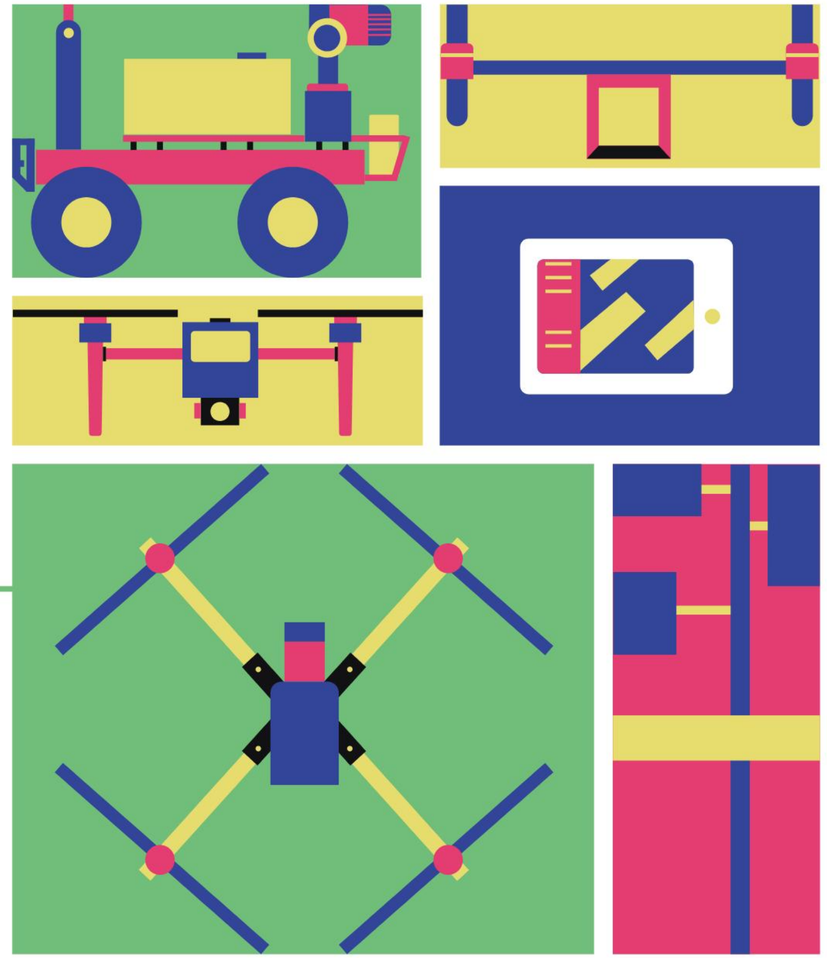
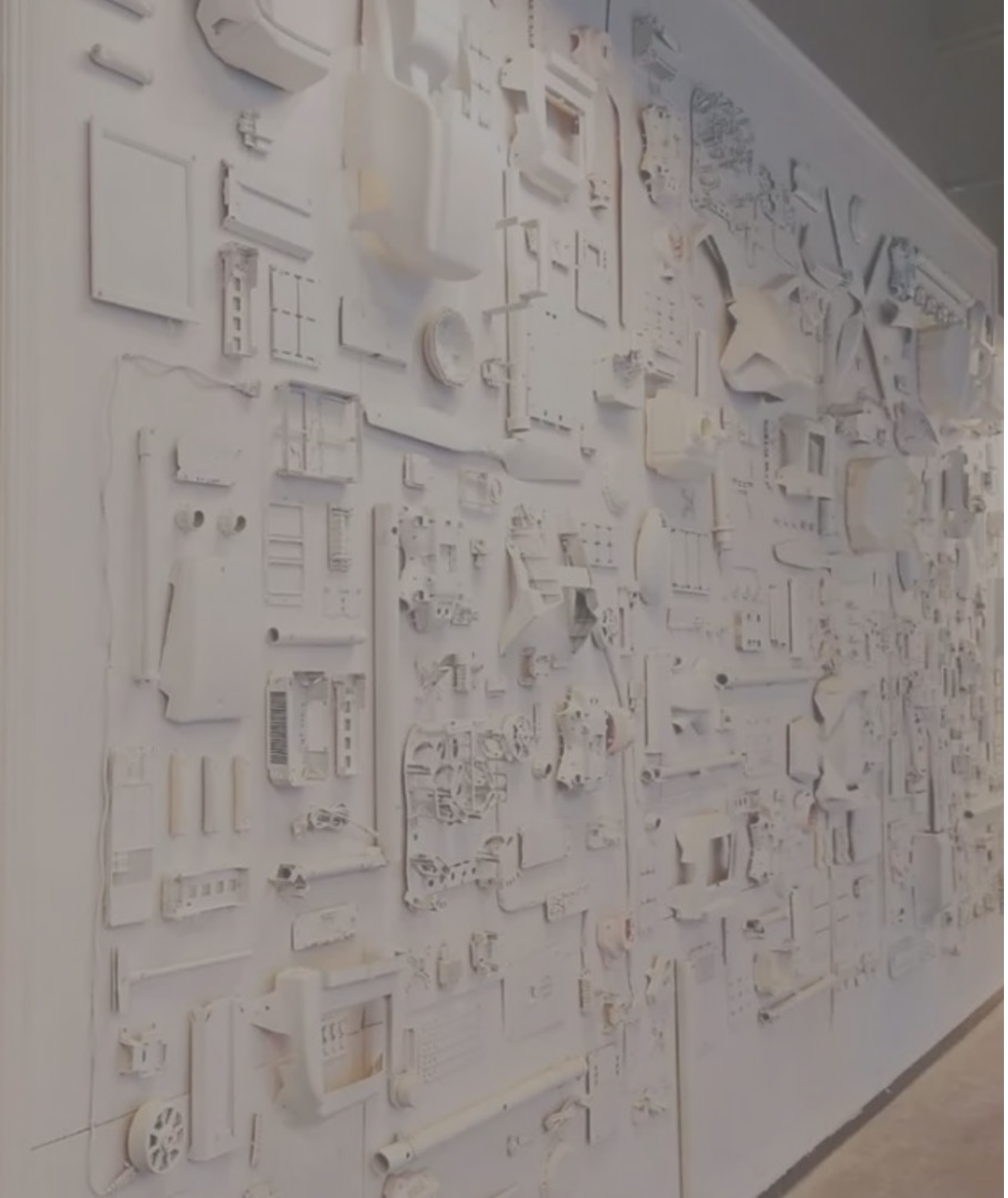
XAG ACADEMY
GLOBAL TRAINING
PROGRAM

XAG

Case Studies in Troubleshooting





01 | Submodule Offline Troubleshooting

02 | Calibration Process of the Arm Angle

03 | Sensor System Offline Troubleshooting

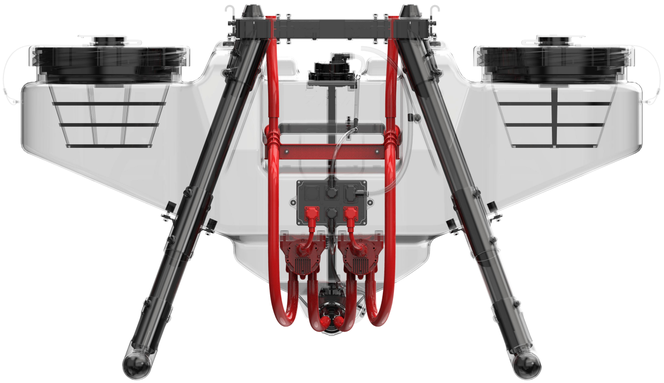
04 | RevoSpray Issues Troubleshooting

01 Submodule Offline Troubleshooting

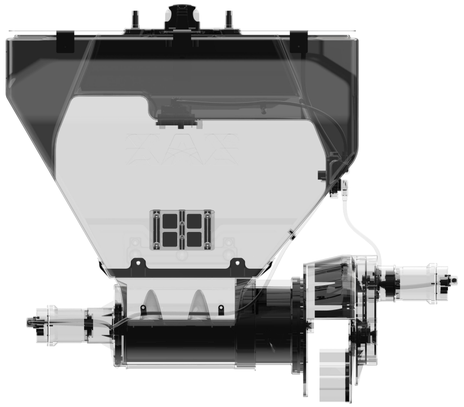
Introduction

The drone is based on the complete combination of execusion system (spraying system\spreading system) submodules to identify the current execution system. If part of the module is offline due to short circuit, drive anomaly, disconnect and other reasons, or the submodule is not matched due to loading errors, it will lead to incomplete identification of the submodule.

At this time, the device cannot locate which submodule is abnormal. Even can not normally identify what execution system is currently installed, need to solve the submodule anomaly to restore normal recognition.



spraying system



spreading system

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Troubleshooting guidelines

Anomaly Condition 1:

Error displayed on APP interface:"No application system detected".
Error description: Because most of the molecular modules in the execution system are abnormal, the device cannot identify the current execution system according to the combination of submodules.

*Scope of application:Device (24 drones) APP version (5.3.17 or above)

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Troubleshooting guidelines

Step 1:tap the drone avatar on the main page of the APP to enter the device details page. Select the execution system and tap "No execution system installed".

Step 2:Select the execution system of the current device, for example, the execution system of the current drone is "RevoSpray-4 sprayer".

*Scope of application:Device (24 drones) APP version (5.3.17 or above)

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Troubleshooting guidelines

Step 3:The Check Submodules page is displayed. You can view the information+status of all submodules of the selected execution system.

Step 4:tap the list of submodules with abnormal status and solve the abnormal problem of submodules according to the troubleshooting guide.

*Scope of application:Device (24 drones) APP version (5.3.17 or above)

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Note:

The submodule information list includes: Submodule Name (Submodule Identification Code) + Submodule Status

- **Submodule Name:** Contains sequential information of the submodule, corresponding to the physical location in the schematic diagram
- **Submodule Identification Code:** Identifies the submodule type to verify compatibility with the current interface
- **Normal:** Submodule is recognized correctly
- **Offline:** Submodule is not detected
- **Mismatched Submodule:** Incorrect submodule is connected to the interface, or the factory identification code is recorded incorrectly

*Scope of application:Device (24 drones) APP version (5.3.17 or above)

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Troubleshooting guidelines

Anomaly Condition 2:

Error displayed on APP interface: "Task System Submodule Mismatch"
Error description: Partial submodules in the execution system are abnormal. The device can still determine the execution system type through the combination of normal submodules, but it cannot pinpoint which specific submodule is malfunctioning.

*Scope of application:Device (24 drones) APP version (5.3.17 or above)

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Troubleshooting guidelines

Step 1: On the App home page, tap the drone avatar to enter the device details page. Select the execution system and tap "Troubleshoot".

Step 2: After automatically entering the "Troubleshoot Submodule Anomalies" interface, you can view the information and status of all submodules in the selected actuation system.

*Scope of application:Device (24 drones) APP version (5.3.17 or above)

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Troubleshooting guidelines

Step 3:Tap the submodule list with abnormal status, and resolve submodule anomalies by following the troubleshooting guide.

*Scope of application:Device (24 drones) APP version (5.3.17 or above)

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Abnormal Condition 3:

In addition to general connection issues, three specific scenarios are currently known to cause the "No execution System Detected" phenomenon:

- Nozzle circuit short
- Nozzle ESC malfunction (rare occurrence)
- Flight controller CAN termination resistor fault (may occur post-crash scenarios)

*Scope of application:Device (24 drones) APP version (5.3.17 or above)

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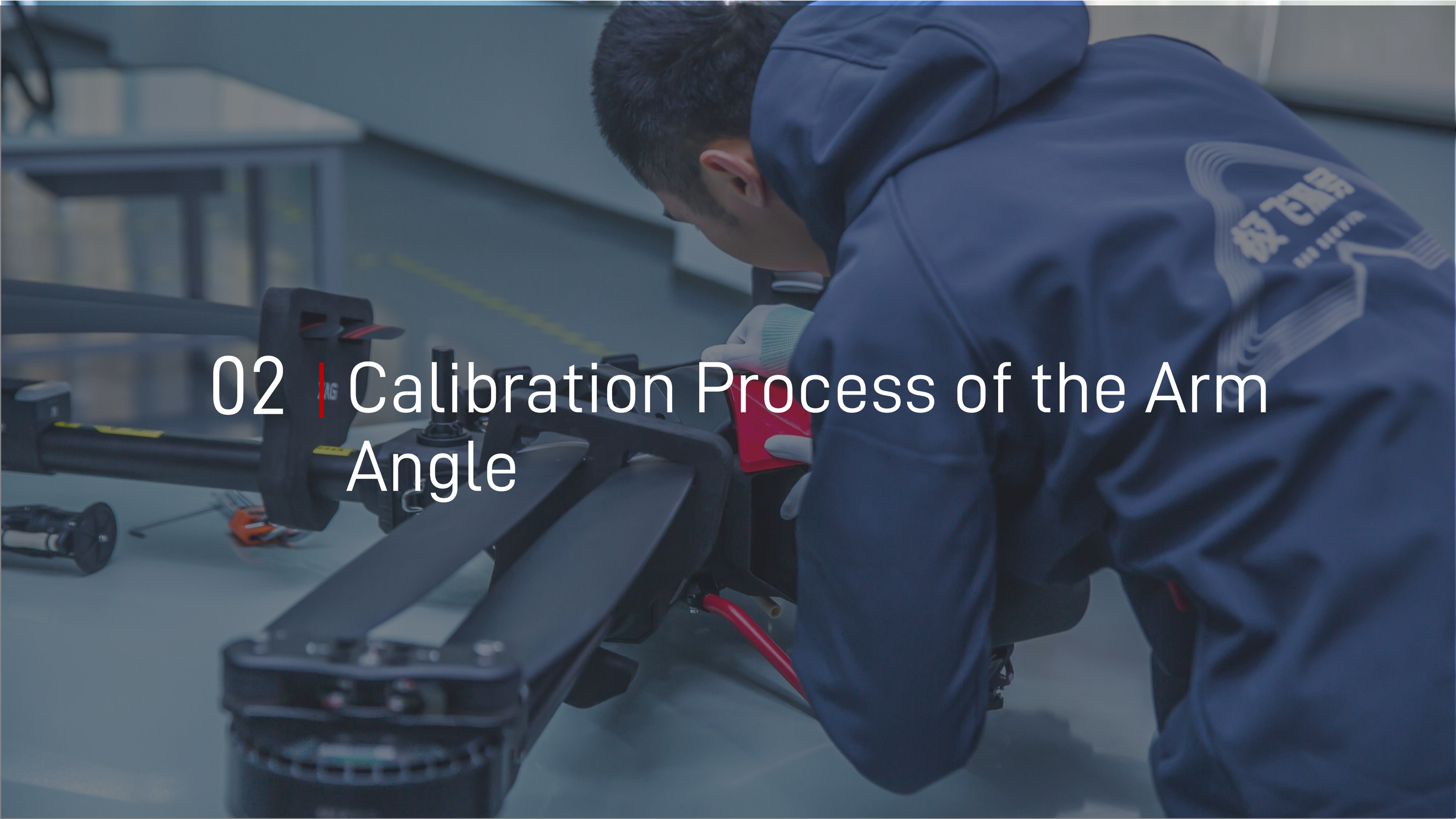

02 Calibration Process of the Arm Angle

Introduction

For the P series agricultural drones, angle calibration is required during the process of replacing the drone arms. Failure to operate in accordance with this procedure may result in the maintenance effect failing to meet expectations or the emergence of secondary risks.

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Classification

P series agricultural Drone

Maintenance tool

Digital pitchometer

Mobile operating systems

Android/HarmonyOS

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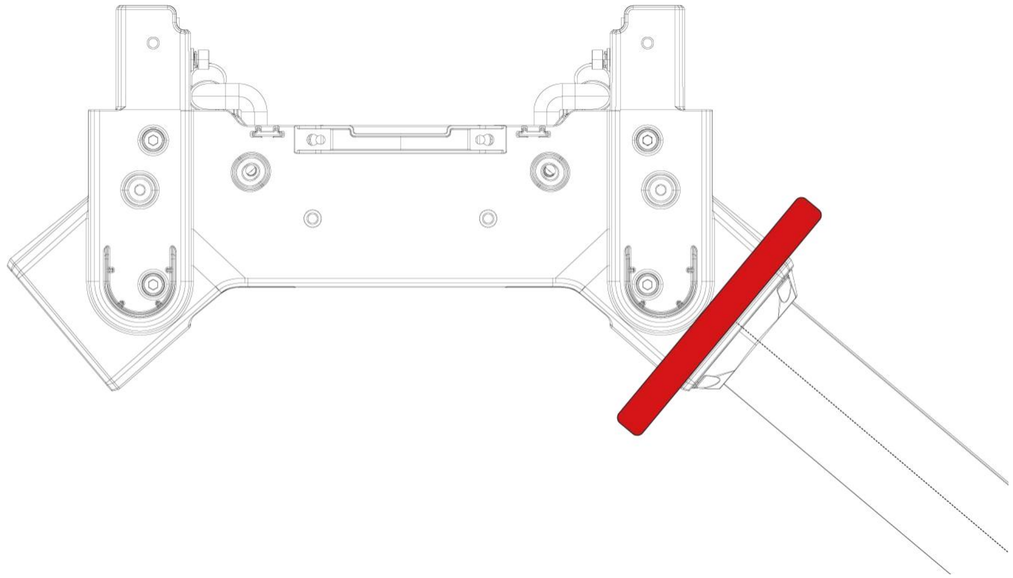
Arm Measurement and Replacement Procedure

I. Measurement Steps for the Fuselage and Drone Arms

Overall Inspection

Fuselage side

Turn on the digital pitchometer, invert it and place it horizontally so that it is perpendicular to the side beam. Ensure that the angle of the screen is perpendicular to the direction of the drone arm, and then record the current angle value(α).



Placement position at the fuselage side

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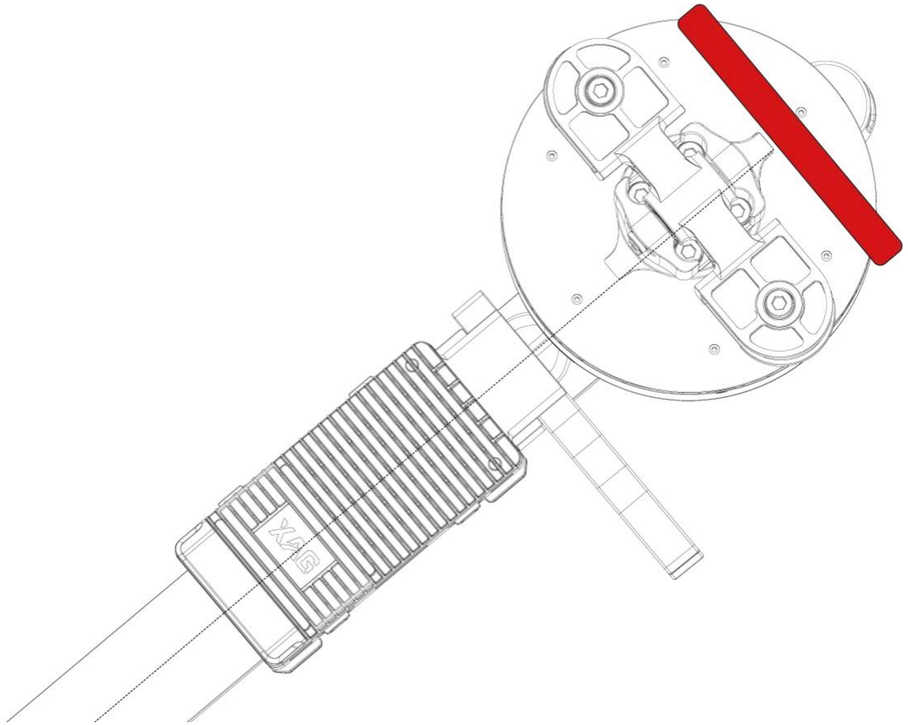
Arm Measurement and Replacement Procedure

Motor side

Invert the digital pitchometer and place it vertically on the upper surface of the motor. Make sure that the angle of the screen is perpendicular to the direction of the drone arm, and thenrecord the current angle value (β).



Placement position at the motor side

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Arm Measurement and Replacement Procedure

II. Methods for Verifying the Angle Difference

Subtract the angle at the root position of the drone arm on the main frame from the angle at the motor position to obtain the result of the angle difference.

Calculation formula

$\Delta\theta = |\alpha - \beta|$

α: Main frame arm root position angle

β: Motor position angle

Δθ: Angle difference

α	β	Δθ	Qualification Status
10	10	0	Y
0	0.6	0.6	N
0.5	-0.5	1	N
0.1	0.5	0.4	Y

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Cautions(Important)

1. The angle difference shall not be greater than 0.5°. When it is greater than 0.5°, a secondary measurement is required to check the structural conditions of the motor and the drone arm.
2. For the secondary measurement, it is necessary to check the angle difference between the folded part of the drone arm, the fuselage, and the motor end, and replace the parts with a relatively large angle difference.
3. After the replacement is completed, the overall angle difference needs to be re-measured, and adjustments should be made in a timely manner until the measured data does not exceed 0.5° .

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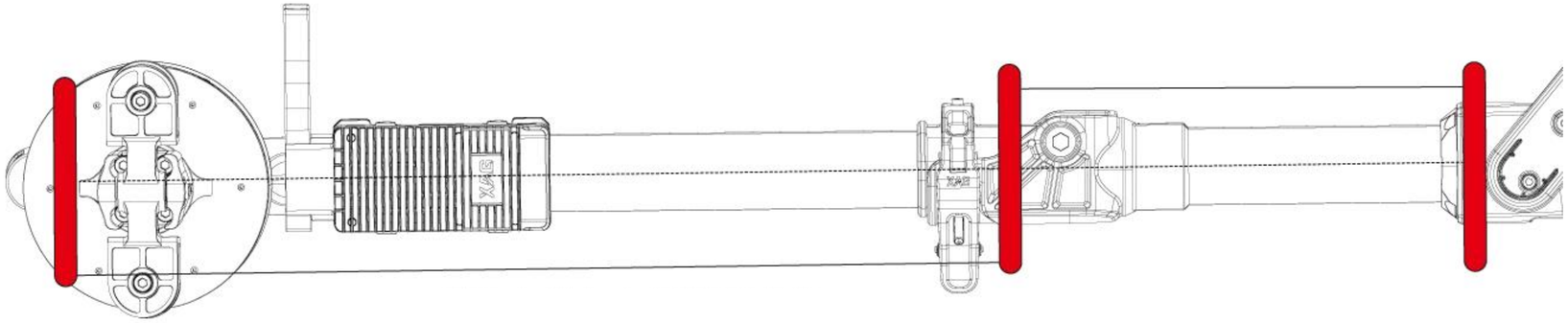
Cautions

Verify angle difference between middle section and fuselage



Verify angle difference between middle section and motor end

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Assembly Requirements for the Drone Arm at the Fuselage End:

1. Location of Key Measurement and Control Point: The fixing bolt of the drone arm
2. Tool for Key Measurement and Control Point: Torque wrench
3. Torque at Key Measurement and Control Point: 29-31Kgf.cm

III. Hovering Inspection

After confirming that the angle of the drone arm is correct and the installation is completed, run an outdoor test to confirm that the equipment is operating normally.

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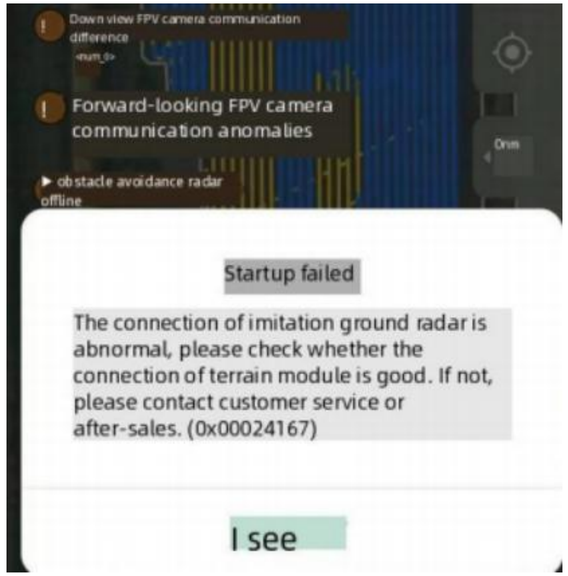
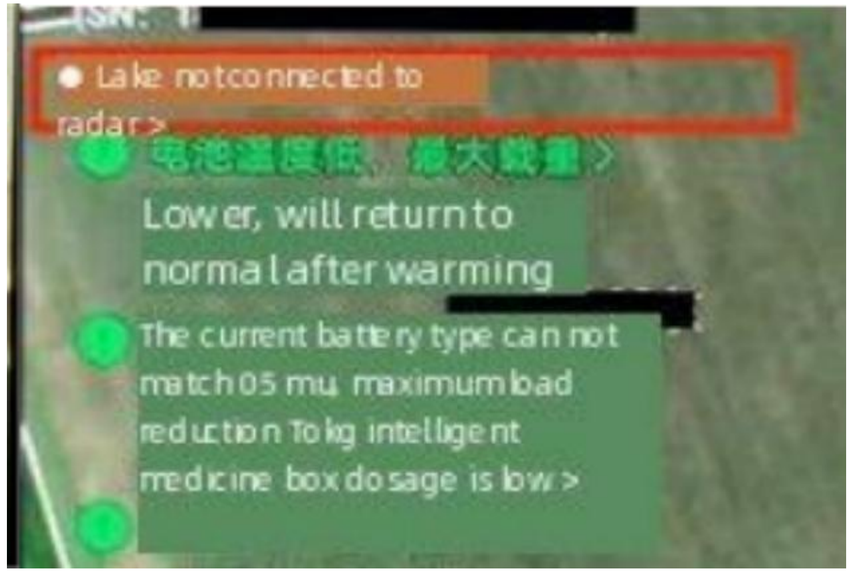
03 | Sensor System Offline Troubleshooting

Error messages such as "Radar Not Connected" or "Sensor System Offline" often indicate poor contact due to worn module circuits or connectors. Technically verified, applying grease is an effective solution. Please follow the guide below.





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Preparation Work

***Connector Grease, Model YAMATE G-650**

***Hko needle: 18G recommended (ID/OD: 1.0/1.3 mm)**

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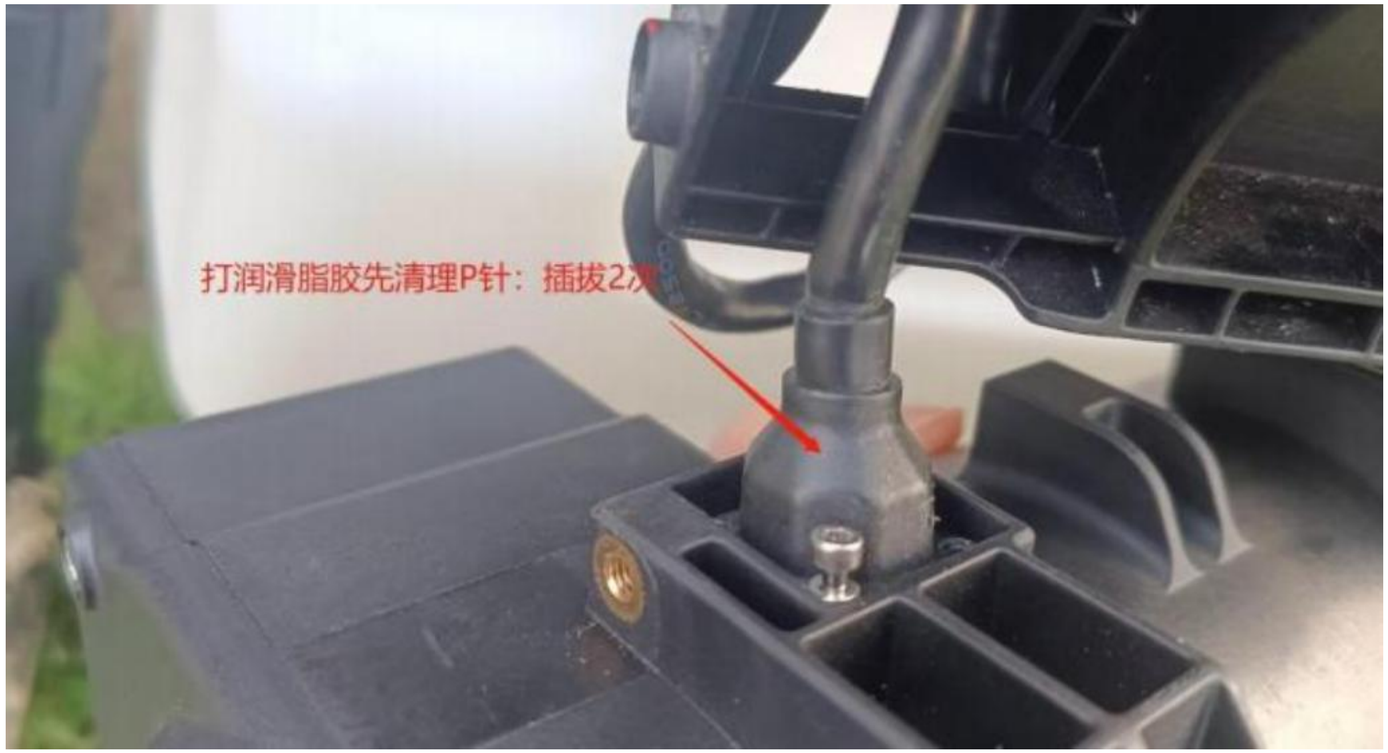
Operation Steps

1. Clean connector pins (plug and unplug 2 times)



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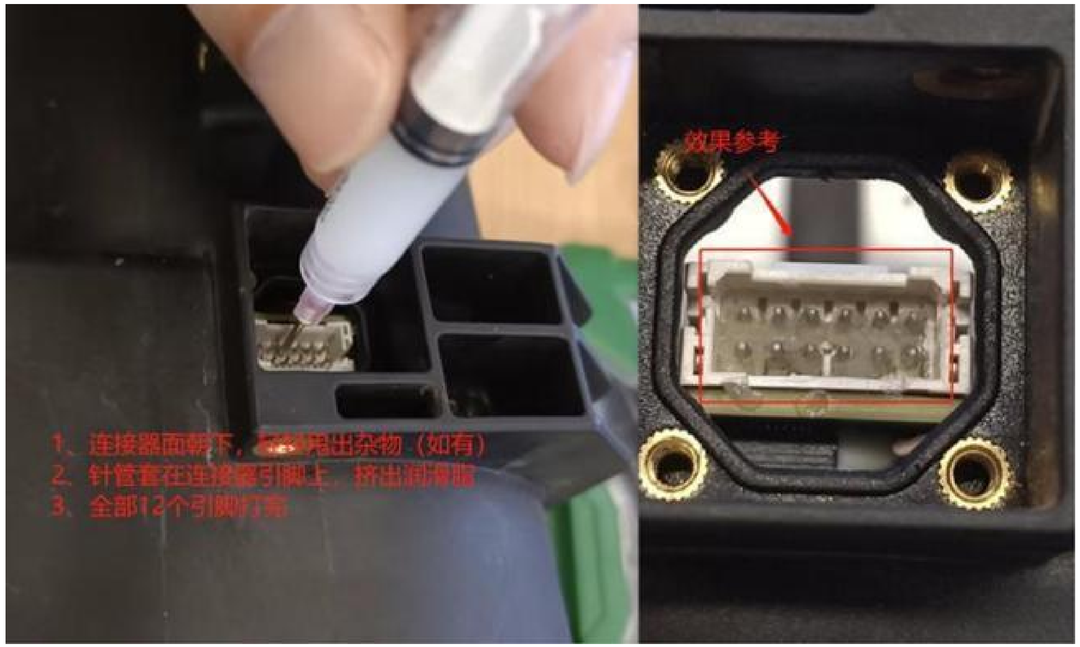
Operation Steps

2. Plate end connectors greased
2.1. With the connector face down, gently throw out the debris (if any)
2.2. Sleeve the needle tube on the connector pin and extrude the grease
2.3. All 12 pins are punched, please refer to the picture on the right for the effect



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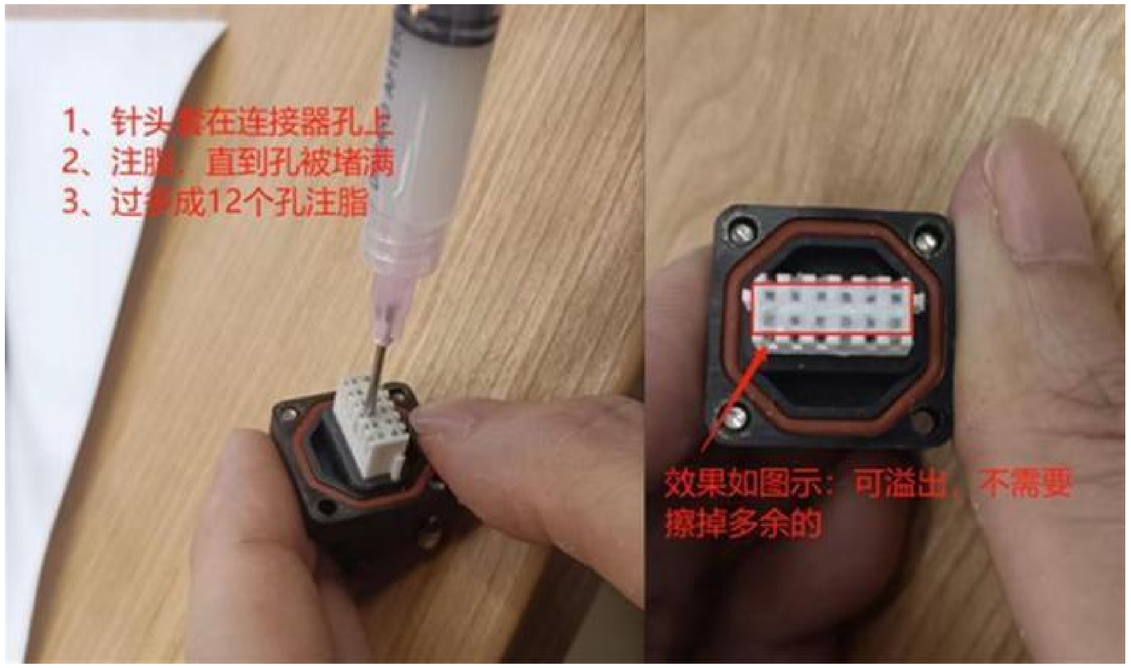
Operation Steps

3. Grease the wire board connector
3.1. The needle is put on the connector hole
3.2. Inject grease until the hole is filled
3.3. If you have too much grease is injected into 12 holes. The effect is as shown in the picture on the right. It can overflow and there is no need to wipe off the excess



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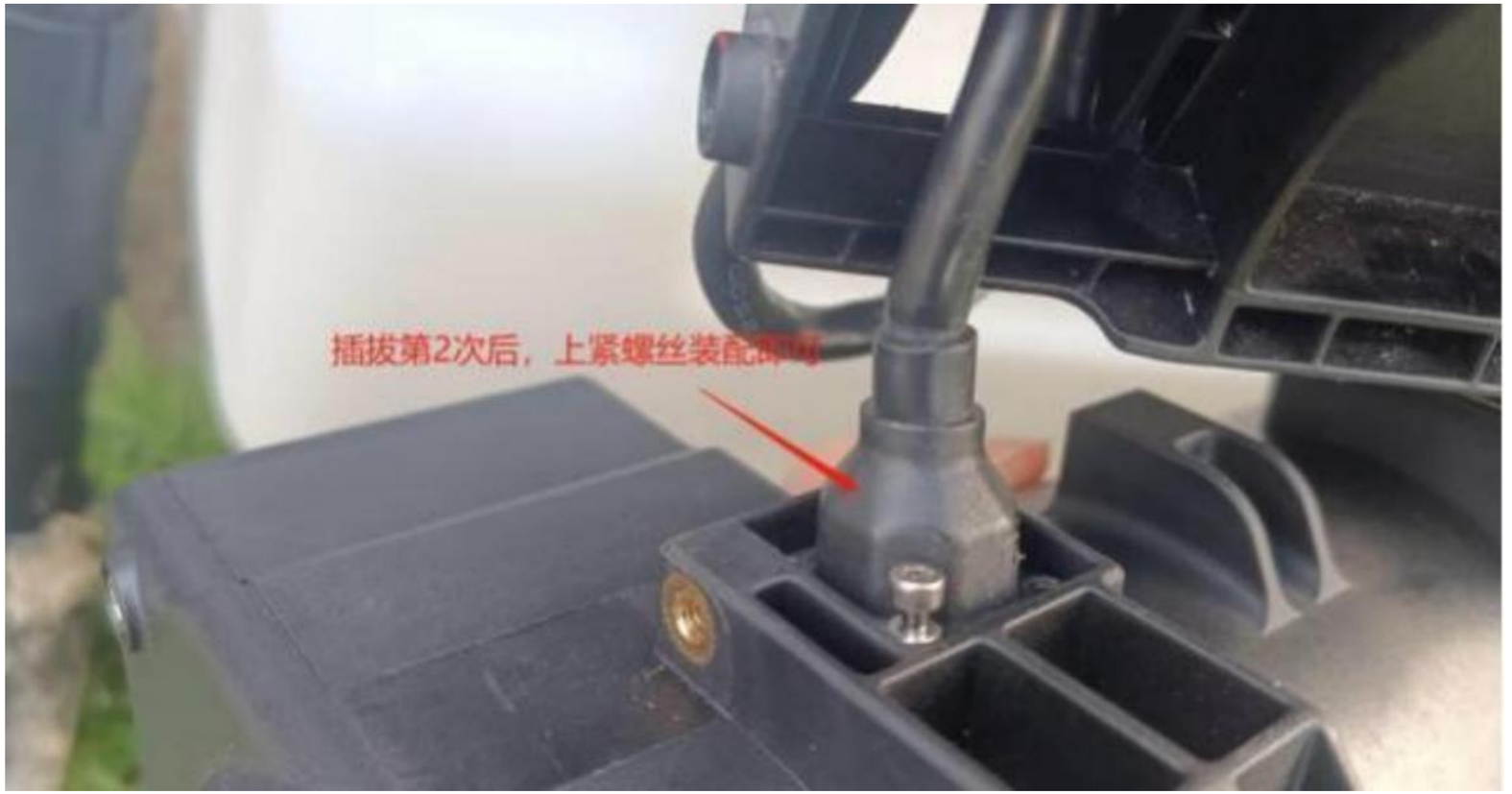
Operation Steps

4. Assembly line (locking after plugging and unplugging 2nd time)



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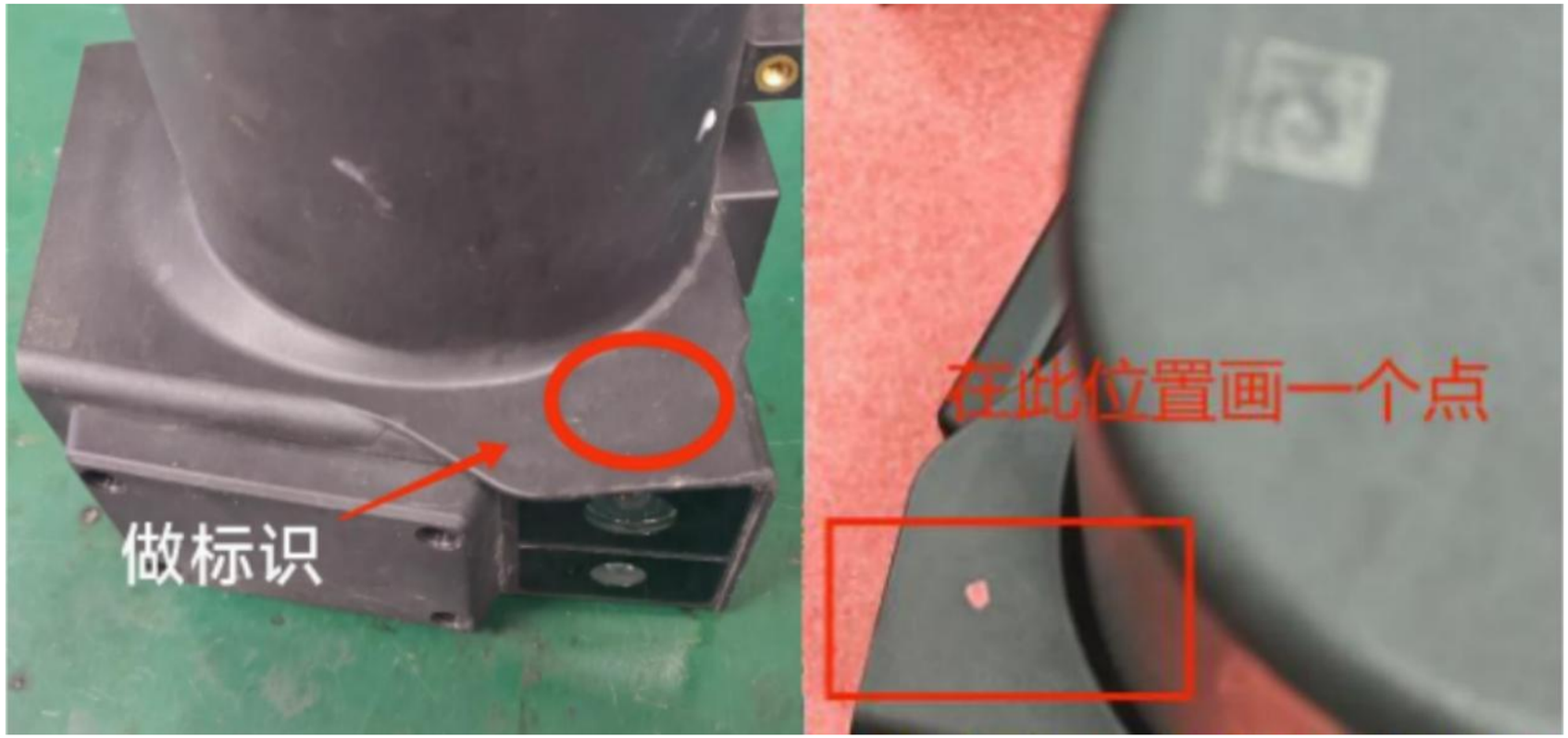
Operation Steps

5. After the processing is completed, mark the position shown in the picture with a red marker (as shown in the right figure)



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04 | RevoSpray Issues Troubleshooting

4.1. Spraying Amount Data Inaccurate

***The actual spraying amount of the drone is significantly different from the spraying amount set in the APP, with a spraying amount error of over 12%.**

*** The XAG ONE App shows "Abnormal spraying system parameters, which may affect the accuracy of spraying control".**

***During the manual testing process, the nozzle does not spray water or spray less water.**

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Inspection before calibration:

1) Confirm that the firmware of payload system and the spraying system have been upgraded to the latest version.

2) Please confirm if the reading of the liquid level sensor is accurate. Add 20L of water to the liquid tank and check if the liquid level displayed on the APP is within ± 5% of 20L. At the same time, it is necessary to confirm the deviation of the liquid tank scale. (Due to potential scale marking deviations caused by transportation-induced deformations, please manually measure 20L of water and check if the APP display is accurate, do not rely solely on tank markings).

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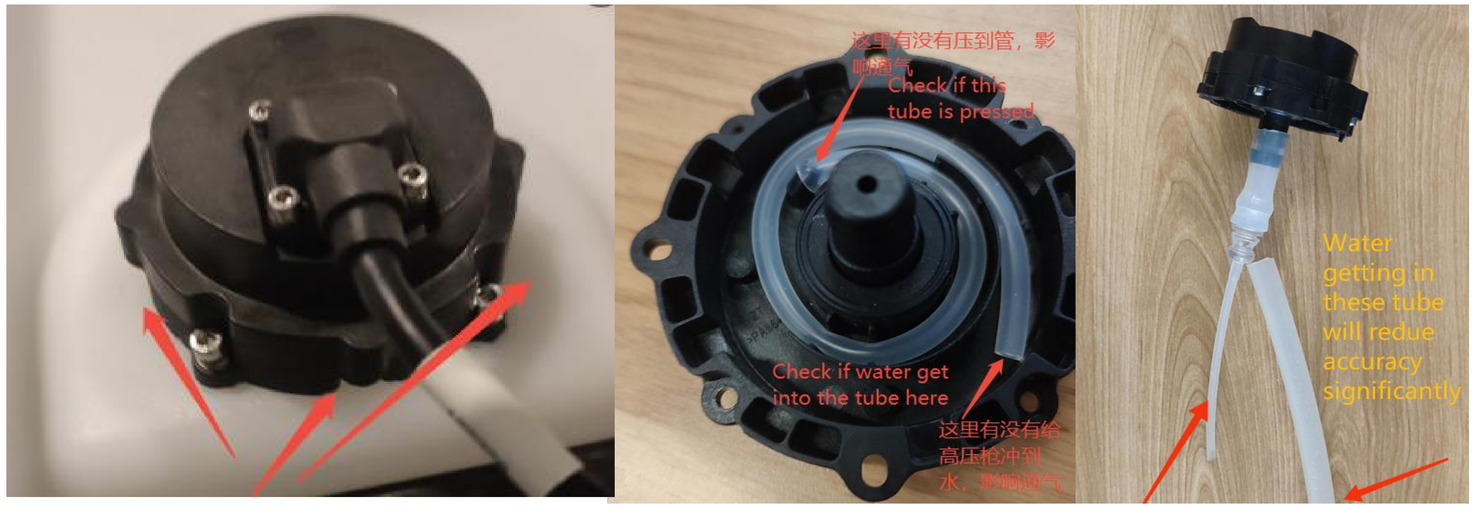
Attention: If there is a significant deviation, please handle it according to the following methods:

① Check whether the remaining liquid level displayed on the APP is correct, including if the level show 0L when empty. If the reading is incorrect, proceed with the following troubleshooting steps.



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3)Before calibration, it is necessary to check whether the pipeline is flattened, especially the folding arm and the connection between water pump and liquid tank, prevent affecting the liquid flow rate.

4)Check if the filter at the outlet of the liquid tank is blocked by foreign objects to avoid affecting the liquid flow rate.

5)When calibrating, the drone should be placed on a horizontal surface and adjusted according to the requirements to avoid deviation that affects the calibration accuracy.

6)Check if the selected liquid tank volume is correct, and select the correct liquid tank volume in the app.

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7)Check whether the impeller of the pump are faulty or if installation errors are causing uneven liquid output.

Normal impeller

Corrosion or broken impeller or severe wear

(Impeller higher than cavity)

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8)If four nozzles are installed, they need to be re-calibrated. (The calibration values of 4 nozzles are not compatible with those of 2 nozzles, and need to be re-calibrated after installation)

9)It is prohibited to disassemble water pipes for calibration, the connection status of the water pipes during operation and calibration must be consistent.

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4.2. How to deal with the problem that the sprinkler impeller pump does not discharge water or the water output is too low?

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Countermeasures:

This usually happens with following conditions:
1. New drones that were never used before.
2. Drone after long time stroage.
3. User performed a drainage operation on the ground when the tank was completely drained. Once the tank is empty, the impeller can only pump air. Air is too light, resulting in insufficient centrifugal force and failure to form suction, which causes the pump to run dry without pumping water during low-flow operations.

Improvement measures: To ensure that the pump body and pipeline are filled with water and avoid abnormal water discharge caused by residual air, the following two pipeline filling methods are recommended.

Method 1: Clear water pipeline filling method
Steps: Inject at least 5L of clear water into the pump body and pipeline, and use the high-flow mode to fill water quickly. Observe the water outlet of the sprinkler. Stop filling the pipeline after both pump heads discharge water normally, and then normal dosing operations can be carried out.

Method 2: Medicine liquid pipeline filling method
Steps: Directly use the medicine liquid to fill the pipeline at high flow rate, and stop immediately after the sprinkler discharges the liquid. A container can be placed under the sprinkler to catch the medicine liquid to avoid waste (For high-cost medicines)

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Note:
Since each impeller pump undergoes factory testing where the motor rotation direction is set to a single direction, but after actual assembly, the rotation directions of the left and right impeller pump motors are opposite, this causes the impeller of one side's pump to be in a reverse rotation state. When adjusting the rubber impeller of the pump from reverse to forward rotation, it is necessary to overcome the frictional resistance between the impeller and the inner wall of the pump cavity. If the motor speed (pump flow rate) is low, it cannot overcome this frictional resistance, resulting in abnormal water output, reduced water volume, or no water discharge from the pump.

Handling method: When conducting the first spray test on a new machine, use the "XAG ONE" App, open the manual spray test in the spray system interface, adjust the pump flow rate to the maximum, wait for the pump impeller to rotate smoothly, and check if the flow rate is normal. Complete the spray calibration after the fault is resolved.

If the liquid temperature is too low (below 10°C or even lower) and the pump fails to draw water, it may be because a highly corrosion-resistant impeller is used instead of the gray impeller with low-temperature characteristics.

Handling method: Replace with an impeller with low-temperature characteristics, recalibrate, and then use the pump.

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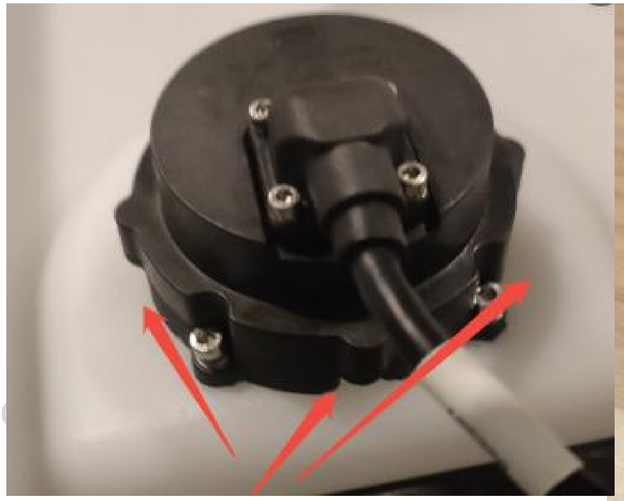
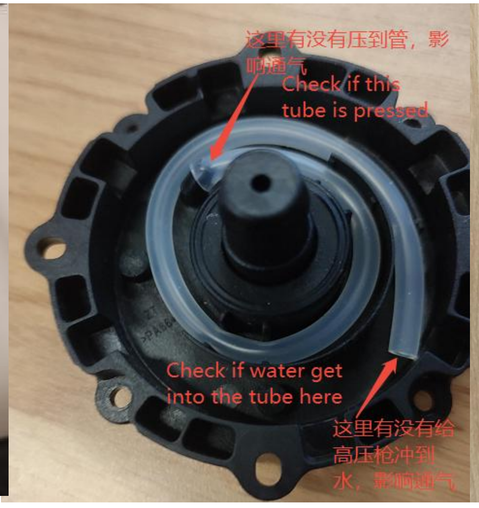
4.3. What do the light signals of the liquid level sensor mean?

First step: Empty the liquid in the liquidtank and check the status of the indicator light.

① Green light flashing (1 flash per second): Indicates the liquid level sensor is working normally. However, if the APP displays a value other than 0L or less than 1L, it means the positive value is too high, and the capillary tube needs to be disassembled for further inspection.
② Red light flashing (1 flash per second): Indicates the negative value of the liquid level sensor is too high, likely due to water in the capillary tube that needs to be dried.
③ Green light always on: Indicates abnormal communication of the liquid level sensor. Check or replace the air pressure PCBA board.
④ Red light always on: Indicates abnormal CAN communication. Check the connection wires between the spraying junction box and the liquid level sensor, as well as between the headstock junction board and the spraying junction box for looseness or damage.
⑤ Light off: Indicates abnormal powe supply. Check the power supply circuit.





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4.4. After filling the liquid, the "XAG ONE" App shows "OL" or there is a significant discrepancy with the actual amount of liquid. How to handle this?

Analysis of the cause:
It may be that there is water around the liquid level gauge, or the internal capillary tube has water rushed into it by a high-pressure gun, which affects air permeability and thus the detection.
It can be handled through the following steps:

① Empty the liquid in the liquidtank and check the status of the indicator light.

② A red light flashing once per second indicates that the negative value of the barometer is too high, which may be caused by water around it. In this case, you need to wipe off the water around the liquid level gauge. If this doesn't work, remove the liquid level gauge from the liquidtank, check if there is water in the internal capillary tube, and shake off or blow dry the water. Alternatively, if the internal capillary tube is kinked at the bend, which affects ventilation, straighten it out.

③ Reinstall the liquid level sensor in its original position when the tank is empty.

④ Turn on the equipment, add an appropriate amount of liquid, and check if the remaining amount of liquidin the tank displayed on the App is normal.

Caution:Do not spread on the liquid level sensor with high pressure water jets, water entering the level reader will cause inaccurate readings.

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4.5. What is the function of the capillary tube on the liquid level sensor?

Answer: It prevents liquid from entering the PCB board while allowing air to enter the liquid level sensor normally, ensuring the module operates properly.

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4.6. How to distinguish and use the two types of impellers?

① Low-temperature characteristic impeller, light gray, suitable for use when the ambient temperature is below 15°C;

--Usage tips: This type of impeller is not as resistant to chemicals. If it is a newly replaced impeller, during calibration, you can unplug the pipe connected to the machine body for calibration. Alternatively, after the impeller has been operated for 3.3 hectare or 3 shifts, when the impeller has swollen to a certain extent, perform secondary calibration, which will be more accurate.

② Strong chemical-resistant impeller, black, with high chemical and corrosion resistance, suitable for use when the ambient temperature is above 15°C.

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4.7. The APP reports a fault "Abnormal water pump status". What's the reason and how to handle it?

When the water pump reports "Abnormal water pump status" (displayed in green), it can be ignored. This prompt indicates that after calibration, the maximum rotation speed of the water pump fails to reach 16L/min.

Users can disregard this prompt in the following scenarios:
- If the gray impeller (low-temperature type) is used, and the impeller has slightly swollen after operation, but there is no report of water pump jamming or inaccurate flow rate, no action is needed.
- When the minimum daily temperature rises to above 15°C, replace the impeller with the black chemical-resistant type, recalibrate the system, and the maximum flow rate will be restored.

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4.8. During flight operations, no liquid is discharged from the nozzle while the water pump is running.

① If the system has been emptied or after a night of inactivity, before operating the next day, it is recommended to pump water at maximum flow rate on the ground first. When the pump body is too dry and the flow rate is low, the pump may fail to draw liquid.
② Check whether the pipeline at the bottom of the water pump is kinked or crushed, which may prevent liquid discharge.
③ Inspect the water outlet filter screen for severe blockage that may hinder liquid suction.

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4.9. Why is there still leftover liquid returning after activating the emptying switch?

① Activating the emptying function does not necessarily empty the tank completely before returning. It only takes effect when triggering the "low liquid return" mechanism.

② When the emptying function is enabled, it will only trigger the discharge of leftover liquid during the return flight segment when the remaining liquid is 600ml or less after the operation ends. If there is too much leftover liquid, the emptying function will not be activated, as excessive liquid may cause phytotoxicity.

③ To completely empty the liquid:
- Add an appropriate amount of liquid based on pre-job estimates.
- Set the application rate to a reasonable value to match the added liquid volume.
- After landing, perform an additional flight segment to use up the remaining liquid.

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THE END