

Ziegler-Nichols Loop Tuning



This protocol is designed to optimize the loops for disturbance rejection.



There is the possibility for the loop to go unstable at too high gain. Use caution as gain is increased.

- 1. From the Home Screen, touch the Channel icon for the loop to be tuned
- 2. Touch Settings > PID Params
- 3. Choose a Set Point temperature
- 4. Set Proportional Gain (K_p) to 0
- 5. Turn off Integral and Differential portions of the loop (T_i & T_D , respectively)
- 6. While monitoring the error in temperature on rolling graph, **slowly** increase K_p until the error begins to oscillate




- 7. Use the  and  icons, to scale displayed response appropriately



- 8. Use the  icon to pause the graph

- 9. Note K_p where oscillation begins, $K_{p,cr}$



- 10. Use the Cursors enabled by touching the  icon to measure the period of oscillation, T_{cr}
- 11. Use the following table to set the values of K_p , T_i , and T_D

| Type of Controller | K_p | T_i | T_D |
|--------------------|----------------|--------------|---------------|
| PI | $0.45K_{p,cr}$ | $0.83T_{cr}$ | 0 |
| PID | $0.6K_{p,cr}$ | $0.5T_{cr}$ | $0.125T_{cr}$ |

Tab. 1: Ziegler-Nichols loop values

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Last update: **2021/08/26 14:26**

