

**Micro-size Low Cost 2-wire Passive Thermal Resistance Signal Isolation Transmitter IC  
RTD Pt100 / Cu50 Temperature Signal Loop Powered Isolation Transmitter  
ISO Z-W-O1 Series**

| Features  | Applications  |
|---|---|
| <ul style="list-style-type: none"> <li>• Three-wire, four-wire or two-wire PT100/Cu50 thermal resistance signal input.</li> <li>• Accuracy, linearization error grade: 0.2(Relative Temperature).</li> <li>• Special high efficient signal loop power extraction technique, external power supply is not required.</li> <li>• 3000VDC dual isolation between signal input and output.</li> <li>• Built-in linear processing and long-term compensation circuit.</li> <li>• Output 2-wire 4-20mA current signal (loop powered).</li> <li>• Output loop powered power supply voltage range: 12--30VDC.</li> <li>• Small size, low cost, easy use and high reliability.</li> <li>• Standard SIP12 Pin, UL94V-0 flame retardant package.</li> <li>• Industrial operating temperature range: - 45℃ ~ + 85℃.</li> </ul> | <ul style="list-style-type: none"> <li>• Thermal resistance temperature signal isolation&amp;conversion.</li> <li>• Industry site high-precision temperature signal measuring and signal acquisition. PT100/Cu50 signal conversion and controlling.</li> <li>• Multiple-channel temperature signal ground wire loop isolation and interference suppression.</li> <li>• Converting temperature sensor signal into 4-20mA signal.</li> <li>• Water tank, oil tank and heating units temperature signal monitoring and alarm.</li> <li>• Steady signal transmitting and receiving between meters and temperature controller.</li> <li>• Power monitoring, medical equipment temperature control.</li> <li>• Thermal resistance signal isolated transmission, realize the functions: 1-input 1-output, 2-input 2-output, 3-input 3-output.</li> </ul> |

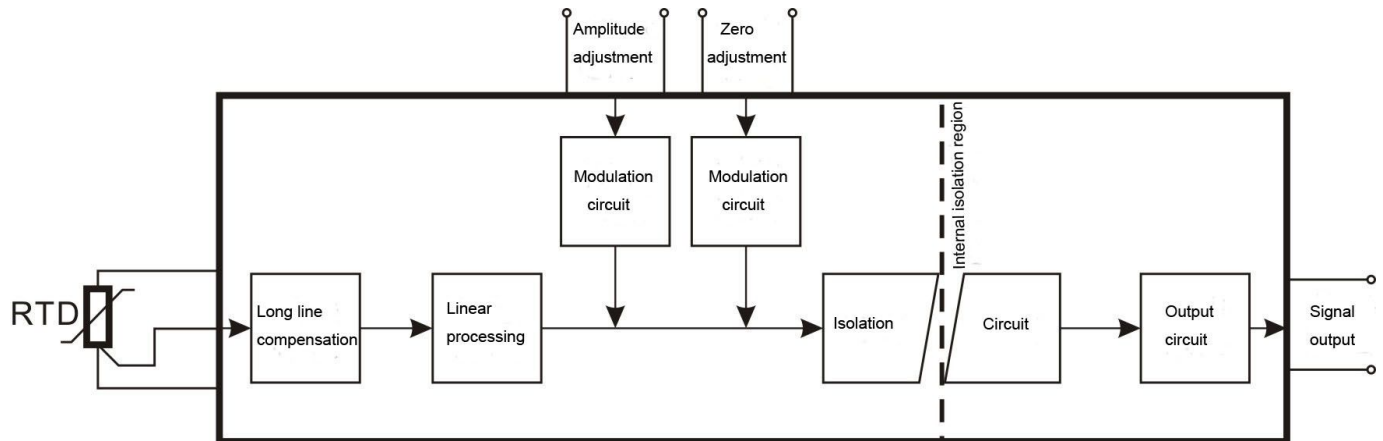
## Introduction

**SunYuan ISO Z-W-O1** is one of the smallest size (SIP 12Pin) low cost passive 2-wire 4-20mA loop powered thermal resistance signal isolation transmitters. The signal isolation transmitter is mainly applied in 2-wire, 3-wire or 4-wire PT10/PT100/PT1000 or Cu50/Cu100 temperature sensor signal acquisition, isolation and transmission. It can convert temperature signal collected from thermal-resistance sensor into standard 4-20mA current signal output in linearity.

Unique magneto-electric isolation mode and high efficient final level feed technique have been used in developing and designing that isolation transmitter. It realizes thermal resistance temperature signal to 4-20mA standard signal isolated conversion in high accuracy without power supply. The output signal can be well matched with any types of meters&instruments (like PLC, DCS system) analog input terminals. The signal transmitter is a kind of low cost, small size standard SIP 12PIN flame-retardant integrated circuits. Inside the IC, there is signal modulation and demodulation circuit, signal coupling isolated conversion circuit, high efficient DC-DC step-up circuit, signal zero/gain calibration circuit and thermal resistance linear circuit, long-line compensation, interference suppression circuit, etc. Output loop powered power supply range: 12--30VDC, it has high accuracy in conversion and good linearity. The zero and gain can be adjusted and calibrated by adding external potentiometer. By adopting advanced integrated internal structure and new isolation technology, the modules possess the features: 3KVDC isolation between signal input and output (total isolation type), and operates in normal in abominable industrial conditions like wide temperature, humidity and vibration.

Sunyuan ISO ZW-O1 has the following features: small size, easy to use, can be easily installed in the other devices, it can realize PT100 and other thermal resistance sensor signal acquisition and isolated conversion with high accuracy by adding some external components. The signal transmitter is loop powered, so user do not need to add external power supply and that can reduce users' cost. The signal transmitter have two types of package, small size PCB-mounted package, 35mm DIN rail-mounted package. The 35mm DIN rail-mounted products can be 1-input 1-output, 2-input 2-output, 3-input 3-output. For 35mm DIN rail-mounted package, there are adjusting & calibration circuits inside, and wiring terminal outsides, user can use it directly.

## Functional Block



## Max. Rated Value

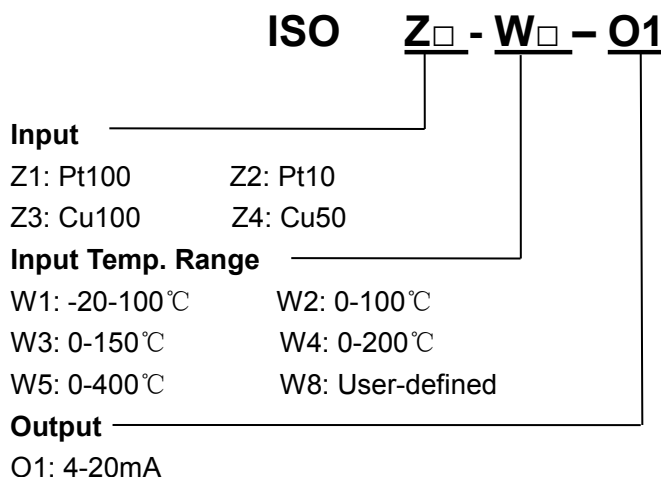
(If the product operates in the max. rated value in a long time, may affect the durability, if exceed the max. values, may cause un-repairable damage.)

|  |               |
|--|---------------|
| Continuous isolation voltage                             | 3KVDC/rms     |
| Vin (Max. input voltage)                                 | 32VDC         |
| Junction Temperature (Max. Range of ambient temperature) | - 45℃ ~ + 85℃ |
| Storage temperature                                      | +150℃         |
| Lead Temperature (Continuous time <10S)                  | +300℃         |
| Output Short to Common                                   | Continuous    |

## General Parameters

|  |  |
|--|--|
| Accuracy, linearization error grade-----0.2(Relative Temperature).   | Load regulation ratio -----<0.05% meas.val./100Ω                                   |
| Operating temperature----- -40 ~ +85℃  | Isolation----- Signal input and output dual isolation.                             |
| Operating humidity----- 10 ~ 90% (non-condensation)  | Response time ----- ≤100mS   |
| Storage temperature----- -45 ~ +105℃   | Isolation voltage.-----3KV(60HZ / S), leakage current < 1mA                        |
| Storage humidity----- 10 ~ 95%(non-condensation)   | Impulse withstand voltage ----- 3KVk, 1.2/50us(peak value)                         |
| Loop voltage-----Wide range loop powered power supply voltage range 12 ~ 30VDC, Auxiliary power supply: None | Temperature drift ----- 0.0050%F.S./℃<br>(-40℃ ~ +85℃ operating temperature range) |

## Model Selection & Definition



**Model selection examples:**

E.g.1: Signal input: Pt100; temperature range -20-100℃; signal output 4-20 mA; PCB-mounted type.

Model No.: ISO Z1-W1-O1

E.g.2: Signal input: Cu50; temperature range: 0-100℃; signal output 4-20mA; PCB-mounted type.

Model No.: ISO Z4-W2-O1

E.g.3: Signal input: PT100; temperature range: 0-150℃; signal output 4-20mA; 1-input 1-output 35mm DIN rail-mounted.

Model No.: DIN 1X1 ISO Z1-W3-O1

E.g.4: Signal input: Cu50, temperature range: 0-400℃; signal output 4-20mA; 2-input 2-output 35mm DIN rail-mounted.

Model No.: DIN 2X2 ISO Z4-W5-O1

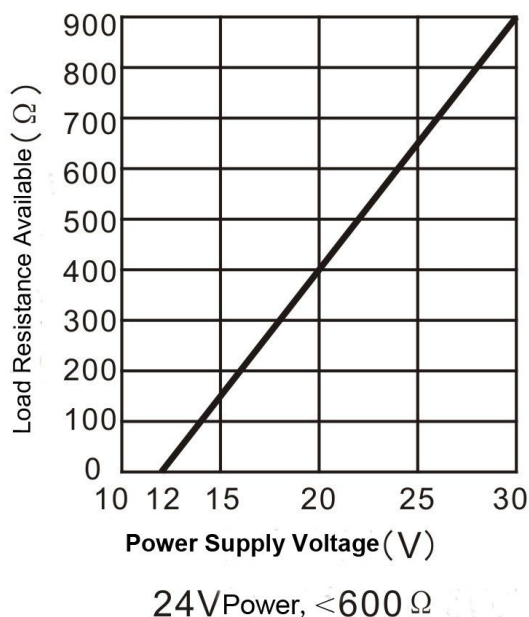
**Technical Parameters**

| Parameters                  | Conditions           | Min. | Typical | Max. | Unit  |
|-----------------------------|----------------------|------|---------|------|-------|
| Isolation voltage AC, 60Hz  | 10S                  | 2000 | 3000    | 4000 | Vrms  |
| Insulation resistance       | 500VDC               |      | 100     |      | MΩ    |
| Leakage current             | 240Vrms, 60Hz        |      | 0.5     |      | uA    |
| Temperature drift           | -40~+85℃             |      | ±50     | ±100 | PPm/℃ |
| Non-linearity               | Relative temperature |      | ±0.2    | ±0.5 | %FSK  |
| Output linearity range      |                      | 0    | 4       | 24   | mA    |
| Output current $I_o$        |                      | 3.5  |         | 40   | mA    |
| Output volt. drop $V_{oh}$  | $I_o=20mA$           |      | 12      |      | V     |
| Output signal voltage range |                      | 12   | 24      | 30   | V     |
| Output load capacity        | 24VDC                |      | 500     | 600  | Ω     |
| Response time               |                      |      | 20      | 100  | mS    |

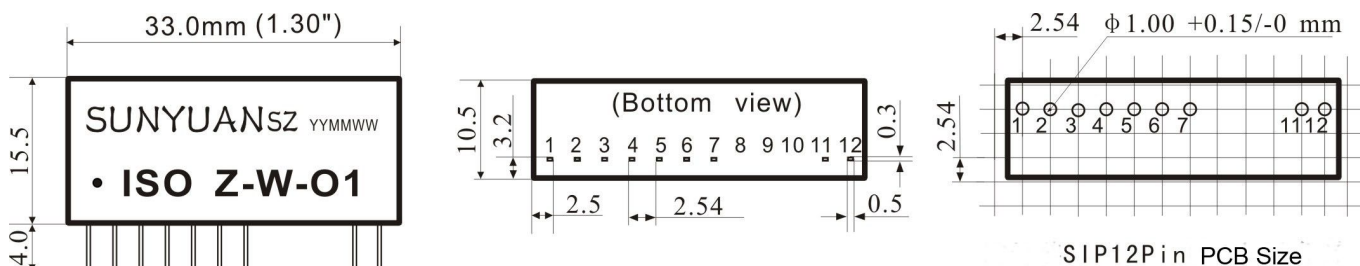
**The relation between load resistance and loop powered power supply**

$$\text{Load Resistance} = \frac{\text{Power supply (V)} - 12V}{0.02A}$$

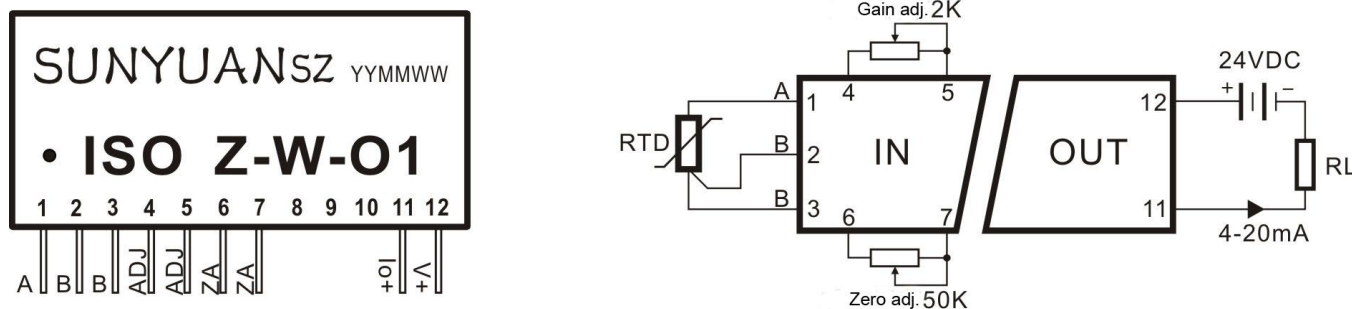
(including wire resistance)



## Dimension (Standard SIP 12PIN)



## PIN Definition & Functional Block

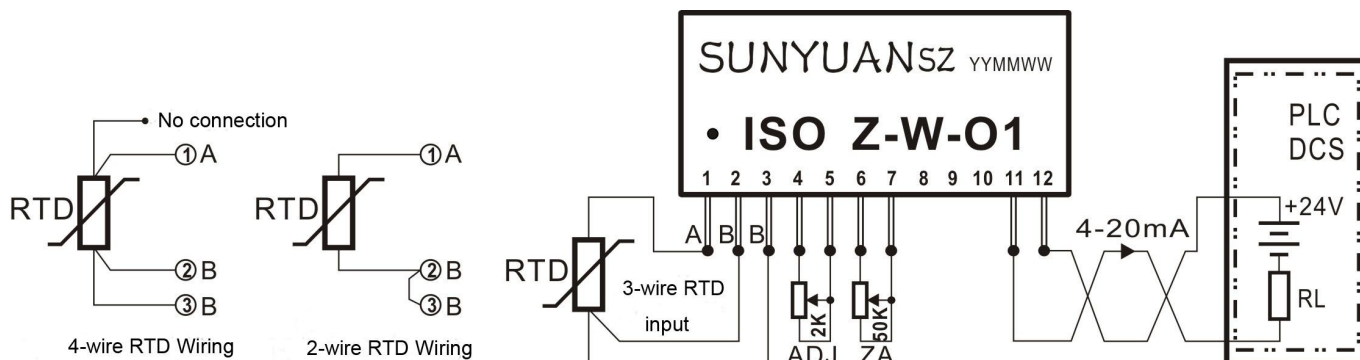


## PCB-mounted Package PIN Description (SIP 12PIN)

| Thermal resistance input A | Thermal resistance input B | Thermal resistance input B | Gain adjustment terminal #1 | Gain adjustment terminal #2 | Zero adjustment terminal #1 | Zero adjustment terminal #1 | NC   | Current output + | Voltage input + |
|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------|------------------|-----------------|
| A                          | B                          | B                          | ADJ                         | ADJ                         | ZA                          | ZA                          | NC   | IO+              | V+              |
| 1                          | 2                          | 3                          | 4                           | 5                           | 6                           | 7                           | 8~10 | 11               | 12              |

- Note:**
- If input is 2-wire thermal resistance, pin2 and pin3 should be short connected.  
If input is 4-wire thermal resistance, pin1 should be short connected to any one line of terminal A of thermal resistance.
  - Thermal Resistance disconnection detection:
    - Output max. value: the line connected to PIN3 or PIN1 is broken.
    - Output min. value: the line connected to PIN1 is broken.

## Typical Applications



## Calibration Methods

Calibration devices: 1x Resistance Box (Accuracy 0.01Ω), 1x DC Power Supply Source,  
1x Universal Multi-meter (Accuracy four and a half bit ).

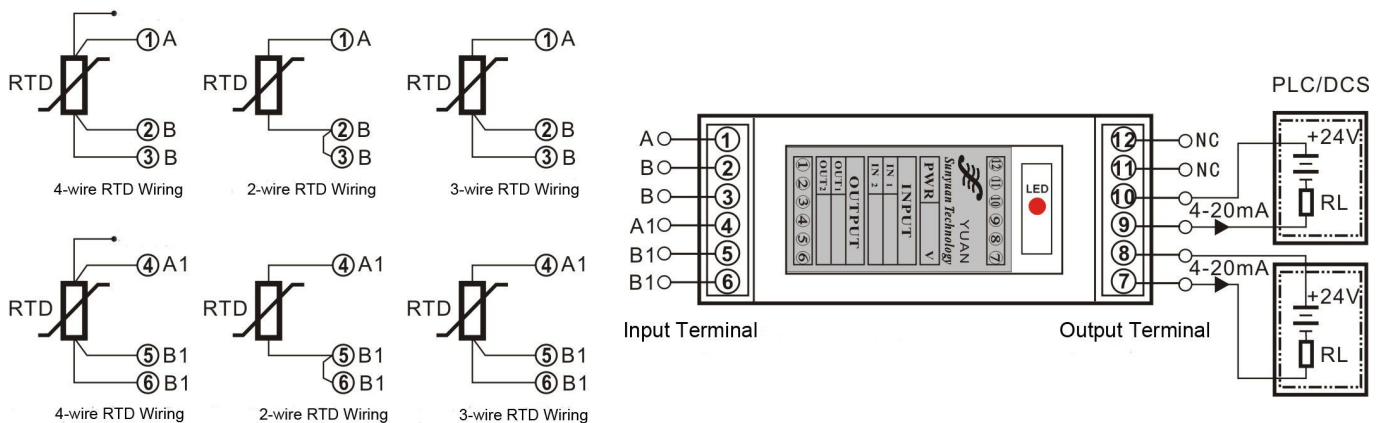
Calibration Steps:

- Connect ISO Z-W-O1 well according to the application diagram or install ISO Z-W-O1 in your designed PCB.

2. Connect the power supply based on the loop powered power supply value, well install the adjusting potentiometer, connect the output to the multi-meter.
3. Check the reference table based on the input temperature range to get the corresponding thermal resistance value  $R_{low}$ - $R_{high}$ .
4. Power-on, starting up for 15 minutes.
5. Adjust the resistance box to get resistance value:  $R_{low}$ , adjust the zero potentiometer to make ISO Z-W-O1 output the corresponding output value of zero (e.g.: 4mA).
6. Adjust the resistance box to get resistance value:  $R_{high}$ , adjust the amplitude potentiometer to make ISO Z-W-O1 output the corresponding output value of span.(e.g. 20mA)
7. Repeat step 5 and step 6 several times to improve the output precision.
8. Complete calibration.

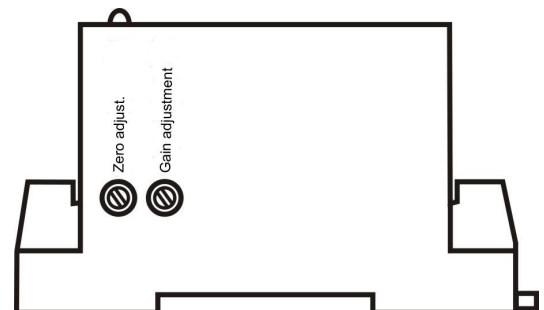
### Multi-channel 35mm DIN Rail-mounted DIN 1X1/1X2 SY Z-W-O1 Series Dimension & Wring Diagram

Sunyuan **ISO Z-W-O1** Standard DIN35 Rail-mounted Passive 2-wire 4-20mA Loop Powered RTD Thermal-resistance Transmitter has several sets of SY Z-W-O1 series IC modules inside. The converters can be 1-input 1-output (DIN1X1),2-input 2-output (DIN 2X2) to achieve multi-channel RTD thermal resistance to analog signal conversion. Zero and full adjustment are available, user can adjust Zero and Span through the zero & span adjustment button in the left/right side of the transmitter. PCB size inside L\*W: 79.5\*32.5(mm). The DIN Rail-mounted RTD Signal Transmitter has been well calibrated before ex-factory, user can use it directly without any adjustment. The signal transmitter can be calibrate via the zero, gain potentiometer in the left side if it requires to do calibration again or to improve the accuracy.



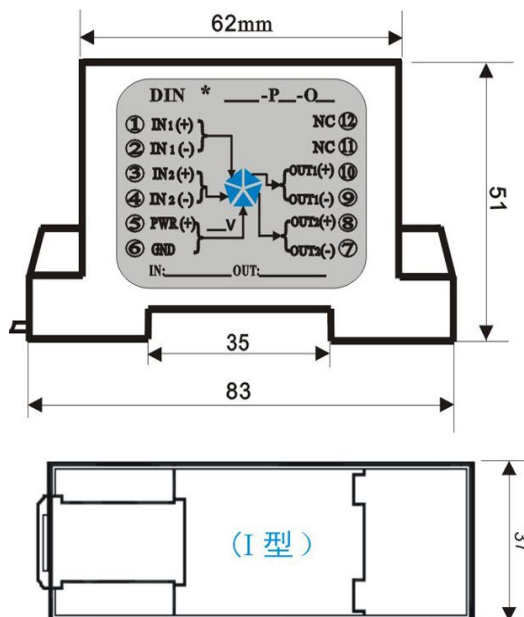
### DIN Rail-mounted Type Pin Description

| Pin | Pin Functions |   |
|-----|---------------|---|
| 1   | A             | 1 <sup>st</sup> channel RTD input A terminal  |
| 2   | B             | 2 <sup>nd</sup> channel RTD input B terminal  |
| 3   | B             | 1 <sup>st</sup> channel RTD input B terminal  |
| 4   | A1            | 2 <sup>nd</sup> channel RTD input A1 terminal |
| 5   | B1            | 2 <sup>nd</sup> channel RTD input B1 terminal |
| 6   | B1            | 2 <sup>nd</sup> channel RTD input B1 terminal |
| 7   | IOut2+        | 2 <sup>nd</sup> channel current ouput +       |
| 8   | V2+           | 2 <sup>nd</sup> channel voltage input +       |
| 9   | IOut1+        | 1 <sup>st</sup> channel current ouput +       |
| 10  | V1+           | 1 <sup>st</sup> channel voltage input +       |
| 11  | NC;           | No connection                                 |
| 12  | NC;           | No connection                                 |



**Zero/Gain adjustment**

## DIN Rail-mounted Type Dimension



Note: The specification is subject to change without notice.