120km Laser Range Finder Module

M120KX ultra-long range laser range finder module is a military pulsed laser rangefinder designed for aircraft, unmanned aerial vehicle, aerial gun and other application scenarios. It has the advantages of small size, low power consumption, stable performance, long measuring distance, long service life, eye safety and so on. It is an important technical equipment to improve the product aiming accuracy.Welcome to buy 120km Laser Range Finder Module from us.

Ranging range: flight height ≥6km, air-to-ground ranging target reflectance ≥0.1, measuring distance ≥120km. Surface to air, for a small target with a cross-sectional area of 0.1m2, target reflectivity ≥0.3, atmospheric visibility ≥16km, measurement distance ≥16km.

JIOPTICS® 120km Laser Range Finder Module Features

(1)There are three modes-operating mode, standby mode and error mode. With standby mode, pumping power and thermal-control power can be switch off. Operating mode is set as a default, if you want to switch to standby mode and set it as a default, it can be realized by laser communication instructions. In addition, it can also achieve power fail safeguard function.
(2)When power switch on, it can monitor and give feedback immediately. If it's in error, it will self-check and report (every 1s on self-check).
(3)It is able to collect times of transmitting laser pulse.
(4)With external trigger operating mode(No more than 25Hz).
(5)With overvoltage safeguard function.
(6)With overcurrent safeguard function: when current in laser LD excesses the maximum value, it will switch to standby mode and send error report.
(7)With overheat safeguard function: when radiator temperature excesses the maximum value in standby mode, it will switch to standby mode and send error report.

JIOPTICS® 120km Laser Range Finder Module Parameters

Parameters	Specification		
Wavelength	1570nm		
Maximum Range	≥120km	Ranging from sky to ground	reflectivity≥0.1

			Altitude of aircraft≥6km
	≥16km	Ranging from ground to sky, target area:0.1 ㎡	reflectivity≥0.3
			visibility≥16km
Minimum Range	≥400m		
Ranging repetition rate	≥20Hz		
Divergence angle	≤0.6mrad		
Ranging accuracy	≤±5m		
Power supply	DC 22V~30V		
Power (under room temperature)	≤300W		
Continuous operating time	≥3min@20hz		
Operating temperature	-40℃~+55℃		
Storage temperature	-50℃~+65℃		
Dimension	≤405mm×230mm×160mm(lens cap is not included)		
Weight	≤10kg		

Communication interfaces

With bold and clear marks, special design of socket and connectors is tend to protect it from reverse and false connection. For external interface, it adopts military J30J micro-connectors(names vary according to different manufacturers) Socket: XS1
Table 1 and table 2 show the socket and plug of external interface, table 3 shows definition of Pin NO.

Table 1 Socket of external interface of laser rangefinder

NO.	Item	Model	Mark
1	Socket of power supply and communication interface	J30JM-15ZKP29	XS1

Table 2 Plug of external interface of laser rangefinder

NO.	Item	Model	Mark
1	Plug of power supply and communication interface	J30J-15TJL–C1(L100)	XP1

Table 3 Definition of Pin NO.

PIN NO.	Abbr.	Note.	Definition
1	PWR+	DC，28V+	
2	PWR+	DC，28V+	
3	PWR+	DC，28V+	
4	PWR+	DC，28V+	
5	RTN_P	DC，28V-	
6	RTN_P	DC，28V-	
7	RTN_P	DC，28V-	
8	RTN_P	DC，28V-	
9	LRF_COM_T+	RS422(COM)Y	Laser rangefinder transmit+
10	LRF_COM_T-	RS422(COM)Z	Laser rangefinder transmit-
11	LRF_COM_R-	RS422(COM)B	Laser rangefinder receive-
12	LRF_COM_R+	RS422(COM)A	Laser rangefinder receive+
13	GND_ LRF_COM	RS422(COM)GND	
14	LRF_ Trigg_R+	external trigger receive+	
15	LRF_ Trigg _R-	external trigger receive-	

Dimension
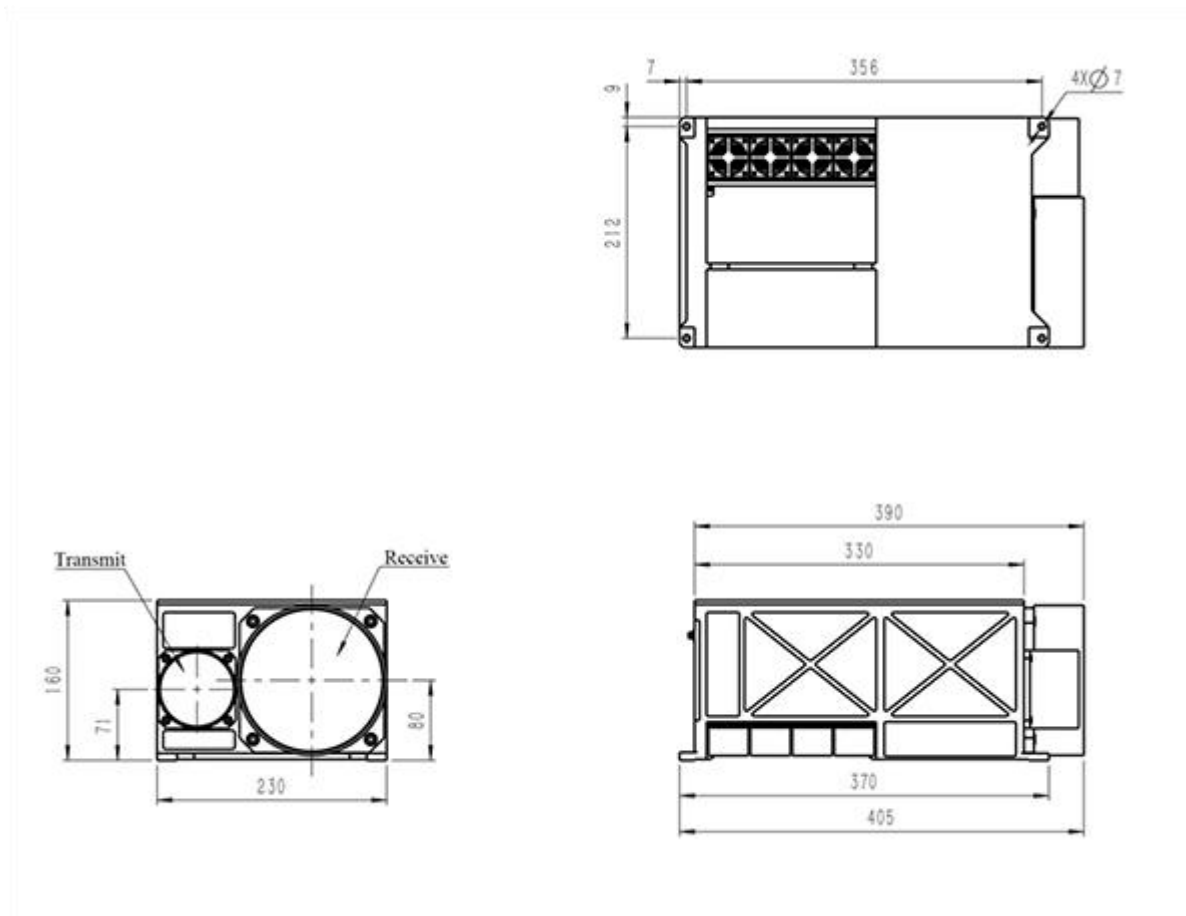
Calculation of ranging ability

Targets and condition requirements
Ranging ability: 120km(ranging from sky to ground, reflectivity:≥0.1, Altitude of aircraft:≥6km)
Ranging ability:≥16km(ranging from ground to sky, target area:0.1 ㎡, reflectivity:≥0.3, visibility≥16km)
(2)Analysis and verification
The main parameters that affect ranging ability are peak power of lasers, divergence angle, transmitting and receiving transmittance, wavelength of laser, etc.
For this laser rangefinder, it takes≥10MW peak power of lasers, 0.6mrad divergence angle, 1570nm wavelength, transmitting transmittance≥90%, receiving transmittance≥80% and 140mm receiving aperture.
It is a laser rangefinder for small targets, ranging ability can be calculated by the following formula.
Ranging formula for small targets：

$$P_r = \frac{4P_t \tau_t \tau_r A_s A_r \rho}{\pi \theta_t^2 R^4} \cdot e^{-2\sigma\frac{R}{V}}$$

P_r: Detectable optical power

P_t: Transmitting power of laser rangefinder(10MW)

τ_t: Transmitting transmittance(0.9)

τ_r: Receiving transmittance(0.8)

A_r: Optical receiving area(140mm receiving aperture)

ρ: Target reflectivity(0.3)

σ: Atmosphere attenuation coefficient(0.01)

R: Distance to targets

As long as detectable optical power that reflected by targets is larger than minimum detectable power, a laser rangefinder is able to range distance to a target. For a laser rangefinder with 1570nm wavelength, generally, the minimum detectable power(M.D.S) of APD is 5×10-9W.
Under 40km visibility with 32km distance to targets, the minimum detectable power is lower than M.D.S of APD(5×10-9W), therefore, under a condition with 40km visibility, a laser rangefinder can range distance for (2.3m×2.3m) targets up to 31~32km(might be close or less than 32km).