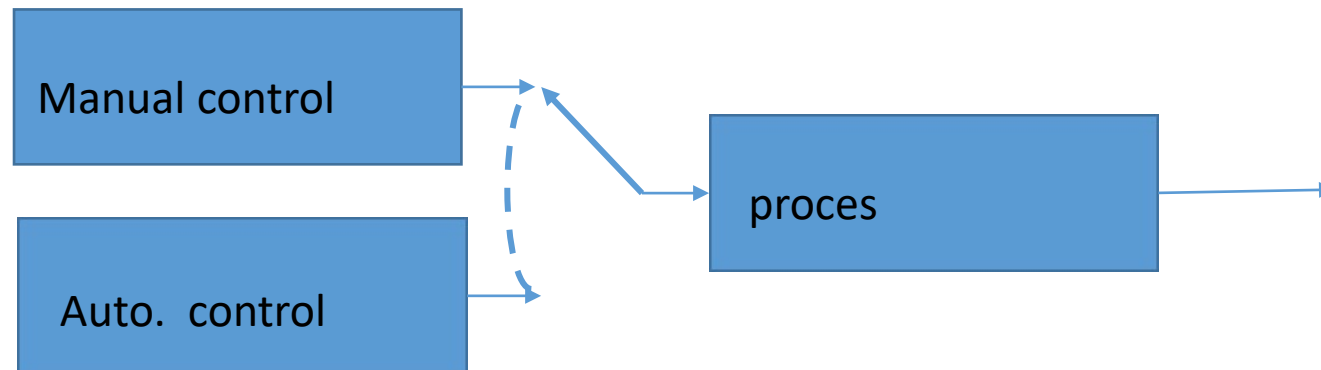


Bumpless transfer between
manual and automatic control

Changing between manual and automatic control

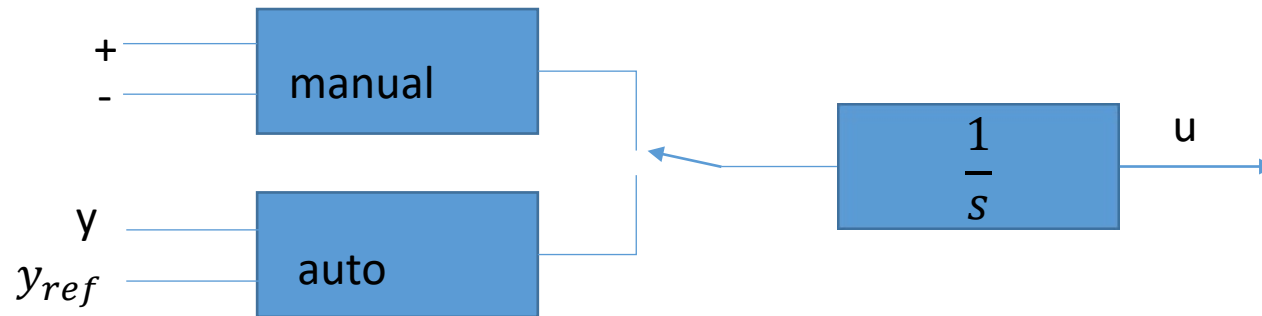
- Some processes are controlled manually in some part of the time and automatically the other time e.g. manually control of start up and automatic control.
- The switching between manual and automatic control can imply large transients



Changing between manual and automatic control

- a system is in manual mode the control algorithm produces a control signal that might be different from the manually generated control signal.
- To avoid 'bumps' it is necessary to make sure that the two signals are the same at the switching time.

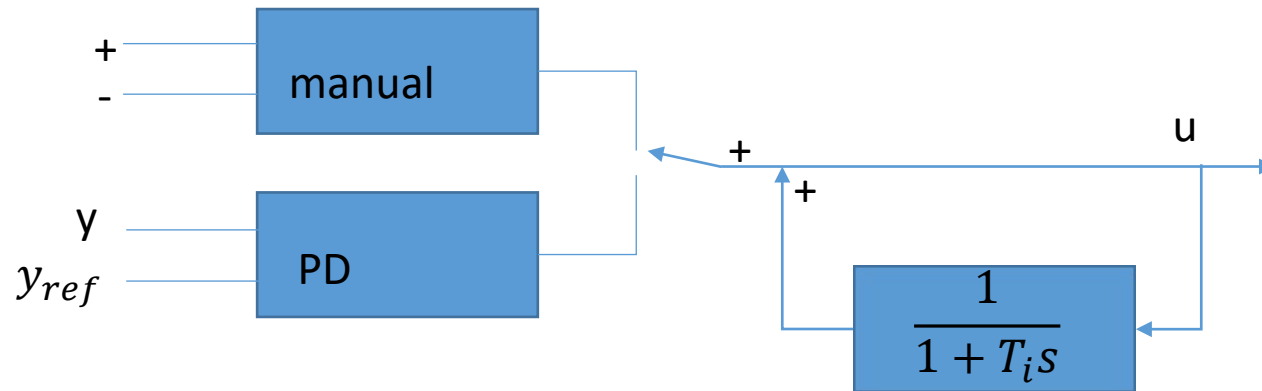
Bump less transfer in a controller with incremental output



The switching is before the input to the integrator implying a smooth transition.

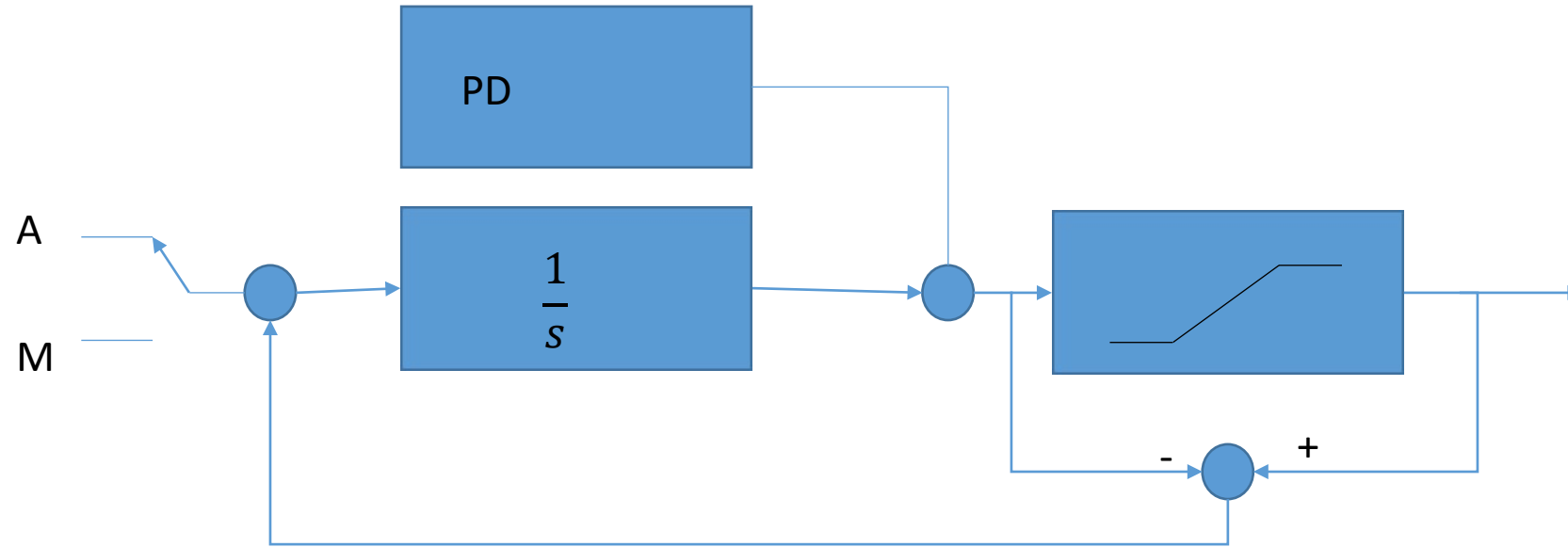
The incremental updating via the integrator avoids large transients.

Bumpless transfer in a PID controller with a special series implementation

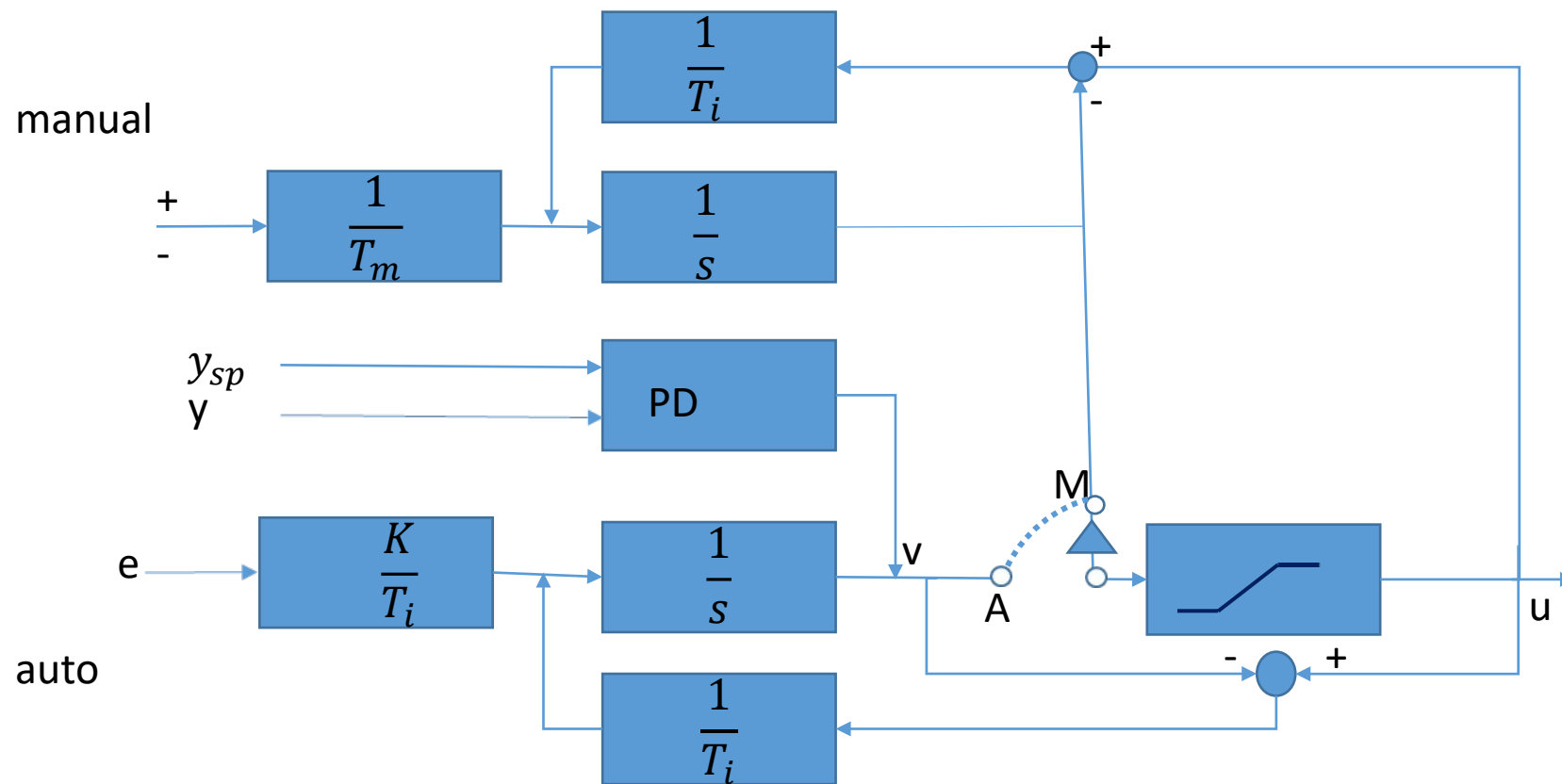


There will be a transient if the output from the PD is \neq zero at the switching time, the PI part will avoid this.

PID controller where one integrator is used to obtain I in automatic PID and to sum the incremental commands in manual control.



PID controller with parallel implementation switching smoothly between auto and manual control.



Make sure that the integrator in PID is reset to a proper value when the controller is in manual mode.

In manual mode the feed back of the difference between u and the PID output v tracks u . This ensures that v and u will be close at all times