



SWR34X/SWR34D Single/Dual-Axis Inclinator Switch with Relay Output

Product Manual

V1.5-20260412



✓ Technical Highlights

- ❖ Accuracy: 0.1°;
- ❖ Relay output (NO/NC);
- ❖ Threshold setting via RS232;
- ❖ User-configurable alarm angle.

✓ Product Introduction

The SWR34X / SWR34D series consists of digital single-axis and dual-axis tilt switches developed by Ruicom Technology specifically for horizontal safety alarming and platform leveling detection; they feature built-in relay outputs. Users can customize tilt alarm thresholds; when the tilt exceeds the limit, the device outputs a passive relay contact signal (1A drive current) to control solenoid valves for hydraulic outrigger leveling. These switches incorporate secondary compensation for temperature and linearity, along with comprehensive protection against short circuits, surges, reverse polarity, and transient high voltages. Equipped with industrial-grade MCUs, conformal-coated PCBs, imported cables, and wide-temperature-range metal housings, they are stable, reliable, and suitable for various harsh industrial environments.

✓ Application Scope

With their high-precision inertial measurement capabilities, this product series offers mature solutions for industrial-grade applications:

- ❖ Agricultural Machinery & Equipment
- ❖ Aerial Work Platforms
- ❖ Woodworking Machinery
- ❖ Medical Equipment Leveling
- ❖ Construction Lifting Equipment
- ❖ Aerial Work Suspended Platforms
- ❖ Construction Tower Cranes
- ❖ Electric Vehicle Control Systems

**Measurement and
Control of
Construction
Machinery and
Equipment**



**Safety Monitoring
of Bridges and**



**Excavator Angle
Measurement and
Control**



**High-precision
large-scale jig**



Performance Parameters

SWR34X/SWR34D	Condition	Parameter	
Measurement range		±15	°
Measurement axes		X/X Y	Axis
Resolution		0.05	°
Measurement accuracy		0.1	°
Long-term stability		0.05	°
Zero-point temperature coefficient	-40 ~ 85℃	±0.006	°/℃
Sensitivity temperature coefficient	-40 ~ 85℃	≤100	ppm/℃
Power-up startup time		0.1s	
Response time		0.2s	
Electromagnetic compatibility (EMC)	In accordance with EN 61000 and GB/T 17626		
Mean Time Between Failures (MTBF)		≥98,000 hours/cycles	
Insulation resistance		≥100 MΩ	
Shock resistance		100g @ 11ms, 3-axis (half-sine wave)	
Vibration resistance		10grms、10 ~ 1000Hz	
Waterproof rating		Direct lead wire: IP67; Aviation connector: IP65	
Cable	Comes standard with a 1-meter shielded cable (4 x 0.4 mm ²) that is wear-resistant, oil-resistant, and suitable for a wide temperature range.		
Weight		140g (excluding cable)	

Electrical parameters

Parameter	Condition	Minimum Value	Typical Value		Maximum Value	Unit
Supply voltage	Standard	9	12	24	36	V
Alarm output current					500	mA
Operating current	No load		40			mA
Operating temperature		-40			+85	℃
Storage temperature		-40			+85	℃

Ordering and Selection

Model	Measurement Axis	Output Type	Output direction	Angular threshold
SWR34	X: X Axis	1:Single output	NO:Relay normally open output	Output Angle Threshold Setting
	Y: Y Axis	-	-	Any value within the 0–30° range can be selected. Examples: 005 = 0.5° alarm; 135 = 13.5° alarm.
	D: Dual Axis	2: Dual output	NC:Relay normally closed output	

Example: SWR34X1-NO-005: X-axis, single-channel output, normally open relay output, 0.5° alarm.

Note: 1) Different models correspond to different wire color functions, so please refer to the order information and model description before placing an order.

2) The factory default alarm threshold is $\pm 2^\circ$ (can also be customized according to customer requirements).

3) Explanation of normally open and normally closed:

NC (normally closed output) stays closed under normal conditions and turns open when the alarm threshold is exceeded;

NO (normally open output) stays open under normal conditions and turns closed when the alarm threshold is exceeded.

Interface Definition

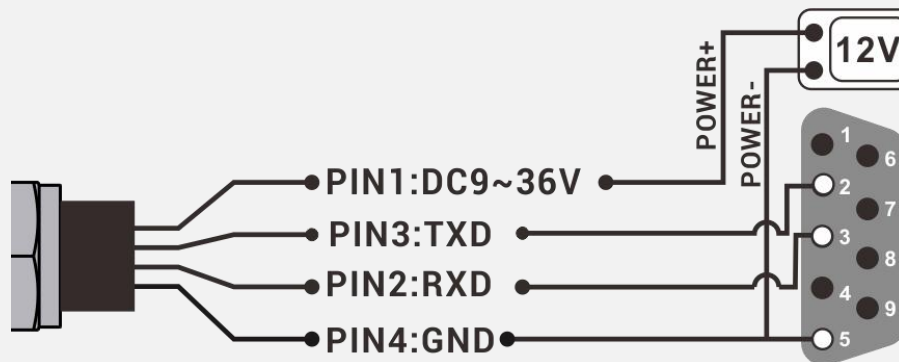
Color Definition	Single-axis Single-channel	Single-axis Dual-channel	Dual-axis Single-channel	Dual-axis Dual-channel
Red	Positive Power Supply	Power Positive	Positive Power	Power Positive
Black	GND	GND	GND	GND
Green	Reset	RXD	Reset	RXD
Brown	Common Terminal	+X Common Terminal	Common Terminal	X Common Terminal
Orange	RXD	-X Signal Output	RXD	Y Signal Output
White	TXD	-X Common Terminal	TXD	Y Common Terminal
Yellow	X-Axis Normally Open	+X Signal Output	XY-Axis Normally Open	X Signal Output
Blue	X-Axis Normally Closed	TXD	XY-Axis Normally Closed	TXD

Notes: 1) The RXD and TXD lines can be connected to a computer to configure alarm thresholds via software. Distinct thresholds can be set for each direction (-X, +X, -Y, +Y).

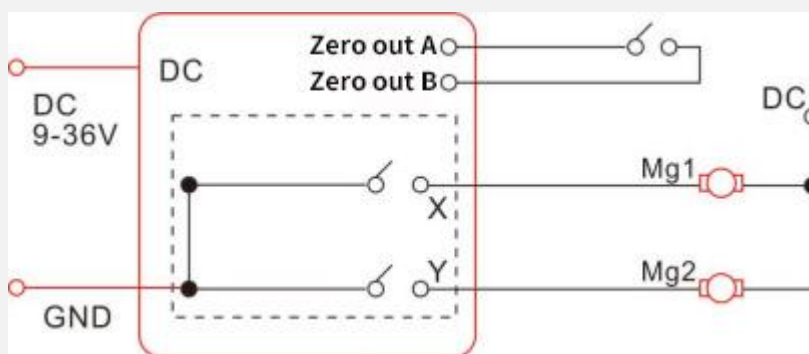
2) Please refer to the diagram below for the RXD and TXD connection setup:

3) For models lacking RXD and TXD functionality, alarm thresholds are fixed at factory settings and cannot be modified by the user.

- 4) Debugging via laptop requires an RS232-to-USB adapter, whereas a desktop computer can connect directly to the COM port. (If using an adapter, the corresponding driver must be installed.)



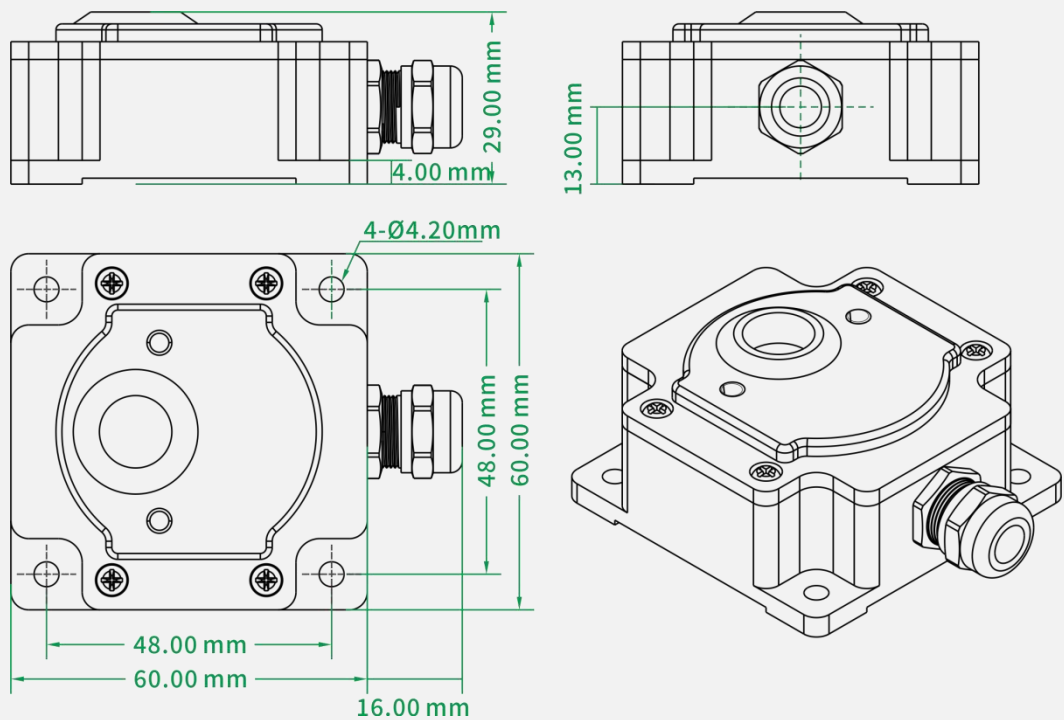
✓ Instructions for Use



The diagram above illustrates the operating principle of the dual-axis switch; the output signals are relay-style switch signals. Each output terminal corresponds to an internal switch (indicated within the dashed box), with one side of each switch internally connected to ground. For models equipped with a Common (COM) terminal, the internal switches are connected to the COM terminal, allowing the user to connect it to either the power supply or ground based on specific requirements. In this diagram, MG1 activates when the tilt reaches the preset threshold in the X-axis, and MG2 activates when the tilt reaches the preset threshold in the Y-axis. To set a relative angle, simply short-circuit the "Zeroing A" and "Zeroing B" lines for 2 seconds.



Product Dimensions

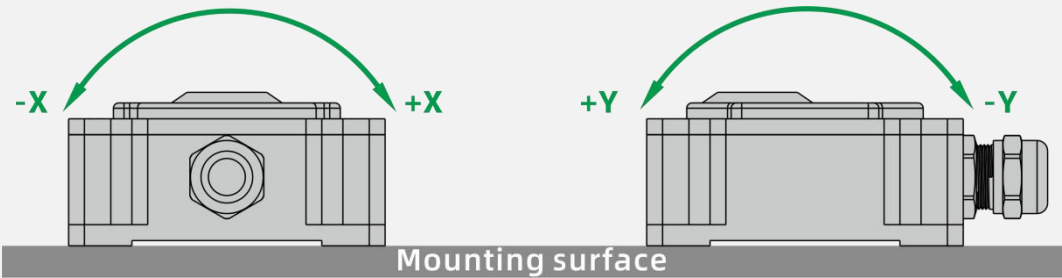


Housing dimensions: L60 xW60 xH29mm	Mounting dimensions: L48xW48xH4mm	Mounting screws: 4 x M4 screws
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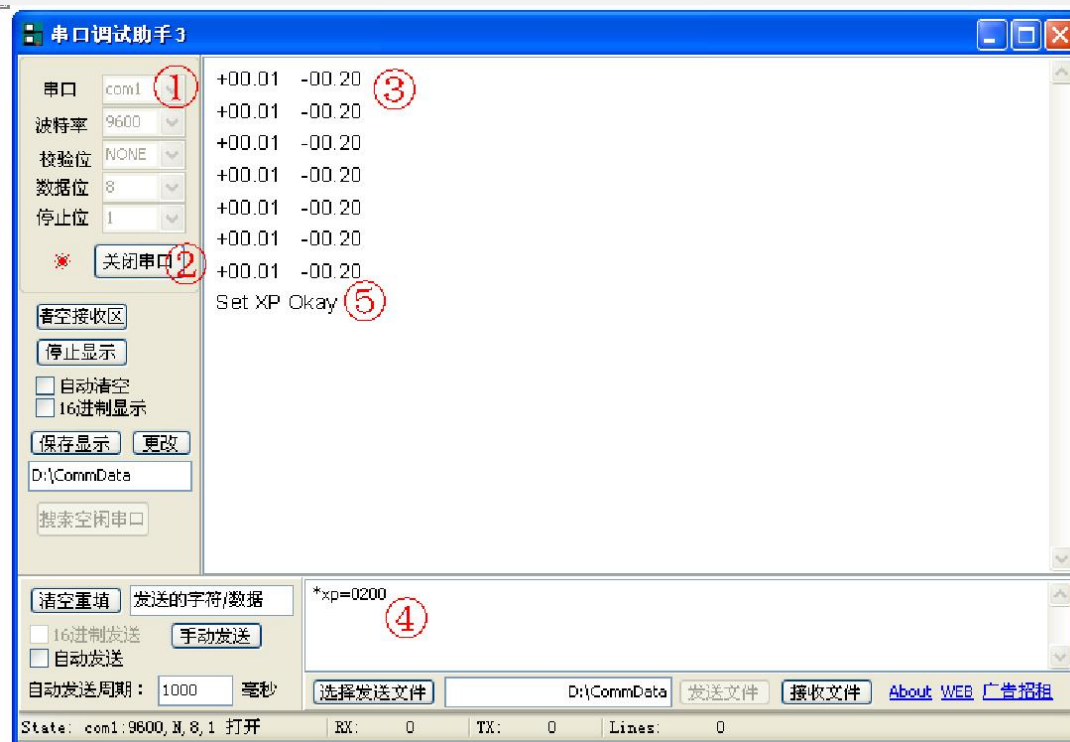
Installation Orientation

Note: During installation, ensure the sensor's mounting surface is parallel to the target surface and minimize the effects of dynamic forces and acceleration on the sensor. This product can be mounted either horizontally or vertically; please refer to the diagram below for installation methods.



Debugging software

If customers wish to modify the alarm thresholds themselves, they can do so by connecting the device to a computer and using serial port debugging software. While standard, publicly available serial debugging tools downloaded from the internet can be used, Ruiguan also provides dedicated debugging software that allows for direct connection to the inclinometer on a PC to display angle readings.



Debugging steps:

- 1) Launch the software.
- 2) Select the appropriate COM port (refer to item "2").
- 3) Use default settings for all other parameters; no further configuration is required.
- 4) Click the "Open Serial Port" button (refer to item "2").
- 5) Data will then appear in the returned data area (refer to item "3").
- 6) To set an alarm threshold, enter the corresponding command in the input area (refer to item "4"). (Please consult the communication protocol section of this specification for the command.)
- 7) The setting is successful if "Command+Okay" appears in the returned data area (refer to item "5").

Analysis of common connection issues:

- a) Check the power supply: verify the positive and negative terminals and ensure it is DC power.
- b) Swap the RXD and TXD data lines and test again.
- c) COM port conflict: close any debugging devices using other COM ports first.
- d) The black wire is not connected to pin 5 of the COM port.
- e) If an RS232 converter is used, check that it is functioning correctly and that the driver is

installed.

f) Use a multimeter to measure the sensor current; if it is below 20mA or above 60mA, the sensor is likely damaged.



Communication protocol

One: Data frame format: (8 data bits, 1 stop bit, no parity, default baud rate 9600)

Angle output format (ASCII code)

A single set of output data consists of 18 bytes:

Byte1: X	Byte 10: Y
Byte2: +/-	Byte 11: +/-
Byte3: X	Tens digit of the axis angle value
Byte4: X	Units digit of the axis angle value
Byte5: decimal point "."	Byte 14: Decimal point "."
Byte6: X	Tenths digit of the axis angle value
Byte7: X	Hundredths digit of the axis angle value
Byte8: Space(0x20)	Byte 17: Carriage return (0x0D)
Byte9: Space(0x20)	Byte 18: Line feed (0x0A)

The format is as follows:

ITEA M	SIGNE D	DAT A	SPACE	SPACE	ITEA M	SIGNE D	DAT A	ENTER	NEWLIN E
X	+/-	**. **	Space	Space	Y	+/-	**. **	Enter key	Line break

For example: If the current X-axis angle is +01.50 degrees and the Y-axis angle is -01.00 degrees, the display shows X+01.50; Y-01.00.

Note: If the user set a relative zero point during the previous startup, the system will output "relative angle measure!" upon the current startup.

Two: Relevant configuration commands (The following commands are case-sensitive.)

Command	Description
&Z	Sets the current position as the relative zero point and stores the relevant data in EEPROM; outputs relative angle data. Responds with "set relative zero" upon receiving the command.
&R	Outputs absolute angle data; responds with "absolute zero" upon receiving the command.
*xp=????	Sets the alarm point for the positive X-axis; "?????" represents the angle value (range: 0001–1000; default: 0150). Responds with "SetxP OK!" upon receiving the command.
*xn=????	*xn=???? – Sets the alarm point for the negative X-axis; "?????" represents the angle value (range: 0001–1000; default: 0150). Responds with "SetxN OK!" upon receiving the command.
*yp=????	*yp=???? – Sets the alarm point for the positive Y-axis; "?????" represents the angle value (range: 0001–1000; default: 0150). Responds with "SetyP OK!" upon receiving the command.
*yn=????	*yn=???? – Sets the alarm point for the negative Y-axis; "?????" represents the angle value (range: 0001–1000; default: 0150). Responds with "SetyN OK!"

upon receiving the command.

When the green wire functions as the zero-reset line, short-circuiting it with the black wire for 2 seconds and then releasing it sets the current angle as the relative zero point. This function operates similarly to the "&Z" command; however, unlike the command, successfully setting the zero point this way triggers an alarm signal output lasting approximately 1 second. (When not using this function, please properly secure the green wire to prevent accidental short-circuits with other wires.)