

# Two-wire and passive analog signal current loop 10KV high isolation safety barrier

4-20mA(0-20mA) Two-wire and passive current loop high isolation IC: **ISOH 4-20mA** series

## Product features

- Unique high-efficiency signal loop technology of power supply from coupling, without an external source of power.
- 10KVAC high voltage isolation technology for signal input/output loops at both of ends
- 4-20mA (0.1、0.2grade) signal high precision undistorted transmission technology
- Extremely high linearity in the 4-20mA full range, nonlinearity error <0.2%
- 4-20mA loop power supply ultra-wide range voltage input (8.5~32VDC)
- The loop signal takes a lower voltage drop (3.5VDC / Type @20mA)
- Industrial grade environment temperature range: -40 ~ +85 °C
- Small size standard single column SIP 16Pin accord with UL94V-0 flame retardant package

## Typical application

- 4-20ma current loop signal high voltage isolation safety barrier
- Power instrumentation, medical equipment monitoring isolation safety barrier
- Rail transit DC high voltage monitoring isolation safety barrier
- Signal acquisition isolation and anti-interference between PLC and DCS input channels
- Ground loop interference suppression for power transmission and distribution control system
- Multi-channel instrumentation and sensor signal reliable transmission and reception monitoring
- Analog signal data acquisition isolation and long line undistorted transmission
- High isolation between the electric load and power management instrument bus interface

## Description

**SunYuan ISOH 4-20mA** is our the newest developed two-wire passive 4-20mA current loop isolation module in industry circles with the highest isolation voltage (10KVAC) and small size (16-pin single-in-line SIP16 Pin) & low-cost. This new product is a passive analog signal isolation hybrid integrated circuit of front-end 4-20mA current signal input and back-end 4-20mA output, IC internal including the current signal modulation and demodulation circuit, signal coupling isolation conversion circuit, etc. . This new product adopts the unique Sunyuan technology magnetic-electric coupling isolation and high-efficiency loop power take-off invention technology, which effectively solves the problem of dependence of the signal isolation circuit on the power supply during operation, and can realize high-precision, high-linearity 10KV anti-EMS high-isolation transmission of 4-20mA (0-20mA) signal between the industrial field sensors & instrumentation, PLC & DCS. The 16pin SIP small size (46X22X12mm) standard PCB mounting design can be embedded in the instrument panel, sensor, PLC and other operation control boards, which simplifies the user system design choice and reduces the volume and wiring cost.

**ISOH 4-20mA** adopts Sunyuan's unique electromagnetic isolation coupling technology, which does not require independent power supply and has a small input equivalent resistance inside, which makes the input voltage of the IC reach an ultra-wide range (8.5~32VDC). The technical products can be directly connected in the two-wire 4-20mA or 0-20mA working circuit of industrial field PLC, instrumentation and sensor, physical transmitter and other devices, and can achieve 4-20mA signal anti-interference isolation, long-distance distortion-free transmission without external auxiliary power supply.. The integrated process and new technology isolation measures inside the product enable the input and output ports of the device to achieve a high isolation insulation voltage of 10KVAC and can meet the harsh environment requirements such as wide temperature, humidity and vibration in the industrial field. The products are IC module package and DIN35 Rail-mounted packaging, It is widely used in track voltage monitoring, generator or motor safe operation monitoring, power transmission and distribution remote monitoring, instrumentation and sensor signal transmission and reception, medical

equipment safety barrier, industrial intelligent control, nuclear power equipment and other fields.

**The Maximum rating of product** (long-term operation in the maximum rated environment affects the service life of the product and irreparable damage may occur if beyond the maximum value.)

Continuous Isolation Voltage	10000Vrms
Vin (The Max voltage of input)	32VDC
Working Temperature	+85 °C
Storage Temperature	+150°C
Lead Temperature	+300°C
Output short circuit time	Sustainable

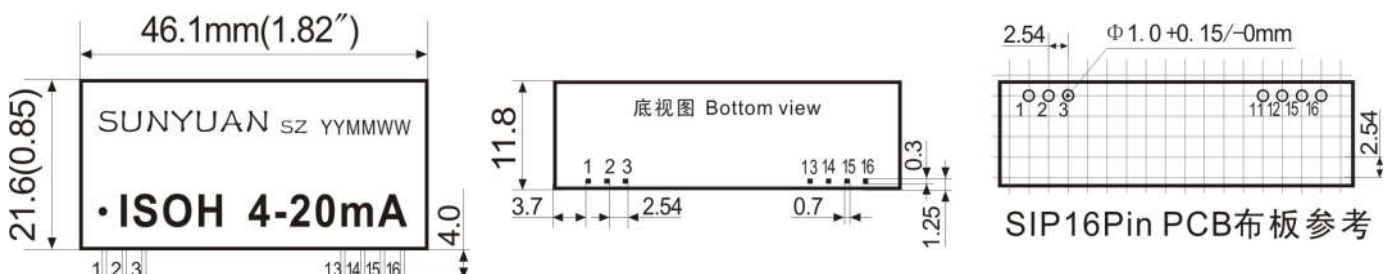
**General parameters**

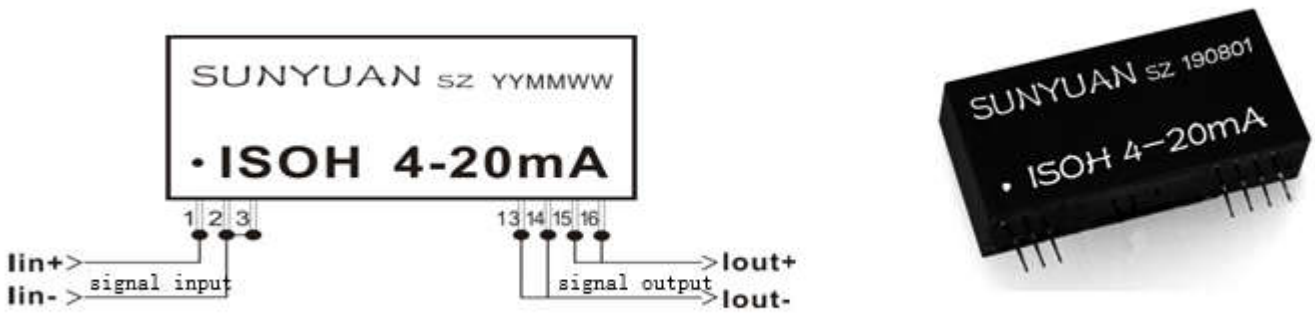
Accuracy, linearity error grade ----- 0.1, 0.2grade	Load regulation rate ----- <0.05% meas.val./100Ω
Auxiliary power ----- no	Isolation ----- Signal input / signal output, two isolated
Working Temperature ----- -40 ~ +85°C	Packaging -----SIP16 Pin
Working humidity-----10 ~ 90%( No condensation )	Withstand voltage --- 10KV(50HZ / 60S), Leakage current < 1mA
Storage Temperature ----- -45~ +105°C	impulse withstand voltage----- 10KVAC , 1.2/50us( <u>peak value</u> )
Storage humidity-----10 ~ 95% ( No condensation )	<u>temperature drifting</u> ---0.0050%F.S./°C (-40°C ~ +85°C range)

**Technical parameters**

Parameter	Condition	Min	Typical value	Max	Unit
Isolation voltage AC, 50Hz	60S		10000		Vrms
Insulation resistance	500VDC		100		MΩ
Leakage current	240Vrms, 50Hz		0.5		uA
Temperature drifting	-40~+85°C		±50	±100	PPm/°C
Nonlinearity	Within full scale		±0.1	±0.2	%FSK
Input signal voltage range		8.5		32	V
Output linear range		0	4	20	mA
Output current Io		0.1		40	mA
Output pressure drop Voh	Io=20mA		3.5		V
Output load capacity	Io=20mA		250		Ω
Frequency response (small signal bandwidth)	Io=20mA		100		Hz

**Dimensions and pin definitions**

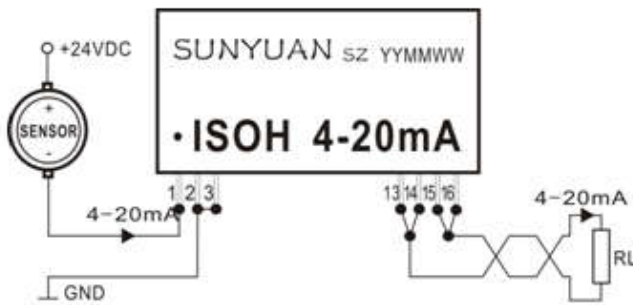




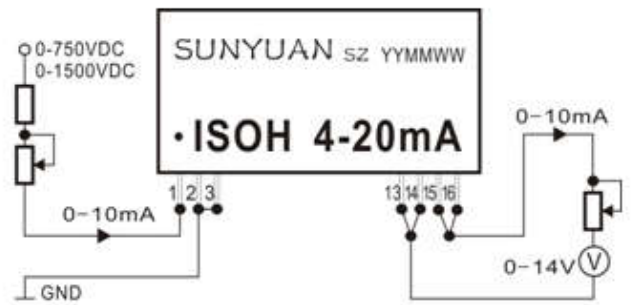
Pin function description (SIP16 Pin)

signal Input Positive end	signal Input Negative end	empty foot	signal Output Negative end	signal Output Negative end	signal Output Positive end	signal Output Positive end
Iin+	Iin-	NC	Iout-	Iout-	Iout+	Iout+
1	2~3	4~12	13	14	15	16

Typical application

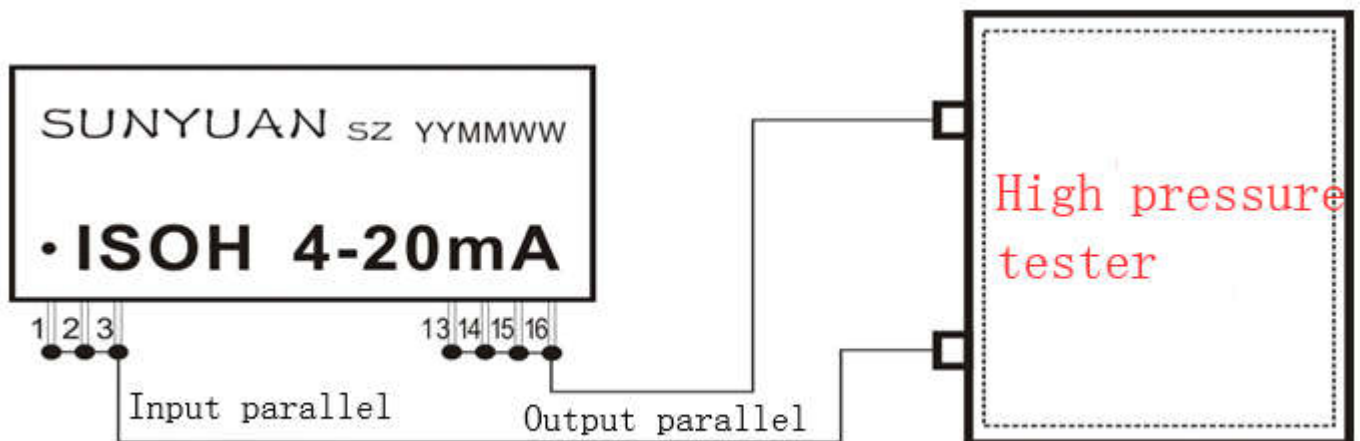


4-20mA current loop 10KV high isolation IC typical application diagram



Typical application diagram of safe high isolation voltage sampling for subway voltage detection system

High voltage isolation safety detection method



### **High voltage isolation safety test method and precautions**

1. Referring to the wiring shown in the above figure, setting the rated high voltage value of the high voltage tester according to the product isolation voltage parameter specification. Please pay attention to personal safety when testing, beware of electric shock!

Test environment: room temperature TA = 25 ° C, air humidity < 75%

2. The high voltage test operator must wear rubber-insulated gloves with rubber insulation pads on the ground to avoid high voltage electric shock.
3. The instrument housing of the high voltage tester must be grounded reliably and should not be detected in a high temperature, humid and dusty environment.
4. When connecting the measured object, the high voltage tester must ensure that the high voltage output value is "0" and the detection function key is "reset" to prevent contact with other objects.
5. When the instrument is in the high voltage test state and before the end of high voltage discharge, it is strictly forbidden to contact the measured object, test line or high voltage output.
6. Product isolation voltage test method as shown in the above figure, short the input terminal and output terminal pin respectively and load the rated voltage value for 1 minute.
7. According to the rated isolation voltage value of the product, use the output voltage of the manual gear to adjust tester from 0 to the rated value and keep it for a minute.
8. The insulation voltage test itself is a destructive test of the insulator. For the same product, the high voltage test should be minimized. If there are multiple tests between different customers, the general requirements are as follows: the batch product is tested according to the rated voltage value of the specification for the first time, and the test voltage value should be reduced by 0.7 times of the rated value each time. The number of high voltage tests, otherwise the product will be irreparable damage during multiple high-voltage tests. .

# 4-20mA Current Loop Isolator

ISO 4-20mA(0-20mA) Analog Signal Isolator

## Features :

- 4-20mA current input/output, high precision (distortion <0.2%)
- High linearity in the full span(non-linearity<0.2%).
- Isolation between signal input and output: 3KV or 6KVDC
- Low impedance (volt. drop<2V), no external instruments or power supply required.
- SIP 12Pin small size, UL94V-0 standard for flame retardant encapsulation.
- 4-20mA signal extra-wide range volt. Input (8.5~28VDC).
- Frequency response (small signal band-width): 2KHZ (I<sub>o</sub>=20mA)
- Industrial operating temperature: - 45°C ~ + 85°C

## Applications :

- 4-20mA signal long-distance transmission in industrial site
- PLC, DCS analog signals data acquisition and isolation
- Ground loop elimination
- Transmission and Monitoring of signals of instruments and meters, sensors,etc
- Analog signal data acquisition, isolation and long distance non-distortion transmission.
- Monitor and control electrical instruments and meters, medical equipments, isolated safety bar.
- Isolated safety bar in rail transit DC high voltage monitoring

## Generalization:

**SunYuan** SIP12 Pin current loop isolated module: ISO 4-20mA module is a kind of single-chip two-wire isolated interface IC chip. Inside the IC, there are current signal modulation circuit, magnetoelectric isolation transform circuit and signal reduction demodulation circuit,etc. The low input equivalent resistance makes the IC module achieve wide range input voltage (8.5~28VDC) to realize the long-distance, non-distortion transmission of signals without external power supply. By adopting SMD technological structure and new isolation technology, the modules posses 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.

## Maximum Rated Values:

(If exceed the value below, may cause irremediable defect.)

Continuous Isolation Volt.:	3KVDC/rms
Input Signal Volt. (Max.):	32VDC
Operating Ambient Temp.:	- 45°C ~ + 85°C
Welding Temp.(<10S):	+300°C
Output Short-circuit Time:	Main-tenability

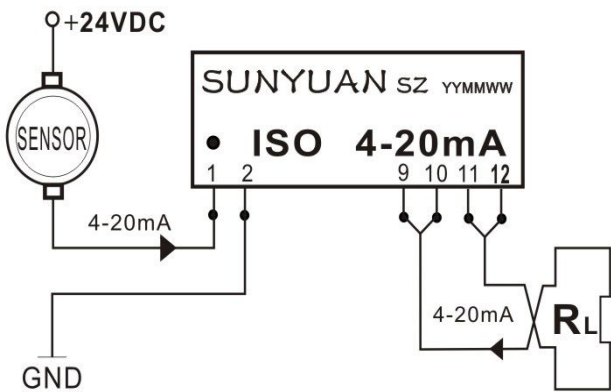
## General Technical Parameters:

Accuracy, linearity error grade ----- 0.1, 0.2	Hysteresis error ----- < 0.5%
Auxiliary power----- No	Isolation ----- signal input and output
Operating Temp. ----- -20 ~ +70°C	Insulation Resistance ----- ≥20MΩ
Operating Humidity -----10~90% (no condensation)	Withstand Voltage ----- 3KV(60HZ/S), leak current 1mA
Storage Temp.----- -20 ~ +70°C	Impact Resistance Volt. ----- 3KV, 1.2/50us (peak value)
Storage Humidity -----10 ~ 95% (no condensation)	

**Specifications:**

Parameter	Conditions	Min.	Typical Value	Max.	Unit
Isolation Volt. AC, 60Hz	10S	1000	2500	6000	Vrms
Insulation Impedance			$10^{12} \parallel 1$		$\Omega \parallel Pf$
Leak current	240Vrms, 60Hz		0.5		$\mu A$
Temp. Drift	-45~+85°C		$\pm 50$	$\pm 100$	PPm/°C
Non-linearity	In range of full span		$\pm 0.1$	$\pm 0.2$	%FSK
Input Signal Volt. Range		7.5	12	32	V
Output Linearity Range		0	4	20	mA
Output Current $I_o$		0.1		40	mA
Output Voltage Drop $V_{oh}$	$I_o=20mA$		2		V
Output Signal Ripple			5		mV
Frequency Response (small signal bandwidth)	$I_o=20mA$		2		KHz

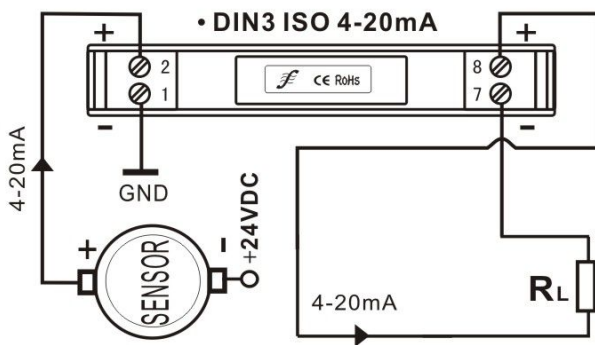
**Typical Applications:**



ISO 4-20mA Signal Isolator IC Typical Connection Diagram



SIP12PIN PCB-mounted Package



DIN3 ISO 4-20mA Signal Isolator Typical Application Diagram

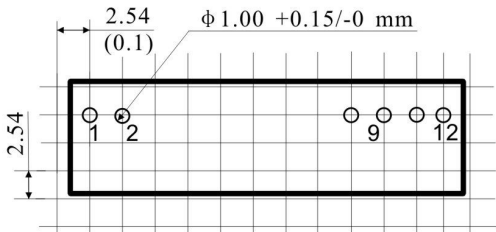
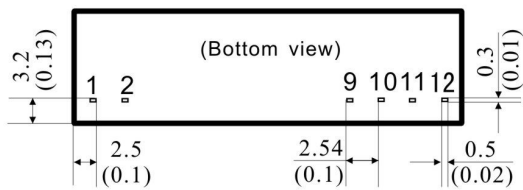
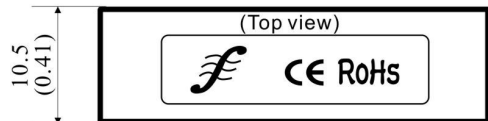
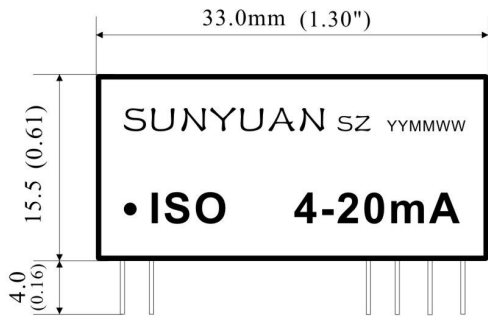


25mm DIN Rail-mounted Package

**PIN Description:**

PIN	PIN Definition	
1	lin+	Signal Input
2	GND	Signal Input
3~8		Null
9	lo-	Signal Output
10	lo-	Signal Output
11	lo+	Signal Output
12	lo+	Signal Output

**Outline Dimensions:**



**External Forms and Dimensions**

