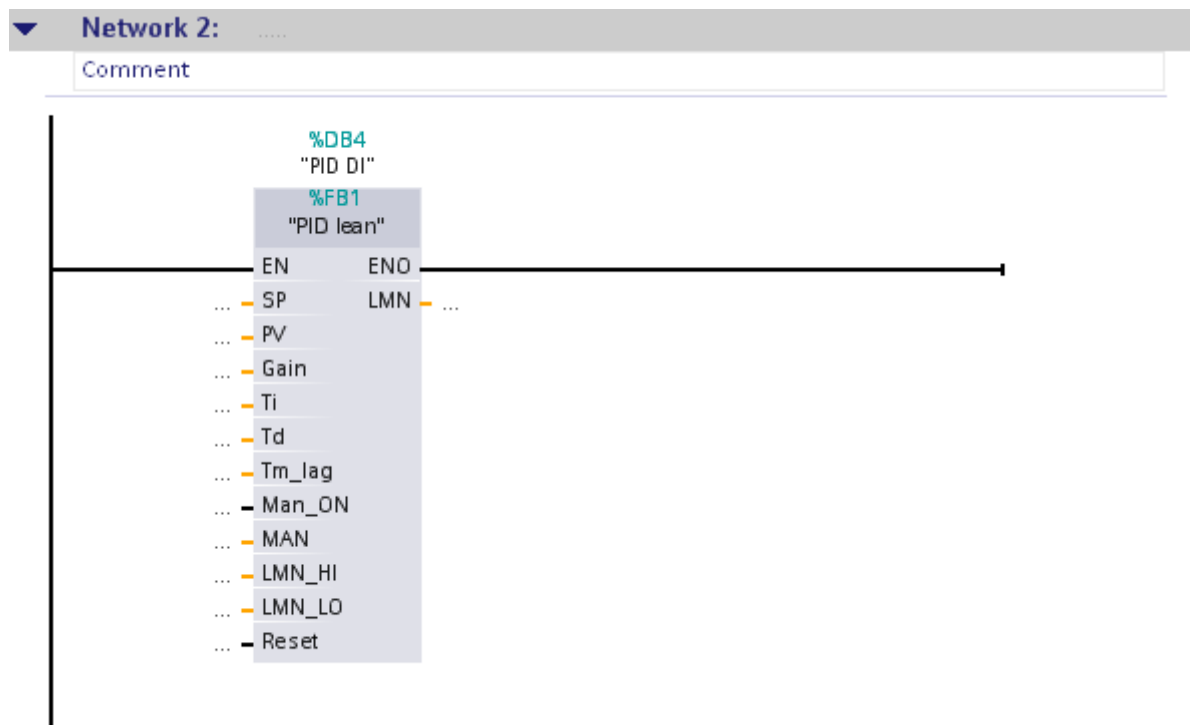


The S7-1200 has a one of the most complete PID controller of the SIMATIC world. Your tuning tool, for example, makes your use very practical.

Some applications, however, are very simple, and don't need all of the potential of the intern S7-1200 PID controller. For this very simple application, the follow "lean" version of PID controller could be a choice.

He has a clean list of parameter that makes your use for simple application, that doesn't needs of tuning tools. He has an auto detection of its call time, so he could be place in any cycle or time OB without any special adjusts. Your open source could also easily adapt for special uses.

[Pid.zip]



Parameter description

The parameter of the PID lean follow the S7-300/S7-400 (in a simplified way) description as decrypted follow:

| Parameter | Data Type | Range of Values | Default | Description |
|-----------|-----------|---|---------|------------------------------------|
| SP | REAL | -100.0...100.0 (%) or phys. value at same unit as PV | 0.0 | SETPOINT |
| PV | REAL | -100.0...100.0 (%) or phys. value at same unit as SP | 0.0 | PROCESS VARIABLE |
| Gain | REAL | | 2.0 | PROPORTIONAL GAIN Specifies the |

| | | | | |
|--------|------|--|-------|--|
| | | | | controller gain. |
| Ti | TIME | >= CYCLE | T#20s | INTEGRATION TIME Determines the time response of the integrator If Ti = 0s, the PID integration is deactivated |
| TD | TIME | >= CYCLE | T#10s | DERIVATIVE TIME The “derivative time” input determines the time response of the derivative unit. If Ti = 0s, the PID integration is deactivated |
| Tm_lag | TIME | >= CYCLE | T#2s | TIME LAG OF THE DERIVATIVE ACTION The algorithm of the D action includes a time lag that can be assigned at the “time lag of the derivative action” input. |
| Man_ON | BOOL | | TRUE | MANUAL VALUE ON If the input “manual value on” is set, the control loop is interrupted. A manual value (MAN) is set as the manipulated value (LMN). |
| MAN | REAL | -100.0...100. 0 (%) or phys. value at same unit as LMN | 0.0 | MANUAL VALUE MAN value is passed to LMN when Man_ON is true. |
| LMN_HI | REAL | -100.0...100. 0 (%) or phys. value at same unit as LMN | 0.0 | MANIPULATED VALUE HIGH LIMIT The manipulated value is always limited by an upper and lower limit. The “manipulated value high limit” input specifies the upper limit. |
| LMN_LO | REAL | -100.0...100. | 0.0 | MANIPULATED |

| | | | | |
|-------|------|---|------|---|
| | | 0 (%) or phys. value at same unit as LMN | | VALUE LOW LIMIT The manipulated value is always limited by an upper and lower limit. The “manipulated value low limit” input specifies the lower limit. |
| Reset | BOOL | | TRUE | COMPLETE RESTART The block has a complete restart routine that is processed when the input “complete restart” is set. |
| LMN | REAL | | 0.0 | MANIPULATED VALUE The effective manipulated value is output in floating point format at the “manipulated value” output. |

Algorithmic

In manual mode (Man_ON = TRUE) the MAN value is passed to LMN (limited to LMN_HI, LMN_LOW).

In automatic mode (Man_ON = TRUE) the LMN is calculated as follow:

$$ER = SP - PV$$

Delta Time = time interval between the actual call and the last call of the FB.

Delta ER = ER – ER of the previous cycle

$$LMN = LMN_P + LMN_I + LMN_D$$

LMN_P (proportional part of the PID) = ER *Gain

LMN_I (proportional part of the PID) = ER *Gain * Delta Time / Ti

Notes:

If Ti = 0, then LMN_I = 0

If LMN > LMN_HI or LMN < LMN_LO or Man_On = True then LMN_I = LMN – LMN_P – LMN_I

LMN_D (derivative part of the PID) = Tm_lag * Delta ER / (Delta Time * Tm_lag / Td + 1) + LMN_D * (1 + Delta Time * Tm_lag / Td)

Notes:

If Td = 0, then LMN_D = 0

Important:

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