SPECIFICATIONS

Item No.：SCA116Z

Description: Digital Type Z-Axis Inclinometer

Production implementation standard reference

- Enterprise quality system standards: ISO9001: 2008 standard (certification number: 128101)
- Tilt sensor production standards: GB / T 191 SJ 20873-2003 inclinometer general specification of Level
- The Academy of metrology and quality inspection Calibrated in accordance to: JJF1119-2004 Electronic Level calibration Specification
- Gyro accelerometer test standard: QJ 2318-92 Gyro accelerometer test methods
- Software development reference standard: GJB 2786A-2009 military software development General requirements
- Product environmental testing standards: GJB150
- Electromagnetic anti-interference test standards: GB / T 17626
- Version：Ver.09
- Date:2014.4.22

SCA116Z- Digital Type Z-Axis Inclinometer

General Description

SCA116Z is a high accuracy & high performance inclinometer launched by RION company to the Z – Axis measurement application, in industrial applications, it is unpredictable the measured object inclination towards X or Y direction ,which means that the 360-degree horizontal posture may tilt to any one direction, under this application if you use single-axis X or dual-axis XY unable to accurately measure, the Z-axis tilt can meet customer demand, integrated operation of the X-axis and Y-axis data, get the Z-axis tilt angle.

SCA116Z built-in high-precision 16bit A / D differential converter, through 5 filtering algorithm, the output interface RS485, RS232, RS422, TTL, PWM are optional.Because of Built in ADI company's high precision digital temperature sensor that can correct the sensor temperature drift in accordance with the changes of the built-in temperature sensor, to ensure high repeatability of the product in the low-temperature and high-temperature environment. The output frequency response standards up to 18Hz, for higher response frequency Division we can customize according to the user requests. The products are truly industrial-grade products, reliable performance, scalability, and a variety of output options. Suitable for a variety of harsh industrial control environment.

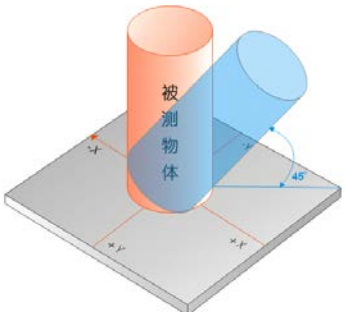
Features:

- ●Inclination tilt measuring
- ●Accuracy: refer to the technical data
- ●Wide temperature working: -40～+85℃
- ●IP67 protection class
- ●Direct lead cable interface
- ●Output mode RS232/RS485/TTL/ CAN 2.0B (optional)
- ●Measuring Range :±1～±90° optional
- ●Wide voltage input: 9～36V
- ●Resolution: 0.01°
- ●Highly anti-vibration performance >2000g
- ●Small size :90×40×26mm（customized）

Application:

- ●Satellite positioning Search
- ●engineering mechanical measurement of dip angle
- ●Radar detection of vehicle platform
- ●Gun Barrel angle measurement in early shooting
- ●Rubber hose flexural measuring
- ●Rail-mobile monitoring
- ●oil-well drilling equipment
- ●Underground drill posture navigation
- ●Pier posture measuring

Product Schematic diagram



被测物体朝-Y和+X方向倾斜，
通过X和Y角度运算弧度、求
正切、正切平方、1+tgx2+tgy2、
开方、到倒数、求反与余弦、
弧度最终换算出X与Y之间的夹角。

Technical Data

Parameters	Conditions	SCA116Z-10	SCA116Z-30	SCA116Z-60	SCA116Z-90	Unit
Measuring rang		±10	±30	±60	±90	°
Measuring axis		X	X	X	X	
Resolution		0.01	0.01	0.01	0.01	°
Absolute accuracy		0.02	0.05	0.08	0.1	°
Long term stability		0.05	0.05	0.05	0.05	
Zero temperature coefficient	-40～85°	±0.006	±0.006	±0.006	±0.006	°/℃
Sensitivity temperature coefficient	-40～85°	≤100	≤100	≤100	≤100	ppm/℃
Power on time		0.5	0.5	0.5	0.5	S
Response time		0.05	0.05	0.05	0.05	s
Output rate	5Hz、15Hz、35Hz、50Hz、100Hz can be setting					
Output signal	RS232/RS485/RS422/TTL/PWM/CAN/MODBUS					
EMC	According to EN61000 and GBT17626					
MTBF	≥50000hours/times					
Insulation Resistance	≥100M					
Shockproof	100g@11ms、3Times/Axis(half sinusoid))					
Anti-vibration	10grms、10～1000Hz					
Protection glass	IP67					
Cables	Standard 1M length、wearproof、grease proofing、wide temperature、Shielded cables 4*0.4mm2					
Weight	120g(without cable)					

*This Technical data only list ± 10 °, ± 30 °, ± 60 °, + 90 ° series for reference, other measuring range please refer to the adjacent parameters

Electronic Characteristics

Parameters	Conditions	Min	Standard	Max	Unit
Power supply	Standard	9	12、24	36	V
	customized		5		V
Working current	non-loaded		30		mA
Working temperature		-40		+85	℃
Store temperature		-55		+125	℃

Key words：

Resolution：Refers to the sensor in measuring range to detect and identify the smallest changed value.

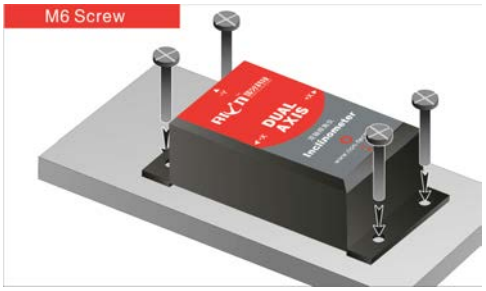
Absolute accuracy：Refers to in the normal temperature circumstances,the sensor absolute linearity, repeatability, hysteresis, zero deviation, and transverse error comprehensive error.

Long term stability : Refers to the sensors in normal temperature conditions, the deviation between the maximum and minimum values after a year's long time work.

Response time：Refers to the sensor in an angle change, the sensor output value reached the standard time required.

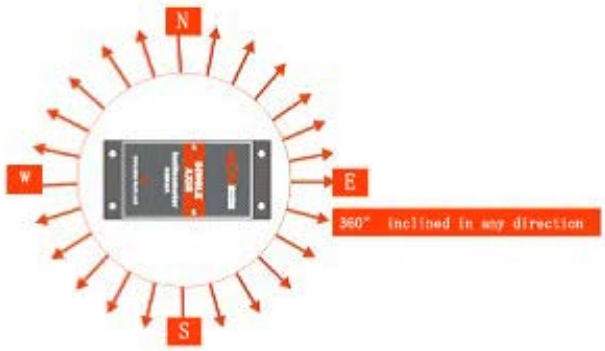
Mechanical Parameters

○ Connectors：1m lead cable（customized）
○ Protection glass：IP67
○ Enclosure material ： Aluminum Oxide
○ Installation ： 4*M6 screws



Measuring Directions&Fix

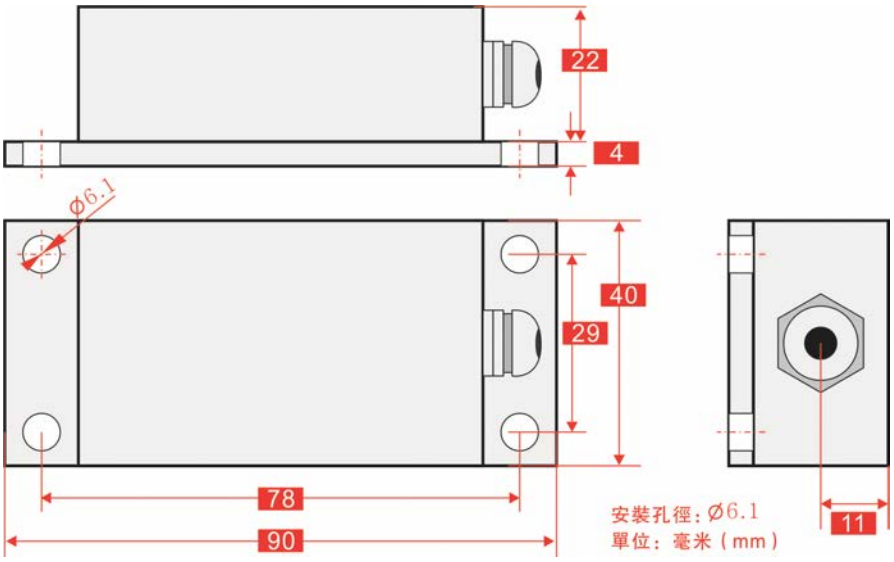
The installation must guarantee the product bottom is parallel to measured face， and reduce the influence of dynamic and acceleration to the sensor. This product can be installed horizontally or mounted vertically, for model selection and order please refer to the specifications in ordering information ,for installation please refer to the following scheme.



Production installation notes:

Please follow the correct way to install tilt sensor, incorrect installation can cause measurement errors, with particular attention to the mounting surface and the measured surface must be fixed closely, smoothly, stability,if mounting surface uneven likely to cause the sensor to measure the angle error. 2) The sensor axis and the measured axis must be parallel ,the two axes do not produce the angle as much as possible.

Dimension

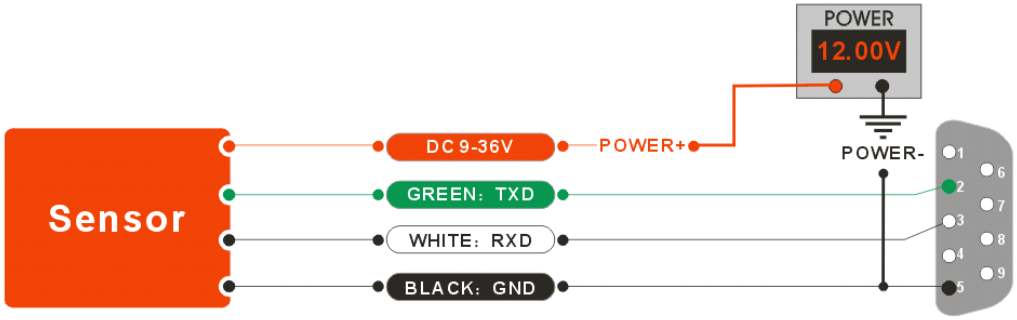


Size：L90×W40×H26mm

Electrical Connection

Line	BLACK	WHITE	GREEN	RED

color	GND	RS232(RXD)	RS232(TXD)	Vcc 9～36V
function	Power Negative	RS485(D+)	RS485(D-)	Power positive

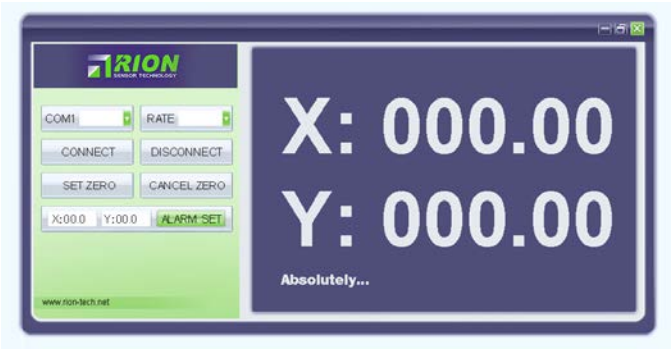


Ordering information:

Model	Ordering Description	Output corresponding: digital series output
SCA116Z-X-Y	Z refer to the fixed Z-axis horizontal mounting measurement	
	X refer to the model selection code for angle measuring range; From 01 ～90deg full measuring range are optional	
	Y refer to 5 optionals ： 1）RS232 2）RS485 3）RS422 4）PWM 5) CAN 2.0B	
E.g：SCA116Z-60-232：Z-axis horizontal mounting/±60°Measuring range /RS232 signal output		

RION serial port tester software

Rion's product matched debugging software can be connected to the inclinometer on computer by itself then for angle display ,also you can download public version of the comassistant software on line for using .



COM: computer port optional

RATE：data refresh rate

CONNECT：connect inclinometer

DISCONNECT：disconnect inclinometer

SET ZERO：set current position is ZERO

CANCEL ZERO：cancel relative ZERO setting

Inclinometer debugging procedure ：

1）Connect the white line to the third pin of COM port;

2）Connect the green line to the second pin of COM port;

3） Connect the black line to the fifth pin of COM port and meanwhile connect with external power negative

4) Connect the red line to the external power positive (see electronic connection chart),if you are using a laptop computer you need a RS232 to USB module, if the PC then can be directly connected communication with the computer COM port.

5) Open the host computer RION software;

6) to select the corresponding COM port (COM port must be selected correctly , if wrong can not be connected);

7) RATE option preferably 10, the higher the number, the faster the angle data of the software response, and vice versa, the slower;

8) Click software "CONNECT" button , the data will be displayed

Common problem analysis for connection failure:

a) Check the power: check positive and negative, whether DC ?

b) Exchange two data lines RXD and TXD re-commissioning;

c) COM port is occupied, close the other COM port debugging equipment;

d) The black line is not connected to the fifth pin of COM port;

e) If you are using a RS232 converter, please check whether the converter can work properly;

f) Please measure with a multimeter, if the sensor current below 20mA or greater than 60mA then judge sensor was damaged.

Product Protocol

1、DATA FRAME FORMAT：（8 bits date，1 bit stop，No check，Default baud rate 9600）

Identifier (1byte)	Date Length (1byte)	Address code (1byte)	Command word (1byte)	Date domain	Check sum (1byte)
68					

Date format: hexadecimal

Identifier：Fixed68

Data length：From data length to check sum（including check sum）length

Address code：Accumulating module address，Default :00

Date domain will be changed according to the content and length of command word

Check sum：Data length、Address code、Command word and data domain sum,No carry.

2、COMMAND word analysis、

Desc.	**Meaning/Example**	Description
0X04	**Meanwhile read angle command** E.g: ***68 04 00 04 08***	Data domain（0byte） No Data domain command
0X84	**The sensor answer reply** E.g: **68 0D 00 84 00 20 10 10 05 25 00 00 00 FB**	Data domain（9byte） AA AB BB CC CD DD EE EE EE AA AB BB: three character means X axis CC CD DD: three character means Y axis EE EE EE : : three character retention data ,regular is

		000000 Angle format with same analytic method as X axis or Y axis The angle on the left example is X axis 020.10deg, Y axis -05.25deg
0X05	**Setting relative/absolute ZERO :** Can set the current angle to Zero degree, relative measurement, can also be set to absolute ex-factory zero, power off save E.g: ***68 05 00 05 00 0A***	Data domain （1byte） 00: absolute ZERO 01: relative ZERO
0X85	Sensor answer reply command E.g: **68 05 00 85 00 8A**	Data domain（1byte） Data domain in the number means the sensor response results 00 Setting successfully FF Setting failure
0X0B	**Setting communication rate** **E.g: *68 05 00 0B 03 13*** The command setting is effective after power off then restart (power off with save function)	Data domain（1byte） Baud rate：default :9600 00 means 2400 01 means 4800 02 means 9600 03 means 19200 04 means 38400 05 means 115200
0X8B	Sensor answer reply command E.G:**68 05 00 8B 90**	Data domain（1byte） Data domain in the number means the sensor response results 00 Success FF Failure
0X0C	**Setting sensor output mode** Response rule; Need upper computer send reading angle command , the sensor answer the corresponding angle Automatic output rule: The sensor with power on can Automatically output X angle , output frequency is 20HZ (Power off with save function) E.g: ***68 05 00 0C 00 11***	Data domain （1byte）Factory default: 00 00 Answer reply mode 01 5Hz Automatical output mode 02 15Hz Automatical output mode 03 25Hz Automatical output mode 04 35Hz Automatical output mode 05 50Hz Automatical output mode 06 100 Hz Automatical output mode
0X8C	The sensor answer reply command E.g: **68 05 00 8C 00 91**	Data domain（1byte） Data domain in the number means the sensor response results 00 Success FF Failure

0X0F	**Setting module address command** The sensor default address is 00, 1, such as a plurality of sensor to be connected with a bus cable, e.g RS485.requires each sensor is set to a different address, in order to achieve control and response angle . 2, If successfully changed the new address, follow all of the commands and responding Packet address code has to switch to the new address code which already changed then to be effective, otherwise the sensor will not respond to commands.(power off with save function) E.g: ***68 05 00 0F 01 15*** Setting the address to 01 ***68 05 FF 0F 00 13*** Use the common address to reset address to 00	Data domain （1byte）XX Module address Address from 00 to EF range Note: All products have a common address :FF, If forget the address what has been set during operation , can use FF address to operate the product can still normally respond
0X8F	The sensor answer reply command E.g: 68 05 00 8F 94	Data domain（1byte）, Data domain in the number means the sensor response results 00 Success FF Failure
0X0D	**Query relative/absolute ZERO** Used to query the sensor current ZERO mode is relative ZERO or absolute ZERO E.g : **68 04 00 0D 11**	Data domain（0byte） No data domain commands
0X8D	The sensor answer reply command E.g:**68 05 00 8D 00 92**	Data domain (1byte）, Data domain in the number means the sensor response results 00 Absolute ZERO 01 Relative ZERO

0x17	**Set the sensor filter coefficients** Set to a different filter coefficient to adjust the angle acquisition rate, in order that there is a steady angle output in working with different type devices(This function with memory after power off) ***E.g: 68 05 00 17 01 1D***	Data domain （1byte）Factory default : 02 01 1 Filtering Fast response, no delay, the output of the last one data beat (100 sampling) 02 2 Filtering For the periodic peak value filtering, faster response, and the short delay (30 sampling) 03 3 Filtering After periodic filtering then large range of smoothing filtering, biggest delay, only suitable for static measurements (5 sampling)
0X97	The sensor answer reply command E.g: **68 05 00 97 00 02**	Data domain（1byte） Data domain in the number means the sensor response results 00 success FF failure

ESD Sensitive Device

※ More products information, please refer to the company's Website : www.rion-tech.net

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