usually, WVDs to be installed in a certain application site will work together with a certain WAP-348X, among which a local wireless sensor network is established. These WVDs are expected to communicate with this WAP-348X only, just as this WAP-348X is expected to receive data from these WVDs. Every WVD is a node in the network and have a unique ID. It is necessary to bind the WAP-348X to all WVDs within the network, so that these WVDs will only communicate with this bound WAP-348X, and this WAP-348X will not accept any other data from WVDs which are installed in other regions. This feature can be achieved through configuring the region filter function of WAP-348X by the *SensorManager* software, in which all the WVDs can be bound to the WAP-348X by their IDs. Only those WVD who's ID is listed in filter table can communicate with the corresponding WAP-348X. Other WVDs which are not listed in filter table cannot join the local sensor network and communicate with the WAP-348X.

The region filter function prevent signal interfere from other network nearby. Binding WVD with lane provides intuitive installation information for managers. To facilitate easy identification, users can also mark a user-defined message for every WVD and it corresponding lane.

5.7.GPRS communication

Some type of WAP-348X provides GPRS function, which supplies user high integration, low cost and low price traffic information monitoring solution. The information data can be transmitted to a server through GPRS. To use this function, customers should select the type of WAP-348X whit GPRS, and prepare a SIM card

with GPRS service enabled.

5.8.PoE

The Power over Ethernet (PoE) function is available for some type of WAP-348X which supports PoE 802.3af/at standard. By virtue of PoE, the WAP-348X can be powered through an Ethernet cable shared with data communication.

6. Specifications

Technical Info.	Parameters
Part number	WAP-348X
Wireless radio frequency	433MHz
Communicate range	120m
Wireless protocol	ROSIM
Debut interface	USB
Data interface	RS232/Ethernet/GPRS
Detection channel	48
Power supply	DC9~36V
Output signal	48 OCs
Output logic	Configurable
Product size	Length 230/Width 100/High 49 (mm)
Operation temperature	-40 ~ 85°C
Storage temperature	-40 ~ 85°C

7. Accessories

ROSIM provides two kinds of antenna for customers. The Yagi directional antenna is usually suitable for application site where the communication distance between WAP-348X and each sensor are long. While the whip antenna, which is an omnidirectional antenna, is usually suitable for those short range applications in which the distance between WAP-348X and sensors are no more than 30 meters. The length of RF cable is normally 10 meters. It can be customized to any length.



Yagi antenna or whip antenna



RF cable



Power adapter



RS-232 cable

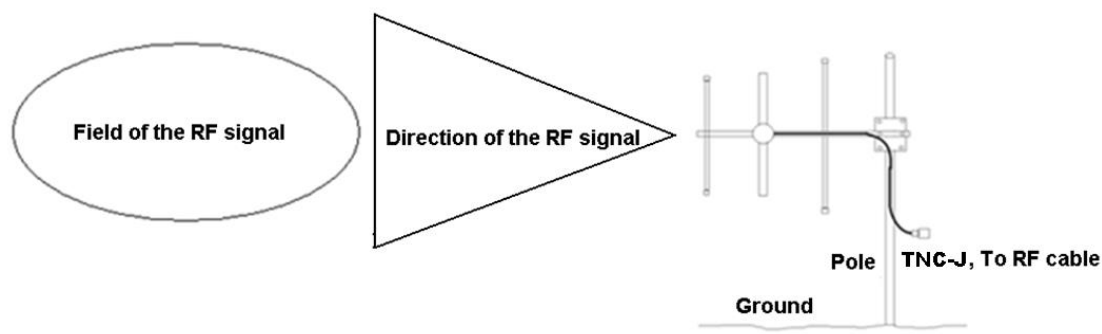
8. Configuration

WAP-348X can be configured to run in real-time or period traffic flow monitoring mode, or speed measurement mode. ROSIM provides *SensorManager* as a configuration tool to customers as well as testing software. More details please see the user manual of *SensorManager*.

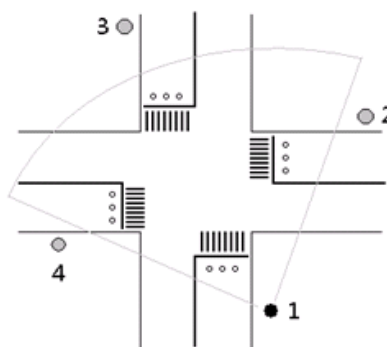
9. Installation

9.1. Antenna install

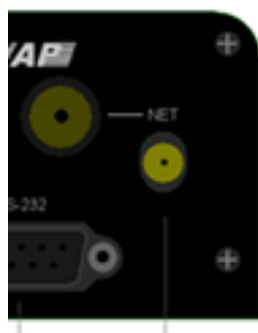
Normally the WAP-348X is equipped with a Yagi antenna. As a directional antenna, the radiation diagram is shown as:



Please note that the signal radiation direction should point to the position where WVDs are installed. For an intersection, as WVDs are installed in 4 different directions, the antenna should be installed in the position where all the WVDs could be covered by the RF signal. As is recommended in the following picture, the positions 1, 2, 3 and 4 are equivalent in this figure, so any of them would be suitable for antenna installing.



For most applications, a lamppost is suitable to install the antenna if it is near the case and the power supply is available. Or else, a pole should



be set up to install the antenna.

Please note that do not directly fix the antenna to the lamppost or pole in case the RF signal is affected. A bracket could be used to fix the antenna to the pole. The antenna should be set up more than 5.5 meters high no matter which installation method you selected, and should be fixed firmly to prevent danger. Also, it is important that lightning protection measures should be taken to the lamppost or pole used to set

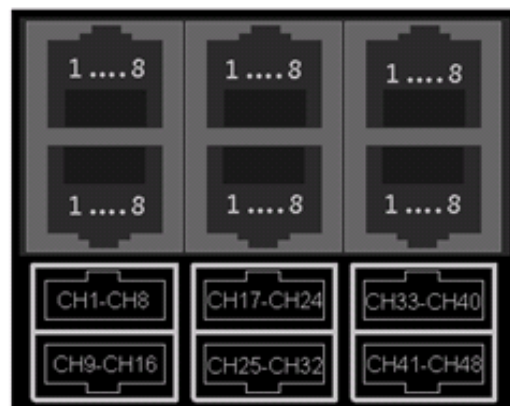
up the antenna.

After the antenna was set up, please screw the RF cable to the connector on the back of antenna, and wrap it by waterproof tape. The length of the RF cable can be 10 meters or 20 meters, and also can be customized according to the requirement. Finally connect the RF cable to the antenna socket on WAP-348X.

9.2. Output terminals

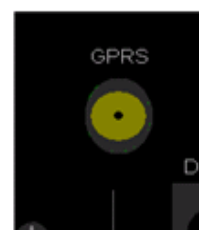
The 48 output terminals on rear panel are used to output result of detection in voltage signal. The output presents the existence of a vehicle on the corresponding WVD sensor. According to the different applications, the appropriate terminals should be connected to the system of other devices, such as signaler and high-speed capture camera. If terminals are not used, just remain them disconnected.

Each output terminal is an OC output inside the WAP-348X. External circuits may require the use of appropriate pull-up resistors, and the pulling voltage level can be DC9~36V.



9.3. GPRS antenna connection

Some type of WAP-348X provides GPRS function, which provides system integrator a solution with high integration, low cost and low price. User should prepare a SIM card with GPRS service enabled. The GPRS antenna which comes along with our product has a magnetic chuck, so it can be easily installed on the top of a lamppost or pole.



9.4. Set the configuration

Since BOOT_0, BOOT_1 and TEST_SEL are reserved for factory, the only one that users need to set is LOGIC_SEL, which is used to select the logic level of output terminals, and you can select the ON or OFF state when toggle up or down. The following table gives the details of this configuration:

Detection status	LED status	Terminal (OC) status	
		LOGIC_SEL=ON	LOGIC_SEL=OFF

Vehicle detected	Red	Connect	Disconnect
No vehicle	Green	Disconnect	Connect
WVD Warning	Green flash	Disconnect	Disconnect
WVD off line	Off	Disconnect	Disconnect

9.5.Data communication

WAP-348X provides a variety of data communication interface, such as RS-232 port, Ethernet port and USB port as well. System integrator could select any of these communication interfaces for data transmission between this wireless vehicle detection network and host systems.

9.6.Power supply

WAP-348X needs a DC12V/2A power supply. It might be found in the case where WAP-348X is installed. Otherwise, you can also use the AC110~240V-DC12V/2A power adapter provided by factory. The power supply can be connected directly to the DC12V socket in rear panel of WAP-348X when the adapter is used. If the DC12V power supply inside the equipment is expected to be used, two power lines are needed to connect it to the power input terminals in rear panel of WAP-348X. Note that these two sockets are connected together inside WAP-348X, so they are functional equivalent.

9.7.Run indicator

Power on the WAP-348X by pushing the switch to ON side after the power supply line is connected. At this time, the SYS and RUN LED are lighting as:

Indication LED	Description
RUN LED	Indicating WAP-348X communicate status. Once WAP-348X receives wireless signal, this light flashes.
SYS LED	WAP-348X running status. Flashing once per second means device work normally. It stop flashing if the device out of run.
GSM LED	Indicating the working state of GPRS network. Rapid flashing: Network abnormal or invalid SIM card detected. Slow flashing: Work normally. <i>Note: This feature is only available to WAP-348X with GPRS.</i>

At the same time, the 48 indicator LEDs in front panel will also indicate the status of all the detection channels. Following table gives the description of 48 indicator LEDs:

Status of LED	Description
Off	No WVD is bound to this LED, or the WVD is out of work.
Red	A vehicle is detected by WVD installed in this channel.
Green	No vehicle detected.
Green flash	WVD warning.

As no WVD has been installed before, all 48 LEDs are off now. These LEDs will be needed to verify the communication link between WAP-348X and each WVD when installing the WVDs, and to confirm whether the installed WVDs are working regularly as well.

10. Supports

ROSIM creates and manufactures high quality wireless parking detection devices. We provide customers 24 hours on-line supports.

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