AIT



WTS-7628-R20 Series
High-speed wireless transmission inclination sensor
Technical Manual

V3.0

High-speed Wireless Transmission Inclination Sensor

WTS-7628-R20

FEATURES

- Resolution 0.001°
- Dual-axis inclination measurement with ±60° range
- Magnetic switch
- Data can be transferred to the cloud
- Unique balanced pressure valve
- Replaceable battery
- IP68 waterproof rating
- Accuracy 0.005°
- Battery query
- Timed wake-up
- Motion wake-up
- Remote online upgrade
- Temperature output
- Three-axis inclination, three-axis acceleration

APPLICATIONS

- Dangerous housing monitoring
- Bridge tower inclination measurement
- Dam monitoring
- Slope disaster prevention
- Ancient building protection monitoring
- Tunnel monitoring
- Foundation pit inclinometer
- Tower tilt monitoring

DESCRIPTION

WTS-7628-R20 High-speed Wireless Transmission Inclination Sensor is a compact, intelligent digital inclination sensor designed specifically for structural health monitoring. Using rechargeable lithium batteries or disposable dry batteries, rechargeable lithium batteries can work continuously for 24 hours on a single charge (continuous measurement and transmission of data), can be connected to a special external charger for rapid charging. It can meet the demand of high-precision and high-frequency monitoring. Using disposable dry battery to upload data once an hour can be used continuously for 3 years, which can meet the long-term monitoring needs of customers. With remote control and management functions, connecting the wireless router can transmit data to the cloud.

In terms of network connection, the sensor has an automatic disconnection and reconnection function, effectively avoiding problems caused by network anomalies and server maintenance and other factors resulting in loss of connection. Support TCP and UDP. sensitive mechanism using the latest technology, micro-electromechanical production process inclination unit, small size, low power consumption, high consistency and stability, due to the digital inclination sensing module, linearity is easier to get corrected. The working temperature reaches industrialgrade -40℃～+85℃.

SPECIFICATIONS

Table 1. Mechanical Index

Connector	Aviation connector
Protection level	IP68(1 m water depth, 24 hours continuous test)
Shell material	ABS+30% glass fiber + magnesium aluminum alloy anodized base
Installation	Four M6 screws

Note:
1. Please tighten the cap to prevent the product from water ingress when the socket is not wired.
2. There are wires inside, please don't dismantle it violently when opening the top cover or bottom plate.

Table 2. Performance Index

Measuring range	condition	≤5	5~30	30~60	°
Measuring Axis	Vertical to	X-Y-Z			
Accuracy	room	±0.005	±0.006	±0.007	°
Resolving Power		0.001	0.001	0.001	°
Zero Temperature	-40～85℃	±0.002	±0.002	±0.002	°/℃
Cross-axis error	25℃	0.005	0.006	0.007	°
Output Frequency	Up to 100				Hz
Other Output Data	Temperature, Battery Voltage				
Auto Sleep Mode	Support				
Timed wake-up	Support				
Motion Wakeup	Support				
Mean Time Between Failure	≥ 90000 hours				
MTBF	According to GBT17626				
Electromagnetic	≥100 MΩ				
Impact resistance	2000g, 0.5ms, 3 times/axis				
Overall Dimension	L105.2*W85*H76(mm)(without antenna)				
Weight	<500g				

Resolution: The smallest change value of the measured value that the sensor can detect and distinguish within the measurement range.
Accuracy: The root mean square error of the actual angle and the sensor measuring angle for multiple (≥16 times) measurements.

Table 3. Electrical index

Power connector	Rechargeable Battery Voltage	8.4V DC
	Disposable Dry Battery Voltage	3.6V DC
	Standby Current	6μA (typical)
	Operating Current	80mA (Average value)
	Rechargeable Battery Capacity	6000mAH
	Disposable Dry Battery Capacity	19000mAH
Working Temperature	-40℃~85℃	
Communication Distance	Open 200m	
Frequency band	2412 ~ 2484MHz	
Standard Antenna Height	159mm	
Antenna Gain	8DBI	
Transmit power	13~16dBm	
Receiving Sensitivity	-90~-67dBm	

Note: The negative terminal is usually under the plastic skin of the battery, please take effective measures to prevent short-circuiting of the battery caused by rubbing the plastic skin during battery disassembly.

Calculation of power consumption

Hibernation current 6uA
3 years hibernation current consumption 0.006*24*365*3=157.68mAh
Average working time per power-on 45s, average working current 50mA, 1 hour wake-up time
Power consumption per wake-up 45/3600*50=0.625mAh
Wake up once an hour for 3 years power consumption is: 0.625*24*365*3=16425mAh
Consumption for 3 years: 16425+157.68=16582.68mAh
Remaining power 19000-16582.68=2417.32mAh
Remaining power can also be a total of motion wake-up times
2417.32/0.625=3867.712

Network Topology

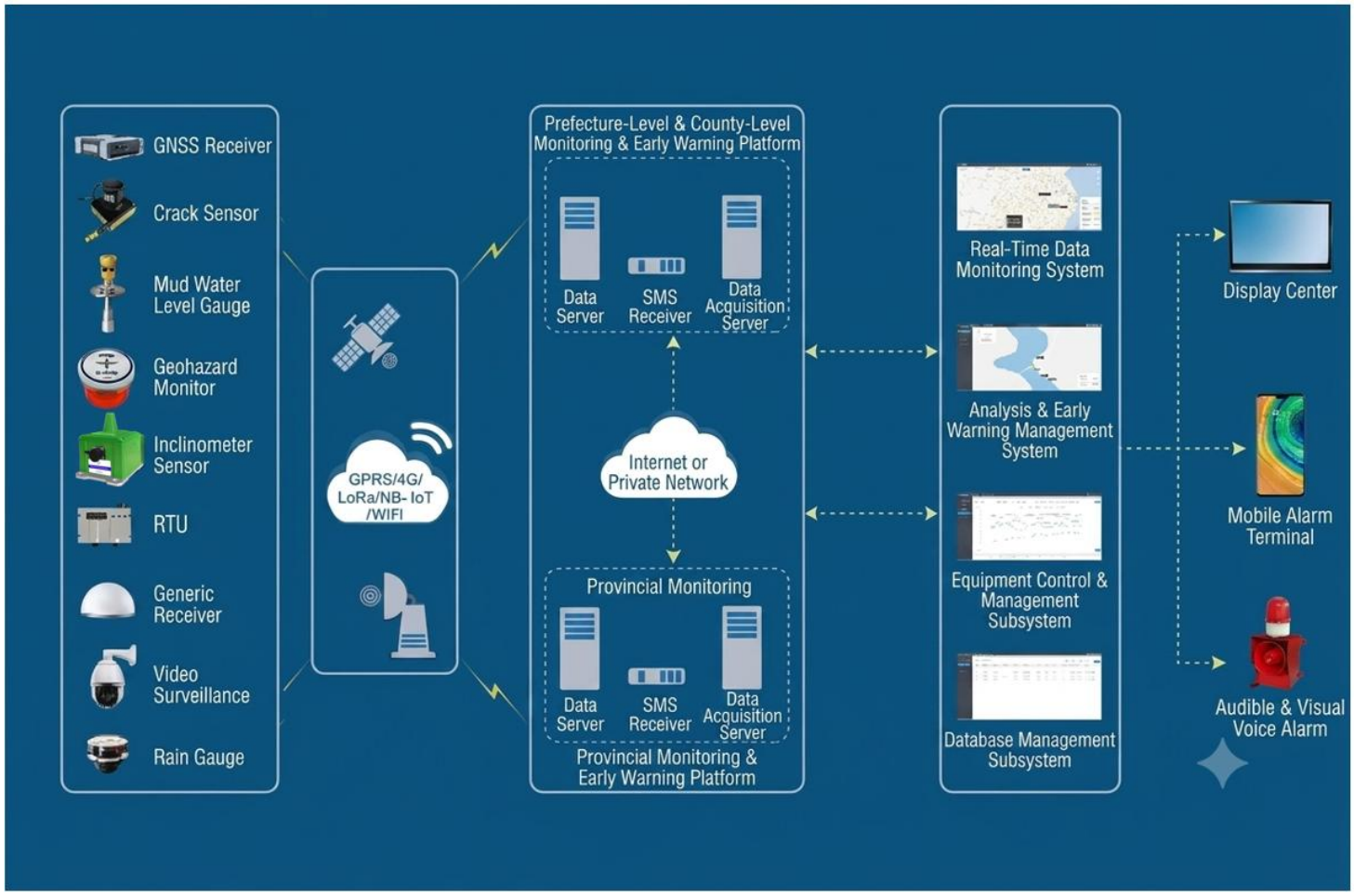


Figure 1. Network Toplogy

ELECTRICAL INTERFACE

Aviation plug wiring definition

Wiring color	RED	BLACK	GREEN	YELLOW
function	1	3	4	5
	3.6-5V	GND	RXD	TXD

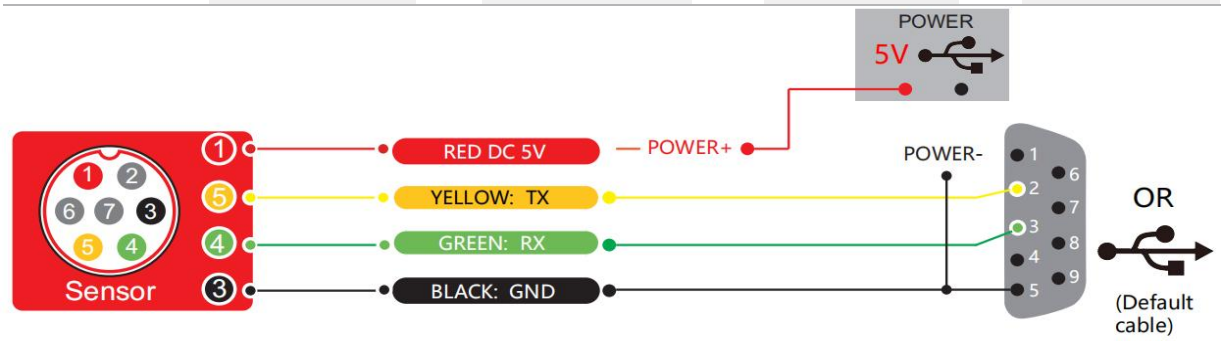
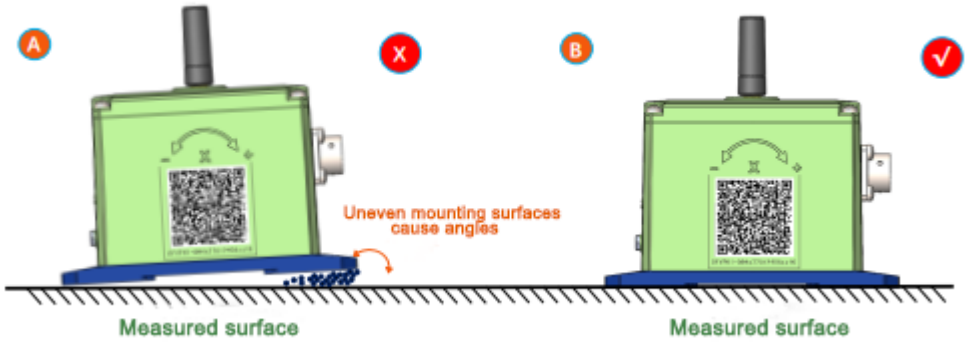


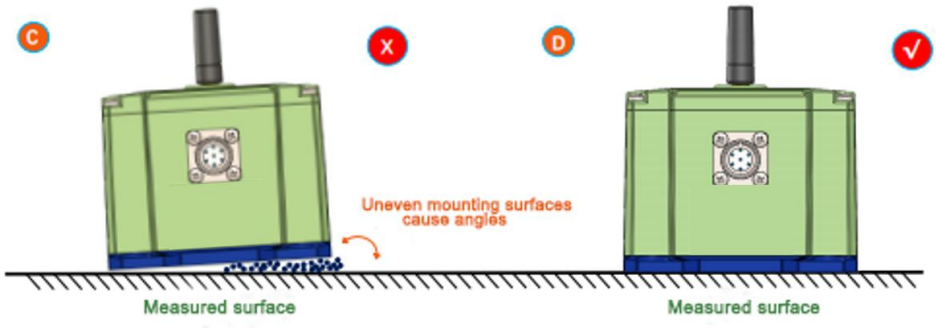
Figure 2. Electrical Connection

INSTALLATION

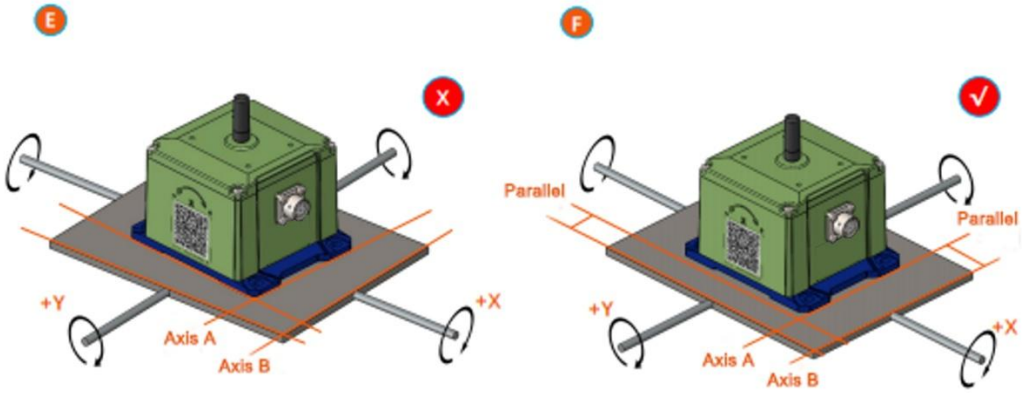
The correct installation method can avoid measurement errors. The following points should be done when installing the sensor:

First of all, make sure that the sensor mounting surface is completely close to the measured surface, and the measured surface should be as level as possible, and there should be no included angles as shown in Figure A and Figure C. The correct installation method is shown in Figure B and Figure D.





Secondly, the bottom line of the sensor and the axis of the measured object cannot have an angle as shown in Figure E, and the bottom line of the sensor should be kept parallel or orthogonal to the axis of rotation of the measured object during installation. This product can be installed horizontally or vertically (vertical installation needs to be customized), and the correct installation method is shown in Figure F.



Finally, the mounting surface of the sensor and the surface to be measured must be tightly fixed, smooth in contact, and stable in rotation, and measurement errors due to acceleration and vibration must be avoided.

DIMENSIONS

Product size：(Antenna not included) L105.2*W85*H96.8（mm），the length and width may be a 1mm error, please refer to the actual product

Standard antenna height: 159mm (this product without antenna cap)

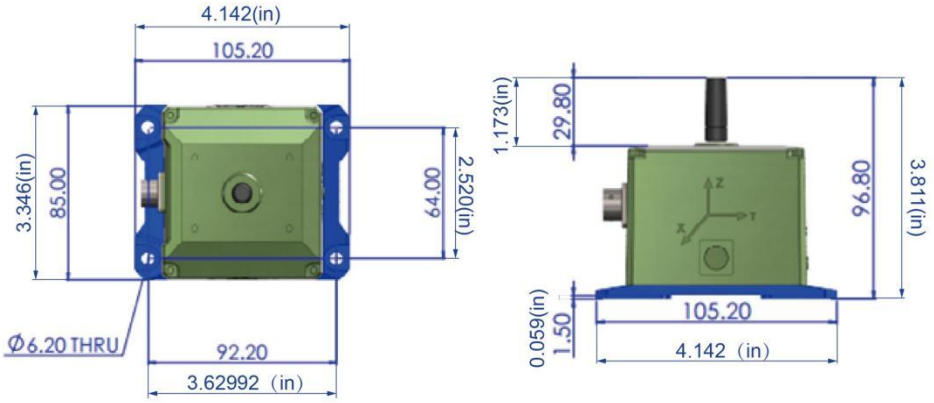


Figure 3. Outline Dimensions