Connection of Pt 100 with long cables.

In standard UTI applications, the Pt 100 is excited by a square wave voltage between E and F (AC signal), via the series connection of R_{bias} and R_{ref} (see UTI Data sheet). This works fine as long as the cables are short (under 0,5 meter). When the connecting cables need to be longer, the parasitic capacity between the connecting wires and / or the grounded cable shield will degrade the signal. Please refer to application note APPUTI08 for more information about this subject.

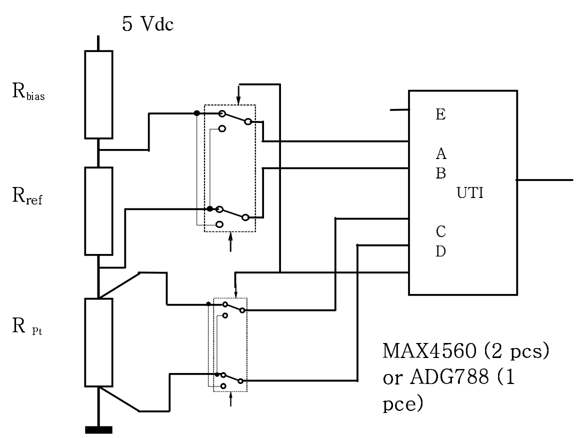
Because there is one single current flowing through the three resistors, the value of R_{Pt} can be determined by measuring the ratio between the voltages over R_{Pt} and R_{ref}.

In order to measure these voltages correctly, the signal has to be a properly shaped square wave signal (of which the amplitude as a certain percentage of the original excitation signal). The higher the cable capacitance, the more the rectangular signal will degrade into a rounded off shape, which means errors in the final read-out of the Pt resistance.

The solution to this problem is to add four analogue switches (one or two integrated circuits). R_{bias}, R_{ref} and R_{Pt} are then connect in series to a 5 volt DC voltage supply and by means of the analogue switches the respective voltages over R_{ref} and R_{Pt} are chopped back into the original UTI mode 11 signal format. This way the cable capacitance has no effect at all on the accuracy of the measurements and the UTI can measure PT100 / PT1000 values with maximum precision according to its specifications, no matter the cable length.

In order to maintain this precision it is imperative to use analogue switches that have very small leakage currents (no current leakage difference between R_{ref} and R_{Pt}).

No changes in the software are needed and the small extra board can be considered as a plug-in.



Basic setup of DC excitation of R_{Pt} and Rref

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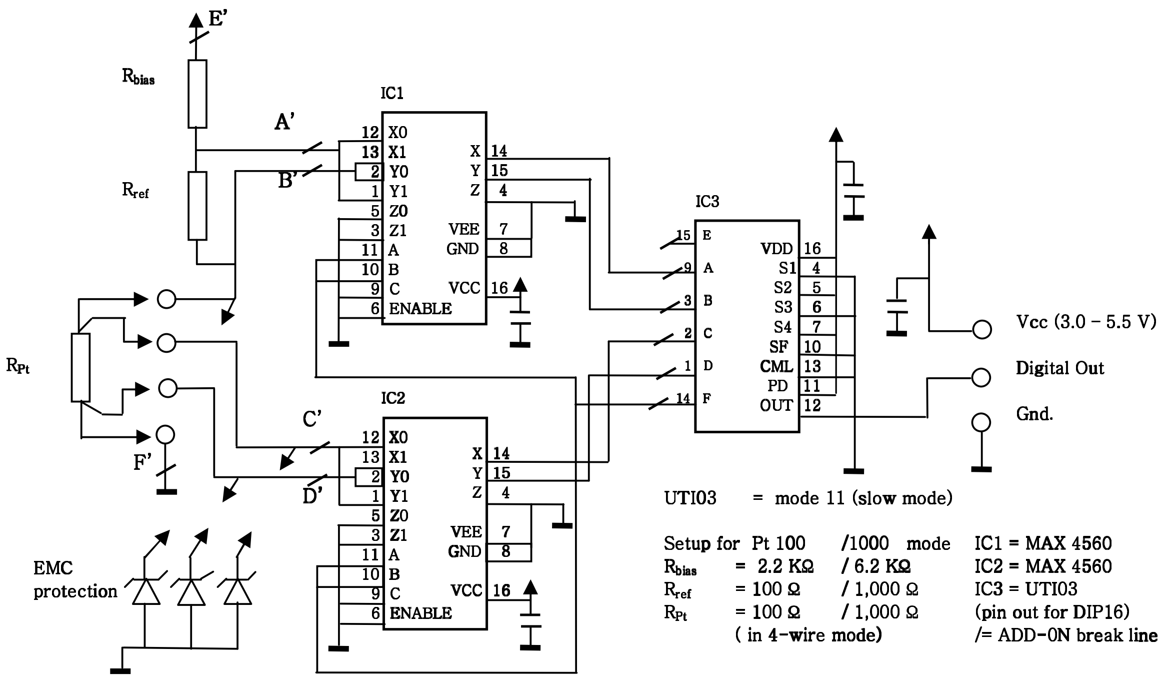
Only UTI point F is needed to control the analogue switches. It is not necessary to change the software in case in standard (AC mode) UTI mode 11 is used. As a consequence, the analogue switch plug-in board can be added to existing Pt applications, to improve accuracy, even while extending the cable lengths.
Small DC voltage sources (like for example contact potentials originating from poor cable layout and temperature differences between soldering points) in series with the sense lines of the Pt element "can not be seen" by the UTI. Therefore it is important that all connections are made correctly. On the UTI side of the switches such effects are compensated by the chopping technique.



Practical circuit of DC Pt application

In the above diagram UTI points A – F come in pairs. (A and A', B and B' etc). This is meant to underline the fact that this circuit can be put in place in an existing application, by putting the board in between the UTI points and the original Pt cable. Cable point A goes to A', UTI point A goes to A etc.

For the analogue switches several types can be used. A very important switch parameter is the leakage current (=< 10 pA) and the charge injection (< 10 pC).

As the switches are connected to a potentially long sensor cable, it is also important to take precautions to prevent EMC/ESD damage.

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