# Using potentiometers as sensors.

"The MIDIcreator has a 5V output, but the proportional inputs are 0-3.2V.
How do I connect a potentiometer to the proportional inputs?"

This can be done by using an additional, fixed, resistor to set the maximum output voltage, from the potentiometer.
The output voltage is determined by the *ratio* of the two resistors in the chain.
In this example, the output voltage V_{out} is

given by: $V_{out} = \dfrac{R_2}{R_1 + R_2} V_{in}$ …(1)

Input Voltage
(V_{in} = +5V)

Fixed Resistor (R_1)

Max Output
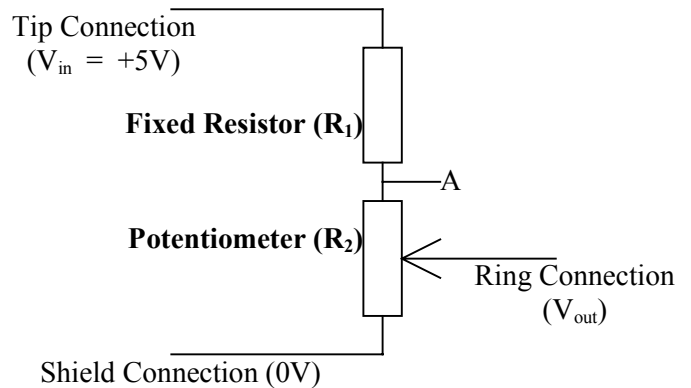Voltage (V_{out})

Fixed Resistor (R_2)

Common (0V)
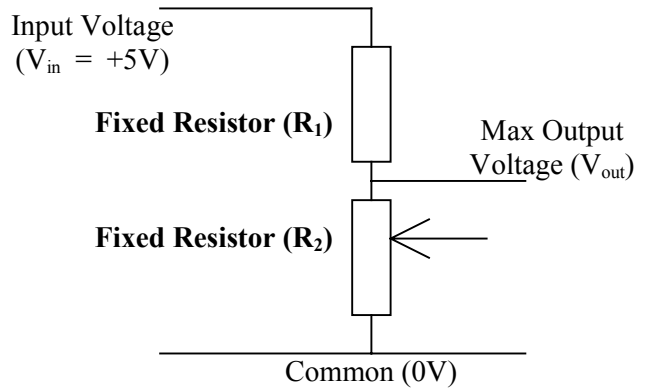
How do I select the value of R_1 ?

The value of R_1 should be chosen so as to give a voltage of 3.2V at point "A".
As the potentiometer is moved a voltage of between 0 and 3.2V is presented to the MIDIcreator input [1].

For example:
If a 10KΩ potentiometer is to be used, to give a voltage of between 0 and 3.2V at the input to MIDIcreator.

Tip Connection
(V_{in} = +5V)

Fixed Resistor (R_1)

A

Potentiometer (R_2)

Ring Connection
(V_{out})

Shield Connection (0V)

Re-arranging equation (1) gives us : $R_1 = \left(\dfrac{V_{in}}{V_{out}} - 1 \right) R_2 = \left(\dfrac{5}{3.2} - 1 \right) 10K\Omega = 5.625\,K\Omega$

The nearest "standard" value of resistor is 5.6KΩ, giving a voltage range of 0 - 3.205V [2].

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[1] The input impedance of the MIDIcreator is 100KΩ to ground. If the potentiometer is of too large a value, this impedance must be taken into account, and the resultant voltage range produced by the potentiometer will be non-linear.
[2] It is best to produce a maximum voltage of at least 3.2V, in order to utilise the full range of the MIDIcreator proportional input. Hence selecting a value of R_1 which is LESS THAN the calculated value.