

# Calibrating PID Control

This tutorial will help you determine the constants for PID control in ProCoDA.

## PID Calibration Guide

To establish constants for PID control in ProCoDA, follow the procedure shown at this [link](#). The steps will be summarized below.

1. After you have loaded the proper PID control function and have created the appropriate set points in your method file, set the P, I, and D set points to zero.
2. Set P to a small value and change the target value to provoke a response from the PID control.
3. Observe the graph of the variable being controlled for this value of P. If the result is an oscillation that becomes damped (decreasing amplitude), increase the value of P incrementally and repeat the process. If the result is an oscillation that becomes amplified (increasing amplitude), lower the value of P and repeat the process.
4. The objective is to find a value of P for which there is a periodic oscillation of the value with a constant amplitude. Once the correct P value ( $K_u$ ) has been found, write it down and also record the period of the wave (time between two consecutive crests of the oscillation -  $P_u$  - in minutes).
5. AguaClara researchers typically use PI control (the value of D is set to zero). To find the value of P required, use the equation:  $P = K_u/2.2$ . To find the value of I required, use the equation:  $I = P_u/1.2$ . This should result in a value in minutes, which is the correct unit for I.
6. Change your set points (P and I) to the new values. Ensure that there is less than 10% variation in your variable, and fine tune if necessary.

This calibration method may result in oscillatory behavior. To reduce variability in the output, consider reducing P to damp the oscillations. This will reduce the responsiveness of the algorithm and will increase the stability.