

Configuring Benewake TF Series LiDARs on PX4 Firmware





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PX4 has its own unique advantages; it is preferred and liked by the majority of users. The TF series is a highly cost-effective LiDAR launched by Benewake, which is sought after by the majority of drone users. This tutorial introduces the connection method of TF series PixHawk and configuring over the PX4 firmware. The same procedure can be followed for other flight controllers as long as the right physical port is used. This document is based on QGroundControl v4.0.6 and firmware PX4 v1.11.0. If the ground station or firmware is not fully functional, please upgrade.

1 Hardware Connection

This article uses Pixhawk as an example to illustrate the connection, as shown below:



Please install the TF Series LiDAR on the multi-rotor, vertically downwards, and ensure that there are no obstacles in front of the lens. Then configure the software settings:

1) Under Settings--Parameters--EKF2_-EKF2_RNG_AID, select *Range aid enabled*, as shown below:

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成月後夏									
	12.041	FKF2 NOALD NOISE	10.0 =	Measurement noise for non-aiding position hold					
1	Battery Calibration	EKF2_NOAID_TOUT	5000000 uSec	Maximum lapsed time from last fusion of measurements that constrain velocity drift before the EKF will report t					
	Commandar	EKF2_OF_DELAY		Optical flow measurement delay relative to IMU measurements Assumes measurement is timestamped at trailing edge					
机架	DEDO	EKF2_OF_GATE							
(()) 传感器	EKF2	EKF2_OF_N_MAX	0.50 rad/s	Measurement noise for the optical flow sensor					
()	F# Attitude Control	EKF2_OF_N_MIN		Measurement noise for the optical flow sensor when it's reported quality metric is at the maximum					
00 遥控器	Failure Detector	EKF2_OF_POS_X	0.000 =	X position of optical flow focal point in body frame (forward axis with origin relative to vehicle centre of gr					
001 飞行模式	Follow target	EKF2_OF_POS_Y	0.000 m	Y position of optical flow focal point in body frame (right axis with origin relative to vehicle centre of grav					
	GPS Failure Navigation	EKF2_OF_POS_Z	0.000 =	Z position of optical flow focal point in body frame (down axis with origin relative to vehicle centre of gravi					
- 电源	Geofence	EKF2_OF_QMIN		Optical Flow data will only be used if the sensor reports a quality metric \succ EKF2_OF_QMIN					
📤 电机	Hover Thrust Estimator	EKF2_PCOEF_XN							
-	Land Detector	EKF2_PCOEF_XP							
安全	WAVLink	EKF2_PCOEF_YN		Pressure position error coefficient for the negative Y axis. This is the ratio of static pressure error to dyna					
이나 湖多	Wiecollanooue	EKF2_PCOEF_YP		Pressure position error coefficient for the positive Y axis. This is the ratio of static pressure error to dyna					
111	Winning	EKF2_PCOEF_Z		Static pressure position error coefficient for the Z axis. This is the ratio of static pressure error to dynami					
℃ 参数	Mission	EKF2_REQ_EPH		Required EPH to use GPS					
	Mixer Output	EKF2_REQ_EPV		Required EPV to use GPS					
L.	Mount	EKF2_REQ_GPS_H		Required GPS health time on startup					
	Ilticopter Attitude Contro	EKF2_REQ_HDRIFT		Maximum horizontal drift speed to use GPS					
	ilticopter Position Contro	EKF2_REQ_NSATS							
	Multicopter Rate Control	EKF2_REQ_PDOP		Required PDOP to use GPS					
	PWM Outputs	EKF2_REQ_SACC							
	Precision Land	EKF2_REQ_VDRIFT		Maximum vertical drift speed to use GPS					
	Radio Calibration	EKF2_RNG_AID		Range sensor aid 🦛					
	Madro dalloración	EKF2 RNG A HMAX	5.000 m	Maximum absolute altitude (height above ground level) allowed for range aid mode					





User-defined settings:

- **EKF2_RNG_A_VMAX**: The maximum horizontal speed trigger value of multi-rotor using TF series as range finder, it means that TF series LiDAR will become active only when the flight speed is lower than this value. The default value is 1m/s, the minimum value is 0.1m/s, and the maximum value is 2m/s.
- **EKF2_RNG_A_HMAX**: The maximum altitude trigger value of TF series based multi-rotor, which means that TF series will become active only when the flying altitude is less than this value. The default value is 5m, the minimum value is 1m, and the maximum value is 10m.
- Turn on LiDAR options: Under Setting--Sensors--SENS TFMINI CFG, select *TELEM2* (this port can be changed if you are using another serial port), as shown below:

Note: If this option is not available, you need to download the source program from the official website and change the default.cmake file of the corresponding board.

https://dev.px4.io/master/en/

File location: *PX4\Firmware\boards\px4\fmu-v2\default.cmake*, fmu-v2 is the corresponding flight control board; please refer to the official tutorial link below for details.

Change the content: Need to add distance sensor/tfmini

	Na10110001/1100011
24	<pre>#batt_smbus</pre>
25	<pre>#camera_capture</pre>
26	<pre>#camera_trigger</pre>
27	<pre>#differential_pressure # all available differential pressure drivers</pre>
28	differential_pressure/ms4525
29	<pre>#distance_sensor # all available distance sensor drivers</pre>
30	<pre>#distance_sensor/11401s</pre>
31	distance_sensor/tfmini 🔶
32	#dshot
33	‡gps
34	<pre>#heater</pre>
35	<pre>#imu # all available imu drivers</pre>
36	<pre>#imu/adis16448</pre>
37	<pre>#imu/adis16477</pre>
38	<pre>#imu/adis16497</pre>
29	im1/12ad20





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救 具装置	搜索:	清除 只显示修改					
्र सहरुद्	Standard	CAL_AIR_CMODEL	Model with Pitot	Airspeed sensor compensation model for the SDP3x			
	Battery Calibration	CAL_AIR_TUBED_MM	1.500 millimeter	Airspeed sensor tube diameter. Only used for the Tube Pressure Drop Compe			
	Commander	CAL_AIR_TUBELEN	0.200 meter	Airspeed sensor tube length			
机架	EKE2	CAL_MAG_SIDES		n Bitfield selecting mag sides for calibration			
((-)) 传感器	EW Astisula Control	IMU_ACCEL_CUTOFF	30.000 Hz	Low pass filter cutoff frequency for accel			
(, ,)	FW Attitude Control	IMU_DGYRO_CUTOFF					
00 遥控器	Failure Detector	IMU_GYRO_CUTOFF	30.000 Hz	Low pass filter cutoff frequency for gyro			
001 飞行楼式	Follow target	IMU_GYRO_NF_BW	20.000 Hz	Notch filter bandwidth for gyro			
an issue	GPS Failure Navigation	IMU_GYRO_NF_FREQ	0.000 Hz				
一 电源	Geofence	IMU_GYRO_RATEMAX					
📥 电机	Hover Thrust Estimator	SENS_BARO_QNH	1013.250 hPa	QNH for barometer			
安全	Land Detector	SENS_BOARD_ROT					
	WAVLink	SENS_BOARD_X_OFF					
이나 调参	Wi11	SENS_BOARD_Y_OFF					
TYL	miscerraneous	SENS_BOARD_Z_OFF					
今 参数	Mission	SENS_FLOW_ROT					
1	Mixer Output	SENS_TFMINI_CFG		Serial Configuration for Benewake TFmini Rangefinder			
	Mount						
	ilticopter Attitude Contro						
	ulticopter Position Contro						
•	Multicopter Rate Control						
	PWM Outputs						
	Precision Land						
	Radio Calibration						
	Radio Switches						
	Return Mode						
	SD Logging						
	Sensor Calibration						
	Sensors						
	Serial						

After completing the above steps, please restart the flight controller and QGroundControl. There is a LiDAR value display on the main interface, as shown below:



