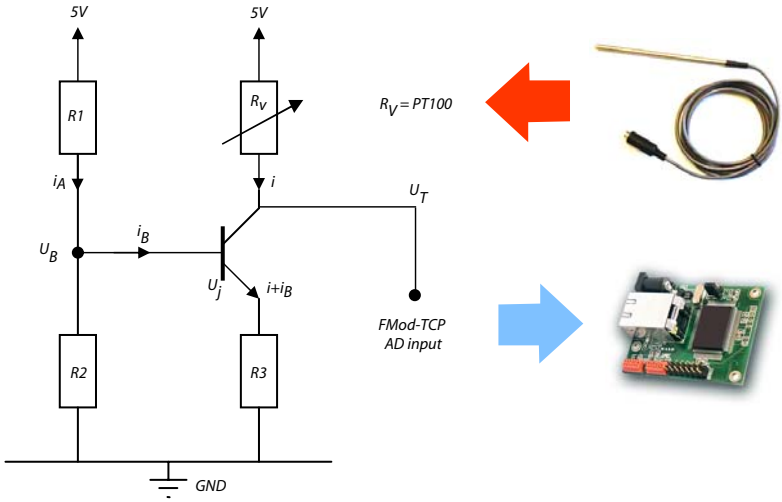
Interface your Analog Signals on the network

Several applications use analog signals (audio , temperature, level, pressure, etc. signals). It is often useful to convert these analog measurements to a digital value, that can be then compared to a predefined number to trigger an alarm or a specific behaviour. A lot of sensors on the market provide an analog signal output, and it can be directly connected to the AD input on the FMod-TCP.

The Analog-to-Digital conversion gives 10bit values for each sample, and can deliver a sample every 50us. The analog signal level has to be between GND and VCC of the FMod-TCP board (tipically 0-5V). Be careful that if the references (VCC and GND of the board) of the AD converter are not stable, the accuracy of the conversion can be bad.

Example of a temperature signal given by a PT100 sensor:
To measure the temperature with a PT100 sensor (a special resistor which value depends from the temperature), it is only necessary to have a current source which can be made with one transistor (NPN) and 3 resistors (R_1, R_2 and R_3).



$$U_B = R_3(i + i_B) + U_j \quad \text{and} \quad i = \beta \cdot i_B$$

$$i_B = \frac{(U_B - U_j)}{(\beta + 1)R_3} \rightarrow i = \frac{\beta (U_B - U_j)}{(\beta + 1) R_3} = \frac{(U_B - U_j)}{R_3} \quad \text{if} \quad \beta >> 1$$

$$\text{If } i_B << i_A = \frac{5}{R_1 + R_2} \text{ then } U_B = \frac{5R_2}{R_1 + R_2}$$

$$\Rightarrow i \cong 4.3 \cdot \frac{R_2}{R_3 (R_1 + R_2)} = \text{const}$$

We are then able to calculate the temperature by measuring the voltage U_T :

$$U_T = 5 - R_V \cdot i = 5 - R_V \cdot \text{const} = 5 - \text{fct(T)} \cdot \text{const}$$

with R_V=fct(T) given by the PT100 manufacturer.

The digital value of the conversion is accessible through the TCP port # 8010 (or UDP port # 7010) at the memory location (register) 0x22 (2 bytes value). More details on the AD conversion can be found in the FMod-TCP_UserManual_X.Y.pdf , downloadable on FiveCo's web site.