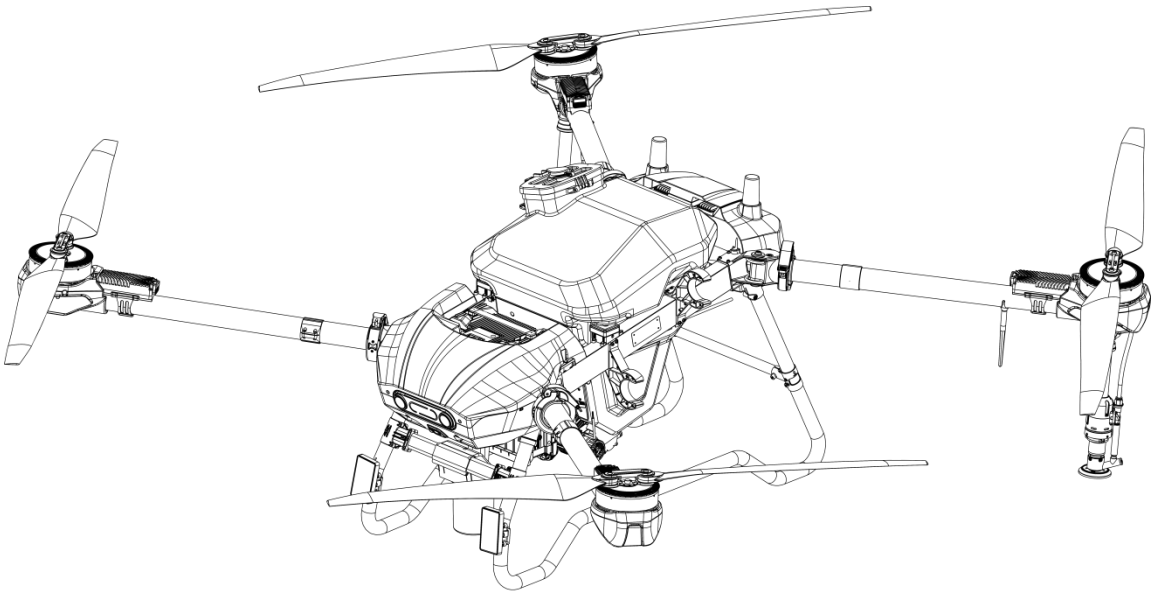
Agricultural Drone Operation Manual

Troubleshooting Manual

Version 1.0



VECTOR AGR™
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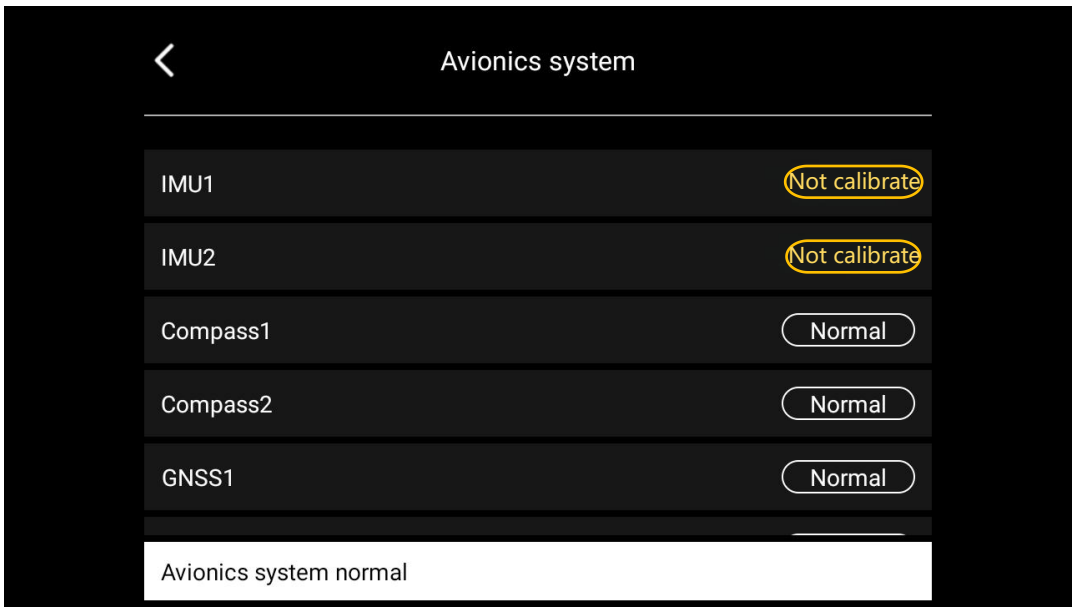
1. Avionics System



1.1. IMU Abnormal Report

■**Fault Description: The remote controller gives a voice prompt: "IMU not calibrated." The screen also displays "IMU1/IMU2 not calibrated."**

■**Possible Cause: This typically occurs after replacing the avionics module or interface board, or when the drone has not been powered on for an extended period.**

■**Troubleshooting Steps: Place the drone on a level surface in an environment free from vibration and strong magnetic interference. Then navigate to remote controller' s Hamburger Menu > Drone Settings > Advanced Settings > IMU Calibration to perform calibration.**

1.2. Magnetometer Abnormal Report

■**Fault Description: The remote controller gives a voice prompt:**

"Magnetometer interference detected" or "Magnetometer not calibrated."

- **Possible Cause: This typically occurs after replacing the avionics module or interface board, or when there is strong magnetic interference above the avionics.**
- **Troubleshooting Steps: Check for any potential sources of magnetic interference above the drone. Place the drone flat on the ground and follow the remote controller prompts to rotate the drone horizontally until the app indicates calibration is complete.**
- **Fault Description: The remote controller gives a voice prompt: "Avionics system error – Magnetometer 1/2 unrecognized."**
- **Possible Cause: Usually caused by a malfunction of the avionics module itself.**
- **Troubleshooting Steps: Replace the avionics module.**

1.3. GNSS Abnormal Report

- **Fault Description:**

  Audio Alert: The remote controller gives a voice prompt: "Dual-antenna heading error."

  Visual Warning: Weak GPS signal, satellite icon turns red or yellow, low satellite count displayed, and positioning status icon flickers (e.g., green → red).

  Before Takeoff: The app displays messages such as "Insufficient satellite

count, unable to take off" or "GPS not ready."

During Flight: The drone drifts, has unstable altitude, or shows signs of losing control.

■Possible Cause:

Environmental Factors: Signal obstruction around the drone, such as flying near tall buildings, indoors, or under dense forest canopy.

Weather Interference: Signal disruption caused by thunderclouds or ionospheric disturbances.

Electromagnetic Interference: Flying near high-voltage power lines, communication base stations, or radar sources may cause strong electromagnetic interference.

Hardware Issues: Physical damage to the antenna due to crashes or collisions, or loose antenna connections.

■Troubleshooting Steps:

Before flight, ensure the environment is open and free from obstructions.

Pause the flight and wait for stable weather conditions.

Fly as far away from potential sources of interference as possible.

Inspect the antenna and connection cables for damage, and replace any faulty components.

1.4. Meaning of Avionics Indicator Lights

Avionics status LED Definition

5 LEDs display the working status of the avionics system

Power status LED: not controlled by software, green

(1) External power connected	on
(2) External power disconnected	off

Control bus LED: controlled by the main control software, green

(1) When external CAN data is received	on
(2) If no external CAN data is received for more than 0.5 seconds	off

Data transmission status LED: controlled by the main control software, green

(1) Locked and data received	on
(2) Locked but no data received for over 0.5 seconds	off for 2 seconds, on for 0.5 seconds (repeating cycle)
(3) Not locked	off

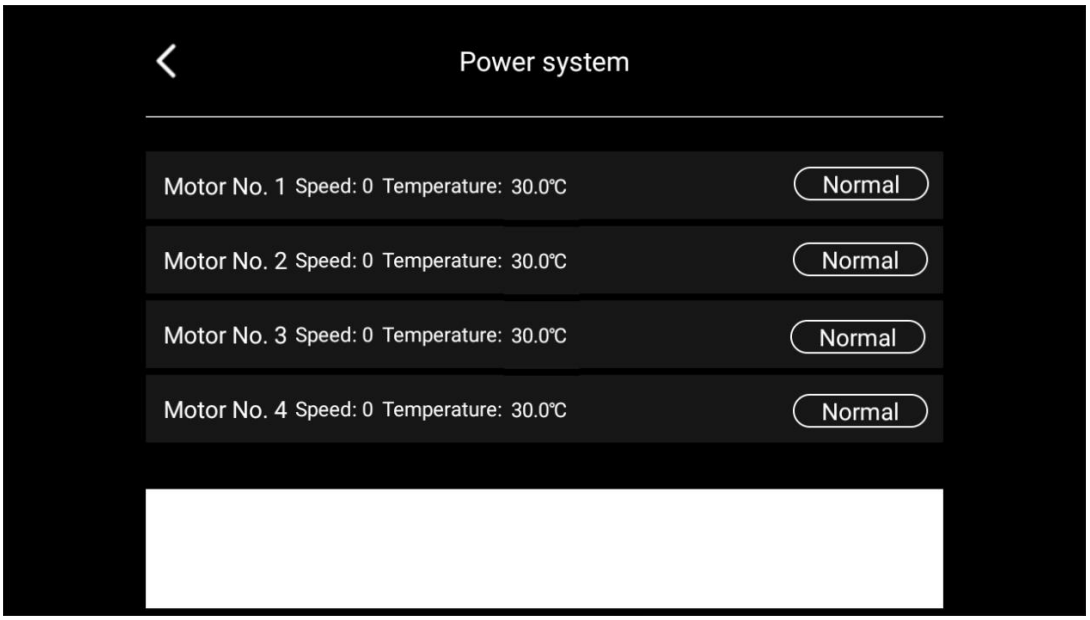
GNSS1 LED: controlled by the main control software, green, UM482 positioning and orientation status

(1) RTK fixed and oriented	steady on
(2) RTK fixed but not oriented	off for 2s, on for 0.5s, off for 0.5s, on for 0.5s (repeating cycle)
(3) Single point or float, oriented	off for 2s, on for 0.5s (repeating cycle)
(4) Single point not positioned, not oriented	off

GNSS2 LED: controlled by the main control software, green, 906AM positioning status

(1) 906AM single-point positioning	on
(2) Single-point not positioned	off

2. Power System



2.1. Mechanical Failure of Power Assembly

■Fault Description:

Motor rotation is not smooth, accompanied by a grinding or clicking sound; severe vibration during startup; unable to rotate normally.

Motor casing deformation leads to bearing wear.

■Possible Cause:

Sand or foreign objects have entered the motor.

Collision or compression during flight or transportation has caused motor deformation.

■Troubleshooting Steps:

Clean out any foreign objects inside the motor promptly.

Replace the power assembly with a new one.

2.2. Motor Overheating in Power Assembly

- **Fault Description: The motor casing becomes extremely hot to the touch (the remote controller interface shows temperature exceeding 60°C) and emits a burnt smell.**
- **Possible Cause: Prolonged operation under overload conditions, such as heavy payload, high RPM, or high ambient temperature.**
- **Troubleshooting Steps: Immediately land the drone to allow cooling. Check whether the motor coils are blackened or deformed, and reduce payload to observe if the issue persists.**

2.3. ESC Burnout in Power Assembly

- **Fault Description: The ESC casing emits flames or black smoke, accompanied by a burnt smell.**
- **Possible Cause: Caused by a short circuit or overcurrent.**
- **Troubleshooting Steps: Replace the entire power assembly.**

2.4. Propeller Failure

■Fault Description:

Severe vibration and significantly increased noise during flight.

Irregular drifting while hovering.

Visible damage, delamination, or cracking on the propeller surface.

■Possible Cause:

Deformation caused by collisions or compression during transport.

Improper installation, such as loose propeller clamp screws leading to centrifugal imbalance.

Surface contamination from dirt or corrosive fertilizers.

■Troubleshooting Steps:

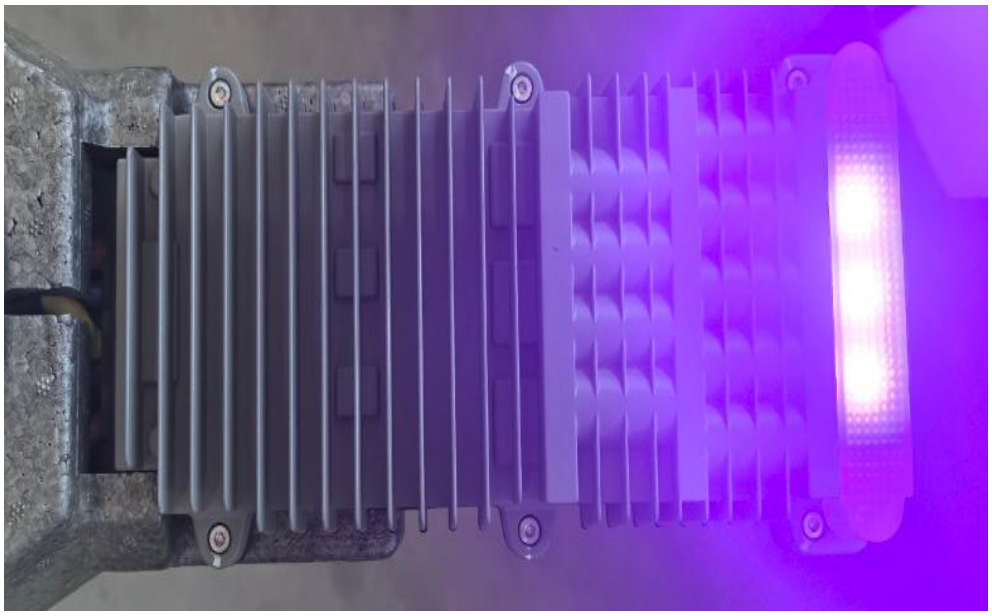
Replace with a new pair of propellers (HD580 propellers must be replaced in matched pairs).

Check the tightness of the propeller clamp screws.

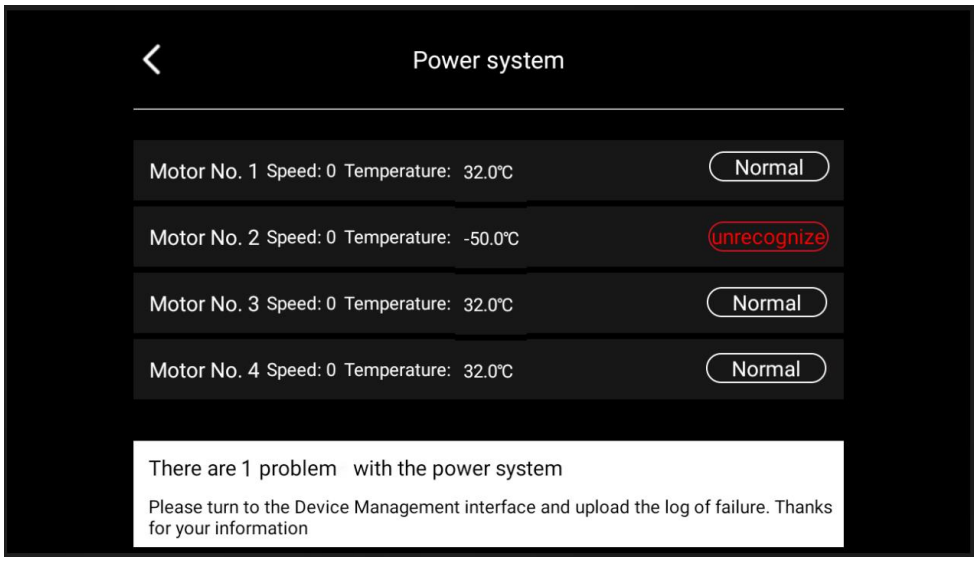
Clean any dirt or contaminants from the propeller surface promptly.

2.5. Communication Failure in Power Assembly

■**Fault Description: After powering on the drone, the ESC indicator flashes purple with a beeping sound.**

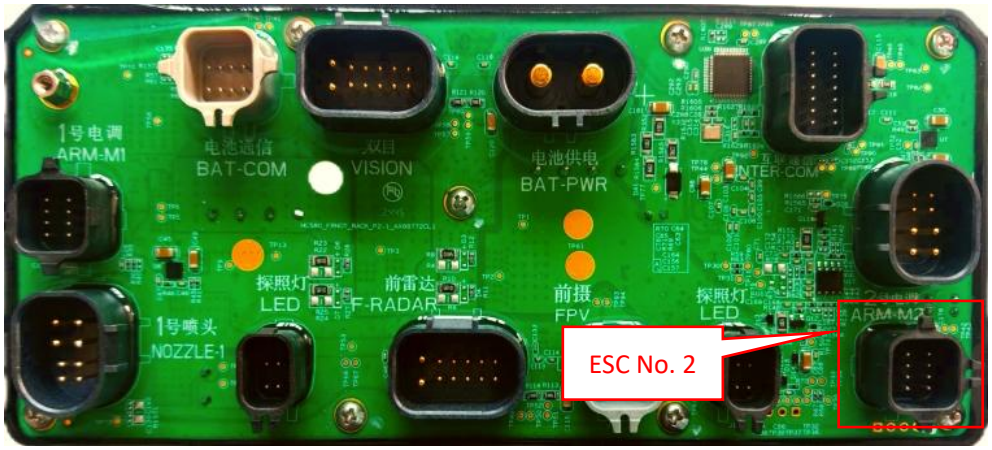


■**Fault Description: On the remote controller interface, the power system status shows "unrecognized" (e.g., No. 2).**



■Possible Cause: The flight controller is not receiving signals from the ESC.

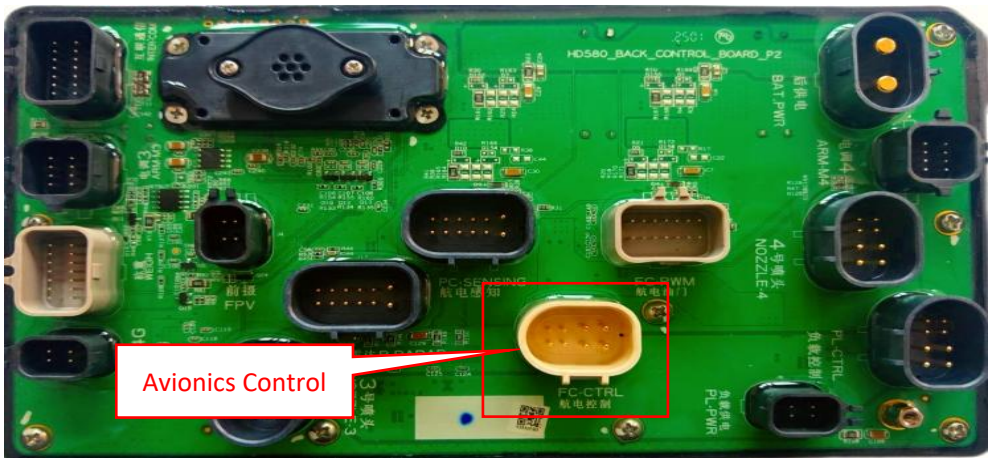
■Troubleshooting Steps: Check the reliability of the wiring harness connections. If the issue persists, replace the power assembly.



Note: Description of loose or unplugged cable scenarios

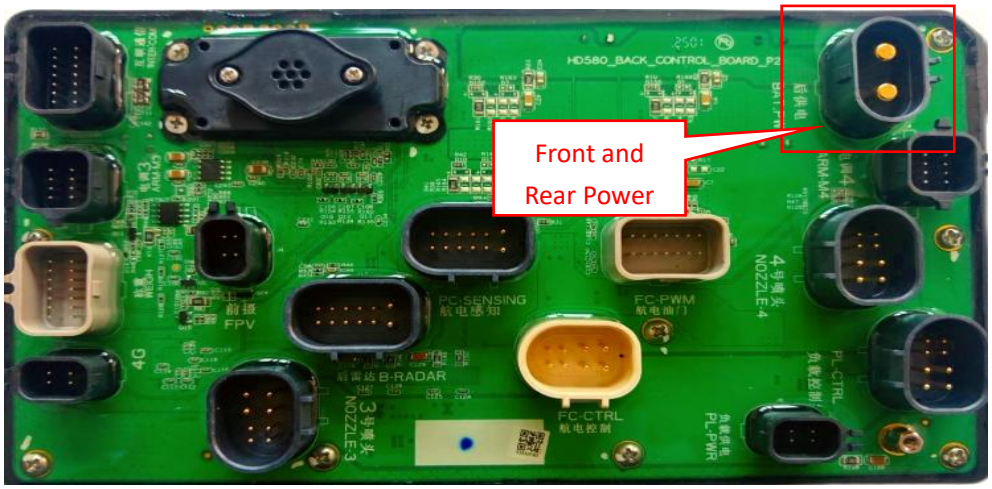
① **Avionics control cable: loose connection**

Navigation lights on arms 1 through 4 remain solid purple, and the remote controller cannot connect to the drone.

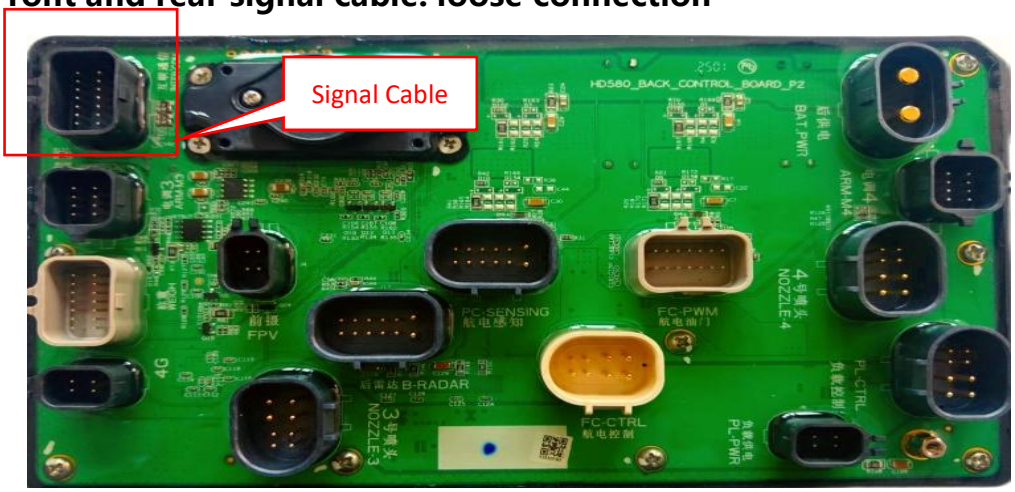


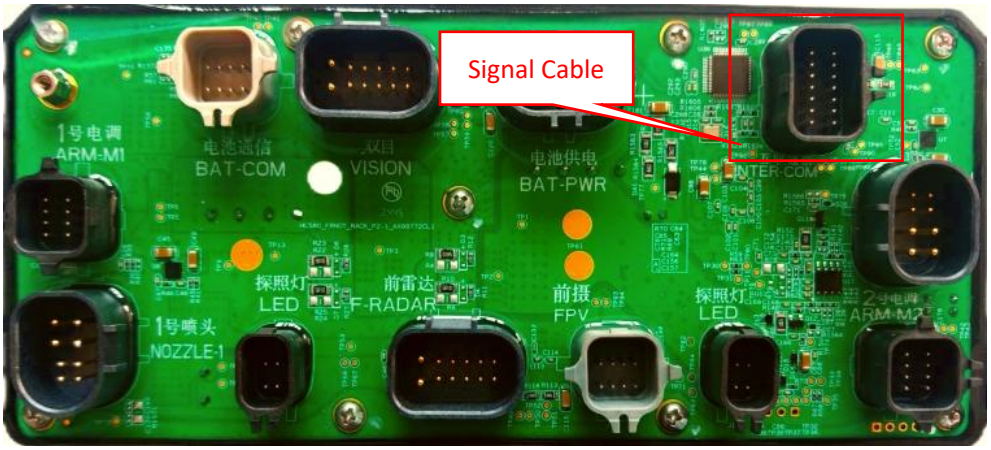
② **Front and rear power cables: loose connection**

Navigation lights on arms 1 through 4 remain solid purple, and the remote control cannot connect to the drone.

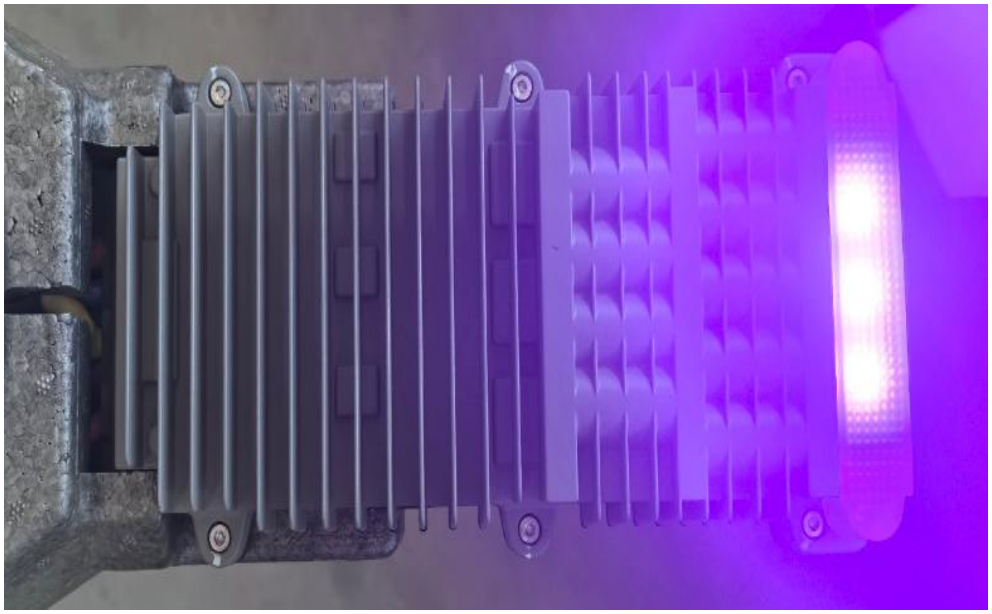


③ **Front and rear signal cable: loose connection**

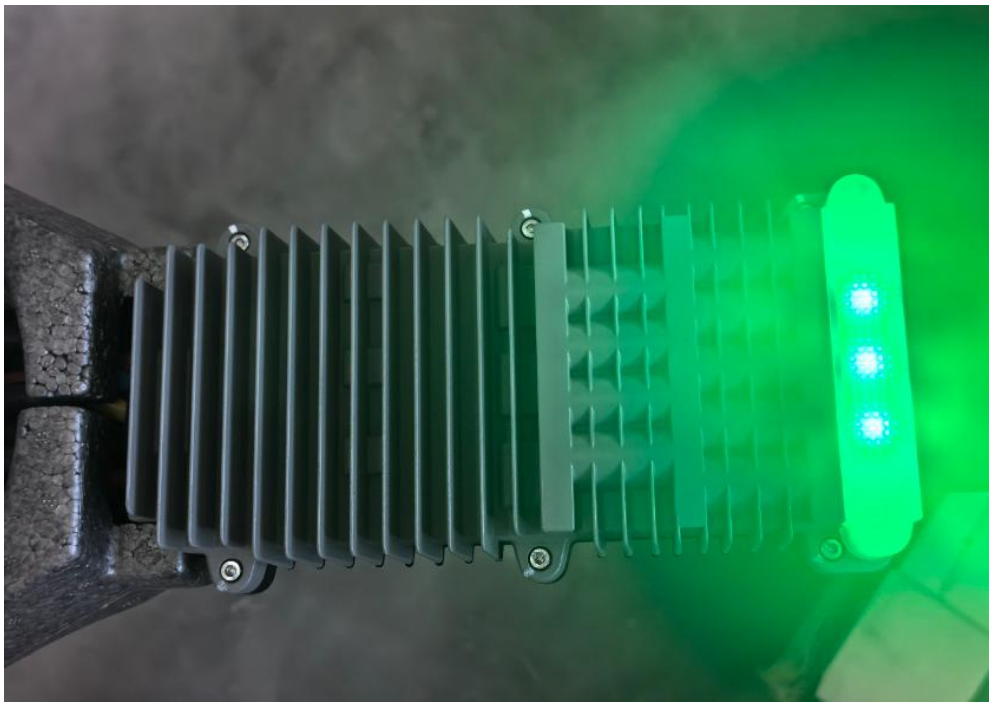




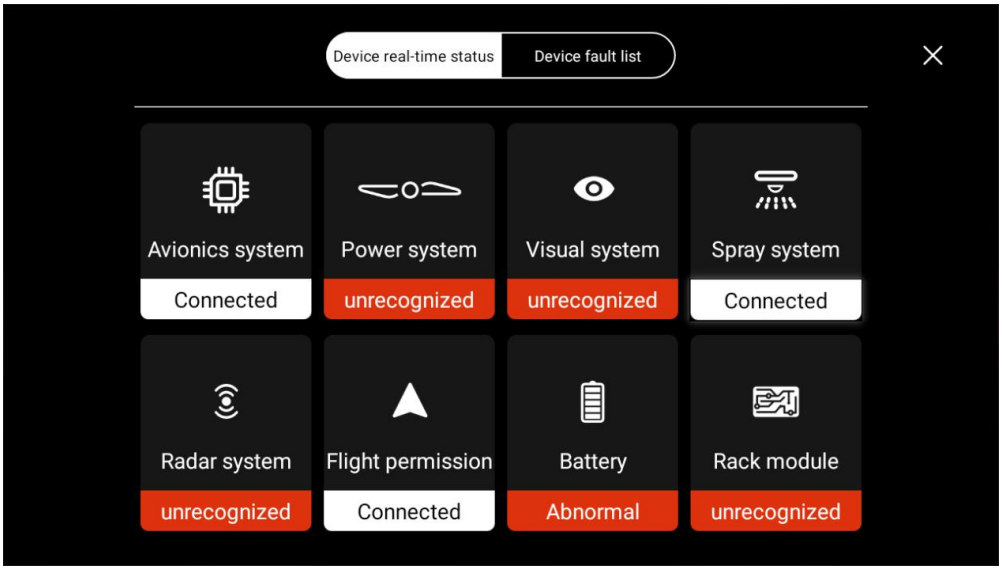
The remote controller is properly connected to the drone. ESC No. 1 and No. 2 navigation lights are purple



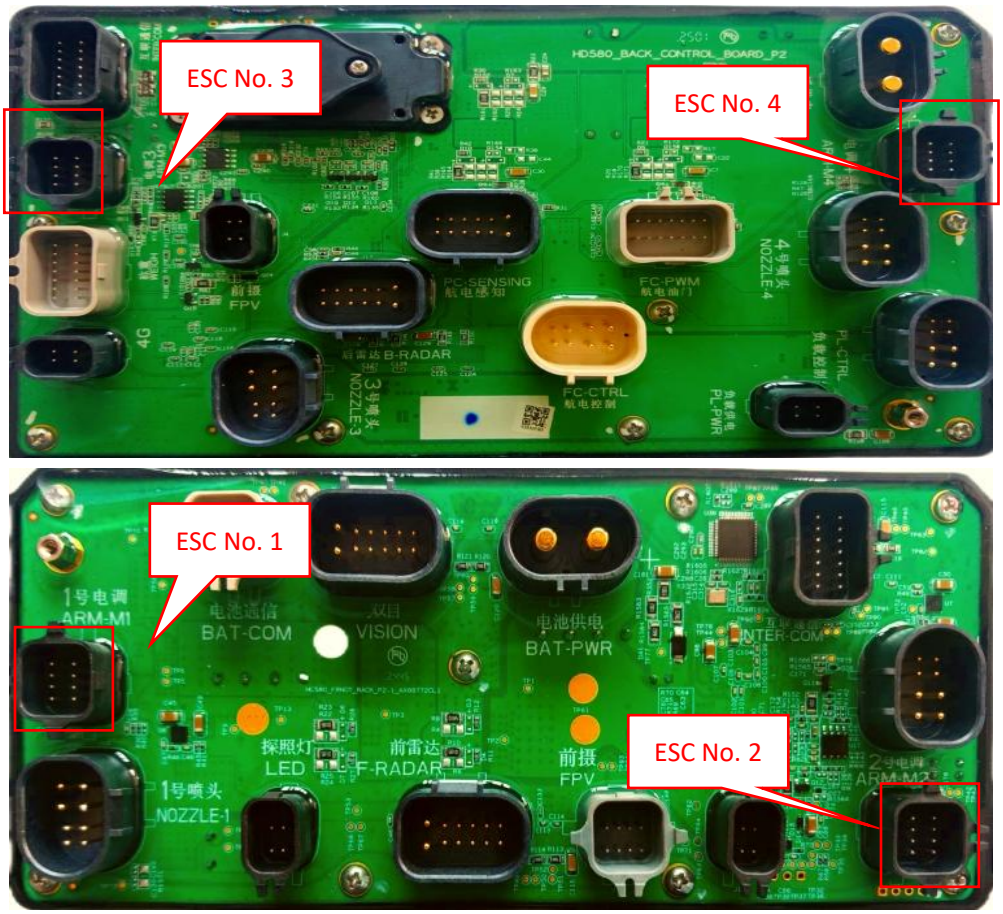
ESC No. 3 and No. 4 navigation lights are green.



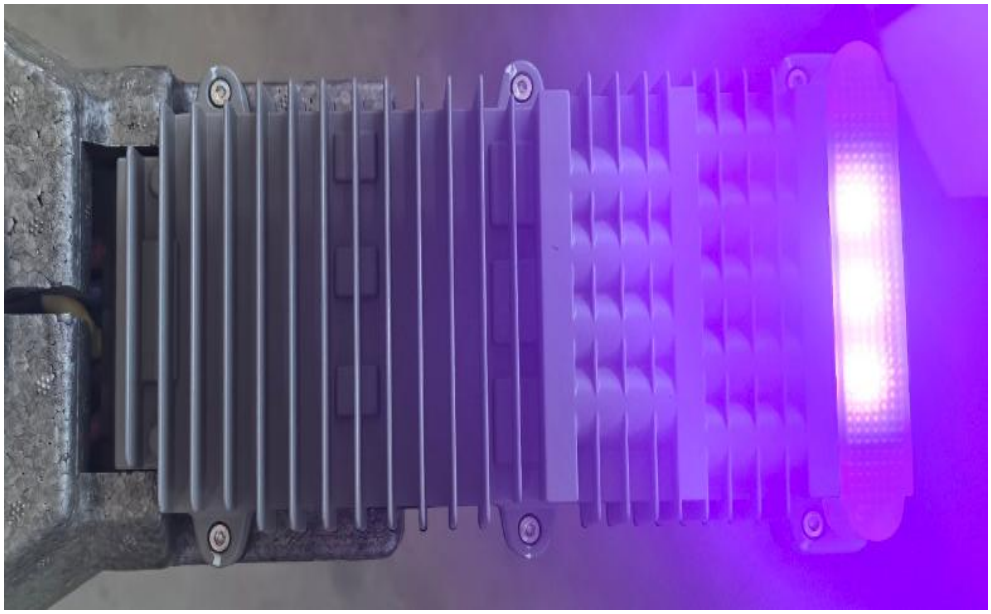
Device real-time status shows Power system, Visual system, Radar system and Rack module are unrecognized, Battery is Abnormal.



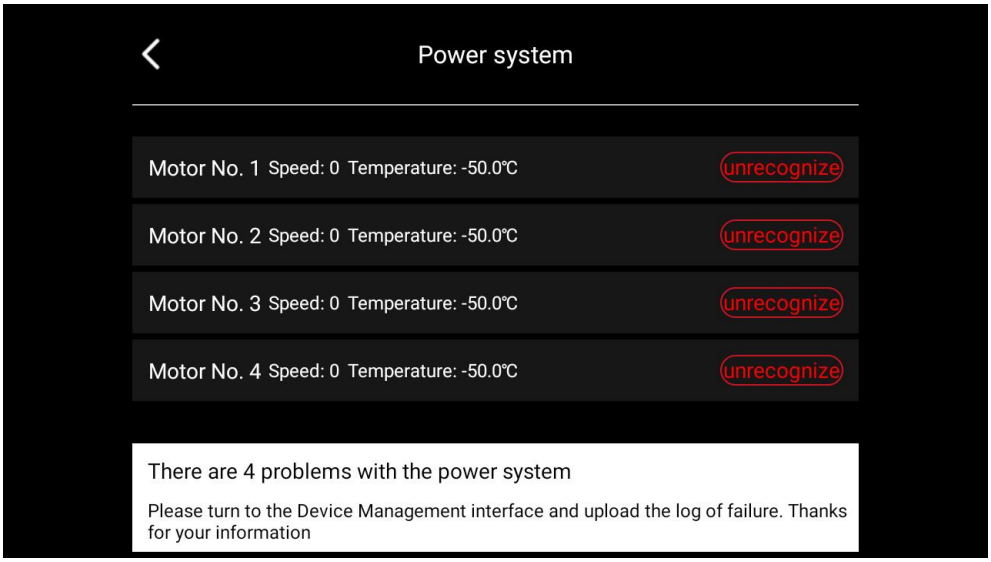
④ **Power ESC cables No. 1 to No. 4: loose connection**



Navigation lights of ESCs No. 1 to No. 4 show purple.

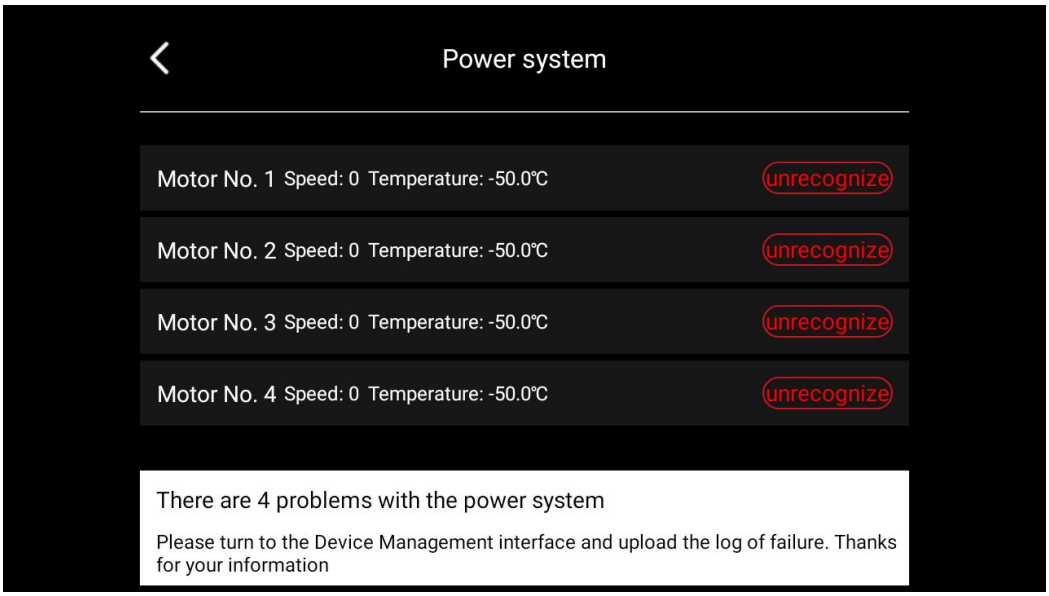


Power system reports motors No. 1 to No. 4 as unrecognized.

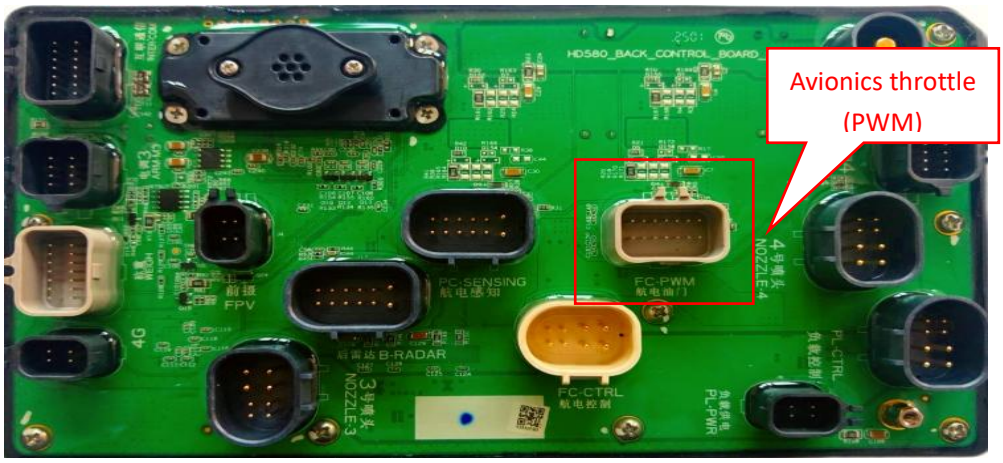


⑤ Power cables No. 1 to No. 4: loose connection; navigation lights of power assemblies No. 1 to No. 4 are not lit (purple lights off).

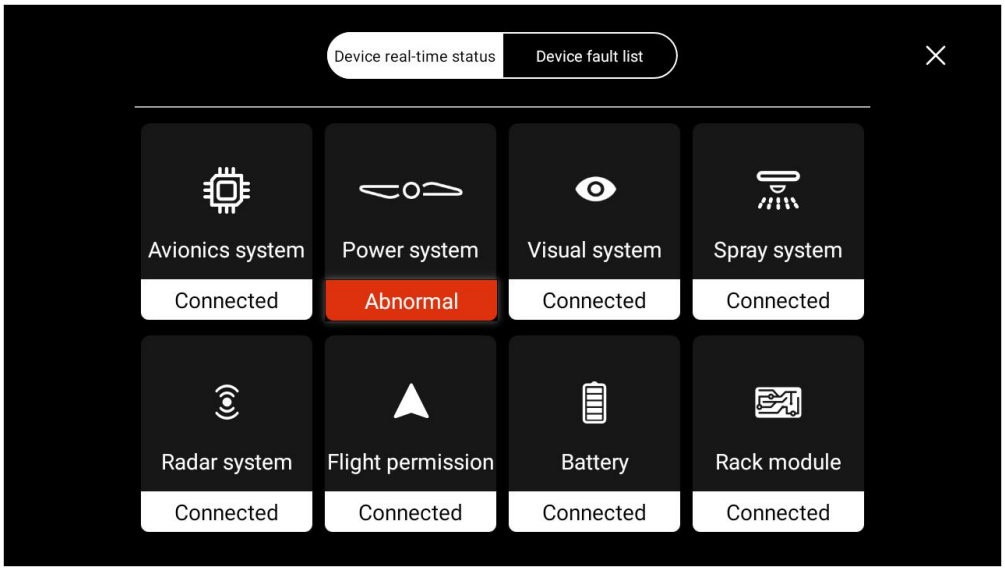
Power system reports motors No. 1 to No. 4 as unrecognized.



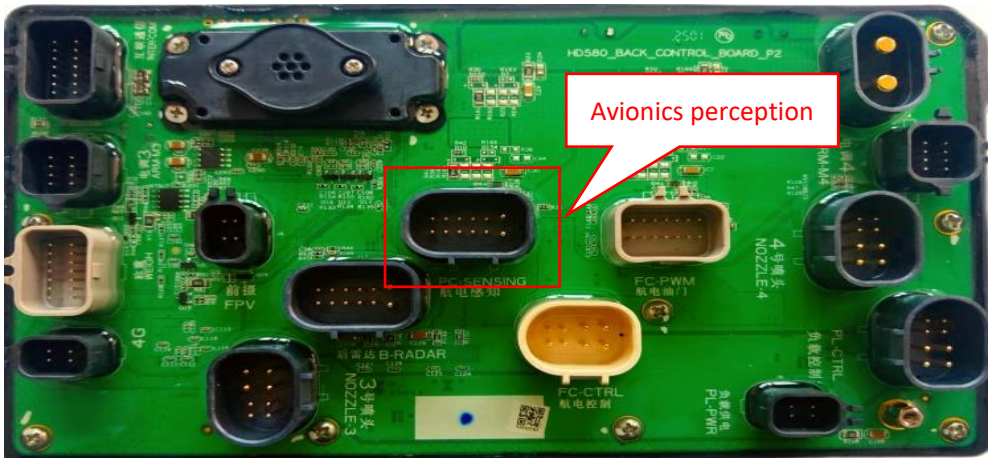
⑥ Avionics throttle (PWM) cable: loose connection



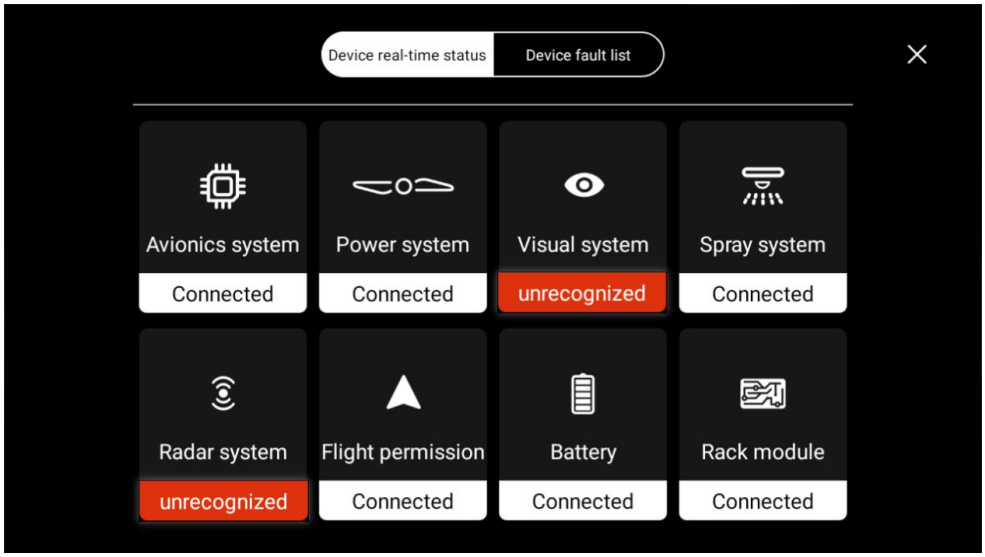
Arms No. 1 to No. 4 navigation lights are solid purple. The remote controller is properly connected to the drone. The power system reports an abnormality; motors No. 1 to No. 4 report ESC operation faults and control signal loss.



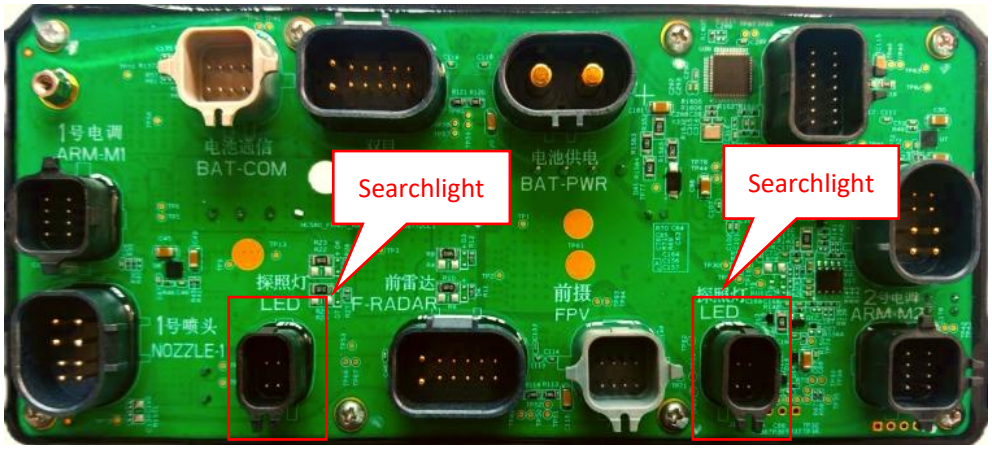
⑦ Avionics perception (Ethernet) cable: loose connection



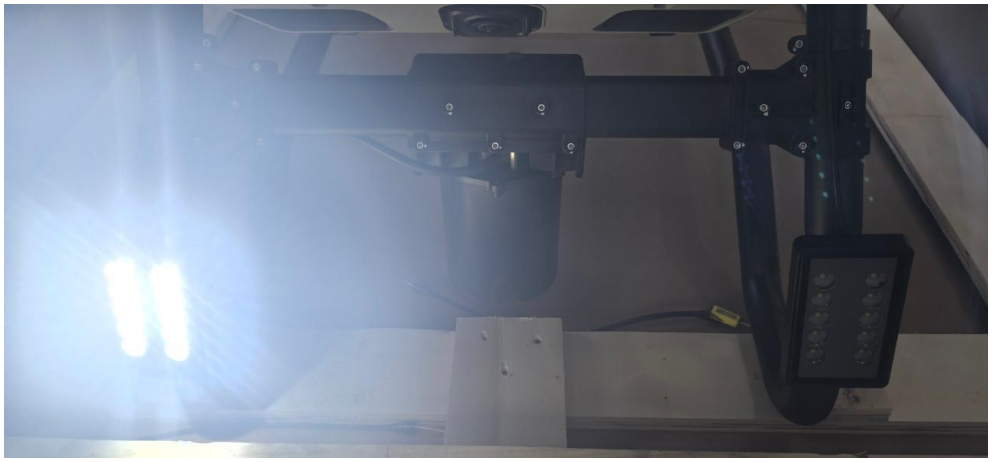
Radar system unrecognized, Visual system unrecognized.



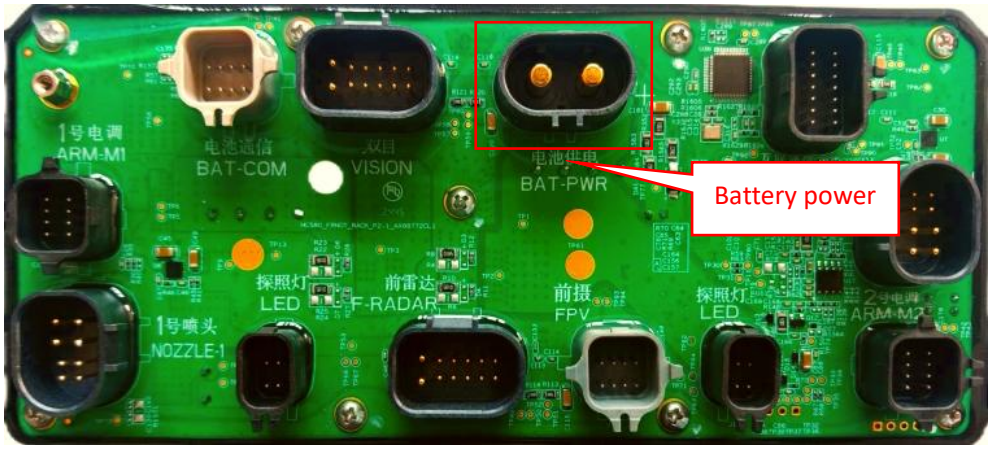
⑧ Searchlight cable: loose connection



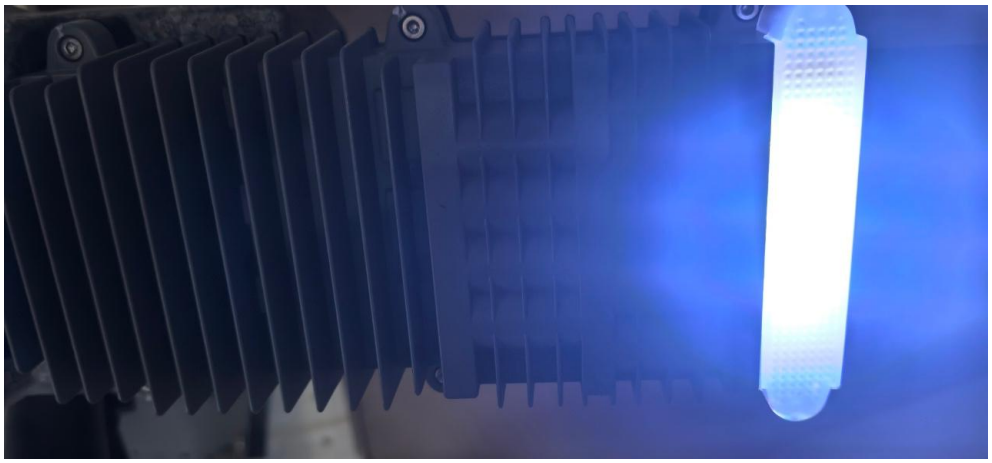
Searchlight not lit



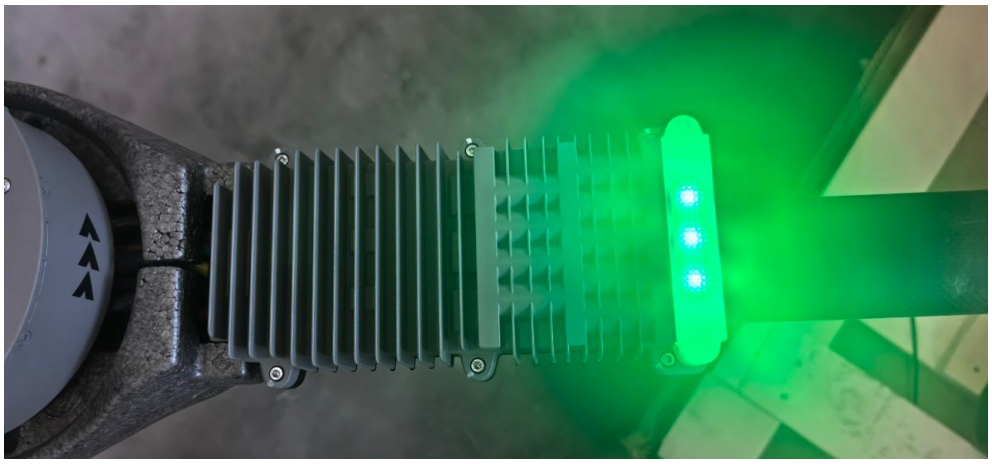
⑨ Battery power (supply) cable: loose connection



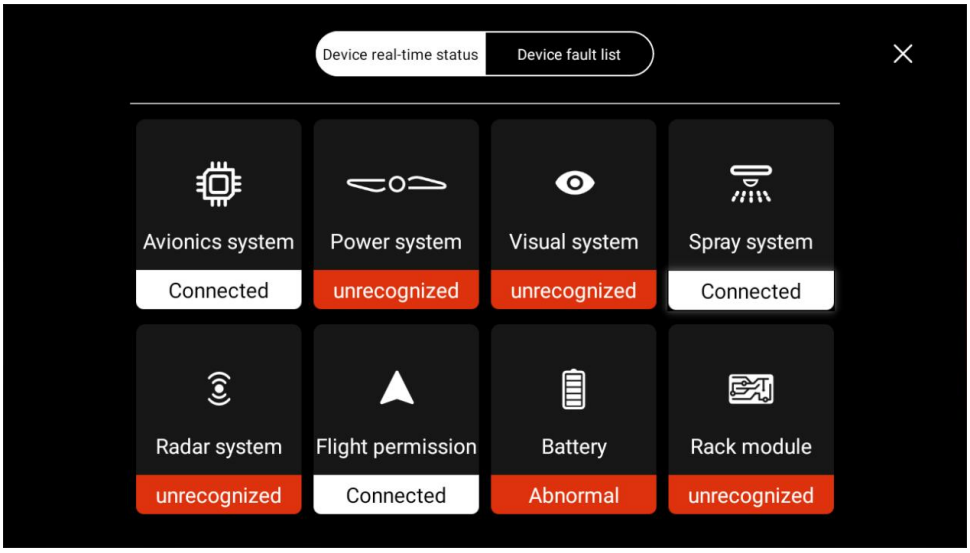
ESC No. 1 and No. 2 lights show white.



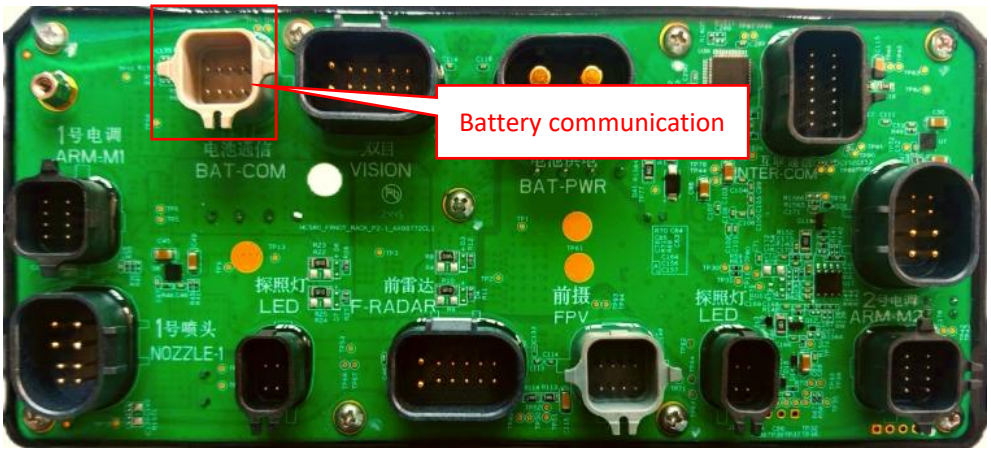
ESC No. 3 and No. 4 lights show green.



Device real-time status shows Power system, Visual system, Radar system and Rack module are unrecognized, Battery is Abnormal.

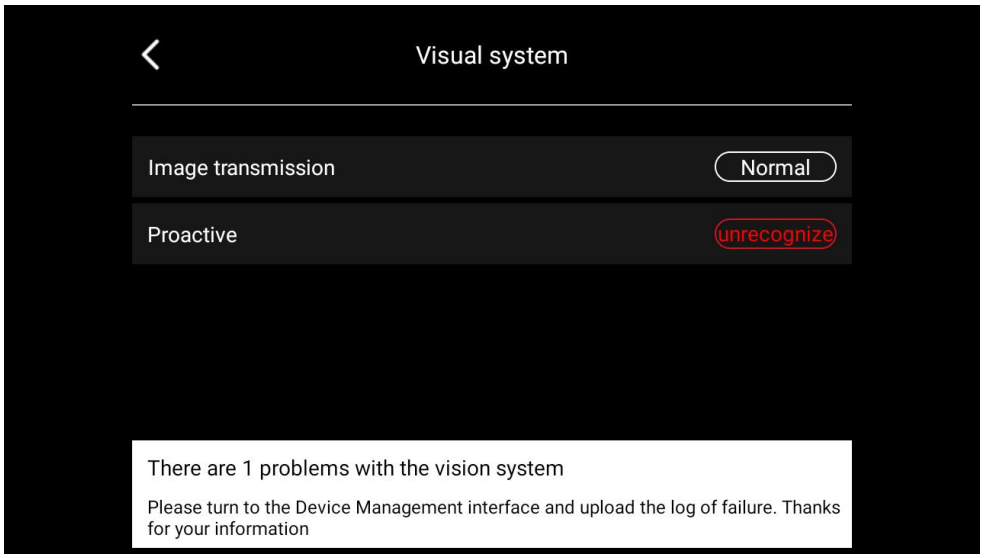


⑩ Battery communication cable: loose connection



The drone fails to power on normally after the battery is connected; the battery indicator is flashing red.

3. Visual System



3.1. Image Transmission Fault

■**Fault Description: The remote control displays: "Visual system fault – image transmission is unrecognized."**

■**Possible Cause: Image transmission antenna is damaged (e.g., broken or loose) or has a poor connection.**

■**Troubleshooting Steps: Replace the image transmission antenna or secure the antenna connection.**

3.2. Front Camera Failure

■**Fault Description:**

Remote control’ s visual system shows "Front camera is unrecognized."

Image is blurry, black screen, or displays snow/noise.

Gimbal cannot rotate properly or image shakes.

■Possible Cause:

Physical damage caused by collision (poor or broken cable connections).

Lens scratched or water ingress.

Abnormal connection between image transmission module and camera.

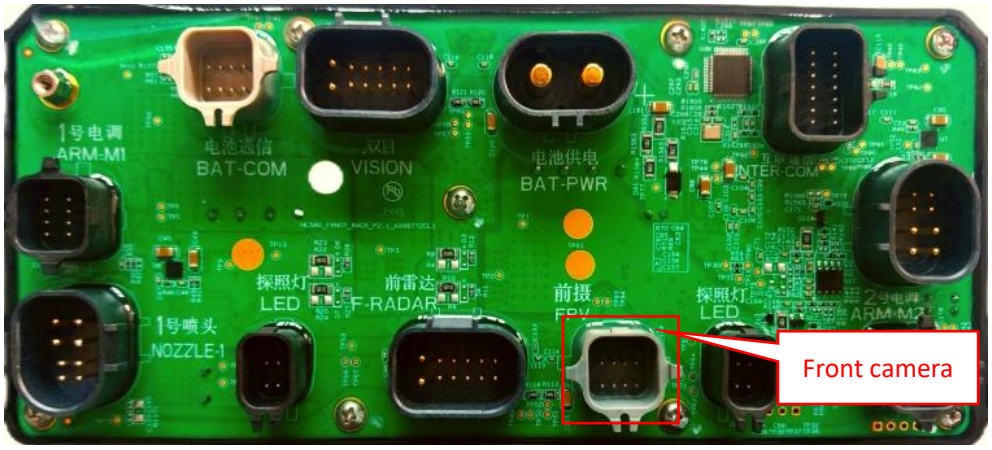
Ethernet connection abnormality.

■Troubleshooting Steps:

Check the front interface board → front and rear signal cables → camera connections; if ineffective, try replacing the front interface board and camera.

Gently shake the flex cable connectors to confirm looseness (power off before operation); if ineffective, replace the front camera.

If hardware damage is confirmed (e.g., broken lens or cable), replace immediately.



4. Operation System

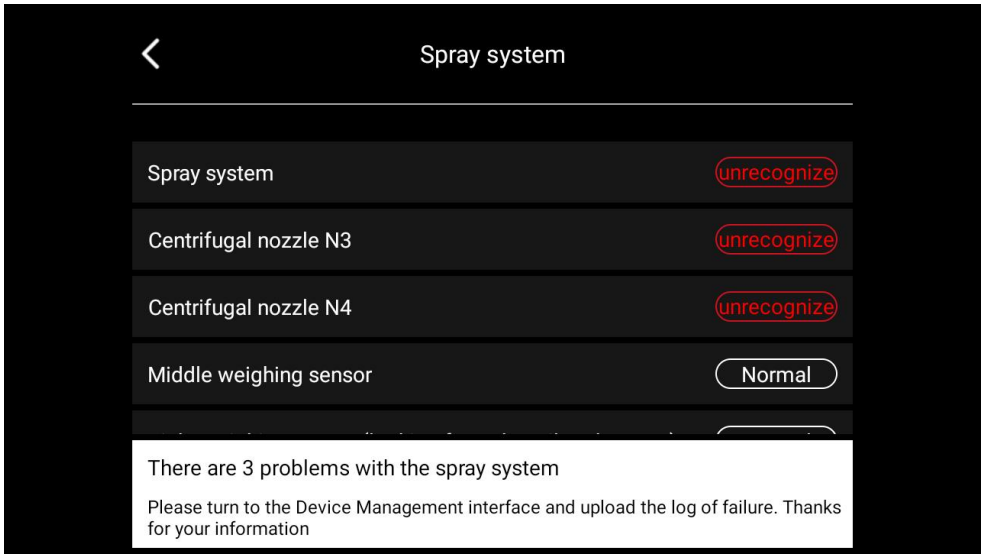
4.1. Medicine Supply System Abnormal Report

■**Fault Description:**

Nozzle does not rotate, rotates unstably, or produces abnormal noise.

Spraying range is reduced or distribution is uneven.

Visual error in operation system: "Centrifugal nozzle is unrecognized," "Bus voltage is too low."



■Possible Cause:

Mechanical blockage: centrifugal spray plate jammed by crystallized chemicals, entangled weeds, or foreign objects.

Wear of centrifugal plate: deformation of teeth/holes (due to prolonged use or collision).

Damaged wiring harness or unstable connection.

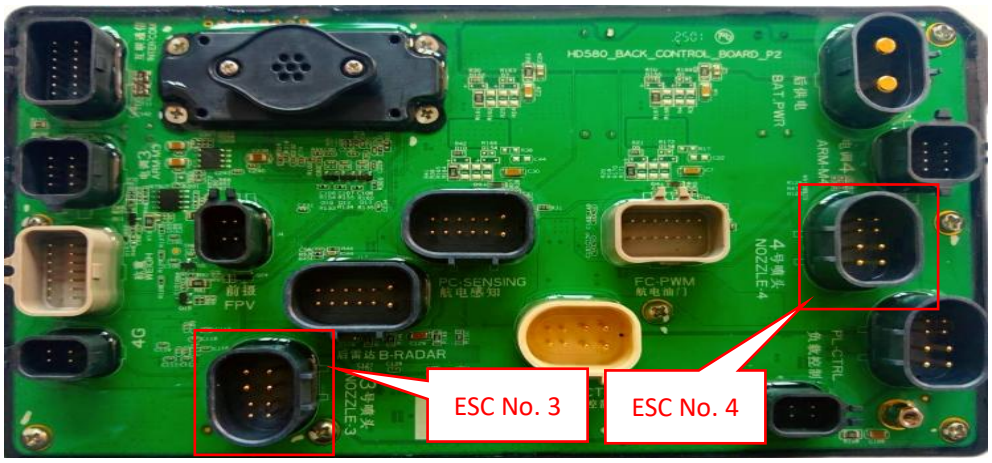
■Troubleshooting Steps:

Manually rotate the centrifugal plate to check for blockage; remove entangled weeds or crystallized residues.

Replace the centrifugal spray plate.

Inspect wiring harness connections; if ineffective, replace the centrifugal

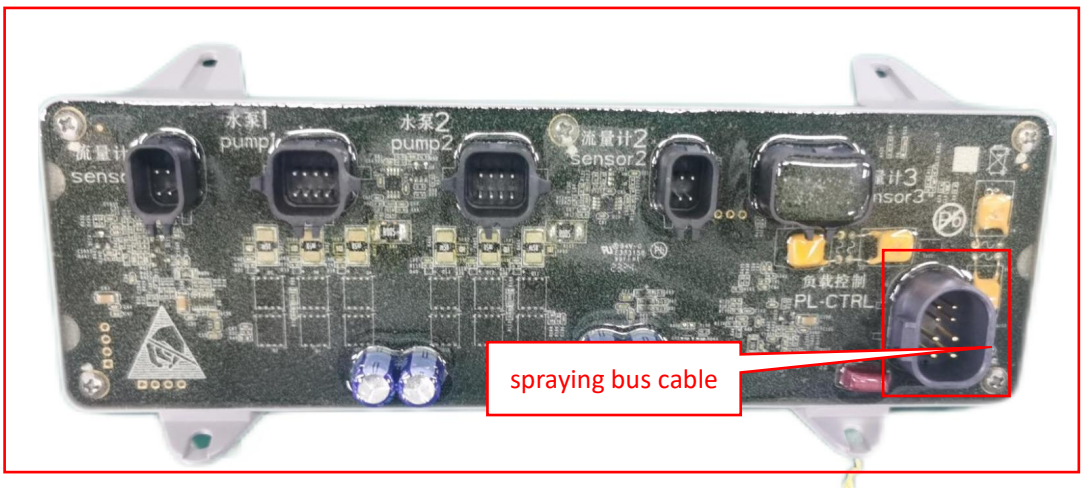
nozzle.



■Fault Description: The remote control reports: "Operation system error – spraying medicine supply system is unrecognized."

■Possible Cause: Connection issues or agrochemical container control board failure.

■Troubleshooting Steps: Reconnect the operation bus and spraying bus cables. Check wiring harness connections to confirm no corrosion, breaks, or damage. If the problem persists, replace the agrochemical container control box.

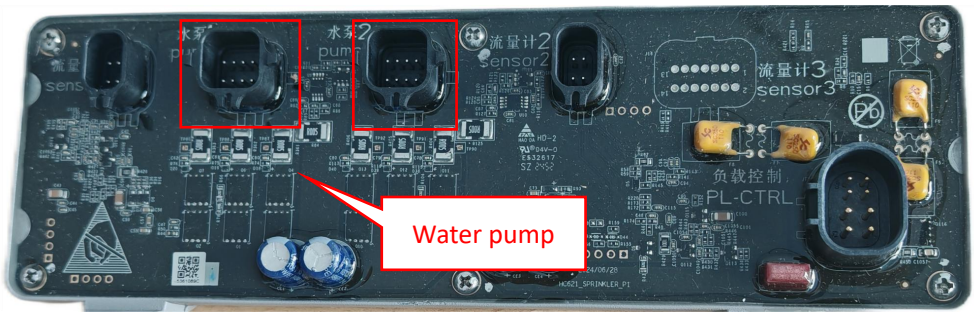


■Fault Description: Water pump does not work and does not vibrate; the

problem persists after replacing with a new water pump.

■Possible Cause: Agrochemical container control box malfunction.

■Troubleshooting Steps: Use a new or known good water pump for testing. If swapping the water pumps between the original and new units shows the same side failing, replace the agrochemical container control box.



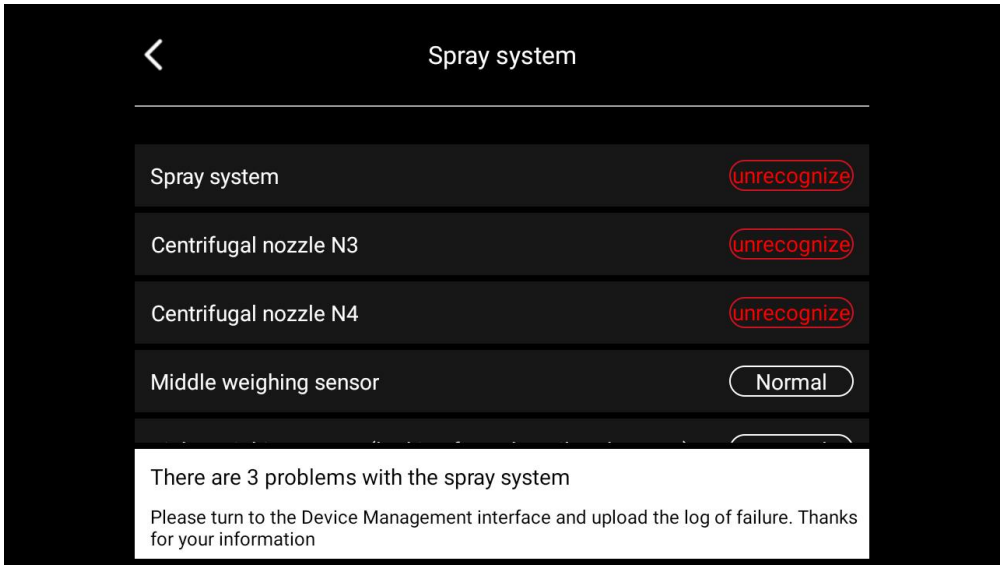
■Fault description: The remote control reports: "Operation system error – Agrochemical supply system bus voltage is low."

■Possible cause: Spraying bus cable connection abnormality or spraying bus cable failure

■Troubleshooting steps: Replace the operation bus cable or spraying bus cable

4.2. Centrifugal Nozzle Abnormal Report

■**Fault description: The remote control reports: "Operation system error – centrifugal nozzle is unrecognized."**



■**Possible cause: Connection issues, agrochemical container control board damage, or centrifugal nozzle damage.**

■**Troubleshooting steps: First confirm the centrifugal nozzle status by connecting a verified working nozzle; if normal, the interface board connector is fine and the nozzle is faulty; otherwise, the agrochemical container control board is faulty.**

■**Fault description: The remote control reports: "Operation system error – centrifugal nozzle bus voltage is too low."**

■**Possible cause: Power supply abnormality.**

■**Troubleshooting steps: First confirm the centrifugal nozzle status by connecting a verified working nozzle; if normal, the interface board connector is fine and the nozzle is faulty; otherwise, the agrochemical**

container control board is faulty.

- **Fault description: The remote control reports: "Operation system error – centrifugal nozzle self-test abnormal."**
- **Possible cause: Connection issues causing poor contact and power driver burnout.**
- **Troubleshooting steps: Replace the centrifugal nozzle; if ineffective, replace the corresponding front and rear interface boards.**

- **Fault description: Centrifugal nozzle boom connection broken (or screw broken).**
- **Possible cause: Structural issue.**
- **Troubleshooting steps: Retrofit the centrifugal nozzle by adding washers below and replacing screws; replace soft connectors at the upper soft connection point.**

4.3. Operation Interface Abnormal Report

- **Fault description: Water pump not working, insufficient flow, or no flow.**
- **Possible cause: Agrochemical impurities accumulated in the impeller flow channel.**
- **Troubleshooting steps: Disassemble the pump and clean the impeller flow channel using a soft brush and clean water.**

4.4. General Abnormality

■Fault description:

Manual spraying functions normally, but the remote control does not display any flow data; after takeoff, the drone reports "low chemical level" and returns automatically. In the real-time operation data, one or both water pumps show no flow. The pump output is intermittent.

The remote control displays: "Flowmeter fault."

Flowmeter calibration fails.

■Possible cause:

The flowmeter is jammed due to viscous agrochemical buildup.

Long-term wear has caused component aging.

The physical properties of the agrochemical (e.g., viscosity, density) differ significantly from those used during calibration.

■Troubleshooting steps:

Remove the flow sensor and clean the turbine blades using clean water and a soft brush.

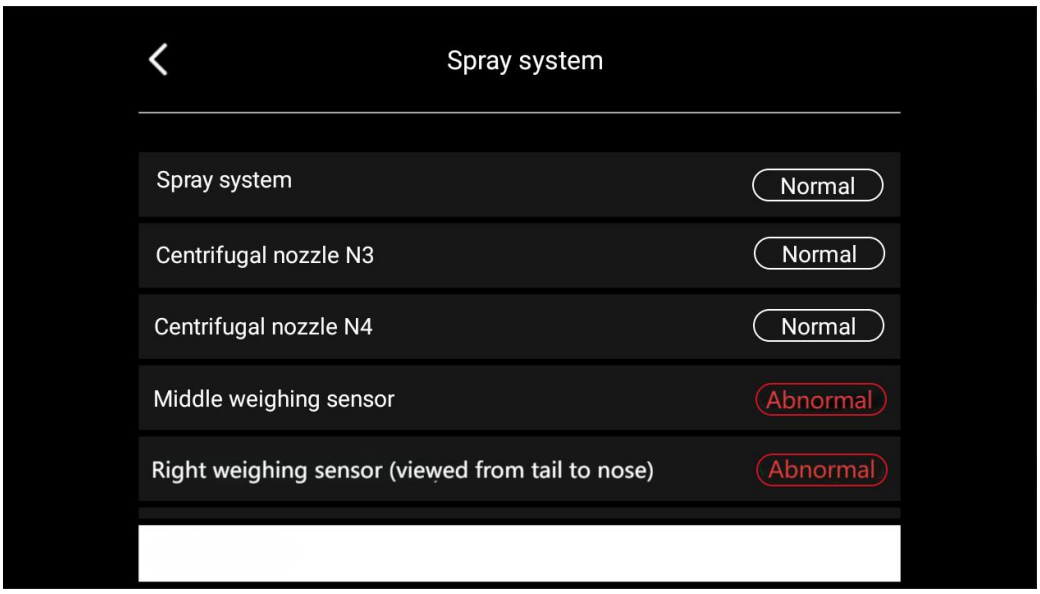
If step 1 is ineffective, replace the flowmeter with a new one.

4.5. Weight Sensor Reports Abnormal Status

■**Fault description: The drone displays: "Operation system fault – weight sensor fault" after powering on.**

■**Possible cause: The weight sensor is damaged due to a high-altitude fall or water ingress.**

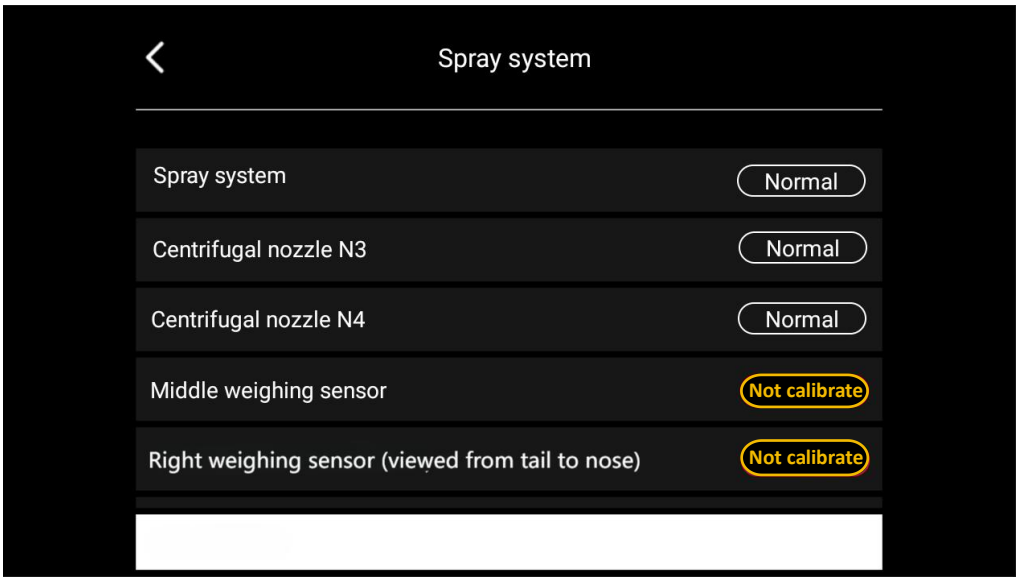
■**Troubleshooting steps: Replace the weight sensor with a new one.**



■**Fault description: Weight not calibrated.**

■**Possible cause: Weight calibration was not performed after switching between the agrochemical container and the fertilizer container.**

■**Troubleshooting steps: Recalibrate using the empty container weight calibration or the full container weight calibration in the operation system interface.**



■**Fault description: Displayed weight does not match the actual amount.**

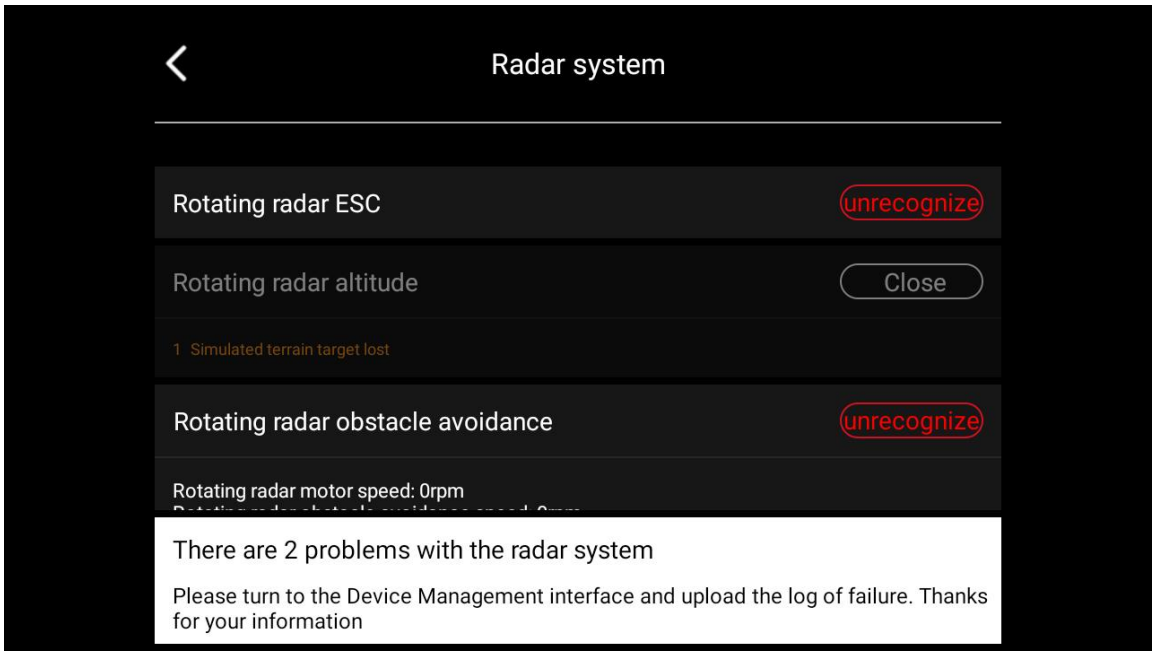
■**Possible cause: Calibration error or weight sensor failure.**

■**Troubleshooting steps: Empty the agrochemical container and perform empty container weight calibration. Then place a 580 battery on top of the container to verify whether the displayed weight is 15 kg. If the weight is correct, no further action is needed; if incorrect, perform full container weight calibration (which requires knowing the exact volume of liquid filled). If the displayed weight is still incorrect after calibration, replace the weight sensors.**

5. Radar System

5.1. Fault Caused by the Radar Unit Itself

■**Fault description: The radar system on the remote control displays an error – rotating radar ESC.**



■**Possible cause: ESC malfunction.**

■**Troubleshooting steps: Replace the radar module.**

■**Fault description: The radar system on the remote control displays an error – rotating radar altitude hold.**

■**Possible cause: Single radar board failure.**

■**Troubleshooting steps: Replace the radar module.**

■**Fault description: The radar system on the remote control displays an error – rotating radar obstacle avoidance, accompanied by abnormal noise during rotation; radar occasionally reports abnormal.**

■**Possible cause: Loose radar mounting cover.**

■**Troubleshooting steps: Replace the radar module.**

5.2. Fault Caused by Software Version

■**Fault description: The drone displays: "Radar system fault – radar has no rotation speed" after powering on.**

■**Possible cause: After replacing the radar module, the drone firmware version is incompatible with the radar version.**

■**Troubleshooting steps: Update to the latest version (ensure the remote control version matches the drone version).**

5.3. Faults Caused by Other Issues

- **Fault description: Radar occasionally malfunctions and reports various abnormalities.**
- **Possible cause: Excessive drone vibration causing connection instability.**
- **Troubleshooting steps: Adjust the consistency of propeller tightness and secure connectors using yellow adhesive.**

- **Fault description: Radar system not recognized, with simultaneous front camera error reported.**
- **Possible cause: Excessive drone vibration causing Ethernet connection instability.**
- **Troubleshooting steps: Check the Ethernet connection along the path: avionics → rear interface board → signal cable → front interface board. Verify the connection reliability throughout this path and secure the connectors with yellow adhesive.**

- **Fault description: Remote control reports: "Radar system fault – rear obstacle avoidance is unrecognized."**
- **Possible cause: Software version mismatch with radar version or rear radar hardware failure.**
- **Troubleshooting steps: Check the drone’s rear radar connection and ensure the firmware versions of the drone and remote control match. Upgrade the software to the latest version. If the rear radar remains unrecognized,**

replace the rear radar module.

6. Rack Module

6.1. Front Interface Board Fault

■**Fault description: After battery power-on, the flight controller power does not turn on (with wiring harness normal).**

■**Possible cause: Power circuit of the front interface board is damaged or power connection cables between the nose and tail are damaged.**

■**Troubleshooting steps: Check the power connection cables between the nose and tail; if normal, replace the front interface board.**

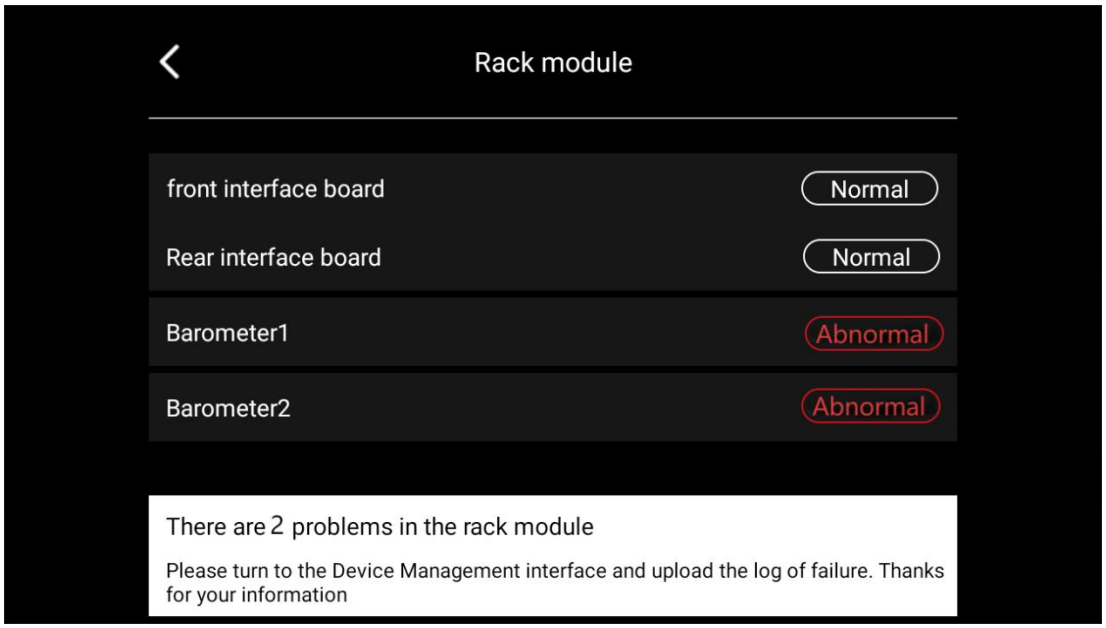
■**Fault description: After the drone is powered on: power system fault (ESCs No. 1 and No. 2); the ESCs emit beeping sounds.**

■**Possible cause: ESC signal connector is damaged (connector pins are broken).**

■**Troubleshooting steps: Replace the front interface board.**

6.2. Barometer Fault

■**Fault description: After the drone is powered on: frame module fault – barometer fault.**



■**Possible cause: Barometer short-circuited due to water ingress (typically occurs when a crashed drone lands in a paddy field).**

■**Troubleshooting steps: Replace the front interface board.**

■**Fault description: PWM throttle signal lost.**

■**Possible cause: PWM from the avionics and front interface board not properly connected; connector pins are broken or the avionics module is damaged.**

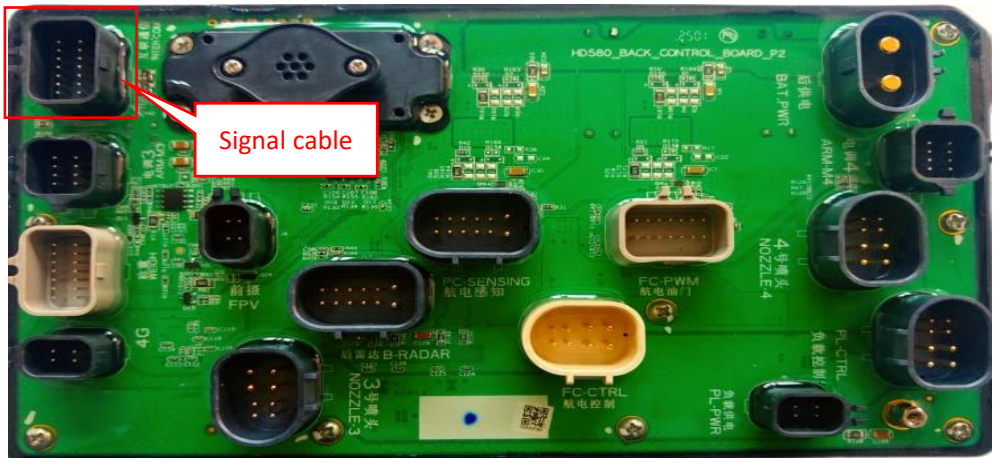
■**Troubleshooting steps: Check the pins of the PWM signal connector and inspect the corresponding throttle pulse.**

6.3. Communication Fault

■**Fault description: Power system fault (ESCs No. 3 and No. 4); both ESCs emit beeping sounds simultaneously.**

■**Possible cause: Fault in the signal cable between the nose and tail or failure of the rear interface board.**

■**Troubleshooting steps: Check the signal connection cable between the nose and tail; if normal, replace the rear interface board.**



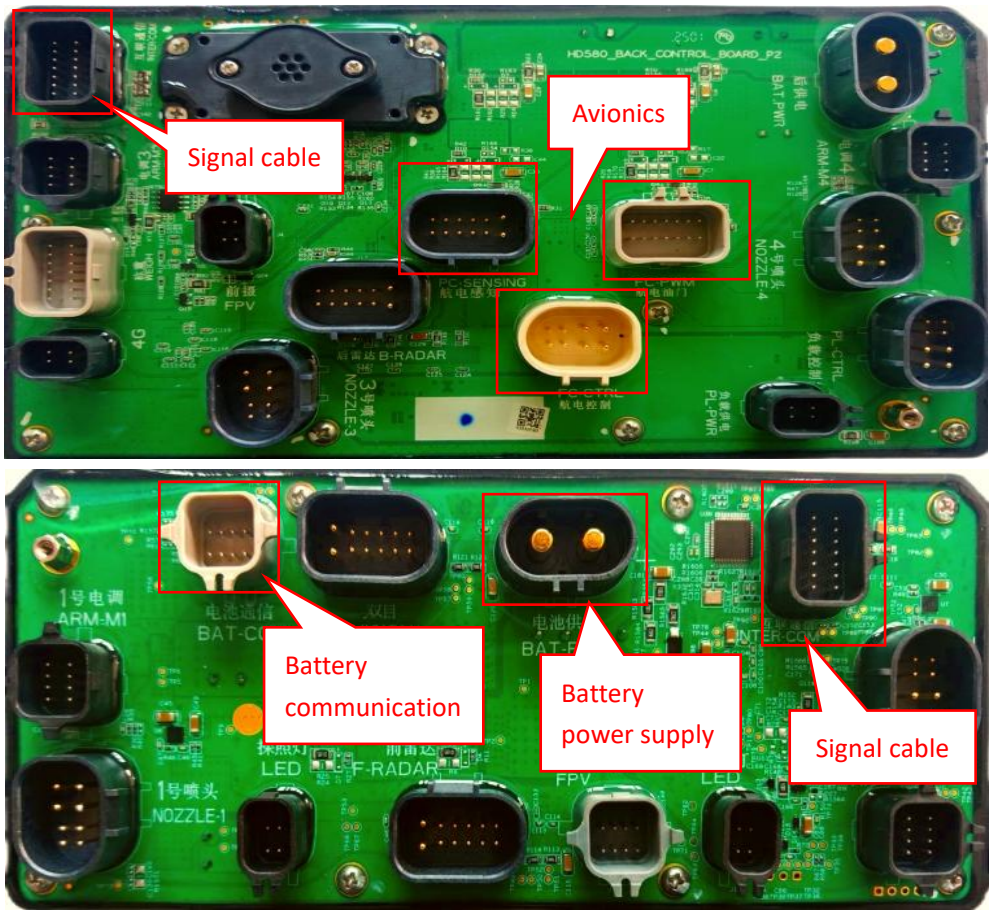
■**Fault description: After the drone is powered on, multiple faults appear simultaneously – visual system fault, radar system fault, etc.**

■**Possible cause: Short circuit in the drone's CAN bus.**

■**排查流程:**

First, remove all external loads from the drone, keeping only the avionics, front and rear interface boards, front and rear signal cables, and power cables. Power on the system. If it powers on normally, reconnect the other components one by one until the shorted device is identified. If the system still fails to power on with only the avionics and interface board connections, troubleshoot step by step following the order: rear interface

board → front interface board → cables → avionics. Once the system can power on normally, proceed with the first troubleshooting step.



■Fault description: After the drone is powered on, Battery 1 indicator: first LED flashes slowly at 30%.

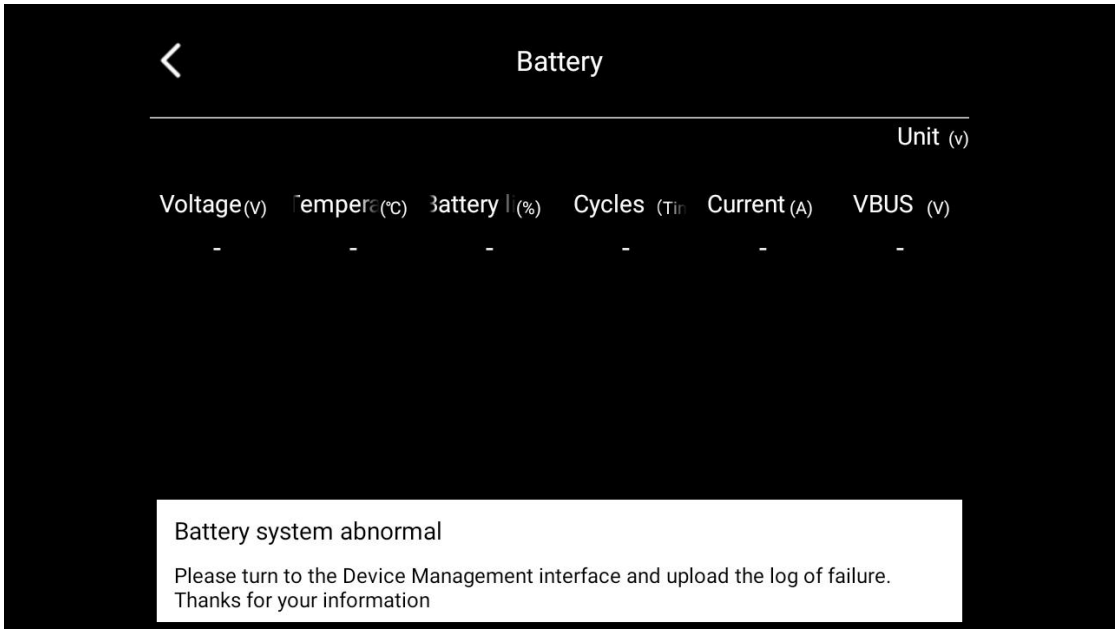
■Possible cause: The battery did not detect a load, or the load detection module is faulty.

■Troubleshooting steps:

Check whether the battery signal cable is properly connected. Try powering on with Battery 2. If the issue is resolved, replace the top cover of Battery 1. If the issue persists, check the signal cable connection of the power distribution board. If the power distribution board signal cable is properly connected, replace the power distribution board module.

7. Energy System

7.1. Battery Fault



- **Fault description: Remote control reports: "Energy system fault – battery cells not detected."**
- **Troubleshooting steps: Replace the battery and test again. If the issue persists, replace the power distribution board.**
- **Troubleshooting steps: Replace the battery and test again. If the issue persists, replace the power distribution board.**

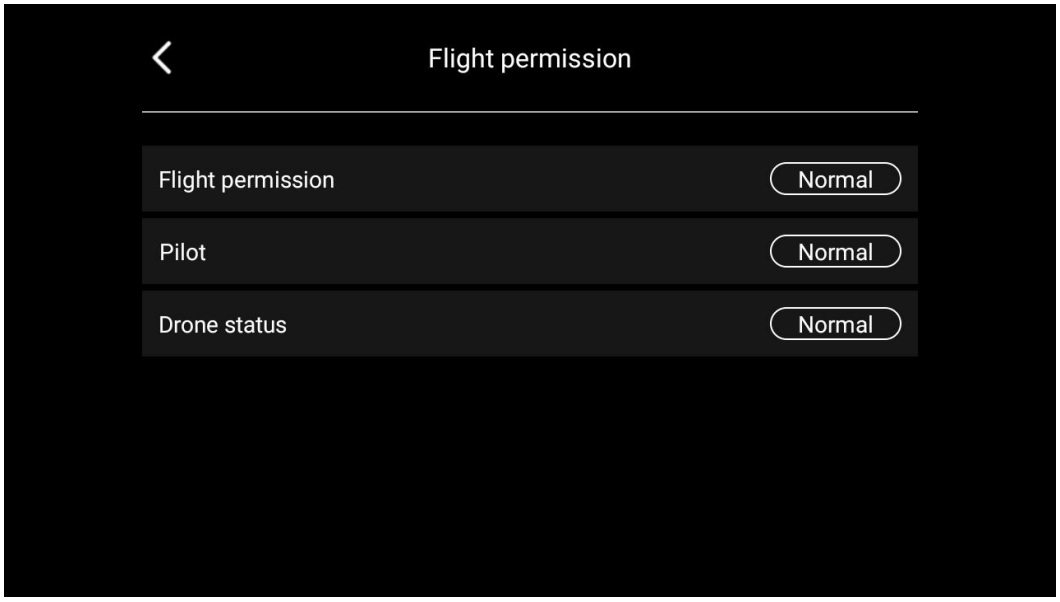
- **Fault description: Remote control reports: "Energy system fault – abnormal cell voltage difference, please land immediately."**
- **Possible cause: Large voltage difference detected among battery cells**
- **Troubleshooting steps: Upload battery logs and await engineer analysis.**

■**Fault description: The battery experiences voltage fluctuations during charging or discharging (voltage jumps from low to high during charging, or high to low when mounted on the drone).**

■**Possible cause: Large voltage difference among battery cells.**

■**Troubleshooting steps: Upload battery logs and wait for engineer analysis.**

8. Flight Permission



8.1. Flight Permission

■**Fault description: Remote controller reports: "Flight permission abnormal."**

■**故 Possible cause: Remote controller logged in with an account other than the drone owner; unlocking is prohibited.**

■**Troubleshooting steps: Authorize this account in the Huida Agricultural Service App under the Control Permission section.**

8.2. Pilot

- **Fault description: Remote controller reports: "Pilot abnormal."**
- **Possible cause: Pilot has not undergone official Huida training or has not been approved.**
- **Troubleshooting steps: Contact the dealer or Huida technical support for training and approval.**

8.3. Drone Status

- **Fault description: Remote controller reports: "Drone status abnormal."**
- **Possible cause: The drone cannot be unlocked in the current area (no-fly zone or outside the dealer’ s authorized operating region).**
- **Troubleshooting steps: Submit required documents for unlocking or contact Huida technical support to add the drone’ s trial flight area.**