

## **SY014 In Cell Amplifier**



## **User Manual**

Rev. 17/10/14

## Product details

The SY014 in-cell amplifier strain gauge bridge is specifically designed to fit inside transducers or strain gauge components providing signal conditioning.

### The SY014 is available in 4 versions

- i. SY014 - 2 wire version: 5.5 to 36V. Excitation 5V
- ii. SY014 - 3 wire version (Low voltage version): 9 to 15V Excitation 5V
- iii. SY014 - 3 wire version: 10 to 20V. Excitation 8V (For the 4 – 20mA & 0 – 5V output versions)
- iv. SY014 - 3 wire version: 12 to 30V. Excitation 8V (For the 0 – 10V output version)

The 2 wire version is designed for 1500 ohm or higher bridges.

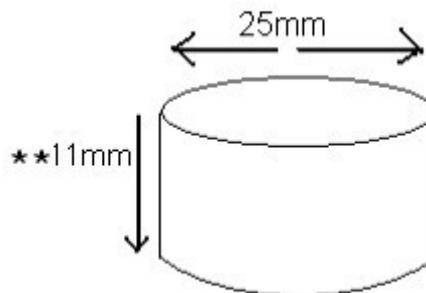
### Special features

- Operating voltage from as low as 5V for the 2 wire version
- Adjustment of +/-20% using span trimmer

## INSTALLATION

Before installation check that the unit is not damaged and that the environment specifications for the product are as indicated in the manual.

Dimensions of the SY014:



\*\* 2Wire and 10-20V versions are 8mm high.

The following operating and storage specifications must not be exceeded

**Operating Temperature:** -40 - 80 °C

**Storage temperature:** -40 - 80 °C

## CONNECTION AND INSTALLATION DETAILS

Before making any connections check the SY014 version to be connected and ensure that the package is secure.

For the installation take into consideration the following:

- v. Ensure easy access to the component
- vi. Ensure the component is stable upon installation with minimum vibration
- vii. No contact with other electromagnetic components or close connections to minimise interference

## Connections

### Power supply

The connections for the power supply should be as indicated for each version.

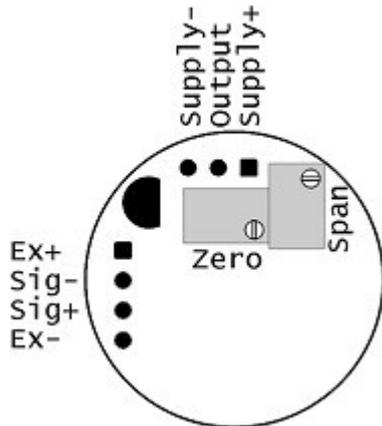
2 wire version: 5V to 36V

3 wire low voltage version: 9 to 15V

3 wire version1: 10 to 20V (For the 4 – 20mA or 0 – 5V output)

3 wire version2: 12 to 30V (For the 0 – 10V output)

The standard version connections are as illustrated in the figure 1 below



**Fig 1: SYO14 pin connections**

The 4-20mA output current is sourced from the output terminal, therefore the load should be between output and supply negative.

The load cell signal wires attach to resistors fitted to the Sig+ and Sig- terminals. The value of these resistors determines the nominal mV/V range.

### **Output Connections**

The 3 wire analogue output is either 4 - 20mA, 0 – 5V or 0 - 10V. The signal Sig+, Sig- and the Ex+ and EX- are designed in such a way as to simplifying installation with clear labeling.

## Span Adjustment

Adjustment of +/-20% is available using the span trimmer. If a change greater than this is required, different resistors will be required in the signal terminals. Depending on the input the output span can be adjusted to the required value.

The resistor values can be calculated and formula is as indicated below.

### For 3-wire versions:

$$R = (4000 \times \text{mV/V}) - \text{BR}/2$$

### For 2-wire version:

$$R = (2500 \times \text{mV/V}) - \text{BR}/2$$

R = value of scaling resistors  
mV/V = required nominal mV/V value i.e. Sensitivity  
BR = load cell bridge resistance

For example if the required sensitivity of a 3 wire amp is 2mV/V and the bridge resistance is 700 ohms

Then

$$R = (4000 \times 2) - \frac{700}{2}$$

$$R = \underline{7650}$$

Nearest preferred value used is 7K5 ohms.

## Calibrating

Adjusting the zero trimmer to set the 4mA or 0V output does not affect the span. The span adjustment has a small effect on the 4mA output. When calibrating it is best to set the 4mA or 0V with no load, then the span using a load as close to maximum as practical.

For calibration operate the low calibration conditions and set the output by adjusting the zero potentiometer to 4mA or 0V. For the high calibration adjust the span potentiometer until the required output of 20mA, 5V or 10V for the specific input is obtained.

## Selection of Amplifier

Depending on the desired application either the 2-wire or three wire amplifier can be used. If there is need for an amplifier to operate where the bridge resistance less than 2000R A three wire unit is the best to use as an amplifier as this will be more stable. This is partly because the working current drawn by the strain gauge bridge and the rest of circuit forms part of the 4mA zero current which will change with temperature causing apparent zero drift. The supply voltage to a two wire amplifier changes with signal level because of the voltage drop across the loop resistance. This generally makes performance of two wire amplifiers worse. The two wire SY014 amplifier requires a bridge resistance of at least 1500ohm.

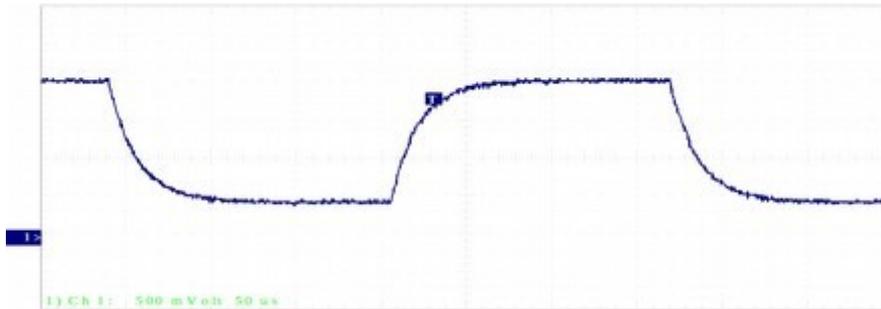
For any choice of amplifier avoid non-standard scaling if possible as this is likely to increase the drift and can cause operational problems.

## Specifications

Parameter	Min	Typ	Max
Supply voltage (DC) <b>3 Wire</b>	9	12	15
	10	12	20
	12	20	30
<b>2 Wire</b>	5.5	20	36
Input sensitivity (mV/V)	0.5		4.5
Excitation voltage (V) <b>3 Wire</b>	8V		
<b>2 Wire</b>	5V $\geq$ 1500R loadcell		
Bandwidth (-3dB)		dc - 240Hz flat dc - 900Hz (-3dB)	
Current consumption(mA)	68 (1.6W)		
Full scale step response (usec)		75	
Zero temperature drift at output ( $\mu$ A/C)		2 ( 0-70 C)	
Span temperature drift (ppm/C)		50	
Non Linearity		0.002%	
Zero adjustment current ver. (mA)	0		11
Zero adjustment voltage ver. (V)	-4		4
Span fine adjustment	-20%		20%
Output load Voltage version (mA)	NA	NA	NA
Operating temp. 1x350R cell 24V ( $^{\circ}$ C)	-40		125
Storage temperature ( $^{\circ}$ C)	-65		150
EMC compliance to	2004/1108/EC.		
Dimensions	Diameter = 25mm, H = 10mm.		
Connections	Solder Pads		

## Response time.

Response time for the SY014 at a scale: 500mv/V and 50u seconds.



Typical rise and fall time is 75u seconds.

## Inquiries and trouble shooting

For any inquiries and problems with the SY014 or other available products checkout our website or send an email using the appropriate link below.

Website [www.synectic.co.uk](http://www.synectic.co.uk)

Email: [technical@synectic.co.uk](mailto:technical@synectic.co.uk)