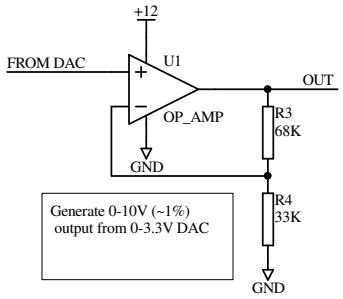
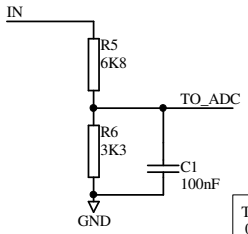
Simple Circuits for use with VM2 ADCs and DACs



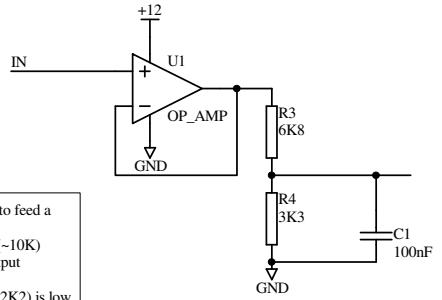
Generate 0-10V (~1%) output from 0-3.3V DAC

0 - 10V Output

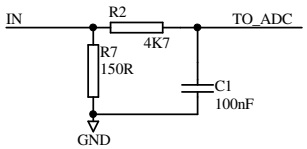


0 - 10V Input - simple

The circuit on the left divides a 0-10V signal down to feed a 0-3.3V ADC.
Disadvantages: low-ish input impedance of the cct (~10K) means it must be driven by something with low output impedance.
Also, check that the output impedance of this cct (~2K2) is low enough to drive the ADC.
You can choose different values for the resistors to change the input and output impedances.
If impedance is a problem then use an op amp, e.g. the circuit on the right.
If you do this, then the amp will have to be powered from something like 12V.



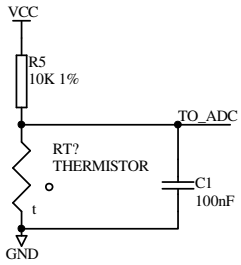
0 - 10V Input, high input impdedance



Convert 4-20mA signal into signal in the range 0-3V, ready for input to ADC.
4K7 is to provide some input protection for the ADC in fault conditions.
Note: the current returns via GND. If you are using lots of these ccts.
then you may need to consider what tracks/wires this current is to flow through,
and check any related voltage drops don't affect the measurement.

4 - 20 mA Input

4-20mA output circuits are not simple and so are not shown here.



Thermistor Input

This cct. is ratiometric, so the measurement is referenced to the ADC's reference, which may be VCC.
The bias resistor value should be the resistance of the thermistor at around the centre of the temperature range required.
The best thermistors have 10K nominal resistance: less means there will be self heating of the thermistor, and more means the output impedance of the cct. is too high to read directly by most ADCs.
Algorithms to convert the ADC reading to temperature can be found on our website.
The capacitor may increase the accuracy of the readings.
You may be able to adjust the ADC to read the ~5-10K input impedance of the divider. This is done using the Period message for some ADCs.

General Notes:

Input capacitors.
Capacitors are shown on the output side of some of these circuits. These are useful when driving the 'on-board' analogue inputs on the VM2.
When driving from sources with 'high' output impedance, the capactor reduces an artificial offset in the reading present on these particular inputs.

Simple Analogue CCTs	Micro-Robotics Ltd.
Revision:	The Old Maltings
Date: 23-May-2016 11:27:34	135 Ditton Walk
Sheet 1 of 1	Cambridge CB5 8QB
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