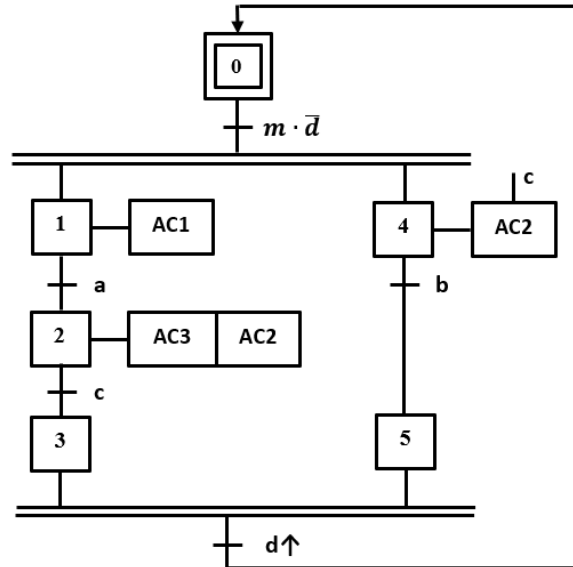




Lab Exam

Exercise 01: (08.0 pts)

Translate the Grafcet below into an equivalent Ladder Diagram (LD) program for the S7-1200.



Exercise 02: (12.0 pts)

Translate the Grafcet below into an equivalent Ladder Diagram (LD) program for the S7-1200.

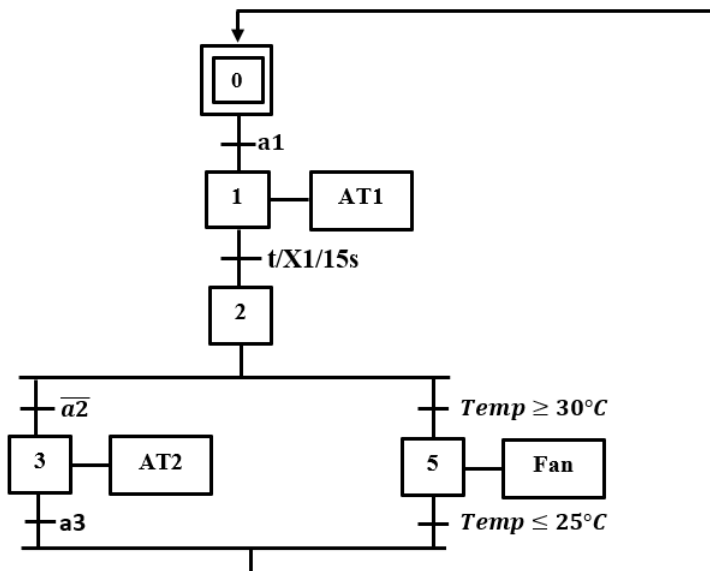


Fig1. The Grafcet diagram

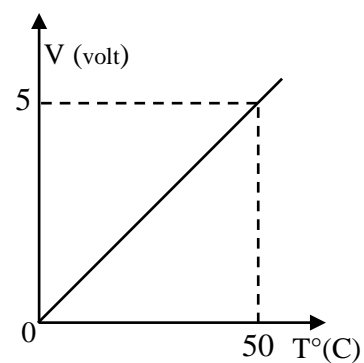


Fig2. The temperature sensor curve

Note:

- The address of the analog input is **IW64**, and it can acquire a voltage input ranging from **0 to 10V**.
- You can use either the **TON** or **TP** timer.
- The back of the page contains a brief reminder of some key concepts.

Timers

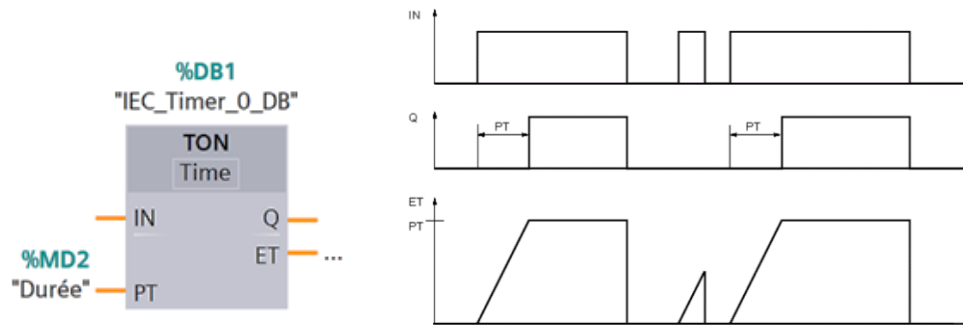


Figure.1. Operating principle of the TON timer.

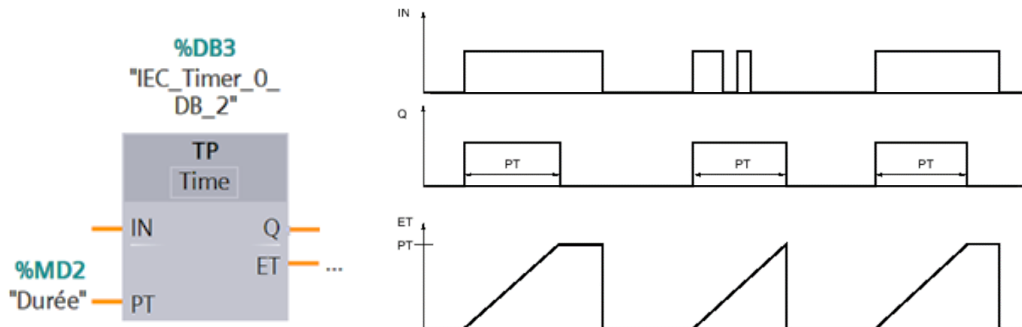
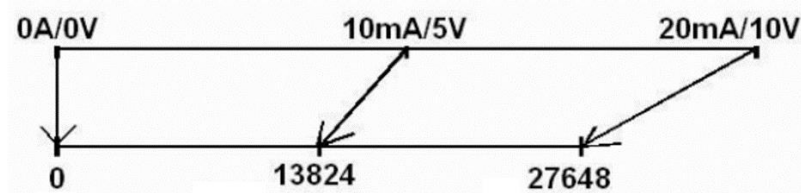


Figure.2. Operating principle of the TP timer.

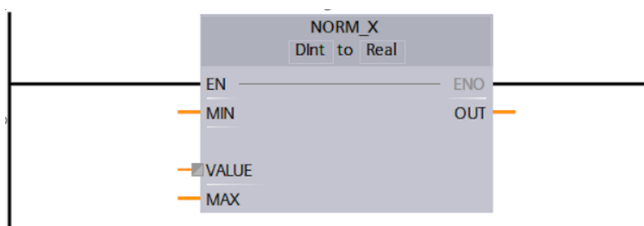
Analog-to-digital conversion

The conversion of analog signals for PLC processing is the same for both analog inputs and outputs. Typical digitized value ranges include the following:



The 'Normalize' instruction uses the following equation:

$$\text{out} = \frac{\text{value} - \text{min}}{\text{max} - \text{min}} \quad , \quad 0 < \text{out} < 1$$



The 'Scale' instruction uses the following equation:

$$\text{out} = \text{value} \cdot (\text{max} - \text{min}) + \text{min}$$

