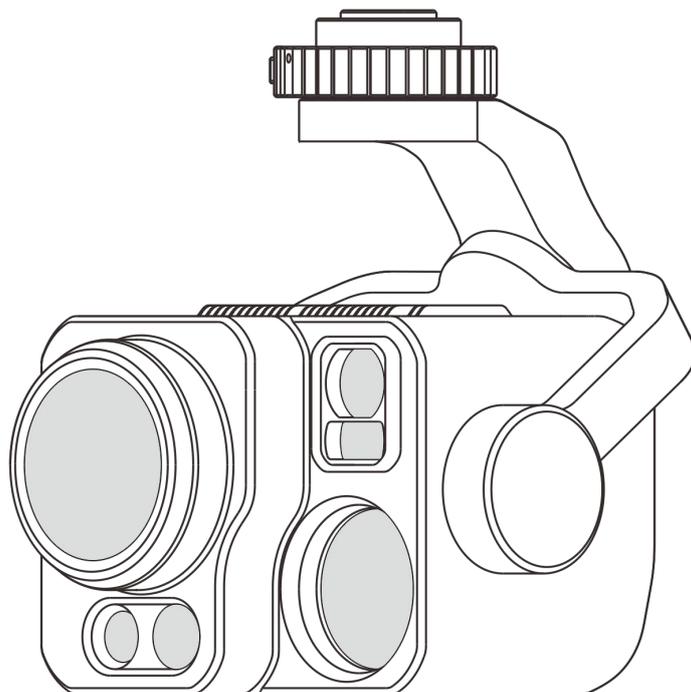

DG-L35T Aircraft Gimbal User Manual

V1.0 2023.08



AUTEL
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Auxiliary reading

- This manual is a PDF electronic document supporting high-quality printing.
- When viewing this manual through PDF reader programs such as Adobe Reader or Microsoft Edge, users can use the shortcut keys Ctrl + F or Command + F to search for locating keywords.
- Users can know the content structure through the directory, and click the title to jump to the corresponding page.

Thank you for purchasing and using DG-L35T aircraft gimbal products under Autel Robotics Co., Ltd. (referred to as "Autel" or "Autel Robotics"). The relevant user documents of this product are provided with the product in the form of electronic documents, and the relevant download addresses have been provided in this manual. Before using this product, please carefully read the operation steps and precautions in this manual, so as to quickly understand the characteristics and usage methods of this product, thus ensuring the safety of users.

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Legends

The following symbols are used in this manual to draw the user's attention to important safety and operation information. Please follow the hints or requirements in the notes under each symbol, otherwise the safety features of the product may be affected or personal injury may be caused.

Symbol	Meaning
	Warning: There may be dangerous conditions during operation.
	Important: Matters needing attention in operation.
	Remarks: Supplementary information.
	Tip: Tip information about getting the best operation experience.

Use tips

This product is an aircraft ecological accessory, which needs to be mounted on a specific aircraft before it can be used.

It is recommended that users first check whether the items in the packing box are complete according to the "Item List", and then read the "Quick Guide" to understand the installation and use of this product.

Be sure to read the User Manual carefully to understand the detailed use of this product.

Please scan the QR code below or get the latest user manual through relevant links.

To download resources, please visit:

[https://manuals.autelrobotics.com/? dir=/Autel% 20Alpha/Accessories/.](https://manuals.autelrobotics.com/?dir=/Autel%20Alpha/Accessories/)



Disclaimer

To ensure the safe and successful operation of this product, it is important to read and understand all the user documentation listed above and strictly follow the instructions and procedures in this manual. This product should be kept out of reach of children or pets. If the user does not comply with the relevant safety operation instructions, Autel will not be responsible for any

product damage or personal and property losses caused by violation of the indicated risks during use, and will not provide warranty services. Do not use incompatible parts or modify this product in any way that does not conform to the official instructions of Autel. Please make sure that the operation does not endanger the personal and property safety of users and others. Once you start using this product, it is deemed that the user has read and accepted all the terms and conditions related to this product. Commit to be responsible for your actions and all the consequences arising therefrom. User undertakes to use this product only for legitimate purposes, and agrees to the above terms and any relevant policies or guidelines that Autel may formulate.



- Please know that in the absence of Autel Enterprise App flight records, Autel may not be able to analyze the causes of product damage or accidents, and may not be able to provide after-sales service.

Warranty policy

Autel promises to users who purchase products through its officially authorized channels:

- Under normal use conditions, the Autel products purchased by users have no defects in materials and processes during the warranty period.
- Under the condition that the user can provide valid purchase certificate, the warranty start date of this product will be calculated from 0:00 am the next day after signing for the product.
- When the user cannot provide valid purchase certificate, the warranty start date of this product will be calculated by postponing the factory date indicated by inquiring the product serial number for 90 days or defined by Autel.
- For more information on after-sales policy, visit <http://www.autelrobotics.cn/page/policy.html>.

After-sales support

If you have any questions or doubts about our products, please contact Autel User Support:

Tel: (844) 692-8835

Website: <https://www.autelrobotics.com/>

Maintenance services

If the equipment needs to be inspected or repaired, please contact Autel in the following ways:

- Send an email to after-sale@autelrobotics.com.
- Call Autel User Support: (844) 692-8835
- Contact the dealer authorized by Autel.

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1. Safe use

After opening the box for the first time, please scan the QR code in the Quick Guide to obtain the electronic version of this manual, and carefully read and understand all the contents of this manual so as to use this product safely and correctly.

Before carrying out actual outfield flight, please be familiar with the functions and characteristics of relevant aircraft and remote control, so as to avoid product damage or personal injury caused by improper operation.

Please use this product in a legal flight environment and abide by relevant local laws and regulations. Be sure to read the Disclaimer and Safety Operation Guidelines before flying to understand relevant safety precautions.

1.1 Instructions for use

The gimbal of DG-L35T aircraft has the functions of taking pictures, recording videos, measuring temperature, etc. When mounted on a specific aircraft for flight operation, please understand and abide by the following operation specifications related to this product. Violation of relevant specifications may cause serious consequences or even break the law.

- It is forbidden to control the aircraft to fly under other conditions of poor physical or mental state, such as drinking, taking drugs, drug anesthesia, dizziness, fatigue, nausea, etc.
- Do not fly in areas prohibited by local regulations without authorization. Prohibited areas may include airports, border lines, major cities and densely populated areas, large-scale event sites, emergencies (such as forest fires, etc.), and sensitive building facilities areas (such as nuclear power plants, power stations, hydropower stations, prisons, traffic arteries, government buildings and military facilities).
- It is forbidden to use aircraft at large-scale event sites. These venues include, but are not limited to, sports venues, concerts, etc.
- It is forbidden to fly in airspace exceeding the height limited by laws and regulations.
- Ensure that the types of flight activities (such as entertainment, official business or business) are clearly understood. Be sure to obtain a permit issued by relevant departments before flying. If necessary, you can consult the local legal staff for a detailed definition of the flight activity category.
- Be sure to respect the privacy of others when shooting with an aircraft. It is forbidden to use this product for any unauthorized surveillance activities, including but not limited to surveillance of others, groups, activities, performances, exhibitions or buildings.
- Please note that using a camera to record or take pictures of others, groups, activities, performances, exhibitions, etc. without legal authorization will infringe copyright, privacy or other legitimate rights and interests of others. Therefore, please carefully understand and abide by local laws and regulations before using.

1.2 Pre-flight inspection

After mounting this product on the relevant aircraft, please check the gimbal of the aircraft according to the following steps before flying to ensure safe use.

- Ensure that the aircraft gimbal is correctly installed on the aircraft, the connection between the two is stable, and the interface between the gimbal unlocking button and the aircraft gimbal is locked.
- Ensure that the lens protection cover of the aircraft gimbal has been removed and the three-axis motion of the gimbal is in normal condition.
- Ensure that the lens surface of the aircraft gimbal camera is free of foreign matter, dirt or fingerprints, and is not blocked by mounting or other accessories on the fuselage.

- Ensure that the aircraft head has been inserted into the microSD card and the rubber protective cover is tightly covered at the microSD card slot, otherwise the product protection performance will be affected.
- Ensure that the aircraft gimbal camera can work normally after the aircraft is powered on.

1.3 Items list

Serial number	Articles	Remarks
1	DG-L35T	1 DG-L35T gimbal as standard.
2	Lens protective cover	Protect the lens of gimbal camera.
3	PTZ interface protective cover	Used to protect the gimbal interface.
4	microSD card	It comes standard with 64GB memory card, which has been inserted into the gimbal before leaving the factory.
5	[Quick Guide]	Guide users to quickly install and disassemble the gimbal.

重要

- Please carefully check the items in the packing box according to the list of items when unpacking for the first time. If you find that the goods are missing or damaged, please contact Autel official or authorized distributor in time.

警告

- When storing the aircraft gimbal separately, please use the lens protective cover to protect the gimbal lens, cover the gimbal interface protective cover, and then store the gimbal in the protective lining to avoid damaging the gimbal due to accidental rotation or bumping.

2. Aircraft gimbal

2.1 Product introduction

Daotong Guiyan L35T (hereinafter referred to as "DG-L35T") is an industry-grade gimbal. The gimbal adopts detachable (E-type buckle) design, has IP55 protection level, supports microSD card storage, and can transmit image data through Wi-Fi. It is suitable for Autel Alpha and Autel Titan aircraft under Autel.

DG-L35T is equipped with a high-magnification zoom camera with 35 times continuous optical zoom capability and 560 times digital zoom capability; It is equipped with long and short focal dual infrared lenses, wide-angle cameras and laser rangefinders, which can provide excellent target thermal imaging images, positioning, ranging and other capabilities for flight operations, and enhance the all-day operation experience.

2.2 Composition of gimbal

2.2.1 Camera

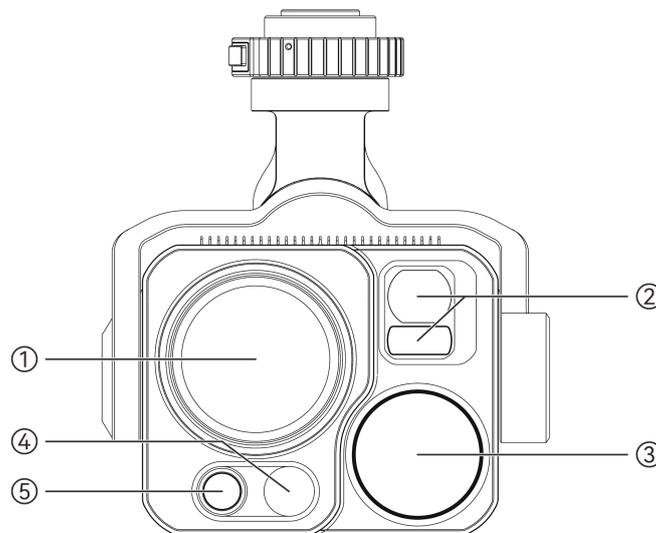


Figure 2-1 DG-L35T aircraft gimbal camera

Table 2-2 Description of DG-L35T aircraft gimbal camera

Serial number	Name	Describe
1	Zoom camera	Zoom cameras are used to shoot long-range scenes, which can clearly shoot distant scenes. 1/1.8" CMOS, 8 million effective pixels, 35x continuous optical zoom, 560x digital zoom.
2	Laser rangefinder	The distance is accurately measured by measuring the time when the laser beam goes back and forth to observe the target once.

Ranging range: 10-2000 meters.

3	45 mm telephoto Infrared thermal imaging camera	Infrared thermal imaging camera is used for temperature measurement and night vision, which can monitor the temperature distribution of the measured target in real time and judge the state of the target. Accurate temperature measurement distance: 4 ~ 50 meters; Infrared resolution: 640 × 512. Temperature measurement range:-20 °C ~ + 150 °C (high gain mode) and 0 ~ + 550 °C (low gain mode).
4	Wide angle camera	Wide-angle camera is used to shoot pictures with a large field of view in a short shooting distance. 1/2 "CMOS, effective pixels of 48 million, can take 8K photos.
5	13 mm short focus Infrared thermal imaging camera	Infrared thermal imaging camera is used for temperature measurement and night vision, which can monitor the temperature distribution of the measured target in real time and judge the state of the target. Accurate temperature measurement distance: 1 ~ 25 meters; Infrared resolution: 640 × 512. Temperature measurement range:-20 °C ~ + 150 °C (high gain mode) and 0 ~ + 550 °C (low gain mode).

警告

- Laser rangefinder is a class 3B laser product, which should be avoided from being exposed to light beam when used.
- Never aim the infrared thermal imaging camera at strong energy sources, such as the sun, lava, laser beam, molten iron, etc., so as not to damage the infrared detector.
- The temperature of the measured target should be less than 600 °C, and the infrared detector will be burned and damaged if observed beyond this temperature.

2.2.2 Gimbal

DG-L35T is a three-axis stabilized gimbal with high-precision motor structure, which ensures that the camera can shoot a stable picture when connecting the aircraft for flight operation.

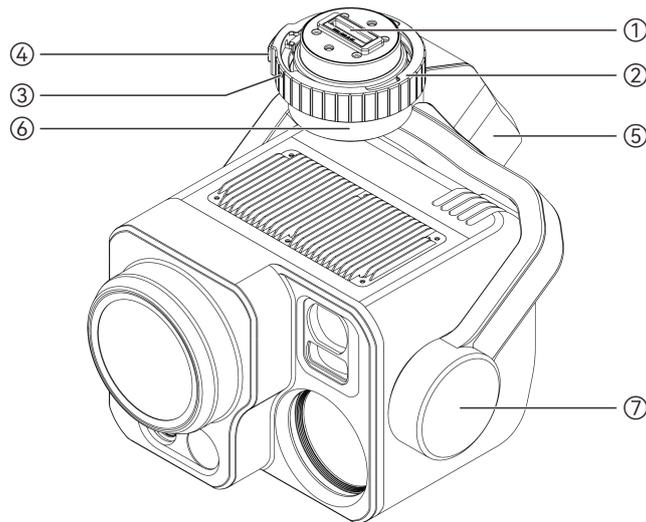


Figure 2-2 PTZ head structure

Table 2-3 Structure description of gimbal

Serial number	Name	Describe
1	Connecting groove	The connecting slot of the gimbal is used for connecting with the connector at the interface of the gimbal of the aircraft.
2	E-type buckle	E-shaped buckle design is adopted at the gimbal interface of DG-L35T, which is used for quick locking connection with the gimbal interface of aircraft.
3	Buckle marking point	It is used for judging the installation direction of the gimbal buckle. When the gimbal is installed, the marking point is rotated from the unlocking mark aligned with the gimbal interface of the aircraft to the locking mark.
4	PTZ head unlock button	When installing or removing the gimbal, first press and hold the gimbal unlock button to ensure that the buckle is unlocked.
5	Roller motor	It is used to control the rolling range of the gimbal to the left or right, and the mechanical range is -60 ~ 60.
6	Heading shaft motor	It is used to control the range of left rotation or right rotation of gimbal in its own axis, and the mechanical range is -45 ~ 45.
7	Pitch shaft motor	It is used to control the upward or downward rotation range of the gimbal (mechanical range: -135 ~ 45, controllable movement range: -90 ~ 30).

警告

- After using the gimbal for a long time, the temperature of the gimbal shell will rise due to heat dissipation. Please wait for the temperature to cool to room temperature before contacting the gimbal to avoid scalding.

2.2.3 Rotation range of gimbal machinery

The mechanical rotation range of pitching axis (Pitch), heading axis (Yaw) and rolling axis (Roll) of gimbal is shown in the following figure.

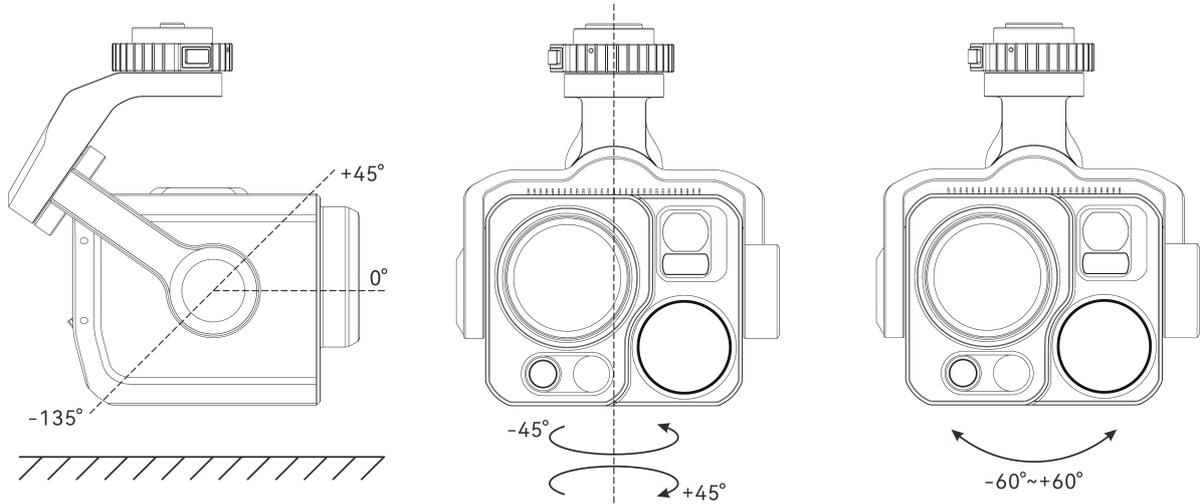


图 1-1 Mechanical rotation range of DG-L35T aircraft gimbal

备注

- The user can control the rotation range of the gimbal to the pitch direction: $-90 \sim 30$.

2.3 Control aircraft gimbal

The gimbal of DG-L35T aircraft can be quickly controlled by the function keys of the remote controller (Autel Intelligent Remote Controller V3), and can also be controlled by Autel Enterprise App.

警告

- When connecting with the aircraft, please take off the lens protection cover of the aircraft gimbal before turning on the power switch of the aircraft, otherwise the gimbal motor and circuit may be damaged.
- When connected with the aircraft, turn on the power switch of the aircraft, and the gimbal of the aircraft will automatically rotate to perform self-inspection and calibration. Please ensure that there are no objects near the gimbal that hinder its movement.

2.3.1 Remote control

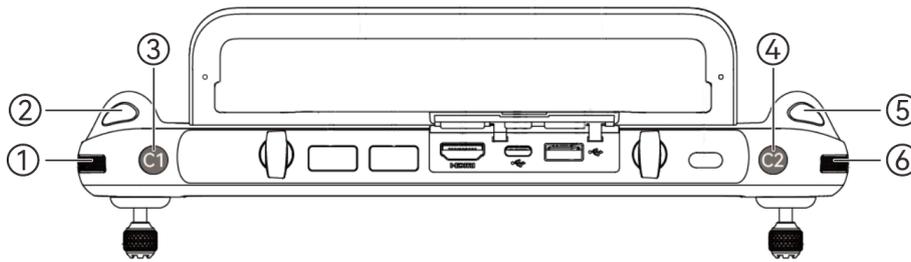


Figure 2-4 Remote control function key

Table 2-4 Description of function keys of remote control

Serial number	Name	Describe
1	Left shift wheel	Pitch angle of gimbal can be adjusted by toggling.
2	Video button	Click Start/End to record the video.
3	C1 bond	You can customize the keystroke function in Autel Enterprise App.
4	C2 bond	You can customize the keystroke function in Autel Enterprise App.
5	Photo button	Click to take a picture.
6	Right dial wheel	The zoom factor of the camera can be adjusted by toggling.

备注

The user can set C1/C2 key to "gimbal back center/45/downward" in Autel Enterprise App, and switch the pitching angle of aircraft gimbal back and forth by clicking C1/C2 key.

- PTZ: The heading angle of PTZ is rotated from the current position to be consistent with the heading of aircraft nose, and the pitching angle of PTZ is rotated from the current angle to the direction of 0.
- PTZ 45: The heading angle of PTZ rotates from the current position to be consistent with the heading of aircraft nose, and the pitching angle of PTZ returns from the current angle to 45.
- Head downward: the heading angle of the head rotates from the current position to be consistent with the heading of the aircraft nose, and the pitching angle of the head rotates from the current angle to the 90 direction.

■ Control camera

- Right dial wheel: controls the zoom factor of the selected camera. Turn to the left to reduce the zoom factor; Move to the right to enlarge the zoom factor.
- Video recording button: Click Start/End to record video.
- Photo button: Click to take photos.

- Control gimbal
- Left shift wheel: control the pitching angle of gimbal. Turn to the left and turn the gimbal downward; Turn to the right and the gimbal turns upward.
- C1/C2 custom key: After setting C1 or C2 key to "gimbal back center/45/downward", you can switch the gimbal angle by clicking.

2.3.2 Autel Enterprise App Control

On the "PTZ Settings" page of Autel Enterprise App, users can set the maximum speed of PTZ pitch axis, PTZ look-up function, or calibrate and fine-tune PTZ, as shown in the following figure.

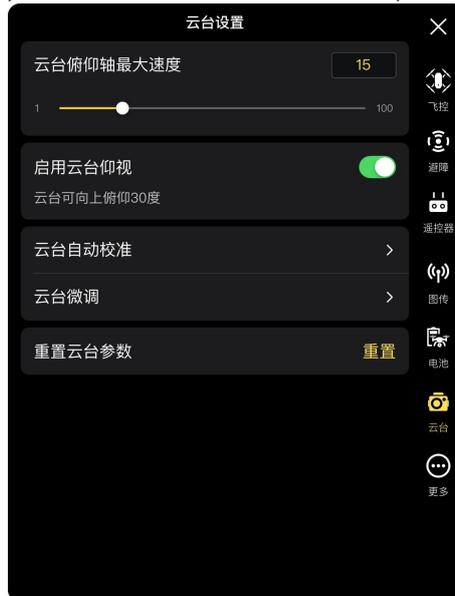


Figure 2-5 Gimbal setting

1. Maximum speed setting of pitching axis of gimbal

Enter a value in the edit box on the right side of "Maximum speed of gimbal axis", or slide the lower slider left and right to adjust the value, so as to set the rotation angle of gimbal axis per second (unit: °/sec).

2. Turn on/off the gimbal look-up function

Click the button on the right side of "Enable gimbal looking up" to turn on or off the gimbal looking up function.

➤ If the head is enabled to look up, the head can be rotated up another 30 degrees on the head-up reference plane.

➤ If the gimbal is not enabled to look up, the gimbal can only keep head-up or top-down at most, and cannot rotate upward to switch to look up.

3. Automatic tripod head calibration

When there is an abnormal situation in the gimbal, click "Automatic Calibration of gimbal", and then click "Start Calibration" button, then the gimbal will automatically start calibration.

4. Trim head fine tuning

When the gimbal position is tilted, click "gimbal fine adjustment", and click the buttons under the functions of "horizontal fine adjustment", "yaw fine adjustment" and "pitch fine adjustment" to make the horizontal and vertical axes in the screen align with the reference objects of the three-screen image transmission screen.

5. Reset gimbal parameters

Click the "Reset" button, and then click the "OK" button to reset the gimbal parameters.

■ Control camera

In the camera interface of Autel Enterprise App, click the following icon to control and set the gimbal camera accordingly.

Table 2-5 Camera function icon

Serial number	Icons	Icon description	Describe
1		Switch zoom camera	On any camera page, click this icon to enter the Zoom Camera page.
2		Switch infrared camera	On any camera page, click this icon to enter the infrared camera page.
3		Switch wide-angle camera	On any camera page, click this icon to enter the wide-angle camera page.
4		Camera settings	Click this icon to view and set the relevant parameters of PTZ camera.
5		Photographing	Click this icon to take pictures.
6		Video recording	Click this icon to record.
7		Photo album	Click this icon to view the material of aircraft photo album and local photo album and download or delete it.
8		Zoom camera zoom	On the "Zoom Camera" page, click this dynamic icon to adjust the zoom multiple of the zoom camera.
9		Infrared camera zoom	On the "Infrared Camera" page, click this dynamic icon to adjust the zoom factor of the infrared thermal imaging camera.
10		Wide-angle camera zoom	On the "Wide Angle Camera" page, click this dynamic icon to adjust the zoom factor of the wide angle camera.
11		Linkage zoom	Click this icon to adjust the zoom factor of any camera, and other cameras will follow the zoom, and the camera picture will be zoomed in or out synchronously.

■ Control gimbal

In the camera interface of Autel Enterprise App, click the following icon to control and set the gimbal camera accordingly.

Table 2-6 Gimbal function icon

Serial number	Icons	Icon description	Describe
1		0 degree of gimbal	Click this icon to return the gimbal to the horizontal centering state.

2		Gimbal 45 degrees	Click on this icon, and the gimbal rotates obliquely downward at an angle of 45 with the horizontal plane.
3		Gimbal 90 degrees	Click on this icon, and the gimbal rotates directly downward at an angle of 90 with the horizontal plane.

■ Automatic tripod head calibration

The aircraft gimbal has been calibrated at the factory, so it is usually not necessary for the user to perform automatic calibration. If the rotation angle of the gimbal is abnormal, it can be automatically calibrated in Autel Enterprise by following the following steps:

1. Place the aircraft on a flat ground, turn on the aircraft and the remote control, and keep the aircraft at rest.
2. Wait for the calibration progress bar to reach 100%, and the screen prompts "Calibration Successful", then the gimbal will automatically calibrate successfully.

提示

- Calibration path: Click "Automatic Calibration of PTZ" >-"Start Calibration" on the "PTZ Settings" page of Autel Enterprise App.

2.4 Installing and removing gimbal

The gimbal of DG-L35T aircraft adopts detachable design, which is convenient for users to carry out field flight operations according to actual mounting requirements.

重要

- Please disassemble and assemble the aircraft gimbal in strict accordance with the operating instructions, otherwise the gimbal may be damaged.
- Please note that the gimbal connector is a precision device, and frequent plugging and unplugging may cause poor contact between aircraft and gimbal.
- DG-L35T aircraft gimbal is only suitable for Autel Alpha and Autel Titan aircraft.

警告

- It is forbidden to disassemble and assemble the gimbal with electricity, and it must wait for the aircraft power supply to be completely turned off for at least 15 seconds (the internal capacitor is discharged) before disassembling and assembling the gimbal.

■ Installing gimbal

1. Place the aircraft on a horizontal surface to ensure stable placement of the aircraft fuselage.
2. Hold the heading swing arm of the gimbal of DG-L35T aircraft, press and hold the aircraft, align the gimbal interface of DG-L35T with the gimbal interface of the aircraft, and ensure that the E-buckle marking point is aligned with the unlocking mark of the gimbal interface of the aircraft.
3. Slowly lift the gimbal to ensure that the connector at the gimbal interface of the aircraft is accurately inserted into the connection slot at the DG-L35T gimbal interface; Press and hold

the gimbal unlock button, and continue to hold the gimbal, so that the connection slot is firmly connected with the connector.

4. Rotate the E-type buckle in the direction shown in the figure until the mark point of the buckle is aligned with the locking mark at the interface of the aircraft gimbal, release the gimbal unlock button, and the gimbal is successfully installed.

! 重要

- After installing the gimbal of the aircraft, the ground test must be carried out before flying to ensure the normal operation of the gimbal.

! 警告

- After installing the gimbal of the aircraft, please ensure that the gimbal is firmly connected with the aircraft, so as to avoid falling or functional failure due to the unstable installation of the gimbal in flight, thus causing flight safety accidents.

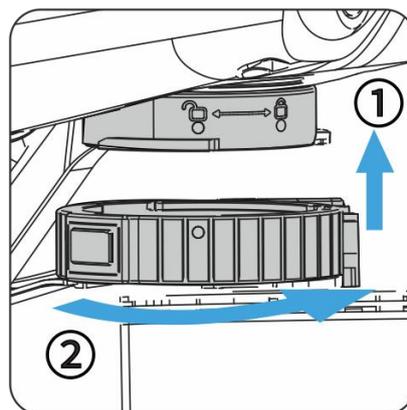


Figure 2-6 Installing gimbal

■ Remove gimbal

1. Place the aircraft on a horizontal surface to ensure stable placement of the aircraft fuselage.
2. Hold the heading swing arm of DG-L35T aircraft gimbal, press and hold the gimbal unlock button at the interface of DG-L35T aircraft gimbal, and rotate the E-buckle in the direction shown in the figure until the mark point of E-buckle aligns with the unlock mark of aircraft gimbal interface.
3. Slowly drag the tripod head down and gently pull it out to ensure that the connector at the tripod head interface of the aircraft is disconnected from the connection slot at the tripod head interface of DG-L35T until they are separated.

! 重要

- After removing the gimbal, please use the lens protective cover to protect the gimbal lens, cover the gimbal interface protective cover, and then store the gimbal in the protective lining to avoid damaging the gimbal due to accidental rotation or bumping.

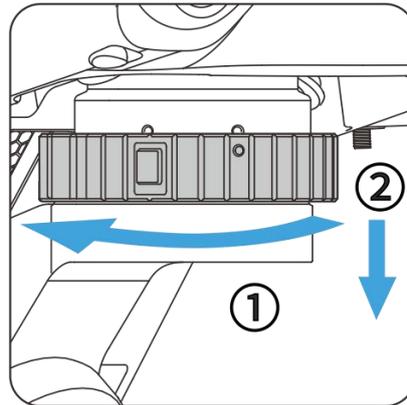


Figure 2-7 Remove gimbal

2.5 Install microSD card

DG-L35T comes standard with a 64GB microSD card (which has been installed in the microSD card slot of aircraft gimbal at the factory). If users need to replace the microSD card with larger capacity, please refer to the following operation.

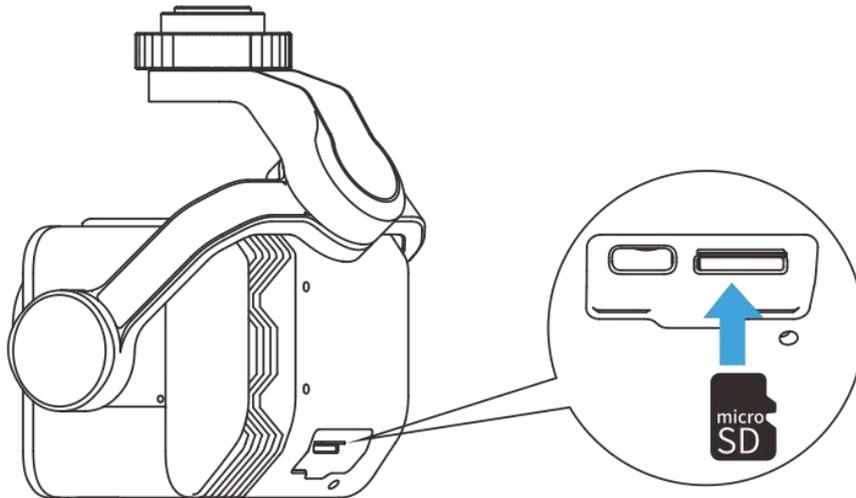


Figure 2-8 Install microSD card

💡 提示

- If you want to shoot high-definition video, it is recommended to use Class 10, UHS-3 or higher microSD card.

⚠️ 警告

- To prevent data loss, please shut down the aircraft before taking out the microSD card.
- After installing microSD card, please cover the rubber protective cover at the card slot in time, so as not to affect the protective performance of the product.

2.6 Protection level

DG-L35T aircraft gimbal (installed to aircraft and covered with rubber protective cover) can reach IP55 protection level under IEC 60529 standard under controlled laboratory conditions. The protection level is not permanently effective, and the protection performance may be degraded due to long-term use and wear.

- It is not recommended to fly in rainy days. If there is rain during the flight, please stop the flight and return or land to a safe point in time.
- Before flying, please confirm the interface of the gimbal. The surface of the gimbal is dry and waterless, and then connect the gimbal to the aircraft.
- After the flight, please wipe the rainwater on the fuselage before storing it, so as to avoid internal water inflow and affect the protective performance.
- Damage caused by immersion in liquid is not covered by warranty.

The following states do not have IP55 protection level.

- The rubber protective cover at the microSD card slot of aircraft gimbal is not installed in place.
- Other possible damages occur in the fuselage of the aircraft gimbal, such as cracking of the shell and failure of waterproof glue.

备注

- Please strictly follow the use environment restrictions of aircraft gimbal, which may cause damage to aircraft gimbal and even cause safety accidents.

2.7 General failure and troubleshooting

1. After the aircraft gimbal is installed on the aircraft, it cannot work:
 - Please check to make sure that the aircraft battery is outputting normally. If it can't work due to low power shutdown, please replace the battery with sufficient power before testing.
2. After the aircraft gimbal is installed to the aircraft, if the aircraft is started normally, the gimbal will not work:
 - Please shut down and remove the gimbal, and check whether there is dirt residue in the connection slot and connector at the interface between the two gimbals. If there is dirt, please clean it before installation test; If there is no dirt, please check whether the interface is damaged.
 - Ensure that the gimbal of the aircraft is not damaged by bumping, falling, immersion, etc. If similar situations occur, it should be stopped, and the internal components of the gimbal may be damaged.
3. After the aircraft gimbal is installed to the aircraft, if the aircraft is started normally, the three axes of the gimbal are stuck during self-inspection:
 - Shut down immediately, remove the gimbal and stop using it. If there may be faults inside the gimbal, contact Autel User Center in time.

2.8 Firmware upgrade

To ensure the best operating experience of the aircraft gimbal, please keep the aircraft gimbal firmware up to date. The new version of firmware will improve the stability and functionality of the gimbal and fix the problems caused by the old version.

Users can use Autel Enterprise App to upgrade the firmware of aircraft gimbal.

! 重要

- Online upgrade needs to ensure that the remote control can be connected to the Internet normally.

1. Ensure that the gimbal of the aircraft is connected to the aircraft, turn on the power supply of the remote controller and the aircraft, ensure that the frequency is matched between the aircraft and the remote controller, the power consumption of the aircraft and the remote controller is greater than 25%, and the network connection of the remote controller is normal.
2. Open the Autel Enterprise App, and if there is a version update, a pop-up reminder will be given on the homepage of the App, or the settings of the App will be entered to manually select the update.
3. Click Upgrade All, and the Autel Enterprise App will automatically download and upgrade the firmware.
4. After the upgrade is completed, restart the remote control and aircraft according to the pop-up prompt.

! 重要

- During the upgrade, please do not shut down the aircraft and keep it connected with the remote control.
- The whole upgrade process is expected to last for 15 minutes (depending on the network status of the remote control connection).
- Do not hit the rod before and after upgrading to ensure that the blades of the aircraft remain in a stalled state.

Appendixes: Specifications

A.1 Basic parameters

Basic parameters	
Dimension of gimbal	144.7 x 133.3 x 158.4 mm
Head weight	910 grams
Protection level	IP55
Installation mode	Removable (E-type buckle)
Working ambient temperature	-20 °C ~ + 50 °C
Storage ambient temperature	-30 °C ~ + 70 °C
Support model	Autel Alpha; Autel Titan
Data storage	Support insertion of microSD card
Maximum extended memory	256GB
Recommended Memory Card List	UHS-I speed registration U3 or V30, minimum write speed 30MB/sec
Wi-Fi standard	802.11 a/b/g/n/ac/ax Support 2 × 2 MIMO Wi-Fi
Wi-Fi operating frequency	2.400-2.4835 GHz 5.150-5.250 GHz (CE/FCC/) 5.725-5.850 GHz
Wi-Fi Effective Omnidirectional Radiated Power (EIRP)	2.400-2.4835 GHz: < 30dBm (FCC); < 20dBm (CE/SRRC) 5.150-5.250 GHz: < 19dBm (FCC/CE) 5.725 TM 5.850 GHz: < 19dBm (FCC/SRRC); < 14dBm (CE)

A.2 PTZ Head Performance

Gimbal	
Mechanical range	Pitch:-135 to 45

	Roll:-60 to 60 Heading:-45 to 45
Controllable rotation range	Pitch:-90 to 30
Stable system	3-axis mechanical gimbal (pitch, roll, heading)
Maximum control speed (pitch)	100 °/sec
Angle jitter	< 0.005 °

A.3 Gimbal camera

Zoom camera	
Image sensor	1/1.8" CMOS with 8 million effective pixels
Lens	Focal length of viewing angle: 7.1 ~ 171.95 mm 5% 35 mm equivalent focal length: 34.7 ~ 838 mm Aperture: F1.61 (Wide) ~ F5.19 (Tele) ± 5% Focus distance: 10m ~ ∞
ISO Range	Normal mode ISO100 ~ ISO25600 Hypersensitivity ISO100 ~ ISO240000
Shutter speed	Photography: 0.5 seconds ~ 1/8000 seconds Video: 1/30 second ~ 1/8000 second
Zoom	1.4-35 x continuous optical zoom, 35-560 x digital zoom
IRCut near infrared switching	Automatic by default, turned off during the day and turned on at night Manual opening: Turn on near infrared input, and the image is black and white Manual turn-off: turn off near infrared and image color
Maximum photo size	3840 × 2160
Photo format	JPG
Photo shooting mode	Automatic
Video resolution	3840 × 2160 30P
Video format	MP4
Maximum video bit rate	30Mbps
Support file system	exFAT/Fat32
Wide angle camera	

Image sensor	1/2 "CMOS with 48 million effective pixels
Lens	Effective focal length: 4.49 mm 35 mm Equivalent focal length: 24 mm Aperture: f/2. 8
ISO Range	Normal mode: ISO100 ~ ISO3200
Shutter speed	Photography: 0.5 seconds ~ 1/8000 seconds Video: 1/30 second ~ 1/8000 second
Photo size	4000 × 3000 (default), 8000 × 6000
Photo format	JPG
Photo shooting mode	Automatic
Video resolution	4000 × 3000 30P
Video format	MP4
Maximum video bit rate	30Mbps
Support file system	exFAT/Fat32
Infrared thermal imaging camera (I)	
Image sensor	Uncooled vanadium oxide focal plane
Lens	FOV: 42 ° Focal length: 13 mm Aperture: f/1. 2 Focus distance: 6 m ~ ∞
Sensitivity	≤ 50 mK @ f/1. 0, 25 °C
Pixel spacing	12um
Wavelength range	8-14um
Temperature measurement mode	Center temperature measurement/pointing temperature measurement/single rectangular frame temperature measurement
Temperature measuring range	-20 °C ~ + 150 °C (high gain mode); 0 °C ~ + 550 °C (low gain mode)
Temperature measurement accuracy	± 3 °C or ± 3% of the reading (whichever is greater) @ ambient temperature-20 °C ~ + 60 °C
Accurate temperature measurement distance	1 ~ 25 meters
Zoom	1-3.5 x wide-angle thermal imaging digital zoom
High temperature warning	High and low temperature alarm threshold, reported coordinates

	and temperature values
Palette	White heat/black heat/scorching heat/rainbow/gray scale/iron red/cold heat
Photo size	640 x 512
Photo format	JPG (with temperature information, dedicated SDK, and PC tool parsing)
Photo shooting mode	Automatic
Video resolution	640 × 512 @ 25FPS
Video format	MP4
Infrared thermal imaging camera (2)	
Image sensor	Uncooled vanadium oxide focal plane
Lens	FOV: 12.3 ° Focal length: 45mm Aperture: f/1. 2 Focus distance: 35 m ~ ∞
Sensitivity	≤ 50 mK @ f/1. 0, 25 °C
Pixel spacing	12um
Wavelength range	8-14um
Temperature measurement mode	Center temperature measurement/pointing temperature measurement/single rectangular frame temperature measurement
Temperature measuring range	-20 °C ~ + 150 °C (high gain mode); 0 °C ~ + 550 °C (low gain mode)
Temperature measurement accuracy	± 3 °C or ± 3% of the reading (whichever is greater) @ ambient temperature-20 °C ~ + 60 °C
Accurate temperature measurement distance	4 ~ 50 meters
Zoom	1-3.5 x wide-angle thermal imaging digital zoom 3.5 x telephoto thermal imaging optical zoom 3.5-56 x telephoto thermal imaging digital zoom
High temperature warning	High and low temperature alarm threshold, reported coordinates and temperature values
Palette	White heat/black heat/scorching heat/rainbow/gray scale/iron red/cold heat
Photo size	640 x 512
Photo format	JPG (with temperature information, dedicated SDK, and PC tool

	parsing)
Photo shooting mode	Automatic
Video resolution	640 × 512 @ 25FPS
Video format	MP4
Laser rangefinder	
Wavelength	905 nm
Measurement accuracy	< 400m: +1 m; > 400m, (D x 0.3%) Where D represents the distance from the perpendicular reflecting surface
Measuring range	10-2000 meters

This device 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 device 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 device does cause harmful interference to radio or television reception, which can be determined by turning the device 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 device and receiver.
- Connect the device 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

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

Radiation Exposure Statement

The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located for operating in conjunction with any other antenna or transmitter.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Part 15 of the FCC Rules and Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions: (1) This device may not cause interference. (2) This device must accept any

interference, including interference that may cause undesired operation of the device

Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes : (1) Cet appareil ne doit pas causer d'interférences. (2) Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement indésirable de l'appareil