How to sense 12V or higher circuitry with the Arduino

Method 1: transistor level converter

Arduino +5

R4
4.7 or 10K

5 to 12V input

to Arduino input

+

R1
1K to 3.3K

T1
2N3904 or BC547

GND

D1
1N4004

GND

Arduino GND
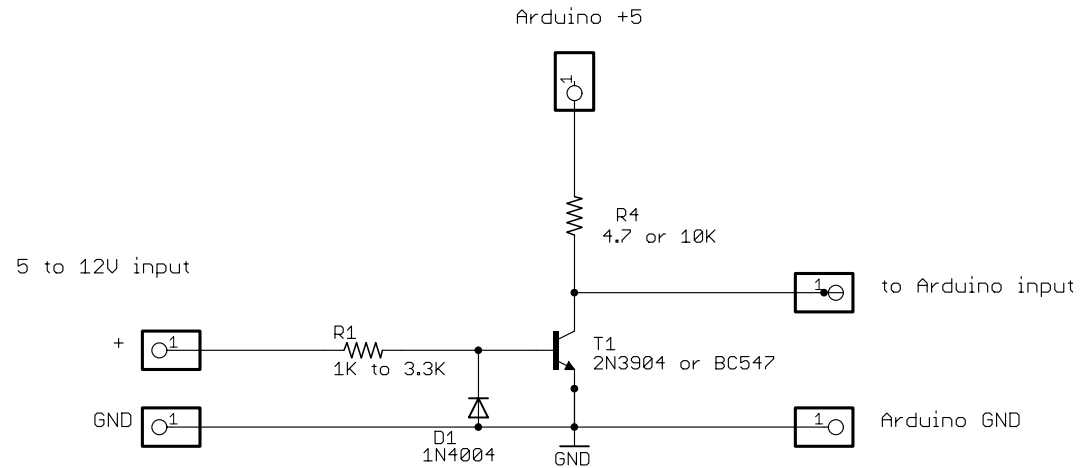
Method 2: optoisolator level converter

Arduino +5

R3
4.7K or 10K

5V to 12V input

OK1

to Arduino input

+

R2
1K to 3.3K

GND

D2
1N4004

4N33

GND

Arduino GND
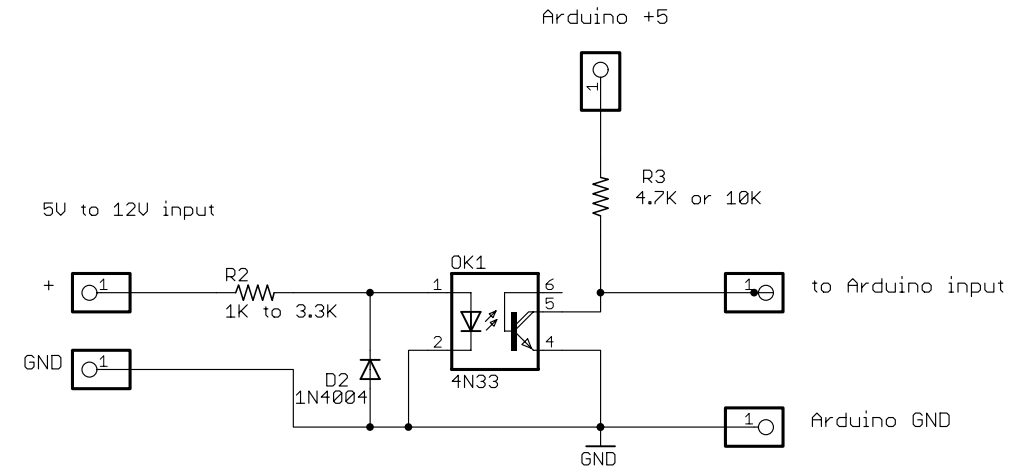
Notes

* Change R1 or R2 to 10K ohms for volages inputs higher than 12V

* OK to connect 12V ground to Arduino, but not positive 12V source!

* Optoisolator version gives excellent noise isolation, as these is no current path through Arduino Circuitry

* Lots of optoisolators will work: 4N33, TL117, 6N138... check the data sheet

* Diodes only required if input is AC, or swings below 0V