

Operating Instructions for the UCOWS Cow Activity

Reader-writer-writer

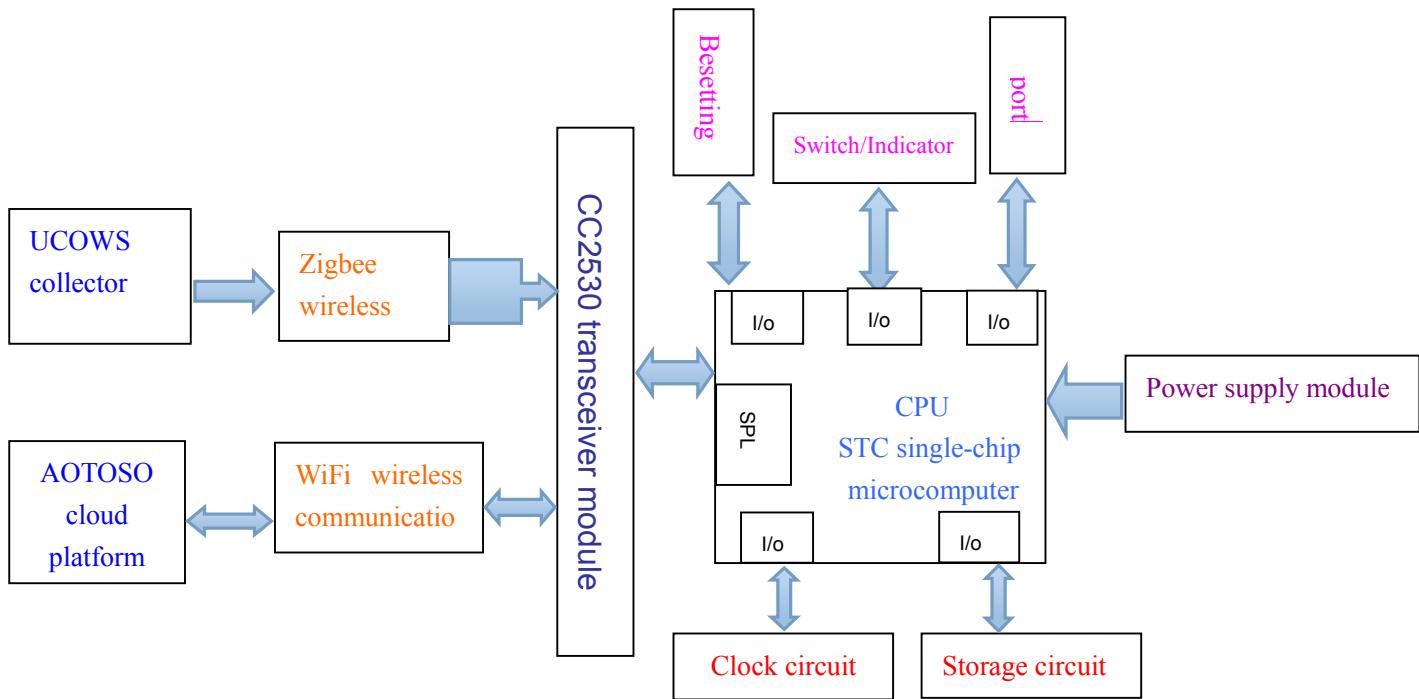
◆ Product Features

The UCOWS cow activity reader-writer-writer (hereinafter “the reader-writer-writer”) is a device to gather the cow activity information collected by the UCOWS cow activity collector, and timely upload the information to the UCOWS cow estrus monitoring system.

- Reader-writer-writer reading distance ≥ 70 meters.
- Communication mode: WIFI wireless network communication.
- Strong adaptability to environment: Storage temperature: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$, operating humidity: $\leq 95\%$
- Wide range of operating temperature: $-30^{\circ}\text{C} \sim +45^{\circ}\text{C}$
- The IP (ingress protection) protection level should reach IP65.

◆ Hardware Design Diagram

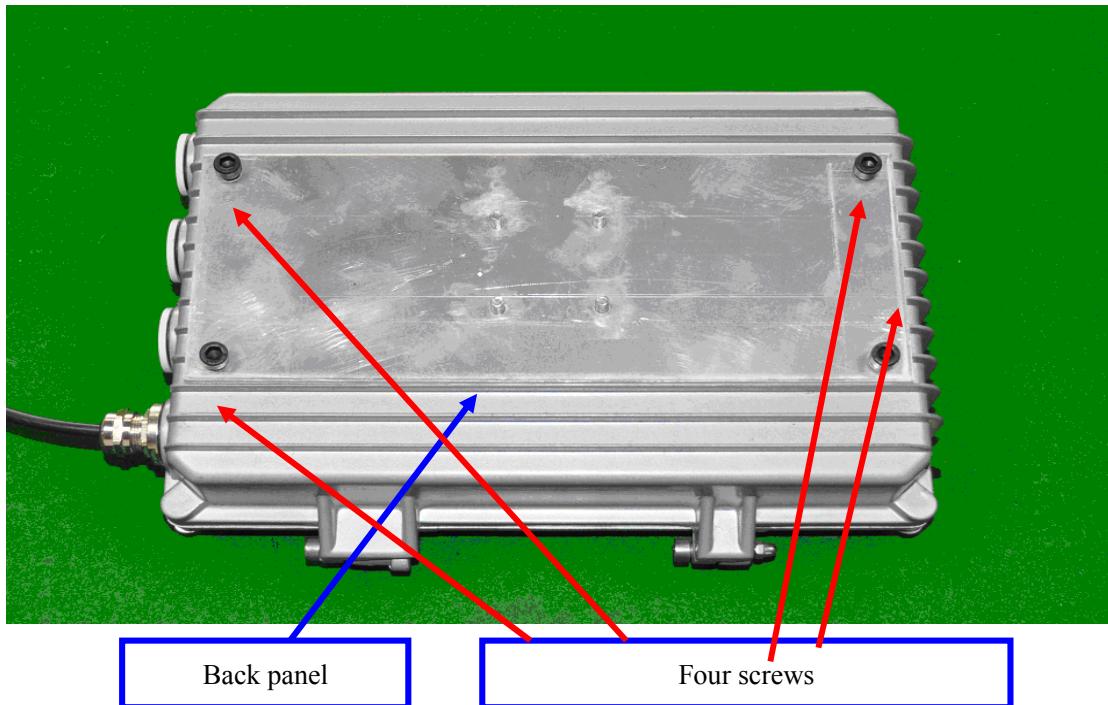
Hardware design diagram for the UCOWS reader-writer (WiFi version)

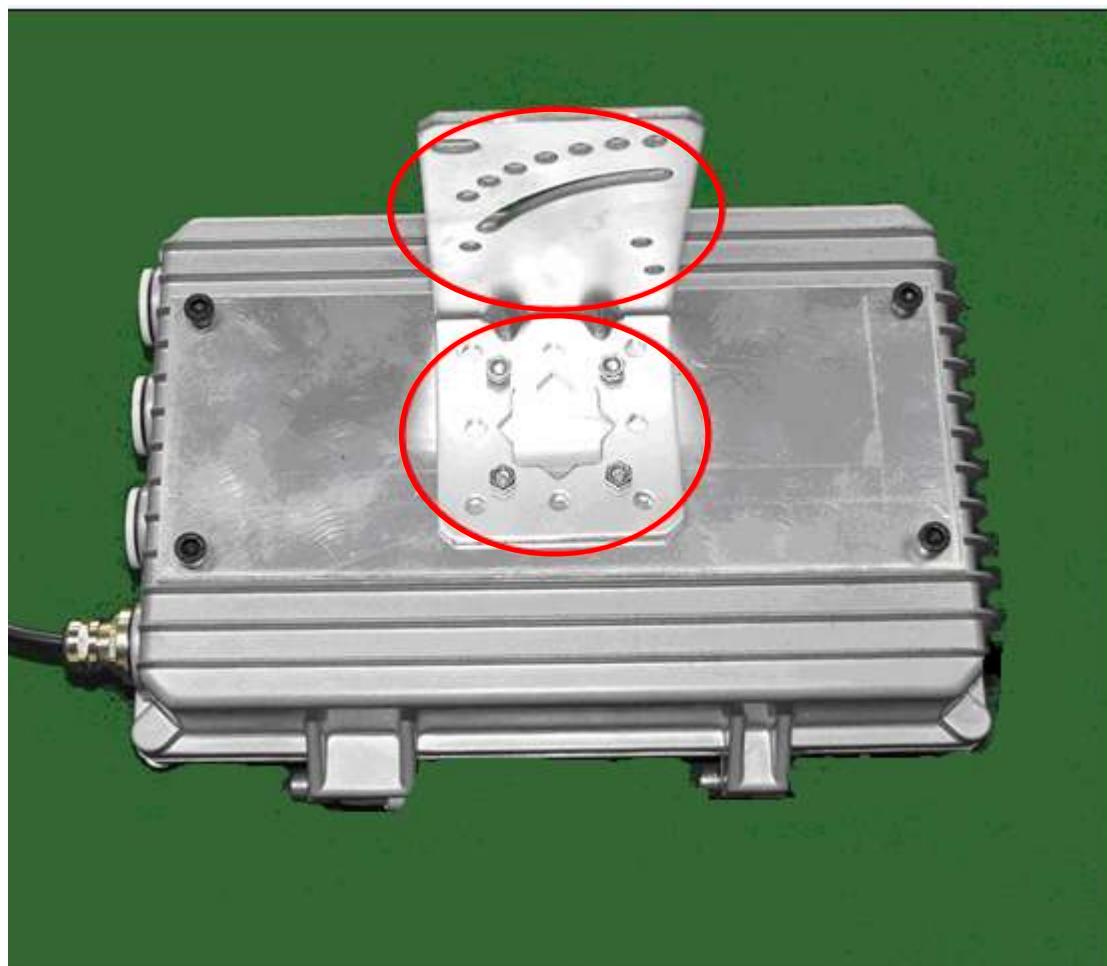


◆ Installation Instructions

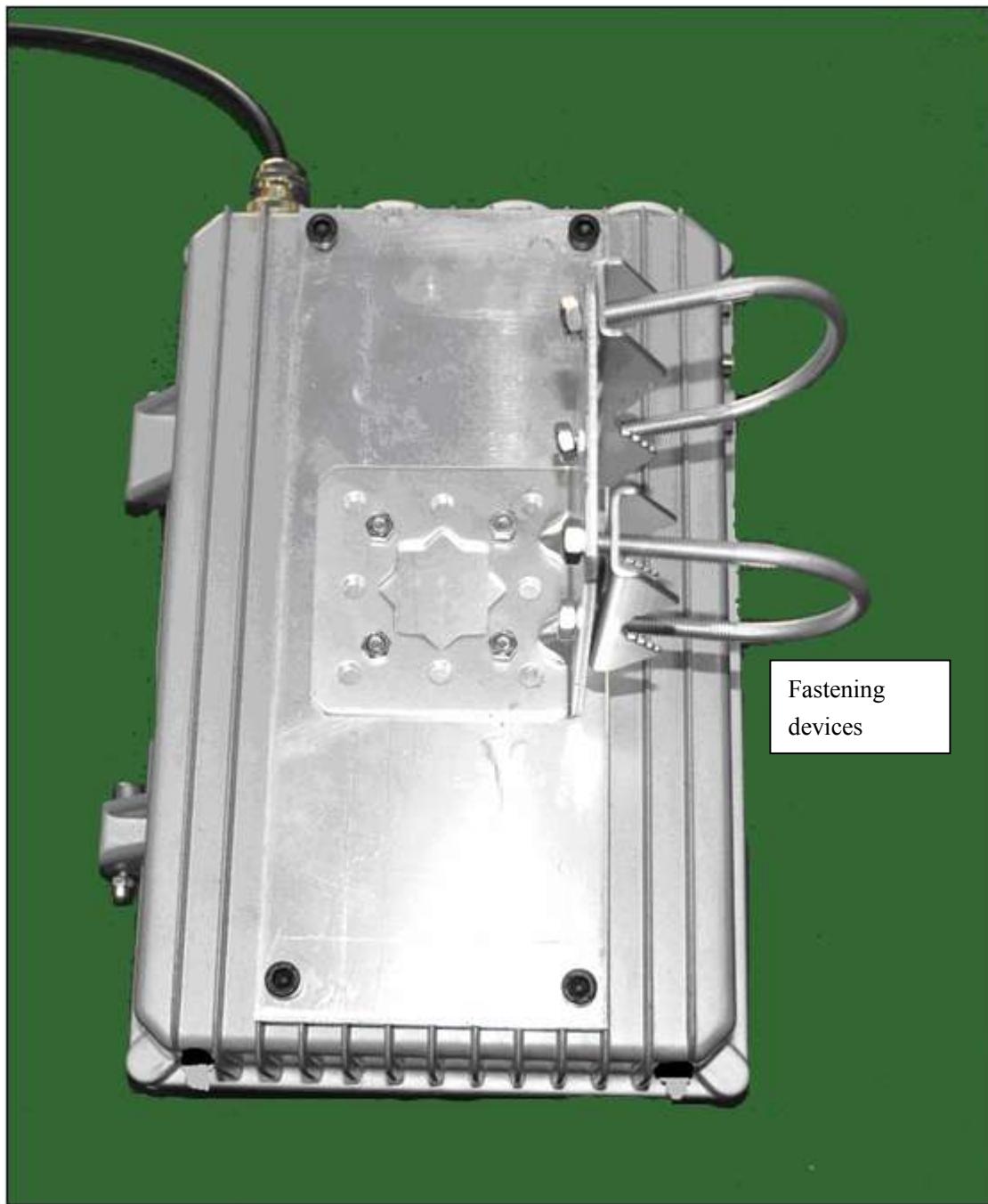
1. Back panel installation

As shown in the figure, install the back panel on the back of the reader-writer-writer shell and securely fasten the four screws



Fixing Bracket Installation

The fixing bracket to fix the reader-writer-writer shell may be changed in line with the environment of the actual on-site installation position. The multiple-hole design in the red circle is for the installation from multiple perspectives and in complex situations.



Overlap the fastening devices on an installation in an appropriate diameter, such as a sturdy stick or a steel pipe, and then fasten the screws.

2. Antenna Installation

Note: The antenna must be firmly installed. Do not excessively tighten the screw

when screwing the antenna entails strenuous efforts; otherwise, the internal patch cord will be twisted off, the waterproof seal at the antenna interface will be damaged, thereby destroying the reader-writer-writer, so that the reader-writer-writer cannot receive data properly. After the installation of the antenna, a certain angle should be set in line with the situation.



3. Power-on Test

Power-on testing must be conducted after the completion of the antenna installation and other related work. The safety of the relevant power supply, antenna and other lines must be examined before the test.



When the device is normal,

- 1) ZigBee will be connected to the network, the red light will flash a few times and then remains permanently on, indicating that the reader-writer-writer is

successfully networked.

- 2) The WiFi networking indicator flashes in the networking process and is always on after the successful WiFi networking.
- 3) The blue light of the data signal is sometimes on and sometimes off. The interval between “on” and “off” depends the time of data receipt; the blue light is on when data are received once and is off when data are received again; in this way, the light is on and off repeatedly, indicating that the device receives data normally.

◆ Debugging Steps

Step 1: Test run the reader-writer-writer and properly install the reader-writer-writer as required;

Step 2: Reliably connect the power interface and the antenna.

Step 3: To confirm whether the reader-writer-writer works normally: When the system becomes stable approximately 60 seconds later after the system is on, the LED indicator on the right of the shell (WiFi networking indicator) flashes yellow in the networking process and is permanently on after the successful networking; the red light (the reader-writer-writer network identification indicator) flashes in the network identification process and is permanently on after the network is identified; and the blue light (the collector communication data receipt indicator) is on or off once a piece of data is received.

Step 4: Wait for 2 hours, and examine whether data transmitted from the collector are received within the 2 hours, and examine whether the data are correct on the UCOWS cow oestrus monitoring platform.

◆ Standards for Acceptance Inspection

1. Acceptance Inspection on Installation

To examine whether the installation is in compliance with the standards, and whether the connection between devices is normal:

- Whether the reader-writer-writer is fixed securely and not loose;
- Whether the power connector and the antenna are firmly connected and fixed;
- Whether the screws are tightened.

2. Acceptance Inspection on Performance

Whether the reader-writer-writer is working normally is mainly examined in the following two ways:

- Examine whether the reader-writer-writer is working normally by the reader-writer-writer's LED indication;
- Examine whether the reader-writer-writer is working normally by checking whether the data collection information is correct on the back-office testing software.

◆ Operating Instructions

Preparation and checking before the use:

1. Check whether the reader-writer-writer shell is damaged;
2. Whether the waterproof cap on each interface of the reader-writer-writer is tightened;
3. Check whether the connection cables of the reader-writer are damaged and whether cable connectors are clean.

◆ Maintenance and Repair

1. Routine Maintenance

- The reader-writer shell, the interfaces and the cable connectors must be kept clean;
- For equipment maintenance, the power supply provided to the reader-writer must be switched off in advance, and then the device shell is opened;
- The power cables should be examined regularly and should be promptly replaced if the cable surface is damaged.

2. Analysis of and Solutions to Common Failures

Failure	Cause analysis	Elimination method	Remarks
The red light (leftmost) is always flashing.	The red light is used to indicate the reader-writer's communication network. The light is always flashing (in network identification) or always on (having accessed or established the network); otherwise, maybe the system is not powered.	First, check whether the system is powered. If the light flashes over six times when the system is powered, the reason may be that the reader-writer's communication signal is not strong enough and the reader-writer cannot access the	

		network, so the reader-writer's communication module needs replacement.	
The yellow light (center) is not lit	The yellow light is used to indicate WiFi networking. If the yellow light stays lit, it indicates the successful connection to the network; if the yellow light is never on, it indicates that the system is not powered; if the yellow light is on and off alternately, it indicates that the reader-writer WiFi is not properly configured.	Check the reader-writer's WiFi configuration, or request technical consultation.	
The blue light (rightmost) does not flash	The blue light is used to indicate the receipt of a piece of data. The blue light changes its status once a piece of data is received. If the blue light never	So, the collector's communication module needs replacement.	

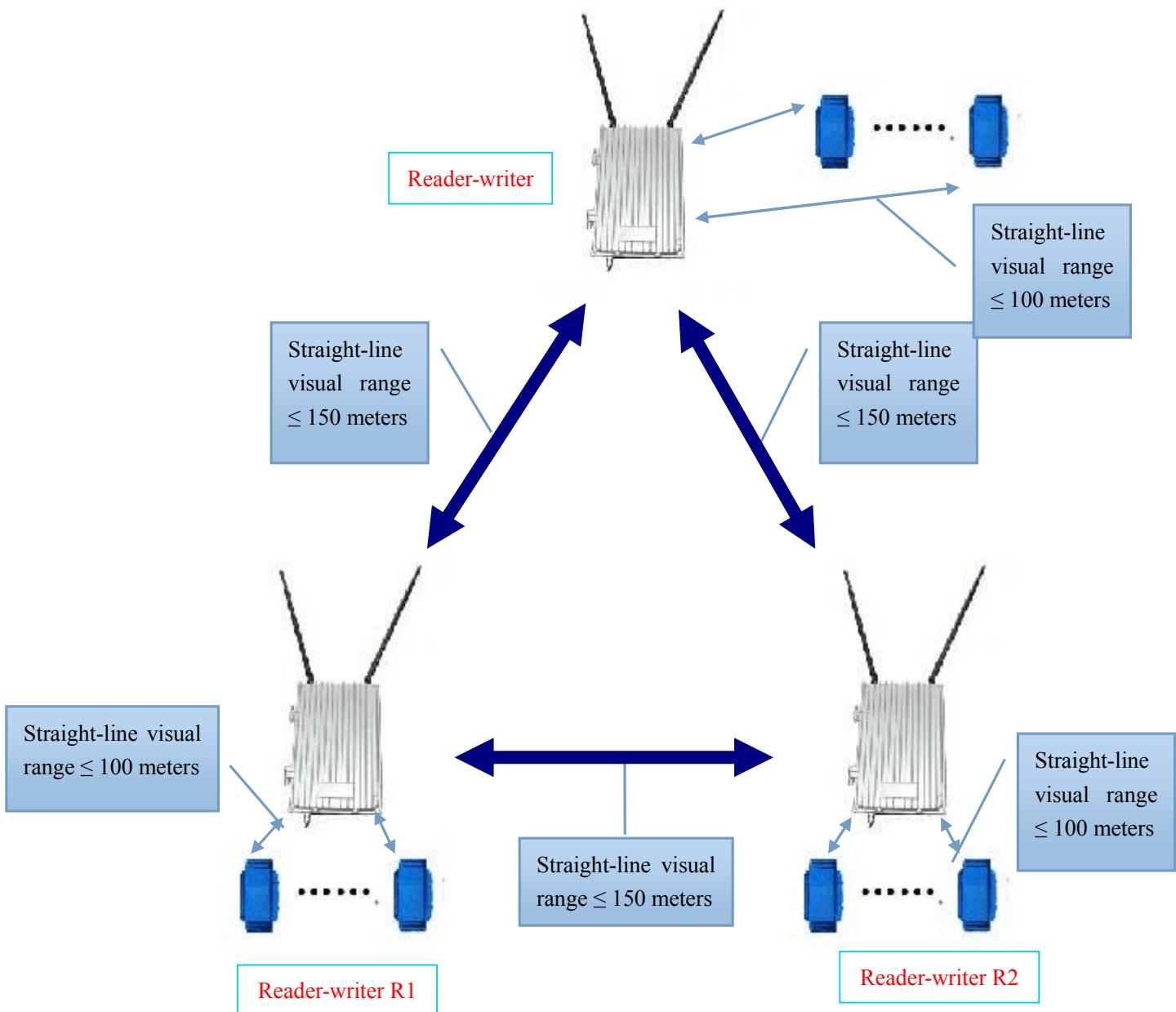
	flashes when the system is powered, it indicates that the communication signal of the reader-writer's collector is not strong enough and the reader-writer cannot receive the data from the collector.		
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3. Maintenance if the Device Is Not in Use for a Long Time

The device should be powered and checked on a regular basis to examine whether the device is working normally.

◆ **Instructions:**

The relevant number of collectors and reader-writers Z and the value of “n” in reader-writers’ Rn should be installed in line with the number of cows. Two or more reader-writers must be installed at required effective distances; otherwise, the monitoring role of the devices cannot be brought into play.



- 1) The maximum straight-line distance between Reader-writer Z and Reader-writer Rn is 150 meters, and the maximum distance between two or more Rns is also 150 meters, because the a distance of 150 meters at most can ensure the normal signal transmission.
- 2) The straight-line distance between a collector and Reader-writer Z or Reader-writer Rn is 100 meters.
- 3) A reader-writer can match, accommodate and receive the information from up to X collectors.

FCC Caution:

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

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.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

NOTE: 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.

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