

# AUTÓMATAS PROGRAMABLES

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**Introducción al Control Industrial – Curso 2020**

# INSTRUCCIONES BÁSICAS

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- Contactos
- Retención
- Contadores
- Temporizadores



# INSTRUCCIONES BÁSICAS

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- Load (LD)

- examine if closed (XIC)



- Load Bar (LDB)

- LoadNot

- examine if open (XIO)



- Out

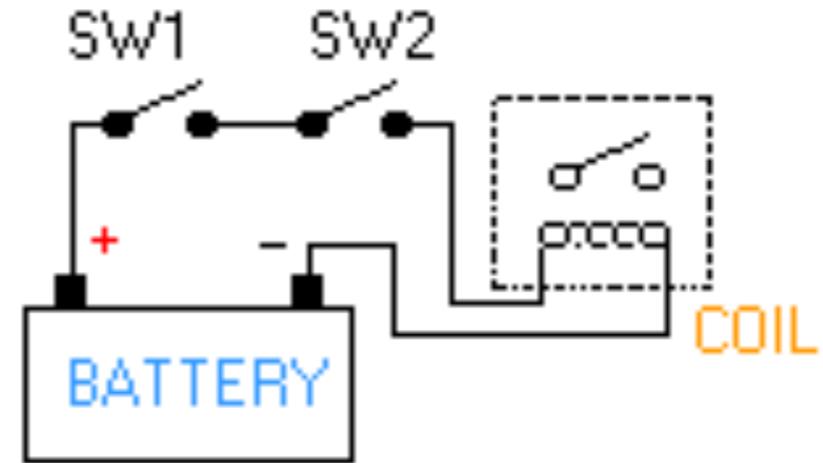
- OutputEnergize



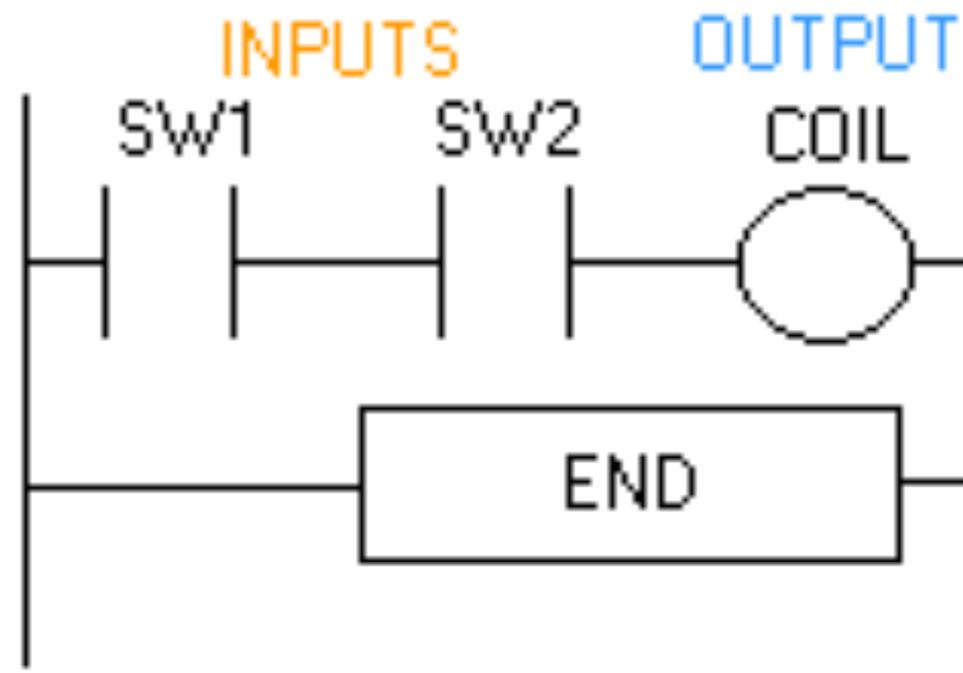
# EJEMPLO

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Circuito con relé



Circuito creado internamente en el PLC



# CONTACTOS - PSIM

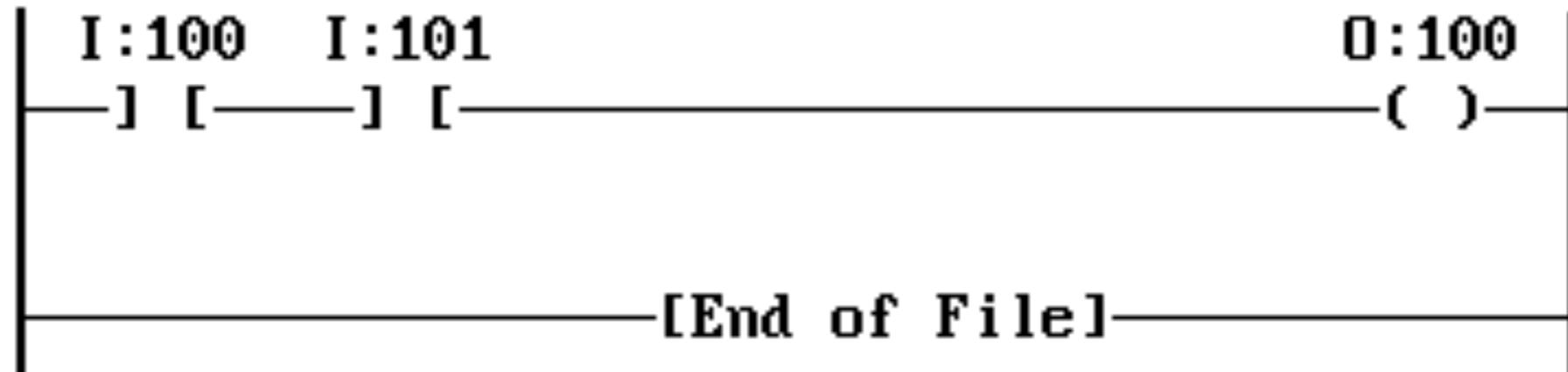
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## Ejemplo

XIC  
—| [—

XIO  
—|/|—

OPE  
—( )—



# CONTACTOS - STEP7 (MARCA SIEMENS)

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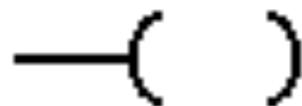
**Contacto abierto**



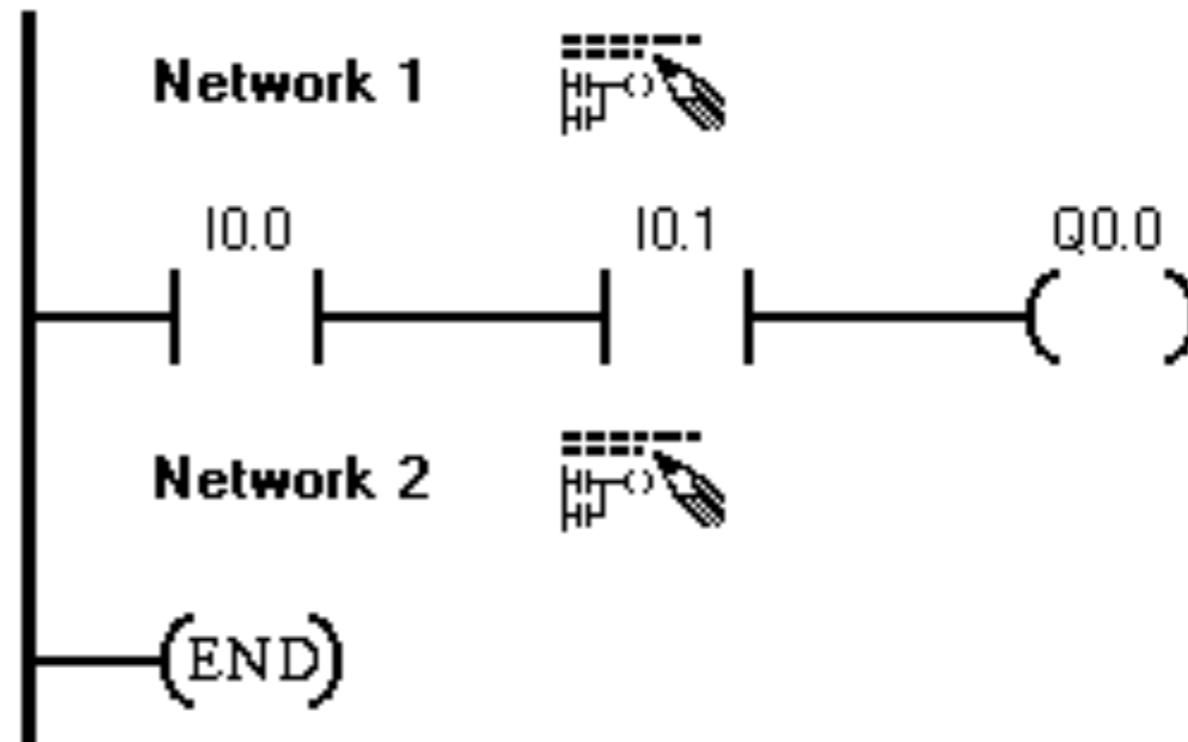
**Contacto cerrado**



**Bobina de salida**



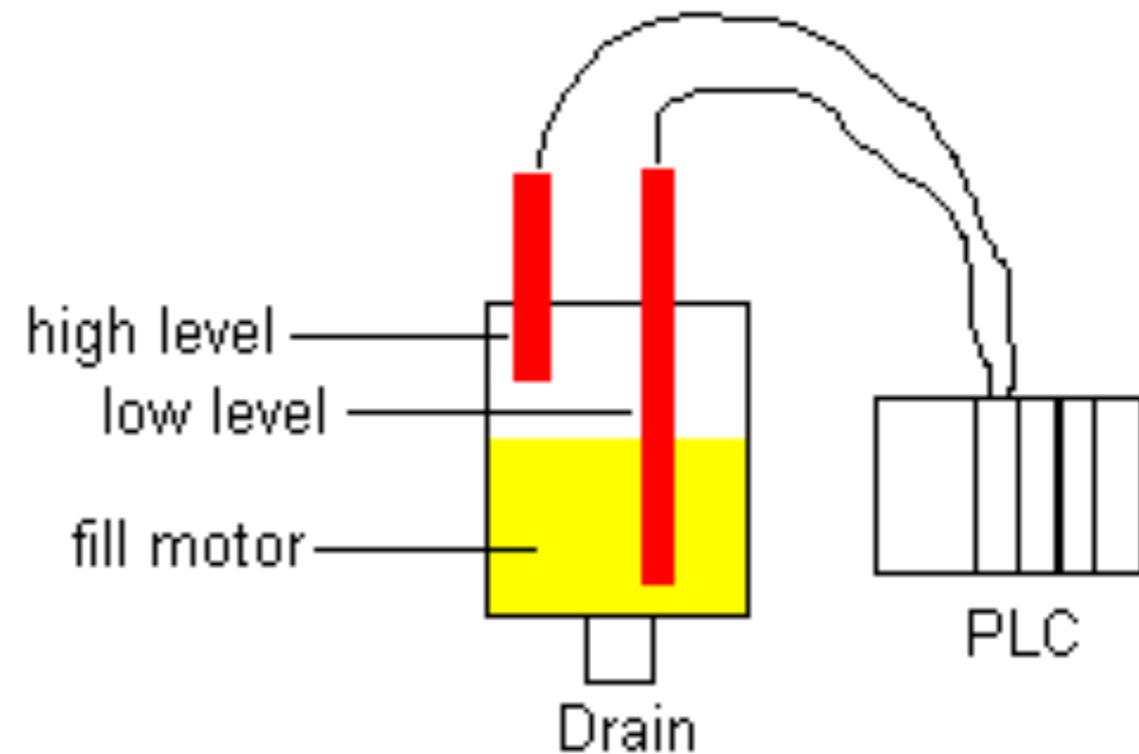
**Ejemplo**



# EJEMPLO - CONTROL DE NIVEL

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- 2 entradas (NC)
- Cuando no están en el líquido están en la posición ON.
- 1 salida
- bomba

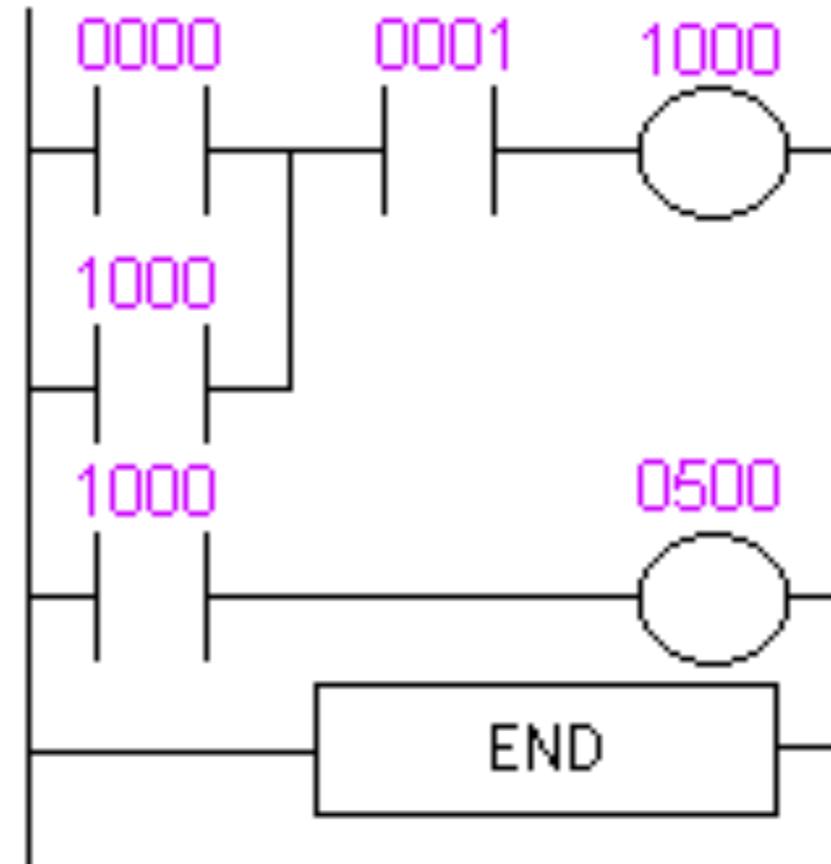


Dispensing oil from a tank

# DEFINICIONES PROGRAMA

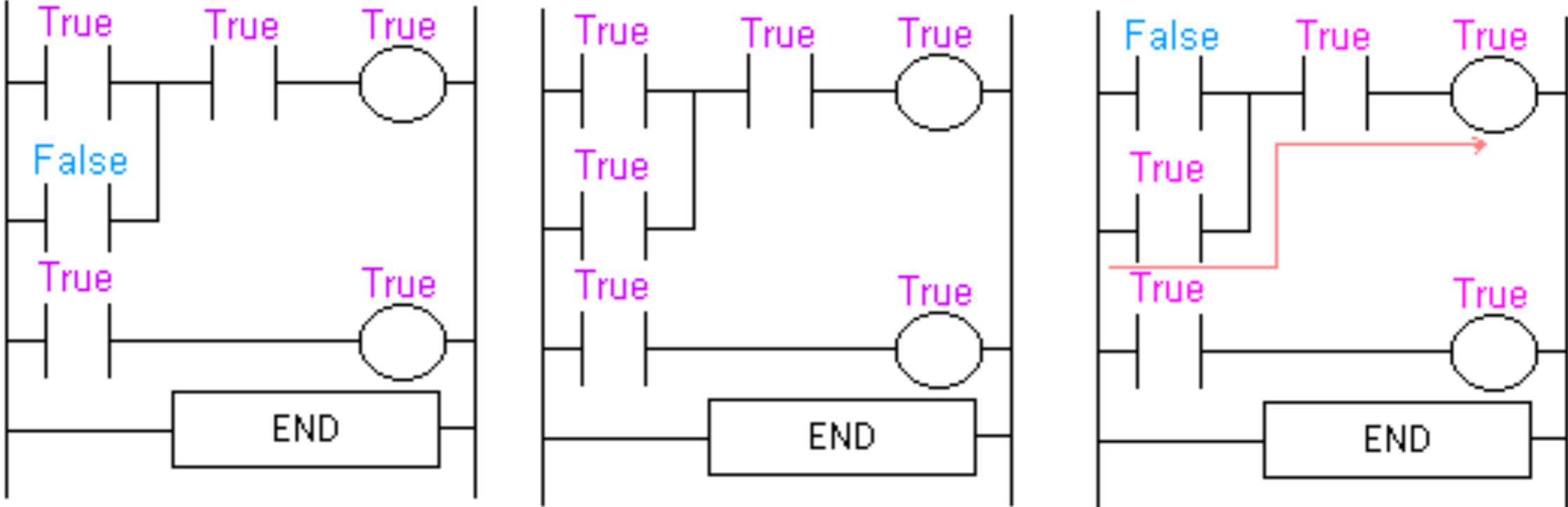
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Señales	Direcciones
Sensor <u>bajo</u> (entrada)	0000
Sensor alto (entrada)	0001
Bomba (salidas)	0500
Relé auxiliar (interno)	1000



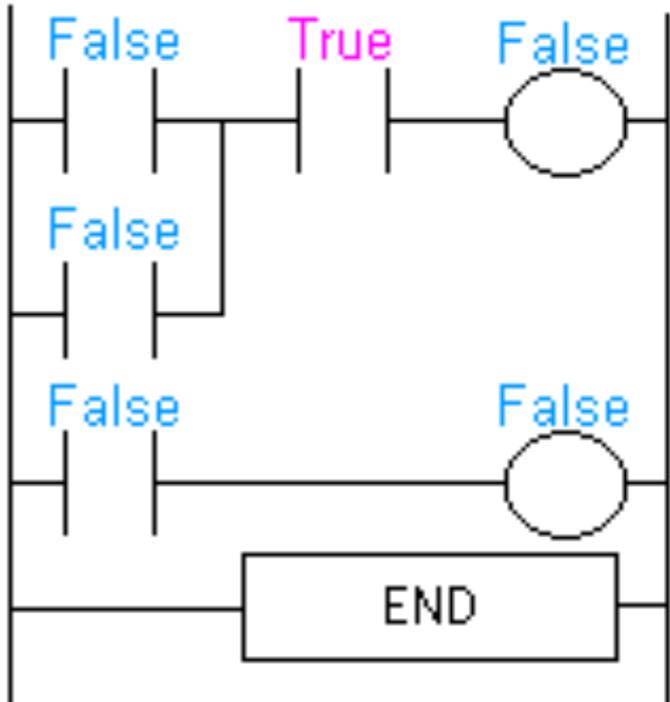
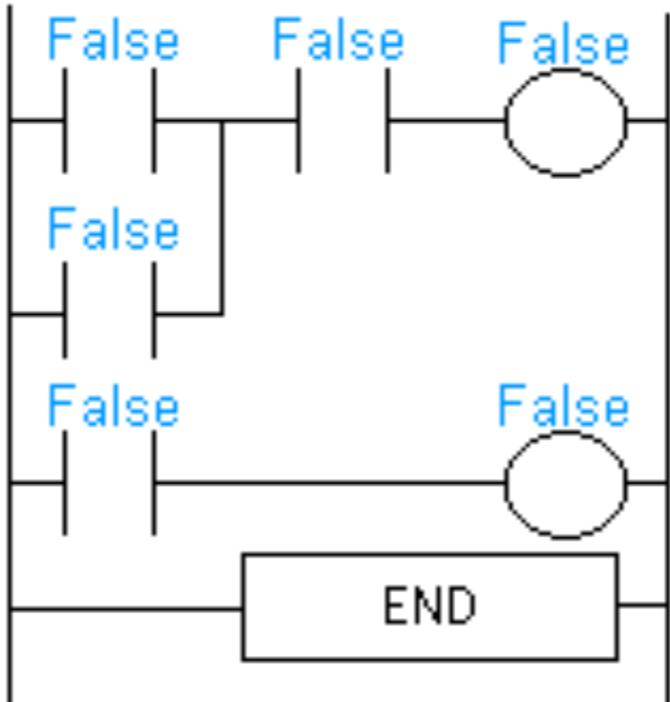
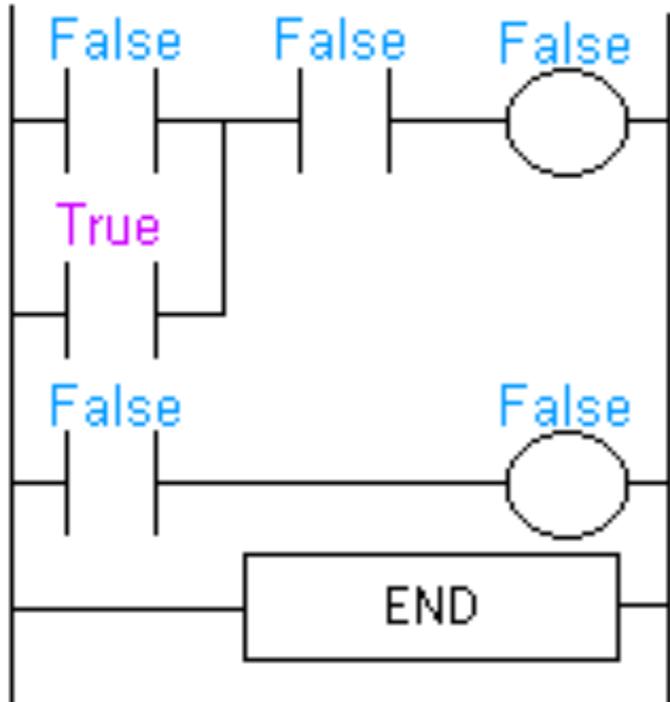
# EJEMPLO FUNCIONAMIENTO 1

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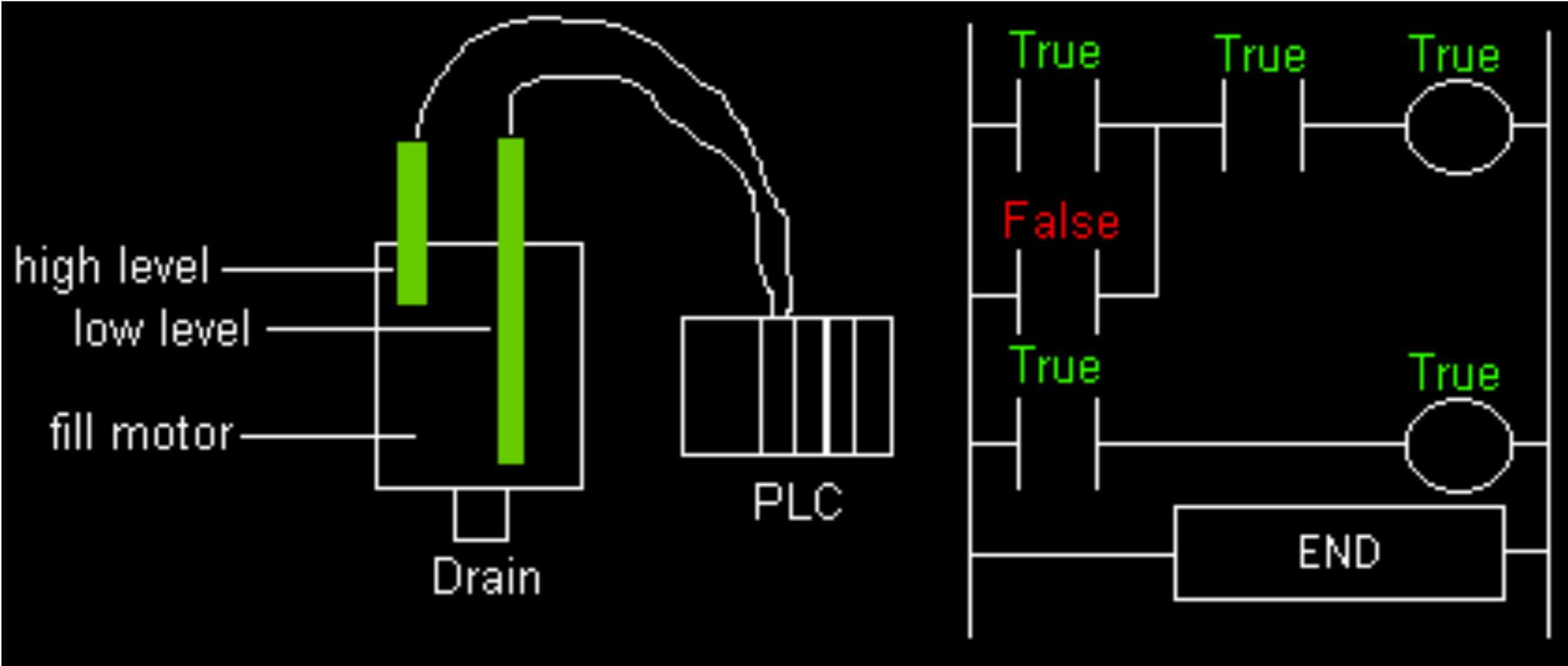
# EJEMPLO FUNCIONAMIENTO 2

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# EJEMPLO ANIMACIÓN

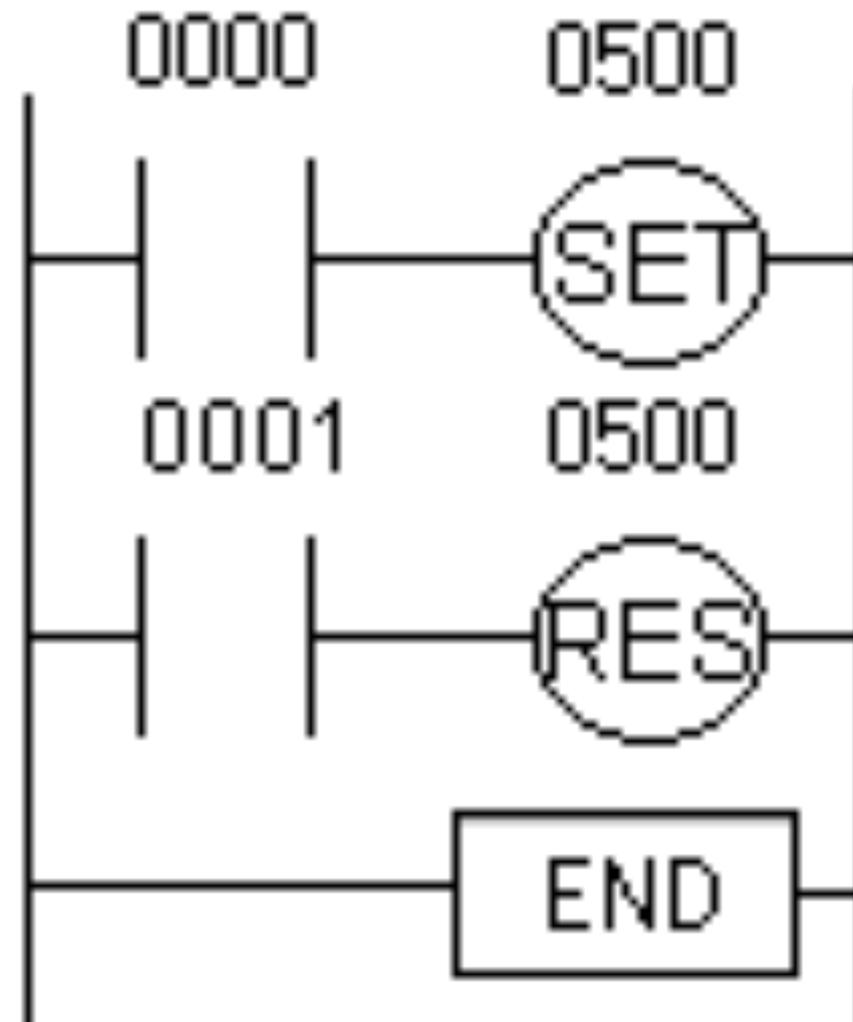
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# RETENCIÓN (LATCH)

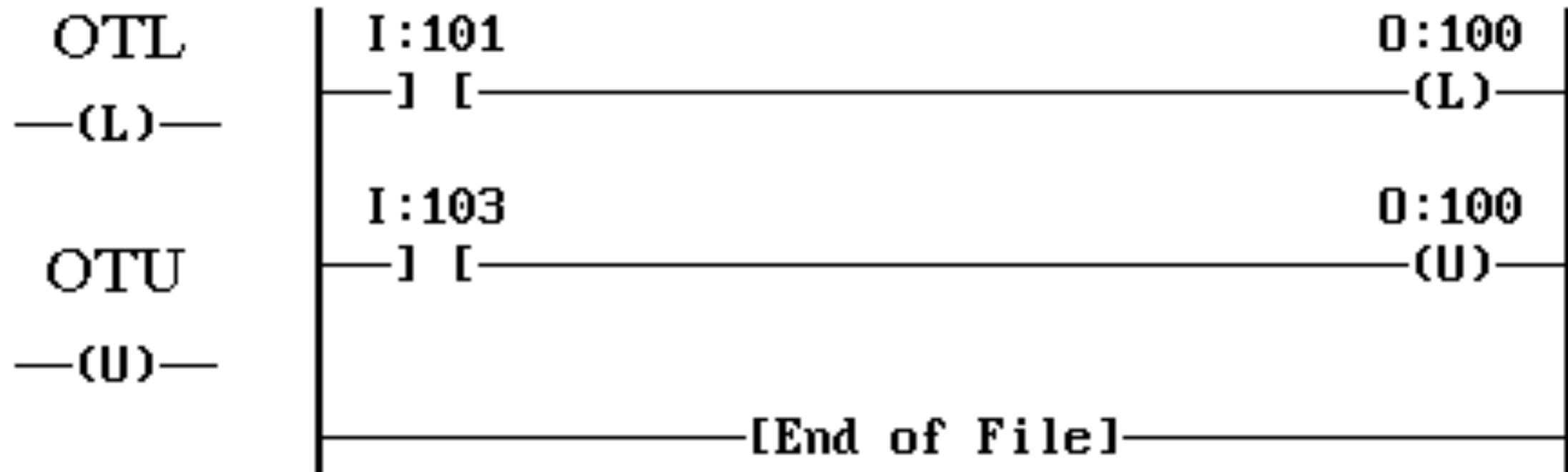
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- Latch (L)
  - SET
  - OTL (output latch)
- Unlatch (U)
  - RES (reset)
  - OTU (output unlatch)
  - RST (reset)



# RETENCIÓN (LATCH) - PSIM

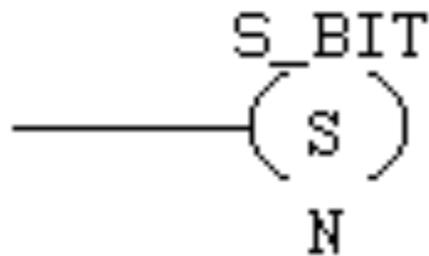
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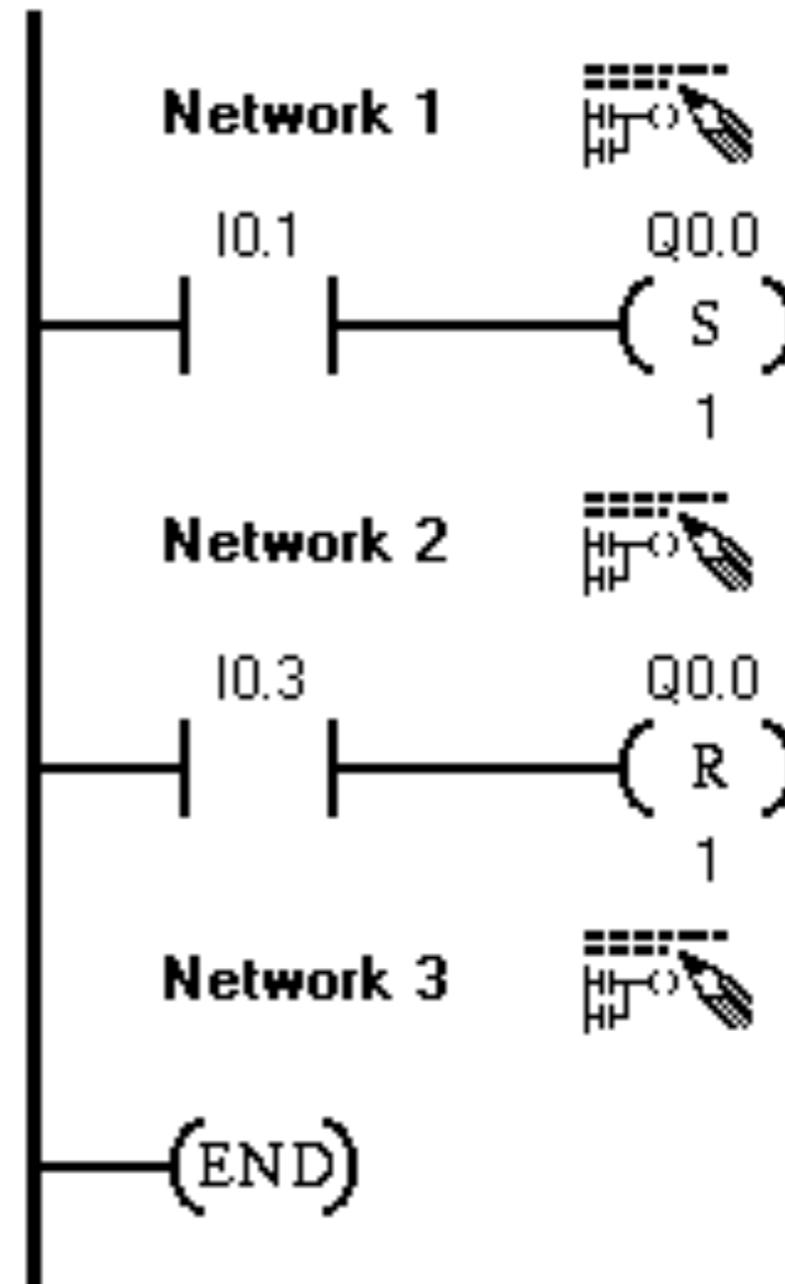
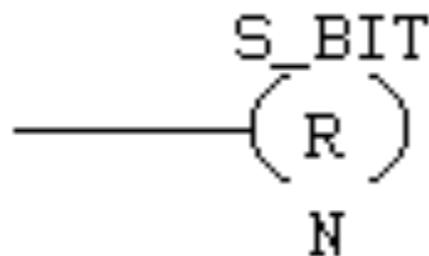
# RETENCIÓN (LATCH) - STEP 7 (SIEMENS)

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## Poner a 1 (Set)

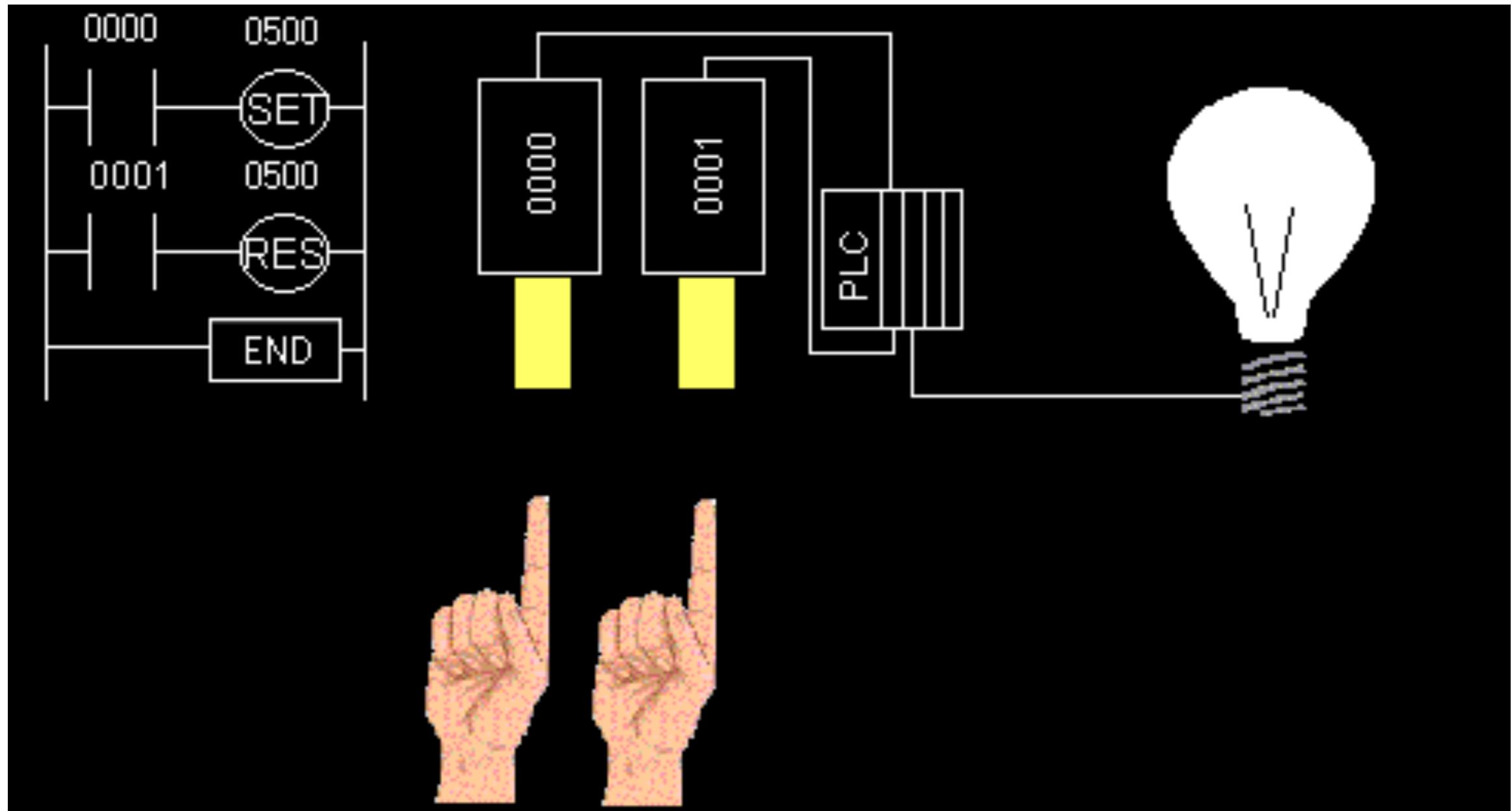


## Poner a 0 (Reset)



# EJEMPLO - ANIMACIÓN

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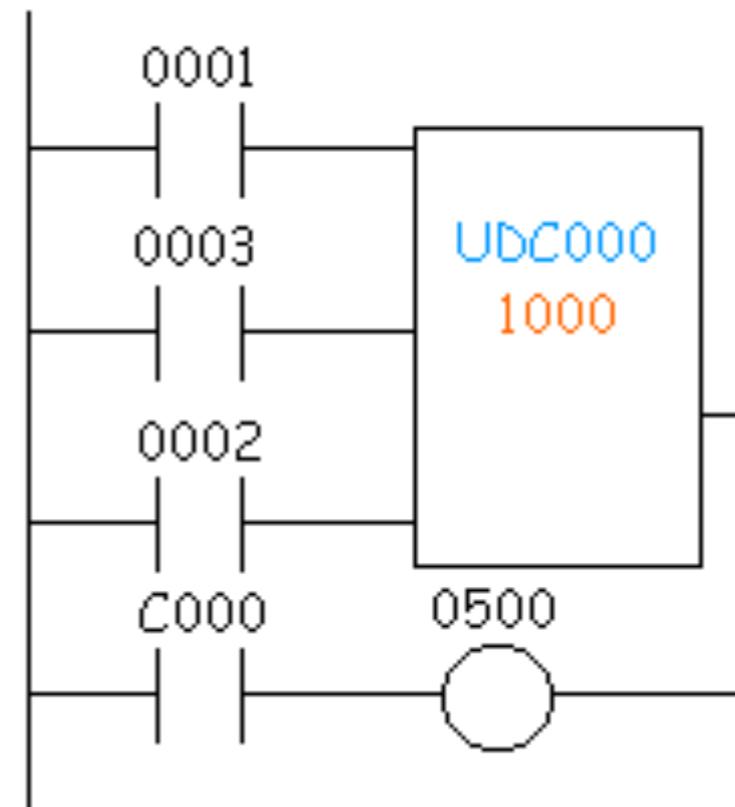
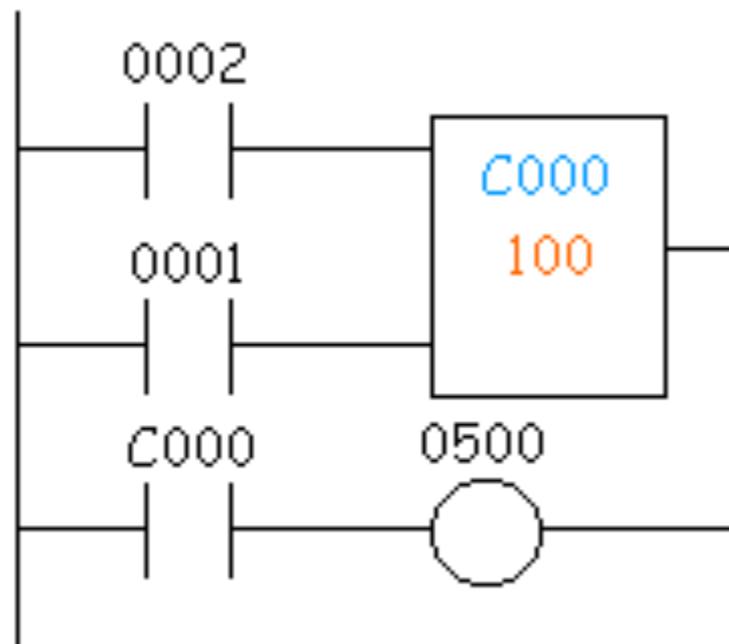
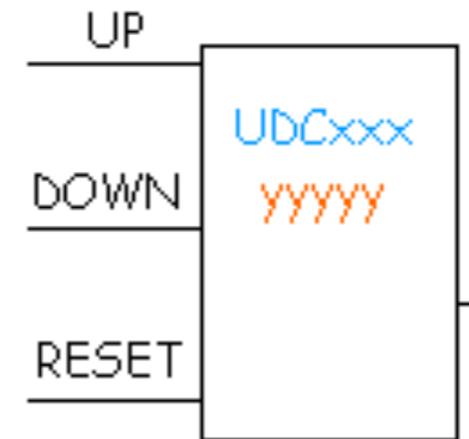
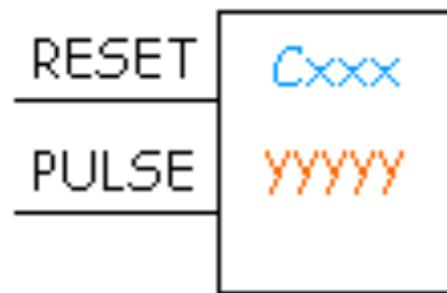
# CONTADORES

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- Diversidad (fabricantes).
  - up-counters (1,2,3...) (CTU, CNT, C, CTR)
  - down counters (9,8,7,...) (CTD)
  - up-down counters (UDC)
  - high-speed counters (HSC, CTH) (hardware)
- Valores
  - 0, 9999 / -32.768, +32.767 / 0, 65535

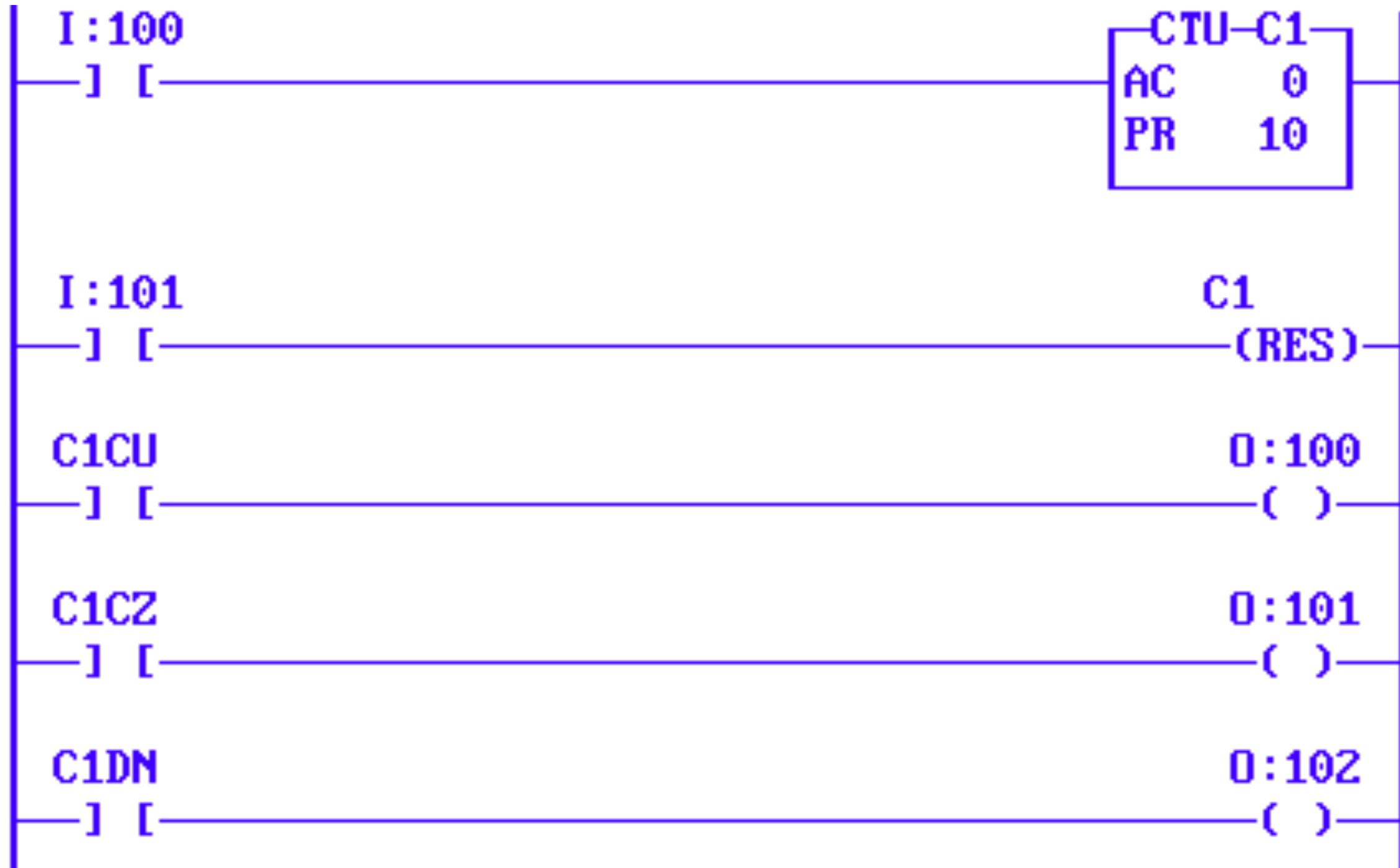
# CONTADORES

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# CONTADORES - PSIM

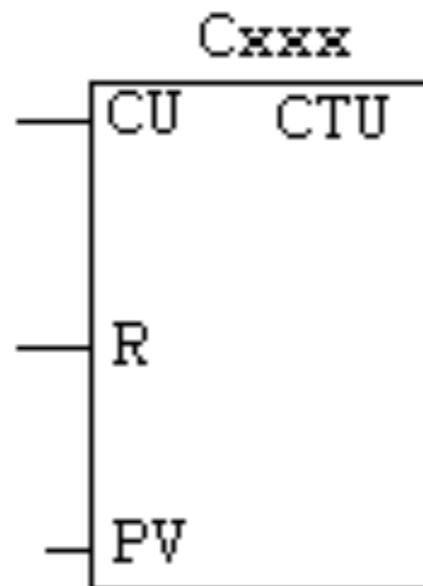
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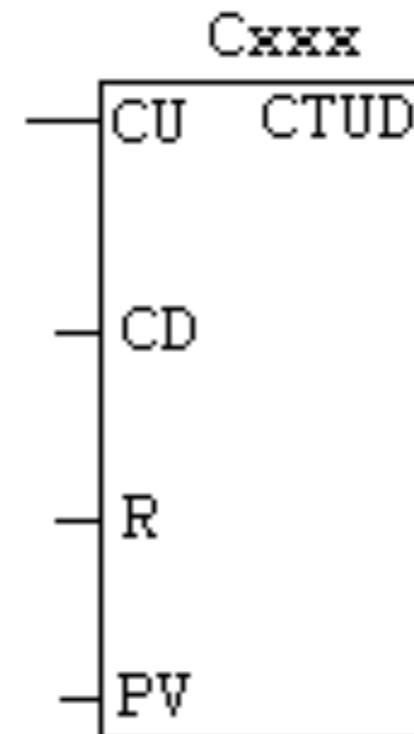
# CONTADORES - STEP 7 (SIEMENS)

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**Contador adelante**

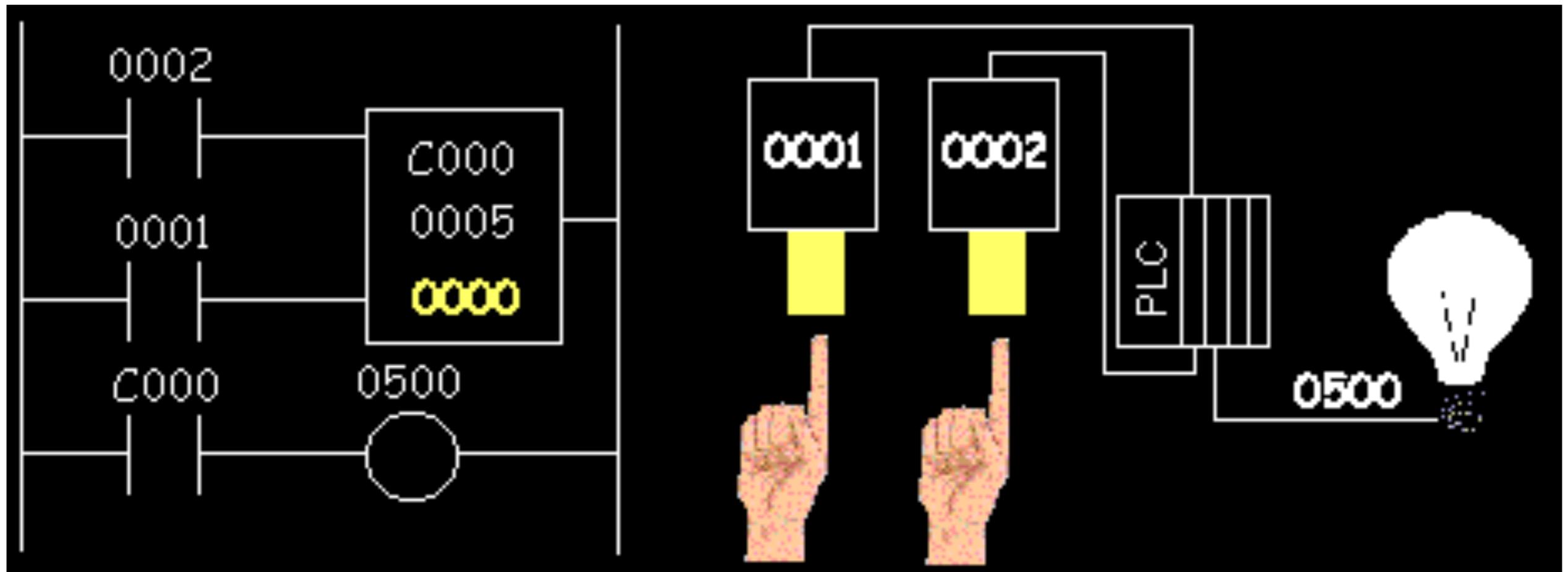


**Contador adelante/atrás**



# EJEMPLO - ANIMACIÓN

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# TIMERS

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- 1 entrada lógica (habilitación).
- On-Delay timer (TON, TIM, TMR0)
- Off-Delay timer (TOF). Poco común.
- Retentive or Accumulating timer (RTO, TMRA).
  - Mantiene el valor actual.
  - 2 entradas
    - una empieza la cuenta
    - limpia el valor almacenado en memoria (RST)

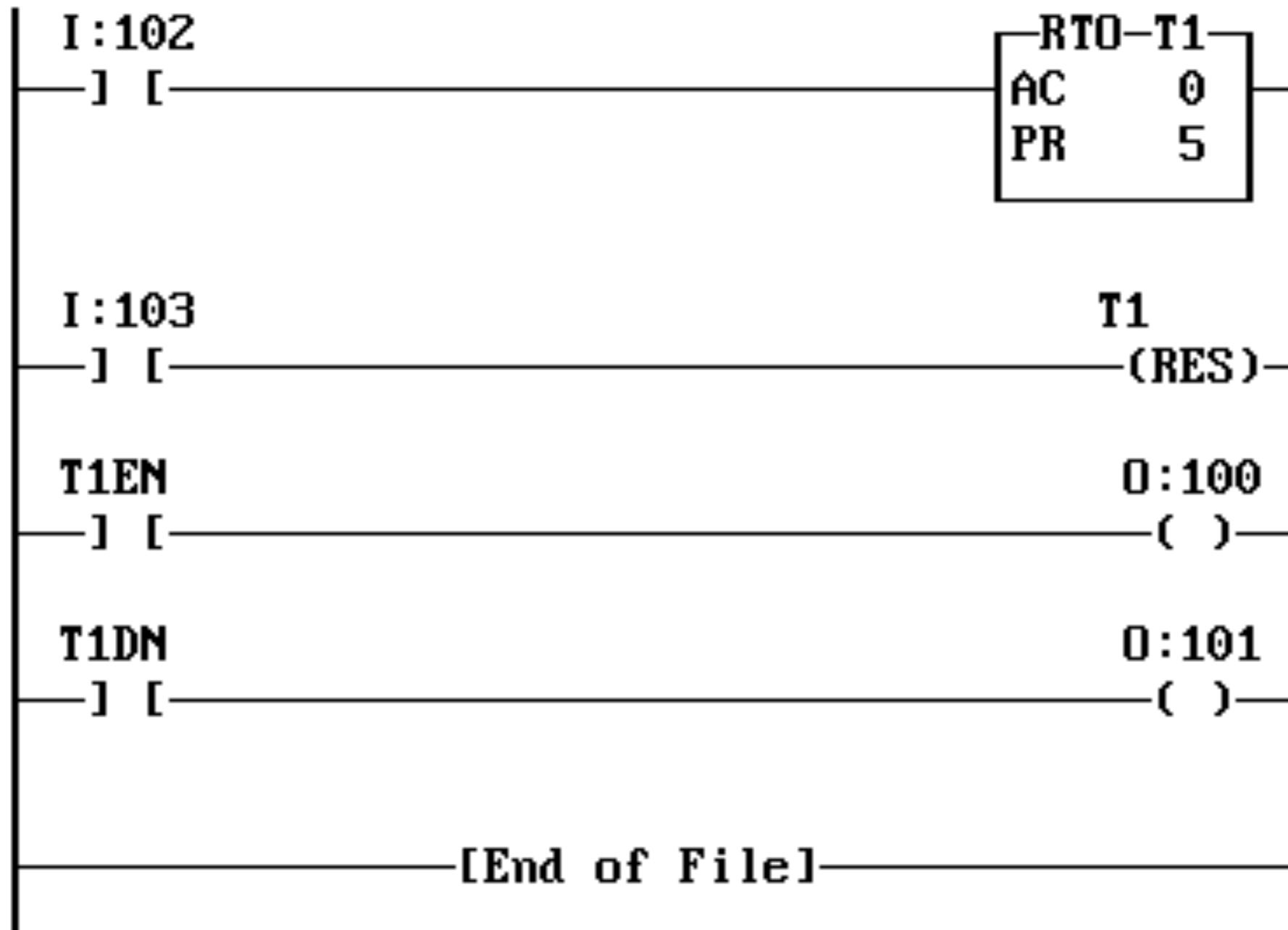
# TIMERS

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- Timers especiales que funcionan como contadores con una base de tiempo elegible
- Incrementos : 1 ms a 1 s. Nombre refleja el incremento:
  - TMH (high speed timer).
  - TMS (super high speed timer).
  - TMRAF (accumulating fast timer).

# TIMERS - PSIM

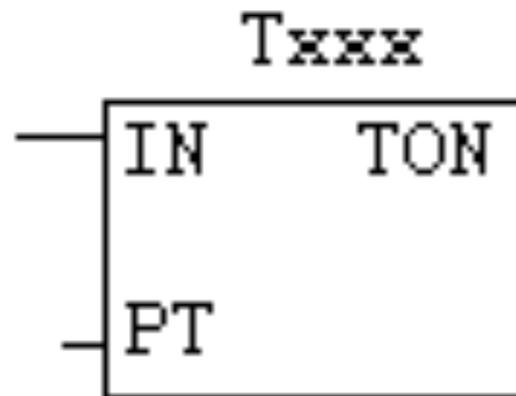
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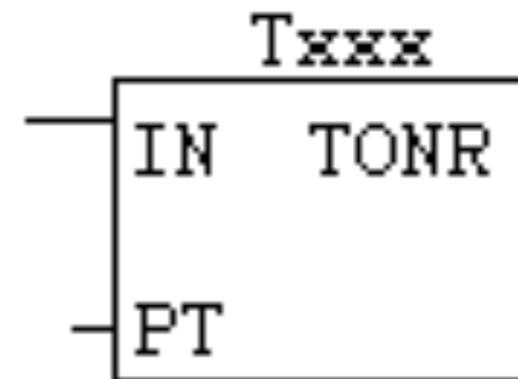
# TIMERS - STEP 7 (SIEMENS)

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## Temporizador de retardo a la conexión

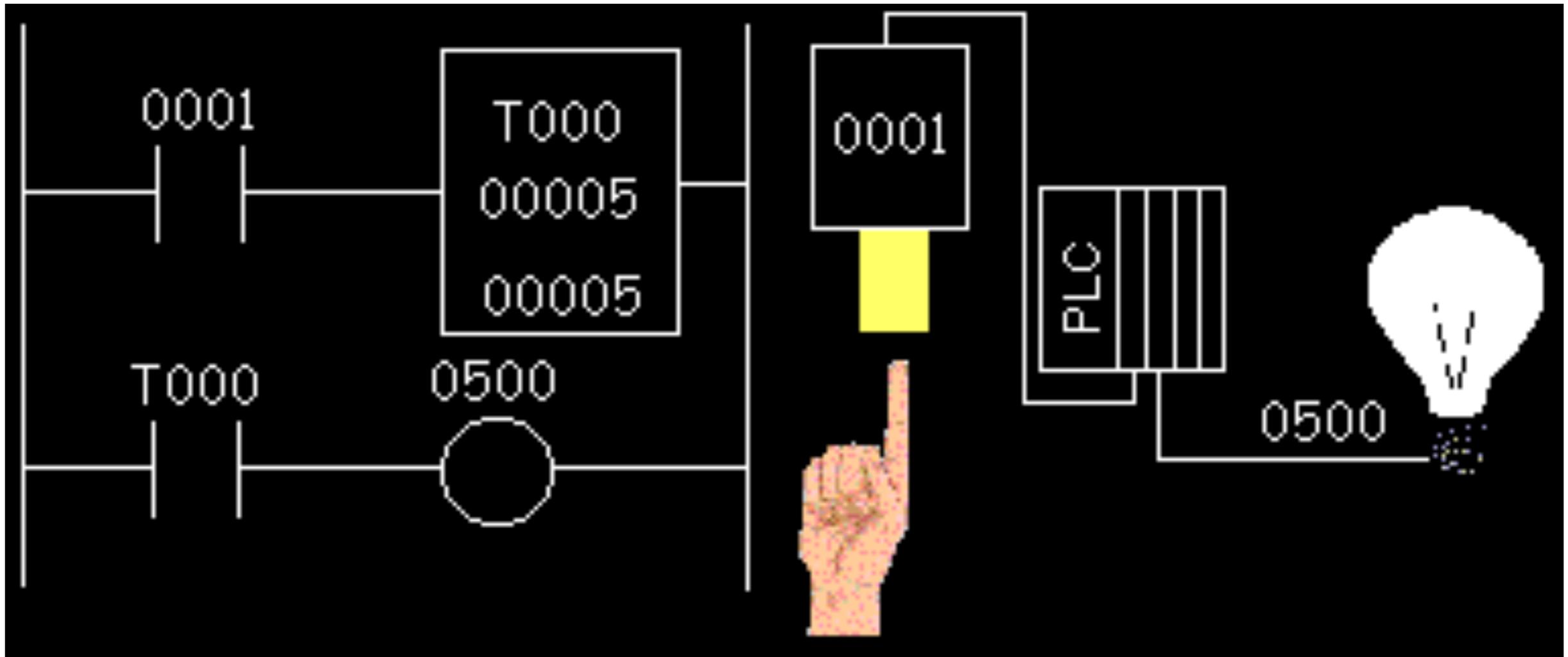


## Temporizador de retardo a la conexión memorizado



# EJEMPLO - ANIMACIÓN

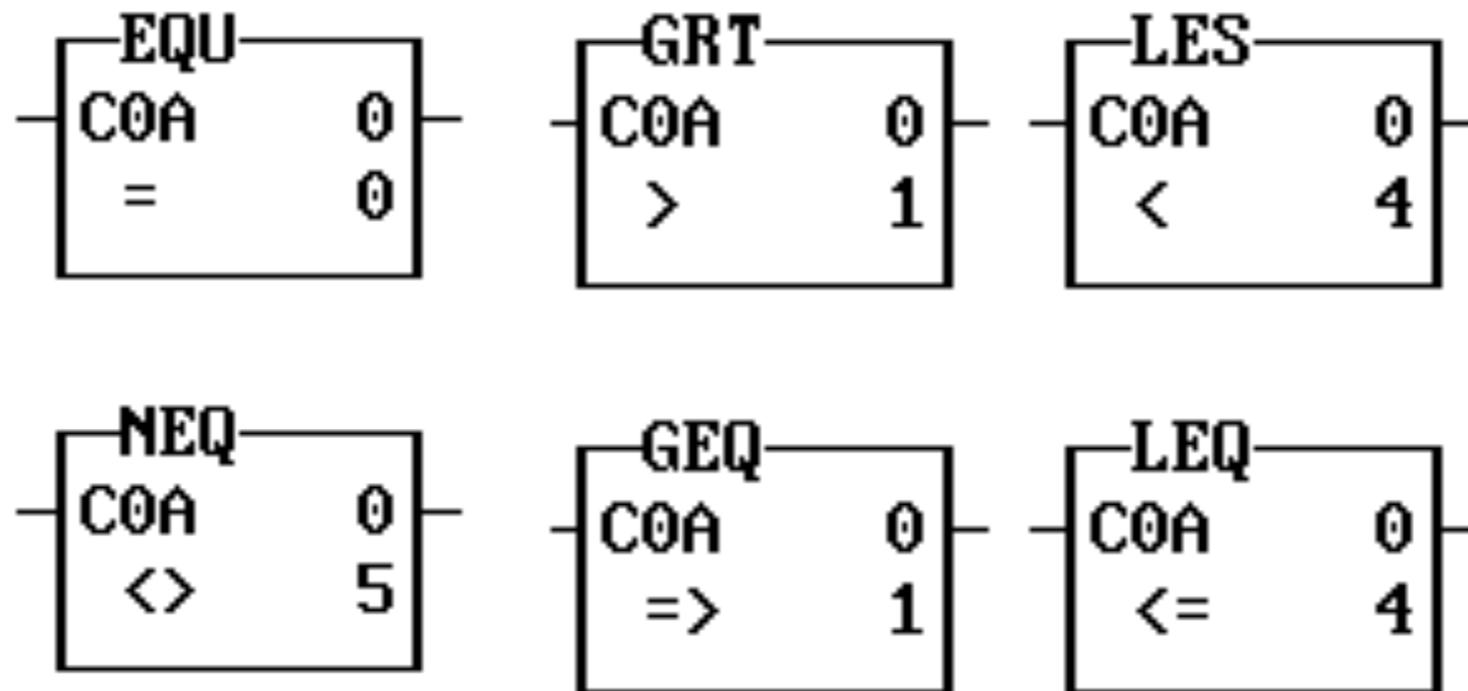
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# OTRAS INSTRUCCIONES

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- ▶ Comparadores
  - ▶ Ejemplos (PSIM)
  - ▶ Hojas de ejercicios



# BIBLIOGRAFÍA Y OTROS LINKS

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<http://www.plcs.net>

<http://www.sea.siemens.com/step>

<http://thelearningpit.com/plc/psim/doc/instructions.html>