TT200203 – FUP - Damping and Ramping Functions

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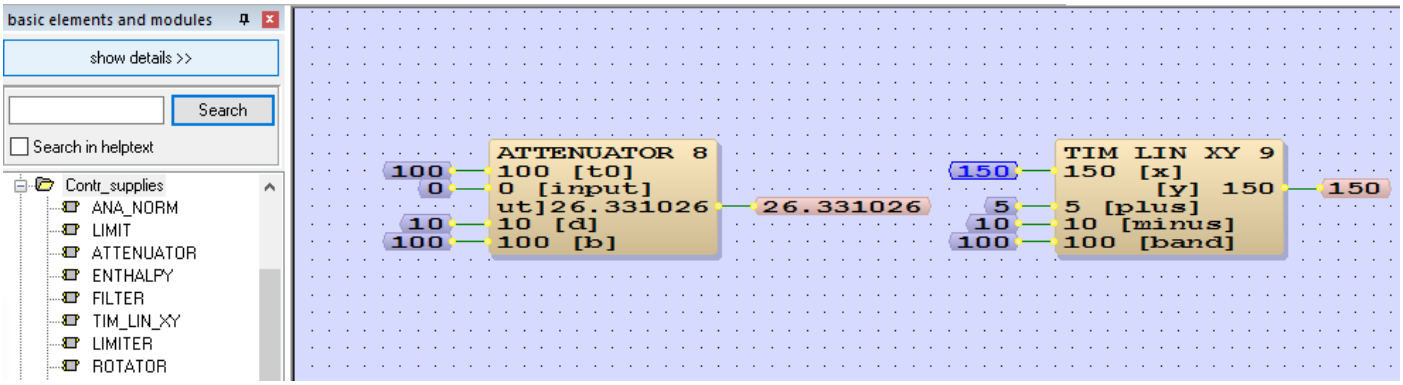
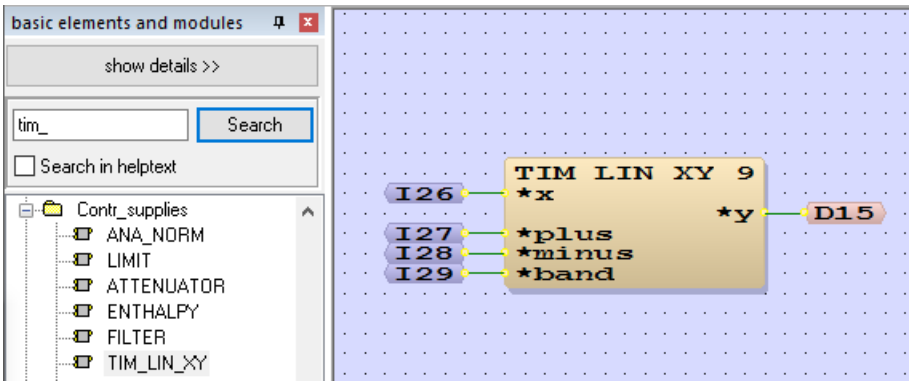
Title	Damping and Ramping Functions (TT200203)
Object	FUP
Reference version	2
Date	02.2020
Author	EK
Goal	To explain the usage of the Damping and Ramping Function Blocks

Content:

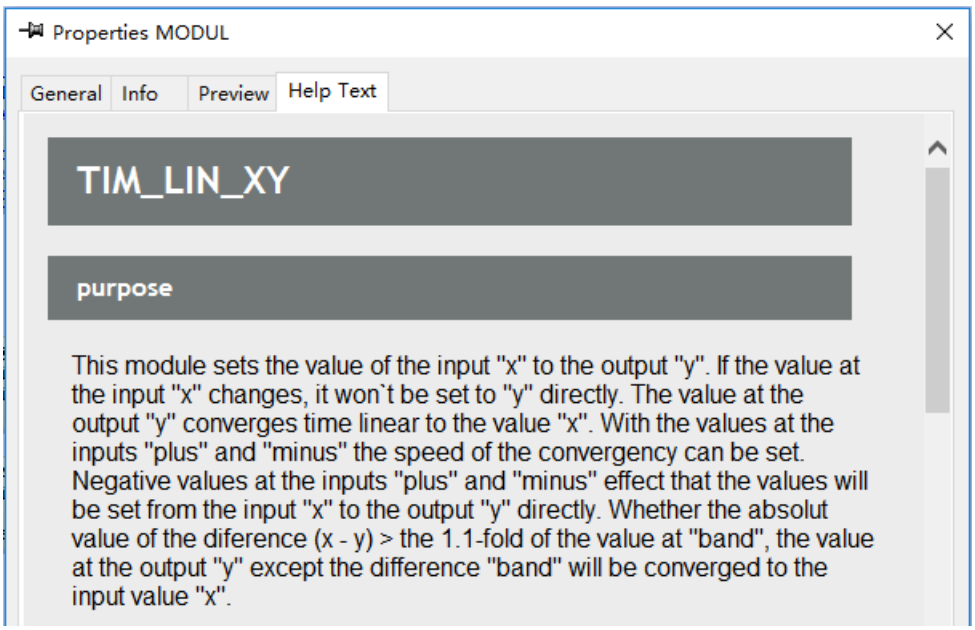


TT200203 – FUP - Damping and Ramping Functions

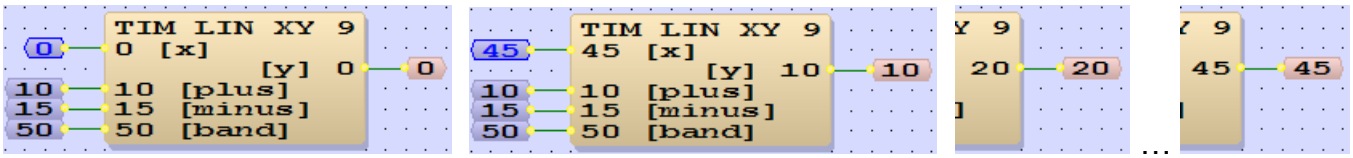
1. Sometimes we want to slow down the change of the analog input and/or output to make the control of the equipment more stable. We've 2 modules for this purpose, and the first one to show you is "TIM_LIN_XY"
2. You can find this module under "Contr_supplies", this is a ramping module that converts fast analog step value changes into a gradual change



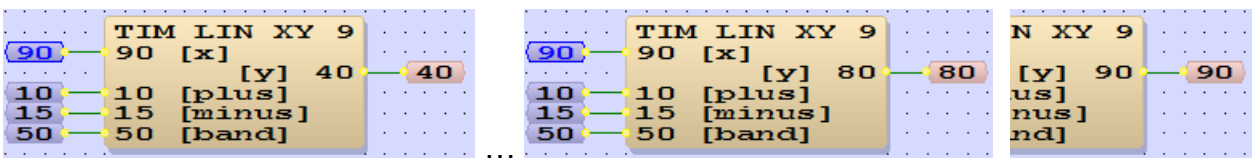
3. You can find the help of the module by double clicking the module and select "Help Text" tab



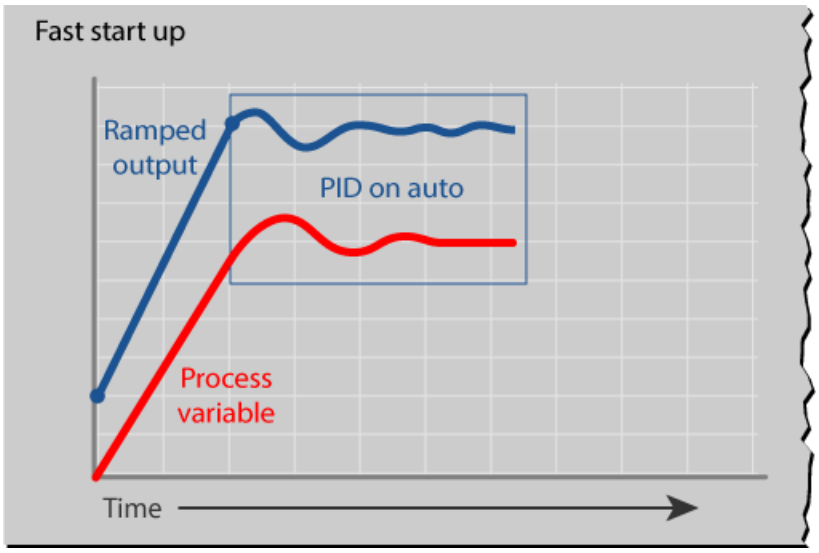
4. Let's try it in simulation. First set x=0, plus=10, minus=15 and band=50. Now when we set the input x to <= 50, output y will ramp up 10 every second until it goes to x



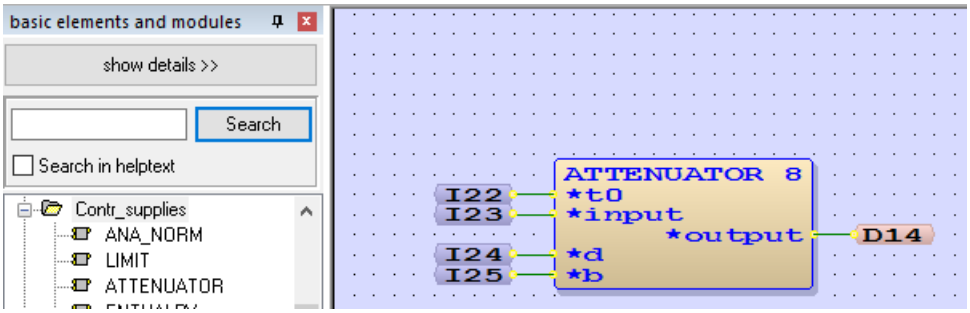
5. If x now goes down to 0, then y will ramp down 15 every second.
6. Now set x=90, y will first go to 90-50=40 directly, and then start to ramp up 10 every second



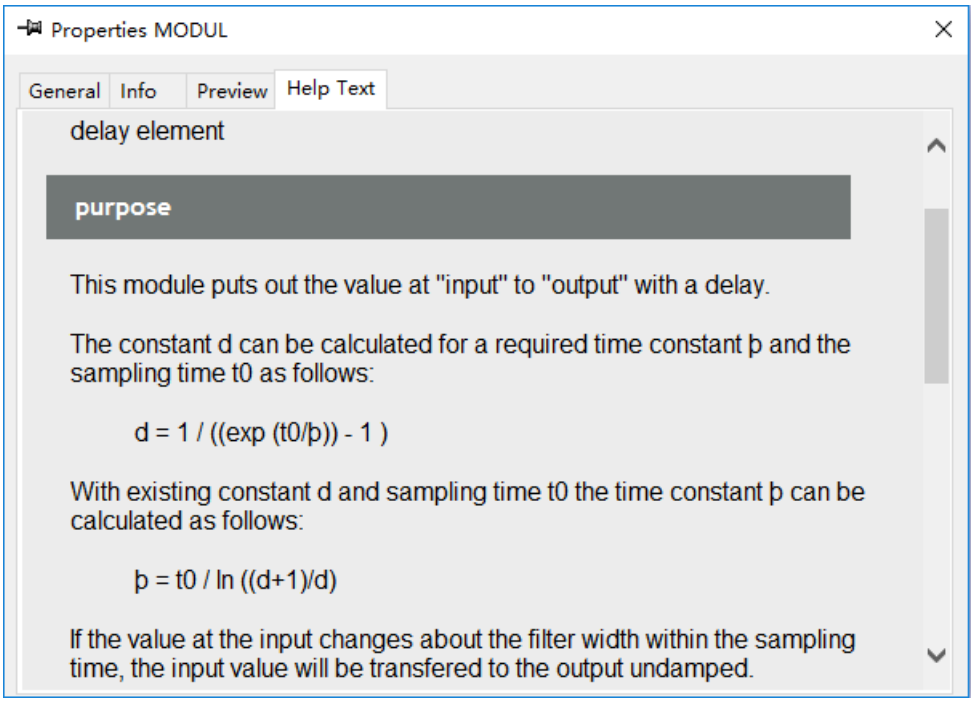
7. If x now goes down to 0, then y will go to 50 directly and then ramp down 15 every second. This means the ramping is always within the “band” setting. Once the input is changed more than the “band”, the output will start from x ± “band”, and then start ramp up or down from there
8. Some startup/shutdown sequences are very linear. In these cases, you might find better control is obtained by ramping the controlled output. Once the process has reached its steady state, switch the PID loop controller to auto, and let it take care of it from there.



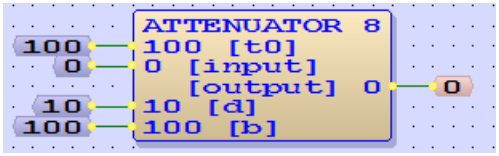
9. Another module to show you is “ATTENUATOR”, which is also under “Contr_supplies”

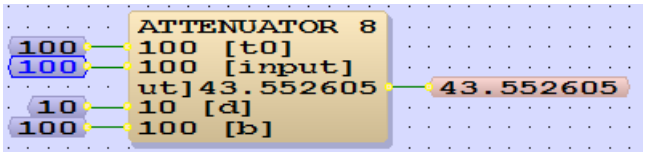


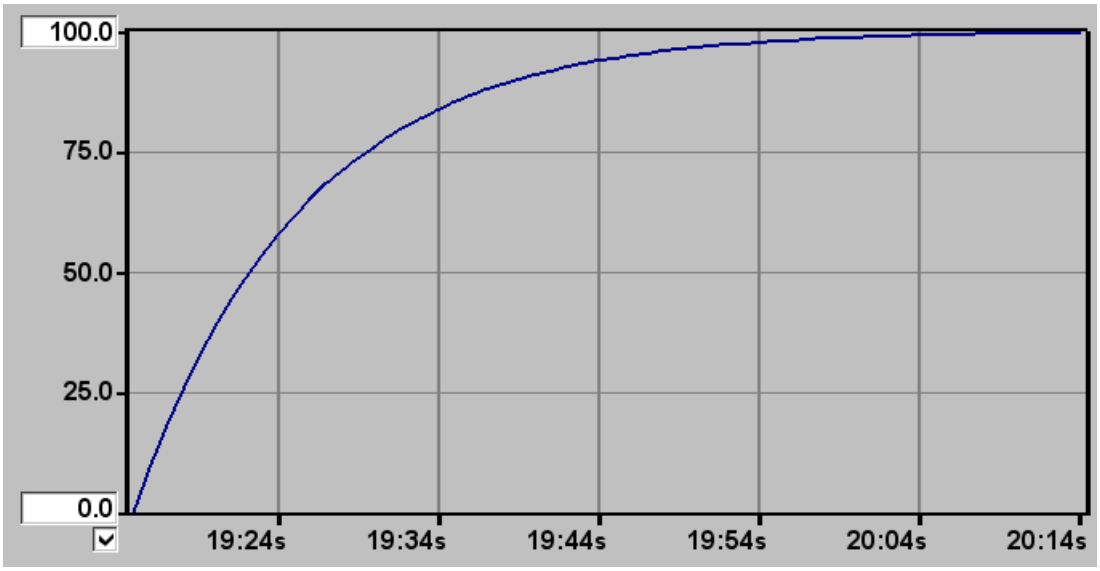
10. You can find the help of the module by double clicking the module and select “Help Text” tab



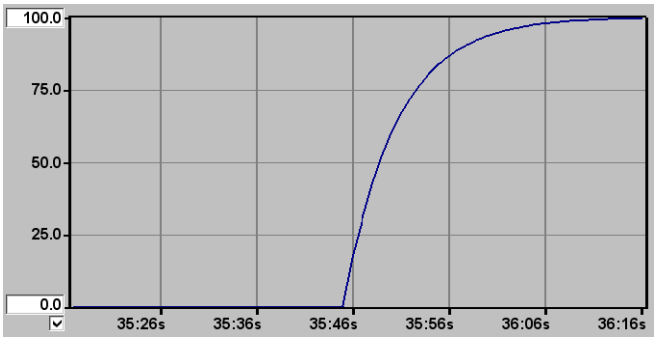
11. Try it in simulation. Set t0=100 (1 second sampling time), d=10, and b=100 (filter width). When the input change to 100, the output will slowly change to 100. It takes about 60 seconds for the output to change from 0-100 when d=10

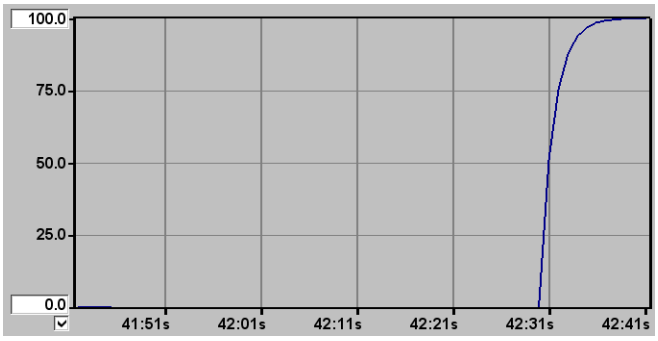






12. When d=5, it takes about 30 seconds. When d=2, it takes about 10 seconds





13. The time it takes for the output to reach the input is independent of the change. Also, when the input changes more than b (filter width), the output will change to the input directly without delay.
14. This module is useful to slow down (filter) the rapid change of the analog input readings (e.g. airflow), such that the PID control can be more stable