SST 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 ±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 emploies 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-506.4	- 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℃)	±0.1°							
Temperature drift coefficient /℃ @ -20~65℃	±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_{90}							
Cross-axis sensitivity	±0.3%FS							
Digital output for SST161,SST162	RS232(optional RS485),update rate:5Hz(default),10Hz,20Hz optional Format: 19200 baud,8 data bits,1 start bit,1 stop bit,none parity,ASCII							
Voltage output for SST141,SST142	0.5~4.5VDC Output Impedance:0.3Ω,load impedance:< 100Ω							
Current output for SST151,SST152	4~20mA 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℃							
Storage temperature range	-40~100℃							
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					
Control range	±5°	±10°	±15°	±30°	±45°	±60°
Temp. drift coefficient /℃ @ -20~65 ℃	±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℃					
Storage temperature range	-40~100℃					
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)					

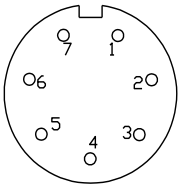
Table 3 SST130 Inclinometer

Product type	SST130 with Omni-direction alarm output					
Control range	±5°	±10°	±15°	±30°	±45°	±60°
Temperature drift /℃ @ -20~65 ℃	±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℃					
Storage temperature range	-40~100℃					
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)					

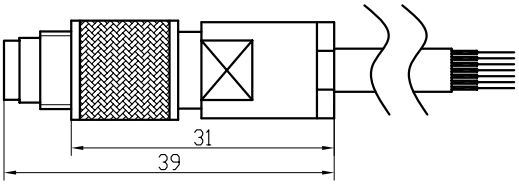
Table 4 SST111 & SST121 Inclinometer

Product type	SST111 & SST121 inclinometer with alarm output					
Control range	±5°	±10°	±15°	±30°	±45°	±60°
Temperature drift /℃ @ -20~65℃	±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℃					
Storage temperature range	-40~100℃					
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

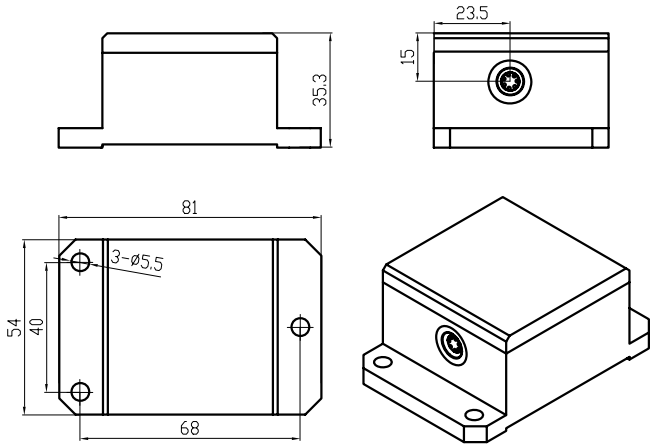
Table 8 SST122 wiring

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

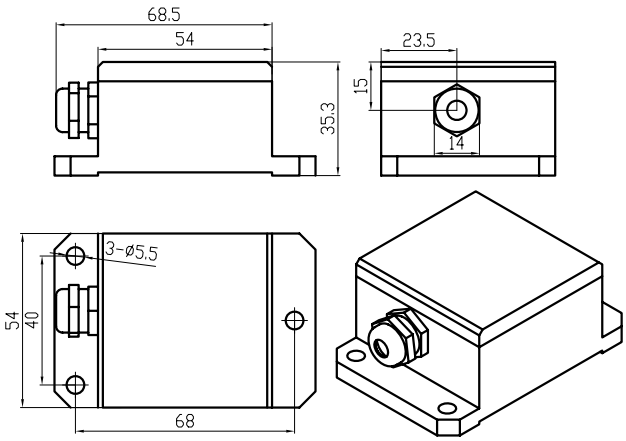
Table 9 Analog/digital output wiring

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°, ±15°,±30°, ±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°, ±15°,±30°, ±45°,±60°, ±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)	

SST200 Inclinometer

Features

- High reliability & performance-cost ratio
- Repeatability & Offset ±0.02°
- Response time 0.3s@t_{90}
- Cross axis sensitivity less than ±0.3%FS
- Temperature drift reach ±0.1°@ -40~85℃ (Option)
- Full seal & anti-shock,IP67 protection
- Carried 50 industry & military standards

Description

SST200 inclinometer based on MEMS technology,integrated with cross-axis sensitivity compensation,filte ring,nonlinearity correction,CAE&EDA simulation and patented automatic testing technology,to meet various industrial measurement & control in most hash environment.

SST200 inclinometer performs high reliability & stability. Thanks full-sealed technology,enhanced PCBA, intelligent power management,enhanced anti-shock & anti-vibration,enforced cable (heavy duty up to 30kg) assembly and robust aluminium alloy house(with heat treatment and anti-torsion finishing). As well as the long-term dynamic simulation and patented auto-test technology.

SST200 meets various strict or special military applications. As request,make fixed test programs according to MIL/EN/IEC/GJB etc. standards. As general option,the total temperature drift can reach ±0.1° within -40~+85℃ .

Applications

Factory automation,Precision instruments,Vessel,Engineering machinery,Aerospace,Civil engineering, Military project.

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

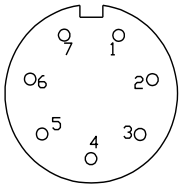
- MIL-HDBD-338B	- MIL-STD-810F-510.4	- MIL-STD-810F-507.4
- ISO 5348 IDT	- MIL-STD-810F-514.5	- EN61000-4-4 EFT
- MIL-STD-810F-501.4	- MIL-STD-810F-516.5	- EN61000-4-5 SURGE
- MIL-STD-810F-502.4	- IEC60529 IP	- EN61000-4-6 CS
- MIL-STD-810F-503.4	- EN61000 -4-2 ESD	- EN61000-4-8 PFMF
- MIL-STD-810F-506.4	- EN61000-4-3 RS	- ISTA-2A

Performances

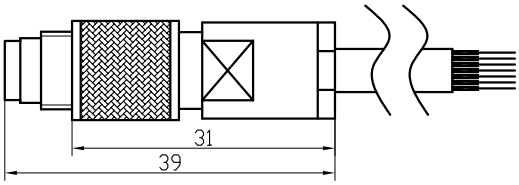
Table 1 Specifications

Measurement range	±5°	±10°	±15°	±30°	±45°	±60°	±90°(Single-axis)
Accuracy(@25 ℃)	±0.05°				±0.08°		±0.1°
Temperature drift @ -20~65 ℃	±0.004°/℃				±0.005°/℃		±0.009°/℃
Temperature drift(Option) @ -40~85 ℃	±0.1°				±0.2°		
Resolution	0.003°						
Repeatability	±0.02°						
Offset repeatability	±0.02°						
Offset	±0.02°						
Cross-axis sensitivity	±0.3%FS						
Measurement axis	1 axis or 2 axis,(only single-axis at ±90°range)						
Digital output for SST250/SST260	RS232(optional: RS485,RS422) Refresh Rate:5Hz(default)10Hz,20Hz(optional) Format:19200 baud,8 data bits,1start bit,1stop bit,none parity,ASCII						
Voltage output for SST230/SST240	Voltage:0.5~4.5VDC Output resistance:0.3Ω Load resistance:<100Ω						
Current output for SST210/SST220	Current:4~20mA Output impedance:50MΩ Load resistance:150~250Ω						
Response time	0.3s@t_{90}						
EMC	According to EN61000						
Insulation resistance	100MΩ						
MTBF	≥150000h/times						
Power supply	With voltage & digital output :9~36VDC,consumption≤20mA With current output:16~36VDC,consumption≤40mA						
Power supply reject ratio	>85dB						
Operation temperature range	-40~85℃						
Storage temperature range	-40~100℃						
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						
Shock	100g@11ms,three-axis, half-sine						
Vibration	8grms,20~2000Hz						
Weight	240g(without connector and cable)						

Wiring



Picture 1 Binder712 socket
(View from outside)

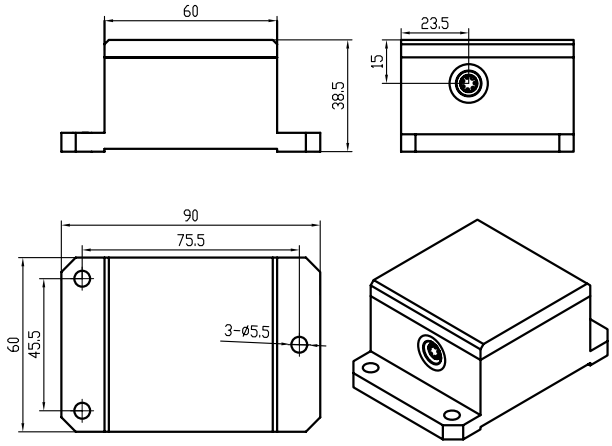


Picture 2 Binder712 plug and cable

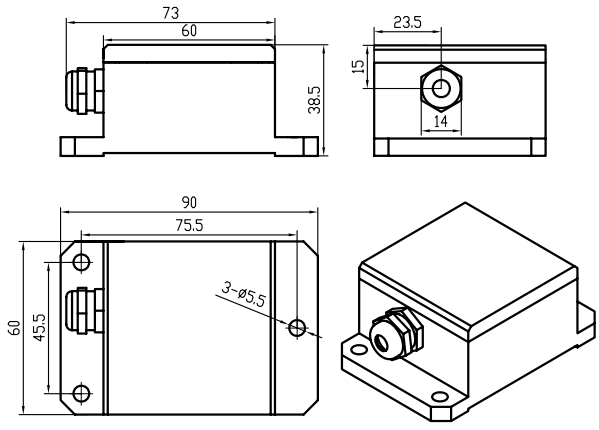
Table2 Binder712/ Pigtail definition

Binder712 Socket Pin	Pigtail Cable color	SST250,SST260			SST220	SST210	SST240	SST230
		RS232	RS485	RS422	4~20mA		0.5~4.5VDC	
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	NC	NC	RS422-RXD+	Ioutx	Iout	Voutx	Vout
5	White	NC	NC	RS422-RXD-	Iouty	NC	Vouty	NC
6	Blue	RS232-TXD	RS485-A	RS422-TXD+	NC	NC	NC	NC
7	Brown	RS232-RXD	RS485-B	RS422-TXD-	NC	NC	NC	NC

Dimensions (mm)



Picture 3 Housing with Binder712 socket



Picture 4 Housing with metal pigtail wiring

Ordering information

Model	Axis	Connection	Output type	Range
SST210	1	Binder712(-C) ,optional Pigtail (-P)	4~20mA	±5°,±10°, ±15°,±30°, ±45°,±60°,±90°
SST220	2	Binder712(-C) ,optional Pigtail (-P)	4~20mA	
SST230	1	Binder712(-C) ,optional Pigtail (-P)	0.5~4.5VDC	
SST240	2	Binder712(-C) ,optional Pigtail (-P)	0.5~4.5VDC	
SST250	1	Binder712(-C) ,optional Pigtail (-P)	RS232(Option RS485, RS422)	
SST260	2	Binder712(-C) ,optional Pigtail (-P)	RS232(Option RS485, RS422)	

SST300 Inclinometer

Features

- Highest combined absolute accuracy ±0.01°@25℃
- Absolute accuracy combined with absolute linearity, cross axis sensitivity, offset, repeatability, hysteresis
- Cross-axis sensitivity ≤±0.1%FS
- Offset ≤±0.005°
- Precise installation & higher actual accuracy
- Adjustable vibration suppression while running
- Temperature drift accuracy(optional):±0.05°@-40~+85℃
- Various output interfaces
- EMC certificated

Description

SST300 inclinometer is excellent tilt device which not only have outstanding performance, but also have simulation & process with advanced EDA&CAE technologies including reliability design, strict process control, structure design, components/materials collection & heat treatment, heat flow analysis, finite element analysis and so on, to achieve high reliability and stability.

Each inclinometer performed with Vigor's patented automatic testing technologies without manual operations and unpredictable random errors occupied. Not only general accuracy test, but also temperature drift compensation, nonlinear correction, cross-axis sensitivity error correction, and/or orthogonal error correction, input-axis misalignment compensation, vertical-axis misalignment compensation, as well as life test, made to reduce additional error caused by filed installation, then realize to installed-to-forgot and acquire accurate data.

Applications

Vessel, Precisioninstruments, Security detection, Civil engineering, Military project, Platform leveling, Drilling machines, Hydraulic leveling.

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)
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- 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-506.4	- EN61000-4-3 RS	- ISTA-2A

Performances

Table 1 Specifications

Measurement range		±5°	±10°	±15°	±30°	±45°	±60°
Combined absolute accuracy① (@25 ℃)		±0.01°	±0.015°	±0.02°	±0.04°	±0.06°	±0.08°
Subroutine parameter	Absolute linearity (LSF,%FS)	±0.06	±0.03	±0.03	±0.03	±0.02	±0.02
	Cross-axis sensitivity②	±0.1%FS					
	Offset③	±0.005°				±0.008°	
	Repeatability	±0.0025°					
	Hysteresis	±0.0025°					
Input axis misalignment④		±4.0°	±3.0°	±2.5°	±1.5°	±1.2°	±1.2°
Sensitivity temperature drift coefficient(max.)		≤100ppm/℃	≤50ppm/℃				
Offset temperature drift coefficient(max.)		≤0.003°/ ℃					
Offset turn on repeatability⑤		±0.008°					
Resolution		0.0025°					
Long-term stability(1 year)		≤0.02°					
Measurement axis		1 axis or 2 axis					
Temperature sensor		Range: -50~125℃ ,Accuracy:±1℃					
Output		RS232 (optional 25 types, please refer to accessories)					
RS232 data format		115200 baud, 8 data bits, 1 start bit, 1 stop bit, none parity,ASCII					
Cold start warming time		60s					
Response time⑦		0.3s(@t_{90})					
Refresh rate(digital output)		5Hz(optional 10Hz,20Hz)					
Response frequency⑧ (analog output)		3Hz @-3dB					
Power supply		9~36VDC					
Power consumption		Average working current≤50mA, average power≤1.5W (25℃ &24VDC)					
Operation temperature range		-40~85℃					
Storage temperature range		-60~100℃					
EMC		According to EN 61000					
Insulation resistance		100MΩ					
MTBF		≥25000 h/times					
Shock		100g@11ms,three-axis, half- sine					
Vibration		8grms, 20~2000Hz					
Protection		IP67					
Connecting		Military class connector (MIL-C-26482)					
Weight		420g(without connector and cable)					

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

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

② The cross-axis sensitivity error 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 Input axis misalignment means during the installation, the allowable installation angle deviation between actual tilt direction and sensor's nature measure ment 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.

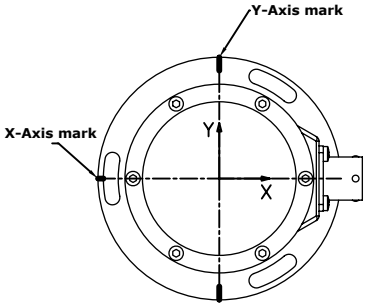
⑤ Offset turn on repeatability means the repeatability of the sensor in repeated by supply power on-off-on many times.

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℃ .

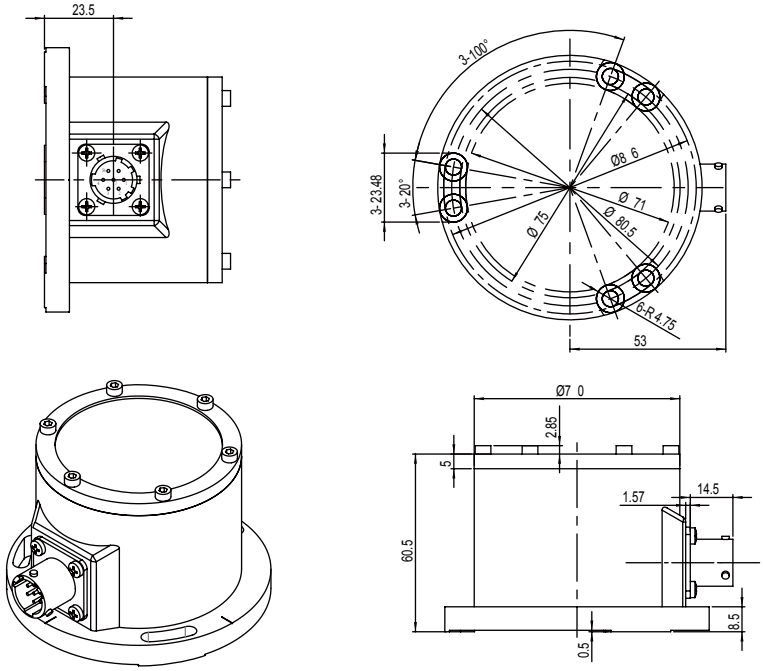
⑦ The response time refers to the angle sensor in a step change (such as the angle changes from -10 ° to +10 °within 5ms), the time required that output of the sensor achieved to the standard value of 90%. The index is different from the sensor set-up time

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.

Dimensions (mm)

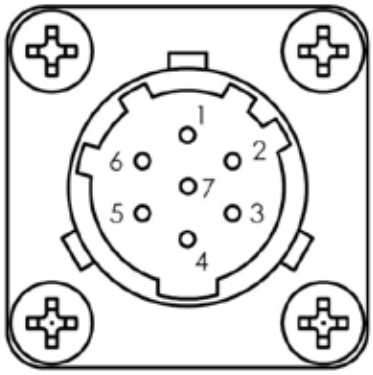


Axial figure



Picture 1 Housing with MIL class connector

Wiring



Picture 2 MIL connector socket
(View from outside)

Table 2 MIL connector socket pin definition

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

Ordering information

P/N: SST3 — Axis — Range — Output — Function — Housing — Cable/plug — Temp.dirft

Axis	Range	Output	Function	Housing	Cable/plug	Temp.dirft
Single — 01 Double — 02	±5° —05 ±10° —10 ±15° —15 ±30° —30 ±45° —45 ±60° —60	RS232 — 00 Other:G1~G25 See table 3	Standard — 00 Other:F1~F5 See table 3	Standard — 00 Other:B1~B6 See table 3	None — 00 Other:C1~C8 See table 3	25℃— 00 Other:D1~D10 See table 3

For example, if order a dual-axis inclinometer, with range ±15°, Output Zigbee wireless transmission, two meters cable with plug, vibration suppression function, anti-explosion housing, the model should be chosen as: SST302-15-G8-F5-B5-C1.

Meanwhile some options (See table 4):

4 channels hub — order number SST003-05-06

Fixed installation base — order number SST003-01-05

Zigbee LCD display with lithium battery — order number SST003-04-07

Complementary power combined with solar and wind energy— order number SST003-09-03

Field calibration equipment (accuracy ±30") — order number SST003-10-02

Accessories & Options

Table 3 Accessories

Item	Order Code	Accessories name	Function
Output interface	G1	RS485 output	Standard industrial ModBus protocol, can be connected to PLC
	G2	RS422 output	Standard industrial interface,can be connected to PLC
	G3	CAN output	Standard industrial interface, can be connected to PLC
	G4	CAN open output	Standard industrial interface, can be connected to PLC
	G5	Ether CAT output	Standard industrial interface, can be connected to PLC
	G6	Device Net output	Standard industrial interface, can be connected to PLC
	G7	Profi-bus output	Standard industrial interface, can be connected to PLC
	G8	HART interface	Standard industrial interface, can be connected to PLC
	G9	TCP/IP interface	Standard industrial TCP/IP interface
	G10	USB2.0 interface	Standard industrial USB interface
	G11	Zigbee interface	Standard industrial 2.4GHz interface
	G12	Wi-Fi interface	Standard industrial interface
	G13	GPRS interface	Standard industrial level
	G14	CDMA interface	Standard industrial level
	G15	SSI output	Standard encoder interface
	G16	PWM output	Standard industrial level
	G17	Vibration string type output	Standard civil engineering industry interface
	G18	Fiber Interface	Single/multimode fiber, industrial level
	G19	4~20mA output	Standard industrial level
	G20	0~5VDC output	Standard industrial level
	G21	-5~+5VDC output	Standard industrial level
	G22	0~10VDC output	Standard industrial level
	G23	-10~+10VDC output	Standard industrial level
	G24	mV output	Standard industrial level
	G25	Switch output	Emergency alarm can be set,2 points/axis
Functional module(built-in)	F1	Single GPS module integrated	Single GPS antenna,positioning accuracy less 3m, gravity correction and time synchronization function
	F2	GPS+Gyro module integrated	Heading accuracy: ≤ 0.5°RMS(including no GPS signals within 60s, no speedometer signal input), ≤ 0.3°RMS(including Gasman speedometer signal input), Output: PPS, longitude and latitude, heading angle(relative to the arctic), Z axis angular rate data, X/Y acceleration data
	F3	Electronic compass module integrated	Plane compass(accuracy±5° when angle changed within 30 degrees, 0.5 degrees when levels)
	F4	Gyro module integrated	Measuring Z axis Angle rate, Measuring X, Y axis dynamic Angle rate
	F5	Vibration module integrated	Measuring Z axis vibration value (0~500 Hz), Resistance to vibration (for compensation)
Housing	B1	Transient high temperature isolation housing	Withstand impact temperature up to 1200℃ within 5 minute duration
	B2	Underwater housing	3000m underwater application, with connector
	B3	Nuclear radiation resistance housing	Apply to nuclear power plants, Anti-radiation 10^7 rads Gamma
	B4	Beam type housing	Hard aluminum alloy, optional 1~3m length
	B5	Anti-explosion housing	According to ATEX Zone2 (Europe), Class I, Division 2(Canada & USA) dIIBT4,dIICT6,ibIIBT4,iaIIBT4,iaIICT6(China)
	B6	Constant temperature housing	Suitable for low temperature,5mins duration from -60 to +25℃
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℃
	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

Temperature drift	D1	Temperature drift	Temperature compensation range is 0~60℃ , and temperature drift accuracy ±0.01°@≤±30°
	D2	Temperature drift	Temperature compensation range is 0~60℃ , and temperature drift accuracy ±0.01°@>±30°
	D3	Temperature drift	Temperature compensation range is -20~60℃ , and temperature drift accuracy ±0.02°@≤±30°
	D4	Temperature drift	Temperature compensation range is -20~60℃ , and temperature drift accuracy ±0.02°@>±30°
	D5	Temperature drift	Temperature compensation range is -30~60℃ , and temperature drift accuracy ±0.03°@≤±30°
	D6	Temperature drift	Temperature compensation range is -30~60℃ , and temperature drift accuracy ±0.03°@>±30°
	D7	Temperature drift	Temperature compensation range is -40~65℃ , and temperature drift accuracy ±0.05°@≤±30°
	D8	Temperature drift	Temperature compensation range is -40~65℃ , and temperature drift accuracy ±0.05°@>±30°
	D9	Temperature drift	Temperature compensation range is -40~85℃ , and temperature drift accuracy ±0.05°@≤±30°
	D10	Temperature drift	Temperature compensation range is -40~85℃ , and temperature drift accuracy ±0.05°@>±30°

Table 4 Options

Item	P/N	Option name	Function
Display & Software	SST003-04-01	Remote single-axis inclination display instrument	LED display tilt angle data, range setup, sensor power supply, RS485 output, suitable for analog output single-axis inclinometer
	SST003-04-02	Remote dual-axis inclination display instrument	LED display tilt angle data, range setup, sensor power supply, RS485 output, suitable for analog output dual-axis inclinometer
	SST003-04-03	Remote single-axis inclination display & Control instrument	Alarm settings (2 points/axis), relay output, LED display, sensor power supply, RS485 output, suitable for analog output, single-axis inclinometer
	SST003-04-04	Remote dual-axis inclination display & Control instrument	alarm setting (2 points/axis), relay output, LED display, sensor power supply, RS485 output, suitable for analog output dual-axis tilt sensors
	SST003-04-05	LCD display	4½ LCD display, single/dual axis
	SST003-04-06	Zigbee LCD display	External power supply, with AC/DC regulator, single/dual axis, 200m distance
	SST003-04-07	Zigbee LCD display	Built-in lithium battery to 8 hours supply, single/dual axis,200m distance
	SST003-04-08	Zigbee LCD display/alarm	Built-in lithium battery to 8 hours supply, single/dual axis,sound/light alarm, emergency alarm can be set up, 200m distance
	SST003-04-09	Application software with PC	Functions: serial port setting, control, diagnose, record, adjustable sampling, zero setting and zero recovery, adjustable vibration suppression filter parameters
	SST003-04-10	Application software	The same function as SST003-04-09,can run in iPhone,iPad
	SST003-04-11	Three-dimensional angle display,measurement software	Can cooperate with inclinometer, which including compass, gyro, GPS, and also can run in iPhone, iPad, PC
	SST003-04-12	Display software with 8 channels	Can combined with SST003-04-09,each channel can achieve independence,can run in iPhone,iPad,PC
	SST003-04-13	Flatness measuring software	Measure and display the surface flatness of object, can run in iPhone,iPad,PC
	SST003-04-14	Verticality measuring software	Through multiple of sensors, to realize the whole object`s vertical degree measurement and display, can run in iPhone,iPad,PC

Converter	SST003-05-01	RS232-USB converter	RS232 convert to USB2.0,external ,industrial-grade
	SST003-05-02	RS232-CAN converter	RS232 convert to CAN2.0B,external, industrial-grade
	SST003-05-03	RS232-GPRS converter	RS232 convert to GPRS wireless transmission, external ,industrial-grade
	SST003-05-04	4 in1 USB converter	4pcs USB access,1 USB output,external, industrial-grade
	SST003-05-05	4 in 1 RS232 converter	4pcs RS232 access,1 USB output,external, industrial-grade
	SST003-05-06	4 channels hub	Suitable for concentrated power supply and wiring distribution,IP65 protection,glass fiber materials,industrial field application
	SST003-05-07	8 channels hub	Suitable for concentrated power supply and wiring distribution,IP65 protection,glass fiber materials,industrial field application
	SST003-05-08	8 channels analog/digital signal data collection box	16 or 24 bits acquisition module, work independently, USB interface, can be connected with PC, etc
Installation tools	SST003-01-01	Magnetic base	50kg suction, permanent magnet, stainless steel materials
	SST003-01-02	Adjustable base	Three-points adjustment, range ±3°, stainless steel materials
	SST003-01-03	Adjustable base with bubble	Three-points adjustment, range ±3°, bubble accuracy is ±20”, stainless steel materials
	SST003-01-04	Adjustable base with micrometer screw	Three-points adjustment, resolution 0.001mm, stainless steel materials
	SST003-01-05	Fixed installation base	Three-points adjustment, stainless steel materials
	SST003-01-06	Alignment block	Positioning sensor’s X\Y axis to align with actual tilt direction
Power	SST003-09-01	AC/DC power supply	Input 220VAC,output 24VDC,output current 2A
	SST003-09-02	The portable rechargeable lithium battery packs	Output 24VDC,Continuous work 24 hours, IP65, rechargeable
	SST003-09-03	Complementary power combined with solar and wind energy	solar and wind energy,output 24VDC@1A, Day & night working
Calibration equipment	SST003-10-01	Field calibration equipment	Mechanical, manual, accuracy ±20”, measurement range ±5°, single axis
	SST003-10-02	Field calibration equipment	Mechanical, manual, accuracy ±30”, measurement range ±30°, single axis
	SST003-10-03	High accuracy calibration equipment for lab	Manual, with LED display, accuracy ±5", resolution 0.5", measurement range±180°, single axis, weight 20 kg
	SST003-10-04	Cross-axis test equipment	Mechanical, manual, accuracy ±30 ", measurement range ±15 °
	SST003-10-05	Adjustable field level platform	Mechanical, manual, 3kgs payload ,level accuracy ±10", adjustable range(X/Y) ±1°
Test report	SST003-11-01	Test report for cross-axis error	Accuracy test report under banking tilt, average 11 points of full range
	SST003-11-02	Test report for absolute linearity	Average 21 points of full range
	SST003-11-03	Test report for Input axis misalignment	Axis migration test report for vertical and horizontal axis of inclinometer, 3 angles of point
	SST003-11-04	Test report for response time and hysteresis	The report for time response curve/ data and hysteresis characteristics
	SST003-11-05	Test report for vibration	According to sensor`s standard vibration characteristic
	SST003-11-06	Test report for mechanical shock	According to sensor`s standard shock characteristic
	SST003-11-07	Test report for temperature shock	Test report of characteristics change under 10℃/minute rate
	SST003-11-08	MTBF analysis report	MTBF Statistical analysis report
	SST003-11-09	FMEA analysis report	FMEA analysis report
	SST003-11-10	Test report for life simulation	Test report for zero position and full range under 7 days continuously power on
	SST003-11-11	Test report for high-low temperature storage	According to MIL standard (meet MIL-810F 501.4, 502.4)
	SST003-11-12	Test report by China National Shanghai Measurement institute	Average 5 points of full range
	SST003-11-13	Test report for salt spray	According to MIL standard(meet MIL-810F 509.4)
	SST003-11-14	Test report for IP protection	According to IEC standard
	SST003-11-15	EMC test report	According to EN6000

SST400 Inclinometer

Features

- Continuous output or acknowledge output
- Adjustable filter to absorb vibration
- Available to modify with local gravity value
- Mostly compatible to SST300's accessories and options (90 types)
- Accuracy up to ±20''
- Cross-axis sensitivity≤±0.2%FS
- ±9"offset repeatability
- Refer to about 50 industry & military standards
- Military class product available

Description

SST400 inclinometer is intelligent renewed product, improved functions & performances comprehensively. SST400 inclinometer strictly tested and combined with simulation & process with advanced EDA&CAE technologies including materials collection, heat treatment, finite element analysis, modal analysis & test (include housing, sensitive apparatus, PCB board and relationship between characters of each other).
SST400 inclinometer adopts Vigor's patented automatic testing technology, not only general test, correct and compensate to temperature drift/non-linearity/cross-axis sensitivity error/orthogonal error/sensitive axis and so on, also made life test with different angular rate & angular acceleration impact and long time temperature cycle test for each product. More test programs, correction and compensation of parameters can be made as special request.

Applications

Factory automation, Precision instrument, Vessel, Engineering machinery, Civil engineering, Military project, Aerospace.

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

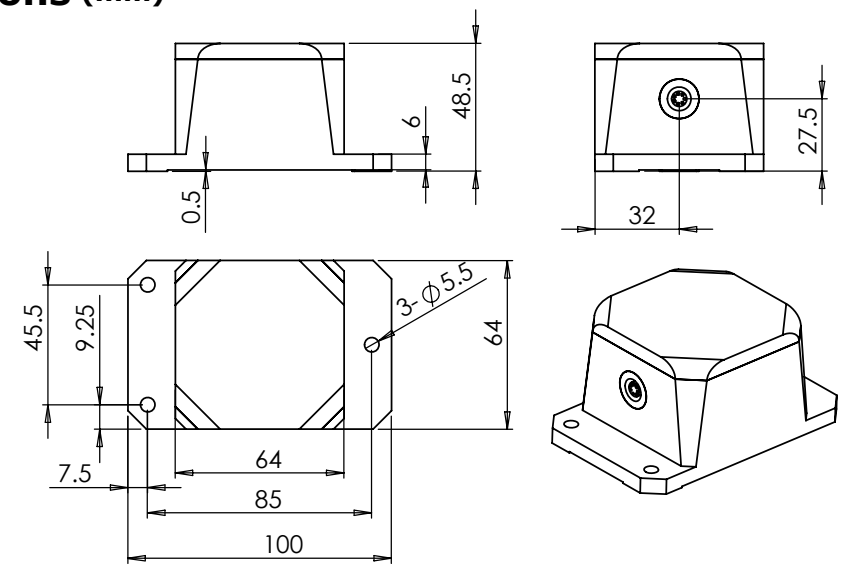
- MIL-HDBD-338B	- MIL-STD-810F-510.4	- MIL-STD-810F-507.4
- ISO 5348 IDT	- MIL-STD-810F-514.5	- EN61000-4-4 EFT
- MIL-STD-810F-501.4	- MIL-STD-810F-516.5	- EN61000-4-5 SURGE
- MIL-STD-810F-502.4	- IEC60529 IP	- EN61000-4-6 CS
- MIL-STD-810F-503.4	- EN61000 -4-2 ESD	- EN61000-4-8 PFMF
- MIL-STD-810F-506.4	- EN61000-4-3 RS	- ISTA-2A

Performances

Table1 Specifications

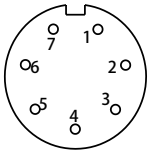
Measurement range	±5°	±10°	±15°	±30°
Accuracy(@25℃)	±20″			
Repeatability	±9″			
Resolution	2″			
Offset	±0.004°			
Response time	0.3s			
Offset temperature drift coefficient	≤0.0006°/ ℃ @ -20~65 ℃			
Sensitivity temperature drift coefficient	≤0.005%/ ℃ @ -20~65 ℃			
Temperature sensor	Range:-50~125℃ ,Accuracy:±1℃			
Measurement axis	1axis or 2 axis			
Cross-axis sensitivity	±0.2%FS			
Output type	RS232 (optional RS422, RS485), 0~5VDC,4~20mA			
RS232 data format	115200 baud,8 data bits,1start bit,1stop bit, none parity,ASCII			
Cold start warming time	60s			
Refresh rate	5Hz(optional 10Hz or 20Hz)			
Response time	0.3s			
Power supply	9~36VDC			
Current consumption	≤100mA			
Power dissipation	Supply current≤50mA, power dissipation≤1.5W(25℃ &24VDC)			
Output impedance	Internal resistance of voltage source:100Ω,sink/leakage current about 10mA Internal resistance of current source: 50MΩ, load :0~625Ω			
Power supply rejection ratio	> 85dB			
Operation temperature range	-40~85℃			
Storage temperature range	-60~100℃			
EMC	According to EN 61000			
Insulation resistance	100MΩ			
MTBF	≥25000h/times			
Shock	100g@11ms,three-axis,half-sine			
Vibration	8grms, 20~2000Hz			
Protection	IP65(optional IP67)			
Housing	6061-T6 aluminum alloy			
Cable	7-wire shielded cable with tensile reinforcement			
Connecting	Binder712 connector			
Weight	≤500g(without connector and cable)			

Dimensions (mm)

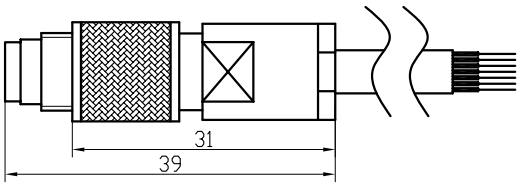


Picture1 Housing with Binder712 socket

Wiring



Picture 2 Binder712 socket
(View from outside)



Picture 3 Binder712 plug and cable

Table 2 Binder712 wiring

Binder712 socket pin	Cable wire colour	Output				
		4~20mA	0~5VDC	RS232	RS485	RS422
1	Red	Power +	Power +	Power +	Power +	Power +
2	Black	Power -	Power -	Power -	Power -	Power-
3	Green	Signal GND	Signal GND	Signal GND	Signal GND	Signal GND
4	Yellow	Ioutx	Voutx	NC	NC	RS422-RXD+
5	White	Iouty	Vouty	NC	NC	RS422-RXD-
6	Blue	NC	NC	RS232-TXD	RS485-A	RS422-TXD+
7	Brown	NC	NC	RS232-RXD	RS485-B	RS422-TXD-

Ordering information

Table 3 Ordering product list

Model	Axis	Output type	Range
SST410	1	4~20mA	±5° ±10° ±15° ±30°
SST420	2	4~20mA	
SST430	1	0~5VDC	
SST440	2	0~5VDC	
SST450	1	RS232(optional RS485,RS422)	
SST460	2	RS232(optional RS485,RS422)	

SST500 Inclinometer

Features

- Up to ±0.001° bias stability within 12 months
- Bias temperature drift achieve ±0.0005°/℃
- Optimization design based on CAE & EDA
- High reliability & flexibility
- Multi-functional management software
- Less than ±3″ bias
- Less than ±1.5″ absolute linearity error
- Kinds of land & aerospace application interfaces
- 3 classes: Industry class, Universal military class, High-quality military class
- Up to 15000 hours of MTBF
- Successfully applied to missile launch, radar, aerospace and other military projects
- Customized product available

Description

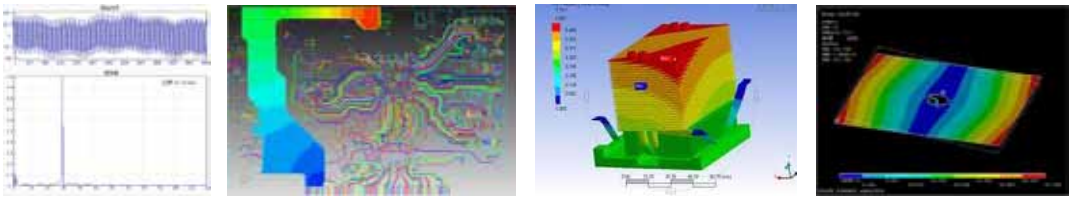
SST500 inclinometer is a revolutionary tilt measurement product, fully absorbs and learns from high precision military inertial navigation technology, precise fusion with machine-electric & inertial test technologies, applied to variety of high-class industrial & military applications.

SST500 inclinometer adopts inertial navigation grade servo accelerometer, with <0.1μg resolution, >25Hz frequency response, >120dB signal-noise ratio. Achieve ± 1.3″ accuracy at room temperature.

SST500 performs excellent dynamic characteristics, long-term stability, and environmental adaptability, experienced with various static & quasi-static long-term works under industrial & military harsh environment.

Thanks Vigor's engineers for making complete modal testing for whole body & key components, to minimize interference from outside shock & vibration.

To maximize reliability of SST500 inclinometer, modeling analysis, regulated software & hardware reliability design, selected proven components directory, finite element analysis (thermal reliability analysis, structural reliability analysis) and FMEA, have been made to ensure the optimal performance and stability as well.



Applications

Military: missile launch, rocket launch, military radar, mobile communication equipment, fire control system, bunkers monitoring, flight test, laser/video equipment, navigation system, etc.

Civil: large-scale bridge, tunneling guidance equipment, space observations, precision machine tools, optical instrument, 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)
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- 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-506.4	- EN61000-4-3 RS	- ISTA-2A

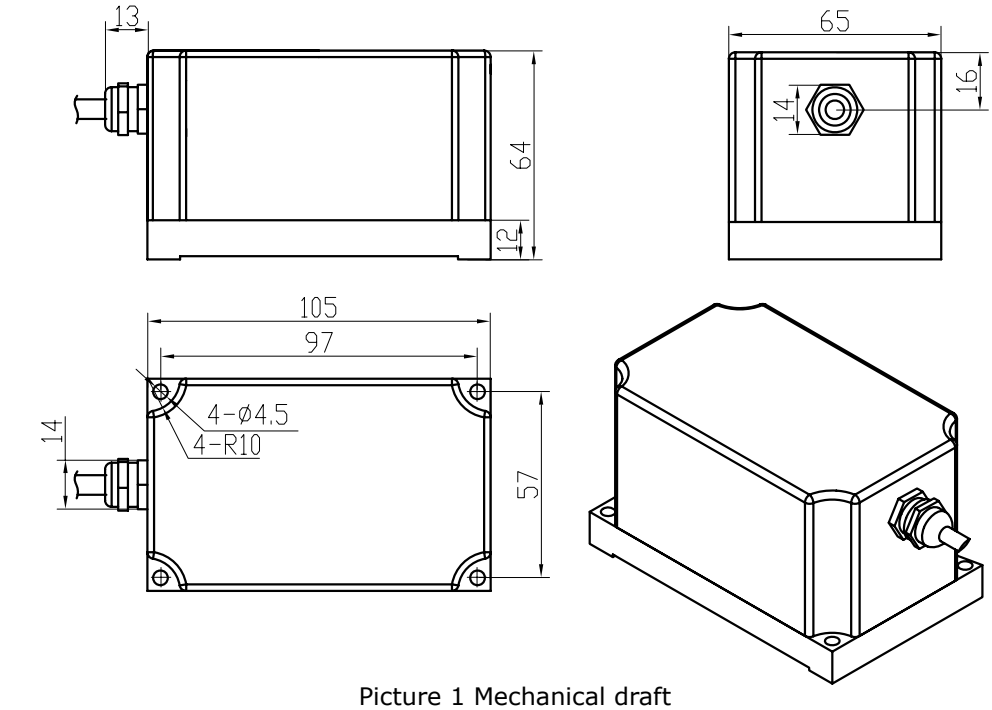
Performances

Table 1 Specifications

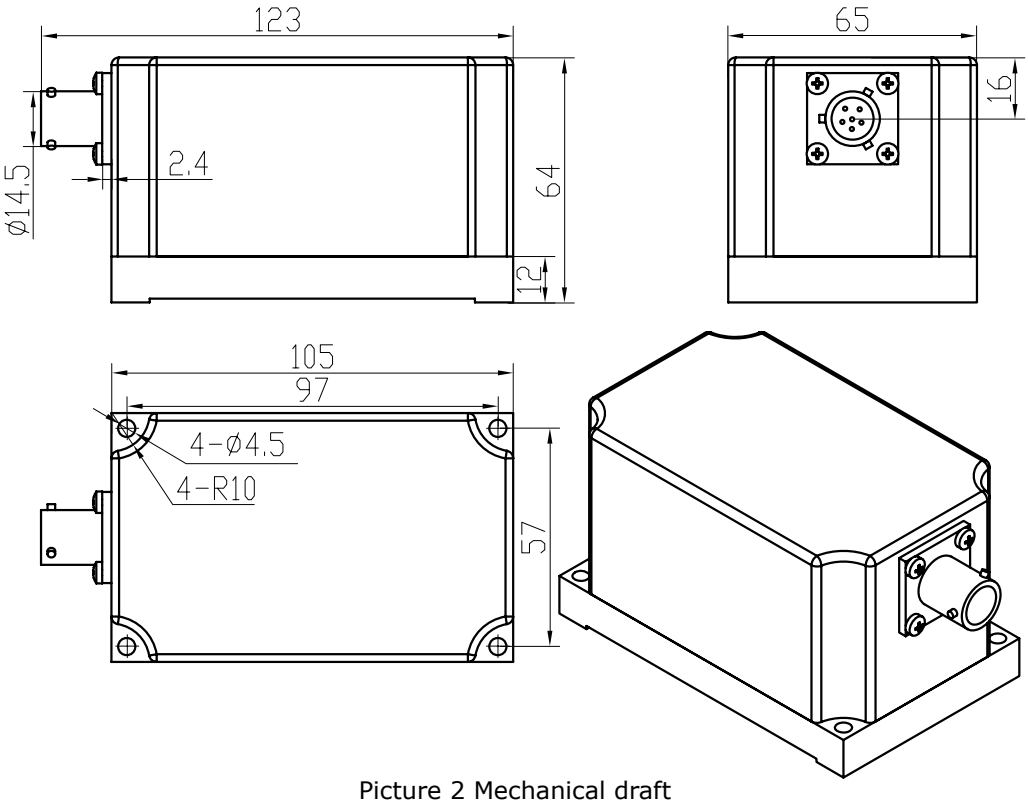
Measurement range		±1°	±5°	±10°	±15°	±30°	±45°	±60°
Absolute linearity error(@20℃)		±1.5″	±5″	±10″	±10″	±15″	±25″	±40″
Resolution		0.1″	0.2″	0.5″	0.5″	0.6″	1″	2″
Axis		Single/Double						
Bias repeatability	Industry class	±3.6″	±3.6″	±3.6″	±3.6″	±10″	±18″	±18″
	Universal military class	±3″						
	High-quality military class	±2″						
Bias stability	Industry level @ 6 months	±10″	±10″	±10″	±10″	±18″	±18″	±30″
	Universal military class @ 6 months	±3.6″						
	High-quality military class @ 12 months	±3.6″						
Bias	Industry class	±10″	±10″	±10″	±10″	±18″	±18″	±30″
	Universal military class	±8″						
	High-quality military class	±3.6″						
Bias temperature drift. /℃	Industry class @-20~65℃	±5″	±5″	±5″	±10″	±15″	±20″	±25″
	Universal military class @-40~85℃	±0.5″	±0.5″	±0.5″	±1″	±1″	±2″	±2″
	High-quality military class @-55~125℃	±0.5″	±0.5″	±0.5″	±1″	±1″	±2″	±2″
Sensitivity temperature drift ppm/℃	Industry class @-20~65℃	±35	±35	±40	±40	±50	±50	±60
	Universal military class @-40~85℃	±30	±20	±20	±10	±10	±10	±10
	High-quality military class @-55~125℃	±30	±20	±20	±10	±10	±10	±10
Cross-axis sensitivity	Industry class	±0.1%FS						
	Universal military class	±0.05%FS						
	High-quality military class	±0.02%FS						
Misalignment	Industry class	≤2mrad.						
	Universal military class	≤0.5mrad.						
	High-quality military class	≤0.05mrad.						
Response time	Industry class	0.3~1.0s(depends on requested accuracy)						
	Universal military class	0.1~1.0s(depends on requested accuracy)						
	High-quality military class	0.1~1.0s(depends on requested accuracy)						
Cold start warming time	Industry class	180s						
	Universal military class	120s						
	High-quality military class	60s						
Output	Industry class	Interface:RS232, RS485, update rate:5Hz, Format:9600 baud,8 data bits,1 start,1 stop,no polarity,ASCII						
	Universal military class	Interface:RS422,update rate:10Hz,20Hz,50Hz, Format:9600 baud,8 data bits,1 start,1 stop,no polarity,ASCII						
	High-quality military class	Interface:MIL-STD-1553B, ARINC429, IEEE1394, IBIS, or depend on request						
EMC	Industry class	According to EN 61000 or GBT17626						
	Universal military class	GJB 151A or MIL STD-461						
	High-quality military class	GJB 151A,or MIL STD-461,or depend on request						

MTBF	Industry class	≥5000h/times
	Universal military class	≥10000h/times
	High-quality military class	≥15000h/times
Power supply	Industry class	9~36VDC(unregulated),≤80mA@24VDC
	Universal military class	12~48VDC(unregulated),≤80mA@24VDC
	High-quality military class	12~48VDC(unregulated),consumption depends on request
Shock	Industry class	100g@11ms,3 axis,6directions,half-sine,1times/axis, total 6 times
	Universal military class	100g@11ms,3 axis,6directions,square wave,2times/axis, total 12 times
	High-quality military class	100g@11ms,3 axis,6directions,square wave,3times/axis, total 18 times
Vibration	Industry class	3grms, 20~2000Hz,random
	Universal military class	5grms, 20~2000Hz,random,1g,1oct/min,20~2000Hz,sine
	High-quality military class	6grms, 20~2000Hz,random,2g,1oct/min,20~2000Hz,sine
Rapid temperature change test	Industry class	-40~85℃ range,10℃ /min ratio
	Universal military class	-40~85℃ range,15℃ /min ratio
	High-quality military class	-60~125℃ range,15℃ /min ratio
Storage temperature test	Industry class	-40~85℃ range, 24h,according to GJB/MIL or depend on request
	Universal military class	-40~125℃ range, 2×24 h,according to GJB/MIL or depend on request
	High-quality military class	-60~125℃ range, 7×24 h,according to GJB/MIL or depend on request
Housing	Industry class	6061-T6 aluminum housing,316N base
	Universal military class	Full 316N,10 cycles of heat treatment
	High-quality military class	Full 316N,10 cycles of heat treatment,6months natural stress release, or depends on request
Connecting	Industry class	Military connector or metal pigtail with 2m shield 7-wire cable (heavy duty up to 30kg)
	Universal military class	Military full stainless steel connector, or full stainless steel pigtail with 2m shield 7-wire cable (heavy duty up to 50kg)
	High-quality military class	Military full stainless steel connector, or full stainless steel pigtail with 2m shield 7-wire cable (heavy duty up to 50kg)
Protection	Industry class	IP65
	Universal military class	IP67
	High-quality military class	Depends on request
Operation temperature range	Industry class	-40~85℃
	Universal military class	-40~85℃
	High-quality military class	-55~125℃
Storage temperature range	Industry class	-40~85℃
	Universal military class	-60~125℃
	High-quality military class	-60~125℃
Weight	Industry class	2Kg
	Universal military class	3Kg
	High-quality military class	Depends on request
Size	Industry class	105x65x64mm(without connector and pigtail)
	Universal military class	105x65x64mm(without connector and pigtail)
	High-quality military class	Depends on request
Temperature sensor (internal)	Industry class	Range-50~125℃ , accuracy ±1℃
	Universal military class	Range-50~125℃ , accuracy ±1℃
	High-quality military class	Range-60~125℃ , accuracy ±1.5℃

Dimensions (mm)

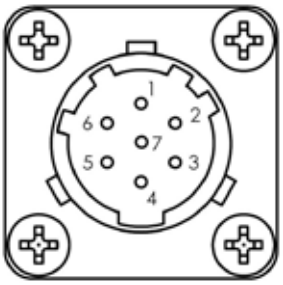


Picture 1 Mechanical draft
(Pigtail, suitable to industry class & universal military class)



Picture 2 Mechanical draft
(Military connector, suitable to industry class & universal military class)

Wiring



Picture 3 Connector socket
(view from outside)

Table 2 Wiring definition

Socket pin	Pigtail cable	Output(single or double axis)		
		RS232	RS485	RS422
1	Red	Power +	Power +	Power +
2	Black	Power -	Power -	Power -
3	Green	Signal GND	Signal GND	Signal GND
4	Yellow	NC	NC	RS422-RXD+
5	White	NC	NC	RS422-RXD-
6	Blue	RS232-TXD	RS485-A	RS422-TXD+
7	Brown	RS232-RXD	RS485-B	RS422-TXD-

Note: 1. Don't connect signal GND and Power GND together.
2. Other outputs on request.

Ordering information

P/N: SST5 — Axis — Range — Output — Quality class — Wiring

- Axis: Single — 50; Double — 60
- Range: ±5° — 05; ±10°— 10; ±15°— 15; ±30°— 30; ±45°— 45; ±60°— 60
- Output: RS232 —00; RS485 —G1; RS422 —G2; 1553B —G26; ARINC429 —G27; IEEE1394 —G28; IBIS —G29
- Quality class: Industry class — N; Universal military class — M; High-quality military class — S
- Wiring: Connector — C; Pigtail — P

Note

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