



## Application Overview

Benewake TF series LiDAR is a ranging sensor with small size, high accuracy, and high measurement frequency. It can be used as an auxiliary landing and altitude holding sensor for UAVs. The LiDAR can provide distance information and feed it back, then UAV can adjust the descent speed or flight height in time.

When the UAV is flying at high altitude, the LiDAR outputs a maximum value or zero, and at this time, GPS data is mainly accepted. When the UAV is rapidly descending, the distance data output by the LiDAR gradually decreases from a large value, and the flight control system judges the altitude from the ground based on the LiDAR data.

## LiDAR Sensor Advantages

### Customer Benefits



It help customer manage the safety height of UAV (0-100m) . No manual work and more reliable than GPS signal.



It will alert automatically when UAV reaches a particular level. The 5m range LiDAR's retail price is less than 50USD.



It provide an accurate distance with small spot. The installation is flexible and simple because of the small volume. Only 1/9 volume of radar.



The power consumption is generally lower than 1W. Support Pixhawk, plug and play.

### Performance

Product	 TFmini Plus	 TF02-Pro	 TF03 series
Range	0.1-12m@90%reflectivity 0.1-4m@10%reflectivity	0.1-40m@90%reflectivity 0.1-13.5m@10%reflectivity	0.1-180/100m@90%reflectivity 0.1-70/40m@10%reflectivity
Accuracy	±5cm@(0.1-5m) ±1%@(5-12m)	±5cm@(0.1-5m) ±1%@(5-40m)	±10cm@(within 10m) 1%@(more than 10m)
FoV	3.6°	3°	0.5°
Interface	UART、I <sup>2</sup> C、I/O	UART、I <sup>2</sup> C	UART、CAN、I/O RS485、RS232 4 mA ... 20 mA (<300Ω)
Power	≤0.55W	≤1W	≤0.9W
Frequency	1-1000Hz	1-1000Hz	1-1000Hz
Protection	IP65	IP65	IP67
Volume	35mm*18.5mm*21mm (L*W*H)	69mm*41.5mm*26mm (L*W*H)	44mm*43mm*32mm (L*W*H)



## Case Study

The real-time measuring ability of Benewake LiDAR is remarkable. Its' FoV is small and the energy is concentrated, There is no mechanical movement structure inside with 1cm accuracy and reliability. Its' life is more than 3 years. At present, Benewake LiDAR is widely used in UAV and aircraft for terrain following and altitude holding.



### Logistic UAV

TF02-Pro is installed at the height of about 30cm below the multi-rotor UAV. At a height within 6m, the UAV mainly uses TF02-Pro ranging information, and above 6m it mainly uses GPS and other sensor information.



### Patrol/Mapping UAV

TF02-Pro is installed under UAV at the height of 20cm above the ground. It control the UAV's descending speed in real time to ensure the stable landing during the descending process.



### Flight Formation

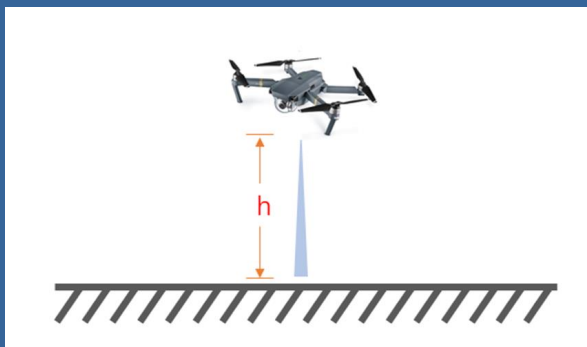
TFmini-S is installed below the UAV with 5cm above the ground. The flight control can manage the ascending, descending and hovering of different UAVs to combine beautiful patterns.



### Driving School Coach Aircraft

TF03 is installed under one wing of UAV and the LiDAR is used as part of the auxiliary landing system to provide the aircraft with wings and ground height information.

## Installation



LiDAR is installed directly under the UAV or under the wing, and measures vertically downward or obliquely. It is more suitable for the complex environment (such as multiple echo interference) with accurate measurement and no detection delay.



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