

# SST100 Inclinometer



辉格科技  
Vigor Technology

# SST100 Inclinometer

## Features

- High stability & performance-cost ratio
- Small size,light weight,easy to integrate
- Cross-axis sensitivity up to  $\pm 0.3\%$ FS
- Omni-direction alarm & dual alarms,analog & digital outputs
- Full-seal,resistant to vibration and shock
- IP67 protection



## Description

SST100 inclinometer is high reliable tilt angle measurement product for construction machinery industry application. This inclinometer adopts various technologies on reliability & stability,including full-sealing,strengthen PCBA design,optimized power management,enhanced resistance to shock & vibration,30kg tensile cable,motion simulation of life testing,patented automatic test technology and precision machining of aluminum alloy.

SST100 inclinometer employs low-g MEMS acceleration sensors with 2000g shock. Through non-linearity compensation,cross-axis sensitivity error compensation,filtering etc,output analog/digital/alarm signals which precise proportional to actual tilt angle or ASCII data of tilt angle,or alarm signal based on setup alarm point.

SST100 inclinometer is suitable for kinds of construction machinery and field equipment,may directly connect with vehicle battery or other unregulated DC power,jitter-free high hysteresis fast ON/OFF output,direct drive such as relays,speakers,sound & light alarm equipment,PLC and other devices,and can setup alarm point online via RS232 interface.

## Applications

Mobile construction machinery,Factory automation,Solar equipment,Transportation machinery,Medical equipment,etc.

## Carried Standards

- GB/T 191 SJ 20873 General requirements for Inclinometer & levelmeter (China)
- GBT 18459 Methods for Calculating the Main static performance specifications for transducers(China)
- JJF 1059 Evaluation and Express of Uncertainty in Measurement(China)
- JJF 1094 Evaluation of the Characteristics of Measuring Instruments(China)
- JJF 1116 Calibration Specification for Linear Accelerometer used precision Centrifuger(China)
- QJ 2318 The test method of gyro & accelerometer(China)
- GJB 2786A General Requirements for Military Software Development(China)
- GJB 2884 General Specification for Three-Axis angular motion simulator(China)
- EN61000-4-11 Voltage dips & Voltage variations
- MIL-HDBD-338B
- MIL-STD-810F-510.4
- MIL-STD-810F-507.4
- ISO 5348 IDT
- MIL-STD-810F-514.5
- EN61000-4-4 EFT
- MIL-STD-810F-501.4
- MIL-STD-810F-516.5
- EN61000-4-5 SURGE
- MIL-STD-810F-502.4
- IEC60529 IP
- EN61000-4-6 CS
- MIL-STD-810F-503.4
- EN61000 -4-2 ESD
- EN61000-4-8 PFMF
- MIL-STD-810F-506.
- EN61000-4-3 RS
- ISTA-2A

## Performances

Table1 SST141/2,SST151/2,SST161/2 Inclinometer

| Product type                                    | SST141,SST142,SST151,SST152,SST161,SST162 with analog/digital output   |      |      |         |      |      |         |       |
|---|--|------|------|---------|------|------|---------|-------|
| Measurement range                               | ±5°  | ±10° | ±15° | ±30°    | ±45° | ±60° | ±90°    | ±180° |
| Accuracy(@25°C)                                 | ±0.1°  |      |      |         |      |      |         |       |
| Temperature drift coefficient<br>/°C @ -20~65°C | ±0.004°  |      |      | ±0.005° |      |      | ±0.009° |       |
| Resolution                                      | 0.003°   |      |      |         |      |      |         |       |
| Repeatability                                   | ±0.02°   |      |      |         |      |      |         |       |
| Offset repeatability                            | ±0.02°   |      |      |         |      |      |         |       |
| Offset  | ±0.02°   |      |      |         |      |      |         |       |
| Measurement axis                                | 1 axis:SST141,SST151,SST161  |      |      |         |      |      |         |       |
|   | 2 axis:SST142,SST152,SST162  |      |      |         |      |      |         |       |
| Response time                                   | 0.3s @ t <sub>90</sub>   |      |      |         |      |      |         |       |
| Cross-axis sensitivity                          | ±0.3%FS  |      |      |         |      |      |         |       |
| Digital output<br>for SST161,SST162             | RS232(optional RS485),update rate:5Hz(default),10Hz,20Hz optional<br>Format: 19200 baud,8 data bits,1 start bit,1 stop bit,none parity,ASCII |      |      |         |      |      |         |       |
| Voltage output<br>for SST141,SST142             | 0.5~4.5VDC<br>Output Impedance:0.3Ω,load impedance:< 100Ω  |      |      |         |      |      |         |       |
| Current output<br>for SST151,SST152             | 4~20mA<br>Output Impedance:50MΩ,load impedance:150~250Ω  |      |      |         |      |      |         |       |
| Cold start warming time                         | 60s  |      |      |         |      |      |         |       |
| Power supply                                    | With digital/voltage output:9~36VDC,consumption≤20mA   |      |      |         |      |      |         |       |
|   | With current output:16~36VDC,consumption≤40mA  |      |      |         |      |      |         |       |
| Power supply reject ratio                       | ≥85dB  |      |      |         |      |      |         |       |
| Operation temperature range                     | -40~85°C   |      |      |         |      |      |         |       |
| Storage temperature range                       | -40~100°C  |      |      |         |      |      |         |       |
| EMC   | According to EN 61000  |      |      |         |      |      |         |       |
| Insulation resistance                           | ≥100MΩ   |      |      |         |      |      |         |       |
| MTBF  | 150000h/times  |      |      |         |      |      |         |       |
| Shock   | 100g@11ms,three-axis,half-sine   |      |      |         |      |      |         |       |
| Vibration                                       | 8grms,20~2000Hz  |      |      |         |      |      |         |       |
| Protection                                      | IP67   |      |      |         |      |      |         |       |
| Housing   | 6061-T6 Aluminum alloy   |      |      |         |      |      |         |       |
| Connecting                                      | Standard: Binder712 connector,optional: metal pigtail  |      |      |         |      |      |         |       |
| Cable   | 7-wire shielded cable with tensile reinforcement,heavy duty up to 30Kg   |      |      |         |      |      |         |       |
| Weight  | ≤240g(without connector and cable)   |      |      |         |      |      |         |       |

Table 2 SST122 Inclinometer

| Product type                               | SST122 with double alarms output                                       |         |         |         |         |         |
|--|--|---------|---------|---------|---------|---------|
|  | ±5°  | ±10°    | ±15°    | ±30°    | ±45°    | ±60°    |
| Temp. drift coefficient<br>/°C @ -20~65 °C | ±0.004°  | ±0.004° | ±0.004° | ±0.004° | ±0.005° | ±0.005° |
| Control direction                          | X & Y axis   |         |         |         |         |         |
| Resolution                                 | 0.02°  |         |         |         |         |         |
| Alarm angle error                          | ±0.1°  |         |         |         |         |         |
| Alarm trigger delay                        | 1.0s   |         |         |         |         |         |
| Alarm disconnect delay                     | 1.0s   |         |         |         |         |         |
| Repeatability                              | ±0.05°   |         |         |         |         |         |
| Hysteresis                                 | ±0.05°   |         |         |         |         |         |
| Switch endurance                           | ≥5000000 times   |         |         |         |         |         |
| Alarm point                                | 2points/axis   |         |         |         |         |         |
| Alarm setting                              | Fixed before delivery  |         |         |         |         |         |
| Alarm delay time                           | 0.3~5.0s,default 1.0s  |         |         |         |         |         |
| Output                                     | NO or NC(default NO),OC output,internal isolation                      |         |         |         |         |         |
| Alarm switch capacity                      | 1A@5~48VDC,inductive load  |         |         |         |         |         |
| Power supply                               | 9~36VDC,≤50mA(when no load)  |         |         |         |         |         |
| Alarm control supply                       | 9~36VDC  |         |         |         |         |         |
| Connecting                                 | Metal pigtail  |         |         |         |         |         |
| Cable                                      | 7-wire shielded cable with tensile reinforcement,heavy duty up to 30Kg |         |         |         |         |         |
| Power supply reject ratio                  | ≥85dB  |         |         |         |         |         |
| Operation temperature range                | -40~85°C   |         |         |         |         |         |
| Storage temperature range                  | -40~100°C  |         |         |         |         |         |
| EMC  | According to EN 61000  |         |         |         |         |         |
| Insulation resistance                      | ≥100MΩ   |         |         |         |         |         |
| MTBF                                       | 150000h/times  |         |         |         |         |         |
| Shock                                      | 100g@11ms,three-axis,half-sine   |         |         |         |         |         |
| Vibration                                  | 8grms,20~2000Hz  |         |         |         |         |         |
| Protection                                 | IP67   |         |         |         |         |         |
| Housing                                    | 6061-T6 Aluminum alloy   |         |         |         |         |         |
| Weight                                     | ≤240g(without connector and cable)                                     |         |         |         |         |         |

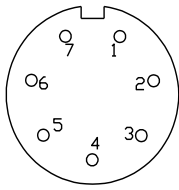
Table 3 SST130 Inclinometer

| Product type                         | SST130 with Omni-direction alarm output                                |         |         |         |         |         |
|--------------------------------------|--|---------|---------|---------|---------|---------|
| Control range                        | ±5°  | ±10°    | ±15°    | ±30°    | ±45°    | ±60°    |
| Temperature drift<br>/°C @ -20~65 °C | ±0.004°  | ±0.004° | ±0.004° | ±0.004° | ±0.005° | ±0.005° |
| Control direction                    | Omni-direction(combined with X and Y axis)                             |         |         |         |         |         |
| Resolution                           | ±0.02°   |         |         |         |         |         |
| Alarm angle error                    | ±0.1°  |         |         |         |         |         |
| Alarm trigger delay                  | 1.0s   |         |         |         |         |         |
| Alarm disconnect delay               | 1.0s   |         |         |         |         |         |
| Repeatability                        | ±0.05°   |         |         |         |         |         |
| Hysteresis                           | ±0.05°   |         |         |         |         |         |
| Switch endurance                     | ≥5000000 times   |         |         |         |         |         |
| Alarm point                          | One alarm point  |         |         |         |         |         |
| Alarm point setting                  | Online setting via RS232   |         |         |         |         |         |
| Alarm time delay                     | 0.3~5.0s,Default value 1.0s,adjustable.                                |         |         |         |         |         |
| Output                               | NO or NC(default NO),OC output,internal isolation                      |         |         |         |         |         |
| Alarm switch capacity                | 1A@5~48VDC   |         |         |         |         |         |
| Online setting via RS232             | Zero setting: available setting range:≤±5°                             |         |         |         |         |         |
|                                      | Alarm point setting: Set any angle as alarm point,default value is ±3° |         |         |         |         |         |
| RS232 interface                      | Format:19200 baud,8 data bits,1start bit,1stop bit,none parity,ASCII   |         |         |         |         |         |
| Power supply                         | 9~36VDC,≤50mA  |         |         |         |         |         |
| Alarm control supply                 | 9~36VDC  |         |         |         |         |         |
| Connecting                           | Standard: Binder712 connector,optional: metal pigtail                  |         |         |         |         |         |
| Cable                                | 7-wire shielded cable with tensile reinforcement,heavy duty up to 30Kg |         |         |         |         |         |
| Power supply reject ratio            | ≥85dB  |         |         |         |         |         |
| Operation temperature range          | -40~85°C   |         |         |         |         |         |
| Storage temperature range            | -40~100°C  |         |         |         |         |         |
| EMC                                  | According to EN 61000  |         |         |         |         |         |
| Insulation Resistance                | ≥100MΩ   |         |         |         |         |         |
| MTBF                                 | 150000h/times  |         |         |         |         |         |
| Shock                                | 100g@11ms,three-axis,half-sine   |         |         |         |         |         |
| Vibration                            | 8grms,20~2000Hz  |         |         |         |         |         |
| Protection                           | IP67   |         |         |         |         |         |
| Housing                              | 6061-T6 Aluminium alloy  |         |         |         |         |         |
| Weight                               | ≤260g(without connector and cable)                                     |         |         |         |         |         |

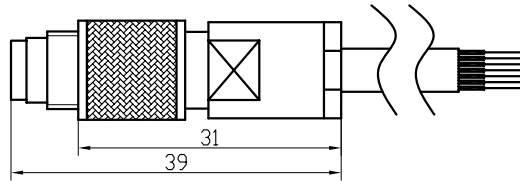
Table 4 SST111 &amp; SST121 Inclinometer

| Product type                        | SST111 & SST121 inclinometer with alarm output                         |         |         |         |         |         |
|-------------------------------------|--|---------|---------|---------|---------|---------|
| Control range                       | ±5°  | ±10°    | ±15°    | ±30°    | ±45°    | ±60°    |
| Temperature drift<br>/°C @ -20~65°C | ±0.004°  | ±0.004° | ±0.004° | ±0.004° | ±0.005° | ±0.005° |
| Control direction                   | Single Axis: SST111  |         |         |         |         |         |
|                                     | Dual Axis: SST121  |         |         |         |         |         |
| Resolution                          | 0.02°  |         |         |         |         |         |
| Alarm angle error                   | ±0.1°  |         |         |         |         |         |
| Alarm trigger delay                 | 1.0s   |         |         |         |         |         |
| Alarm disconnect delay              | 1.0s   |         |         |         |         |         |
| Repeatability                       | ±0.05°   |         |         |         |         |         |
| Hysteresis                          | ±0.05°   |         |         |         |         |         |
| Switch endurance                    | ≥5000000 times   |         |         |         |         |         |
| Alarm point                         | Single Axis(SST111): one alarm point of X Axis                         |         |         |         |         |         |
|                                     | Dual Axis(SST121): one alarm point of each Axis                        |         |         |         |         |         |
| Alarm point setting                 | Online setting via RS232   |         |         |         |         |         |
| Alarm time delay                    | 0.3~5.0s,Default 1.0s,adjustable                                       |         |         |         |         |         |
| Output                              | NO or NC(default NO),OC output,internal isolation                      |         |         |         |         |         |
| Alarm switch capacity               | 1A@5~48VDC   |         |         |         |         |         |
| Online setting via RS232            | Zero setting: available setting range: ≤±5°                            |         |         |         |         |         |
|                                     | Alarm point setting: Set any angle as alarm point,default value is ±3° |         |         |         |         |         |
| RS232 interface                     | Format:19200 baud,8 data bits,1start bit,1stop bit,none parity,ASCII   |         |         |         |         |         |
| Power supply                        | 9~36VDC,≤50mA  |         |         |         |         |         |
| Alarm control supply                | 9~36VDC  |         |         |         |         |         |
| Connecting                          | Standard: Binder712 connector,optional: metal pigtail                  |         |         |         |         |         |
| Cable                               | 7-wire shielded cable with tensile reinforcement,heavy duty up to 30Kg |         |         |         |         |         |
| Power supply reject ratio           | ≥85dB  |         |         |         |         |         |
| Operation temperature range         | -40~85°C   |         |         |         |         |         |
| Storage temperature range           | -40~100°C  |         |         |         |         |         |
| EMC                                 | According to EN 61000  |         |         |         |         |         |
| Insulation resistance               | ≥100MΩ   |         |         |         |         |         |
| MTBF                                | 150000h/times  |         |         |         |         |         |
| Shock                               | 100g@11ms,three-axis,half-sine   |         |         |         |         |         |
| Vibration                           | 8grms,20~2000Hz  |         |         |         |         |         |
| Protection                          | IP67   |         |         |         |         |         |
| Housing                             | 6061-T6 Aluminium alloy  |         |         |         |         |         |
| Weight                              | ≤240g(without connector and cable)                                     |         |         |         |         |         |

# Wiring



Picture 1 Binder712 socket (View from outside)



Picture 2 Binder712 plug and cable

Table 5 SST111 wiring

| Binder712 socket Pin | Pigtail wire color (optional) | Function            |
|----------------------|-------------------------------|---------------------|
| 1                    | Red                           | Power +             |
| 2                    | Black                         | Power -             |
| 3                    | Green                         | Control GND         |
| 4                    | Yellow                        | X Axis alarm output |
| 5                    | White                         | NC                  |
| 6                    | Blue                          | RS232—TXD           |
| 7                    | Brown                         | RS232—RXD           |

Table 6 SST121 wiring

| Binder712 socket pin | Pigtail wire color (optional) | Function            |
|----------------------|-------------------------------|---------------------|
| 1                    | Red                           | Power +             |
| 2                    | Black                         | Power -             |
| 3                    | Green                         | Control GND         |
| 4                    | Yellow                        | X Axis alarm output |
| 5                    | White                         | Y Axis alarm output |
| 6                    | Blue                          | RS232—TXD           |
| 7                    | Brown                         | RS232—RXD           |

Table 7 SST130 wiring

| Binder712 socket pin | Pigtail wire color (optional) | Function     |
|----------------------|-------------------------------|--------------|
| 1                    | Red                           | Power +      |
| 2                    | Black                         | GND          |
| 3                    | Green                         | Control GND  |
| 4                    | Yellow                        | Alarm output |
| 5                    | White                         | NC           |
| 6                    | Blue                          | RS232—TXD    |
| 7                    | Brown                         | RS232—RXD    |

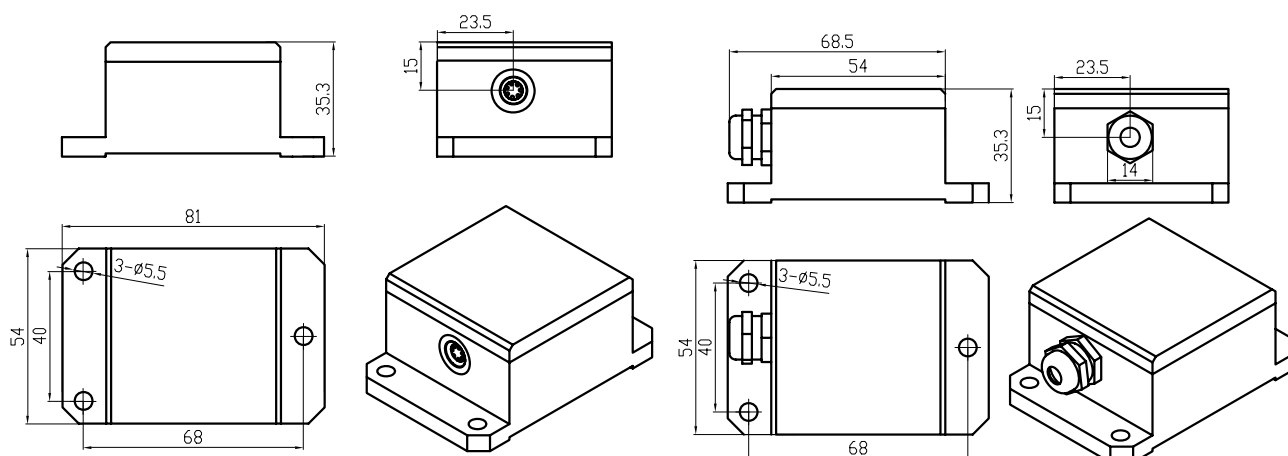
Table 8 SST122 wiring

| Pigtail wire color | Function             |
|--------------------|----------------------|
| Red                | Power +              |
| Black              | GND                  |
| Green              | Control GND          |
| Yellow             | X Axis alarm point 1 |
| White              | Y Axis alarm point 1 |
| Blue               | X Axis alarm point 2 |
| Brown              | Y Axis alarm point 2 |

Table 9 Analog/digital output wiring

| Binder712 pin | Pigtail wire color | Output     |            |            |            |            |            |            |
|---------------|--------------------|------------|------------|------------|------------|------------|------------|------------|
|               |                    | SST151     | SST152     | SST141     | SST142     | SST161     | SST162     | Option     |
|               |                    | 4~20mA     |            | 0.5~4.5VDC |            | RS232      |            | RS485      |
| 1             | Red                | Power+     | Power+     | Power+     | Power+     | Power+     | Power+     | Power+     |
| 2             | Black              | Power -    | Power -    | Power -    | Power -    | Power -    | Power -    | Power -    |
| 3             | Green              | Signal GND | Signal GND | Signal GND | Signal GND | Signal GND | Signal GND | Signal GND |
| 4             | Yellow             | Iout       | Ioutx      | Vout       | Voutx      | NC         | NC         | NC         |
| 5             | White              | NC         | Iouty      | NC         | Vouty      | NC         | NC         | NC         |
| 6             | Blue               | NC         | NC         | NC         | NC         | RS232-TXD  | RS232-TXD  | RS485-A    |
| 7             | Brown              | NC         | NC         | NC         | NC         | RS232-RXD  | RS232-RXD  | RS485-B    |

## Dimensions (mm)



Picture 3 SST100 with Binder712 connector

Picture 4 SST100 with metal pigtail

## Ordering information

| Model  | Axis           | Connector                            | Output                      | Range  |
|--------|----------------|--------------------------------------|-----------------------------|--|
| SST111 | 1              | Binder712(-C) ,optional Pigtail (-P) | 1 alarm point of X axis     | ±5°,±10°,<br>±15°,±30°,<br>±45°,±60°                 |
| SST121 | 2              | Binder712(-C) ,optional Pigtail (-P) | 1 alarm point of each axis  |  |
| SST122 | 2              | Pigtail (-P)                         | 2 alarm points of each axis |  |
| SST130 | Omni-direction | Binder712(-C) ,optional Pigtail (-P) | 1 alarm point               |  |
| SST141 | 1              | Binder712(-C) ,optional Pigtail (-P) | 0.5~4.5VDC                  | ±5°,±10°,<br>±15°,±30°,<br>±45°,±60°,<br>±90°, ±180° |
| SST142 | 2              | Binder712(-C) ,optional Pigtail (-P) | 0.5~4.5VDC                  |  |
| SST151 | 1              | Binder712(-C) ,optional Pigtail (-P) | 4~20mA                      |  |
| SST152 | 2              | Binder712(-C) ,optional Pigtail (-P) | 4~20mA                      |  |
| SST161 | 1              | Binder712(-C) ,optional Pigtail (-P) | RS232 (RS485 optional)      |  |
| SST162 | 2              | Binder712(-C) ,optional Pigtail (-P) | RS232 (RS485 optional)      |  |



Shanghai Vigor Technology Development Co., Ltd.

No.289-4, Bisheng Road, Pudong New District Shanghai China 201204

Hotline. +86-400-0505-021

Tel. +86-21-5840-4921

Fax. +86-21-5835-4552

Email: [sales@vigordigital.com](mailto:sales@vigordigital.com)

Web: [www.vigordigital.com](http://www.vigordigital.com)