AIT



WTS-7627-R20 Series
4G wireless transmission inclination sensor
Technical Manual

V3.0

4G Wireless Transmission Inclination Sensor

WTS-7627-R20

FEATURES

- Resolution: 0.001° .
- Dual-axis inclination measurement with a range of ± 90° .
- Magnetic switch
- Data can be transferred to the cloud
- Remote online upgrade
- Three-axis acceleration
- IP68 waterproof rating
- Accuracy 0.005°
- Three-axis tilt
- Timed wake-up
- Wake on Motion
- Unique balanced pressure valve
- Temperature output
- Replaceable battery

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-7627-R20 4G Wireless Transmission Inclination Sensor is a miniaturized intelligent digital inclination sensor designed for structure health monitoring. It can output three-axis inclination and three-axis acceleration, adopts high-capacity lithium-ion battery (optional rechargeable lithium battery), uploading data once an hour can be used continuously for 3 years. Support 4G full network pass can transmit data to the cloud, support TCP and UDP.This product can set the hibernation time as well as the number of times to send and the sending interval time for each wake-up through the cloud.

Sensitive structure adopts the latest technology, micro-electromechanical production process inclination unit, small size, low power consumption, high consistency and stability, because it is a digital inclination sensing module, linearity is easier to get corrected. The working temperature reaches industrial grade -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

Monitoring items	Range	Accuracy	Unit
X,Y,Z axis angle	0~30	0.005	°
	30~60	0.006	°
	60~90	0.007	°
X,Y,Z axis acceleration	±2000	1	mg
Other reported data	Temperature, Battery Voltage, 4G Signal Strength		
Frequency band information	LTE		
LTE-FDD	B1/B3/B5/B8		
LTE-TDD	B34/B38/B39/B40/B41		
USIM card	Nano-SIM card (small card), support 4G full network communication, user replaceable		
Free Maintenance Time	>3 years		
Weight	<500g		
Dimension	L105.2*W85*H76 (mm) (without antenna)		
Standard Antenna Height	28mm (without antenna cap); 40.94mm (with antenna cap)		
Standard Antenna Gain	12DBI		

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 Charging Voltage	8.4VDC
	Disposable Dry Battery Voltage	3.6VDC
	Standby Current	6μA (typical)
	Operating Current	50mA (average)
	Rechargeable Battery Capacity	6000mAH
	Disposable Dry Battery Capacity	19000mAH
Operating temperature	-40℃~85℃	

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

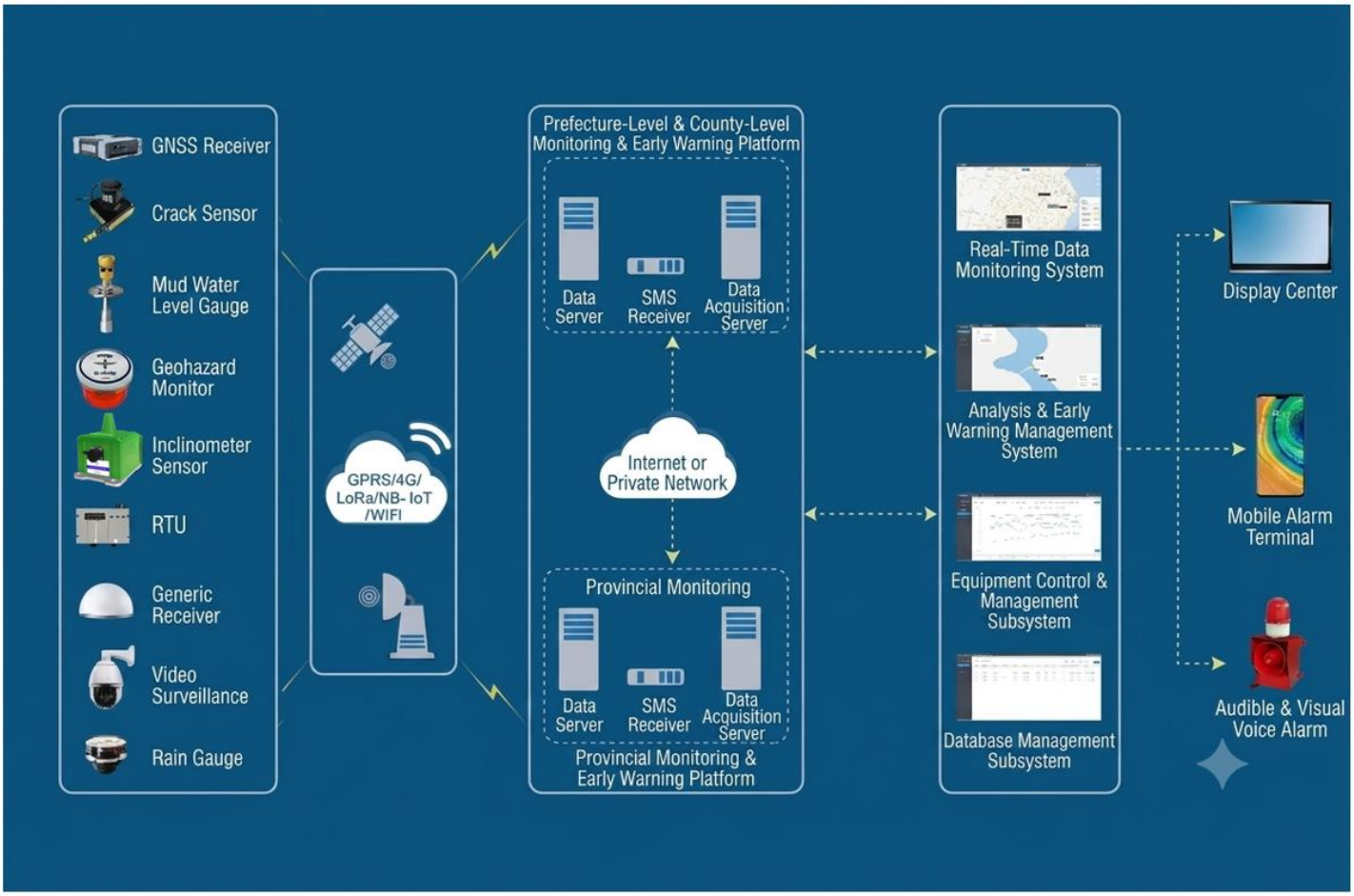


Figure 1. Network Toplogy

ELECTRICAL INTERFACE

Aviation plug wiring definition

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

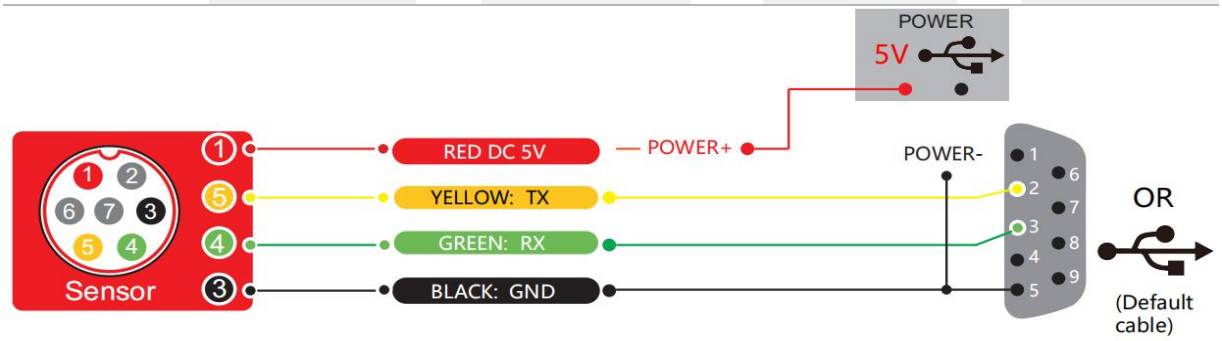
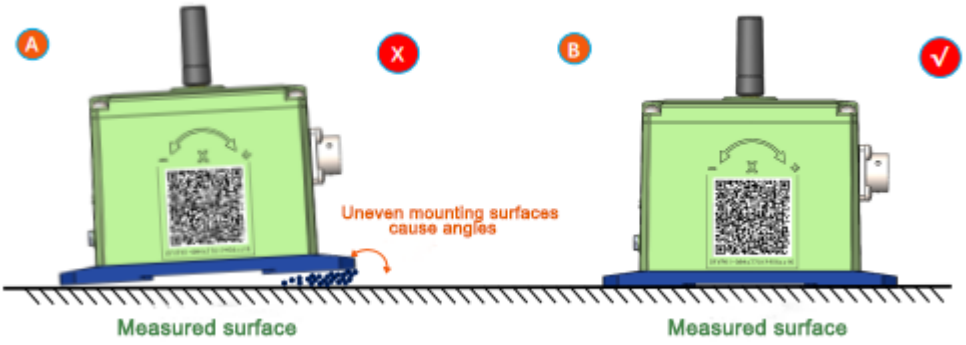


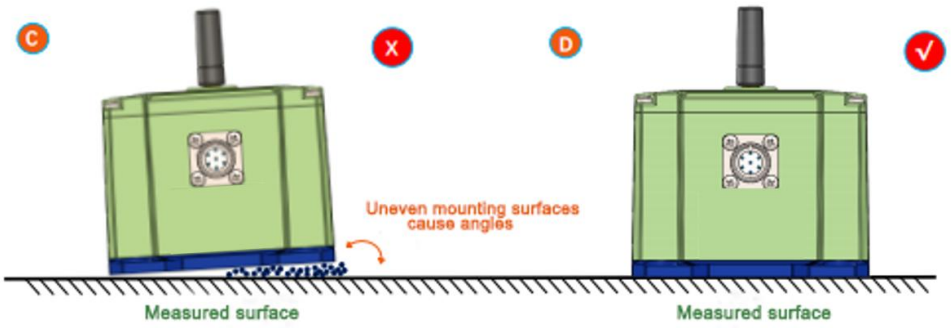
Figure 2. Electrical Connection

INSTALLATION

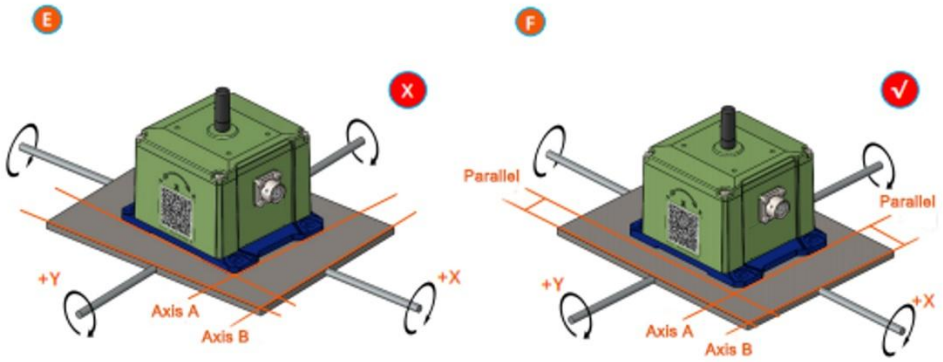
The correct installation method can avoid measurement errors. The following points should be done when installing the sensor:

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*H101.8 (mm) , the length and width may be a 1mm error, please refer to the actual product

Standard antenna height: 28mm (without antenna cap); 40.94mm (with antenna cap)

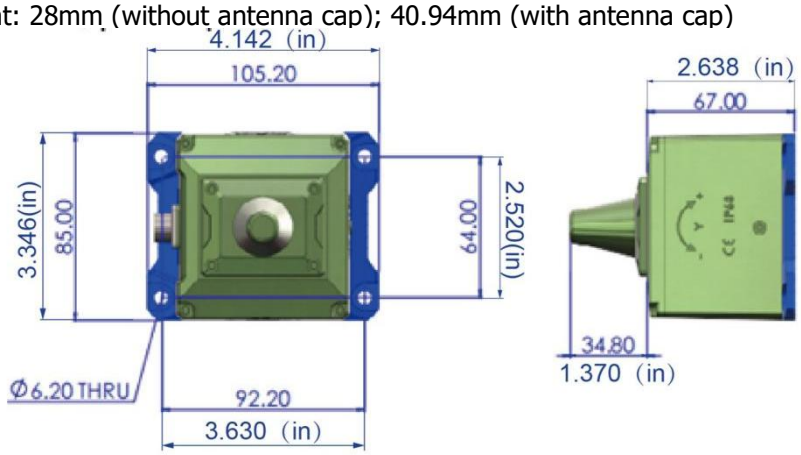


Figure 3. Outline Dimensions