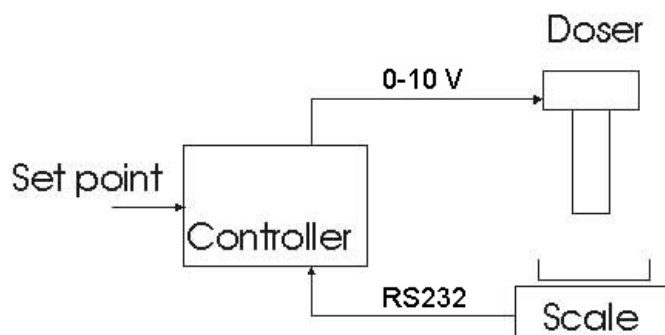# LAMBDA DOSER – Dosing system for powders

We present here a set of devices which connected together permit to add a defined amount of powder in a flask, fully automatically.

Material and methods

A PID controller is connected to a balance through a serial RS-232 (or RS-485) interface (see figure below). The LAMBDA DOSER, which contains the powder, is controlled by a 0-10 V signal. At 0 V the DOSER is stopped, at 10 V it operates at maximal speed.
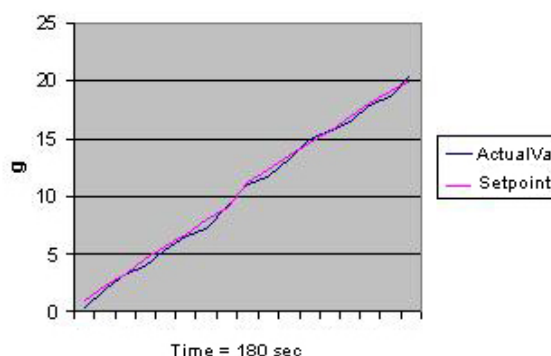

Experimental setup and connection scheme.

The user enters the desired amount of powder and the duration of the dosing and then presses the start button. The controller calculates at each time the amount of powder which should be added (set point). The controller compares this value with the weight measured by the scale and controls the speed of the powder DOSER.

This configuration was used to add 3 times 5g and 3 times 20g of NaCl powder. The controller parameters P=2 (proportional) and D=0 (differential) was used for this experiment.

Results

The results are reported in the table below. The figure underneath shows the set point profile calculated by the controller (magenta) and the added powder amount (blue) measured by the scale as a function of time. The curves show how the controller adjusts the added amount ("ActualVa") to the calculated set point ("Setpoint"), which nicely follows a line.

Set point [g]	5	5	5	20	20	20
Dosing time [min]	2	2	2	3	3	3
Flow rate [g/min]	2.5	2.5	2.5	6.7	6.7	6.7
Powder amount measured [g]	4.8	5.2	5.3	20.4	20.1	20.0
Deviation [%]	4	4	6	2	0.5	0

Amount of powder added as a function of time and time profile of the amount of dosed powder.

Conclusion

The addition of powder with the LAMBDA DOSER has a very good reproducibility and a good precision (for 5 g: better than 6% and for 20 g: better than 2%). A similar construction can be made for precise dosing of liquids by replacing the powder DOSER with a peristaltic pump or a syringe pump.