Instrumentation Amplifier

➢Many industrial and consumer applications require the measurement and control of physical conditions.

For Example

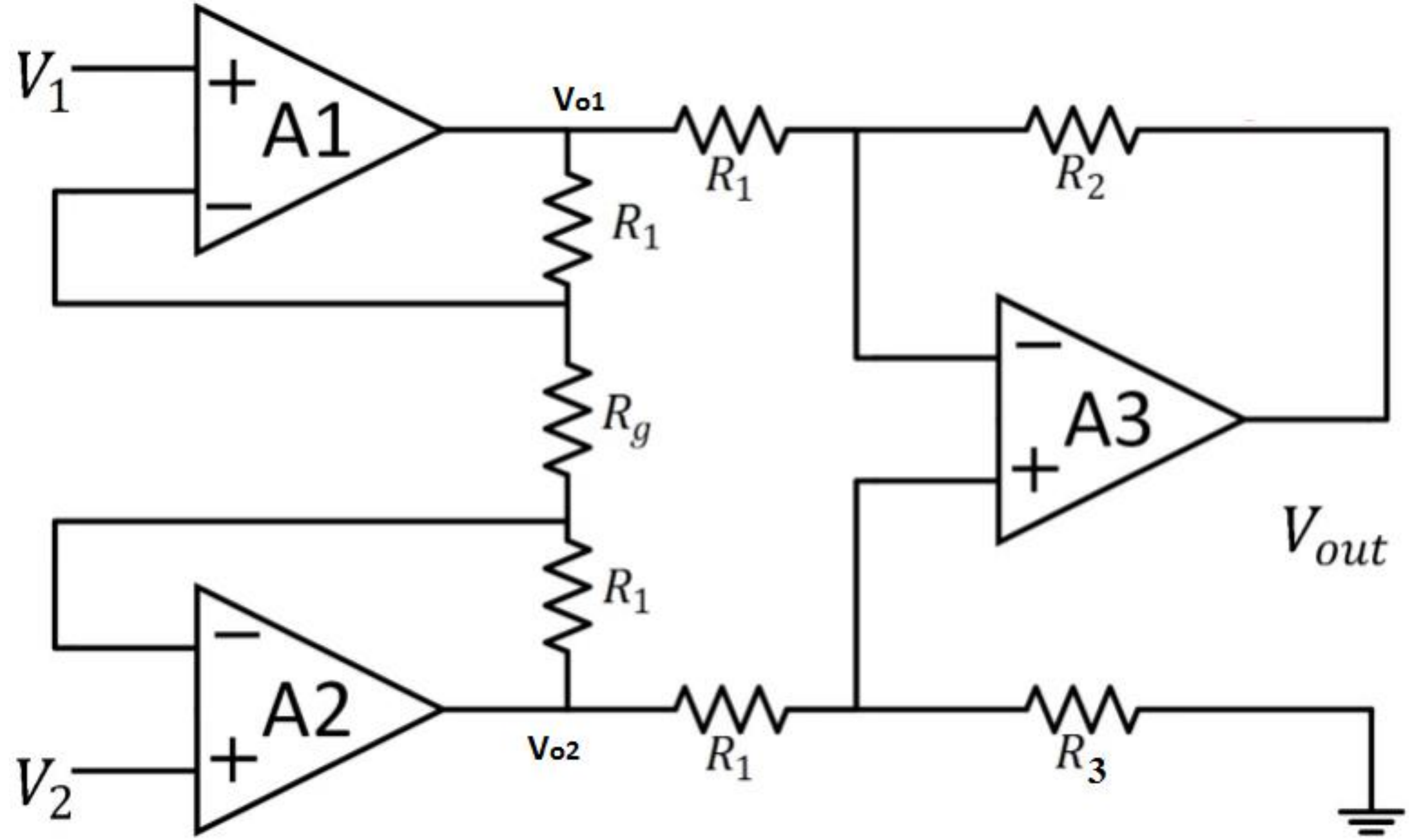
➢Measurements of temperature and humidity inside a diary plant to accurately maintain product quality

➢Precise control of the temperature of a plastic furnace to produce a particular grade of plastic, etc.

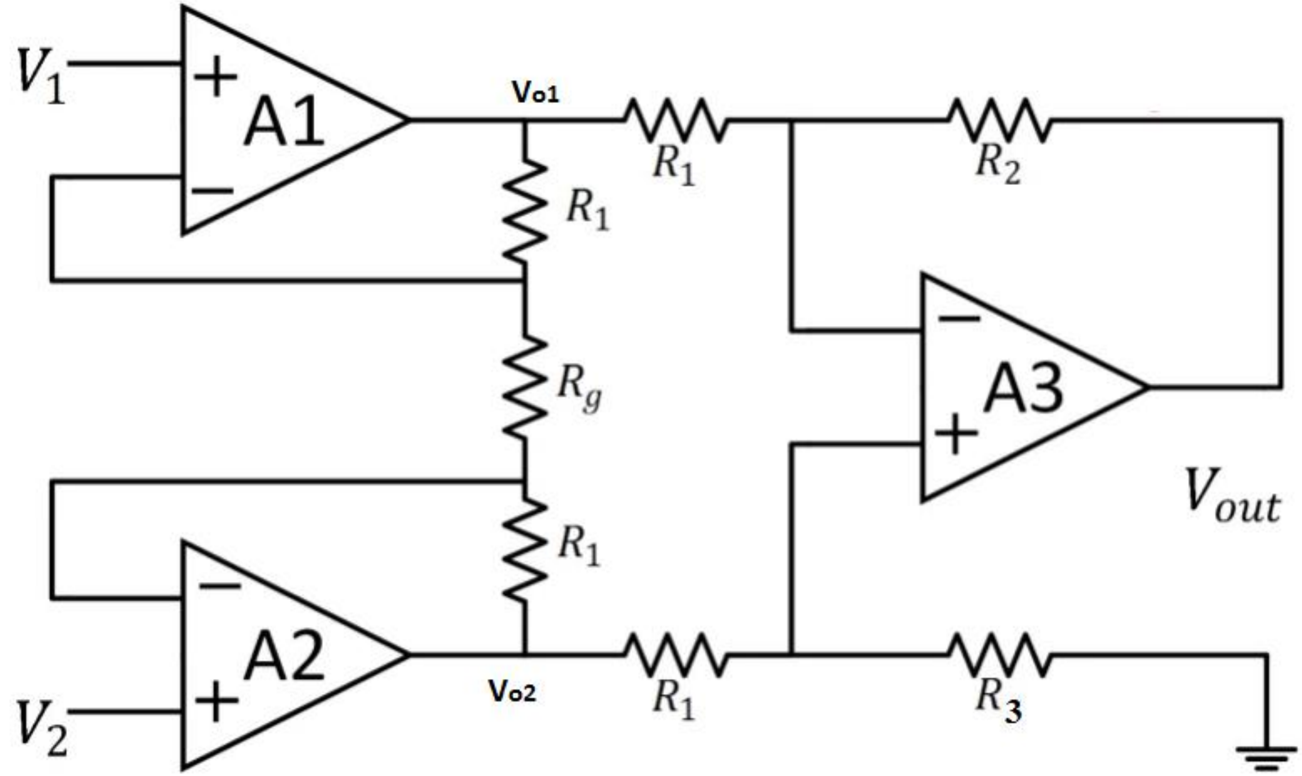
These changes in physical conditions must be converted to electrical quantities using transducers, and then amplified. Such amplifiers, which are used to amplify signals to measure physical quantities are commonly known as Instrumentation Amplifiers.

The input to an instrumentation amplifier is the output signal from the transducer. A transducer is a device which converts one form of energy into another. Most of the transducer outputs are of very low-level signals.

Hence, before the next stage, it is necessary to amplify the level of the signal, rejecting noise and the interference. The general single ended amplifiers are not suitable for such operations. So we use instrumentation Amplifiers which have the capability to reject Noise signal



The op-amps 1 & 2 are non-inverting amplifiers and together form an input stage of the instrumentation amplifier. The op-amp 3 is a difference amplifier that forms the output stage of the instrumentation amplifier.



The output stage of the instrumentation amplifier is a difference amplifier, whose output V_{out} is the amplified difference of the input signals applied to its input terminals. If the outputs of op-amp 1 and op-amp 2 are V_{o1} and V_{o2} respectively, then the output of the difference amplifier is given by,

$$V_{out} = (R_3/R_2)(V_{o1}-V_{o2})$$