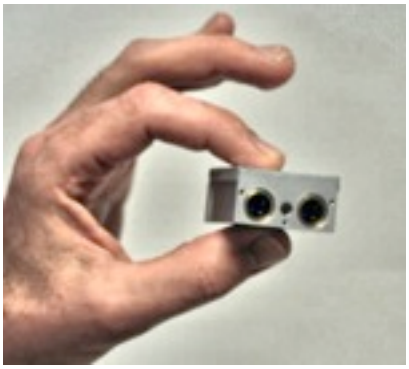
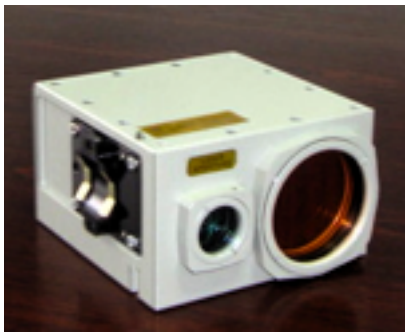
Altimeter systems by laser and radar Summary

ALTM 20000

ALTM 150

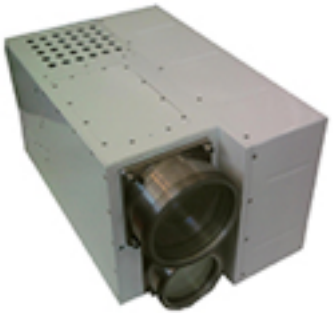


ALTM 120 Micro system



ALTM 2500

ALTM 250 Mini



ALTM 25000

Laseroptronix has worked with laser based altimeters since 15 years and offers a range of sensors with different characteristics. We have all from short range small systems to larger units with 25Km in range and MIL spec. We can also offer a radar based sensor and systems that can handle water surfaces with low reflectivity. Unique is a scanning altimeter that see top objects in a path below the aircraft which adds lots of valuable information.

Features of non contact altimeters

* Non contact sensors by laser or radar
* High speed and high accuracy possible
* High pinpointing capability and finer details and structures can be detected
* Not depending on air pressure and variables out of control
* Models for ROV and unmanned systems that are very small and low weight
* Honest readings as they can see obstacles like tree top in real distances
* Scanning altimeters available that see far moire of what is down there.
* Realistic price level of most models

Laseroptronix
Glimmervägen 8
E-mail info@laseroptronix.se

Telephone office 46-70-7140470
187 40 Täby Sweden
www.laseroptronix.se

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Altimeters are made to measure height when flying. This is no easy task as the application is not as simple as many believe. Here we must see application in step 1. Is this a collision avoidance system ? Or landing aid ? OR a sensor in an other system like GIS data collection. Military ? All have own demands and needs a bit of thinking before we say what is needed.

Table of common models of non scanning altimeters

Model	Range	Speed	Accuracy	Resolution	Weight	Dimensions
ALTM 35	1-35 m	4KHz	+- 5 cm	1 cm	260 gram	103x54x38 mm
ALTM 120 M	2-120 m	12 Hz	+- 5 cm	1 cm	43 gram	36x20x39 mm
ALTM 150	2-150 m	3000 Hz	+- 5 cm	1 cm	260 gram	103x54x38 mm
ALTM 150 Hi	2-150 m	36000 Hz	+- 10 cm	5 cm	260 gram	103x54x38 mm
ALTM 250	20-300 m	10 Hz	+- 1 m	0,3 m	180 gram	95x45x30 mm
ALTM 500	2-500 m	1000 Hz	+- 10 cm	5 cm	600 gram	134x83x51 mm
ALTM 1000	20-1000 m	10 Hz	+-1 m	0,3 m	350 gram	109x76x46 mm
ALTMN 1500	3-1500 m	1000 Hz	+- 10 cm	5 cm	950 gram	154x130x73 mm
ALTM 2500	30-2500 m	1000 Hz	+- 2 m	0,5 m	1,2 Kg	150x120x70 mm
ALTM 6000	1-6000 m	2 Hz	+- 1 m	0,1 m	2.6 Kg	230x210x95 mm
ALTM 10000	100m-10km	5 Hz	+-1 m	+- 1 m	3 kg	110x110x250 mm
ALTM 25000	100 m-25km	5 Hz	5 m	5 m	8,6 Kg	145x200x290mm
Radar module						
ALTR 100	0.3-100m	100 Hz	0,5m	0,5m	Not much	100x100x42 mm

Common specifications for altimeters

Input voltage is flexible and we can fulfill all demands from 5 VDC / 28 VDC to 230 VAC

Output is RS 232, RS 485 or what ever needed by protocol converters.

Temperature range differs but is mostly from - 40 to + 60 C on all models

Design criteria is industrial on some models to MIL spec and Air borne spec of others

Beam divergence All are from about less 1 mili radians on long range units to 2 mili radians for short range

All units are in laser safety class 1 , 2 or 3R. No unit is class 4 that is very dangerous for the eyes.

Units will less 6000 meter in range are diode based units operating at 905 nm in near IR spectra.

10-25 KM units use a 1,5 micron laser source which limits speed to max 5 Hz

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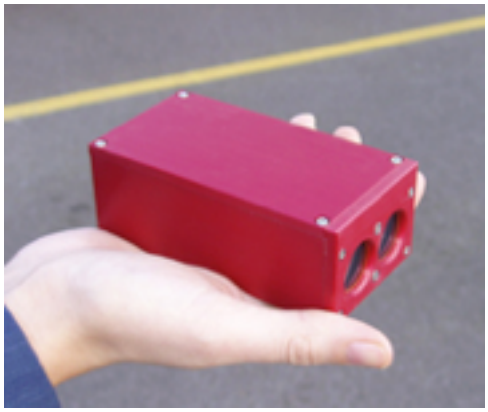
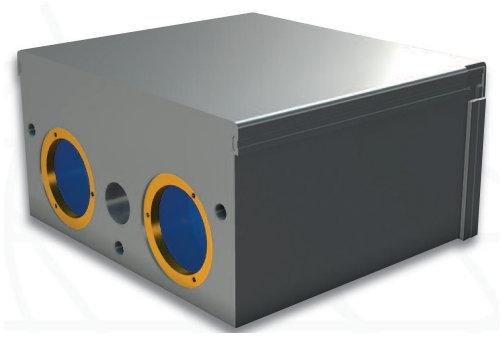


ALTM 35, ALTM 150 and ALTM 150 Hi have same casings but differs in components and software + output. This is a rugged industrial unit with good characteristics and suitable when range is not very long. Applications in landing and UAV are typical.Temperature range is - 40 to + 60C and output is RS 232. Beam divergence is 2.2 mili radians. IP 67 encapsulation. Power supply is 9-24 VDC and it needs about 150 mA at 12 VDC



ALTM 120 M is the smallest device we can offer.It is a bit limited but for many small robot flyers and UAV this can be the solution. It is IP 40 encapsulated and rugged to a high degree. Output is USB 2. Option is a red laser pointer. Power by the USB cable.

ALTM 250 is a small device with better range and a MIL certification of STD-810 G. This is really a rugged device and very well sealed. Special attention has been done to heavy shocks. Temperature range is -40 C to + 55 C. IP 68 encapsulation and RS 485 computer interface. Power input is 6 +- 0,5 Volt without converter.

ALTM 500 is the most common model that fulfill many demands at not very high altitude. This is often used in GIS application and forest measurements. Industrial style with IP 67 encapsulation. Temperature range - 40C to + 60 C. Power input 9-24 VDC and less 200 mA at 12 VDC. The 1000 Hz in output speed with single shot accuracy of +- 10 cm makes this very universal for many applications in avionics.

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Glimmervägen 8
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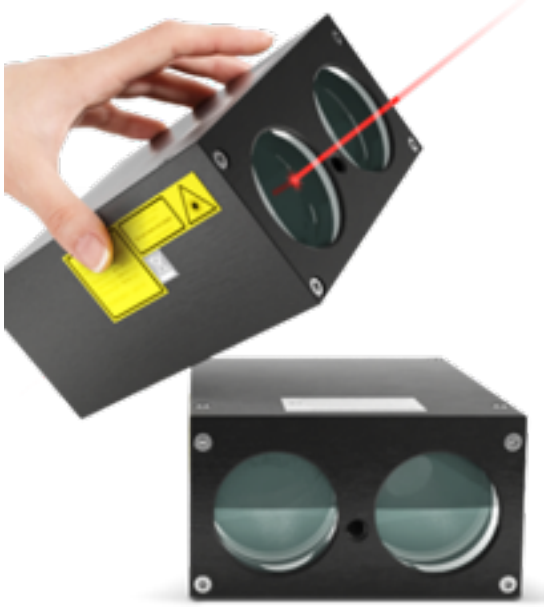
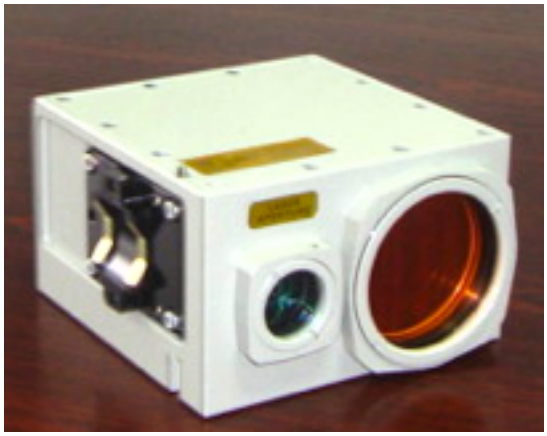
ALTM 1000 compact system can operate to 1000 meter in distance and is very compact and light weighted. MIL certification of STD-810 G. This is really a rugged device and very well sealed. Special attention has been done to heavy shocks. Temperature range is -40 C to + 55 C. IP 68 encapsulation and RS 485 computer interface. Power input is 6 +- 0,5 Volt without converter.



ALTM 1500 is an attractive medium range unit with high speed and accuracy to realistic cost. Here we offers 1000 Hz in speed combined with +- 10 cm in single shot accuracy. Output by RS 232. Ambient temperature range is - 40C to - 60 C .Encapsulation IP 67 standard. Operating voltage 9-24 VDC.

Option we have delivered is 16 KHz output where laser get into a 3B device. Here we can also add scanners for peak tracking of min distances in the area.



ALTM 2500 is a rugged MIL spec and airborne optimized design. Here we have a laser diode system with good range and full 1000 Hz at full range. Encapsulation is IP 57 standard. Operating voltage is 6 volt DC but we have converters for what is needed.

Casing have calibrated mounting surfaces. There is also a viewer channel for optical alignment.

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Glimmervägen 8
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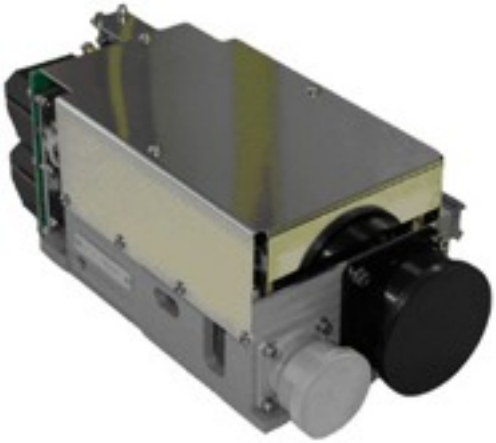
ALTM 6000 is a 6000 meter diode based slow device. It has been used for 3D glacier mapping in arctic areas. Encapsulation is IP 66 and operating voltage 9 VDC.

This device have an integrated inclinometer that can be reached by the RS 232 used for altimeter data transmission.

This system can have an aiming camera integrated into the casing.



ALTM10 000 is a long range system with low speed output by RS232. Spectra of laser is 1538 nm by a Raman shifted Yag laser that is eye safe Class 1. The pump lamp can operate for 10 million shots between replacements. Ambient temperature is -20 C to + 55C. Operating voltage is 20-30 VDC.

This system is a MILitary design and very rugged and solid

ALTM 25000 is a long range 25 KM system. Design is military / airborne and system is very rugged and solid. It is low speed and have a RS 232 interface for communication. The laser is an Yag laser with converter operating at 1570 nm in eye safe area of spectra. The laser is liquid cooled. This makes the laser class 3B system. Ambient temperature is - 32C to + 55C.

Laser is aligned to its mechanical interfaces to be easy to replace and keep alignment correct.

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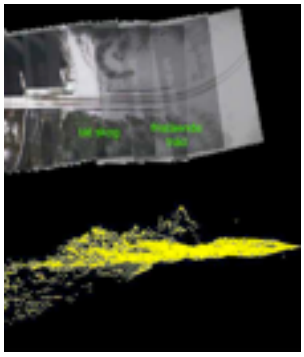
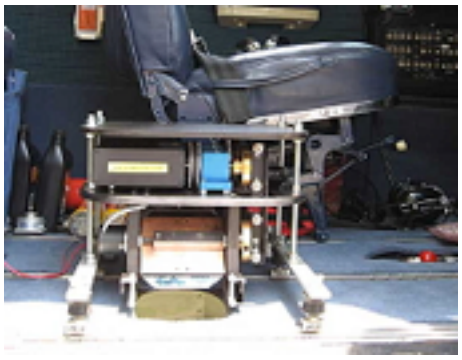
Radar altimeters

ALTR 100 radar unit is a small rugged radar unit to a reasonable price that can be used for altimetry. Range is max 100 meter and it have a radar angle of 11x11 degree. Radar is a 24 GHz ISM band unit. Operating temperature is - 20 C to + 60 C. Encapsulation is IP 67.

RS 232 output included distance data but also laser doppler data for speed vertically.

Scanning laser altimeters for advanced flight control.





Scanning altimeters are unique in that they scan the area under the aircraft and look for a a distance profile. Here they can pick up the shortest distance or longest distance etc. If a flight corridor is in a canyon the question is what is the altitude over the ground. Maybe straight down it is 1000 meter and a little to left 50 meters. Here automatic alarms can be activated.

Scanning altimeters can also be aimed to front and here we see what is coming before we are there. This is of extra value when landing helicopters on low contrast surfaces in bad illumination.

Laseroptronix offers several solutions here with all form very fast 150 meter systems to a slower but still rather fast 2500 meter system. Here we can see all scanned dimensions in 3D.

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