AIT



WTS-7625-R20 Series
Wireless transmission disposable dry cell inclinometer

Technical Manual

V1.0

Wireless Transmission Inclinometer

WTS-7625-R20

FEATURES

- Resolution： 0.001°
- LoRaWAN Wireless network, star network
- Disposable lithium-ion battery
- Support 868MHz /915MHz/923MHz and other frequency bands.
- Remote management
- Unique balanced pressure valve
- Replaceable battery
- Accuracy： ±0.005°
- Battery query, temperature query
- Timed wake-up, motion wake-up
- Wireless signal strength monitoring
- Automatic sleep
- Temperature output
- Three-axis inclination
- Three-axis acceleration

APPLICATIONS

- Tower attitude monitoring
- Power equipment monitoring
- Line slope disaster prevention
- Tower settlement monitoring
- Tunnel monitoring
- Power corridor monitoring

DESCRIPTION

The LoRaWAN WTS-7625-R20 high speed wireless transmission inclination sensor is a compact and intelligent digital inclination sensor designed for structure health monitoring by AIT Sensing. Using disposable lithium sub-battery, the longest working time is over 10 years (upload frequency 1h1 time), also can choose to work with external dedicated power supply. Can meet the needs of high precision and high frequency monitoring. With remote control and management function, connect LoRaWAN gateway to transfer data to the web server. In terms of network connection, the sensor has an automatic drop reconnection function, effectively avoiding problems caused by network abnormalities and server maintenance and other factors resulting in the loss of connection. The sensitive mechanism adopts the latest technology, the micro-electro-mechanical production process of the inclination unit, small size, low power consumption, consistency and stability is very high, because it is a digital inclination sensing module, linearity is more easily corrected. The product shell is made of ABS + 30% glass fiber material, the life can be guaranteed for 8 years, and the working temperature reaches industrial level -40℃ ～ +85℃.

SPECIFICATIONS

Table 1. Mechanical Index

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

Table 2. Performance Index

Measuring range(°)	Condition	≤5	5~30	30~60
Measuring axis	Vertical to each other	X-Y-Z	X-Y-Z	X-Y-Z
Accuracy(°)	Room temperature	±0.005	±0.01	±0.02
Resolution(°)		0.001	0.001	0.001
Zero temperature drift(°/℃)	-40∽+85℃	±0.001	±0.001	±0.001
Cross-axis error(°)	25℃	±0.005	± 0.01	± 0.02
Output frequency	Up to 50Hz			
Electromagnetic compatibility	In accordance with GBT17626			
Time Between Failure	≥100000 hours			
Insulation resistance	≥100 MΩ			
Impact-resistant	2000g，0.5ms，3Times/axis			
Size （mm）	L105.2*W85*H96.8 mm (without antenna) L105.2*W85*H101.8 mm (with antenna)			

*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	Battery Charging Voltage	8.4V DC
	Disposable Dry Battery Voltage	3.7V DC
	Standby Current	4μA
	Battery Capacity	19000mAH
Communication Distance	Maximum： 5km	
Network Topology	star shape	
Device Type	Class A/Class C	
Entry mode	OTAA/ABP	
Transmit Power	+22dBm(max)	
Receiving Sensitivity	-139dBm@SF12/125KHz	

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 Electricity

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

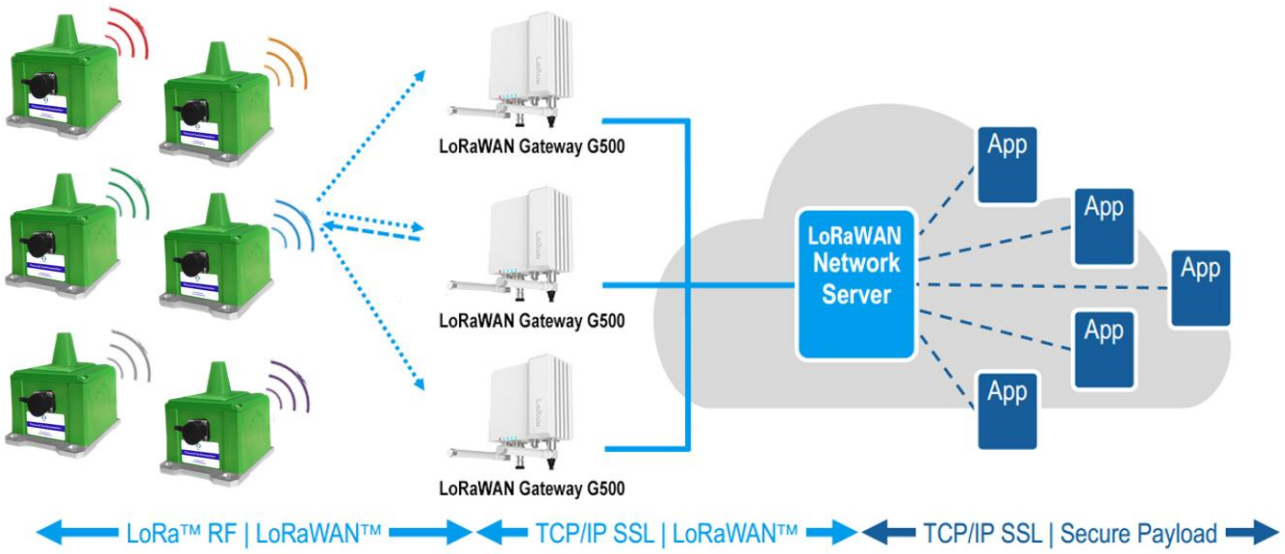


Figure 1. Network Toplogy

ELECTRICAL INTERFACE

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

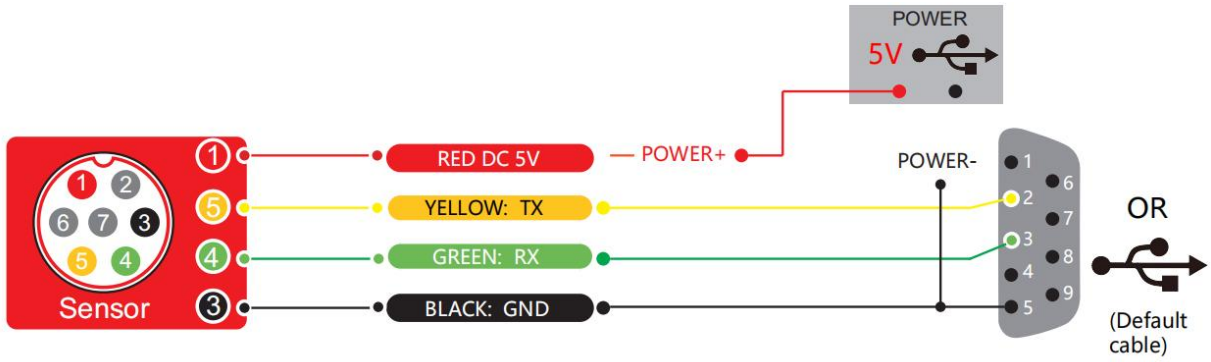
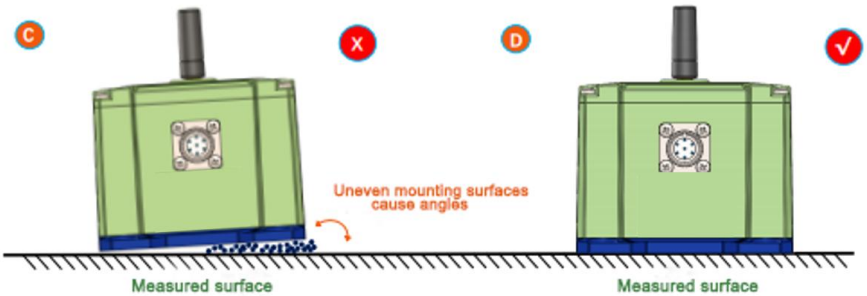


Figure 2. Electrical Connection

INSTALLATION

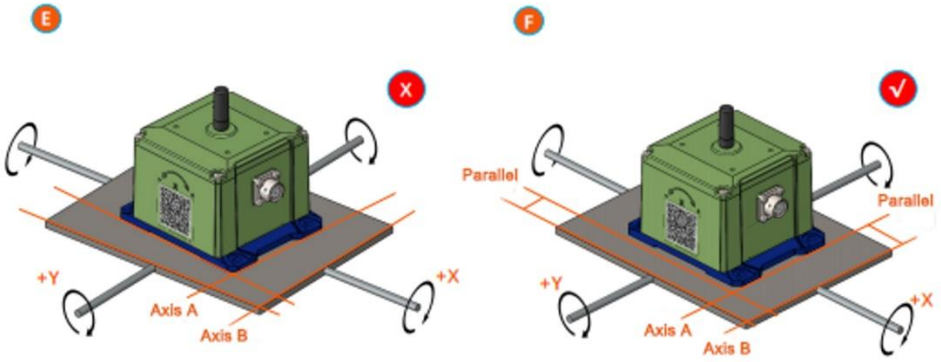
This series of products can only be installed vertically (pendulum type measurement), not horizontally. The correct installation method can avoid measurement errors. The following points should be done when installing the sensor:

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

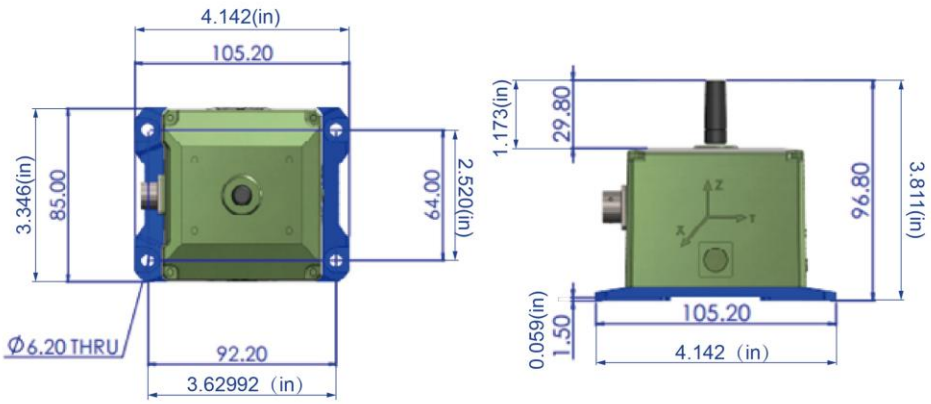
measured object during installation. This product can be installed horizontally or vertically (vertical installation needs to be customized), and the correct installation method is shown in Figure F.



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: (without antenna shield) L105.2 * W85 * H96.8 (mm) length and width may have 1mm error, please prevail in kind!



Product size: (with antenna shield) L105.2 * W85 * H101.8 (mm) length and width may have 1mm error, please prevail in kind!

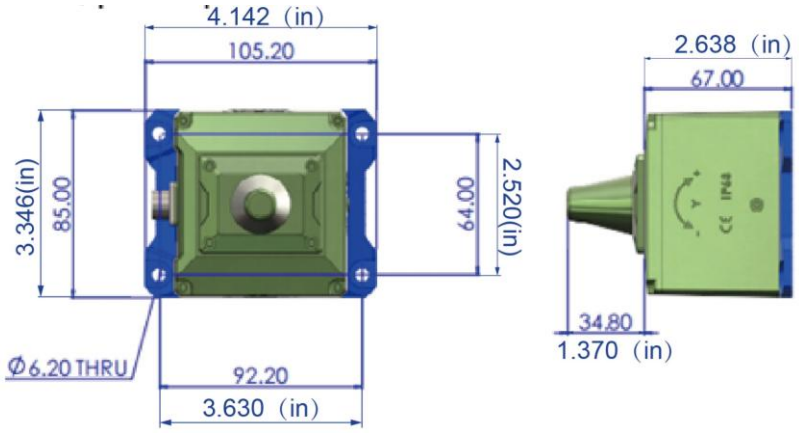


Figure 3. Outline Dimensions