

# Inverting Operational Amplifier

## Student Group

First Name	Surname	Matrikel Nr.

## Table of Contents

Inverting Operational Amplifier .....	2
Gain of Op-Amp .....	2
Analysis of inverting input currents .....	3
Analysis of inverting input voltages .....	4

## Inverting Operational Amplifier

### Gain of Op-Amp

Build the following circuit in [figure 1](#) with the power supply and a multimeter.

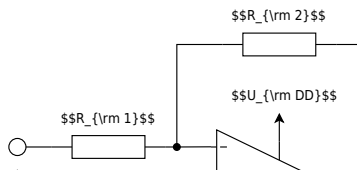


Fig. 1: Inverting Op-Amp

$U_{DD} = 10\text{ V}$ ,  $U_{SS} = -10\text{ V}$ ,  $R_1 = 10\text{ k}\Omega$

Calculate the necessary value for  $R_2$ , so that the Output  $U_{OUT}$  is +5 V. Use the supply voltage of the operational amplifier for  $U_{IN}$ .

$U_{IN} =$

$$R_2$$

**Analysis of inverting input currents**



Fig. 2: Inverting Op-Amp: Investigate currents of the inverting input

$$U_{DD} = 10\text{V}, U_{SS} = -10\text{V}, R_1 = 10\text{k}\Omega$$

Use the values from figure 1 for  $U_{IN}$ ,  $U_{OUT}$ ,  $R_2$ .

Complete the arrows in the scematic of the circuit.

Determine the the currents  $I_1$  and  $I_2$  indirectly by measuring the voltage across known resistors.

$$U_1$$

$$U_2$$

Calculate the algebraic sum of the currents at node  $N_{12}$  using Kirchhoff's Current Law (KCL).

$$I_1$$

$$I_2$$

$$I_{N12}$$

**Analysis of inverting input voltages**

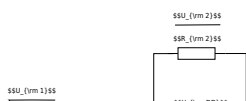


Fig. 3: Inverting Op-Amp: Investigate the virtual GND of the inverting input

$$U_{DD} = 10\text{V}, U_{SS} = -10\text{V}, R_1 = 10\text{k}\Omega$$

Use the values from figure 1 for  $U_{IN}, U_{OUT}, R_2$ .

Complete the reference arrows in the scematic of the circuit.  
 Take the values for  $U_1, U_2, U_{OUT}$  from figure 2.  
 Calculate the voltage  $U_{12}$  using Kirchhoff's Voltage Law (KVL) within the circuit loop.  
 Verify your calculated result by measuring  $U_{12}$ .

$$U_1$$

$$U_2$$

$$U_{OUT}$$

$$\text{Calculated } U_{12}$$

Measured  $U_{12}$

Analyze the physical significance of the potential at  $N_{12}$  relative to GND (defined as  $U_{12}$ ) in the context of the operational amplifier's input configuration. What do you observe?

- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$

What happens if you short-circuit  $R_2$  (the feedback resistor)? Experimentally verify this effect and explain the observed behavior regarding the output voltage.

- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$
- $\{\text{rm .....}\}$

$\{\rm \dots\dots\dots\}$

$\{\rm \dots\dots\dots\}$

From:

<https://wiki.mexle.org/> - **MEXLE Wiki**

Permanent link:

[https://wiki.mexle.org/lab05\\_en/inverting\\_op-amp\\_basics\\_amplification?rev=1777383718](https://wiki.mexle.org/lab05_en/inverting_op-amp_basics_amplification?rev=1777383718)

Last update: **2026/04/28 15:41**

