Figure 1. Top View of INS-4533-R10

APPLICATIONS

- Optoelectronic pod, the stability of the antenna system
- Attitude/azimuth reference system, multi-beam attitude sensing
- Railroad track inspection vehicle, UAV, unmanned ship navigation and control
- Space stable platform, intelligent navigation and control of coal excavator and mining excavator

DESCRIPTION

INS-4533-R10 is a high-performance and high-precision fiber-optic integrated navigation system developed by AIT for aviation surveying and mapping, unmanned aerial vehicles, sea- based and road-based fields. Built-in three-axis fiber optic gyroscope, three-axis accelerometer, optional three-axis magnetic sensor, high-precision air pressure sensor, including a BD/ GPS/ GLONASS three-mode receiver. It can measure the speed, position, and attitude of the carrier, and output the compensated angular rate, acceleration, magnetic field, air pressure, temperature and other information.

INS-4533-R10 is equipped with a brand-new integrated navigation sensor fusion algorithm engine, optimized for multi-path interference, which can well meet the needs of long-term, high-precision, and high-reliability navigation applications in urban and field complex environments. The product supports multiple external sensors such as GNSS/ odometer/ DVL/ barometric altimeter, and has excellent scalability. By using multi-sensor data fusion technology to combine inertial measurement with satellite navigation, odometer information and other information, the system can be regional adaptability and robustness have been greatly improved.

INS-4533-R10 integrated navigation system uses tight coupling technology to closely combine high-precision, professional-grade, multi-channel, dual-antenna single-frequency carrier phase and pseudo-range GPS receivers with high-precision optical fiber inertial measurement units. It has small size, light weight, and Features such as high performance.

SPECIFICATIONS

Table 1.

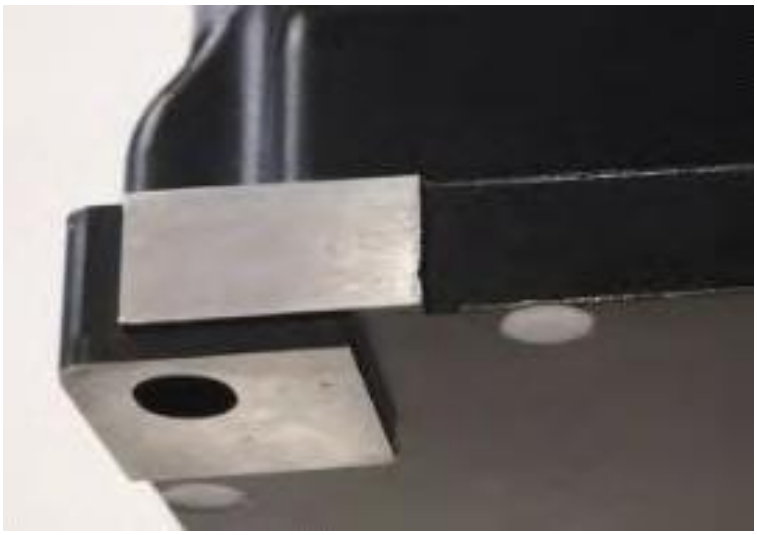
Parameter	Typ.	Unit/Note
North Seeking Accuracy	≤0.5*Secant Latitude	°C
Heading accuracy	≤0.05 (RMS, single antenna dynamic alignment)	°C
Attitude accuracy	≤0.05	°C
Position accuracy	Satellite combination ≤1.5m (single-point positioning, RMS)	M
	DVL combination 1% x D (D is distance travelled)	M
	Odometer combination 0.3% x D (D is distance travelled)	M
Speed accuracy	≤0.03m/s (satellite combination, RMS)	km
Start-up time	≤5S	
Alignment time	≤1-2min (dual antenna satellite assist)	min
Data refresh rate	0.1-100	Hz
Gyroscope range	±1000°	/s
Zero bias stability	≤0.05°	/h
Accelerometer range	±30g	g
Zero bias stability	≤50ug	ug
Supply voltage	18-36V(DC)	
Operating temperature	-40℃~65℃	℃
Storage temperature	-50℃~80℃	℃
Physical dimensions	145 × 121.5 × 125(mm) L5.71 × W4.78 × H4.92 (inch)	
Shock vibration	Meet GJB150.16A-2009,	
Power consumption	≤20W	
Material	Aluminium alloy	
Weight	≤2.6	kg
Interface form	1×RS232,2×RS422,1×PPS，1×CAN，1×RJ45	

INSTALLATION

The GPS antenna we routinely select is a zero-phase measurement one, and general navigation antennas cannot be used in this product. Although some navigation antennas can also be directional, the accuracy will be greatly reduced and errors may also result. If the user replaces an antenna that is not configured or designated by the company, the system will not work properly or other consequences will occur, and the company is not responsible

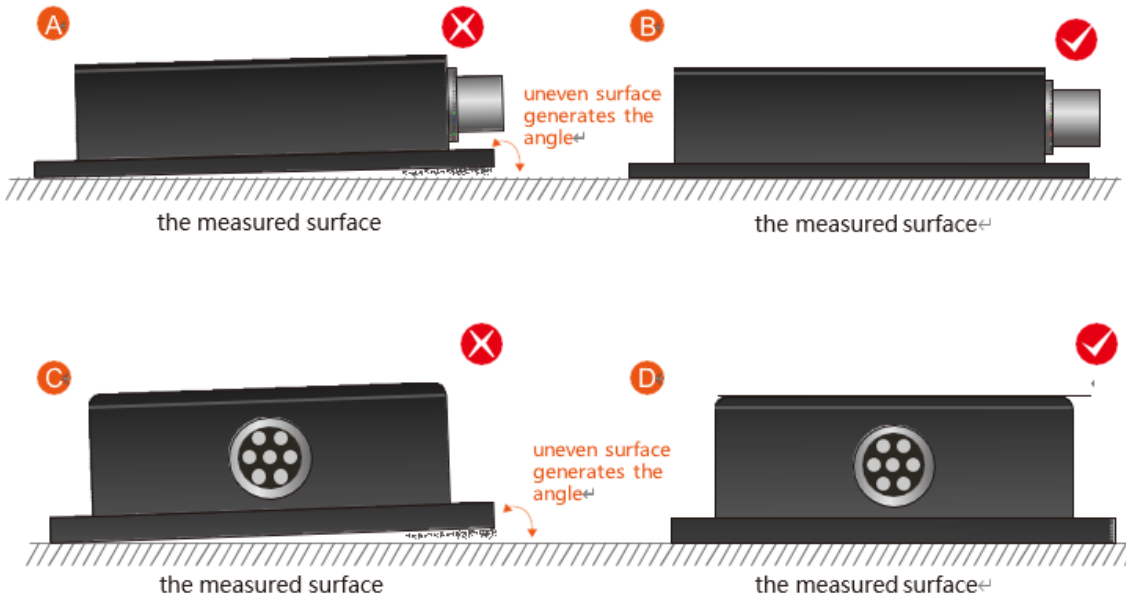
for this.

The correct installation method can avoid measurement errors. The integrated navigation system uses CNC grinding to machine the bottom surface and the measuring surface to make an absolutely smooth surface for easy installation. The following points should be done during installation:



First of all, you must ensure that your equipment has two absolutely smooth planes, and the two planes are absolutely perpendicular, and coincide with the body coordinate system as much as possible to reduce installation errors.

Secondly, while installing the product, the bottom surface of the integrated navigation system coincides with the bottom surface of the aircraft body. Gently push the integrated navigation system to make the combined navigation system and the aircraft surface overlap to ensure that the two surfaces are in close contact with each other. The angle shown is generated, and the correct installation method is shown in Figure B and Figure D.



Finally, after the integrated navigation system is closely attached to the body, use screws to ensure tight fixation, smooth contact, stable rotation, and avoid measurement errors due to acceleration and vibration. Remember that at this time, the screw only serves as a fixing function, not a positioning function. The screw hole of the integrated navigation system is processed into an oval shape for easy adjustment.

ELECTRICAL CONNECTION

XCE12F3Z1D1 The connector interfaces are defined in the following table

NO.	Definition	Remarks：
1	VCC+	Power supply(18-36V)
2	GND	
3		N/A

XE24F26Z1D1 The connector interfaces are defined in the following table

NO.	Definition	Remarks
1	RS422 _ T+	RS422 COM1
3	RS422 _ T-	
5	RS422 _ R+	
7	RS422 _ R-	
9	RS422 _ T+	Reserve
11	RS422 _ T-	
13	RS422 _ R+	
15	RS422 _ R-	
Other		N/A

DIMENSIONS

Outline Dimensions: L145×W121.5 ×H125 mm

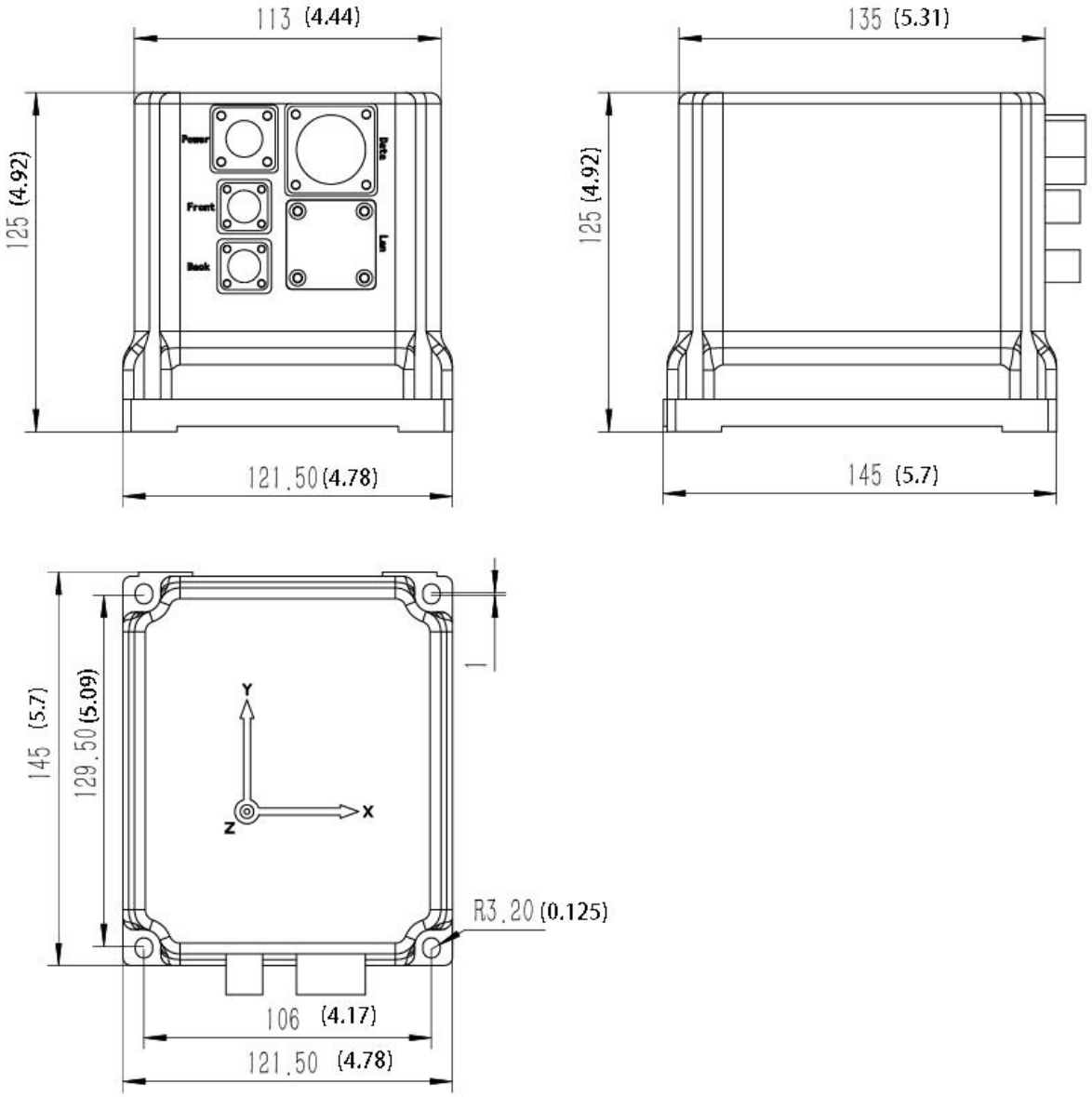


Figure 2. Outline Dimensions

Note: No dimension tolerance is specified according to grade C of GB/T1804-2000.

DEBUGGING SOFTWARE

Steps for usage:

① Ensure that the inertial navigation is absolutely stationary, correctly connect the serial port hardware of the integrated navigation, and connect the power supply.

② Select computer serial port and baud rate, next click connects serial port.

③ Enter the correct geographic latitude, click Inertial Navigation Start → Command Enter, and the working state on the screen shows static alignment. After the working state becomes INS navigation, the inertial navigation enters the working state and can be used at this time.

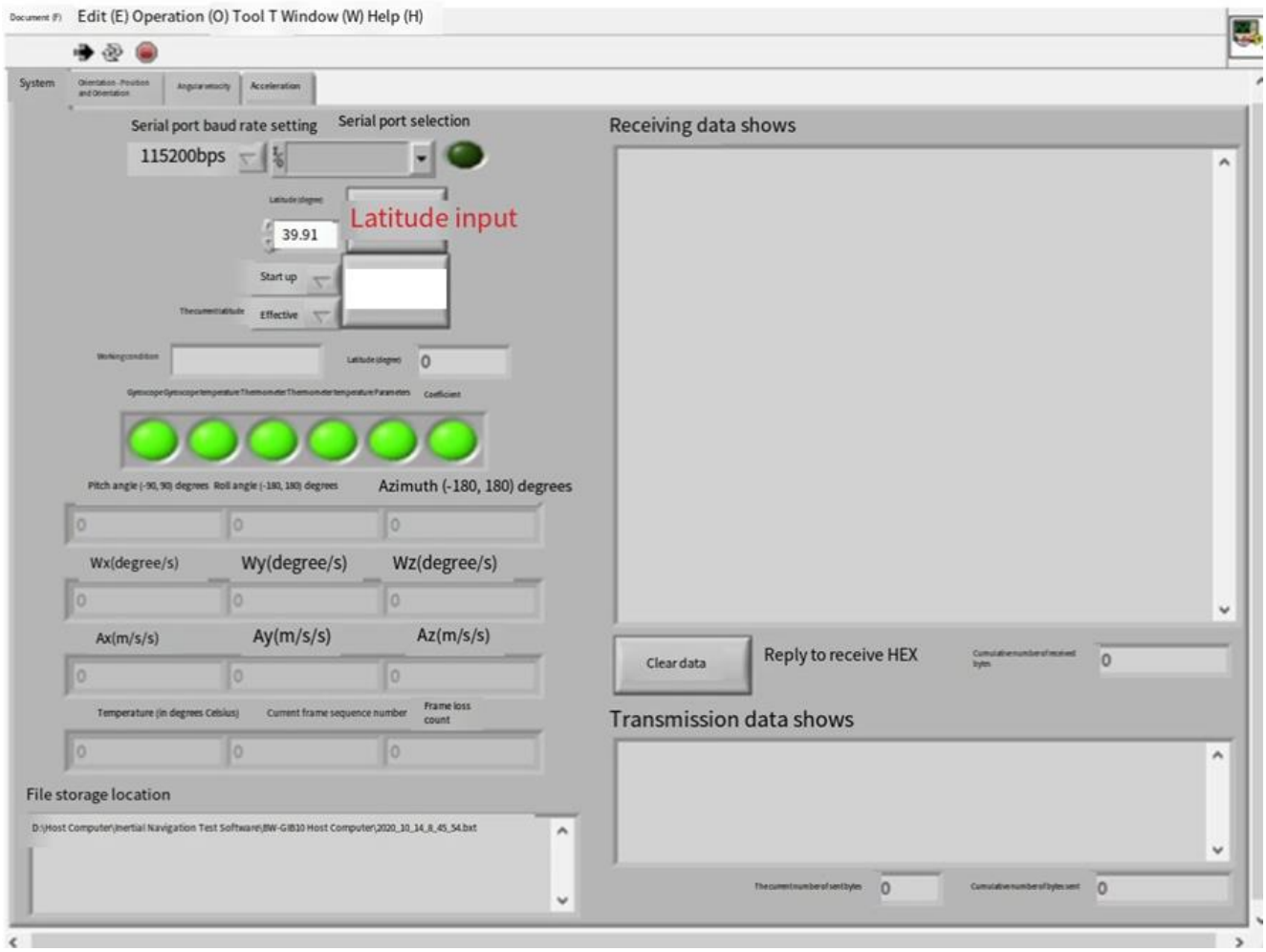


Figure 3：Debug interface

EXECUTIVE STANDARD

- National Standard for Static Calibration Specifications for Dual-Axis Inclination Sensors (Draft)

- GB/T 191 SJ 20873-2003 General Specification for Inclinometers and Levels

ORDERING INFORMATION

Part Number	Buy Now
INS-4533-R10	* *

*: both and are our online store icons. Our products can be ordered from either one of them with the same pricing and delivery time.

NOTICE

1. It is important to carefully read and follow the warnings, cautions, and product-specific notes provided with electronic components. These instructions are designed to ensure the safe and proper use of the component and to prevent damage to the component or surrounding equipment. Failure to follow these instructions could result in malfunction or failure of the component, damage to surrounding equipment, or even injury or harm to individuals. Always take the necessary precautions and seek professional assistance if unsure about proper use or handling of electronic components.
2. Please note that the products and specifications described in this publication are subject to change without prior notice as we continuously improve our products. Therefore, we recommend checking the product descriptions and specifications before placing an order to ensure that they are still applicable. We also reserve the right to discontinue the production and delivery of certain products, which means that not all products named in this publication may always be available.
3. This means that while ATI may provide information about the typical requirements and applications of their products, they cannot guarantee that their products will be suitable for all customer applications. It is the responsibility of the customer to evaluate whether an ATI product with the specified properties is appropriate for their particular application.
4. ATI warrants its products to perform according to specifications for one year from the date of sale, except when damaged due to excessive abuse. If a product fails to meet specifications within one year of the sale, it can be exchanged free of charge.
5. ATI reserves the right to make changes or discontinue products or services without notice. Customers are advised to obtain the latest information before placing orders.
6. All products are sold subject to terms and conditions of sale, including those pertaining to warranty, patent infringement, and limitation of liability. Customers are responsible for their applications using ATI products, and ATI assumes no liability for applications assistance or customer product design.
7. ATI does not grant any license, either express or implied, under any patent right, copyright, mask work right, or other intellectual property right of ATI.
8. ATI's publication of information regarding third-party products or services does not constitute approval, warranty, or endorsement.

9. ATI retains ownership of all rights for special technologies, techniques, and designs for its products and projects, as well as any modifications, improvements, and inventions made by ATI.
10. Despite operating the electronic modules as specified, malfunctions or failures may occur before the end of their usual service life due to the current state of technology. Therefore, it is crucial for customer applications that require a high level of operational safety, especially in accident prevention or life-saving systems where the malfunction or failure of electronic modules could pose a risk to human life or health, to ensure that suitable measures are taken. The customer should design their application or implement protective circuitry or redundancy to prevent injury or damage to third parties in the event of an electronic module malfunction or failure.

