

Ambiente de Desarrollo

Controladores Lógicos Programables

PLC del Laboratorio

- Marca: ABB
- Serie: AC500
- Modelo: AC500-eCo
- CPU: PM554-T-ETH
- Alimentación: 24 VDC
- Memoria: 128 kB
- I/O (Onboard):
 - 8 entradas digitales 24VDC
 - 6 salidas digitales 24 VDC, transistor

PLC del Laboratorio

- Puertos de comunicación:
 - 1 x Ethernet TCP/IP
 - 1 x Serial RS485 (ej: MODBUS)
- Módulo de entradas analógicas: AI562
 - 2 entradas de RTD (temperatura)
- 2 x Relés auxiliares, bobina de 24 VDC, contactos para 220 VAC

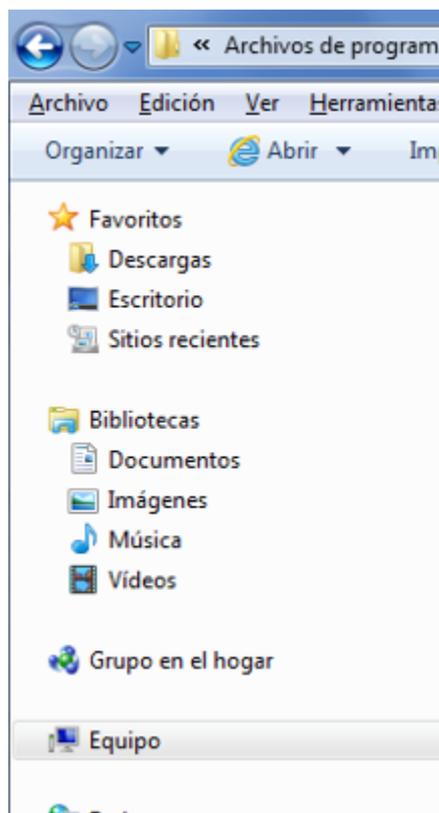
PLC del Laboratorio

- Hardware:
 - Serie AC500 de ABB
 - Modelo: AC500-eCo PM554-T-ETH
- Software:
 - Ambiente de desarrollo: Automation Builder (basado en CoDeSys)



Documentación

- En el Automation Builder:



English Documentation

Marking Stripes

File format: DOC (Microsoft Word)

Document title	ID number
Marking Stripes for TA523	3ADR020024X00xx

Installation Instructions for AC500/S500 hardware (en, de, es, fr, it, sv, cn, ru)

These installation instructions are enclosed in the packing units of the modules and components.

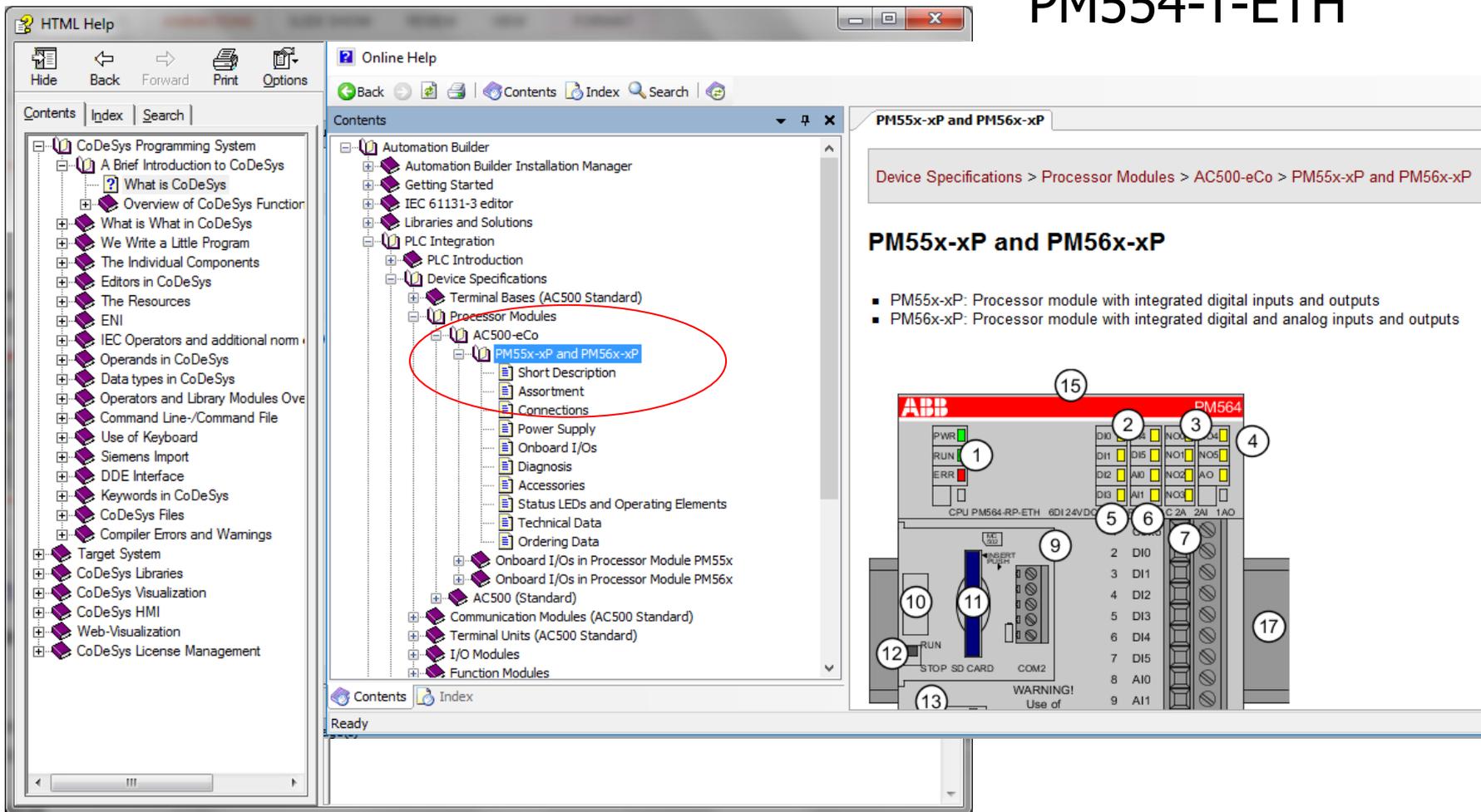
File format: PDF

Analog Input/Output Modules

Document title	ID number
AI523(-XC) Analog input module	3ADR024040M68xx
AI531(-XC) Analog input module	3ADR024041M68xx
AI561, AI562, AI563 Analog input modules	3ADR024062M68xx
AI581-S(-XC) Analog Safety input module	3ADR024012M68xx
AO523(-XC) Analog output module	3ADR024057M68xx
AO561 Analog output module	3ADR024062M68xx
AX521(-XC) Analog input/output module	3ADR024042M68xx
AX522(-XC) Analog input/output module	3ADR024043M68xx

Documentación – Help

PM554-T-ETH



The screenshot shows the HTML Help application interface. The left pane displays the 'Contents' tree, with 'Automation Builder' expanded to 'Device Specifications' > 'Processor Modules' > 'AC500-eCo' > 'PM55x-xP and PM56x-xP'. The right pane shows the 'Device Specifications > Processor Modules > AC500-eCo > PM55x-xP and PM56x-xP' page, which includes a list of specifications and a technical diagram of the module.

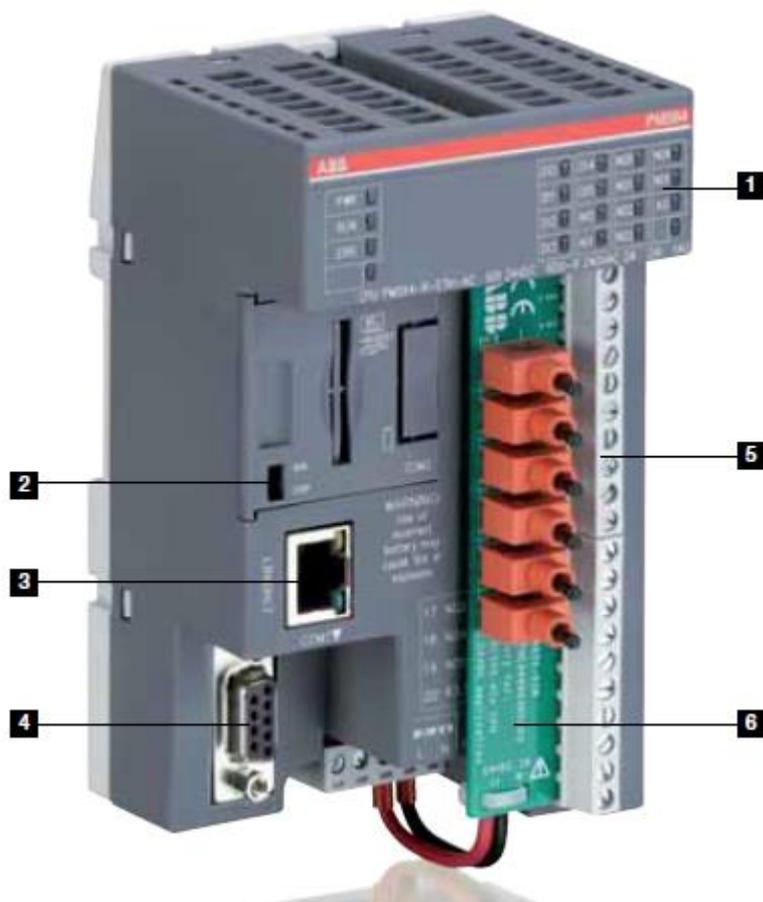
PM55x-xP and PM56x-xP

- PM55x-xP: Processor module with integrated digital inputs and outputs
- PM56x-xP: Processor module with integrated digital and analog inputs and outputs

The technical diagram shows the front panel of the PM554-T-ETH module. It features a red top section with the ABB logo and 'PM564' label. The panel includes several indicators and terminals:

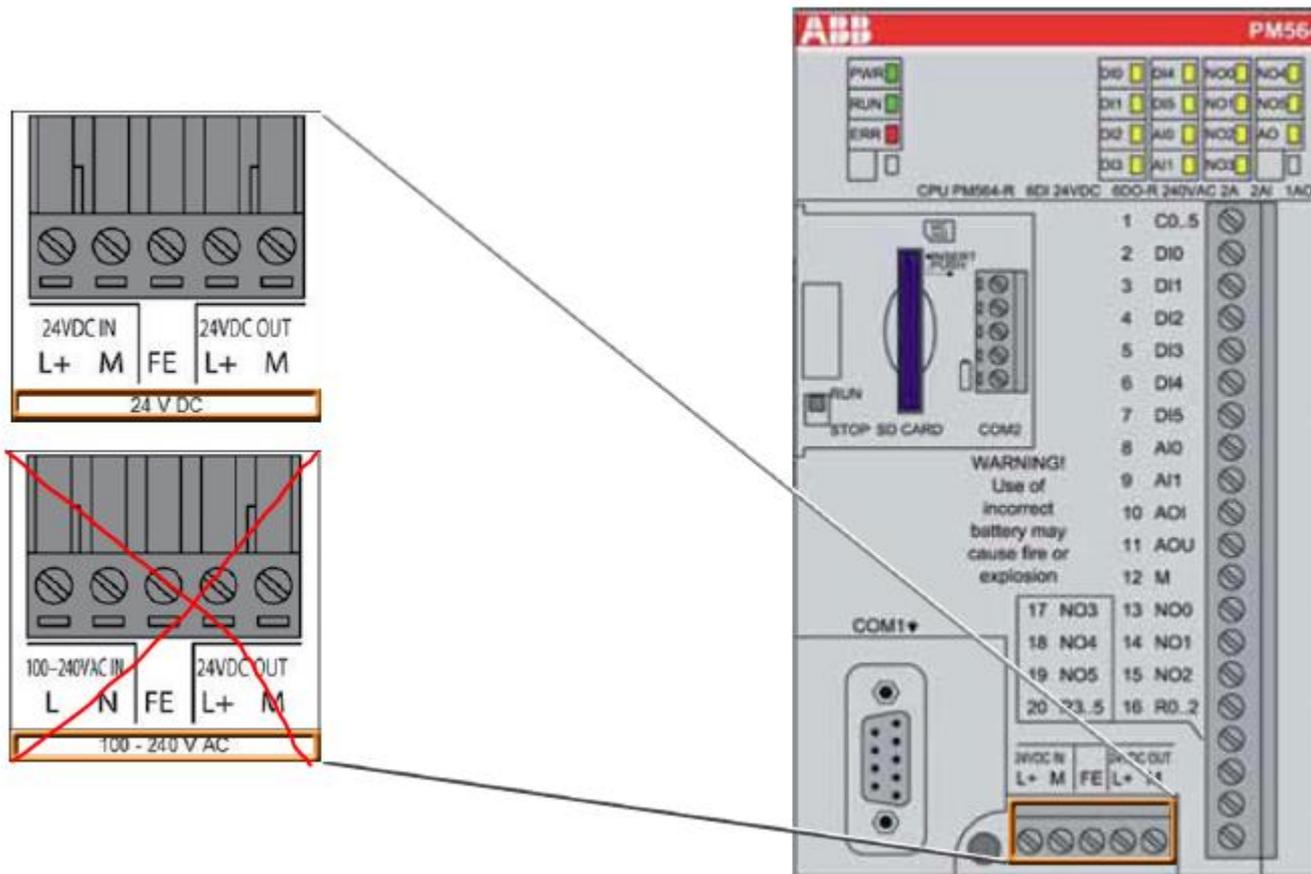
- 1: PWR (Power) indicator
- 2: DI0 (Digital Input 0) terminal
- 3: NO (Normally Open) terminal
- 4: DI1 (Digital Input 1) terminal
- 5: DI2 (Digital Input 2) terminal
- 6: AI0 (Analog Input 0) terminal
- 7: DI3 (Digital Input 3) terminal
- 8: AI1 (Analog Input 1) terminal
- 9: COM2 (Communication 2) terminal
- 10: RUN (Run) indicator
- 11: STOP (Stop) indicator
- 12: SD CARD (Secure Digital Card) slot
- 13: WARNING! Use of (Warning label)
- 15: CPU PM564-RP-ETH 6DI24V/DO (Module identification)
- 17: Terminal block for additional connections

PLC AC500-eCo PM554

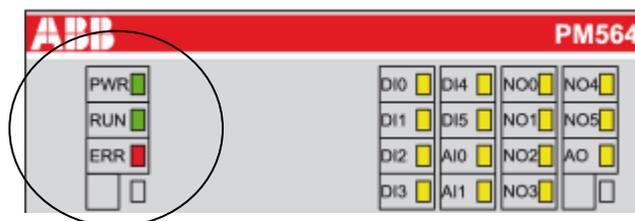


- 1** Status LED indicators
CPU operation and onboard I/O status
- 2** Run / Stop Switch
Control CPU operation
- 3** Ethernet CPU (in selected models)
with RJ45 Port
- 4** COM1
Online access, Modbus RTU, CS31-Bus master,
ASCII
- 5** Integrated onboard I/O
Convenient cost effective solution
- 6** Simulator input, inserted into the terminals and
screws tightened

PLC AC500-eCo PM554



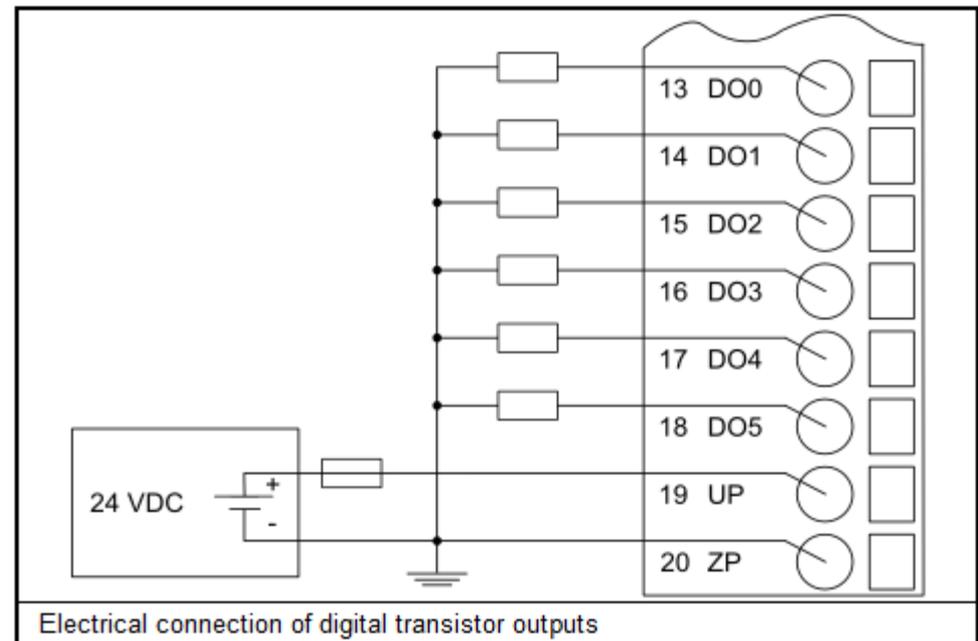
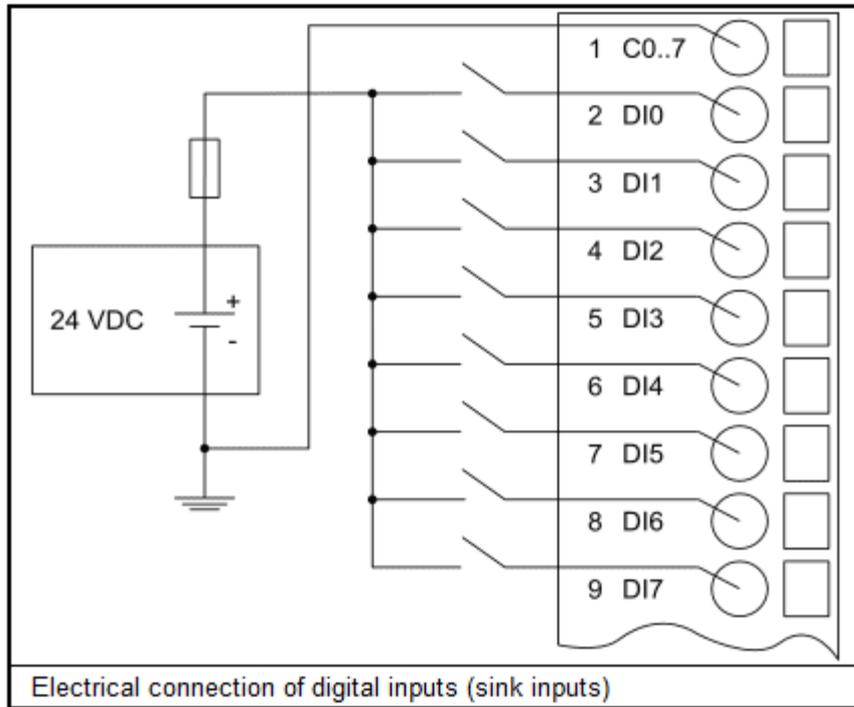
PLC AC500-eCo PM554



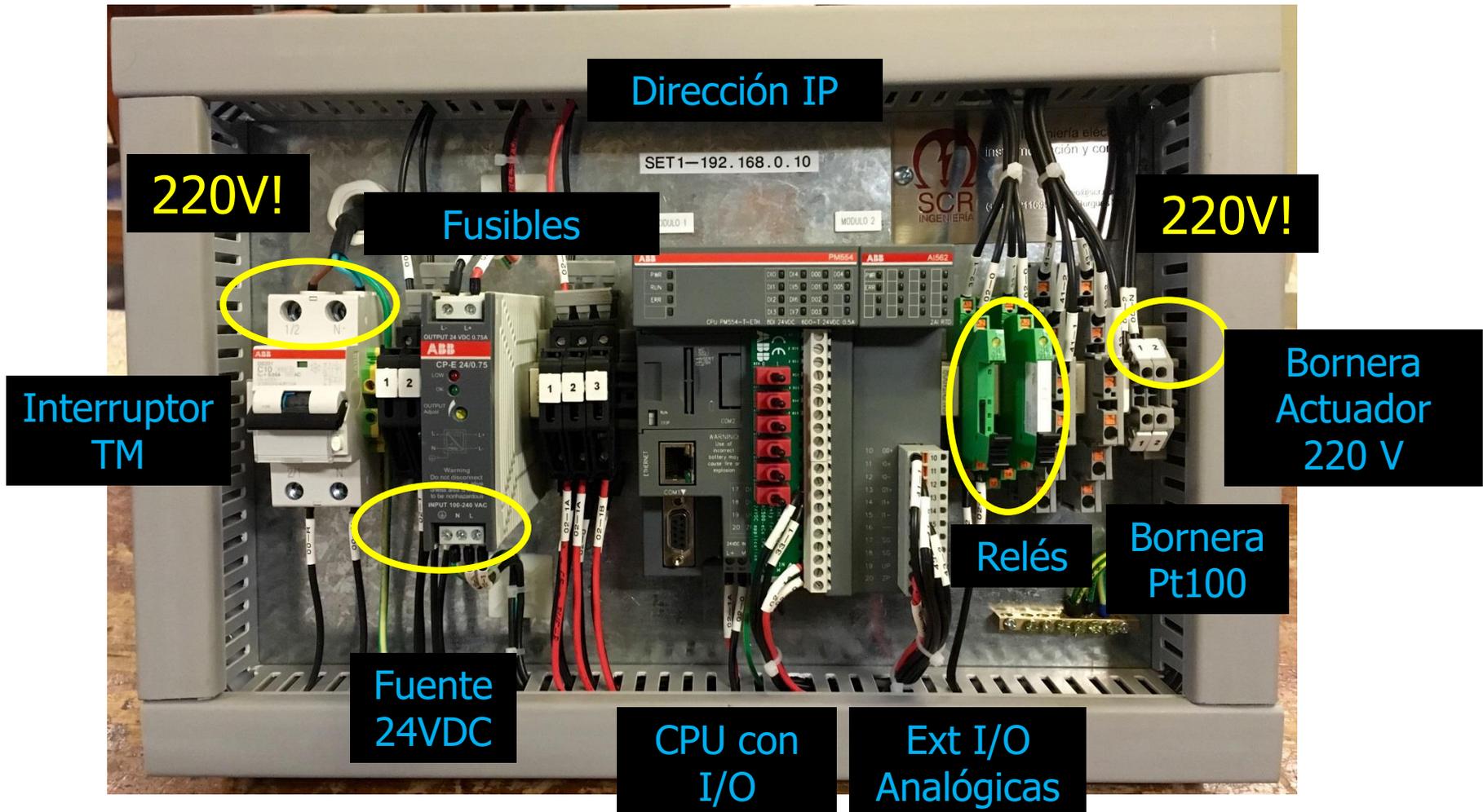
LED	Status	Color	LED = ON	LED = OFF	LED flashing
PWR	Power supply	green	Power supply present	Power supply missing	--
RUN	RUN/STOP Status	green	CPU is in status RUN	CPU is in status STOP	Fast flashing (4 Hz): The CPU is reading/writing data to the SD Memory Card. If the ERR-LED is also flashing, data is written to the Flash-EEPROM. Slow flashing (1 Hz): The firmware update from the SD Memory Card has been finished successfully.
ERR	Error indication	red	An error occurred	No errors or only warnings encountered (E4-errors). The LED behaviour by the error classes 2 to 4 is configurable.	with 4 Hz (fast): displays together with the RUN LED a currently running firmware-upgrade or writing data to the Flash-EPROM.

PLC AC500-eCo PM554

- Onboard I/Os in PM554 CPUs



Set del Laboratorio

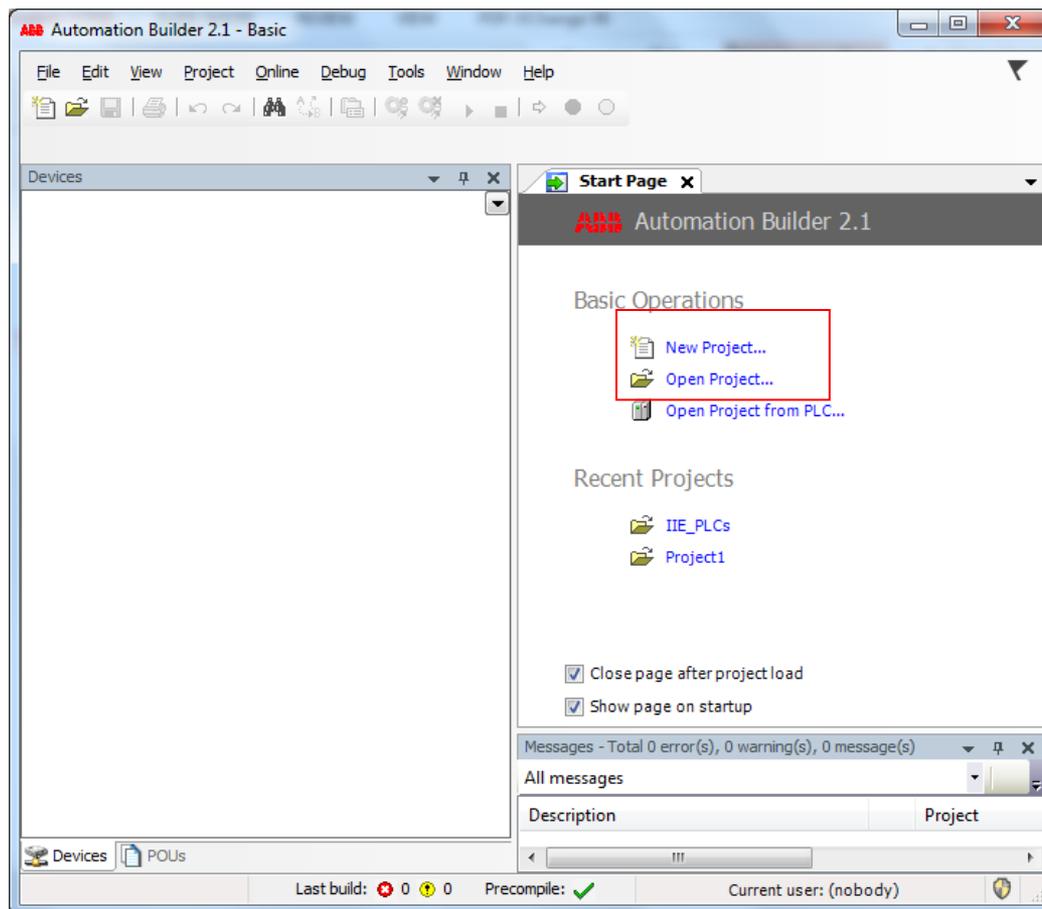


Automation Builder

- Permite:
 - Desarrollar programas para el PLC
 - Comunicación con PLC
- Comunicación:
 - Cargar configuración en el PLC
 - Cargar programas en el PLC
 - Determinar variables y estado del PLC

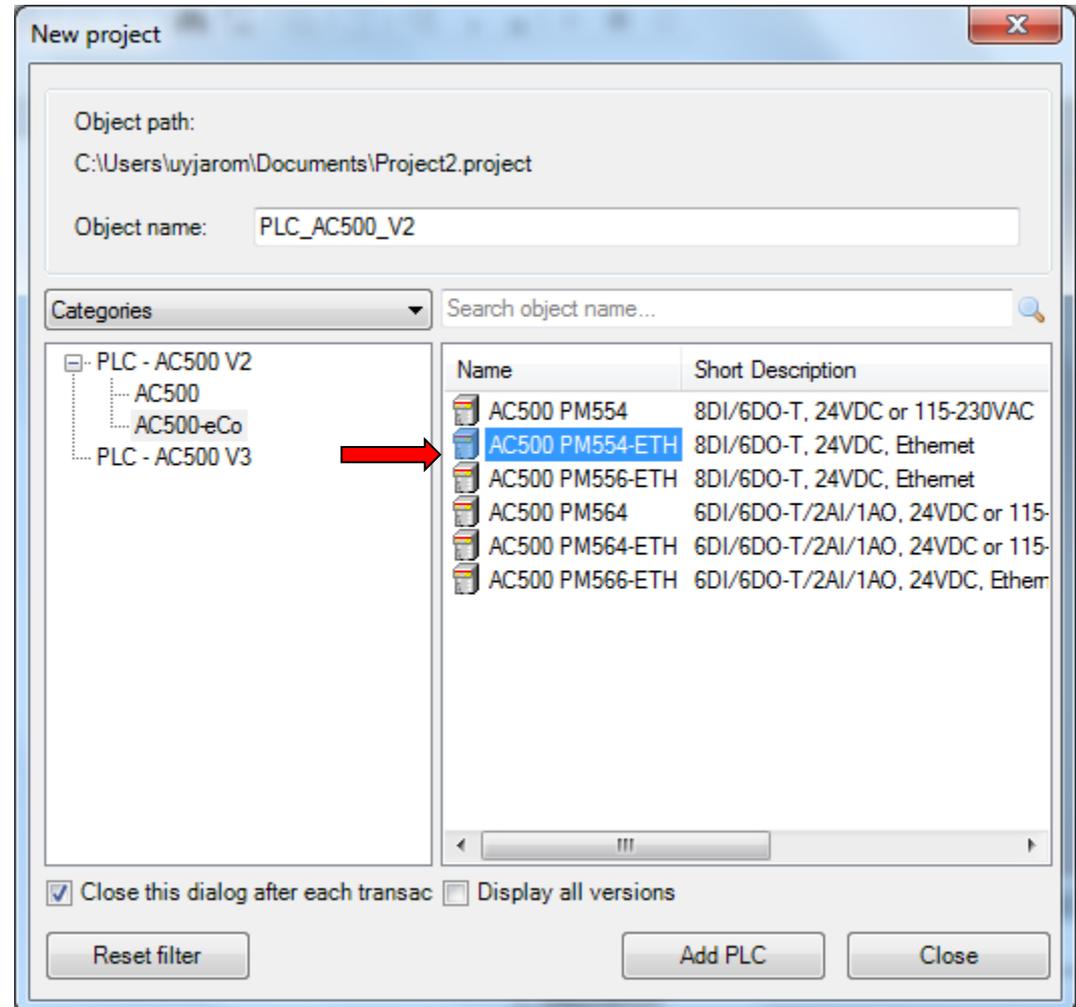
Automation Builder

- New/Open Project



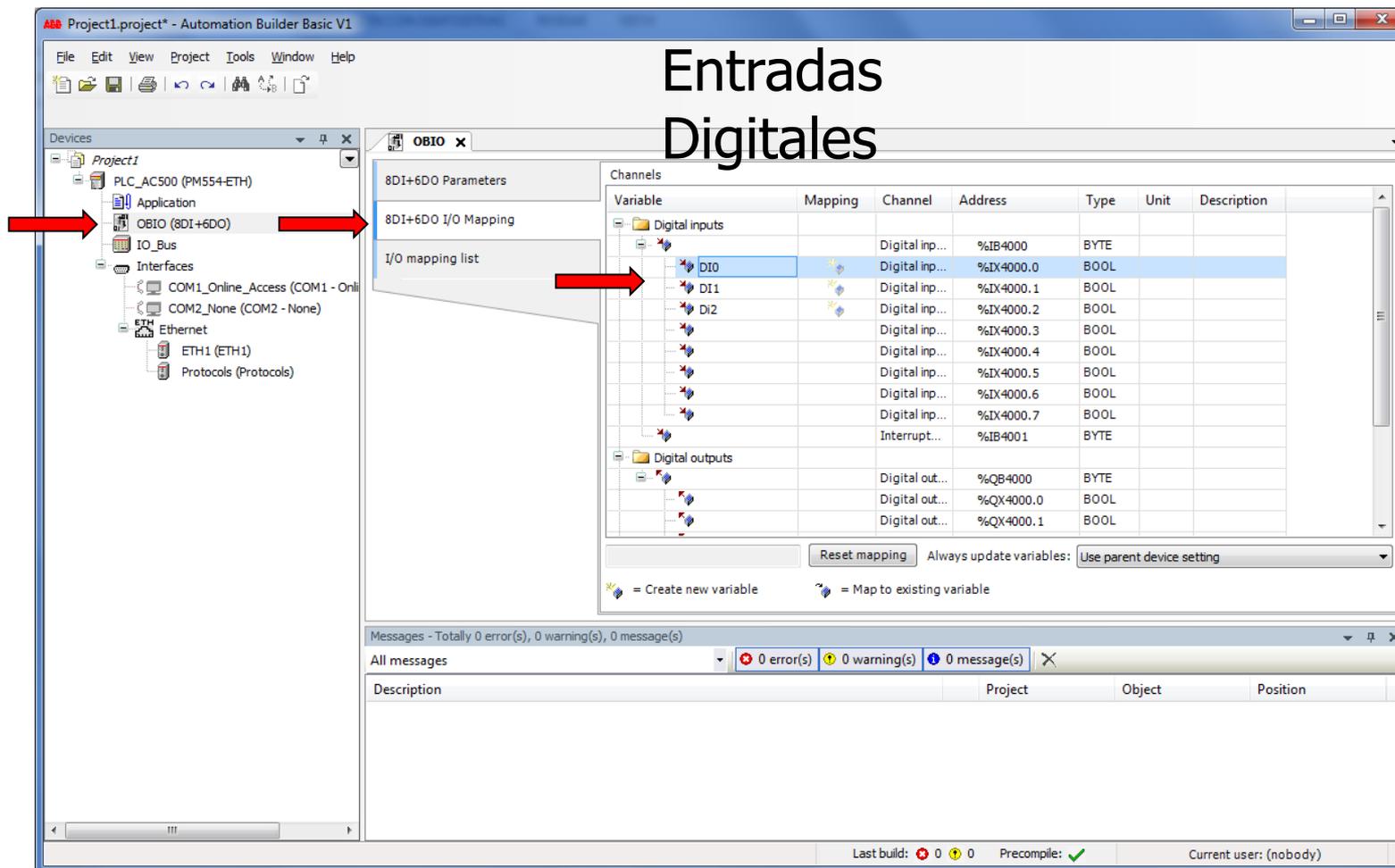
Automation Builder

- Seleccionar el PLC de laboratorio:
- AC500 PM554-ETH



Asignación de I/O

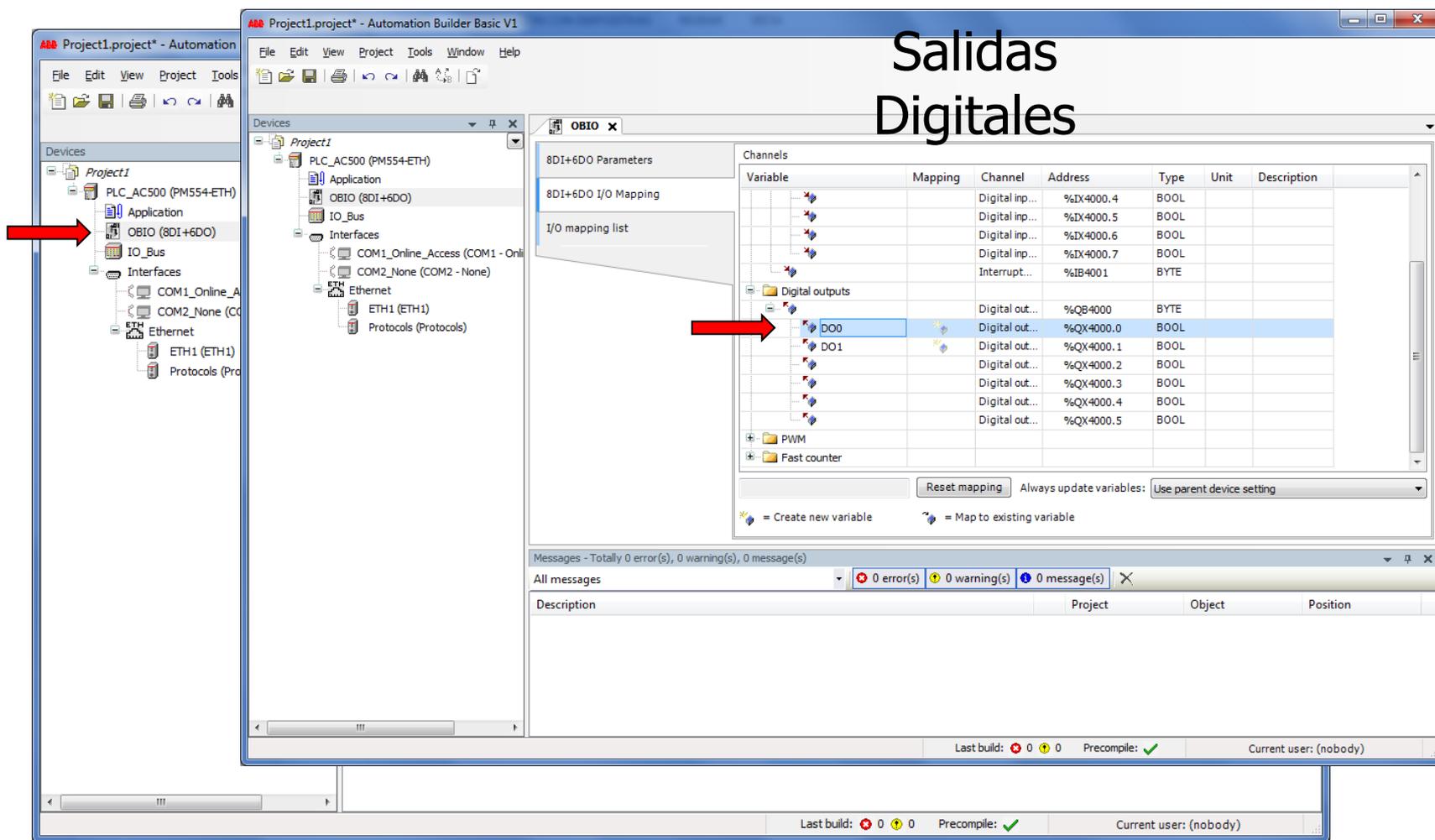
Entradas Digitales



The screenshot displays the 'Automation Builder Basic V1' software interface. The 'Devices' tree on the left shows a project named 'Project1' containing a PLC device 'PLC_AC500 (PM554-ETH)'. Underneath, the 'OBIO (8DI+6DO)' component is selected, and its 'I/O mapping list' is expanded. The 'Channels' table on the right shows the configuration for digital inputs (DI0-DI7) and digital outputs (Q0-Q1). The 'DI0' channel is highlighted, showing its mapping to the variable '%IX4000.0' at address '%IB4000' with a 'BOOL' type. The status bar at the bottom indicates '0 error(s)', '0 warning(s)', and '1 message(s)'. The current user is '(nobody)'.

Variable	Mapping	Channel	Address	Type	Unit	Description
Digital inputs						
		Digital inp...	%IB4000	BYTE		
DI0		Digital inp...	%IX4000.0	BOOL		
DI1		Digital inp...	%IX4000.1	BOOL		
DI2		Digital inp...	%IX4000.2	BOOL		
		Digital inp...	%IX4000.3	BOOL		
		Digital inp...	%IX4000.4	BOOL		
		Digital inp...	%IX4000.5	BOOL		
		Digital inp...	%IX4000.6	BOOL		
		Digital inp...	%IX4000.7	BOOL		
		Interrupt...	%IB4001	BYTE		
Digital outputs						
		Digital out...	%QB4000	BYTE		
		Digital out...	%QX4000.0	BOOL		
		Digital out...	%QX4000.1	BOOL		

Asignación de I/O



Salidas Digitales

The screenshot displays the 'OBIO' configuration window for a PLC. The 'Channels' table lists various digital inputs and outputs. A red arrow points to the 'DO0' output channel, which is highlighted in blue. The 'I/O mapping list' is also visible, showing the mapping of variables to physical channels.

Variable	Mapping	Channel	Address	Type	Unit	Description
		Digital inp...	%IX4000.4	BOOL		
		Digital inp...	%IX4000.5	BOOL		
		Digital inp...	%IX4000.6	BOOL		
		Digital inp...	%IX4000.7	BOOL		
		Interrupt...	%IB4001	BYTE		
		Digital out...	%QB4000	BYTE		
DO0		Digital out...	%QX4000.0	BOOL		
DO1		Digital out...	%QX4000.1	BOOL		
		Digital out...	%QX4000.2	BOOL		
		Digital out...	%QX4000.3	BOOL		
		Digital out...	%QX4000.4	BOOL		
		Digital out...	%QX4000.5	BOOL		

Messages - Totally 0 error(s), 0 warning(s), 0 message(s)

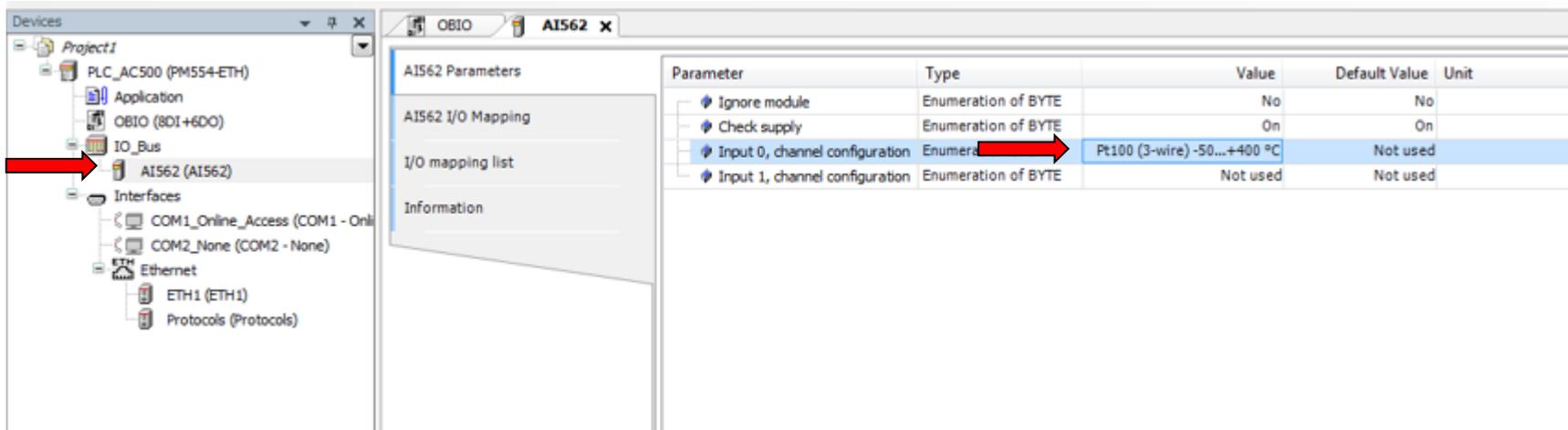
All messages: 0 error(s) 0 warning(s) 0 message(s)

Description	Project	Object	Position
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Last build: 0 0 0 Precompile: ✓ Current user: (nobody)

Asignación de I/O

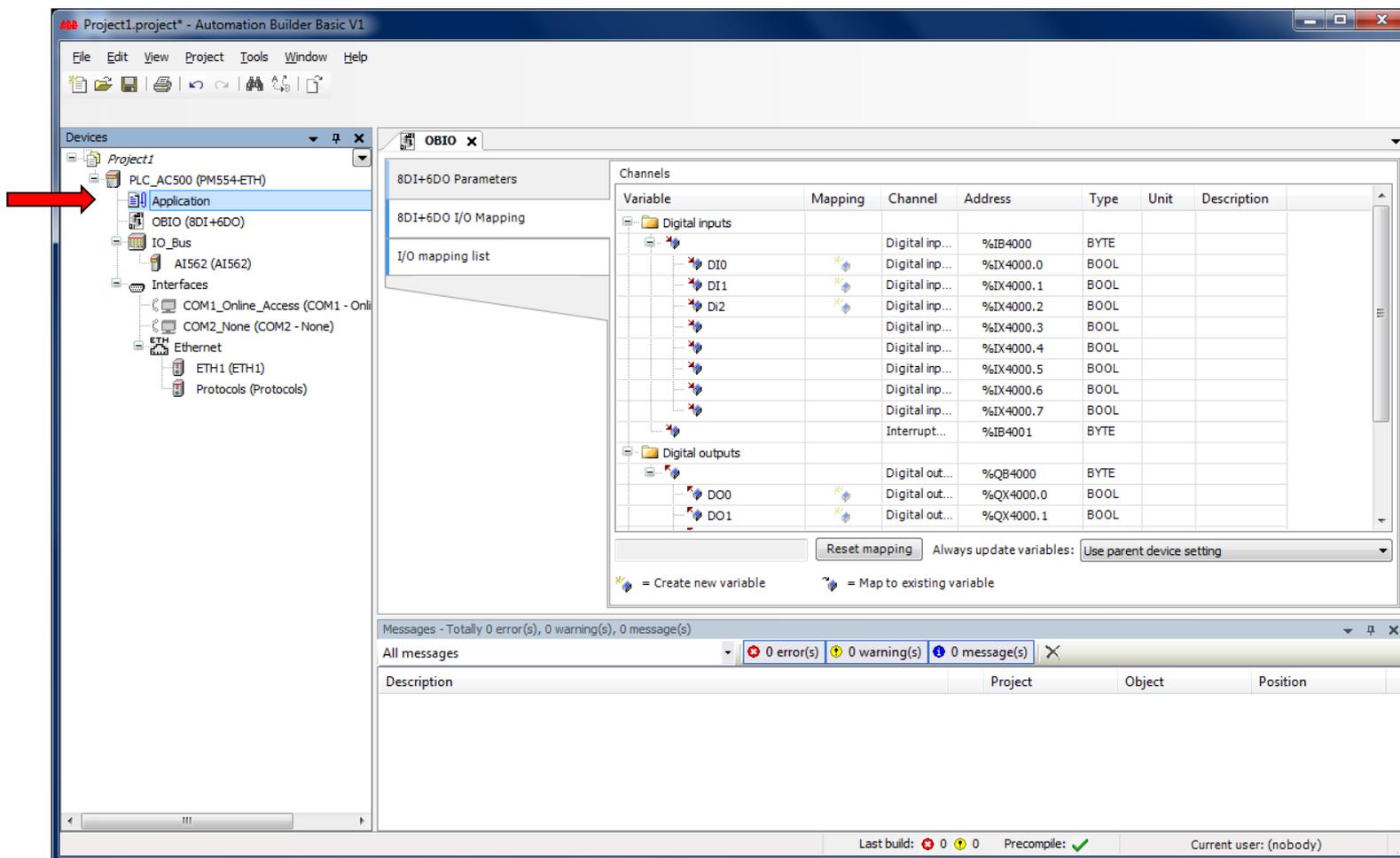
- Agregar módulo AI562 de entradas analógicas:
 - IO_Bus -> Add Object
 - AI562



The screenshot displays the SIMATIC Manager interface. On the left, the 'Devices' tree shows a project named 'Project1' containing a PLC_AC500 (PM554-ETH) with an 'IO_Bus' and an 'AI562 (AI562)' module. A red arrow points to the 'AI562 (AI562)' module. The right pane shows the 'AI562 Parameters' dialog box with a table of parameters. A red arrow points to the 'Input 0, channel configuration' parameter, which is set to 'Pt100 (3-wire) -50...+400 °C'.

Parameter	Type	Value	Default Value	Unit
Ignore module	Enumeration of BYTE	No	No	
Check supply	Enumeration of BYTE	On	On	
Input 0, channel configuration	Enumeration of BYTE	Pt100 (3-wire) -50...+400 °C	Not used	
Input 1, channel configuration	Enumeration of BYTE	Not used	Not used	

Acceso al Programa



The screenshot shows the 'Automation Builder Basic V1' interface for 'Project1.project'. The 'Devices' tree on the left is expanded to show the 'Application' folder, which is highlighted with a red arrow. The main workspace displays the 'OBIO' configuration window, which includes a table of channels and a status bar at the bottom.

Channels Table:

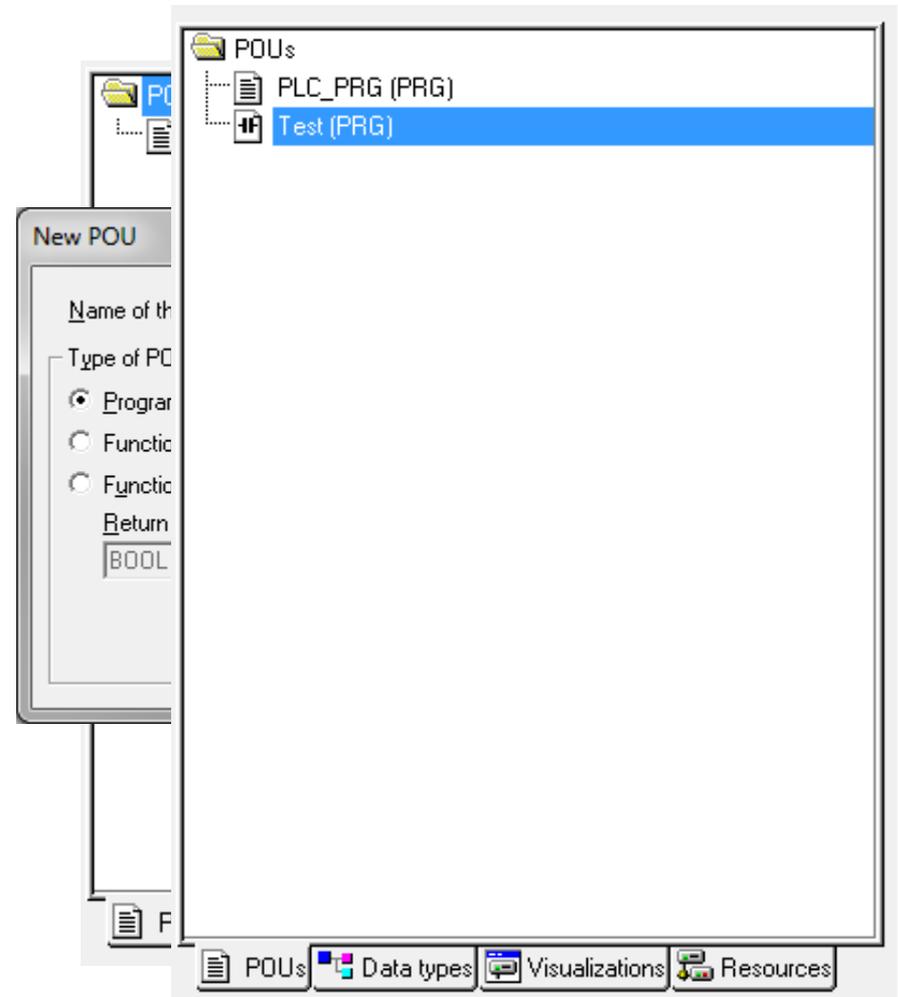
Variable	Mapping	Channel	Address	Type	Unit	Description
Digital inputs						
DIO		Digital inp...	%IB4000	BYTE		
DI1		Digital inp...	%IX4000.0	BOOL		
DI2		Digital inp...	%IX4000.1	BOOL		
		Digital inp...	%IX4000.2	BOOL		
		Digital inp...	%IX4000.3	BOOL		
		Digital inp...	%IX4000.4	BOOL		
		Digital inp...	%IX4000.5	BOOL		
		Digital inp...	%IX4000.6	BOOL		
		Digital inp...	%IX4000.7	BOOL		
		Interrupt...	%IB4001	BYTE		
Digital outputs						
DO0		Digital out...	%QB4000	BYTE		
DO1		Digital out...	%QX4000.0	BOOL		
		Digital out...	%QX4000.1	BOOL		

Messages: Totally 0 error(s), 0 warning(s), 0 message(s)
 All messages: 0 error(s), 0 warning(s), 0 message(s)

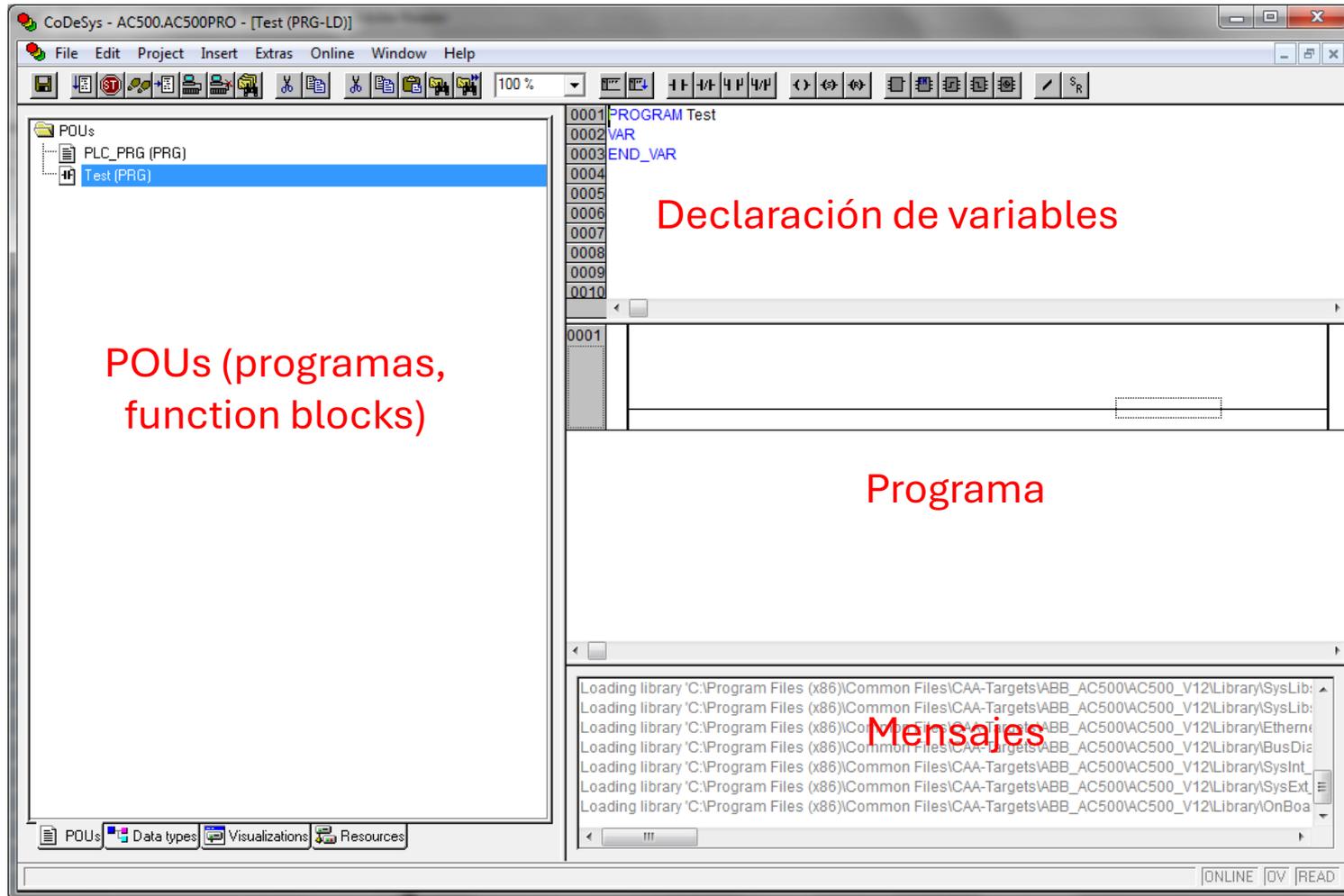
Status Bar: Last build: 0 error(s), 0 warning(s), 0 message(s) | Precompile: ✓ | Current user: (nobody)

POUs

- POU – Program Organization Units
- Lenguajes: LD, IL, FBD, ST, SFC
- “Add Object...”
- Programas, bloques, etc.
- “PLC_PRG” se ejecuta una vez por ciclo por definición



Editor de POU's



CoDeSys - AC500.AC500PRO - [Test (PRG-LD)]

File Edit Project Insert Extras Online Window Help

100 %

POUs

- PLC_PRG (PRG)
- Test (PRG)

0001 PROGRAM Test

0002 VAR

0003 END_VAR

0004

0005

0006

0007

0008

0009

0010

Declaración de variables

Programa

Mensajes

Loading library 'C:\Program Files (x86)\Common Files\CAA-Targets\ABB_AC500\AC500_V12\Library\SysLib:...

Loading library 'C:\Program Files (x86)\Common Files\CAA-Targets\ABB_AC500\AC500_V12\Library\SysLib:...

Loading library 'C:\Program Files (x86)\Common Files\CAA-Targets\ABB_AC500\AC500_V12\Library\Ether:...

Loading library 'C:\Program Files (x86)\Common Files\CAA-Targets\ABB_AC500\AC500_V12\Library\BusDis:...

Loading library 'C:\Program Files (x86)\Common Files\CAA-Targets\ABB_AC500\AC500_V12\Library\SysInt:...

Loading library 'C:\Program Files (x86)\Common Files\CAA-Targets\ABB_AC500\AC500_V12\Library\SysExt:...

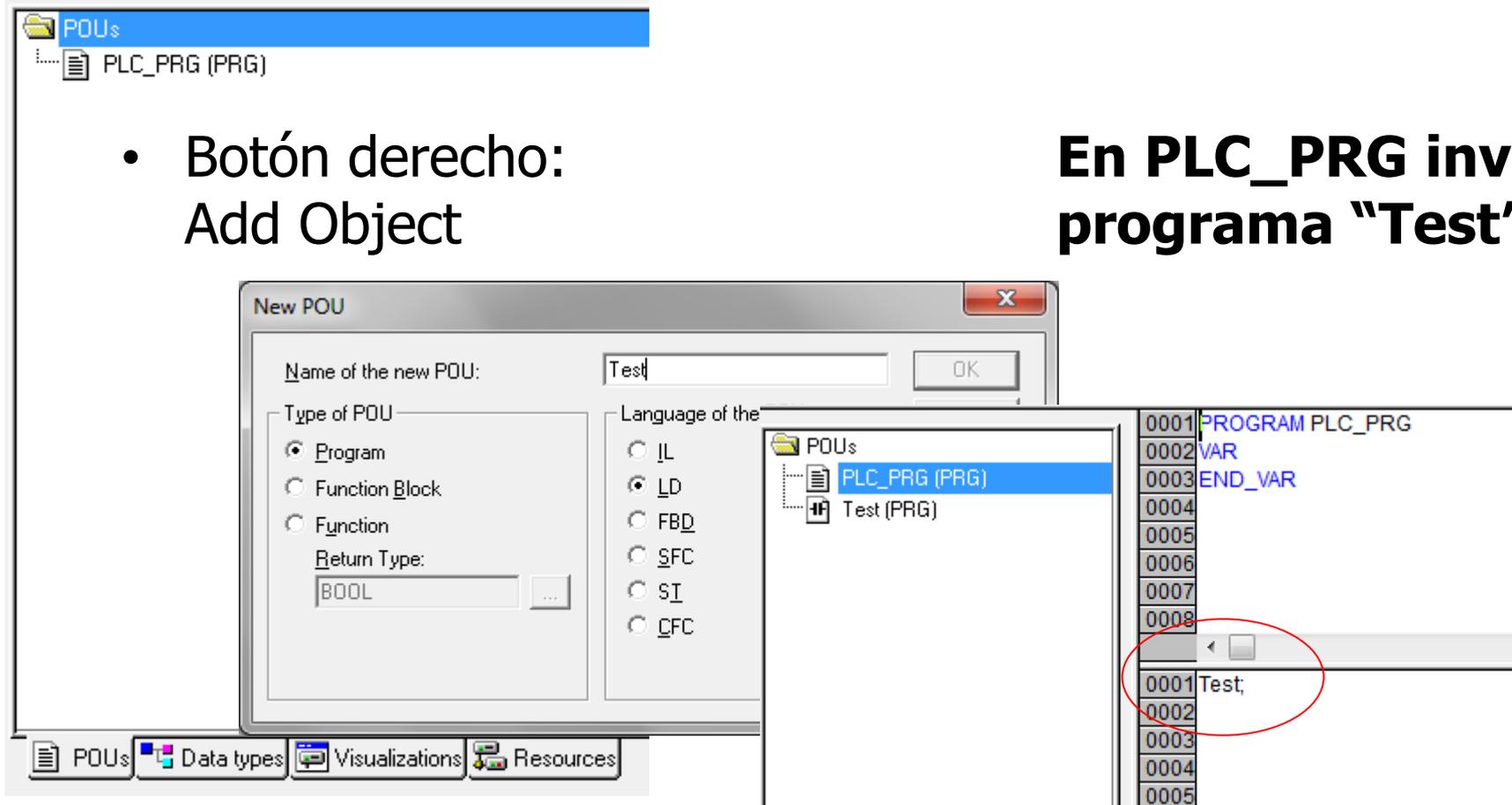
Loading library 'C:\Program Files (x86)\Common Files\CAA-Targets\ABB_AC500\AC500_V12\Library\OnBoa:...

ONLINE OV READ

Programa en LD

- Botón derecho:
Add Object

**En PLC_PRG invocar
programa "Test"**



The screenshot displays the 'New POU' dialog box and a portion of a ladder logic editor. The dialog box is titled 'New POU' and has a close button (X) in the top right corner. It contains the following fields and options:

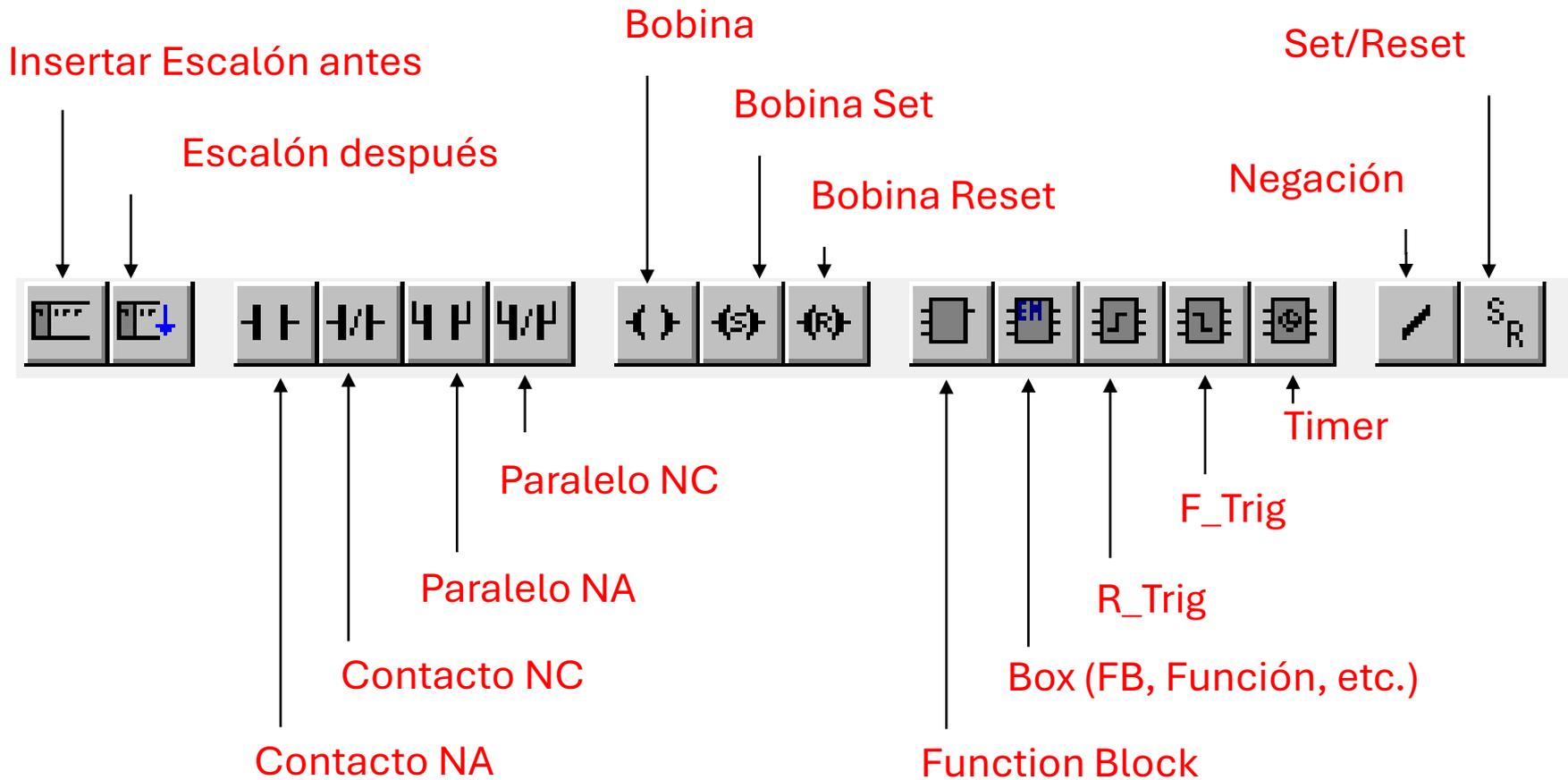
- Name of the new POU:** A text box containing 'Test' and an 'OK' button.
- Type of POU:** Radio buttons for 'Program' (selected), 'Function Block', and 'Function'. Below this is a 'Return Type:' field with 'BOOL' and a browse button (...).
- Language of the:** Radio buttons for 'IL', 'LD' (selected), 'FBD', 'SFC', 'SI', and 'LFC'.

In the background, a file explorer shows a folder 'POUs' containing a file 'PLC_PRG (PRG)'. To the right, a ladder logic editor shows a program structure with the following lines:

0001	PROGRAM PLC_PRG
0002	VAR
0003	END_VAR
0004	
0005	
0006	
0007	
0008	
0001	Test;
0002	
0003	
0004	
0005	

The 'Test;' line at address 0001 is circled in red. At the bottom of the software interface, there are tabs for 'POUs', 'Data types', 'Visualizations', and 'Resources'.

Herramientas LD



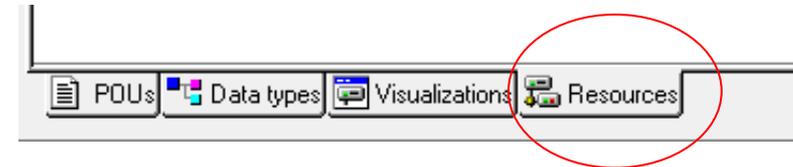
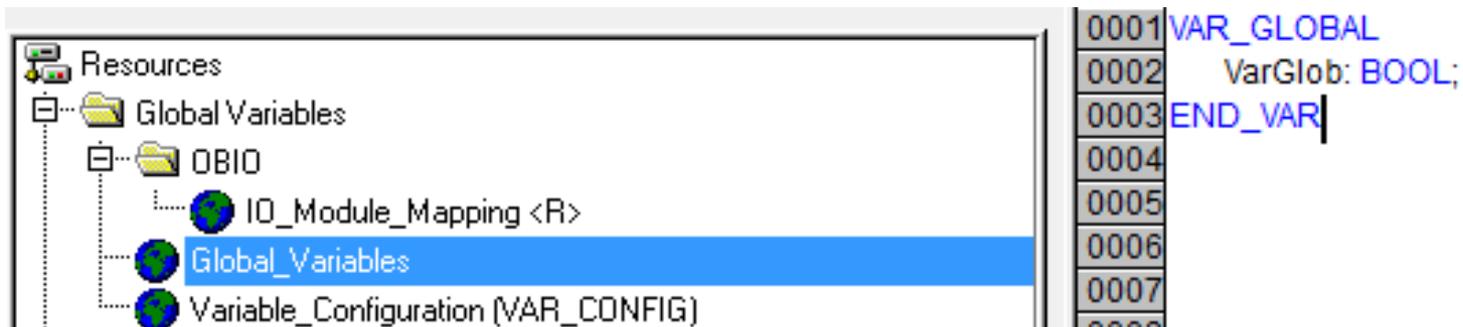
Declaración de Variables

- Sintaxis:
 - Nombre: TIPO [:= Valor Inicial];
- Variables locales a un programa:

```
0001 PROGRAM Test
0002 VAR
0003     Var1: BOOL;
0004     Var2: BOOL;
0005     Tiempo1: TIME := T#5s;
0006     Temperatura1: REAL;
0007 END_VAR
0008
```

Declaración de Variables

- Variables Globales
 - Tab: “Resources”
 - Variables globales internas

A screenshot of the software interface showing the 'Resources' tree view on the left and a code editor on the right. The tree view shows a hierarchy: 'Resources' > 'Global Variables' > 'OBIO' > 'Global_Variables' (selected). The code editor shows the following code:

```

0001 VAR_GLOBAL
0002   VarGlob: BOOL;
0003 END_VAR
0004
0005
0006
0007
0008
    
```

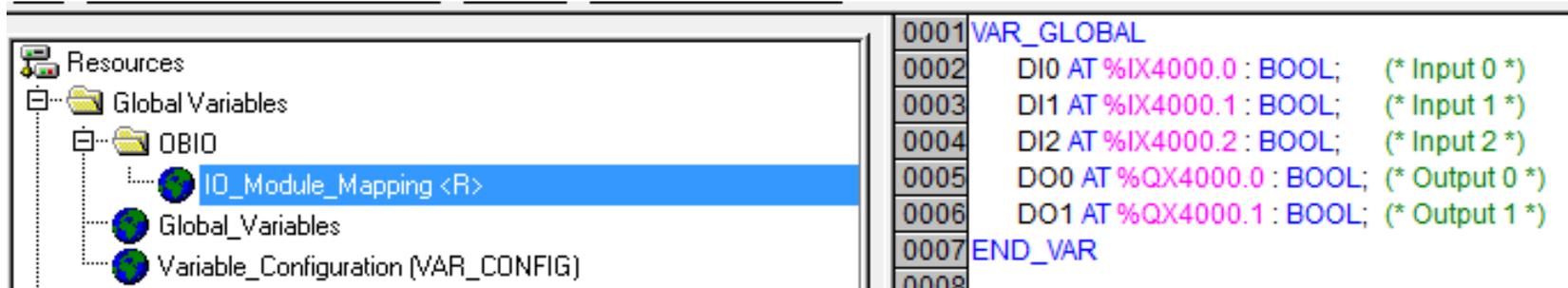
Declaración de Variables

- Variables Globales

- Onboard I/O: Entradas/Salidas
- Sintaxis:

- Nombre **AT** %Dirección: TIPO [:= Valor Inicial];

Declaradas en
Automation Builder



The screenshot shows the 'Resources' tree on the left with 'IO_Module_Mapping <R>' selected. The right pane displays the variable declarations for this resource:

```

0001 VAR_GLOBAL
0002 DI0 AT %IX4000.0 : BOOL; (* Input 0 *)
0003 DI1 AT %IX4000.1 : BOOL; (* Input 1 *)
0004 DI2 AT %IX4000.2 : BOOL; (* Input 2 *)
0005 DO0 AT %QX4000.0 : BOOL; (* Output 0 *)
0006 DO1 AT %QX4000.1 : BOOL; (* Output 1 *)
0007 END_VAR
0008
  
```

Programa en LD

- Posiciones del Cursor:

1. Every text field (possible cursor positions framed in black)



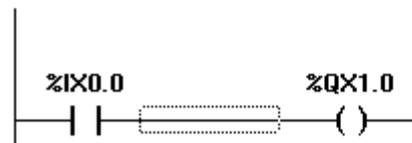
2. Every [Contact](#) or Function Block



3. Every Coil

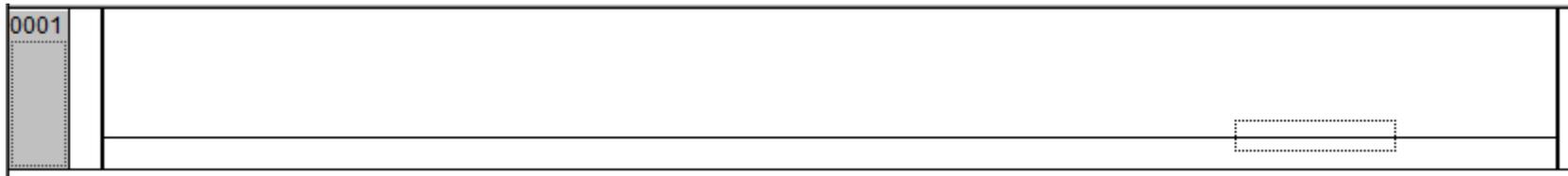


4. The Connecting Line between the Contacts and the Coils.

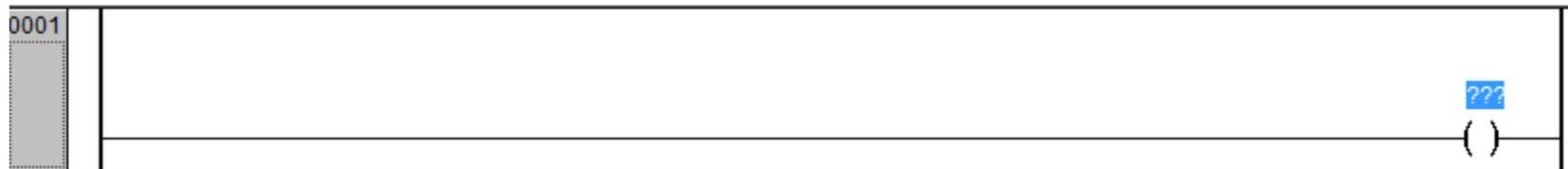


Programa en LD

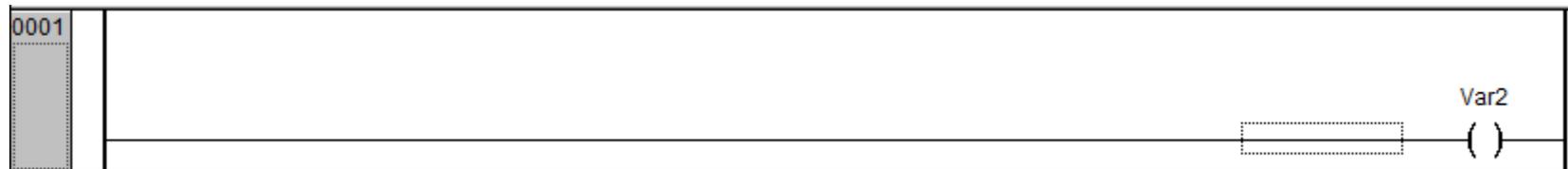
- Escalón vacío:



- Insertar bobina: 

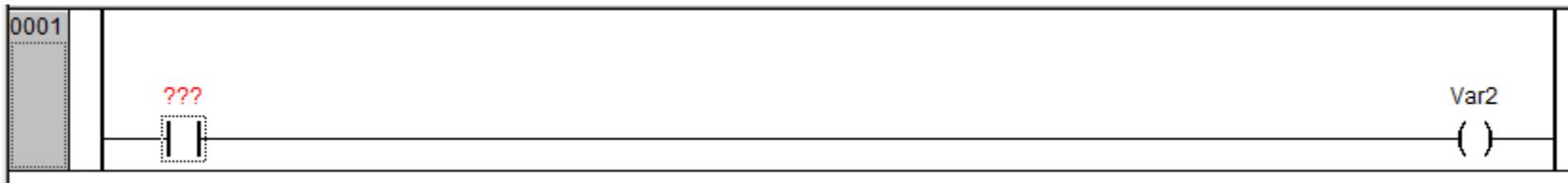


- Nombre de variable (texto directo o F2):

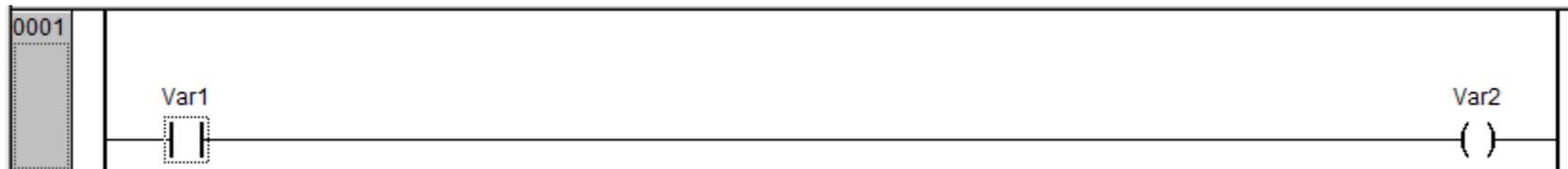


Programa en LD

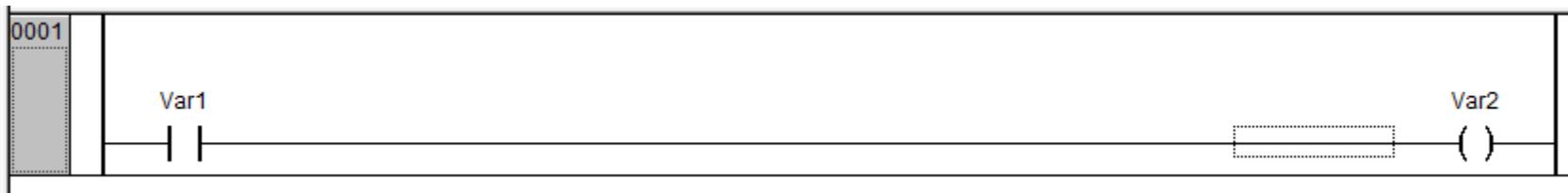
- Insertar contacto: 



- Insertar nombre de la variable:

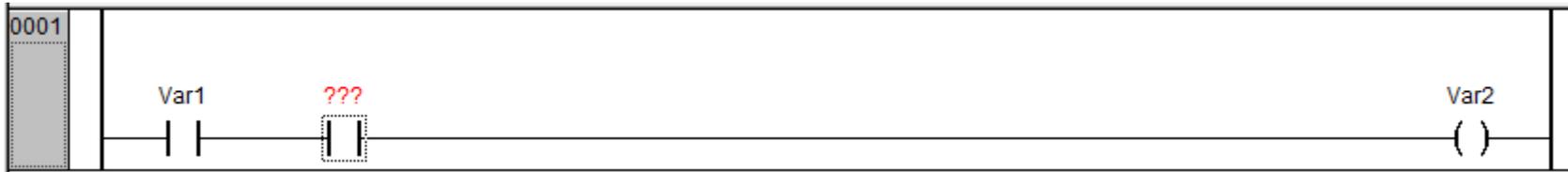


- Posicionar cursor:

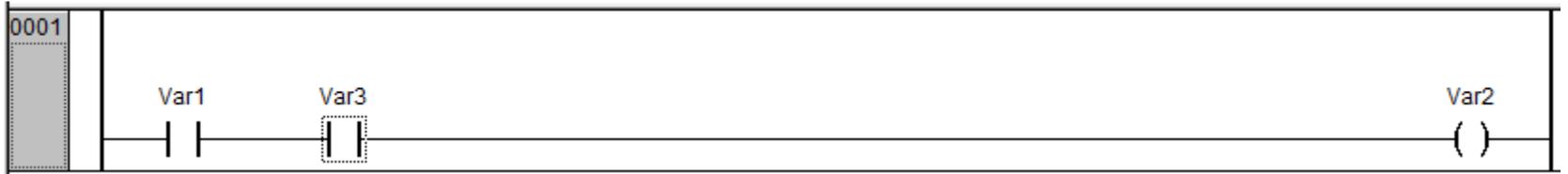


Programa en LD

- Insertar contacto: 

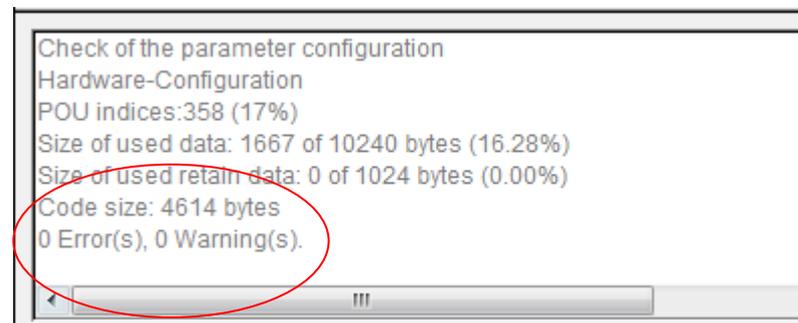


- Insertar nombre de la variable:



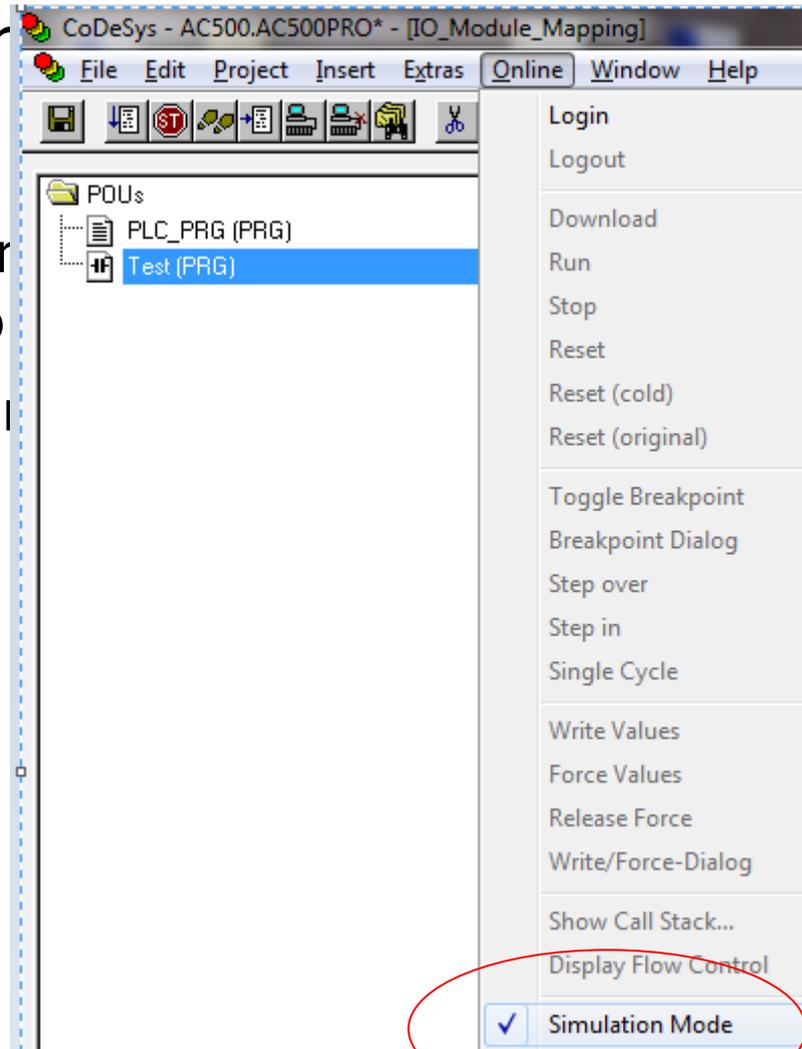
- Compilar: Menu - Project -> Build (F11)

- Mensajes:
 - Verificar Errores



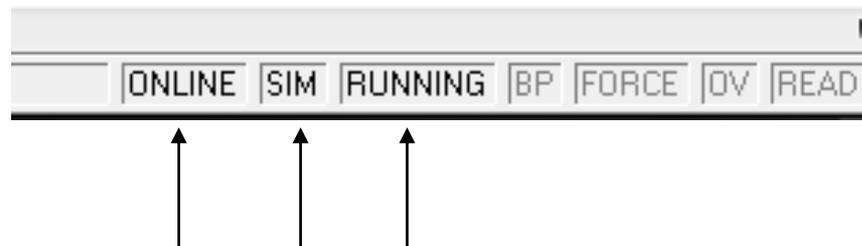
Simulación del Programa

- Simulación: permite “correr” y verificar su funcionamiento
- No se ejecutan POU's de librería
- Menu: Online -> Simulation



Simulación del Programa

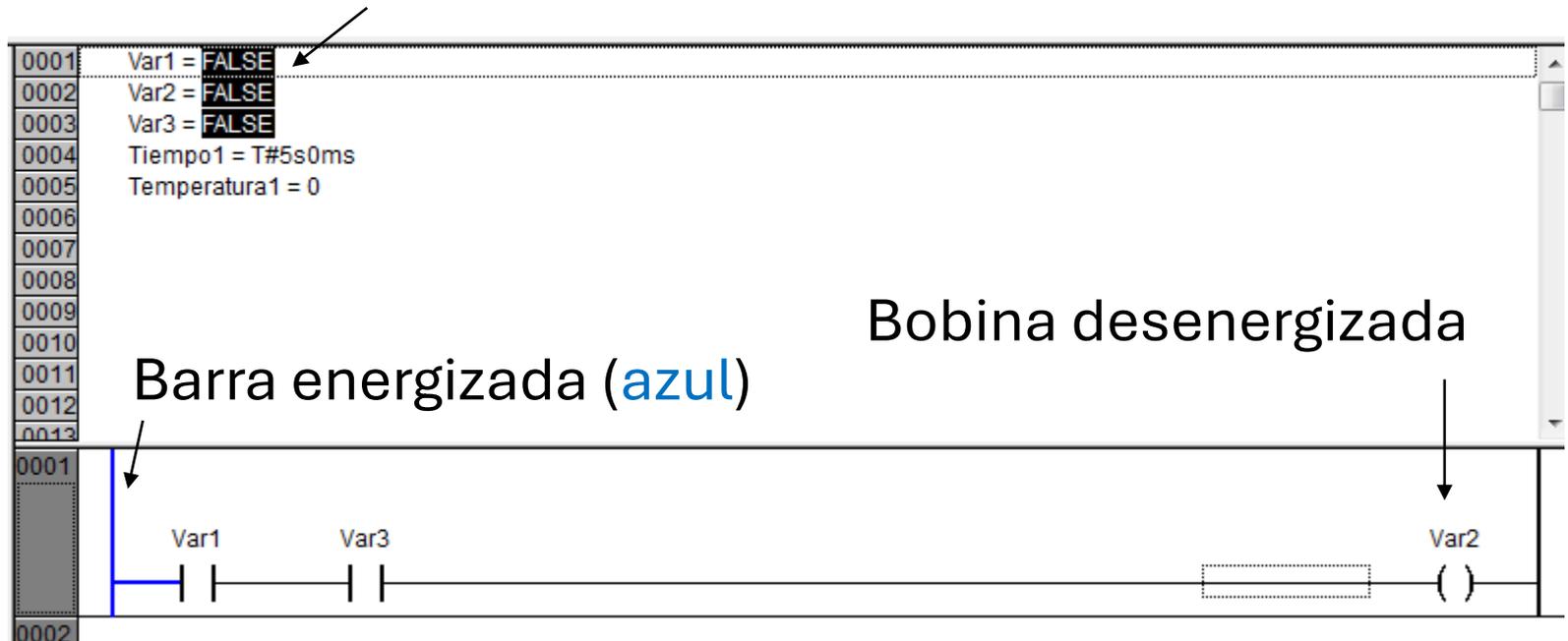
- Ejecución:
 - Menu: Online -> Login
 - Menu:Online -> Run
 - Barra de Status:



Simulación del Programa

- Online:

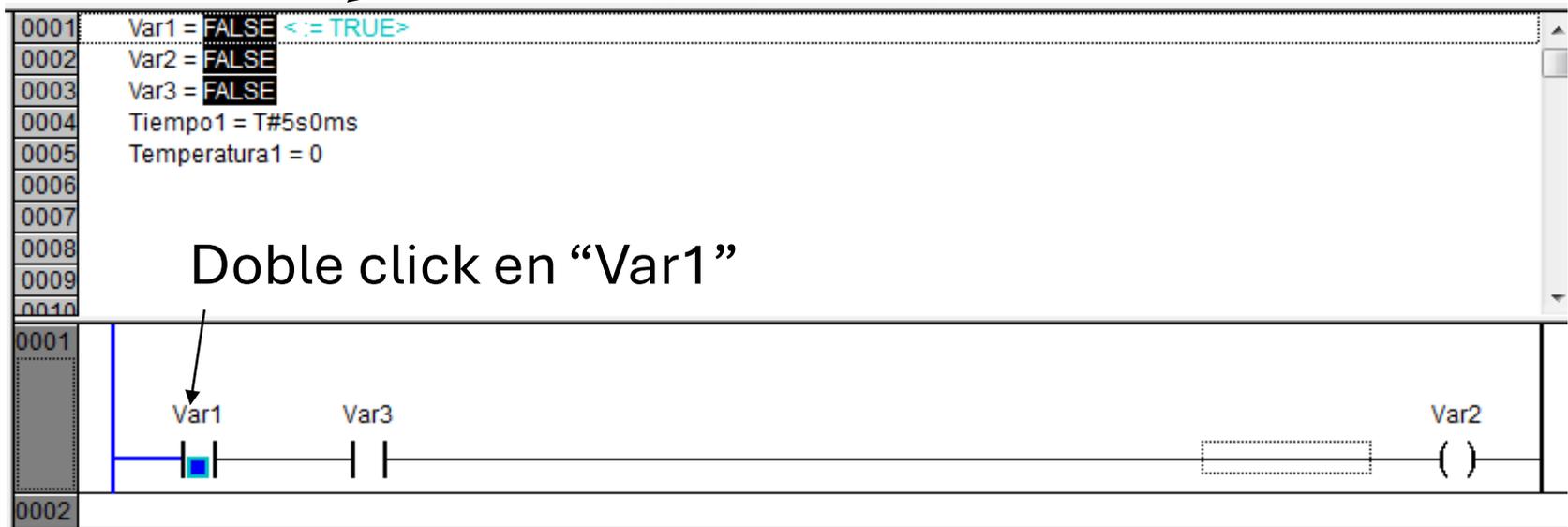
Valor de las variables



Simulación del Programa

- Online: Escribir variables (Write values)

Valor de la variable a escribir (preparado)



The screenshot displays a simulation environment with two main sections:

- Variable Declaration Table (Top):** A table with 10 rows (0001 to 0010) and two columns. The first column contains row numbers, and the second column contains variable declarations.

0001	Var1 = FALSE <:= TRUE>
0002	Var2 = FALSE
0003	Var3 = FALSE
0004	Tiempo1 = T#5s0ms
0005	Temperatura1 = 0
0006	
0007	
0008	
0009	
0010	
- Ladder Logic Diagram (Bottom):** A diagram showing a network between rungs 0001 and 0002. It features three normally open contacts labeled 'Var1', 'Var3', and 'Var2'. The 'Var1' contact is currently closed, indicated by a blue square. The 'Var2' contact is represented by a dashed rectangular box, suggesting it is not yet defined or is in a placeholder state.

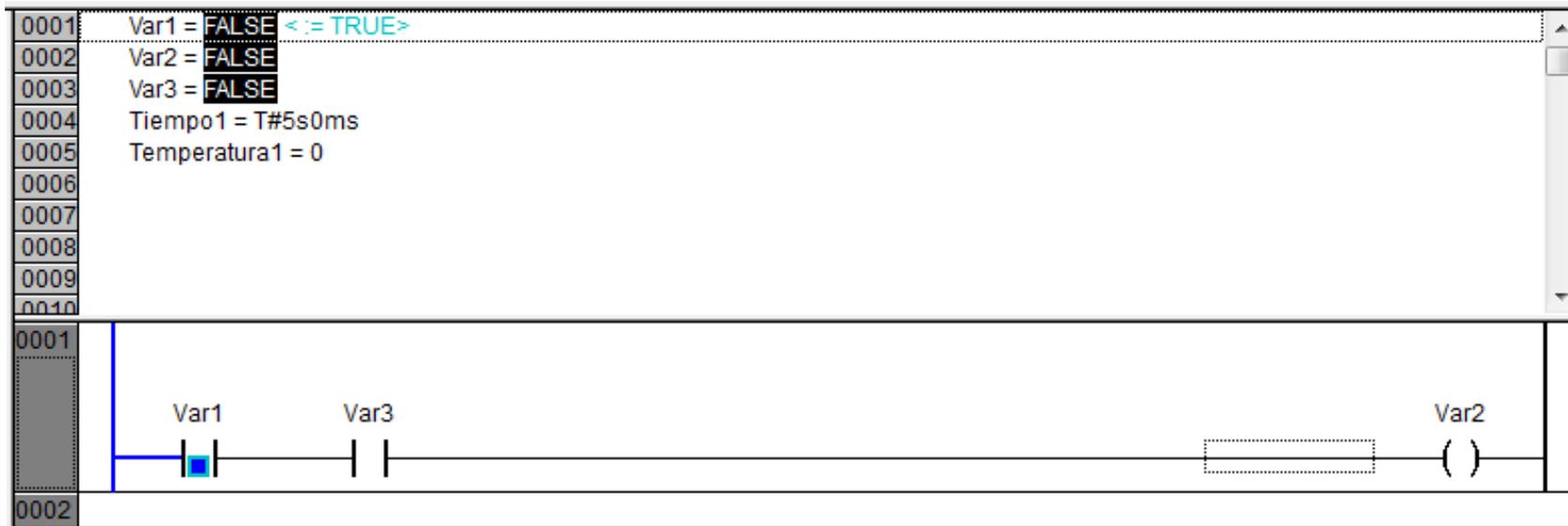
Annotations on the screenshot include:

- An arrow pointing to the '<:= TRUE>' value in the first row of the table, with the text 'Valor de la variable a escribir (preparado)' above it.
- An arrow pointing to the 'Var1' contact in the ladder logic diagram, with the text 'Doble click en "Var1"' below it.

Simulación del Programa

- Online: Escribir variables (Write values)

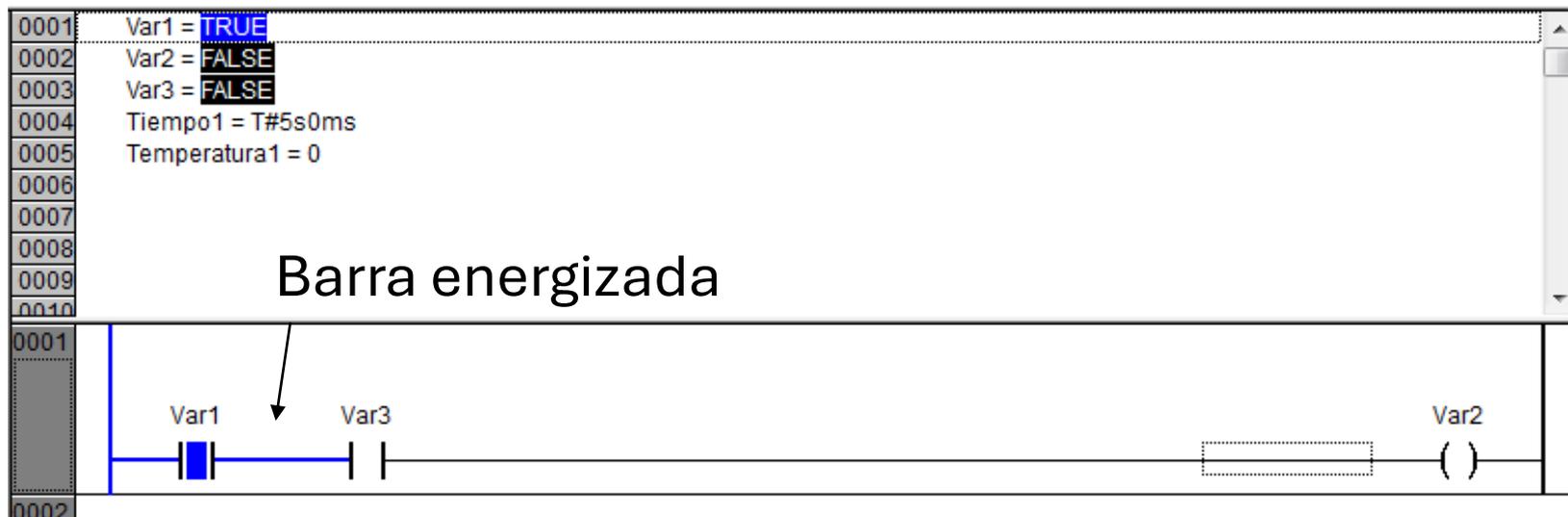
Escribir valores preparados: Ctrl+F7



Simulación del Programa

- Online: Escribir variables (Write values)

Valor de la variable

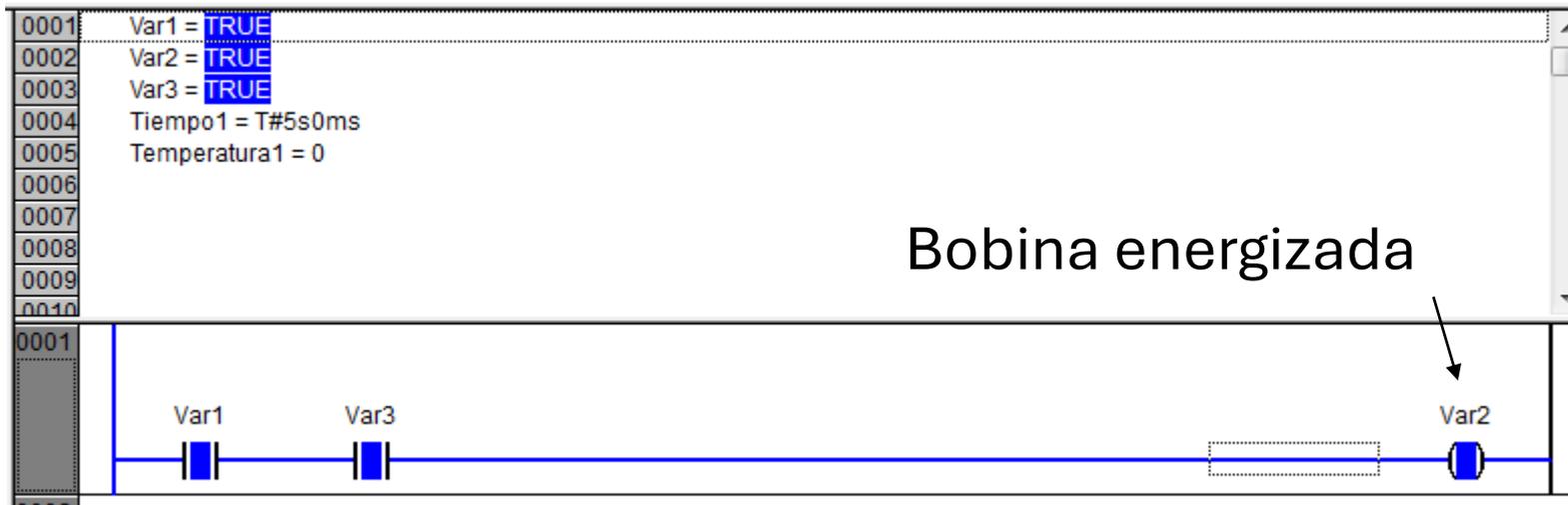


Simulación del Programa

- Online: Escribir variables (Write values)

Doble click en Var 3

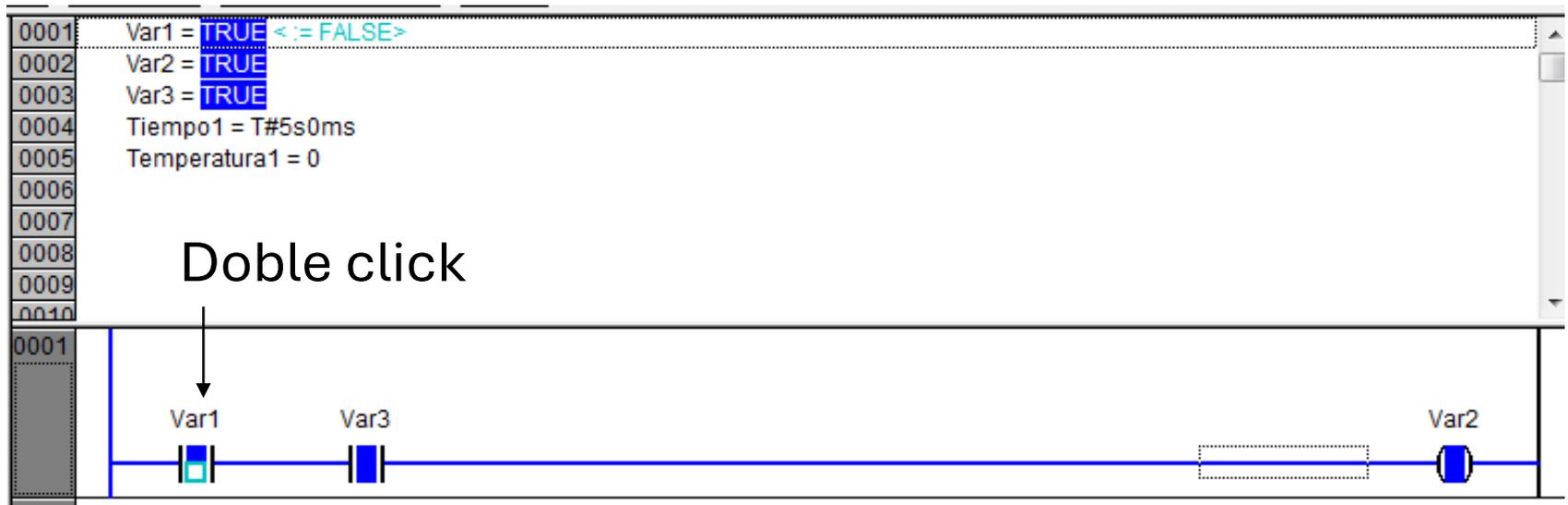
Escribir valores preparados: Ctrl+F7



Simulación del Programa

- Online: Escribir variables (Write values)

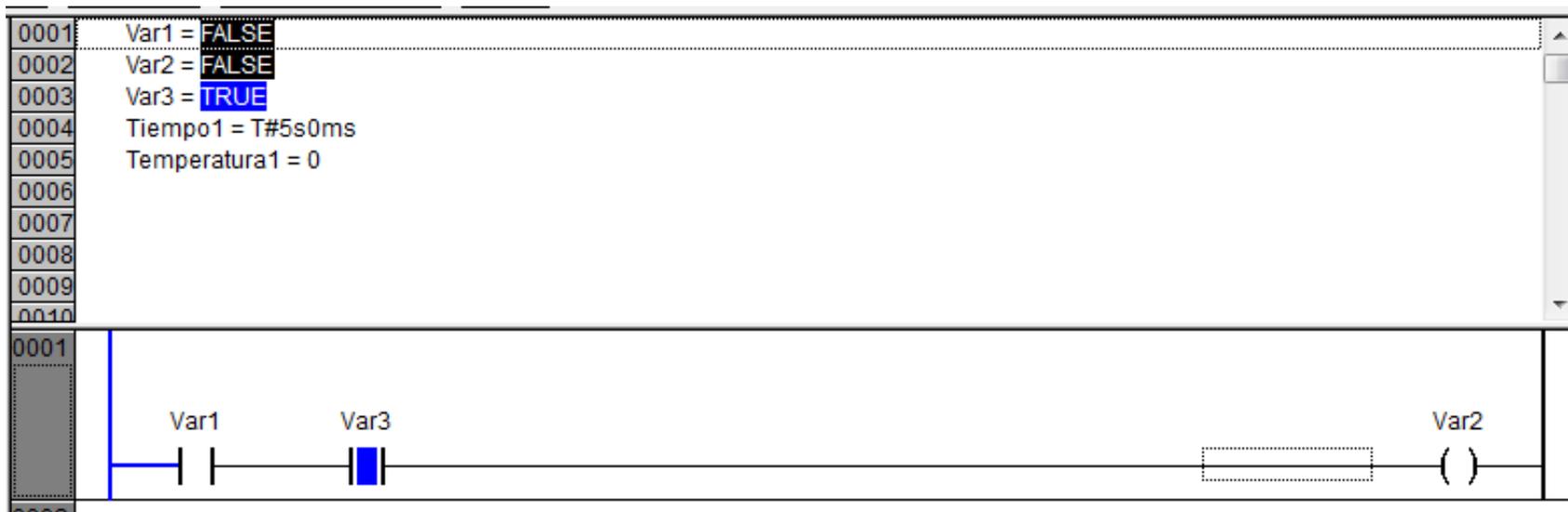
Valor de la variable a
escribir (preparado)



Simulación del Programa

- Online: Escribir variables (Write values)

Escribir valores preparados: Ctrl+F7



Simulación del Programa

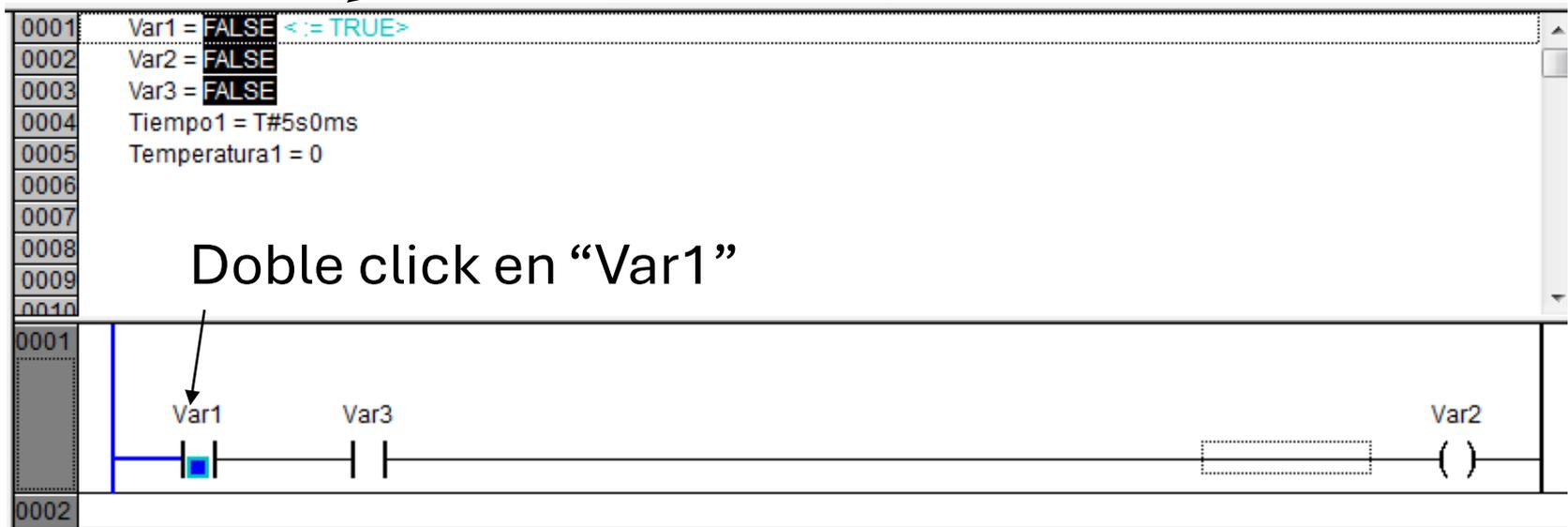
- Online: Forzar variables (Force values)
- Diferencia con Escribir:
 - Escribir (Ctrl+F7): asigna el valor una vez y libera la variable para ser manejada por el programa
 - Forzar (F7): asigna el valor en forma permanente sin importar el resultado del programa

¡Cuidado con
su utilización!

Simulación del Programa

- Online: Forzar variables (Force values)

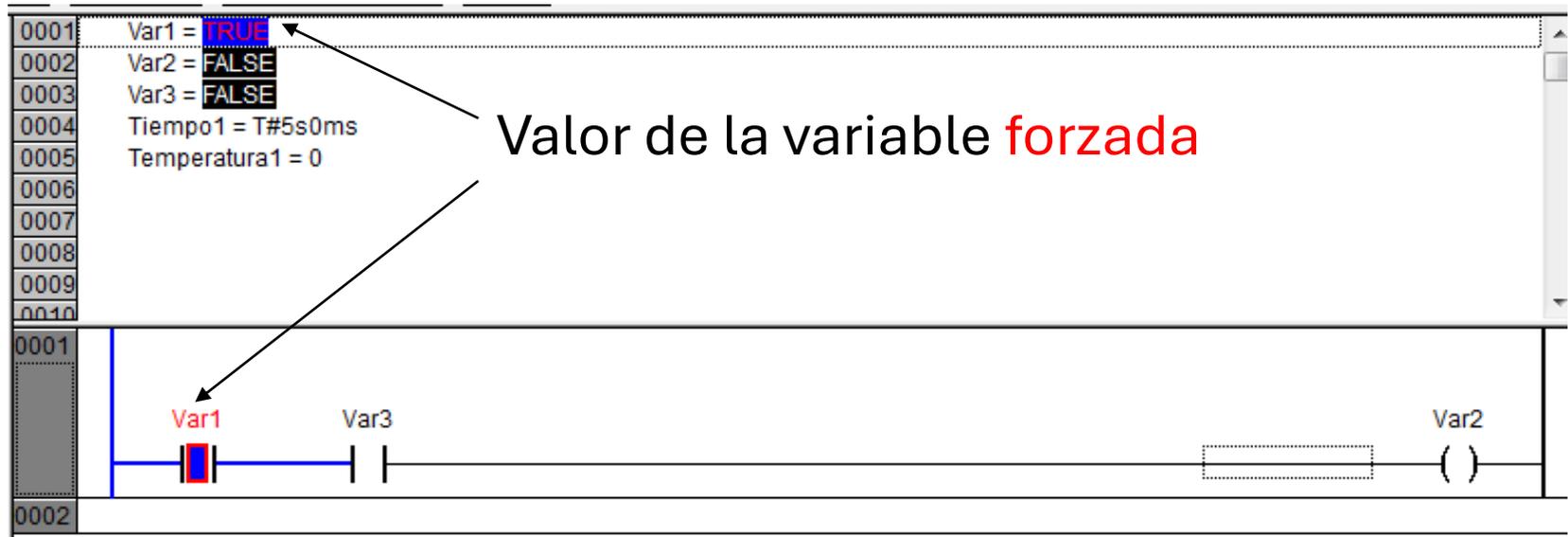
Valor de la variable a forzar (preparado)



Simulación del Programa

- Online: Forzar variables (Force values)

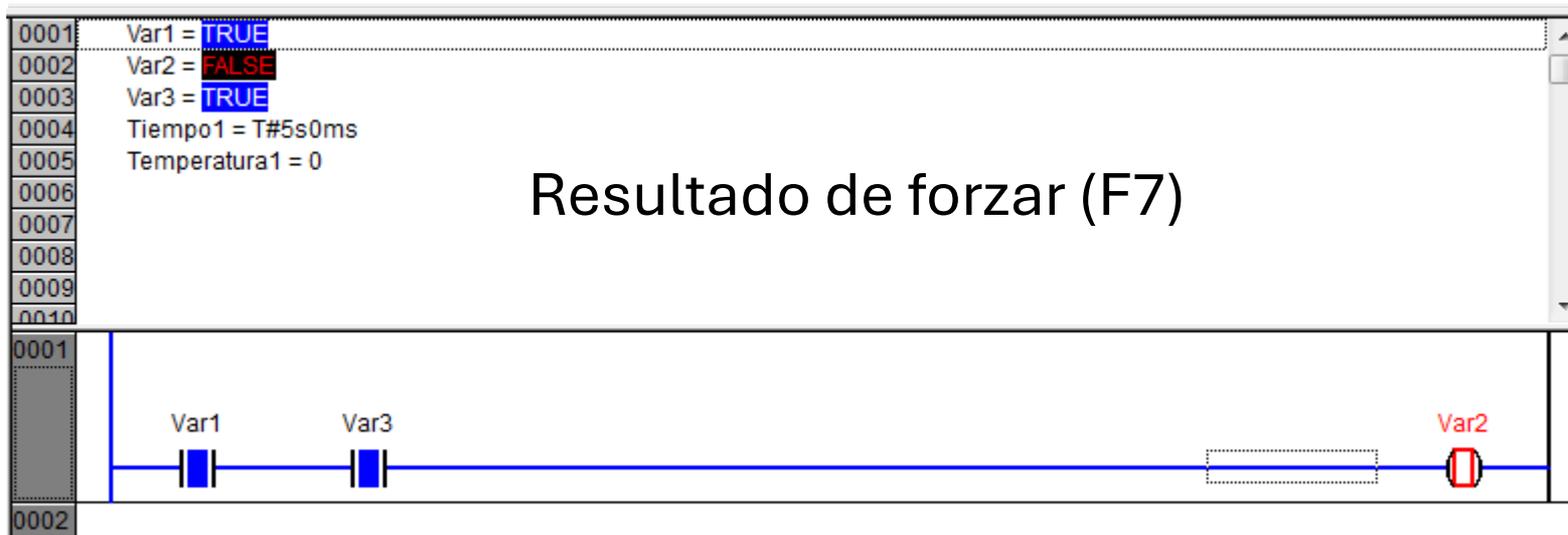
Forzar valores preparados: F7



Simulación del Programa

- Online: Forzar variables (Force values)

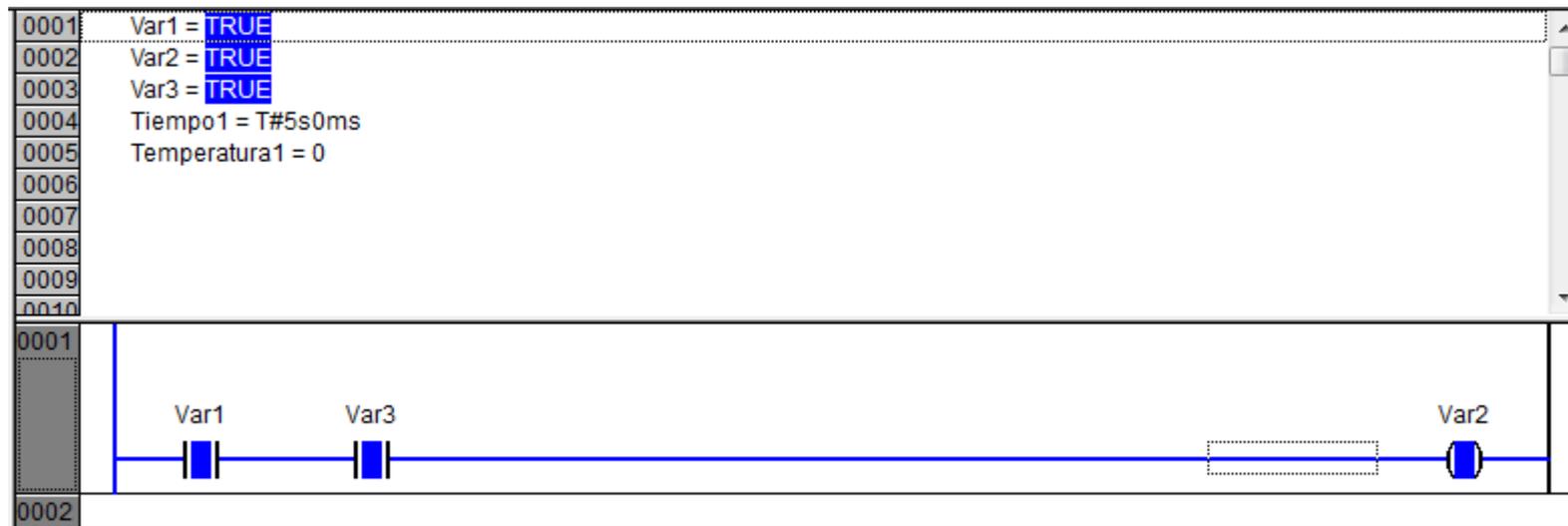
Escribir/Forzar variable asociada a la bobina



Simulación del Programa

- Online: Forzar variables (Force values)

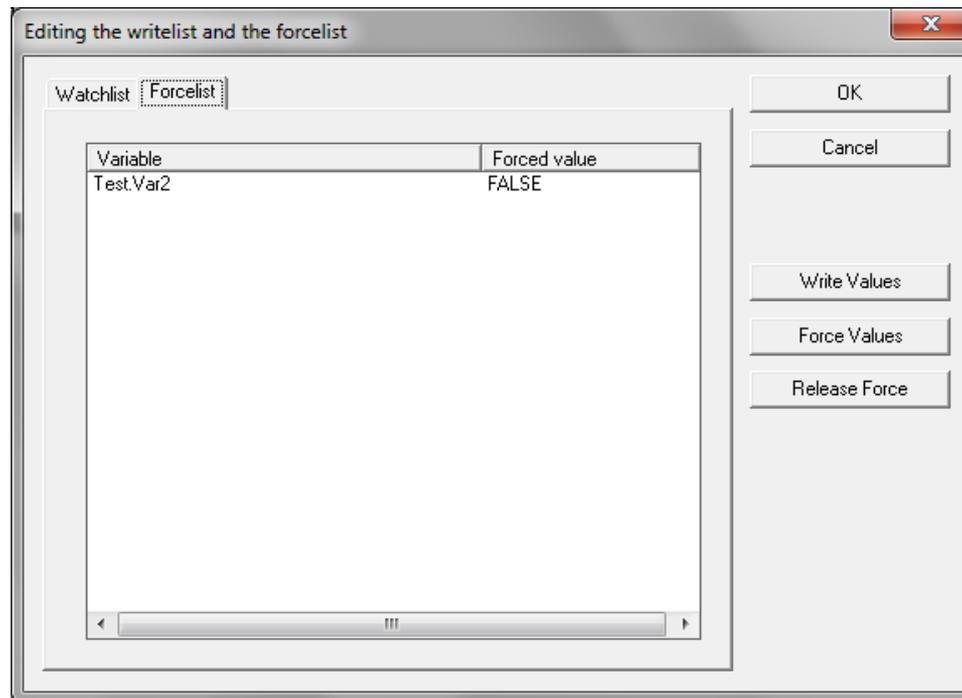
Liberar forzado de variables (Shift+F7)



Simulación del Programa

- Online: Forzar variables (Force values)

Visualizar lista de forzados (Ctrl+Shift+F7)



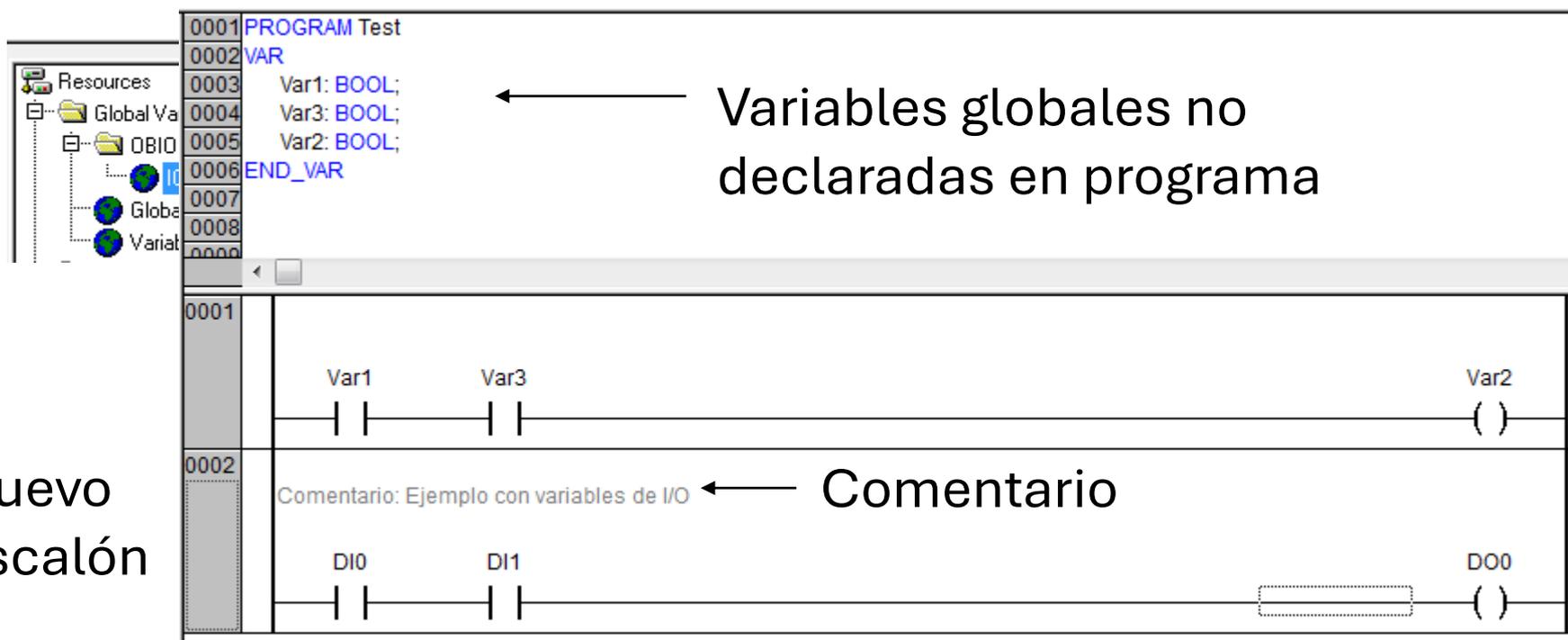
Shortcuts

- F1 - Ayuda
- F2 – Input Assistant
- F11 – Build - Compilar
- F5 – Run – Ejecutar el programa
- Ctrl+F7 – Write values – Escribir
- F7 – Force values – Forzar
- Shift+F7 – Release value – Liberar forzado

Programa en LD

- Ejemplo con Variables de I/O

Variables globales asociadas a entradas/salidas



The screenshot shows a software interface for programming a PLC. On the left, a tree view shows a project structure with folders for 'Global Va', 'OBIO', 'Globe', and 'Variat'. The main window is divided into two sections: a variable declaration table and a ladder logic diagram.

0001	PROGRAM Test
0002	VAR
0003	Var1: BOOL;
0004	Var3: BOOL;
0005	Var2: BOOL;
0006	END_VAR
0007	
0008	
0009	

← Variables globales no declaradas en programa

0001

Var1 Var3 Var2

|| || ()

0002

Comentario: Ejemplo con variables de I/O ← Comentario

DI0 DI1 DO0

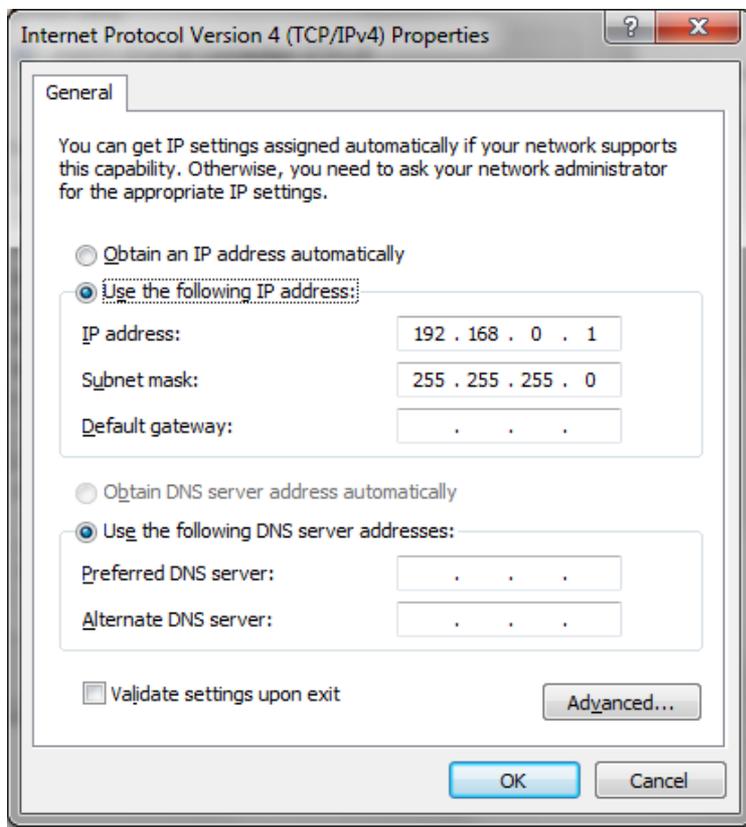
|| || ()

Nuevo
escalón

Conexión Ethernet al PLC

- IP de PC: 192.168.0.XXX
- Mask: 255.255.255.0

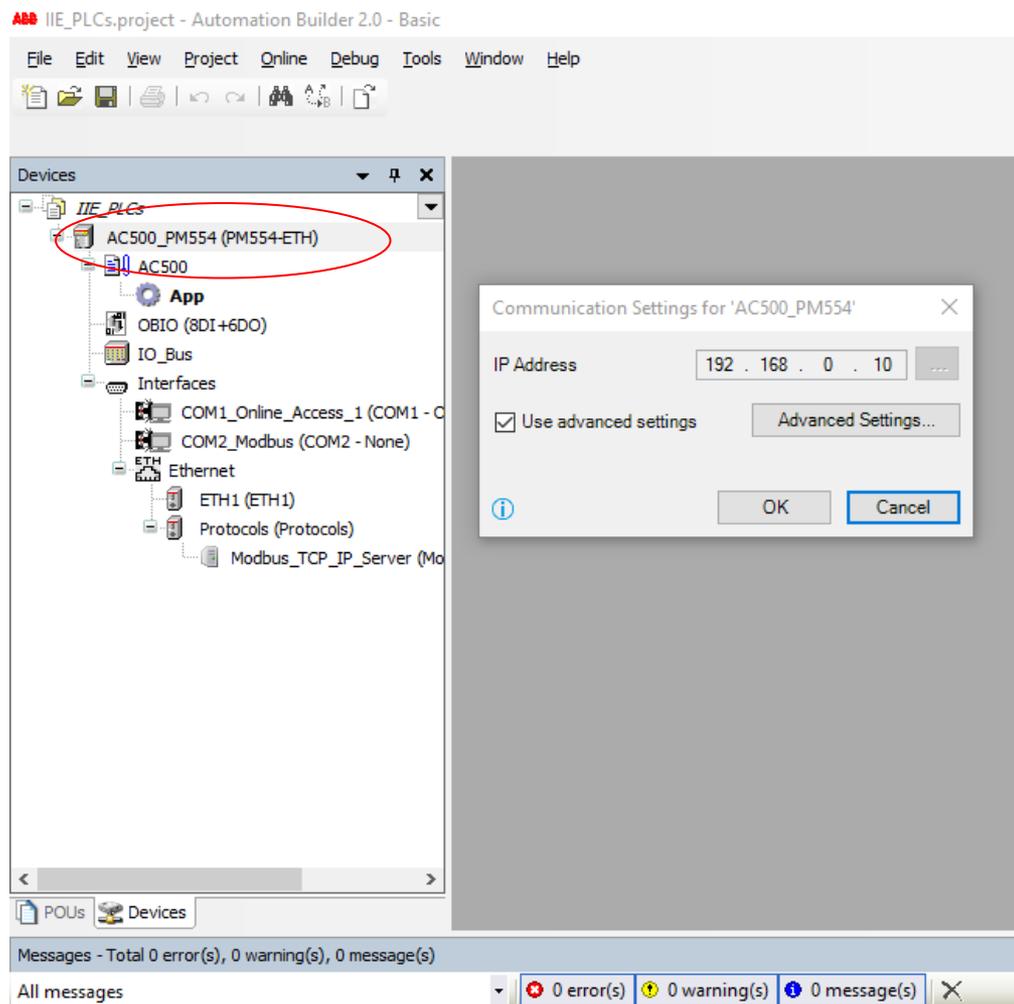
- IP de PLC: 192.168.0.YYY



Set	IP PLC
1	192.168.0.10
2	192.168.0.20
3	192.168.0.30
4	192.168.0.40
5	192.168.0.50
6	192.168.0.60

Conexión Ethernet al PLC

- Objeto AC500_PM554...
- Botón derecho, “Communication Settings”
- Colocar dirección IP del PLC



Descarga al PLC

- Desactivar modo Simulación
- Menu: Online -> Login
- Menu: Online -> Download
- Descargar programa al PLC, se sobre-escribe programa en ejecución

- Menu: Online -> Run

¡Cuidado con un
PLC en marcha!

Descarga al PLC

- Salvar programa en Memoria Flash
- Menu: Online -> Create boot project
- El programa se ejecuta luego de encendido el PLC