Smart Remote Pest Monitoring System User

Manual (Pipeline Vibration Version)

NBL-IoT-SRPMS

Changsha Zoko Link Technology Co., Ltd.

Listing:

I. Product Overview

(1) Product Description

The Smart Remote Pest Monitoring System is a new type of pest monitoring tool developed by our company. Please read this manual carefully before use and keep it safe. The production and processing of this product comply with the national standard GB/T 24689.1-2009 for pest monitoring lamps in plant protection machinery. The system features a stainless steel structure, utilizing light, electrical, numerical control technology, and IoT systems, with reserved 485/232 communication interfaces for integration with various systems such as meteorological systems. It automatically handles pest collection, killing, sorting, and drainage without supervision. This system monitors, analyzes, and predicts the occurrence and development of insects, providing services for agricultural modernization and meeting the needs for pest reporting and specimen collection.

(2) Product Parameters

1. Production and inspection standards comply with GB/T 24689.1-2009 for pest collection equipment in plant protection.

2. The overall structure is made of stainless steel and galvanized spray paint, compliant with GB/T 4237 national standards, with no sharp edges, burrs, or defects on the surface; it should be smooth, sturdy, and well-finished with no welding defects.

3. Various control methods such as light control, rain control, and time control are employed, using 4G/Ethernet for data exchange with the IoT platform.

4. Power input: Options include AC220V, solar power system with 400W solar panels and 200AH batteries.

5. The overall structure uses galvanized plates and stainless steel spray treatment, ensuring outdoor rust resistance for 2 years.

6. LCD display: A 10-inch color LCD touchscreen tablet running Android, allowing easy operation for setting control modes and functionality tests.

7. Pest Water Separation Mechanism: Features an automatic drainage mechanism to effectively separate pests from rainwater, preventing noticeable water accumulation inside the box (CMA and CNAS test reports provided).

8. Automatic pest drying function: Uses infrared technology to automatically dry pests at set intervals, ensuring they remain dry and not decomposed, with two pest collection chambers for simultaneous drying.

9. Equipped with an automatic temperature regulator, reaching 85±5°C within 15 minutes, and the drying time can be set by the user.

10. Drying and Pest Killing Efficiency: The processing chamber temperature ranges between 80-90 degrees, effectively ensuring the integrity of pest carcasses (CMA and CNAS test reports provided).

11. Automatic image capture function: Industrial camera with 1200W pixels captures pest images at set intervals, uploading them to the software platform.

12. Integrated IoT software platform: The monitoring end transmits pest images and information via wireless networks to a client (mobile or computer), allowing users to view pest images remotely.

13. Compatibility: Features IoT connection ports for meteorological, soil, and other monitoring devices, presenting monitoring data through the software platform.

14. Automatic control function: Lights turn on automatically at night and off during the day (or based on time control).

15. Time control: Users can set multiple working time periods according to target pest habits.

16. Rain and Light Control Functions: Automatically controls the monitoring lamp based on external rainfall and light conditions, maintaining operational status even under sudden strong external light at night (CMA and CNAS test reports provided).

17. Memory function: Power outage recovery allows the system to complete tasks from before the outage before starting new ones.

18. Remote wireless restart function: Can remotely restart through commands sent from a PC.

19. Remote debugging capability: Provides remote technical support services.

20. The platform visually displays the current location information of the pest monitoring lamp.

21. Lamp power: 18W.

22. Cleaning device: Driven by a motor to clean the pest collection plate, facilitating post-photo cleaning to ensure pests fall into the collection device below.

23. Power Consumption: Monitoring lamp power ≤225W; standby power ≤15W (CMA and CNAS test reports provided).

24. Four impact screens arranged at 90-degree angles; single screen dimensions: length 608mm±2mm, width 330±2mm, thickness no less than 5mm.

25. Lamp startup time: ≤5s.

26. Insulation resistance: ≥2.5MΩ, equipped with leakage protection devices.

27. IoT platform: Real-time uploading of operational status and image data; users can view pest photos via mobile or computer, featuring AI pest recognition technology that automatically identifies pest type, name, and quantity after photographing.

28. Pest collection drawer: Dimensions 645410150, requiring regular manual cleaning to remove pests.

29. Pest collection plate: Rectangular pest collection board.

30. Rain-resistant design: Surrounding louvres effectively isolate external rain from adversely affecting the device.

31. Can be equipped with lightning protection devices: Includes lightning rods and grounding devices to effectively prevent lightning strikes.

★Features patented by the National Intellectual Property Office: "A Remote Pest Monitoring Device" and "An Automatic Image Collection and Pest Recognition Monitoring Device."

★Possesses a computer software copyright registration certificate for Agricultural Pest Monitoring System.

★The Smart Remote Pest Monitoring System has provincial and higher-level inspection reports.

II、Applicable Scope and Features

The Smart Remote Pest Monitoring System is widely used in agriculture, forestry, customs, horticulture, and research institutions for insect and pest monitoring.

Application Areas: Agriculture, forestry, animal husbandry, vegetables, tobacco, tea, medicinal materials, landscaping, orchards, urban greening, quarantine, etc.

Targeted Pests:

1. Vegetables: Beet armyworm, striped stem borer, diamondback moth, cabbage caterpillar, whitefly, yellow strip beetle, potato tuber moth, cabbage borer, mole cricket.

2. Rice: Rice borer, leafhopper, rice stripe borer, rice stem borer, rice planthopper, rice leaf roller.

3. Cotton: Cotton bollworm, tobacco cutworm, red bollworm, bridge worm, blind bug.

4. Fruit Trees: Stink bug, fruit borer, inchworm, fruit-clipping night moth, peach borer.

5. Forest Pests: American white moth, lantern bug, willow moth, pine caterpillar, pine beetle, longhorn beetle, birch looper, leaf roller, spring looper, poplar white moth, large green leaf beetle.

6. Cereals: Grain borer, armyworm.

7. Miscellaneous Grains: Spodoptera frugiperda, sorghum borer, corn borer, soybean borer, bean moth, millet borer, apple citrus borer.

8. Underground Pests: Cutworms, tobacco cutworms, beetles, tortoise beetles, ladybugs, mole crickets.

9. Grassland Pests: Asian locusts, grassland moths, leaf beetles.

10. Storage Pests: Granary weevil, lesser grain borer, grain moth, black mold pest, bean weevil, ladybug, and more than 1326 other major pests.

III、Working Principles

1. Light Control Principle:

When ambient light brightens (daytime) → The control circuit opens the contact,

putting the monitoring lamp in standby mode (off); when ambient light dims (nighttime) → The control circuit closes the contact, activating the monitoring device (on).

2. Time Control Principle:

Users can set specific working time periods for pest monitoring; the pest monitor uploads time period working data to the server, beginning operations at scheduled times. The monitoring lamp remains in standby mode (off) → The control circuit closes the contact, activating the monitoring device during set periods → Exiting time control mode outside the scheduled period.

3. Rain Control Principle:

During rain → The rain sensor detects signals → The controller activates → The drainage system engages → Prevents rainwater from entering the pest collection channel, directing it to the drainage path to flow out of the box. After rain stops, the device assesses whether the conditions meet the operational criteria; if not, the pest monitoring lamp remains in standby mode.

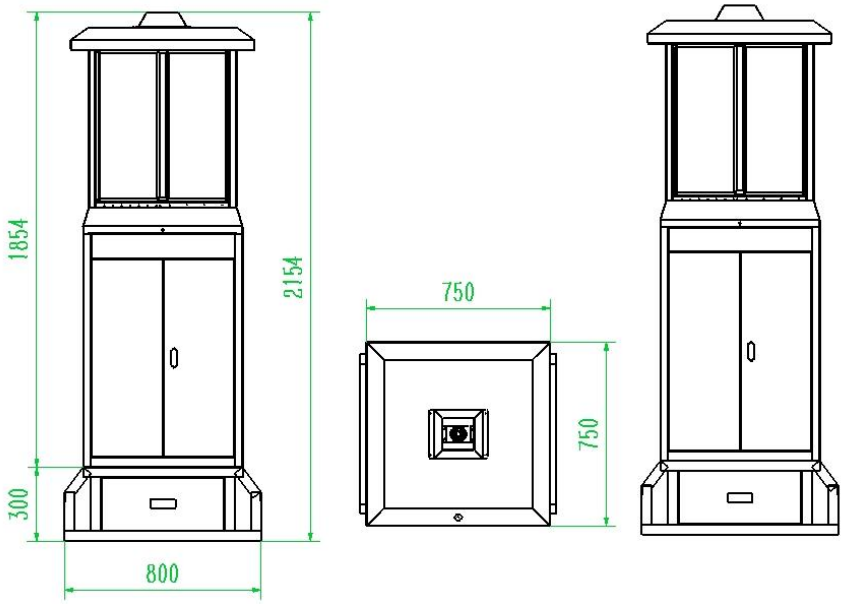
4. Insect Processing Principle:

Using LED pest trap lamps as the light source → Insects are attracted and collide with the glass screen → They fall into the funnel leading to the processing chamber. Live insects fall in and die within 3-5 minutes, then the infrared processing chamber is activated after fifteen minutes → The dead insect mass is heated in a 90°C drying chamber for 15 minutes (this duration can be set) until the pest bodies are dried → Waiting for the remaining time until the user-specified photograph interval, the drying chamber releases the insect mass onto the pest collection board → The collection board vibrates for one second, evenly spreading the pest bodies for the photo process → Cleaning the collection board.

IV、Structure

The overall structure of the Smart Remote Pest Monitoring System is divided into upper, middle, and lower parts, with the upper part serving as the trapping device, the middle part acting as a cabinet structure, and the lower part consisting of a pest collection

drawer, which houses the control circuit and pest processing unit. The trapping device consists of a pest trap lamp, impact screens, and a pest funnel. The pest trap lamp is vertically installed at the center, surrounded by four impact glass screens arranged radially, with a funnel below leading to the processing chamber inside the cabinet.



V. Main Components

1. Light Sensor: Detects changes in external light conditions to automatically control the operation of the entire lamp through light, electricity, and digital systems.

2. Rain Sensor: Senses weather changes such as rain onset and cessation, sending signals to the controller.

3. Attracting Light Source: LED insect-attracting lamp tube, with a wavelength range of 365-395 nm.

4. Impact Screen: Composed of a 5mm transparent glass panel that allows light to transmit, directly shine, reflect, and attract insects to collide.

5. Far Infrared Treatment Chamber: Conducts lethal treatment on insects and automatically directs the processed bodies into the insect collection tray.

6. Vibration Device: Applies slight vibrations to the insects in the collection tray to ensure they are evenly distributed.

7. Cleaning Device: Cleans the photographed insects after vibration, allowing them to fall into the bottom collection drawer.

8. Controller: Manages the operation of the insect-attracting light source and the far infrared processor (operational status), the activity door of the treatment chamber, and the scheduled cleaning and positioning of the collection tray. The controller panel is equipped with nine indicator lights for monitoring device operation status and analyzing faults.

VI. Installation and Usage

(1) Installation

Solar Panel Support Installation

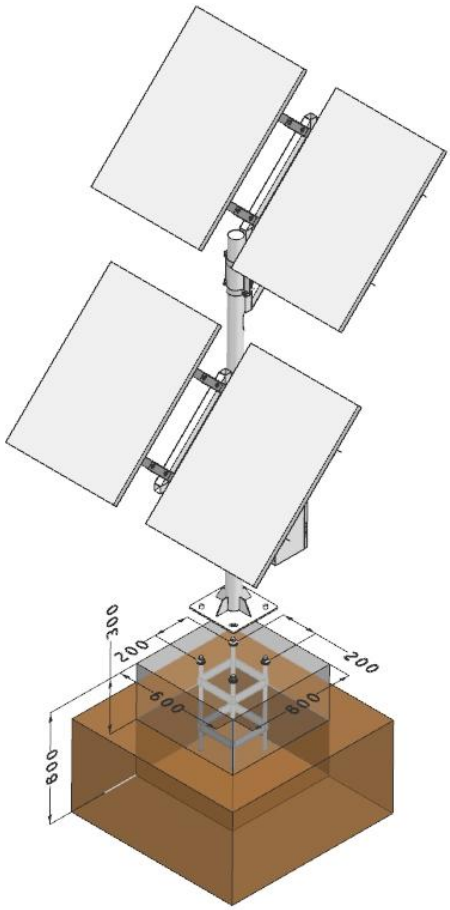
1. Pre-build a concrete base at the installation site (as shown in the diagram below), excavating a pre-buried pit sized 600mm x 600mm and 300mm deep.

2. Install the ground cage, ensuring the effective length of the cage's teeth is 30mm above the height of the concrete base and keep it vertical without tilting; it should face south during installation.

3. Pour concrete for the base with dimensions (length x width x height) = 600mm x 600mm x 600mm, with the base rising 300mm above the ground level. The concrete strength requirement is C20.

4. Once the base is completely dry, securely attach the assembled solar panel support to the ground cage using M16 nuts, washers, and flat pads.

5. Note: When installing solar panels in thunderstorm areas, a lightning protection device must be installed.



Insect Monitoring Lamp Installation

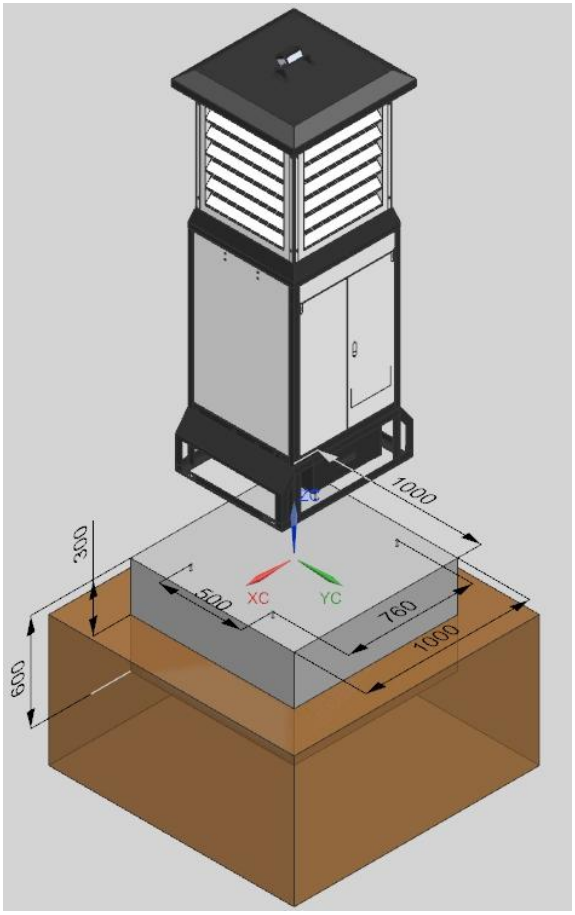
1. Pre-build a concrete base at the installation site (as shown in the diagram below), excavating a pre-buried pit sized 1000mm x 1000mm and 300mm deep.

2. Pour concrete for the base with dimensions (length x width x height) = 1000mm x 1000mm x 600mm, with the base rising 300mm above the ground level. The concrete strength requirement is C20. Once the base is completely dry, use a hammer drill to create holes (the center distance for the holes is: 760mm x 500mm, noting that the hole depth should match the actual length of the expansion screws).

3. Install M12 expansion screws into the holes, ensuring that they are vertically aligned without tilting and leaving enough length for effective installation.

4. Install the insect monitoring lamp assembly into the holes.

5. Note: When installing the insect monitoring lamp in thunderstorm areas, a lightning protection device must be installed.



(2) Usage Instructions

Inspect before use and select the power supply mode.

For 220V AC power supply, push the power switch and switch to AC power mode.

For solar power supply, simply switch the power supply mode to DC power mode.

Ensure the power supply is connected, open the cabinet door of the monitoring lamp, and follow the steps on the controller panel inside the cabinet to check the operation of the monitoring lamp.

Insect Monitoring Function Settings

1. Insect Monitoring Device Status Interface:

- Divided into the insect monitoring working status interface and the extended device status interface. Confirm the information on the insect monitoring working status interface.

- Error Codes: x. 0: No error; 1-1024: Error reported.

- Operating Mode: x. X= Manual, Timer-controlled, Light-controlled, Rain-controlled.

2. Mode Settings Interface:

- Set working mode: Timer-controlled/Light-controlled.

- In timer-controlled mode, the photo interval needs to be set (minimum photo interval is 20 minutes). Up to four working time slots can be set.

- In light-controlled mode: The photo interval needs to be set (minimum photo interval is 20 minutes). When the light intensity is below 850 Lux for a duration of 30 seconds, the working mode is activated, and the insect monitoring lamp will upload data to the platform according to the set photo interval. When the light intensity exceeds 850 Lux for a duration of 30 seconds, the working mode is exited.

3. Device Control Interface:

Mainly used for single-step debugging, power-off restart, and other functions.

Rain Separation Mode

This mode cannot be activated by the user; it is triggered only when the rain and snow sensor of the insect monitoring lamp detects rain or snow. Once in rain control mode, the insect monitoring lamp exits the insect monitoring working mode, activates rain separation, and turns off all switches of the insect monitoring lamp. At this point, the insect monitoring lamp performs rainwater drainage while other modules remain in standby.

When the insect monitoring lamp exits rain control mode, it returns to its previously memorized working state and determines whether to enter working mode based on the settings.

Activation Method: Place a tissue soaked in water on the device’s rain control panel. Within 30 seconds, the insect-attracting light source will turn off, and the entire lamp will shut down. When the rain control panel dries, the device exits rain control mode, and the insect monitoring lamp will enter the corresponding working mode based on whether the current conditions meet the requirements.

Additionally, if there is an abnormal power outage, rainwater separation will also be

automatically activated, ensuring that the interior of the device remains dry after an abnormal power outage.

Working Mode Usage

1. Timer-Controlled Mode:

- Determine whether the current time falls within the preset working time period. If so, the insect-attracting lamp will operate, activating the insect-attracting light. After ten minutes, the far-infrared processing chamber will perform insect drop, initiating the heating and baking chamber to maintain a temperature of 90°C for 15 minutes to process the insects. The processed insects will then be transported via a conveyor belt to collect data beneath the camera, and after the insect monitoring lamp uploads data, the insects will be placed in the storage chamber.

- Wait for the set photo interval for the insect monitoring lamp to upload data again until exiting the working time period, at which point the insect monitoring lamp will enter standby mode.

2. Light-Controlled Mode:

- When light intensity is below 850 Lux for 30 seconds, it enters working mode; when above 850 Lux for 30 seconds, it exits working mode. The insect processing workflow is consistent with the timer-controlled mode.

3. Manual Mode:

- Can be accessed through the mode switch button in the device control interface for debugging the insect monitoring lamp.

4. Insect Drop Board Cleaning:

- After each photo is taken, the insect monitoring lamp will clean the drop board. This process is driven by a stepper motor and a brush. After cleaning, the insects will be expelled from the insect monitoring lamp via the sloped structure below.

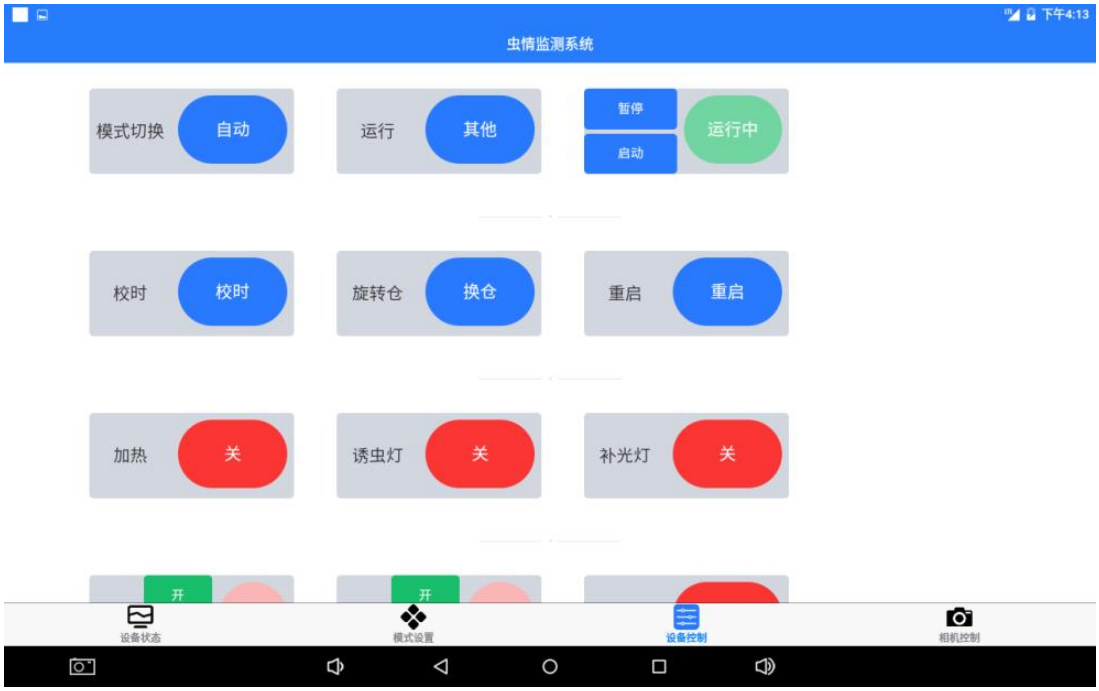
Platform Data Monitoring and Remote Control

The insect monitoring device uploads device status interface data every 5 minutes

and uploads images according to the user-defined photo interval. Users can perform functions such as mode switching, photographing, restarting, and single-step debugging of the insect monitoring lamp via the platform controls.

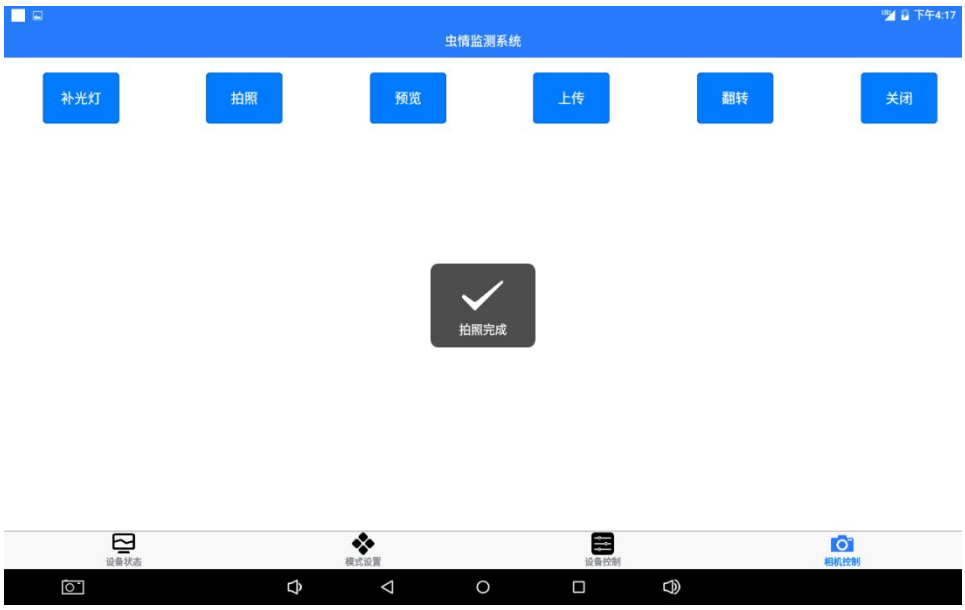
Manual Debugging of Insect Monitoring

Click the "Pause" control button at the top of the "Device Control" interface to terminate the current working state of the insect monitoring lamp. Click the button on the right side of "Mode Switch" to return to the "Device Status" page to refresh the status. If the "Mode Switch" at the top of the device control interface displays "Manual," then it has entered "Manual" mode.



Once in manual mode, the light control, rain control, and timer control will not be triggered, allowing for manual operation of each component. Manual mode is intended for debugging purposes only, and it is advisable to avoid using manual mode when you are not familiar with the device.

In manual mode, manual photography can also be performed, and a message indicating that the photo was successfully taken will be displayed.



VII. Precautions

1. Ensure that the power supply is a 400W solar panel and a matching gel battery of 200AH or more.

2. The front of the monitoring lamp must face east.

3. The installed fixing bolts should be tightened to ensure the lamp body is stable.

4. When installing, connect the ground wire according to the grounding mark on the lamp body.

5. The set working interval should be greater than the baking time.

6. In the event of severe weather such as strong winds and heavy rain, promptly disconnect the power to prevent lightning damage to the internal circuits. After clear weather, wait for two hours before restoring power to avoid electrical leakage due to excessive moisture inside the device.

7. After restoring power, ensure that the device is operating normally before leaving.

8. The insect-attracting light source and impact glass screen should be regularly cleaned of dirt to avoid affecting the trapping effect.

9. After rain, promptly clean the insect drawer to prevent the insects from rotting upon contact with water.

10. Regularly clean the rain control sensor.

11. During loading or transportation, always follow the instructions on the packaging box; it is strictly prohibited to lay the device flat or upside down.

VIII、Faults and Troubleshooting

Fault	Reasons	Troubleshooting Procedures
Nighttime light source does not illuminate or illuminates during daytime	Light sensor malfunction or poor connection at sensor plug	Check the light sensor and sensor connector plug
After installation, when connected to 220V mains power, the control system indicator light does not illuminate	Poor contact at power connection, power cord, or switch	Inspect, replace, or adjust
Monitor trips	Internal circuit leakage	Identify the cause of leakage
Excessive live insects attracted	1. Damaged far-infrared processor 2. Insect-falling system failure	1. Inspect the far-infrared processor 2. Inspect the insect-fall system
Fails to attract insects	1. Light source not illuminating 2. Controller malfunction 3. Rain sensor failure	1. Inspect the light source 2. Contact the manufacturer directly 3. Rinse dirt inside and outside the rain sensor with water
Insect trap light on controller does not illuminate	Controller malfunction	Inspect the controller
Insects cannot enter the treatment chamber smoothly	Insect chute not functioning smoothly	Clean the insect trap funnel
Entire unit fails to operate	1. Power supply not connected 2. Fuse blown 3. Switch disconnected 4. Ground fault circuit interrupter (GFCI) tripped	1. Restore power 2. Replace the fuse 3. Close the switch 4. Repair the earth leakage circuit breaker

Contact US

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