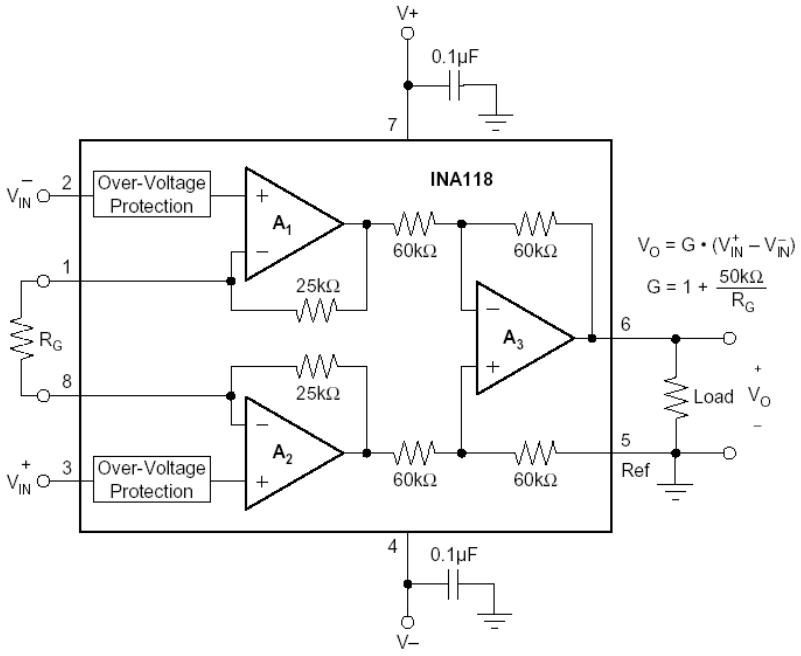
Example 4.2

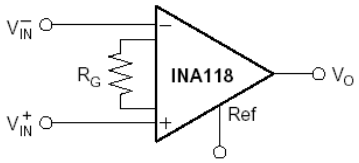
Consider the commercial instrumentation amplifier shown here. For the numerical values for the resistors as given there, verify the entries in the table, by using the formulas that we have derived before for an instrumentation amplifier.

DESIRED GAIN	R_G (Ω)	NEAREST 1% R_G (Ω)
1	NC	NC
2	50.00k	49.9k
5	12.50k	12.4k
10	5.556k	5.62k
20	2.632k	2.61k
50	1.02k	1.02k
100	505.1	511
200	251.3	249
500	100.2	100
1000	50.05	49.9
2000	25.01	24.9
5000	10.00	10
10000	5.001	4.99

NC: No Connection.



Also drawn in simplified form:



Solution:

For the amplifier circuit in Figure 4.1 we have,

$$v_B - v_A = \left(1 + \frac{2R_1}{R_2}\right)(v_{i2} - v_{i1}) \text{ and } v_o = \frac{R_4}{R_3}(v_B - v_A)$$

For the data sheet: $R_2 = R_G$ and $R_1 = 25$ kΩ, $R_3 = R_4 = 60$ kΩ. Then we have

$$v_B - v_A = \left(1 + \frac{50}{R_G}\right)(v_{i2} - v_{i1}) \text{ and } v_o = (v_B - v_A)$$

Or, $$v_o = \left(1 + \frac{50}{R_G}\right)(v_{i2} - v_{i1})$$

It is clear that the values in the table agree with this formula.

Note: For row 1, when R_G is NC, we can assume its value to be infinity.

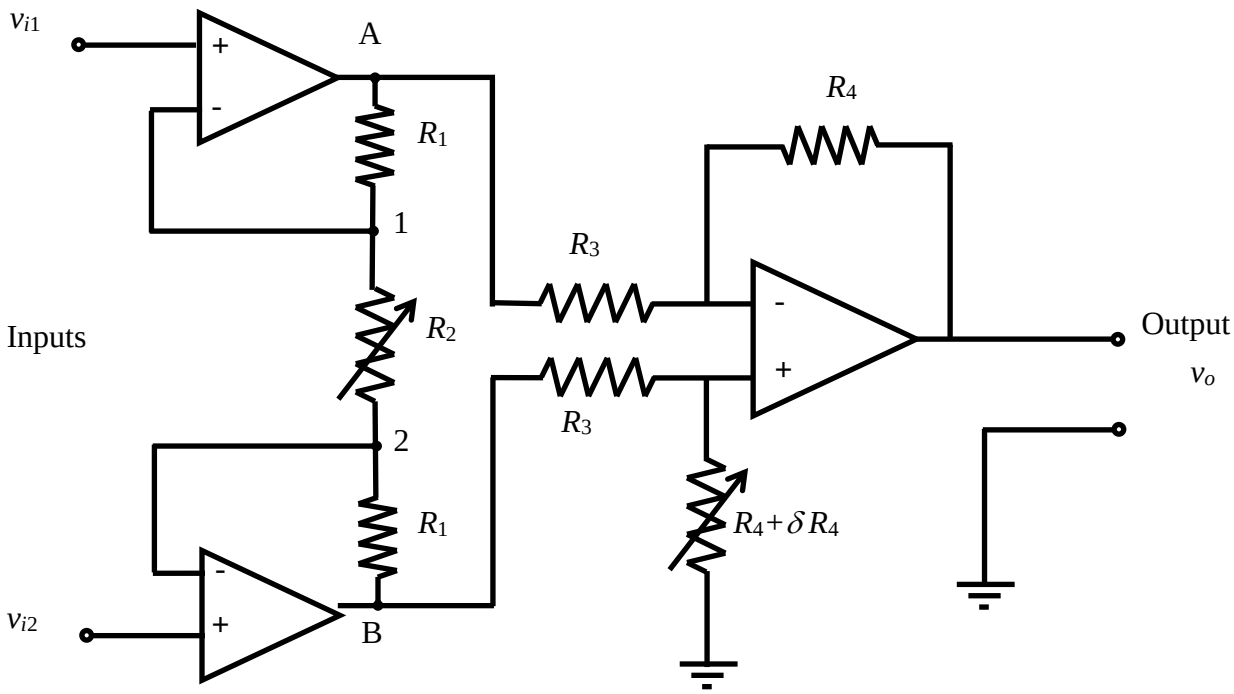


Figure 4.1: Instrumentation amplifier circuit.