

**BEFORE USE ....**

Thank you for choosing us. Before use, please check contents of the package you received as outlined below.

If you have any problems or questions with the product, please contact our sales office or representatives.

**■ PACKAGE INCLUDES:**

Amplifier ..... (1)

**■ MODEL NO.**

Confirm that the model number described on the product is exactly what you ordered.

**■ INSTRUCTION MANUAL**

This manual describes necessary points of caution when you use this product, including installation, connection and basic maintenance procedures.

**POINTS OF CAUTION****■ POWER INPUT RATING & OPERATIONAL RANGE**

Power Supply

Operational voltage range, power consumption

Operational rating 15V DC  $\pm$  5%, 50mA approx. (no load)

**■ ENVIRONMENT**

- Indoor use
- When heavy dust or metal particles are present in the air, install the unit inside proper housing with sufficient ventilation.
- Do not install the unit where it is subjected to continuous vibration. Do not subject the unit to physical impact.
- Environmental temperature must be within -25 to +85°C (-13 to 185°F) with relative humidity within 30 to 90% RH in order to ensure adequate life span and operation.

**■ WIRING**

- Do not install cables (power supply, input and output) close to noise sources (relay drive cable, high frequency line, etc.).
- Do not bind these cables together with those in which noises are present. Do not install them in the same duct.

**■ INSTALLING THE MODULE**

When it is installed on the printed wiring board, land diameter  $\phi$ 1.6 and through-hole  $\phi$ 0.8 are recommended.

**■ AND ....**

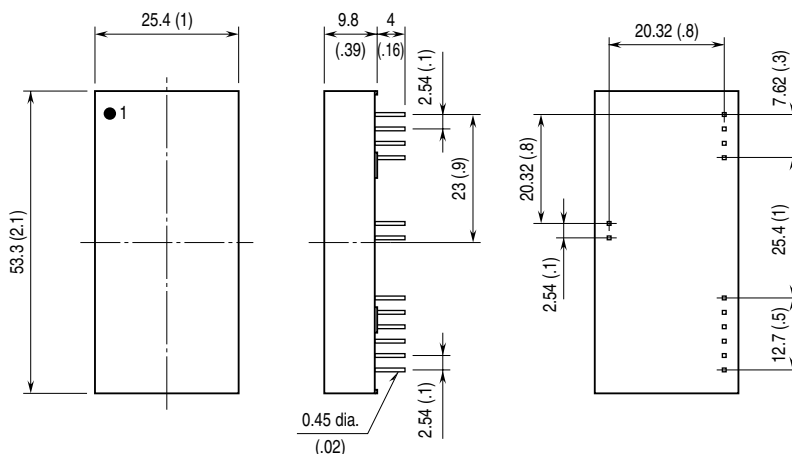
- The unit is designed to function as soon as power is supplied, however, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.
- With voltage output, do not leave the output terminals shortcircuited for a long time. The unit is designed to endure it without breakdown, however, it may shorten appropriate life duration.

**CHECKING**

- 1) Terminal wiring: Check that wiring is correctly connected according to the connection diagram.
- 2) Power input voltage: Check voltage across the pins.
- 3) Input: Check that the input signal is within 0 – 100% of the full-scale.
- 4) Output: Check that the load resistance meets the described specifications.

# TERMINAL CONNECTIONS

## EXTERNAL DIMENSIONS mm (inch)

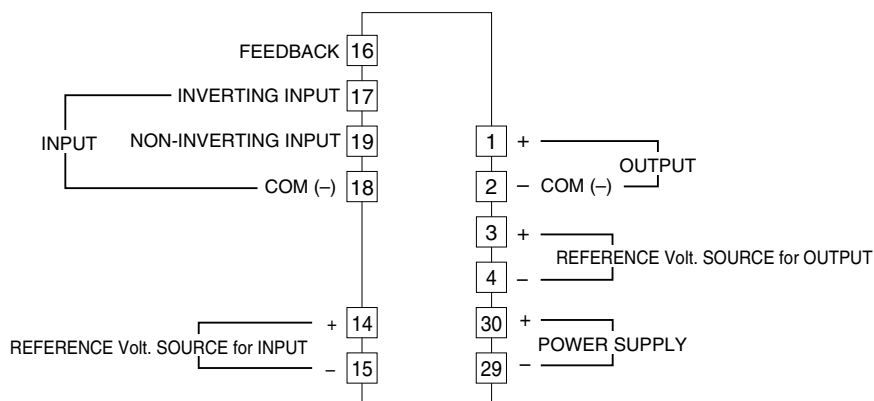


## PIN ASSIGNMENTS

|                  |    |                                  |
|------------------|----|----------------------------------|
|                  | 1  | OUTPUT                           |
|                  | 2  | OUTPUT COM (-)                   |
|                  | 3  | REF. VOLT. SOURCE for OUTPUT (+) |
|                  | 4  | REF. VOLT. SOURCE for OUTPUT (-) |
| POWER SUPPLY (+) | 30 |                                  |
| POWER SUPPLY (-) | 29 |                                  |
|                  | 14 | REF. VOLT. SOURCE for INPUT (+)  |
|                  | 15 | REF. VOLT. SOURCE for INPUT (-)  |
|                  | 16 | FEEDBACK                         |
|                  | 17 | INVERTING INPUT                  |
|                  | 18 | INPUT COM (-)                    |
|                  | 19 | NON-INVERTING INPUT              |

(BOTTOM VIEW)

## TERMINAL ASSIGNMENTS



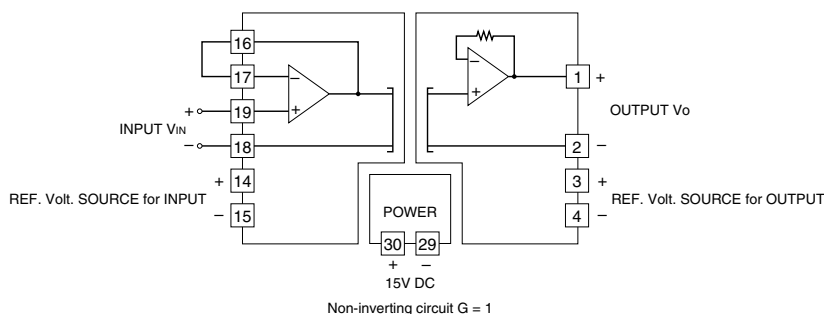
Note. The reference voltage source for input is common to the input COM (-)  
The reference voltage source for output is common to the output COM (-)

## APPLICATION EXAMPLES

The primary amplifier in this unit is high accurate. Installing external resistors to the inverting input (pin 17) and the feedback (pin 16), this unit can be used as a non-inverting or inverting amplifier.

The series resistance of the amplifier,  $R_1 + R_2$  must be between 10k $\Omega$  and 200k $\Omega$ .

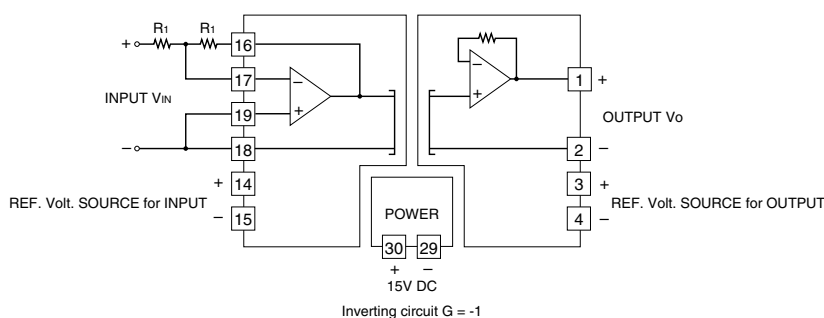
■ Non-inverting amplifier circuit: Basic example of  $G = 1$



The output is proportional to the input.  
The gain is 1.

E.g. 0 – 10V DC for 0 – 10V DC input.

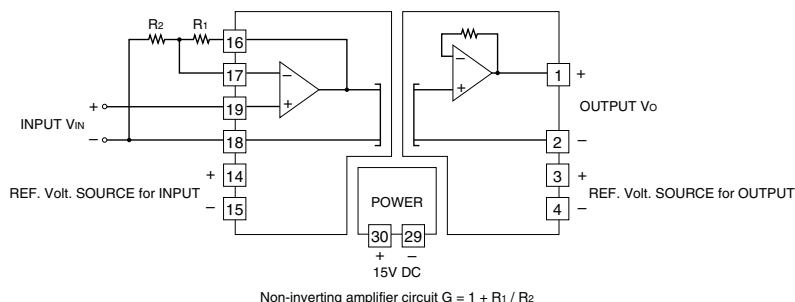
■ Inverting amplifier circuit: Basic example of  $G = -1$  (output inverted to the input)



The output is inverted to the input.  
The gain is -1.

E.g. 0V DC for 0V DC input and -5V DC for +5V DC input.

■ Non-inverting amplifier circuit: Example of  $G = 1 + R_1 / R_2$



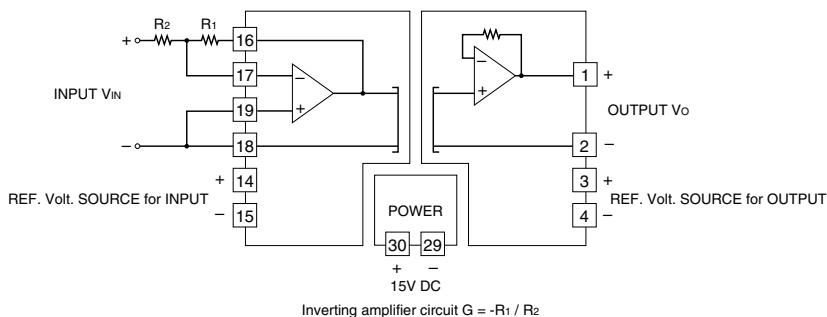
For a non-inverting amplification the output is following.

$$V_O = (1 + R_1 / R_2) \times V_{IN}$$

When  $R_1 = 10\text{k}\Omega$ ,  $R_2 = 10\text{k}\Omega$ , then the output is following. The gain is 2.

$$V_O = 2 \times V_{IN}$$

■ Inverting amplifier circuit: Example of  $G = -R_1 / R_2$  (output inverted to the input)



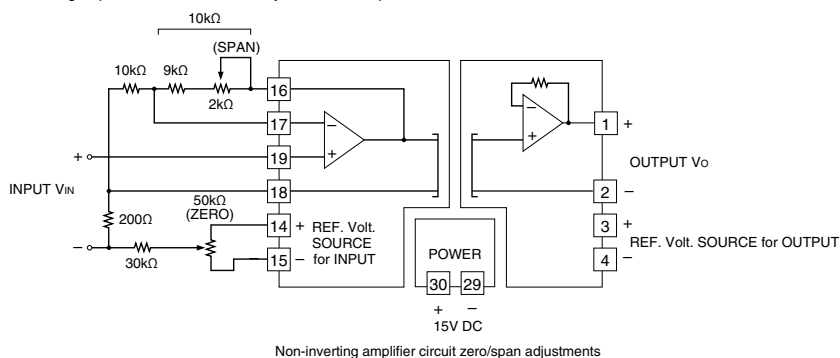
For an inverting amplification the output is following.

$$V_O = -(R_1 / R_2) \times V_{IN}$$

When  $R_1 = 20\text{k}\Omega$ ,  $R_2 = 10\text{k}\Omega$ , then the output is following. The gain is -2.

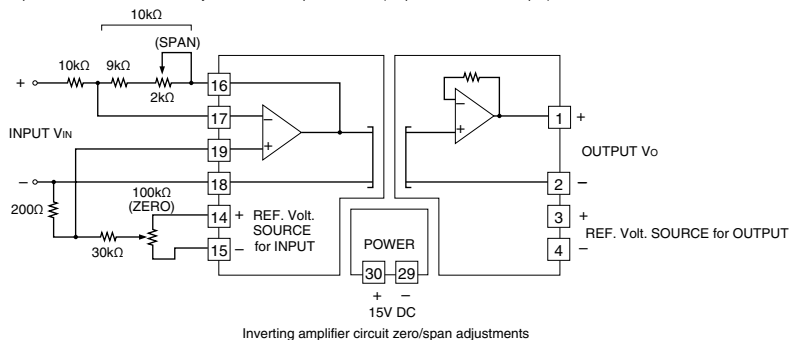
$$V_O = -(20\text{k}\Omega / 10\text{k}\Omega) \times V_{IN} = -2 \times V_{IN}$$

■ Non-inverting amplifier circuit with external adjustments: Example of G = 2



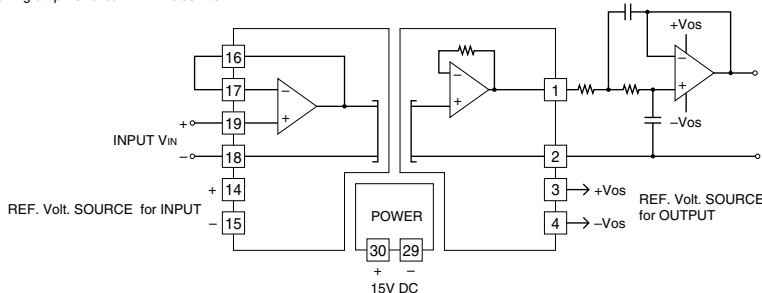
For a non-inverting amplification with external adjustments, when the combined resistance of the span adjustment and 9kΩ is 10kΩ, the gain is  $(1 + 10k\Omega / R_2) \times V_{IN}$ . With the span adjustment (2kΩ), the output is configurable. The zero is adjustable with a reference voltage source of ±16.5 V DC and the attenuation of 200Ω and 30kΩ.

■ Inverting amplifier's circuit with external adjustments: Example of G = -1 (output inverted to the input)



For an inverting amplification with external adjustments, when the combined resistance of the span adjustment and 9kΩ is 10kΩ, the gain is  $-(10k\Omega / R_2) \times V_{IN}$ . With the span adjustment (2kΩ), the output is configurable. The zero is adjustable with a reference voltage source of ±16.5 V DC and the attenuation of 200Ω and 30kΩ.

■ Non-inverting amplifier circuit: With noise filter



Circuit with low-pass filter installed on the output.

## MAINTENANCE

Regular calibration procedure is explained below:

■ CALIBRATION

Warm up the unit for at least 10 minutes. Apply 0%, 25%, 50%, 75% and 100% input signal. Check that the output signal for the respective input signal remains within accuracy described in the data sheet.