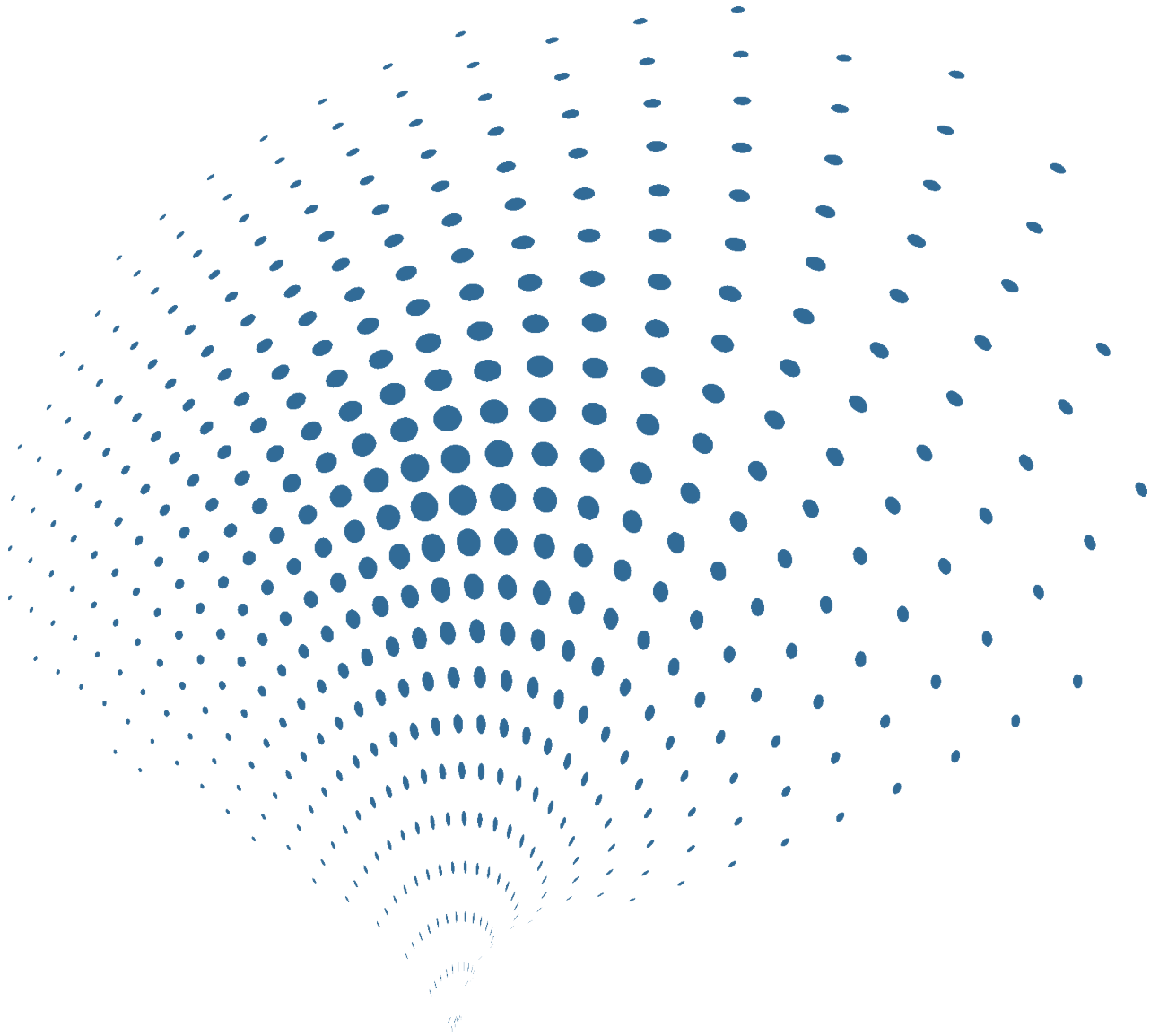




Vigor Technology



Wi-Fi Inclinometer

Wi-Fi Inclinometer

Features

- Based on high performance SST300 inclinometer
- According to IEEE802.11b/g, Wi-Fi compatible
- High speed transmission and security
- 2.4G ISM band
- RF certificated by FCC, CE
- Operation temperature: -40~80°C
- Radio range up to 200m
- Customized wireless sensor network (WSN), 256 nodes max



Descriptions

SST300 Wi-Fi inclinometer integrated with experienced wireless Sensor Network(WSN) technology & patented tilt measurement technology, suitable for industrial remote tilt measurement system application, is a new economical and convenient sensor network product.

SST300 Wi-Fi inclinometer, perfectly combines industrial-grade products with commercial-grade terminal products, giving full play to their respective advantages. It has the following remarkable characteristics:

- ① High-accuracy SST300 inclinometer with advanced MEMS sensor technology to ensure maximum reliability even in the harshest environment.
- ② Adopt mature experienced Wi-Fi technology, to ensure accurate data remote transmission.
- ③ Support a variety of software operating platforms, whether fixed or mobile terminal devices.
- ④ Easy to connect mobile & fixed devices (with Wi-Fi interface) and build wireless network automatically, to realize data acquisition, storage, analysis and query.
- ⑤ With mobile terminal device (iPhone or iPad), surveyor & engineer can log & record data remotely while PLC system and control equipment running, especial to project monitoring, field equipment installing and debugging.
- ⑥ Easy to add & reduce amount of sensor or terminal equipment, can realize many sensor data queried by one device and one sensor datum queried by many devices simultaneously.
- ⑦ Lowest-cost to realize remote tilt measurement, data storage & analysis on your hand anytime & anywhere.
- ⑧ Through internet, data query in other cities comes true and it enables users to diagnose and set sensor remotely.

Applications

Civil engineering: Engineering surveyor collect data from engineering filed remotely, Remote bridge health monitoring & testing system, Tunneling or trenchless filed data survey remotely, Remote structural components monitoring

Industry equipment: Remote equipment attitude detection & monitoring while installing, debugging, controlling or in dangerous

Measurement/test: Remote detecting & monitoring lab device, Remote monitoring/test under dangerous or limited space

Performances

Table 1 Specifications

| | | | | | | |
|---|---|-----------|--------|--------|---------|--------|
| Measurement range | ±5° | ±10° | ±15° | ±30° | ±45° | ±60° |
| Combined absolute accuracy ^① (25 °C) | ±0.01° | ±0.015° | ±0.02° | ±0.04° | ±0.06° | ±0.08° |
| Accuracy subroutine parameter | Absolute linearity (LSF,%FS) | ±0.06 | ±0.03 | ±0.03 | ±0.03 | ±0.02 |
| | Cross-axis sensitivity ^② | ±0.1%FS | | | | |
| | Offset ^③ | ±0.005° | | | ±0.008° | |
| | Repeatability | ±0.0025° | | | | |
| | Hysteresis | ±0.0025° | | | | |
| Allowed installation misalignment ^④ | ±4.0° | ±3.0° | ±2.5° | ±1.5° | ±1.2° | ±1.2° |
| Input-axis mislignment | ≤±0.1° | | | | | |
| Sensitivity temp. drift coefficient | ≤100ppm/°C | ≤50ppm/°C | | | | |
| Offset temperature drift coefficient | ≤0.003°/ °C | | | | | |
| Offset turn on repeatability ^⑤ | ±0.008° | | | | | |
| Resolution | 0.0025° | | | | | |
| Long-term stability ^⑥ | ≤0.02° | | | | | |
| Measurement axis | 1 or 2 axis | | | | | |
| Temperature sensor | Range : -50~125°C, Accuracy:±1°C | | | | | |
| Output | Wi-Fi(TCP/IP & UDP) Other output please refer to Table 4 | | | | | |
| Cold start warming time | 60s | | | | | |
| Response time ^⑦ | 0.3s (@t ₉₀) | | | | | |
| Refresh rate(digital output) | 5Hz (Optional 10Hz,20Hz) | | | | | |
| Response frequency ^⑧ | 3Hz @-3dB | | | | | |
| Power supply | 9 ~ 36VDC | | | | | |
| Power consumption | Average current ≤ 300mA (25 °C&24VDC) | | | | | |
| Operation temperature range | -40 ~ 80°C | | | | | |
| Storage temperature range | -60~100°C | | | | | |
| Insulation resistance | 100MΩ | | | | | |
| MTBF | ≥25000 hours / time | | | | | |
| Shock | 100g@11ms, three-axis, half-sine | | | | | |
| Vibration | 8grms, 20 ~ 2000Hz | | | | | |
| Protection | IP67 | | | | | |
| Connecting | Military class connector (MIL-C-26482) | | | | | |
| Weight | 350g (without connector and cables) | | | | | |

① Combined absolute accuracy means the composite value of sensor's absolute linearity, repeatability, hysteresis, offset and cross-axis sensitivity error. (in room temperature condition) as

$$\Delta = \pm \sqrt{\text{absolute linearity}^2 + \text{repeatability}^2 + \text{hysteresis}^2 + \text{offset}^2 + \text{cross-axis sensitivity}^2} \text{ error}^2$$

② The cross-axis sensitivity means the angle that the tilt sensor may be banked to the normal tilt direction of sensor. The cross-axis sensitivity (±0.1%FS) shows how much perpendicular acceleration or inclination is coupled to the inclinometer output signal. For example, for the single-axis inclinometer with range ±30°(assuming the X-axis as measured tilt direction), when there is a 10° tilt angle perpendicular to the X-axis direction(the actual measuring angle is no change, example as +8.505°), the output signal will generate additional error for this 10° tilt angle, this error is called as cross-axis sensitivity error. SST300's cross-axis sensitivity is 0.1%FS, the extra error is 0.1%×30°=0.03°(max), then real output angle should be +(8.505°±0.03°). In SST300 series, this error has been combined into the absolute accuracy

③ Offset means that when no angle input (such as the inclinometer is placed on an absolute level platform), output of sensor is not equal to zero,the actual output value is zero offset value.

④ Allowed installation misalignment means during the installation, the allow able installation angle deviation between actual tilt direction and sensor's nature measurement direction. In general, when installed,SST300 sensor is required that the measured tilt direction keep parallel or coincident with sensor designated edge, this parameter can be allowed a certain deviation when sensor is installed and does not affect the measurement accuracy.

⑤ Offset turn on repeatability means the repeatability of the sensor in repeated by supply power on-off-on many times.

⑥ Long-term stability means the deviation between the statistics of the maximum and the minimum output value after a year of continuous power supply when the sensor is at 20°C .

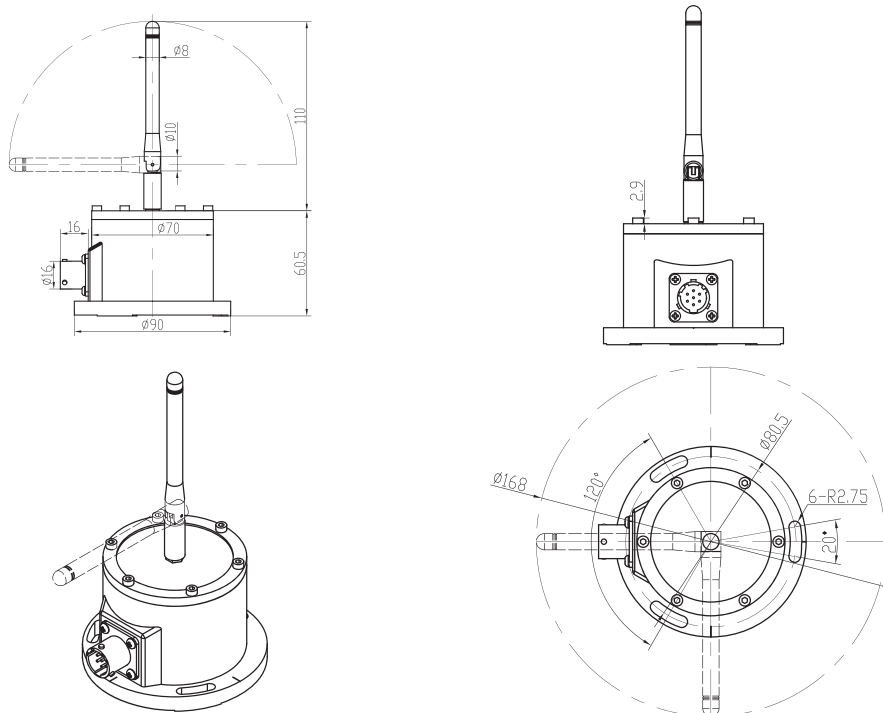
⑦ The response time refers to the angle sensor in a step change (such as the angle changes from -10 ° to +10 °within 5ms), the time required that output of the sensor achieved to the standard value of 90%. The index is different from the sensor set-up time

⑧ Response frequency is for the limitation of the dynamic measurement range, when the dynamic measurement exceeds 3 Hz, because of centripetal force, the output occupied additional random error,this error is difficult to define.

Table 2 Wi-Fi communication specification

| | |
|--|---|
| WLAN protocol | IEEE 802.11b/g, Wi-Fi compatible |
| Radio channel | 802.11b: USA, Canada and Taiwan – 11 Most European Countries – 13 France – 4, Japan – 14 802.11g: USA and Canada – 11 Most European Countries – 13 |
| Modulation system | DSSS, OFDM, DBPSK, DQPSK, CCK, 16-QAM, 64-QAM |
| Band | 2.4G ISM |
| Transmission power | 15dBm \pm 1.5dBm |
| Receiving sensitivity | 802.11b : -91dBm 802.11g : -85dBm |
| Antenna interface | IPEX antenna connector |
| Wireless data transmission rate | 802.11b: 1, 2, 5.5, 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps |
| Wireless network co-existence | Cell phone(GSM/DCS/WCDMA/UMTS/3G) co-existence |
| WLAN setting up | Support AP & Ad-Hoc |
| Encryption | Support WEP40 and WEP104 encryption (64/128 bit). Support OSI & Shared key model WPA/WPA2 PSK, AES and TKIP |
| Wireless Medium Access Control(MAC) protocol | CSMA/CA, with ACK |
| Reset to Network Connection | \leq 3s (WEP) , 6s (WPA) |
| Other function | Wi-Fi automatically recovery after dis-connection max transmission speed 60kb/s(send & receive simultaneously), 90kb/s(send or receive) DNS service Support protocol TCP and UDP Support TCP Server and Client Support UDP broadcast or uni-cast TCP Automatically connection after disconnection As TCP server, permit 3 clients connection Flexible configuration: HTML or PC software |

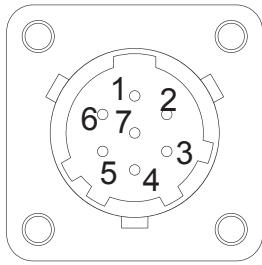
Dimensions (mm)



Picture 1 Dimensions(Wi-Fi Antenna adjusted to upright & rotary)

Note: For analog/digital output in parallel, the sensor height will change, please ask Vigor for details.

Wiring



Picture 2 Connector socket (View from outside)

Table 3 Connector definition

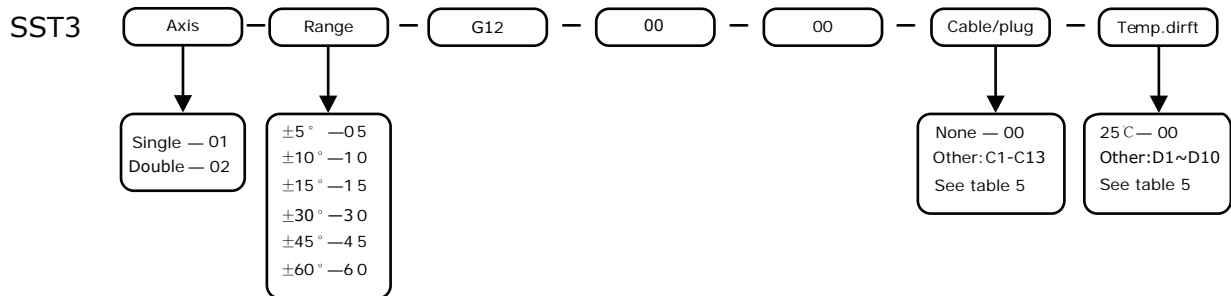
| Pin | Function |
|-----|------------|
| 1 | Power+ |
| 2 | Power- |
| 3 | Signal GND |
| 4 | NC |
| 5 | NC |
| 6 | RS232-TXD |
| 7 | RS232-RXD |

Table 4 Pin definitions for analog and digital interface(in parallel to Wi-Fi)

| Pin | 1 axis | 2 axis | 1 axis | 2 axis | 1 or 2 axis | 1 or 2 axis | 1 or 2 axis |
|-----|---------------------|------------|-------------------------|------------|-------------|-------------|-------------|
| | Current output(G19) | | Voltage output(G20~G24) | | RS232(00) | RS422(G2) | RS485(G1) |
| 1 | Power+ | Power+ | Power+ | Power+ | Power+ | Power+ | Power+ |
| 2 | Power GND | Power GND | Power GND | Power GND | Power GND | Power GND | Power GND |
| 3 | Signal GND | Signal GND | Signal GND | Signal GND | Signal GND | Signal GND | Signal GND |
| 4 | Iout | Ioutx | Vout | Voutx | NC | RS422-RXD+ | NC |
| 5 | NC | Iouty | NC | Vouty | NC | RS422-RXD- | NC |
| 6 | NC | NC | NC | NC | RS232-TXD | RS422-TXD+ | RS485-A |
| 7 | NC | NC | NC | NC | RS232-RXD | RS422-TXD- | RS485-B |

Note: The various output listed in this table need to be explained separately when ordering.
The output of standard products is only Wi-Fi output.

Ordering



For example, if order a dual-axis Wi-Fi inclinometer, with range $\pm 15^\circ$, $\pm 0.02^\circ$ accuracy@-20~60°C , the model should be chosen as: SST302-15-G12-00-00-C1-D3 (2m) .

Accessories & Options

Table 5 Accessories

| | | | |
|-------------------|-----|---------------------------------------|--|
| Cable/Plug | C1 | Standard Cable with plug | Military class connector(meet MIL-C-26482),Standard 2M cable,IP67 protection, heavy duty up to 30kg |
| | C2 | Tensile reinforced shield cable | Heavy duty up to 50kg |
| | C3 | High temperature cable | Up to 250°C |
| | C4 | Armor cover cable | Increasing mechanical strength, erosion and anti-interference ability. |
| | C5 | Watertight cable with plug | 3000m underwater with special plug |
| | C6 | Standard plug | According to MIL-C-26482,IP67 protection |
| | C7 | Compatible with Amphenol plug | Compatible with the standard of SST300 outlet, manufactured by Amphenol |
| | C8 | Corners plug | 90° corner,according to MIL-C-26482,IP67 protection |
| | C9 | Explosion proof connectors and cables | For SST30X-XX-XXX-00-B5-C9-XX only |
| | C10 | Pigtail connector | Only for beam tilt sensor SST301-XX-XXX-XX - B4-C10-XX |
| | C11 | USB cable | For SST30X-XX-G10-00-00-C11-XX only, one end is MIL connector, the other end is USB port. |
| | C12 | Ethernet cable | For SST30X-XX-G9-00-B5-C12-XX only, one end is MIL connector, the other end is RJ45 |
| | C13 | CAN/CANopen cable | Military class connector, standard 2M long, DB-9 interface at the other end, IP67 protection, anti 30KG pull |
| Temperature drift | D1 | Temperature drift | Temperature compensation range is 0~60°C , and temperature drift accuracy $\pm 0.01^\circ @ \leq \pm 30^\circ$ |
| | D2 | Temperature drift | Temperature compensation range is 0~60°C , and temperature drift accuracy $\pm 0.01^\circ @ > \pm 30^\circ$ |
| | D3 | Temperature drift | Temperature compensation range is -20~60°C , and temperature drift accuracy $\pm 0.02^\circ @ \leq \pm 30^\circ$ |
| | D4 | Temperature drift | Temperature compensation range is -20~60°C , and temperature drift accuracy $\pm 0.02^\circ @ > \pm 30^\circ$ |
| | D5 | Temperature drift | Temperature compensation range is -30~60°C , and temperature drift accuracy $\pm 0.03^\circ @ \leq \pm 30^\circ$ |
| | D6 | Temperature drift | Temperature compensation range is -30~60°C , and temperature drift accuracy $\pm 0.03^\circ @ > \pm 30^\circ$ |
| | D7 | Temperature drift | Temperature compensation range is -40~65°C , and temperature drift accuracy $\pm 0.05^\circ @ \leq \pm 30^\circ$ |
| | D8 | Temperature drift | Temperature compensation range is -40~65°C , and temperature drift accuracy $\pm 0.05^\circ @ > \pm 30^\circ$ |
| | D9 | Temperature drift | Temperature compensation range is -40~85°C , and temperature drift accuracy $\pm 0.05^\circ @ \leq \pm 30^\circ$ |
| | D10 | Temperature drift | Temperature compensation range is -40~85°C , and temperature drift accuracy $\pm 0.05^\circ @ > \pm 30^\circ$ |

Shanghai Vigor Technology Development Co., Ltd.

Tel:021-58404921 Fax:021-58354552 Website: www.vigordigital.com
Address: Room 102, Block 4, No. 289 of Bisheng Road, Shanghai, China