Getting Started Handbook

AC500-eCo Starter kit
PS501 Control Builder Plus V2.x

AC500-eCo PM554 and PM564 CPU types are the introductory models of the ABB AC500 PLC family.

General information on the AC500-eCo Starter kit

This AC500-eCo Starter kit helps you to get familiar with ABB AC500 PLC offerings and the engineering tool. For that purpose, this manual explains how to connect and setup the components provided in the starter kit and how to program the PLC by means of several simple example applications.

The screen shots in this document are made with Windows 7. Windows® is a trademark of the Microsoft group of companies.

Contents of the AC500-eCo Starter kit

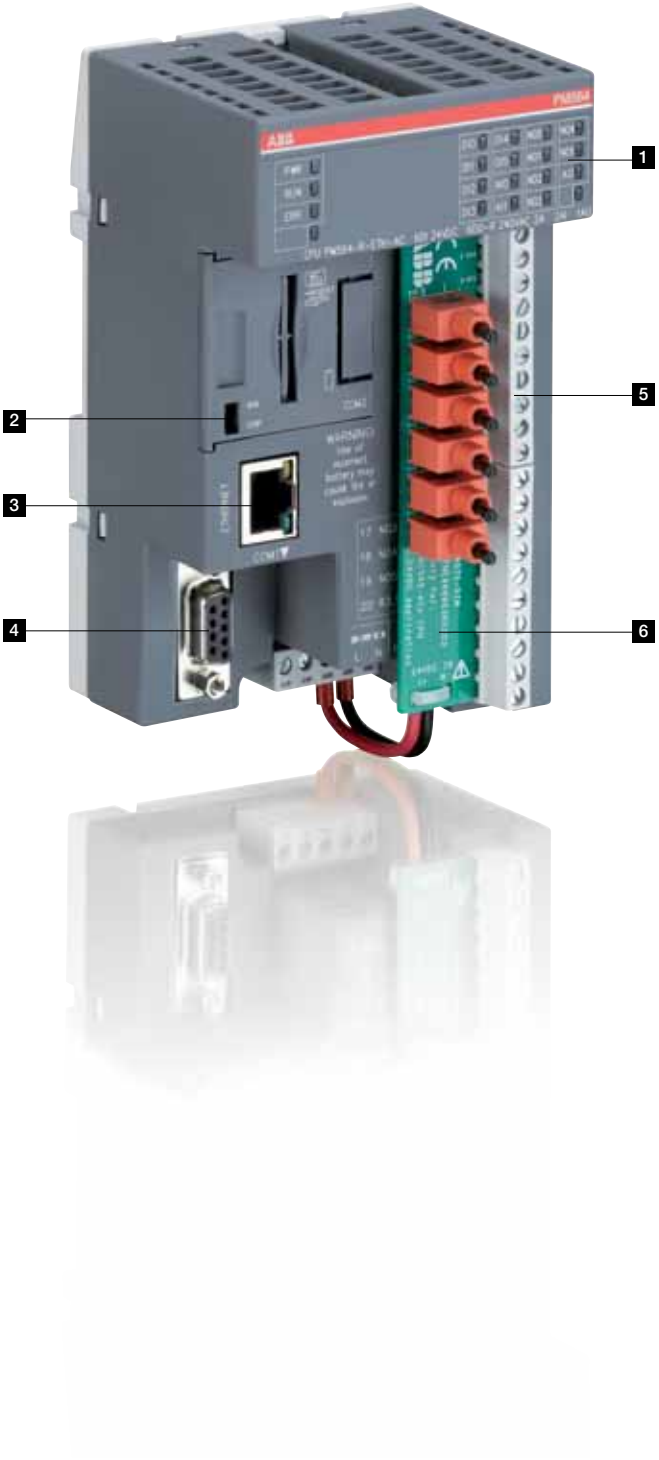
- 1 x AC500-eCo CPU
- 1 x Full functional starter kit version of the PS501 Control Builder Plus engineering tool
- 1 x Getting started handbook
- 1 x Digital input simulator
- 1 x Programming cable

Power and productivity
for a better world™

Table of content

AC500-eCo Starter kit Control Builder Plus
Starter kit description

Operating, display and connection elements of the AC500-eCo CPU (Shown below PM564 with connected input simulator)

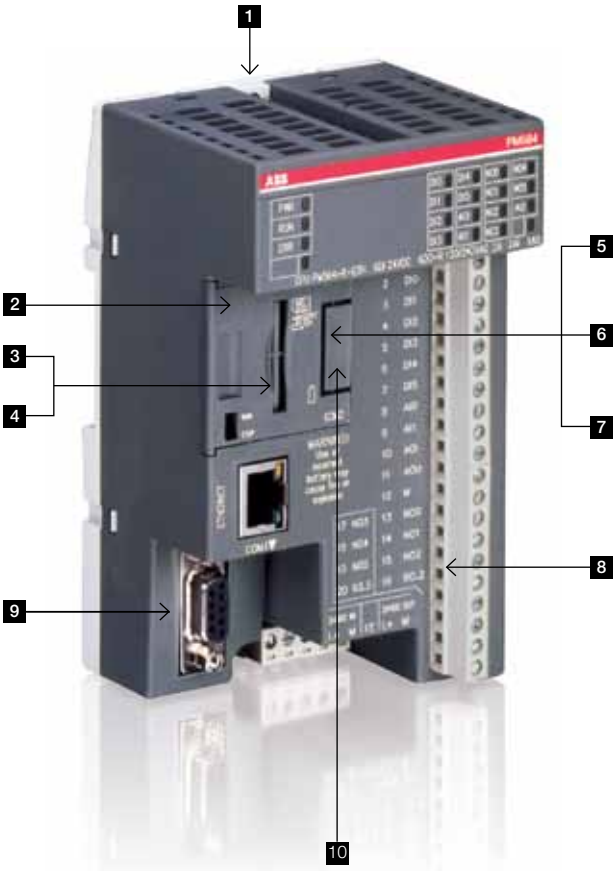


1. Status LED indicators
   CPU operation and onboard I/O status
2. Run / Stop Switch
   Control CPU operation
3. Ethernet CPU (in selected models)
   with RJ45 Port
4. COM1
   Online access, Modbus RTU, CS31-Bus master, ASCII
5. Integrated onboard I/O
   Convenient cost effective solution
6. Simulator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

AC500-eCo Starter kit Control Builder Plus
More options

Versatile
The AC500-eCo offers everything you expect from a modern PLC. A broad set of accessories rounds off the many benefits of our compact line. Covering everything from a comprehensive software and visualization package, to programming cables and terminal blocks, ABB's AC500-eCo offers a host of accessories that gives you the power to implement your application economically and in time.

Customer-friendly application support
Our local sales organizations are always available and will be happy to advise you prior to your order. In addition, our friendly, competent team of support consultants can be contacted any time via our 24/7 hotline.



1 Wall Mounting
(TA566)

2 Cover
(TA570)

3 SD-Card Adapter
(MC503)

4 SD-Card
(MC502)

5 Adapter with COM2
+ realtime clock
(TA562-RS-RTC)
Battery CR2032 not included

6 Adapter with
realtime clock
(TA561-RTC)
Battery CR2032 not included

7 Adapter with COM2
(TA562-RS)

8 Input simulator for
onboard I/O
(TA571-SIM)

9 COM1 USB
programming cable
(TK503)

10 COM2 USB
programming cable
(TK504)

AC500-eCo Starter kit Control Builder Plus
PS501 Control Builder Plus Engineering Tool

Program ABB PLCs with PS501 Control Builder Plus

For PLC, drives and control panels, there is one single smart engineering tool: PS501 Control Builder Plus!

- One tool for programming and configuration of PLCs AC500, AC500-eCo and specific LV drives offered by ABB
- Powerful IEC61131-3 programming functionality: Programming in all five IEC 61131-3 languages, the only recognized international standard
- Advanced visualization setup
- Convenient diagnostics and debugging
- Easy network and fieldbus configuration
- Online changes to multiple PLCs in Ethernet networks

Advanced visualization

Control Builder Plus supports many different kinds of enhanced visualization built-in

- Integrated visualization
- Standalone visualization used in PC with protection of code
- AC500 web visualization built using Control Builder Plus
- Integrated panel builder software for CP600 series panels
- OPC server integrated with CoDeSys

Convenient diagnostics and debugging

- Recipe management for simpler production solutions
- Multiple watch lists for superior overview and for customized tasks
- Smart diagnostics and debugging for easier online use
- Alarm handling for enhanced maintenance and commissioning

Easy network and Fieldbus connectivity

- Simple configuration of Fieldbuses and serial connections:
  - PROFIBUS DP, CAN, CANopen, Modbus, serial and ABB CS31 system bus
  - DeviceNet with Sycon.net configurator
- Easy configuration of real-time Ethernet networks:
  - PROFINET, EtherCAT
- Internet protocol suite includes:
  - HTTP (web server in AC500 CPU)
  - SNTP (time synchronization of CPUs)
  - SMTP (email messages and attachments)
  - FTP (file transfers)
  - DHCP (automatic network IP configuration)
  - TCP/IP (standard transmission control and internet protocol)
  - UDP/IP (fast network communication)
  - IEC60870-5-104 (sub station automation protocol)

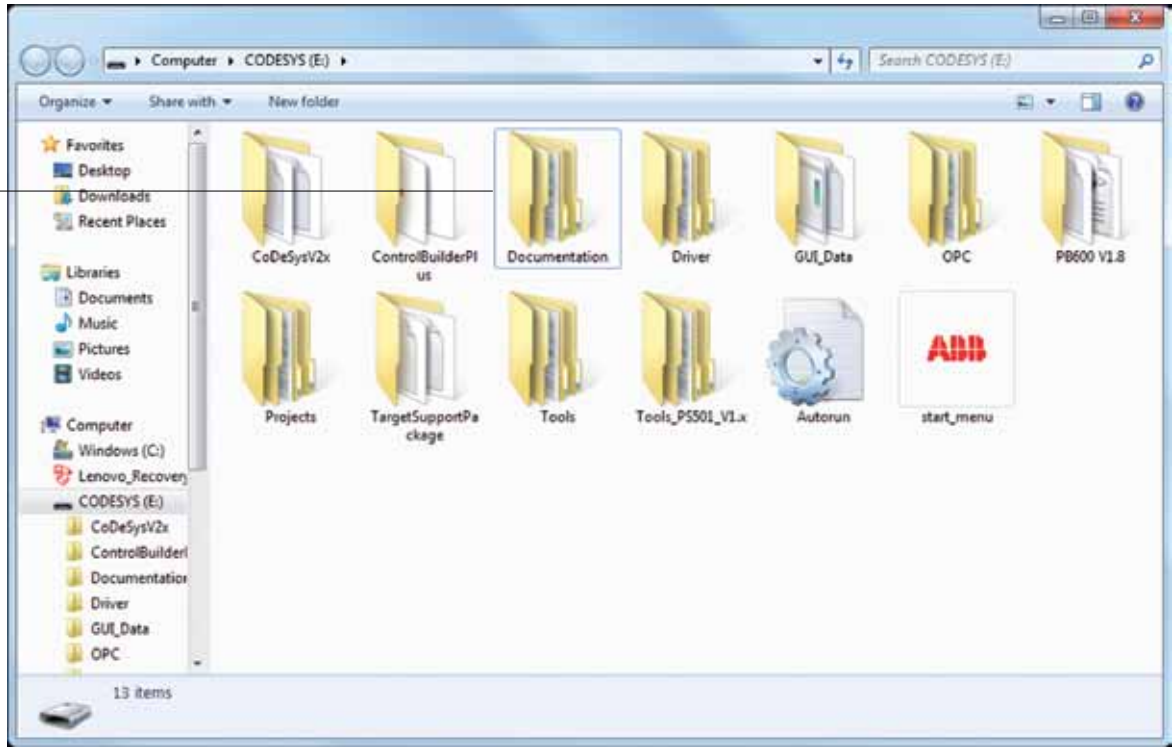
Remote and bulk update and parameterization

- ABB drives connected by Profibus or PROFINET to AC500 can now be remotely parameterized from a single point - the PC running PS501 Control Builder Plus
- Multi-online-change allows to modify and transfer multiple PLC programs simultaneously
- Remote firmware updates reduces travel cost and time.

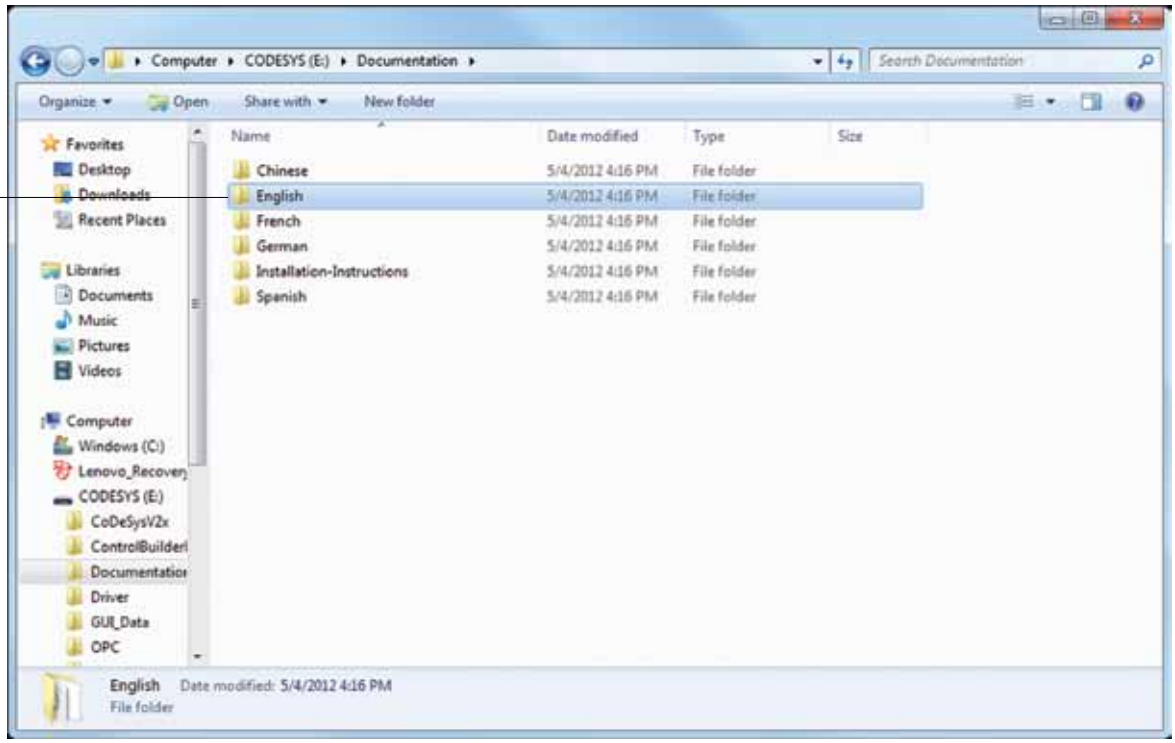
CoDeSys

AC500-eCo Starter kit Control Builder Plus
Navigating helpfiles in documentation

1 To start using the helpfile, insert the **PS501 USB Flash Drive** into PC. Open Windows Explorer, browse to the USB Flash Drive directory, double click on **Documentation** folder.



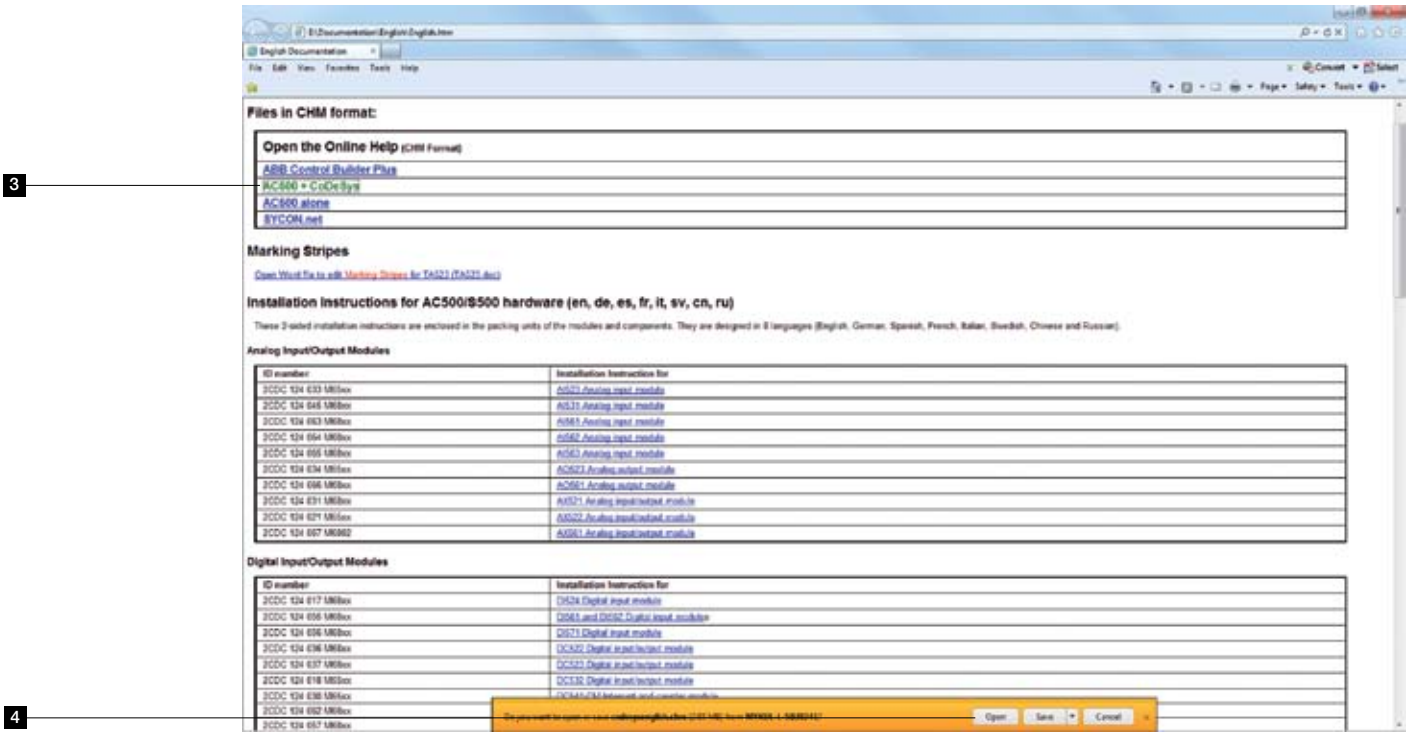
2 Select the prefered language, double click to open folder. Shown below is the English folder. Double click on the **English** HTML file to begin.

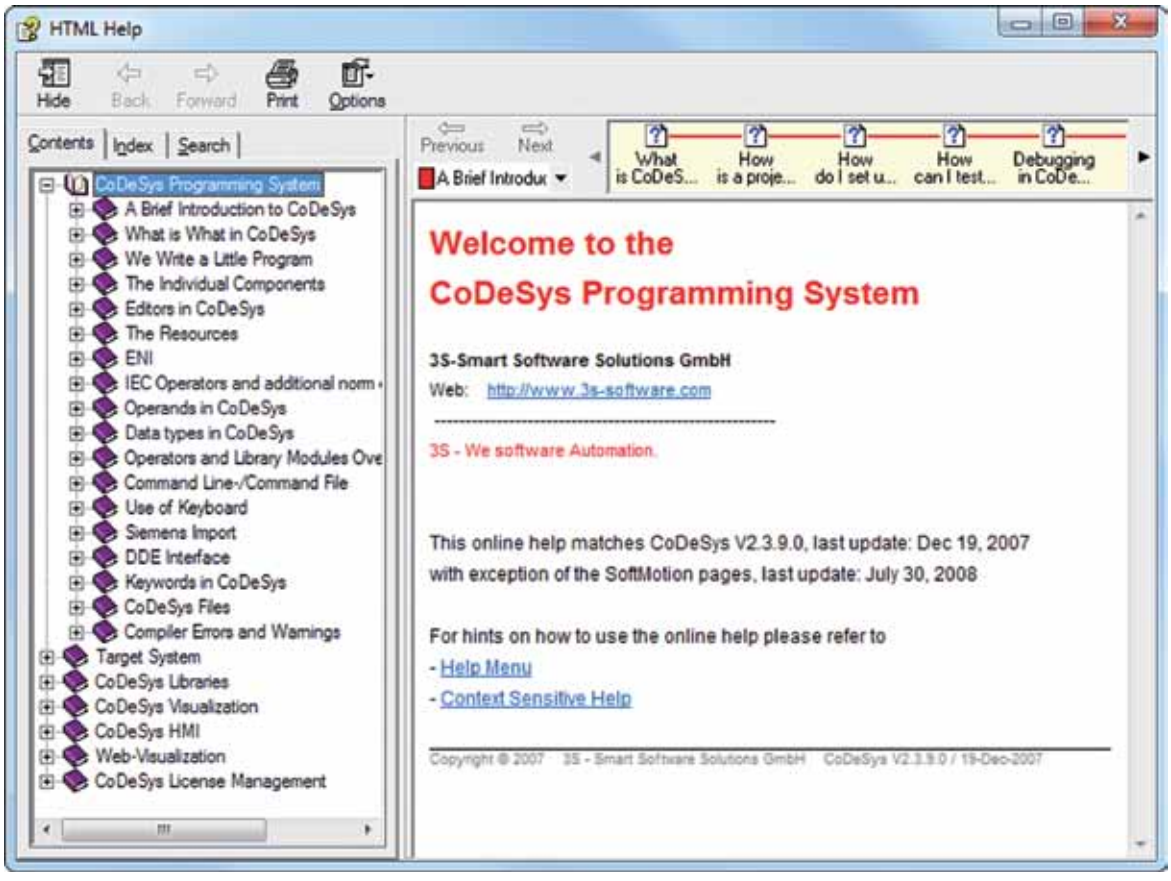


AC500-eCo Starter kit Control Builder Plus
Navigating helpfiles in documentation

3 Select by clicking “**AC500 + CoDeSys**”.

4 A window will pop up and click on “**Open**” to proceed.

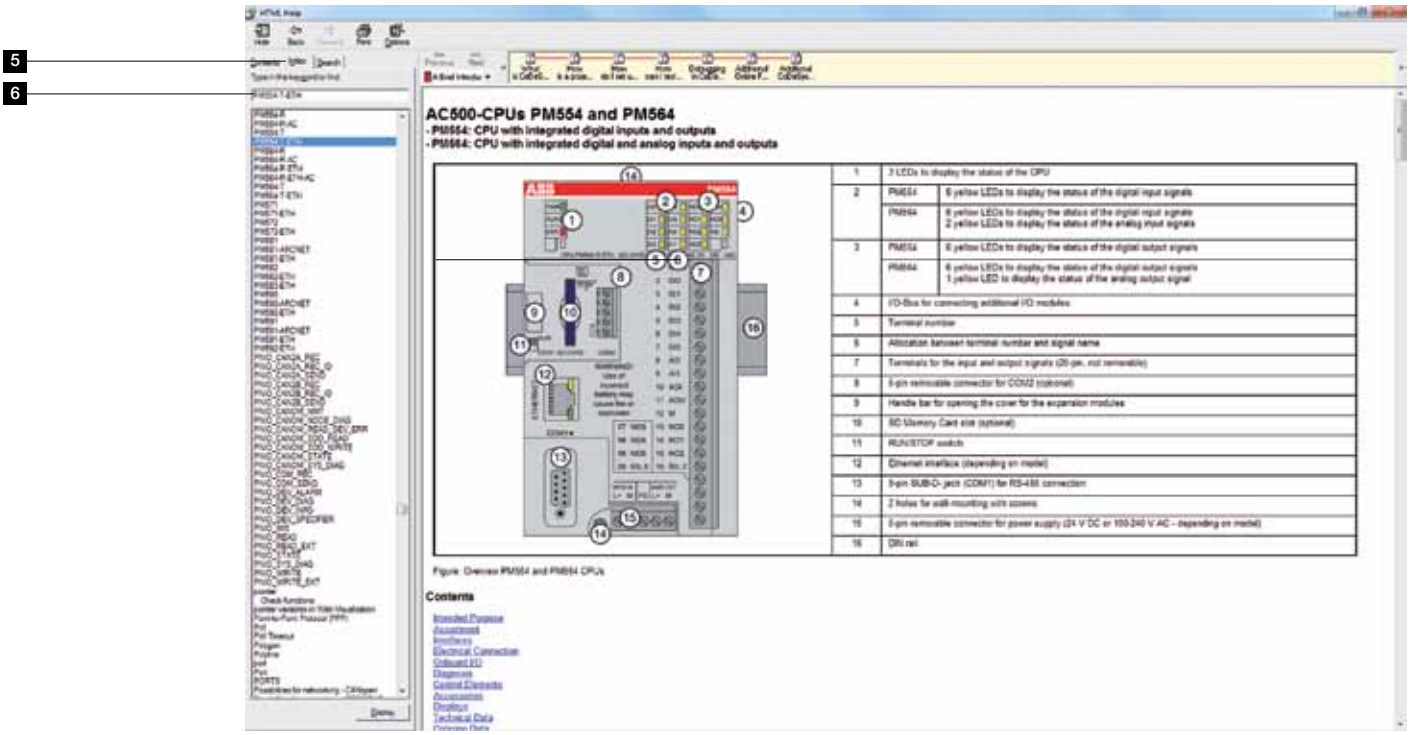




AC500-eCo Starter kit Control Builder Plus
Navigating helpfiles in documentation

5 Select **“Index”**

6 Type **“PM564-T-ETH”** and press ENTER



AC500-eCo Starter kit Control Builder Plus
Mounting of AC500-eCo CPUs on DIN Rail

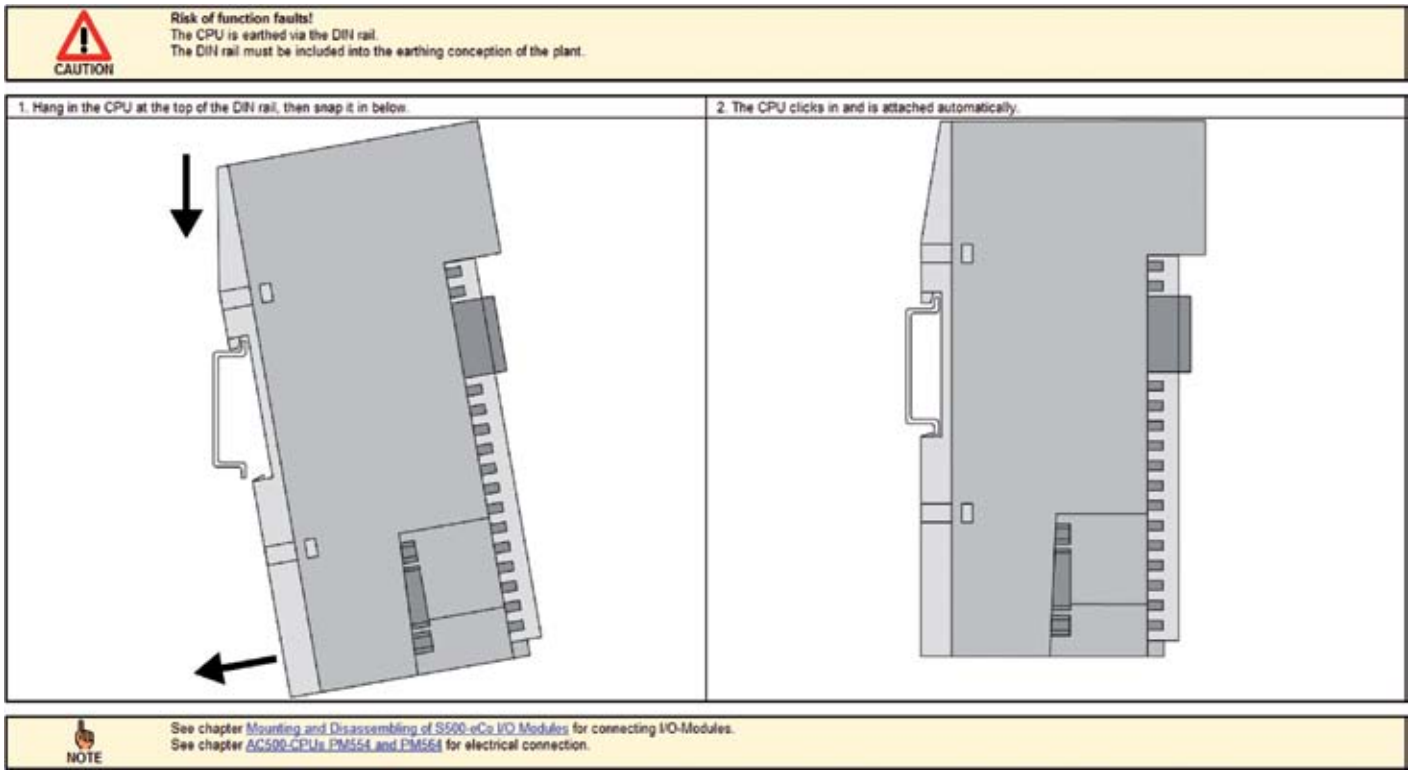
AC500-eCo CPUs can be mounted either on a DIN rail or with screws on a metal plate. Find the different mounting and disassembling procedures below:

1. Unpack the starter kit CPU module from the box.

2. Place the CPU module on the upper side of the DIN rail, and press it down gently.

3. The CPU module automatically locks on the DIN rail with an audible click.

To unmount:
Repeat the steps above in reverse order.



AC500-eCo Starter kit Control Builder Plus
Mounting of AC500-eCo CPUs on a metal plate

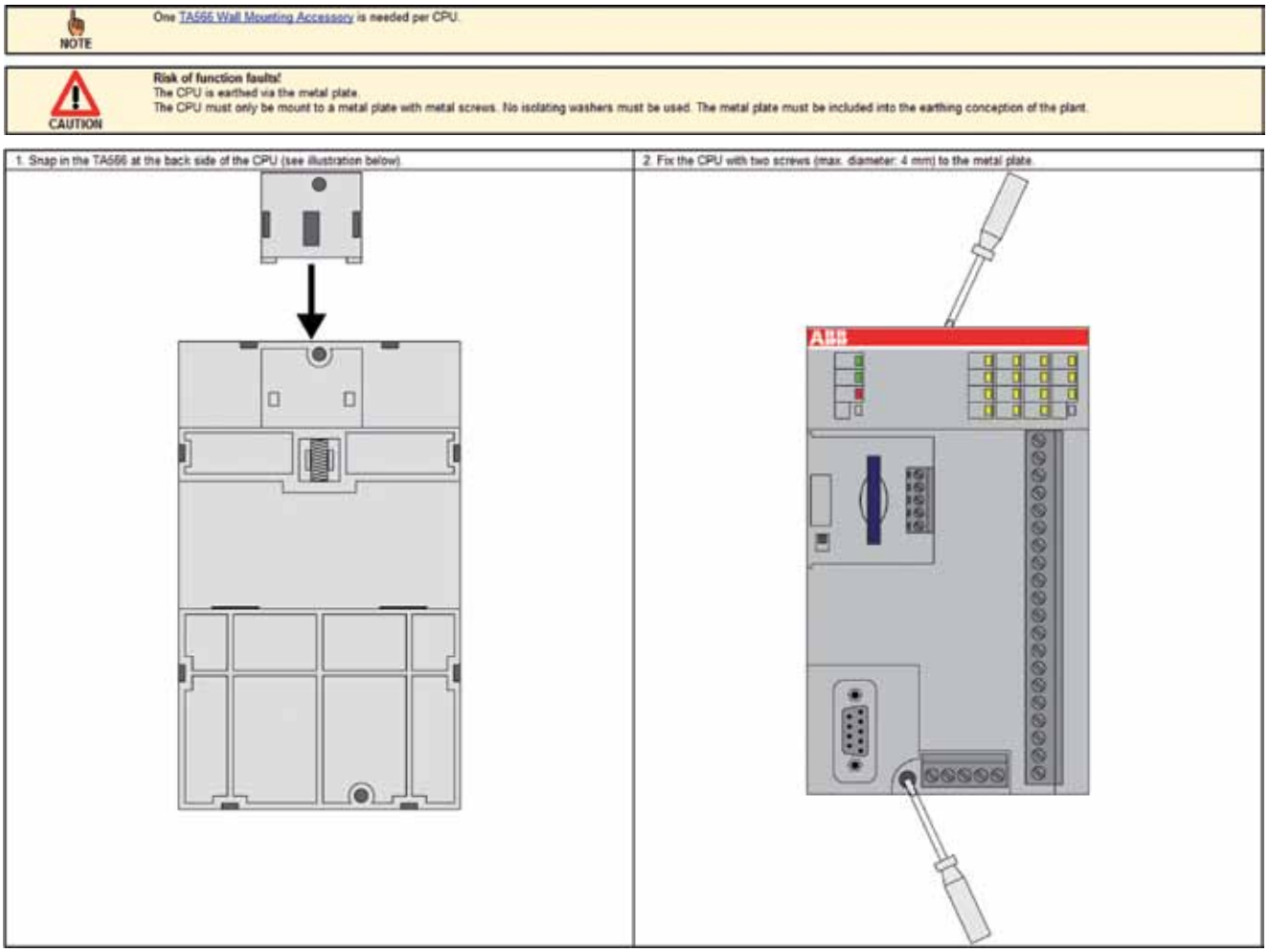
AC500-eCo CPUs can also be mounted with screws on a metal plate with optional **TA566 Wall Mounting Accessory**.
Find the different mounting and disassembling procedures below:

1. Unpack the starter kit CPU module from the box.

2. Snap in the TA566 at the back side of the CPU (See illustration below).

3. Fix the CPU with two screws (Max. diameter: 4 mm) to the metal plate.

To unmount:
Repeat the steps above in reverse order.



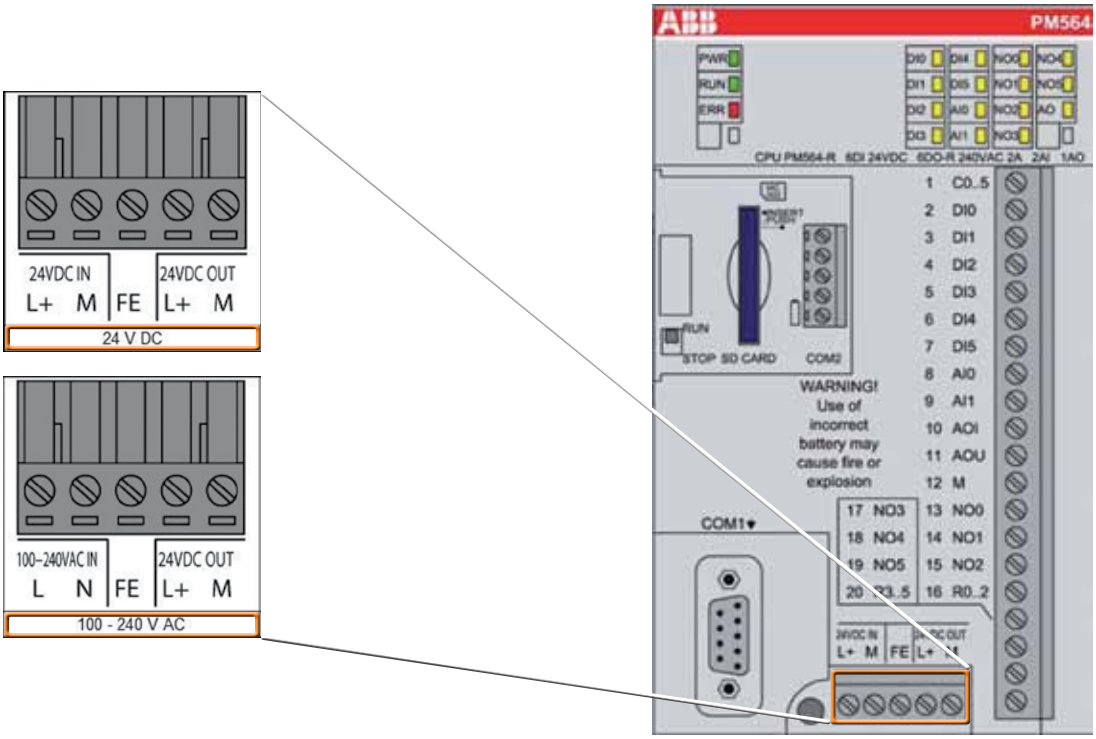
AC500-eCo Starter kit Control Builder Plus
Connecting the power supply to the AC500-eCo CPU

Read the instructions carefully prior to connecting the power supply.

Depending on the variant of the AC500-eCo CPU, the module needs to be powered by either 24V DC or 100-240V AC. A 5-pin screw-type terminal block is provided for connecting the power. The power supply is connected as shown.

The terminal pin assignment is as follows:
24V DC Version or **100-240V AC Version**

Connect the CPU's L+/M terminals on the left (power input) to the L+/M terminals of the power supply module. Verify that the cables are connected correctly.



Risk of equipment damages or personal injury!
Always observe the valid safety regulations regarding the installation, handling and commissioning of electrical equipment! Disregarding these instructions and rules may result in equipment damages, serious physical injury or death!

Risk of damaging the CPU and the connected modules!
For all 24V inputs or outputs, Voltages > 30V DC should not be applied as they can destroy the CPU and the connected modules. The supply voltage for 24V DC variants should never exceed 30V DC.

Installation and maintenance have to be performed according to the technical rules, codes and relevant standards, e.g. EN 60204 part 1, by skilled electricians only. Read the instructions sheet and the following manuals: AC500-eCo installation instructions: 2CDC125122M6801 and AC500 system description Vol 0: 2CDC125015M0201 carefully prior to connecting the power supply to the module. More information and technical documentation is available at www.abb.com/plc, please use the search function on the right side at the top.

The 24V DC out terminals could be used to power external sensors. This supply can be easily looped through to supply power to the Onboard Digital Inputs.

AC500-eCo Starter kit Control Builder Plus
Installing the PS501 Control Builder Plus Engineering Tool

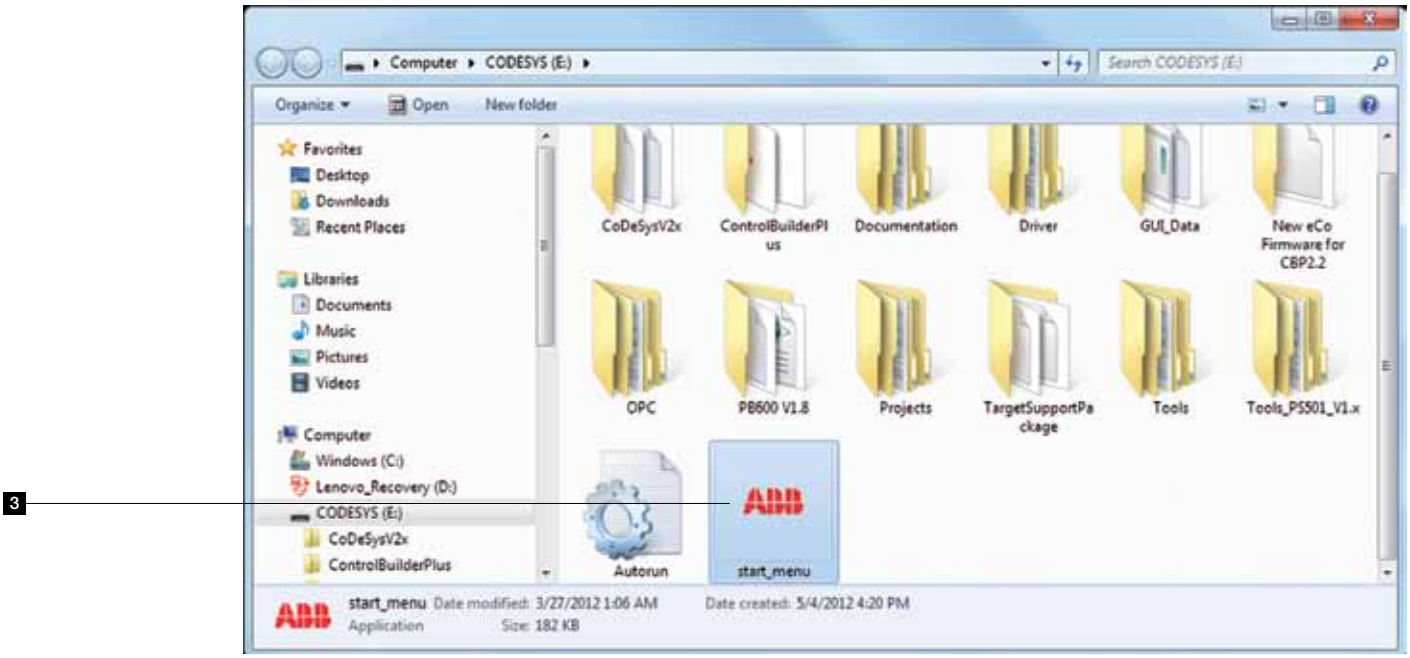
Installing the PS501 Control Builder Plus Engineering Tool

1 Insert the PS501 USB stick into your PC, an AutoPlay screen should pop-up automatically.

2 Double click on **Open folder to view files**.

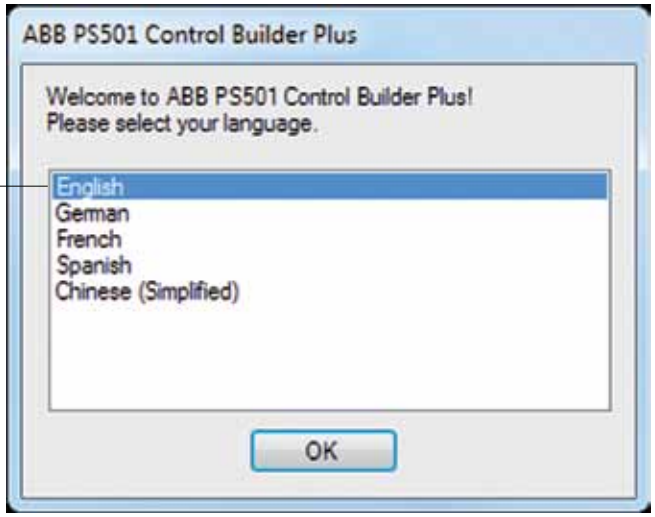
3 Double click on **Start_Menu** with ABB logo.

Take note that you MUST have Admin Rights to install the program.



AC500-eCo Starter kit Control Builder Plus
Installing the PS501 Control Builder Plus Engineering Tool

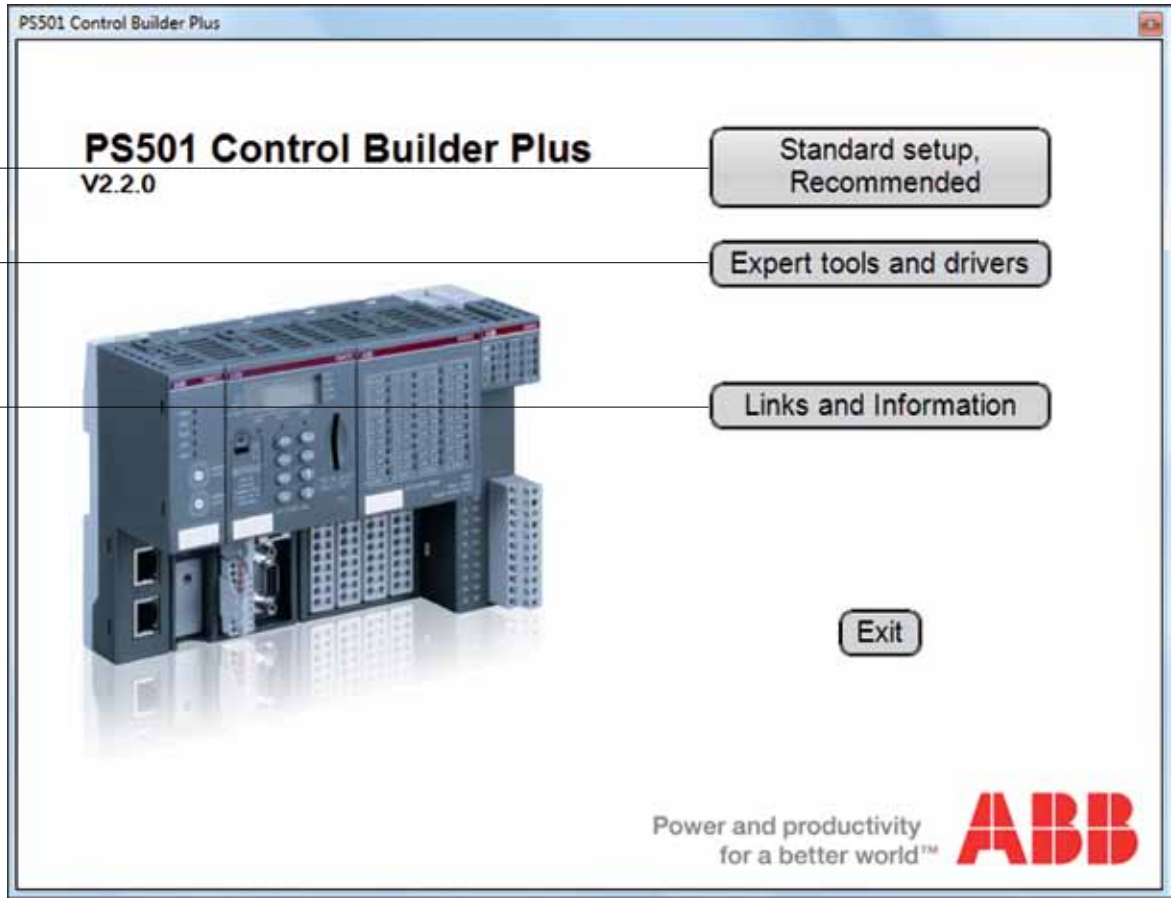
4 Please select **English** for installation, this is recommended for this document.



5 To start using the starter kit, select **Standard setup, Recommended** for software installation. This could take some minutes.

6 Other useful tools are also available for various applications and functions.

7 You can click on **Links and Information** to display important and helpful information which includes: ABB PLC, ABB Drivers, PS501 updates, firmware updates, CAD drawing library, EPLAN data and legacy product support.



AC500-eCo Starter kit Control Builder Plus
Installing the programming cable

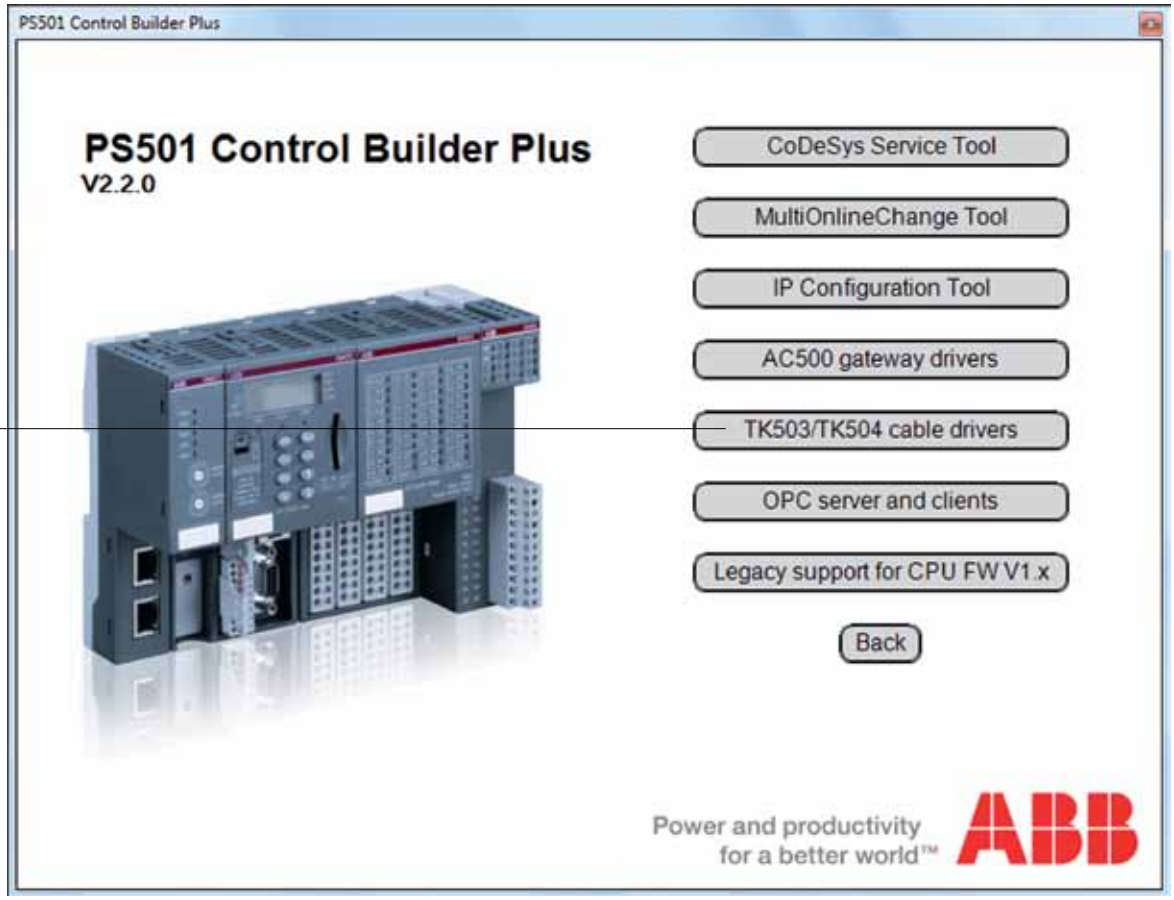
Depending on the type of the AC500-eCo variant you are using there are two different types of programming cable:

1. Non Ethernet variant requires TK503 USB to serial cable.
2. Ethernet variant requires a Cross Over or Patch Cable.
3. If installing **Ethernet Cable** please jump to Ethernet Setting on **Page 16**.

Do not plug in the USB cable until you have completed the driver installation process.

Installing the Driver for the TK503 Programming Cable

1 Use installation USB-stick provided. Go to **Expert Tools and Drivers** > TK503/TK504 cable drivers



2 An installation routine will be launched as shown below: In the appearing dialog, click **Install** and follow the instructions.

AC500-eCo Starter kit Control Builder Plus
Installing the programming cable

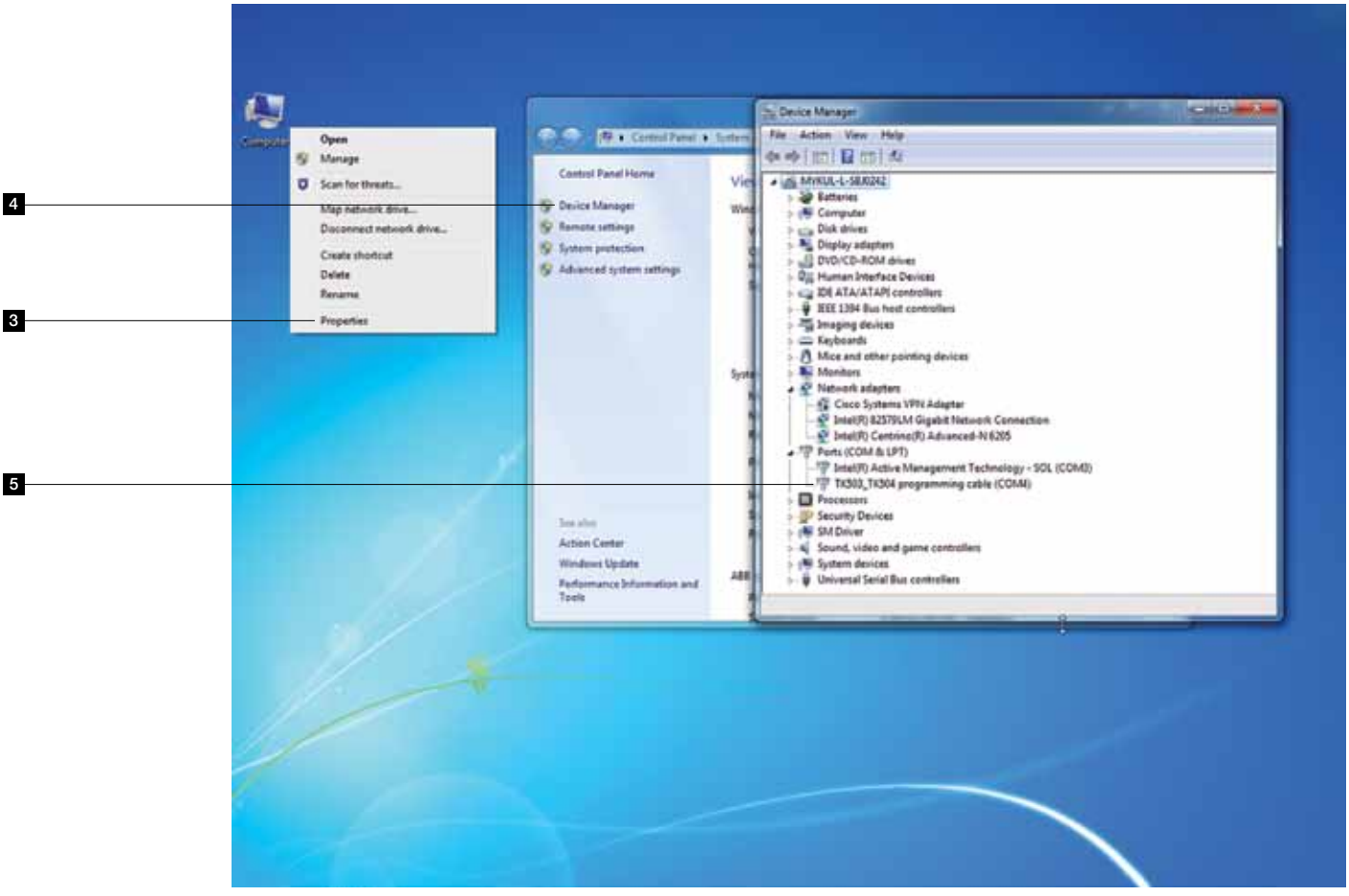
3 After the driver is installed, you can check if the driver is installed properly. First insert the USB connector of the cable TK503 in a USB port of your computer, then click on the **Start** icon in the taskbar, point your mouse on **Computer**, right click to select **Properties**.

4 In the pop up window, click on **Device Manager**. Go to the Port (COM & LPT) list, you will find TK503/504 programming cable is installed on the given com port. In this case it is COM4.

5 Note that different PC may provide different COM port number. Take note of the COM port number as you will need it for your Communication Parameters later.

Take following steps if using OS Microsoft Windows XP
Right click on My Computer > Properties > Hardware > Device Manager

Upon completion of the steps above, you can now insert the USB programming cable to the PC USB port.
Please proceed to **Creating a new project** on **Page 18**.



AC500-eCo Starter kit Control Builder Plus
Setting communication parameters in Windows for Ethernet

Before you are able to download the compiled program the first time from the PC to the PLC, you have to setup the communication parameter. There are two options you can use to login to the PLC, either with Ethernet or serial with TK503 USB cable.

For communication setup with **USB cable TK503** please go to **Page 42**.

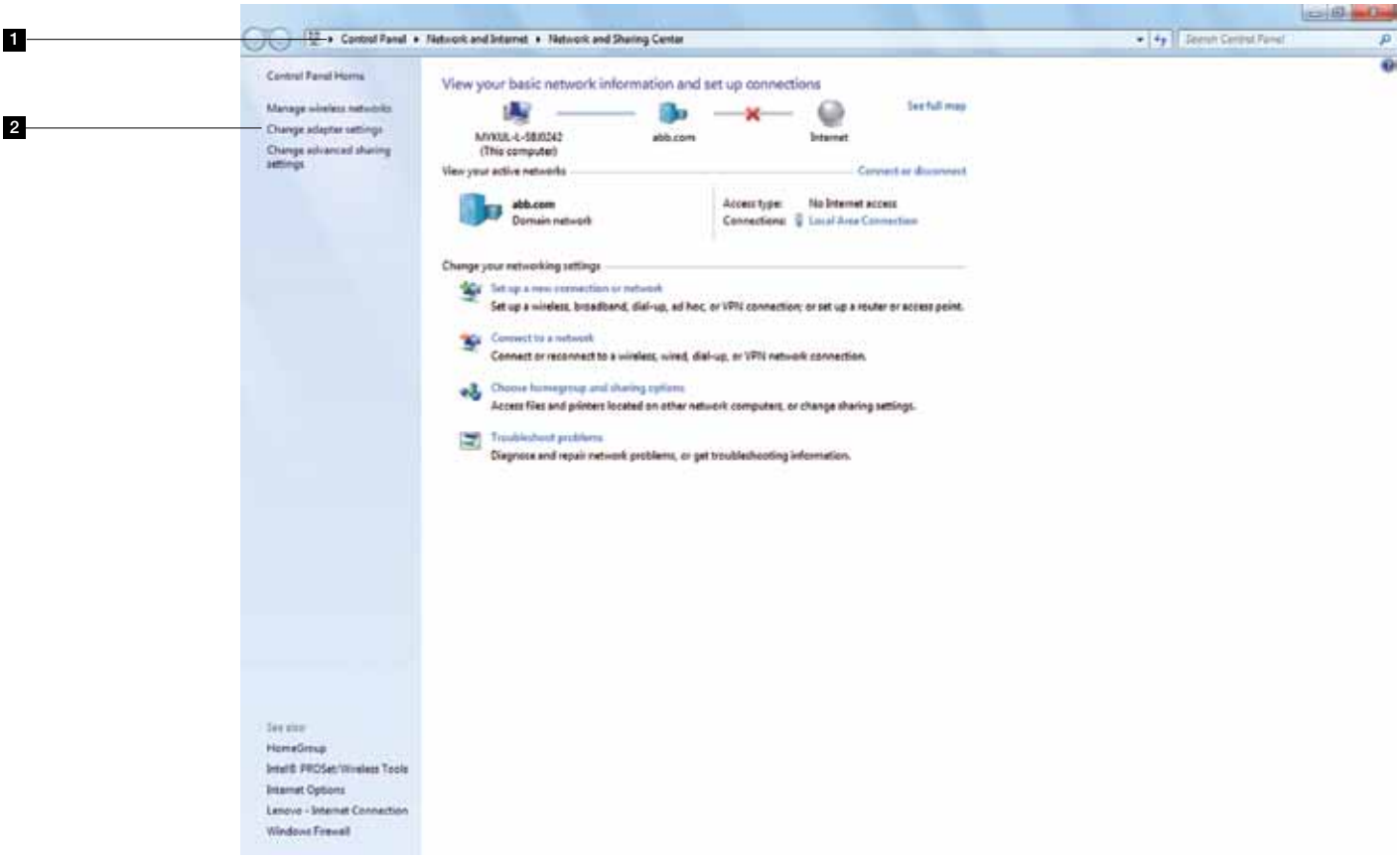
Option 1: Online Access with Ethernet

To verify the IP address of your PC
Make sure that your PC address is in the same class as the CPU's IP address. The factory setting of the CPU for IP address is 192.168.0.10. Then the IP of the PC should be 192.168.0.x, x should not be 10 so that it will not have an IP conflict with the CPU. Subnet mask should be 255.255.255.0.

To change the IP address in your PC, go to:

1. Go to Windows Control Panel > Network and Internet > Network and Sharing Center
2. Click on **change adapter settings**.

If using existing network with several devices, please pay attention on given network rules or contact your system administrator.



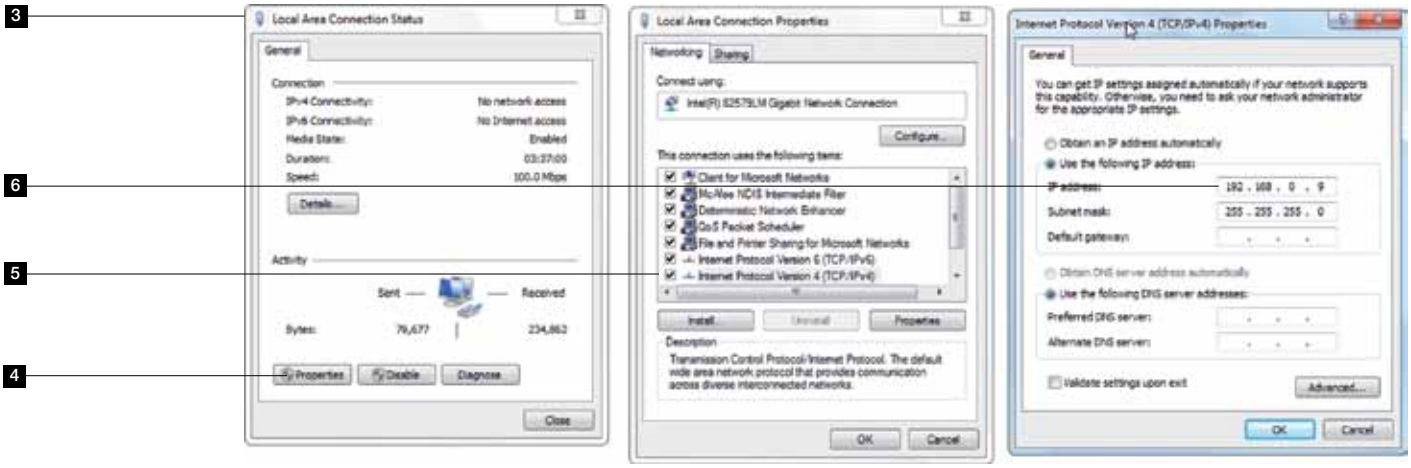
AC500-eCo Starter kit Control Builder Plus
Setting communication parameters in Windows for Ethernet

3 Select **Local Area Connection** and click the right mouse button to open the menu.

4 Choose **Properties** (Status can only be selected when the Ethernet interface of the computer is connected to e.g. a PLC).

5 Select **Internet Protocol Version 4 (TCP/IPv4)** and double click to see properties.

6 Key in your desired IP address and subnet mask then click OK.



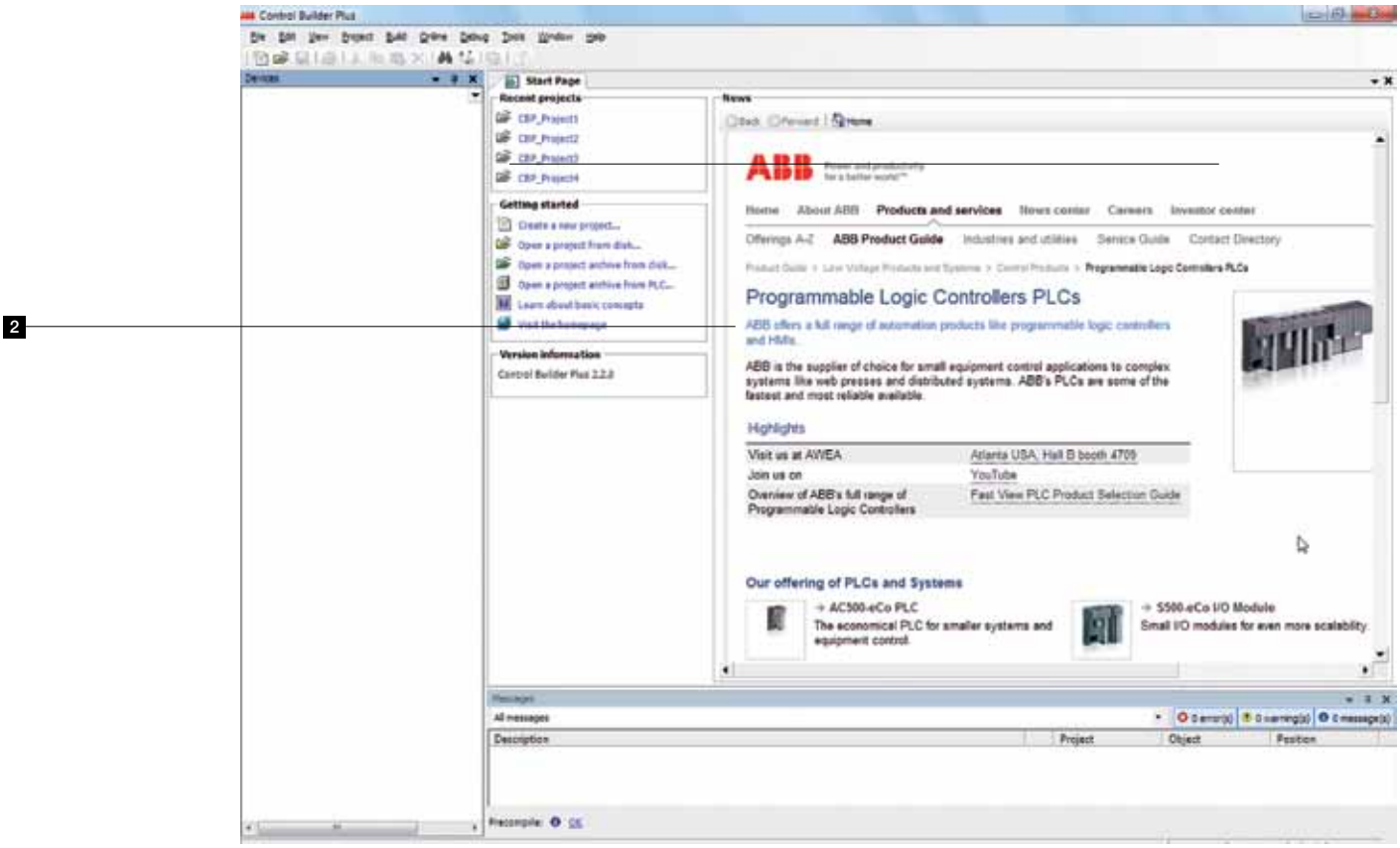
AC500-eCo Starter kit Control Builder Plus
Creating a new project

The following example gives you a brief step-by-step introduction to the PS501 Control Builder Plus software, thus introducing the programming basics for ABB PLCs. You can learn how to program the AC500-eCo PLC if you finish the following exercise.

Example: Getting started with a logical AND function in the programming language Function Block Diagram (FBD).
In this first example, you will develop and start up a very simple application project.

1. Start the ABB Control Builder Plus software.
   Double click on the Control Builder Plus icon on your desktop.
   (If Control Builder Plus icon is not available on your desktop, click **Start**, go to **All Programs**, select **ABB** folder and click on **Control Builder Plus**.)

2. The Control Builder Screen will appear as shown below, if Internet access is available Control Builder Plus will show the default ABB homepage for PLC products.



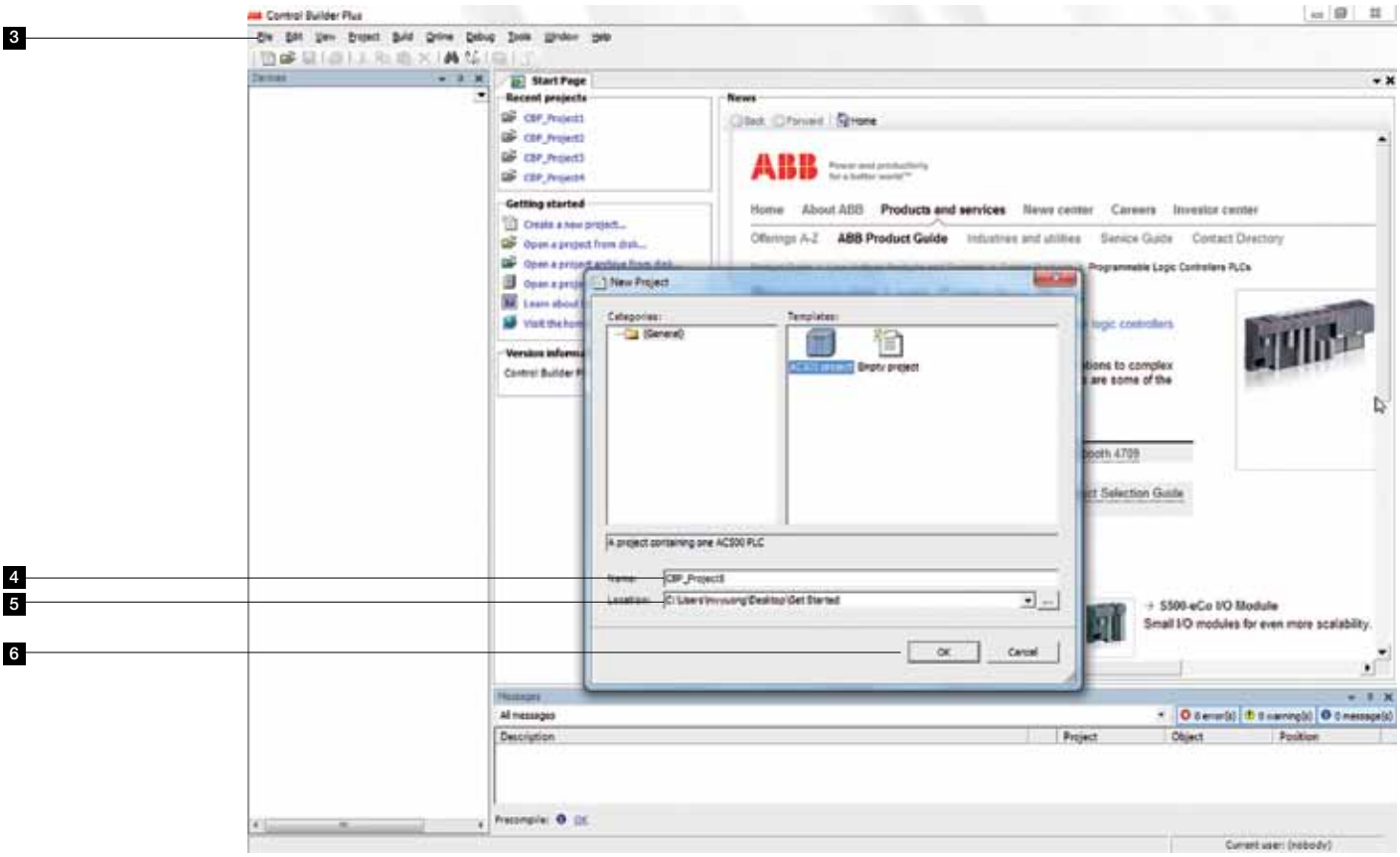
AC500-eCo Starter kit Control Builder Plus
Creating a new project

3 Create a new project by clicking the New button or selecting the File > **New Project**.

4 Enter project name

5 Select where you want to store the project

6 Select **OK** to start

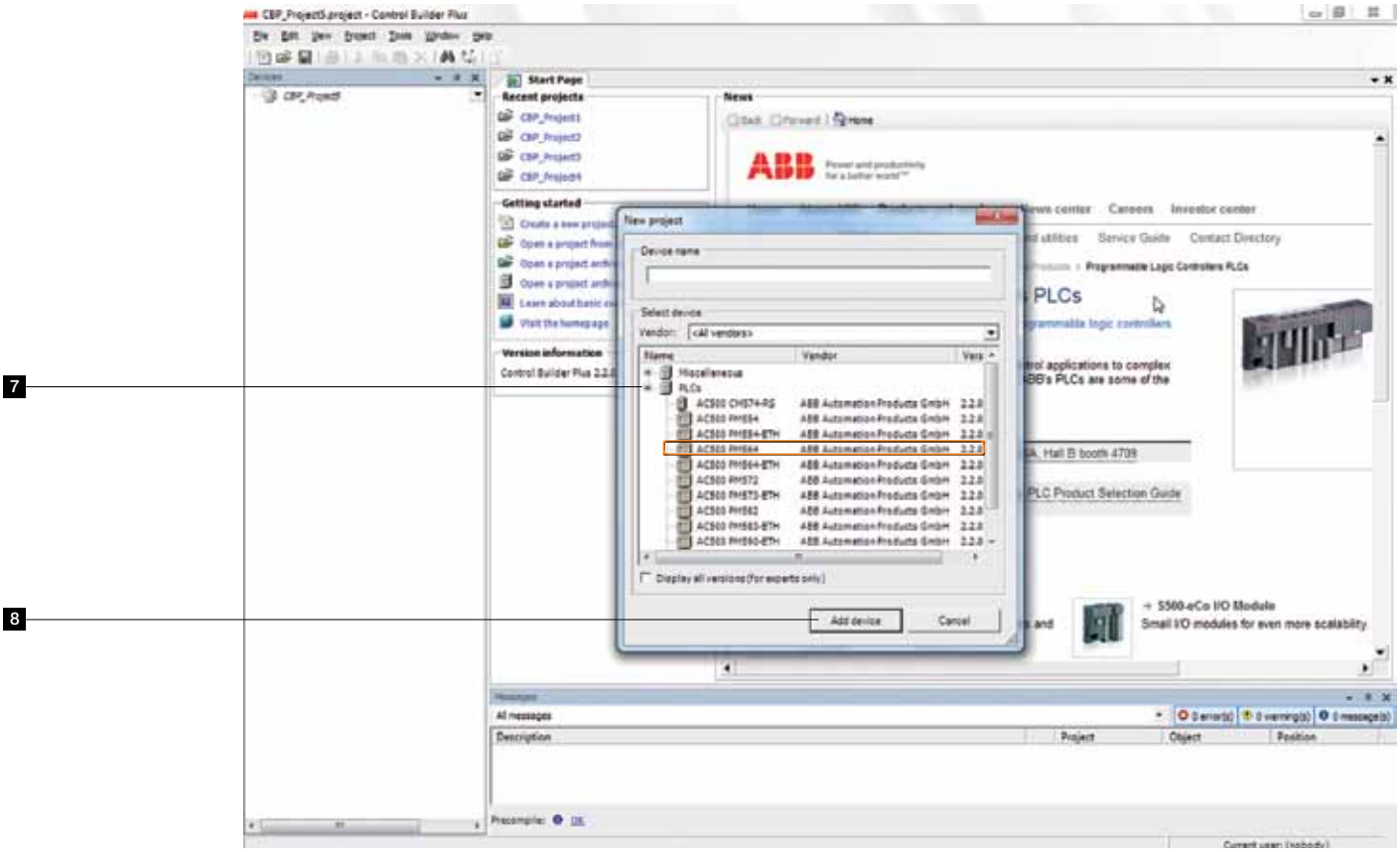


AC500-eCo Starter kit Control Builder Plus
Creating a new project

7 Click the ⊞ left of PLC

8 Select the type of CPU which came with the Starter Kit, click on **Add Device** to complete.

Printed on label on the product	To be selected in Control Builder Plus
PM554-T-ETH	AC500 PM554-ETH
PM564-R-AC	AC500 PM564
PM564-R	AC500 PM564
PM564-T	AC500 PM564



AC500-eCo Starter kit Control Builder Plus
Specifying the hardware configuration

Specifying the hardware configuration

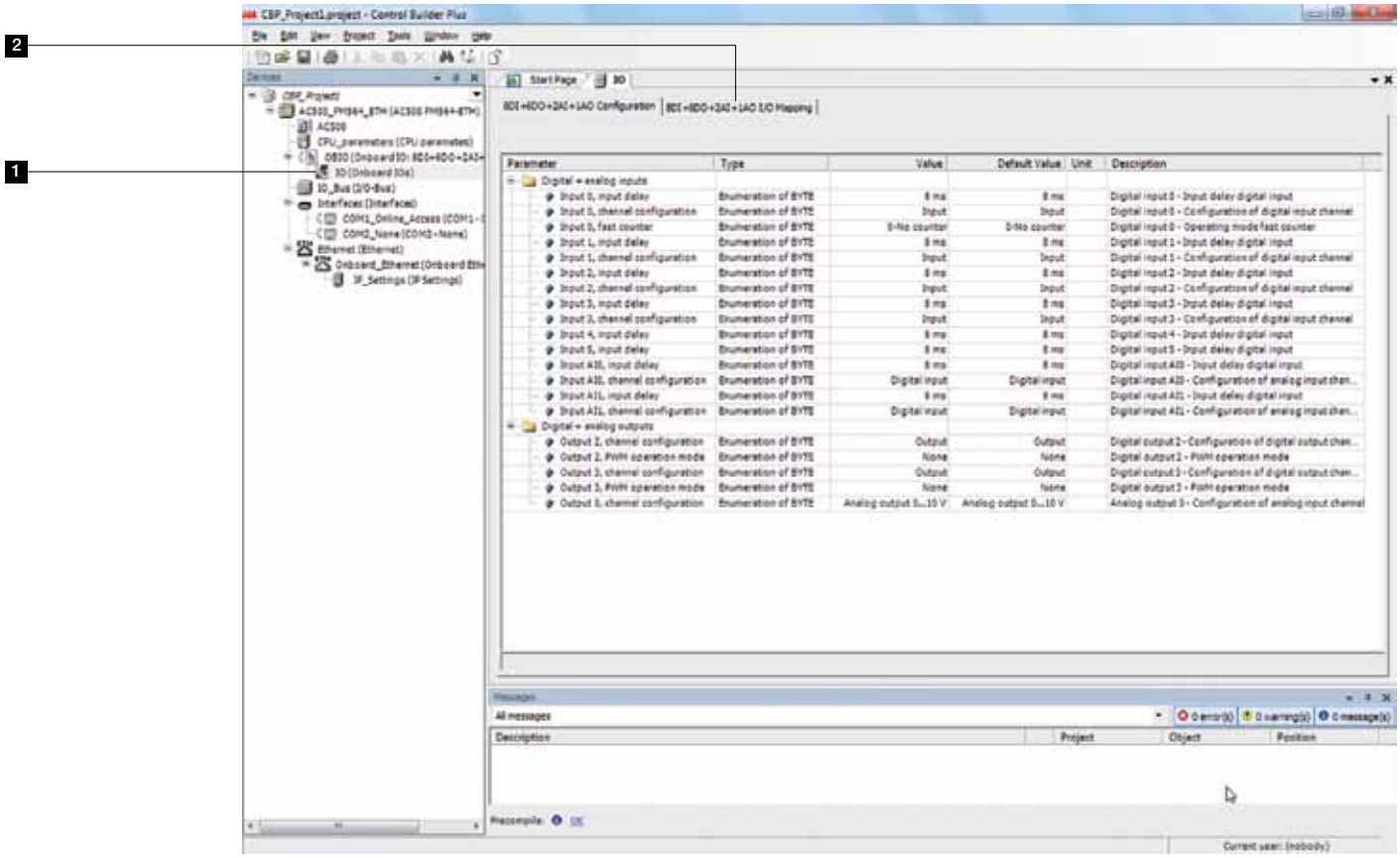
To specify the hardware configuration, the I/Os and their symbolic names have to be defined. Configure your I/O by double clicking I/O (Onboard I/Os) and refer to the mapping tab window opened on the right side where you can give variable names to each I/O points.

To expand the list, double click on the + sign on the left to expand.

1 To create I/O variable for the CPU, double click on the I/O (Onboard I/Os) selection.

2 The I/O tab will open on your right window with 2 child tabs. The 1st tab is I/O configuration, click on the 2nd tab for I/O Mapping.

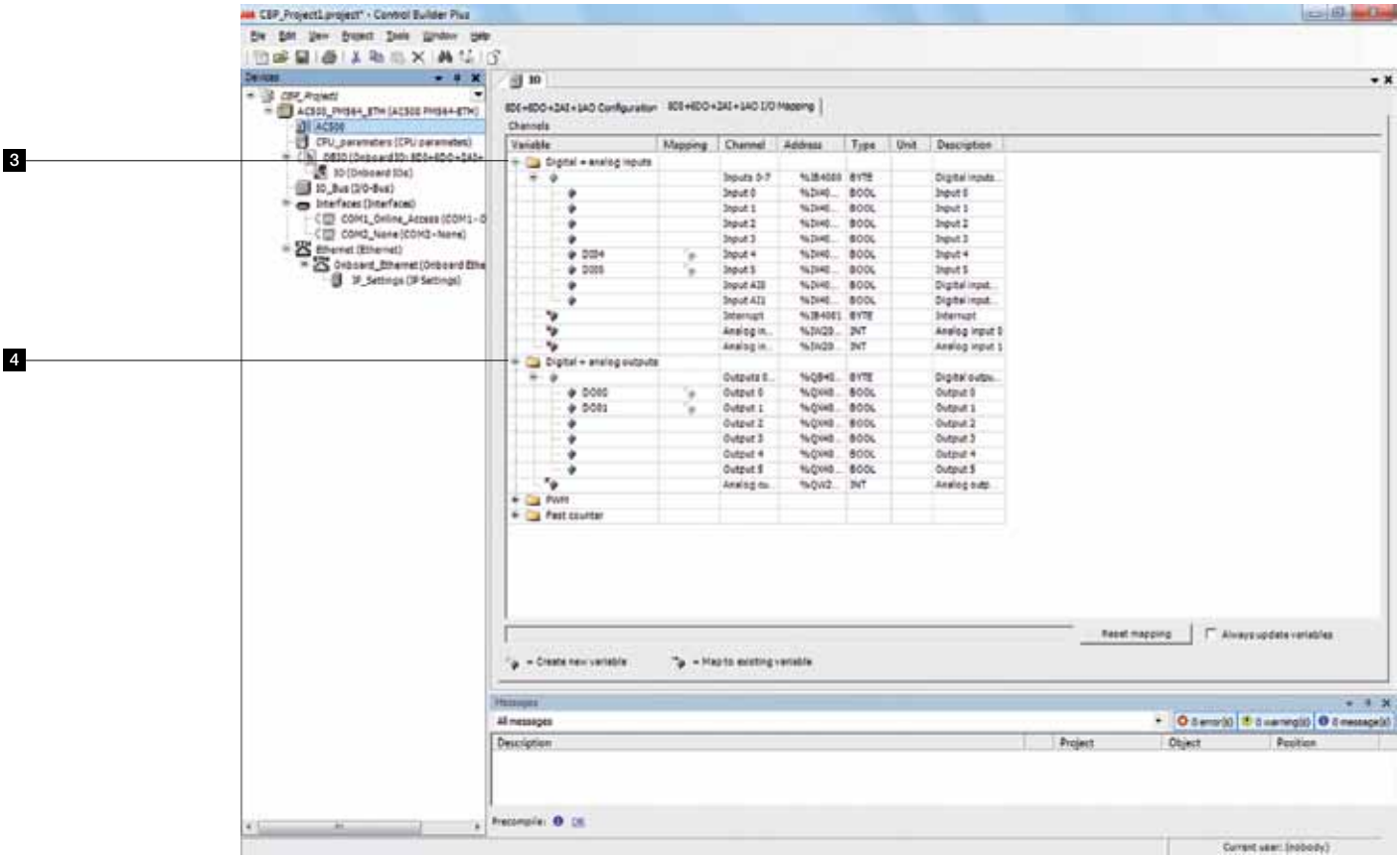
Note, if you made a mistake during the process, you can always **undo** by going to **Edit** on the left hand top corner and click **Undo**.



AC500-eCo Starter kit Control Builder Plus
Specifying the hardware configuration

3 Expand the inputs by clicking the ⊞ left of inputs and clicking the ⊞ left of Inputs 0-7 then add 2 Digital Inputs named **DI04** and **DI05** as shown below.

4 Expand the Outputs in similar way and add 2 Digital Outputs named **DO00** and **DO01** as shown below.

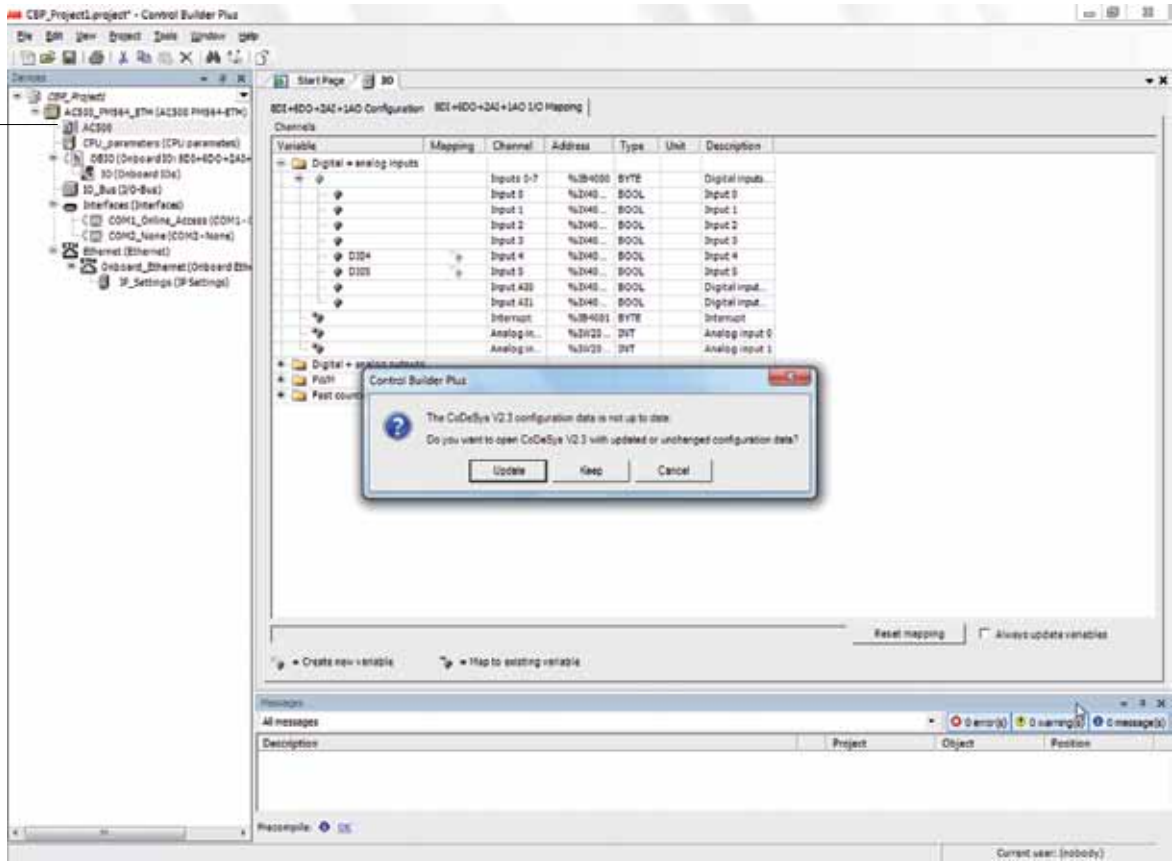


AC500-eCo Starter kit Control Builder Plus
Specifying the hardware configuration

5 Now double click on the AC500 element and press the **Yes** button to update the I/O variables, this will also launch the CoDeSys programming tool in a new window.

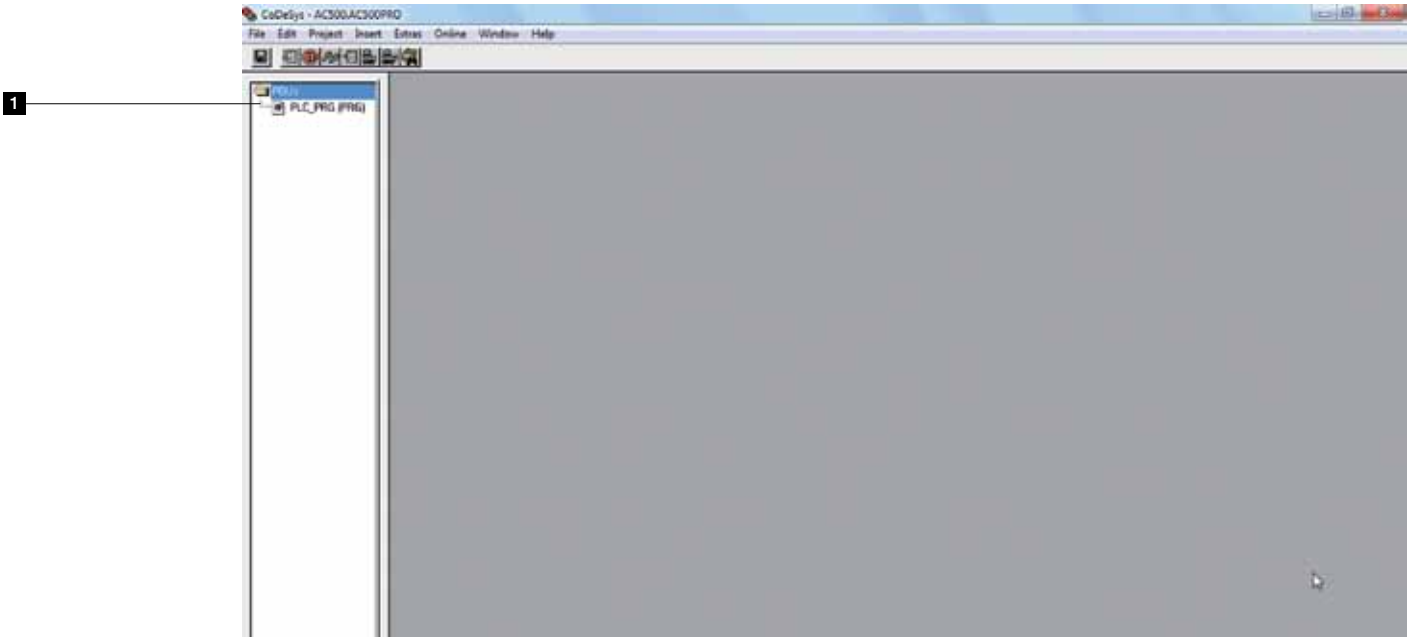
When the configuration has been modified, click “Update” to update the Program editors I/O Variables.
Please be reminded that every time you change something in the Control Builder Plus configuration screen, you have to double click the “AC500” to update the configuration in the CoDeSys Programming Tool.

5

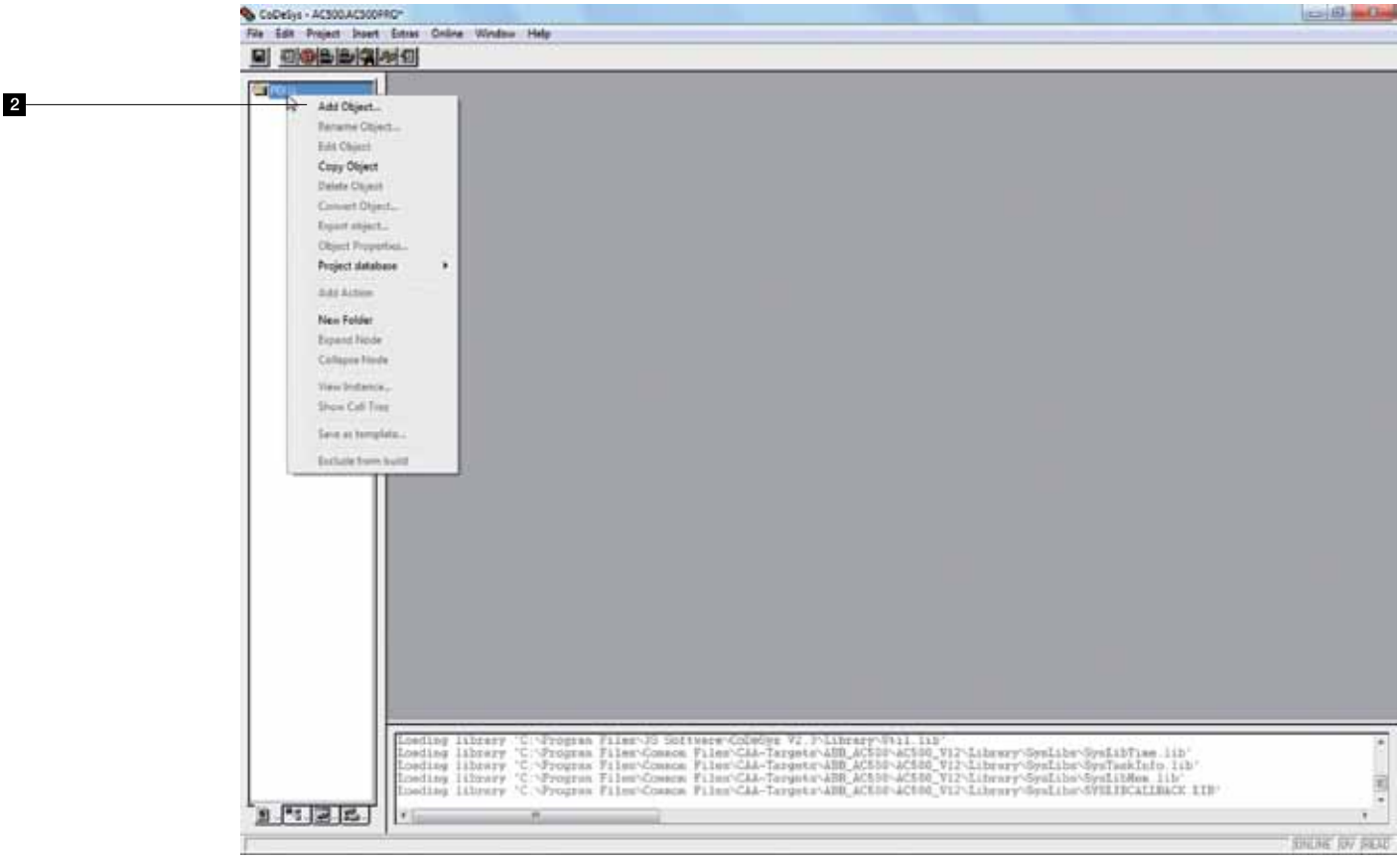


AC500-eCo Starter kit Control Builder Plus
Writing the program code in function block diagram editor

1 In the appearing CoDeSys Program Organization Units (POUs) window, **Structured Text (ST)** program is default, but can be changed to **Function Block Diagram (FBD), Ladder Diagram (LD), Instruction List (IL), Continuous Function Chart (CFC), Sequential Function Chart (SFC)**.



2 To change the programming language, delete the PLC_PRG(PRG). Select with the mouse and press delete, right click on **POUs** and select "**Add Object**".

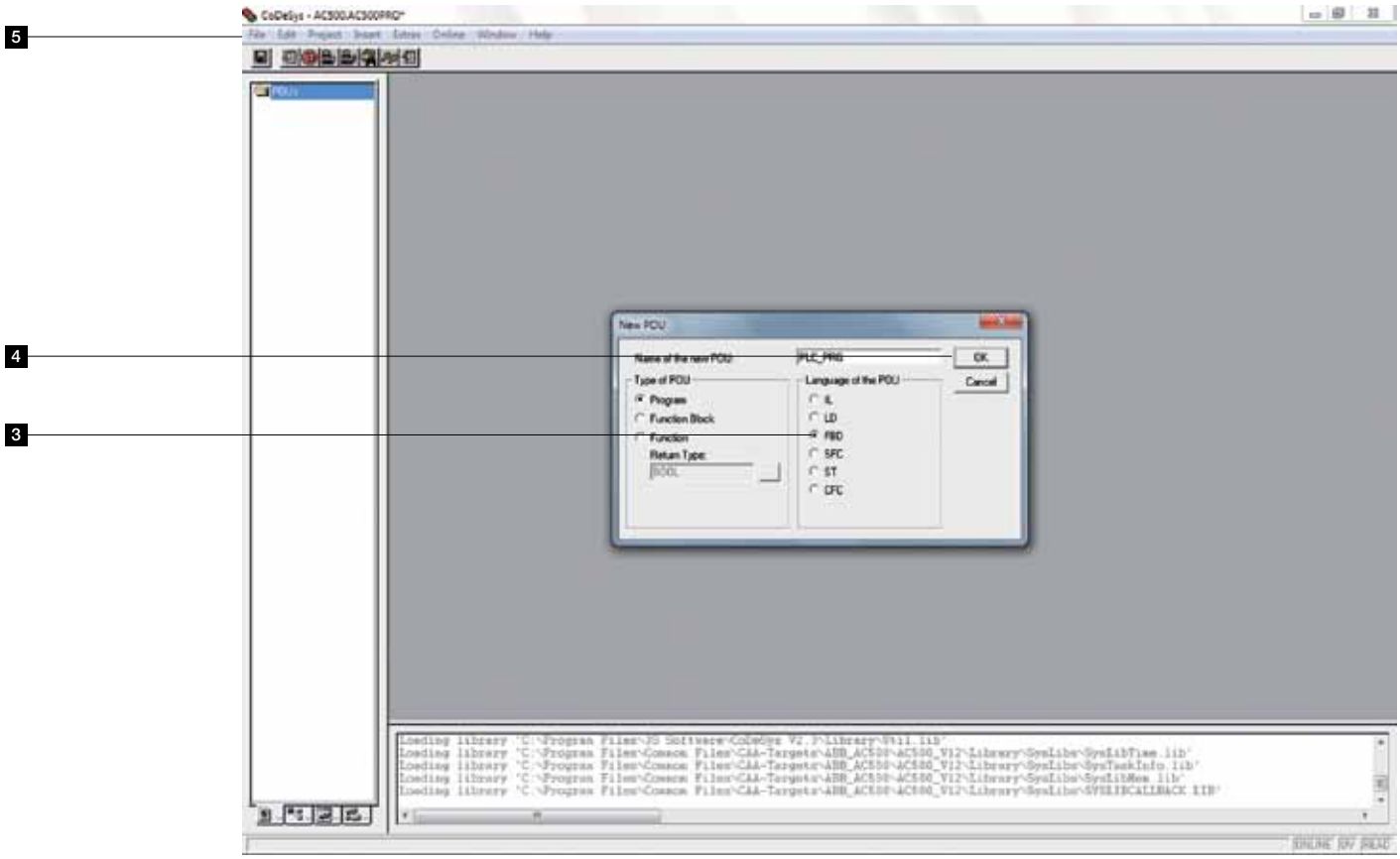


AC500-eCo Starter kit Control Builder Plus
Writing the program code in function block diagram editor

3 In the first program, we will create a program using the Function Block Diagram. Select FBD

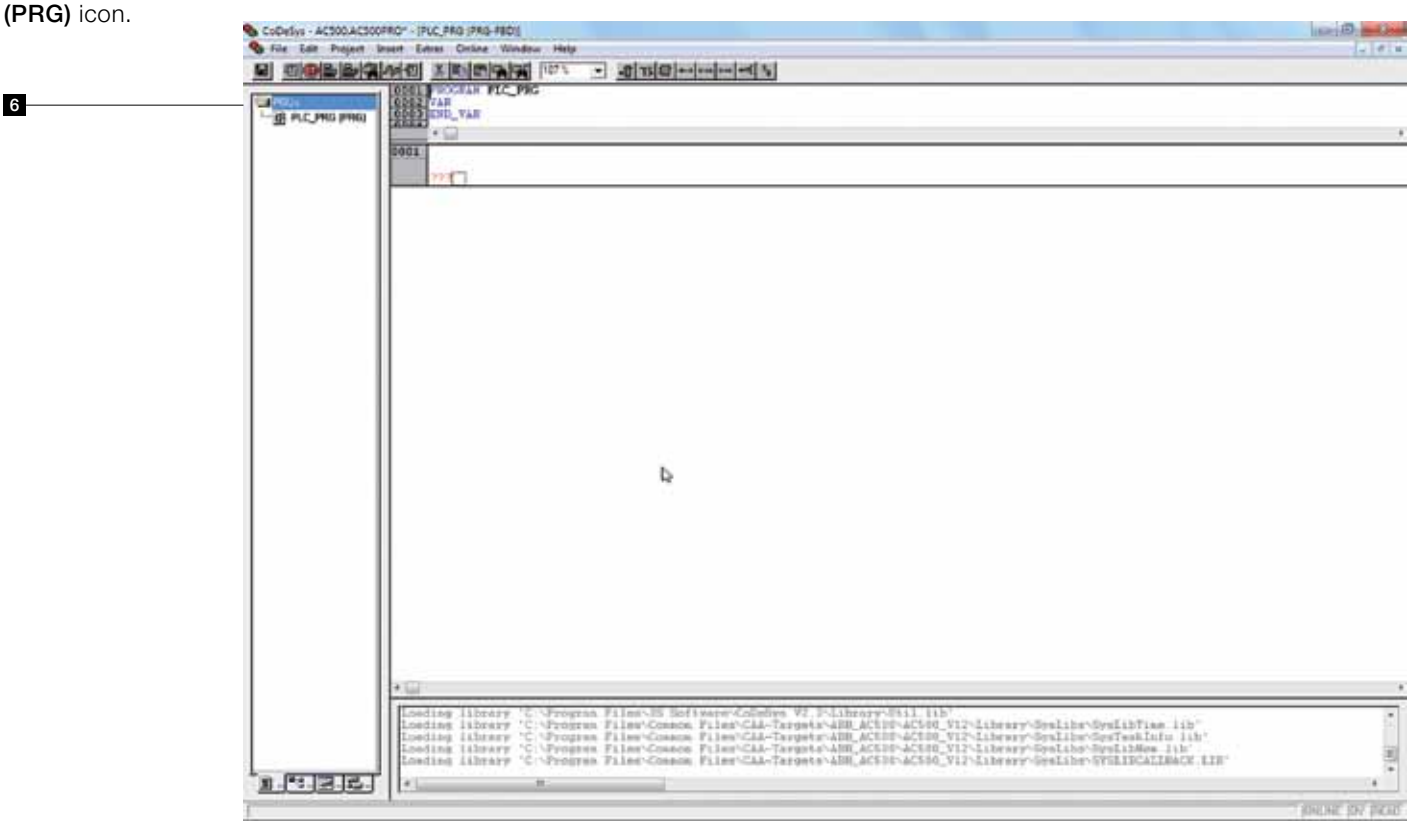
4 and click “OK” and automatically the POU (programming) section opens.

5 Click the **Save** button or select the **File > Save** menu item.



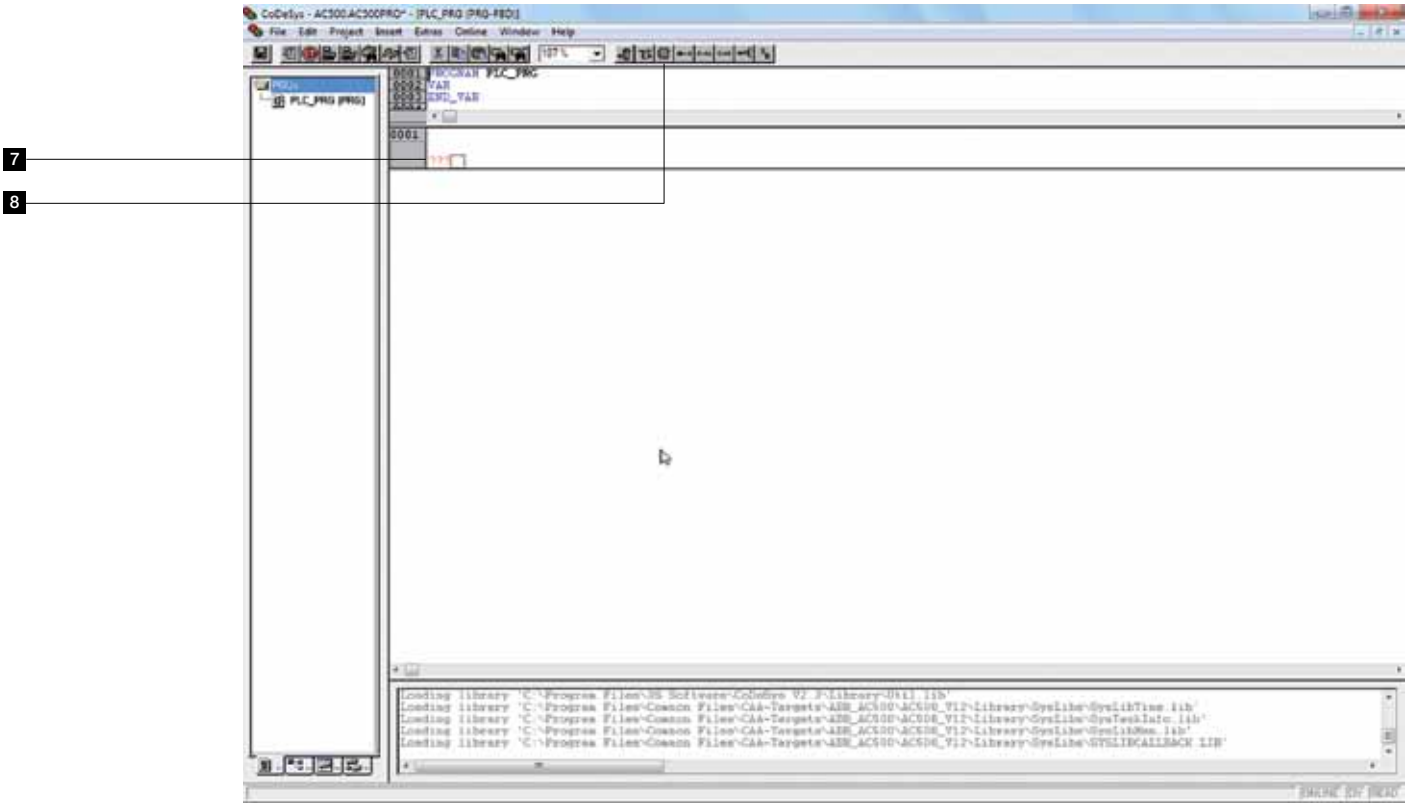
AC500-eCo Starter kit Control Builder Plus
Writing the program code in function block diagram editor

6 To be able to edit the program, you have to open the **POUs** tab (at the bottom of the pane) and double-click the **PLC_PRG (PRG)** icon.



7 At the left window border, the network number is shown (0001 in our example). To make an AND block click the rectangle near the **???**

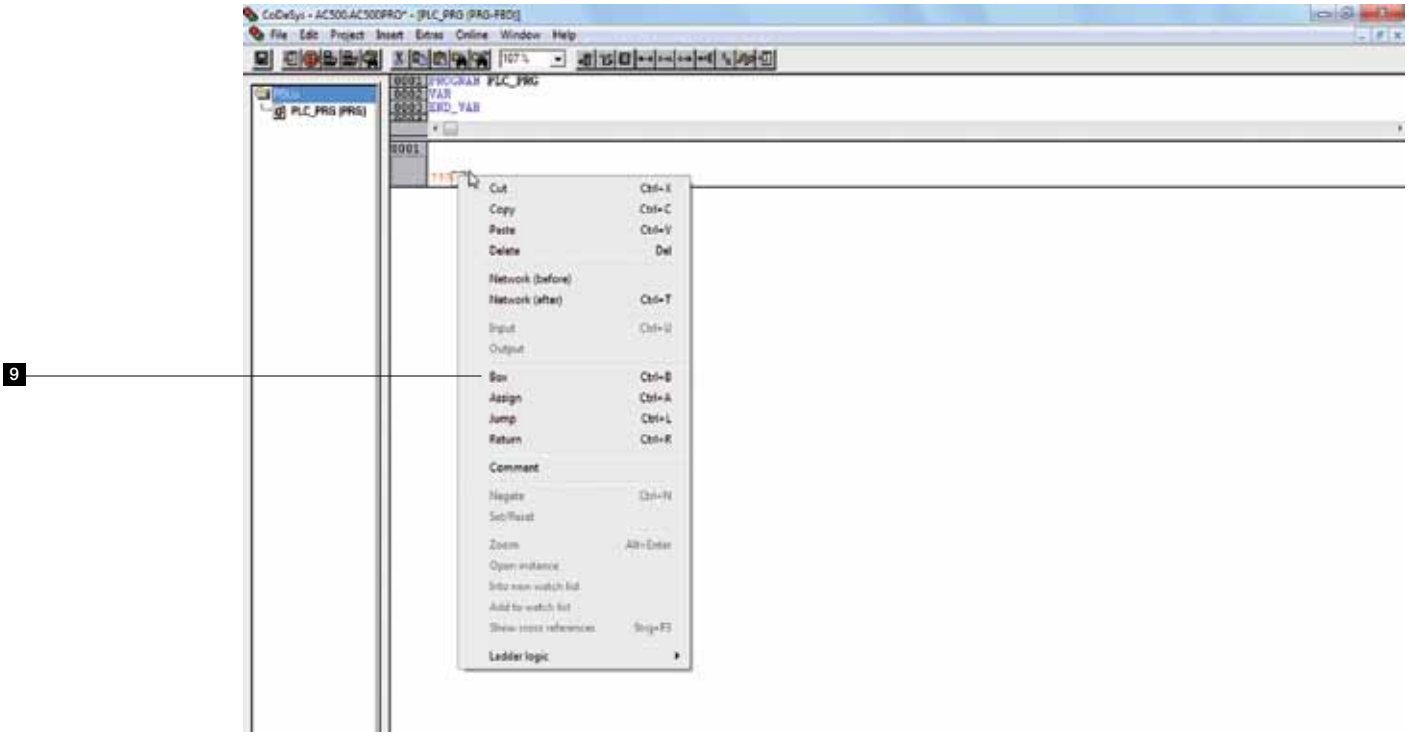
8 Go to the box icon on the top and click on the **BOX** icon.



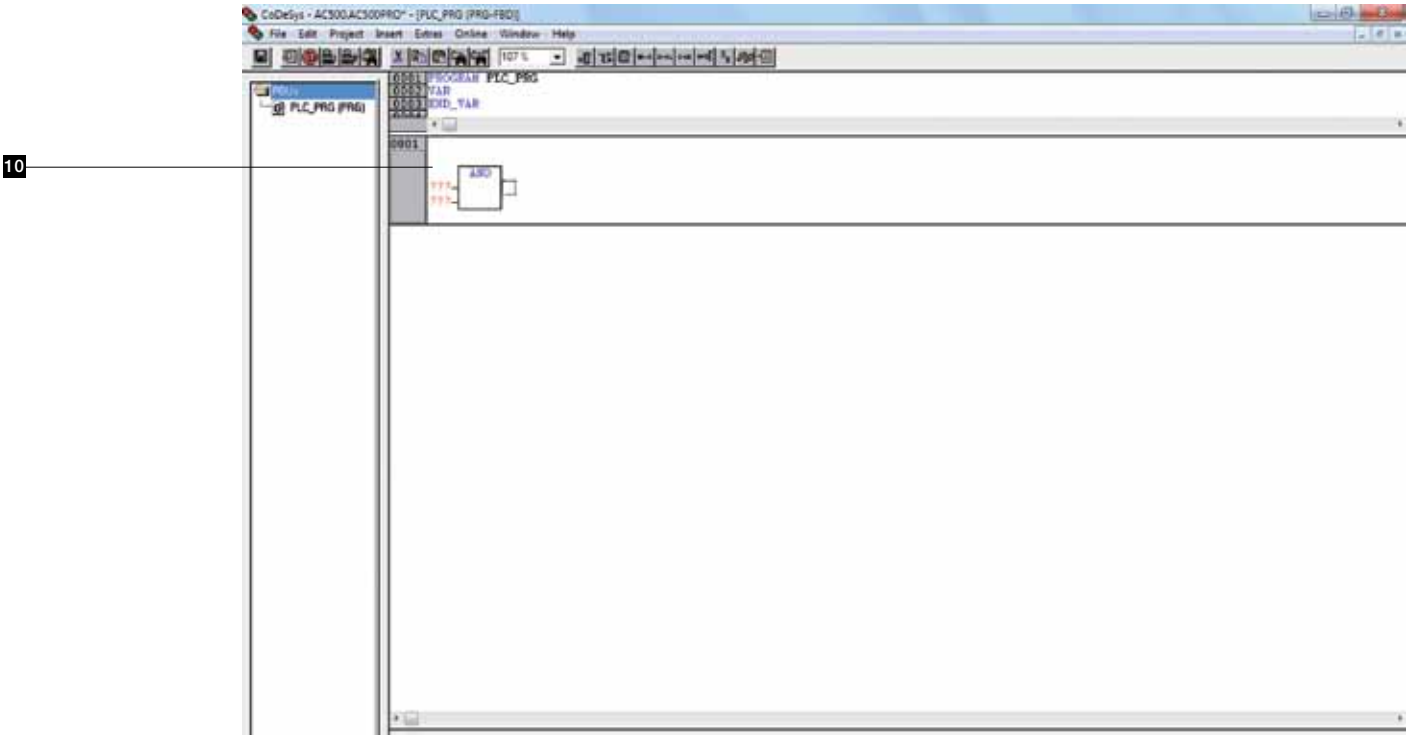
AC500-eCo Starter kit Control Builder Plus
Writing the program code in function block diagram editor

9 Alternatively you could also right click on the network itself and select “BOX” from the context menu as shown below.

When inserting a new box, it will always appear as an AND block.
You can change the block at any time by clicking on the block‘s name and typing another name or F2 for overview all accepted names for operators, functions and function blocks.



10 Enter names for both inputs as follows: Click on the **???** placeholder and type the name DI04 for input1 and DI05 for input2.

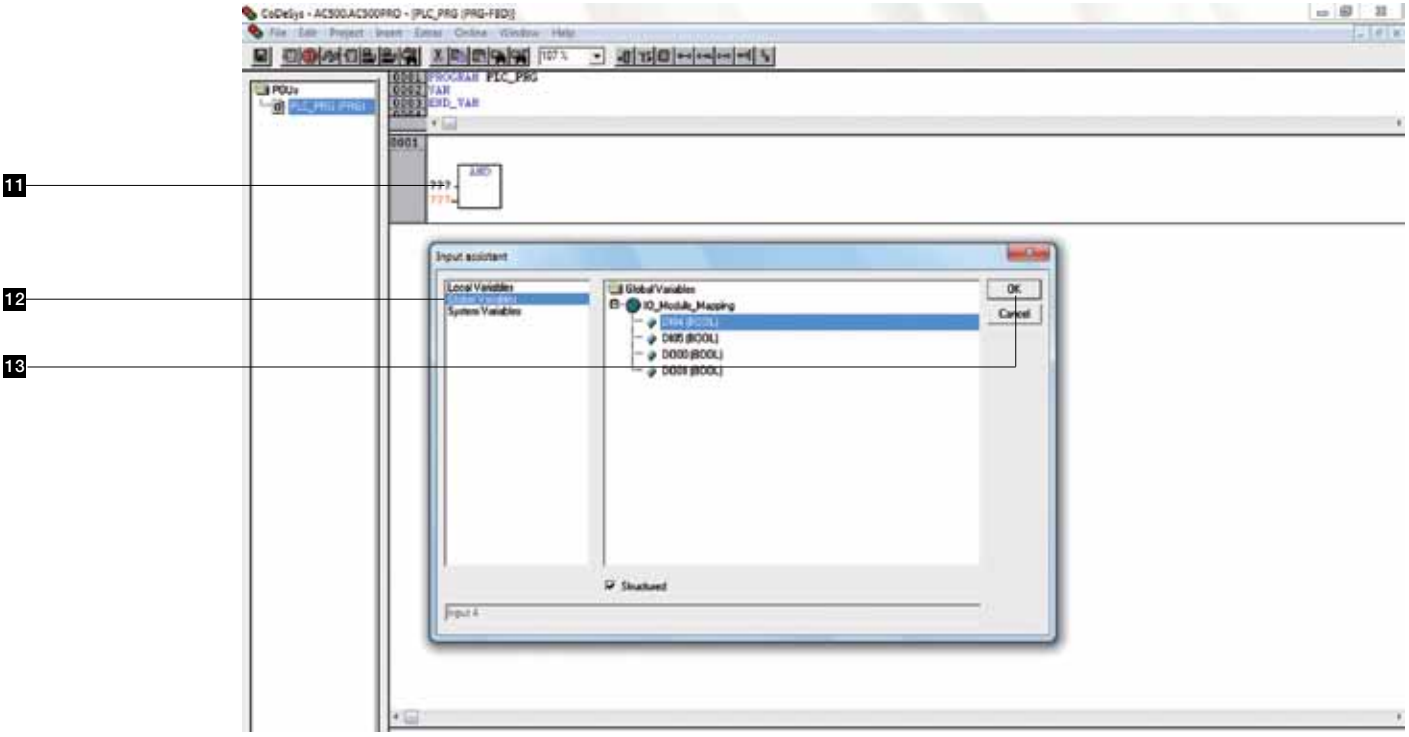


AC500-eCo Starter kit Control Builder Plus
Writing the program code in function block diagram editor

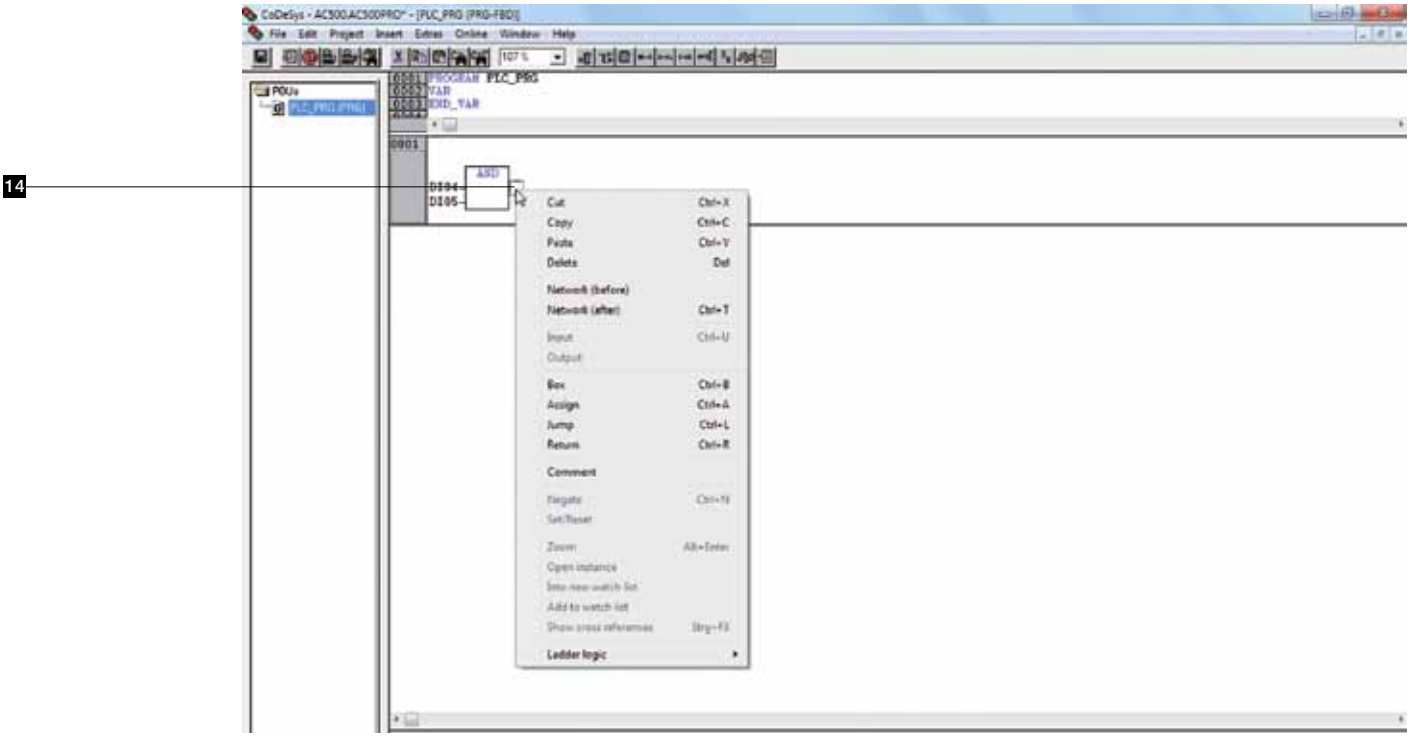
11 Alternatively you could also click on **???** and press the F2 button. An input assistant will pop up as shown below.

12 Select Global Variable.

13 And choose the variable that you want to assign then click “OK”.

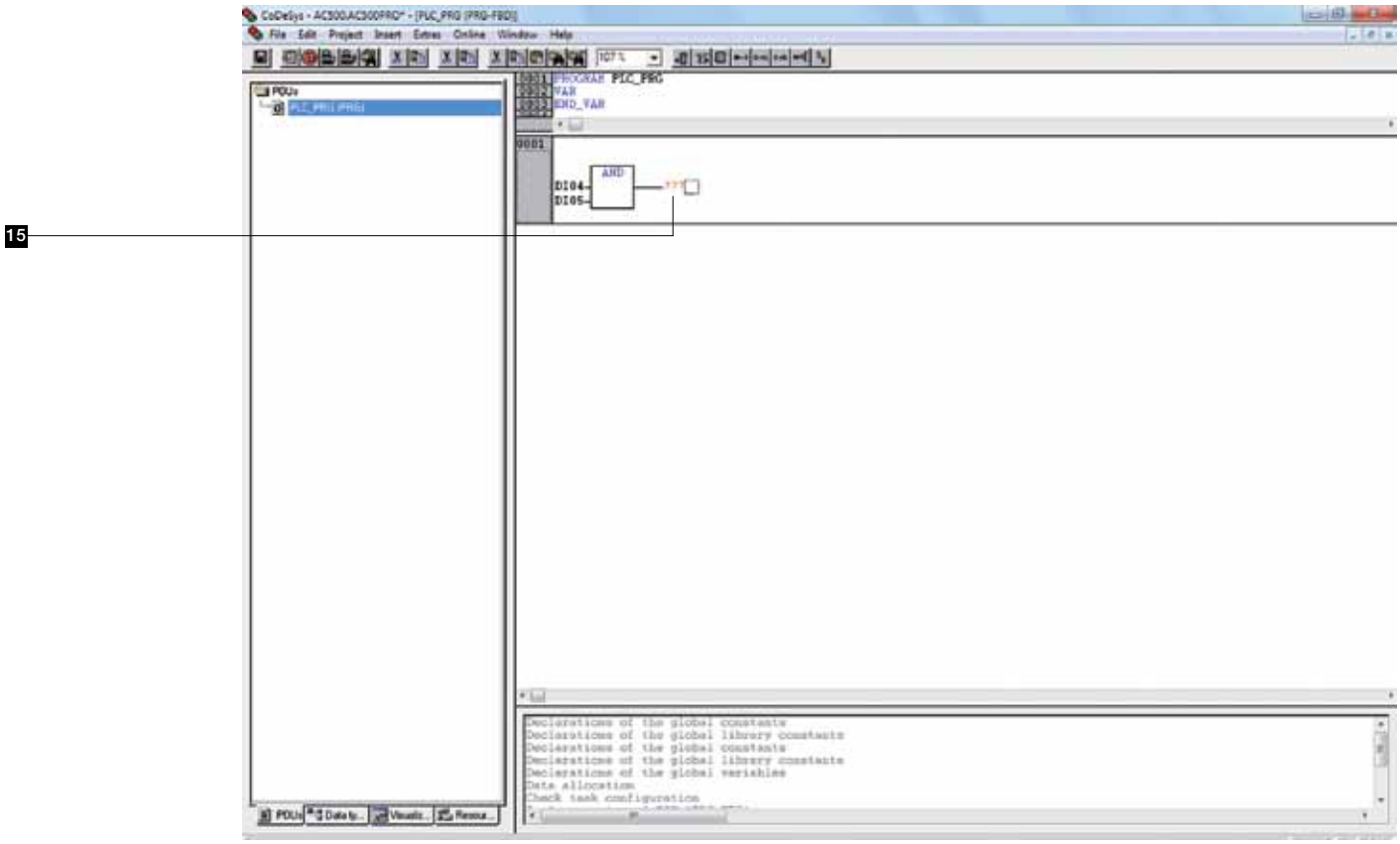


14 To assign an output to the box, **right click** on the ☐ area, and select “Assign” as shown below:



AC500-eCo Starter kit Control Builder Plus
Writing the program code in function block diagram editor

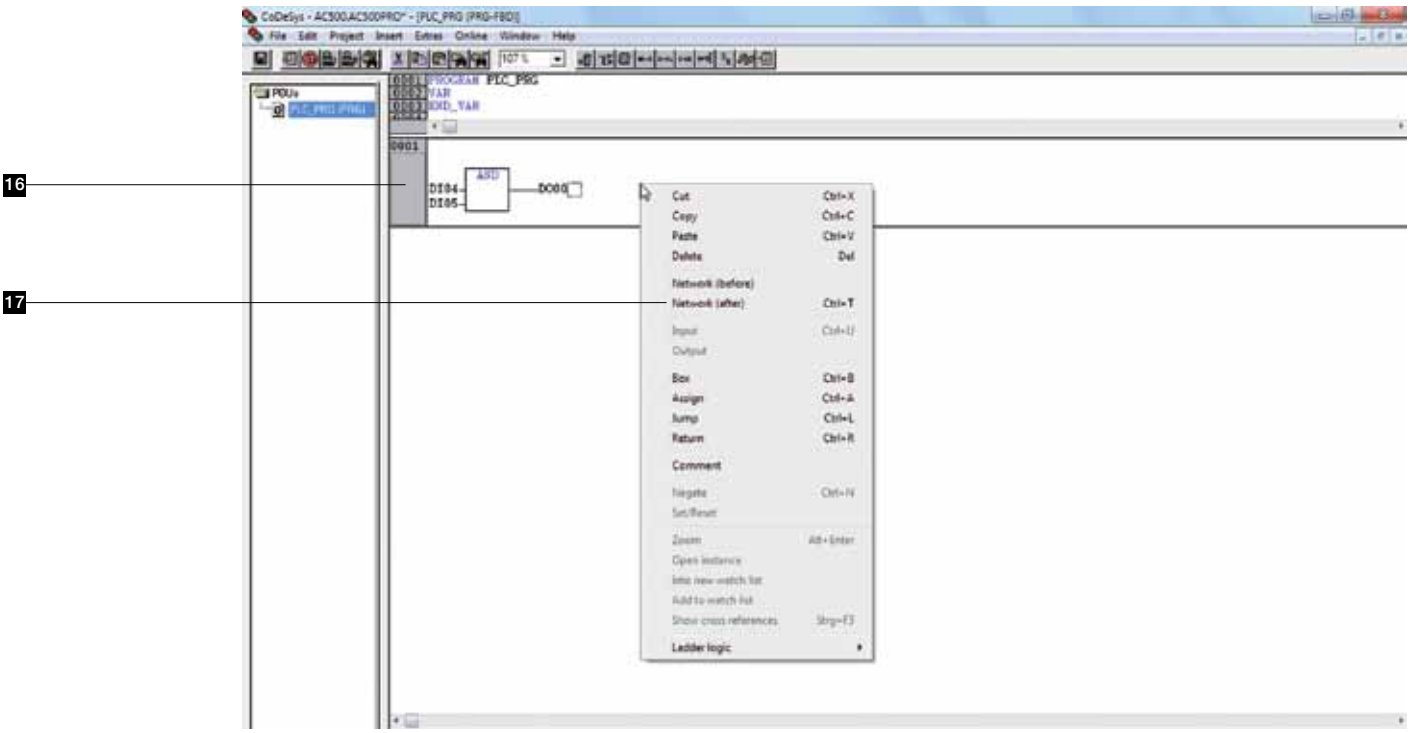
15 Enter a name for the output: Click on **???** and type **DO00**, similarly to Step 11 you can also press F2 to bring up the Input assistant and choose from the list of variables



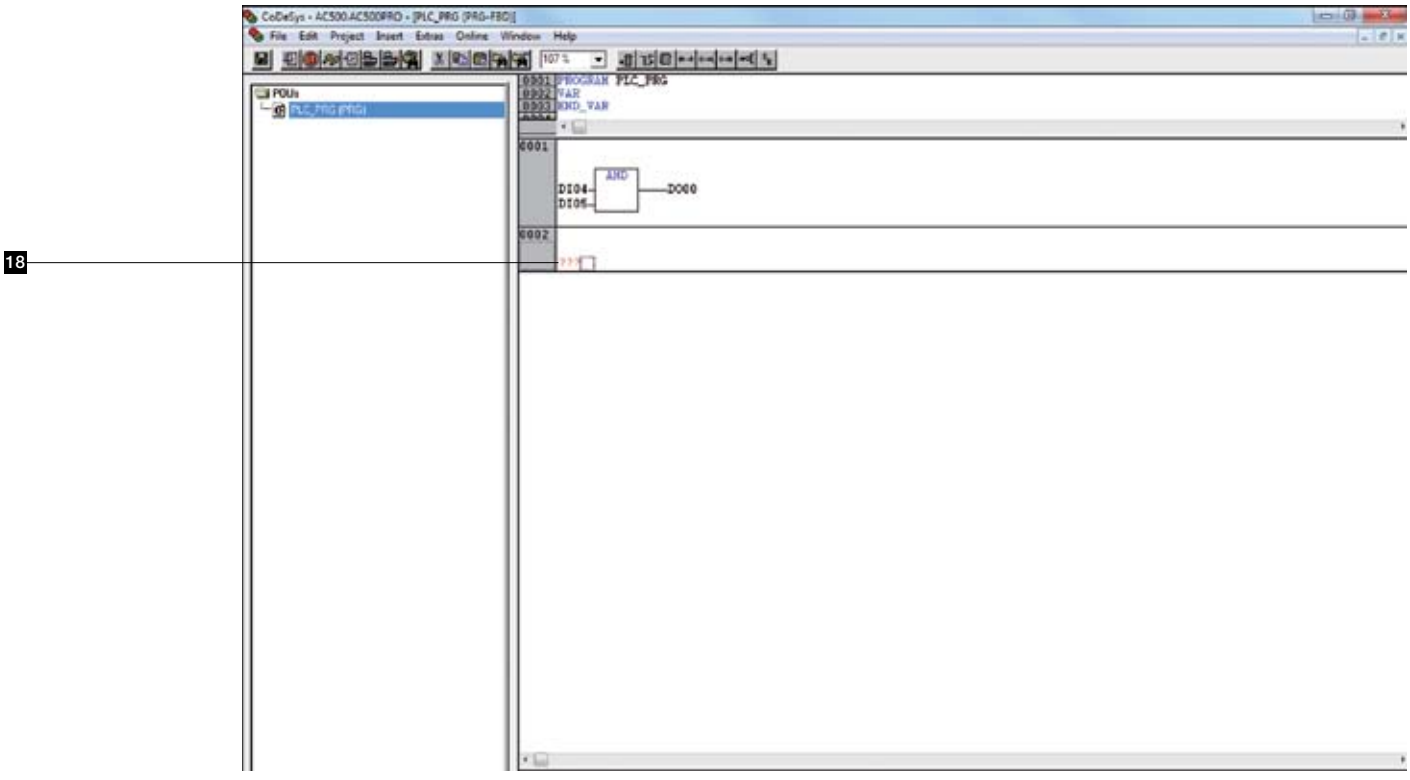
AC500-eCo Starter kit Control Builder Plus
Writing the program code in function block diagram editor

16 Right-click on the network number 0001

17 Select **Network (After)** from the context menu.

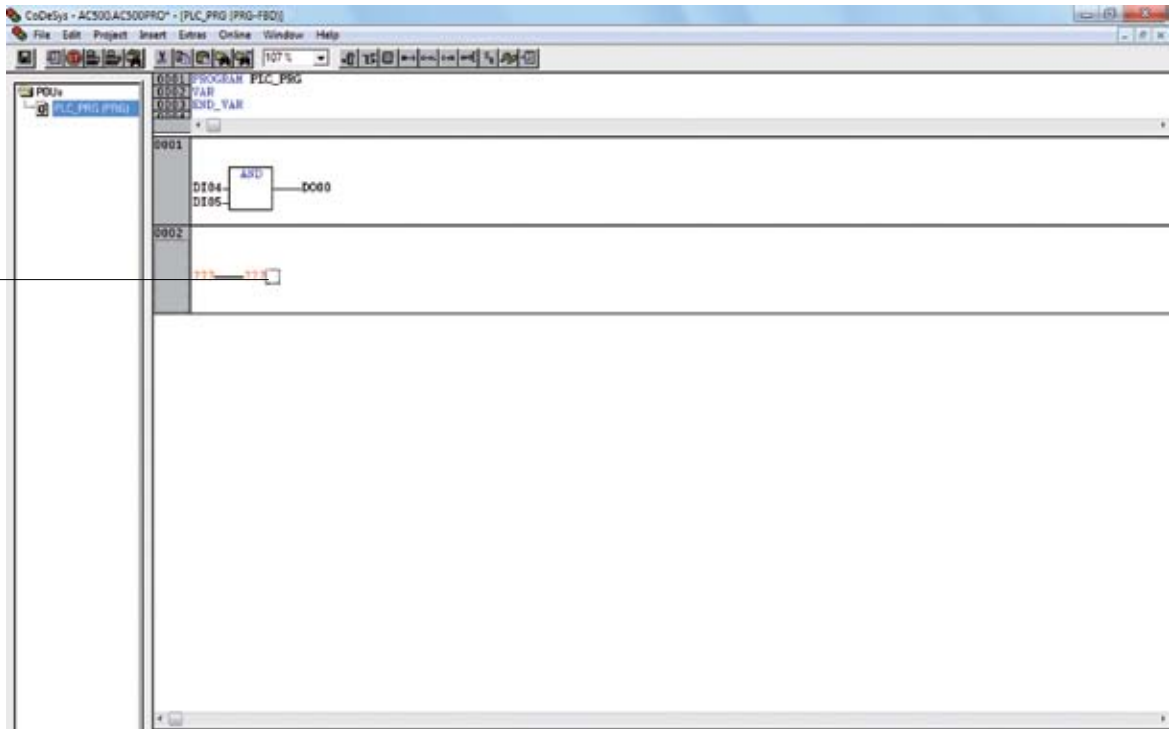


18 In network 0002 right click the rectangle on the right of **???** then select **Assign** in the context menu.

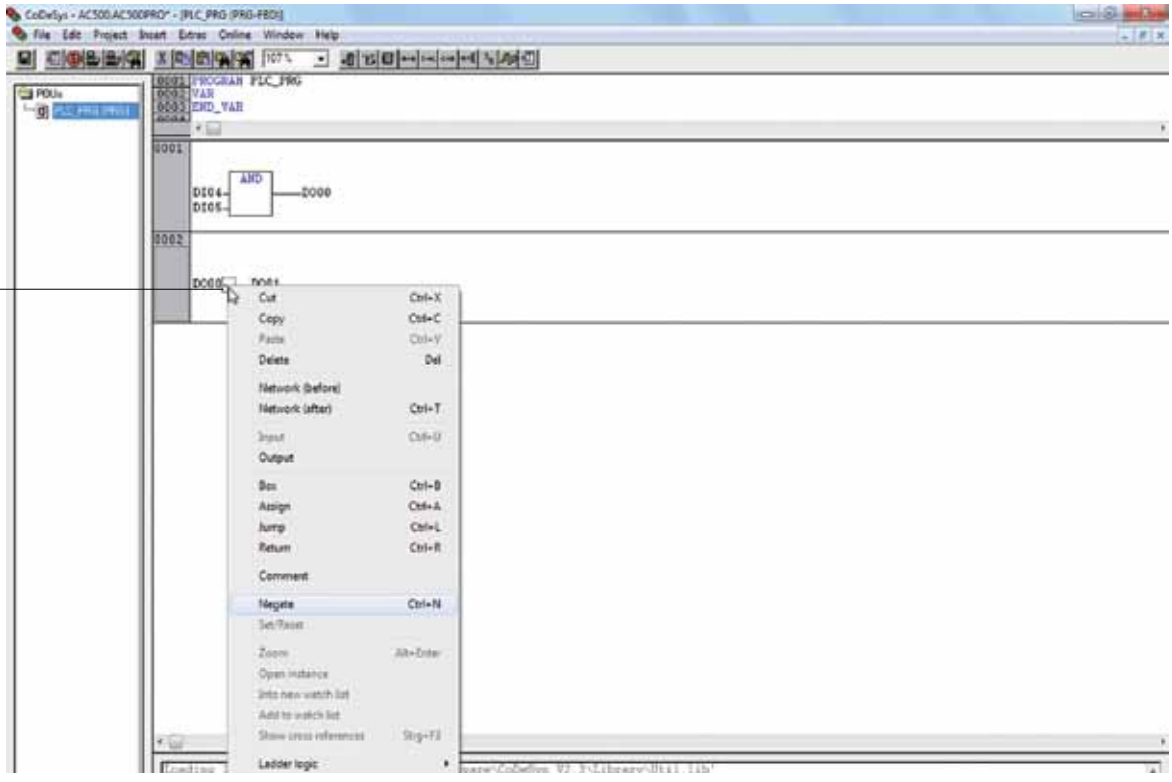


AC500-eCo Starter kit Control Builder Plus
Writing the program code in function block diagram editor

19 Name the input and output by clicking on the **???** place holder.
Enter **DO00** for input and **DO01** for output as shown below.

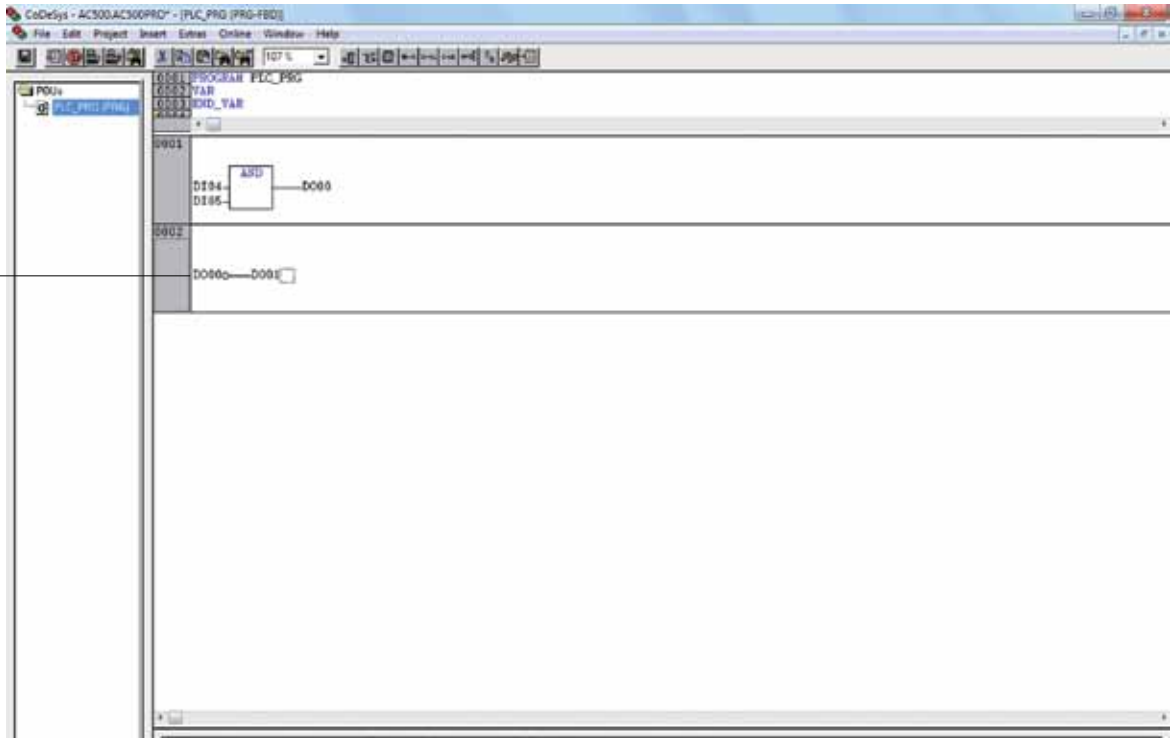


20 Insert a negation as follows: Right-click at the position shown in the figure below and select **Negate** from the context menu.

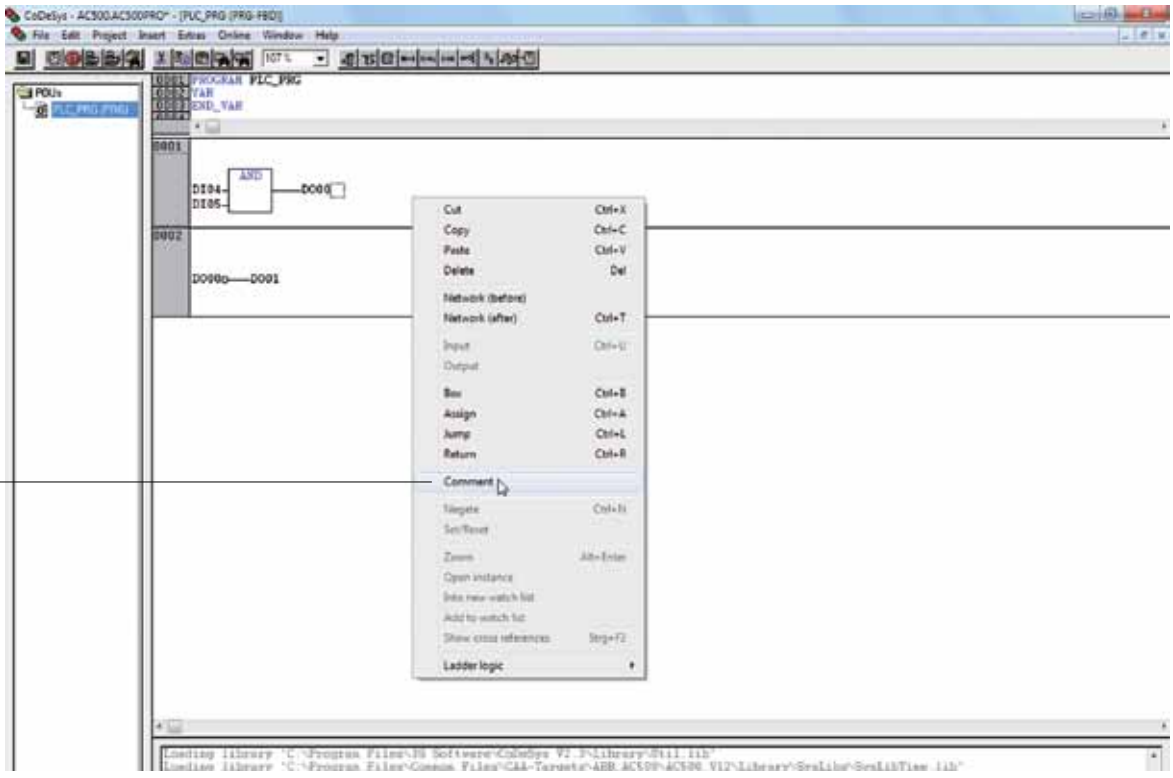


AC500-eCo Starter kit Control Builder Plus
Writing the program code in function block diagram editor

21 Now, your code should look as follows:

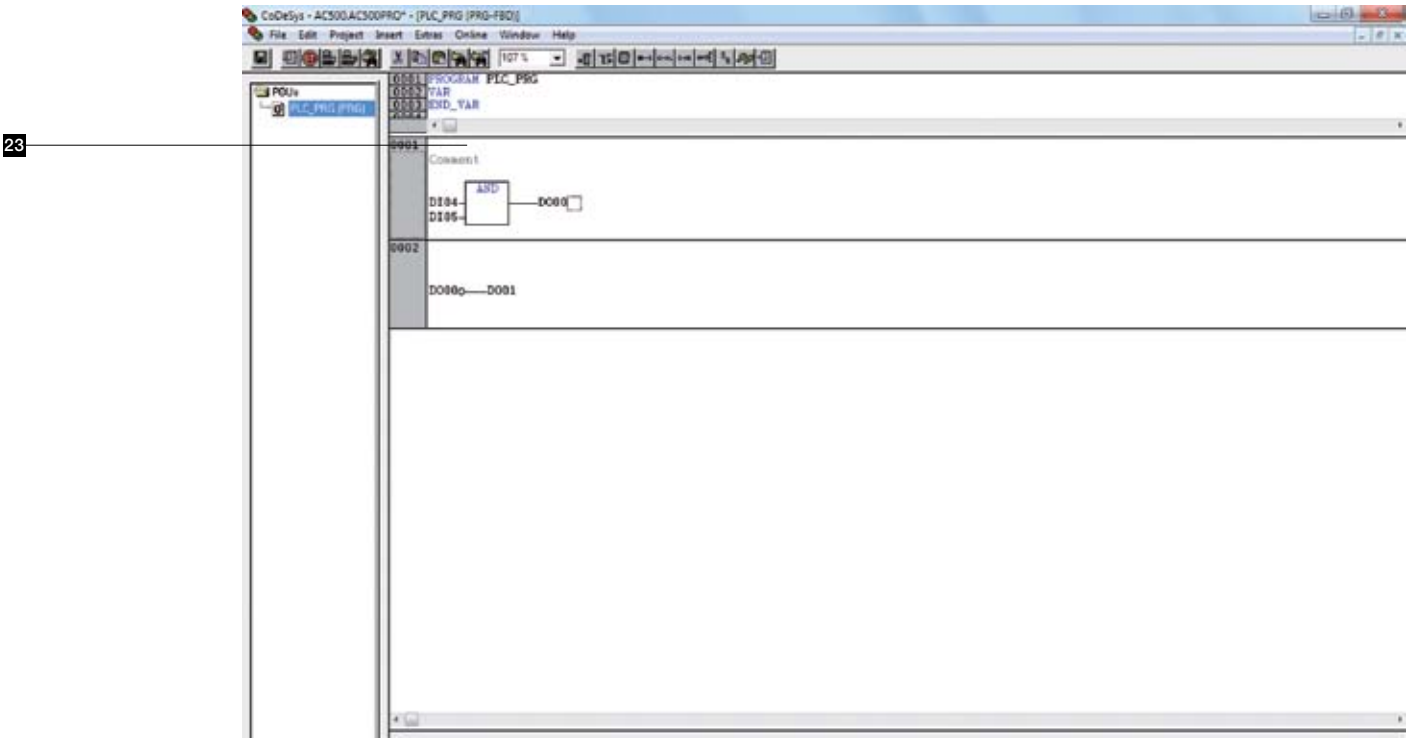


22 Insert a comment into the network as follows:
Right-click on Network **0001** and select **Comment** from the context menu.
To edit the comment click on the text Comment and mark the text with the mouse.



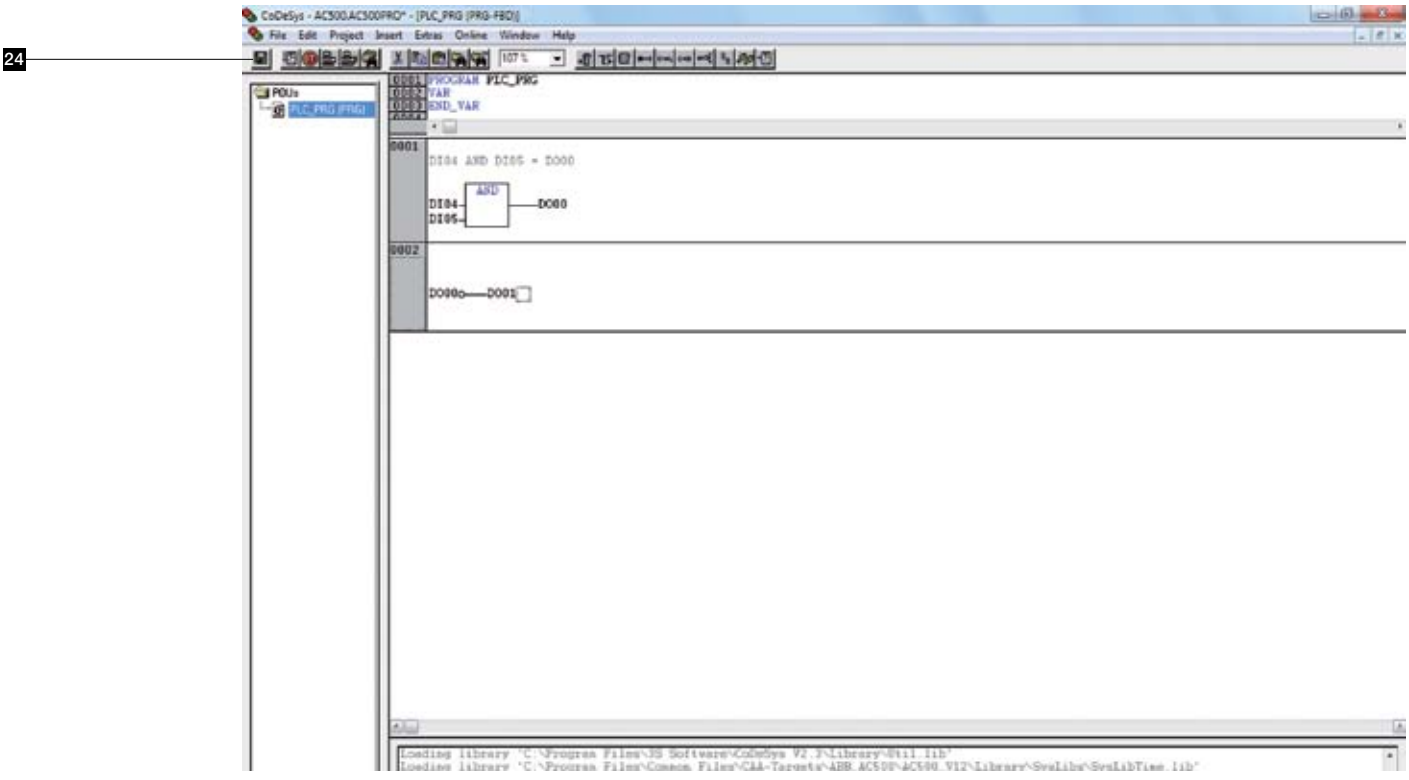
AC500-eCo Starter kit Control Builder Plus
Writing the program code in function block diagram editor

23 Enter DI04 AND DI05 = DO00 and click anywhere to confirm your entry.



Now, the networks 0001 and 0002 should look as follows:

24 Save the program either by clicking the **Save** button or selecting the **File > Save** menu item.

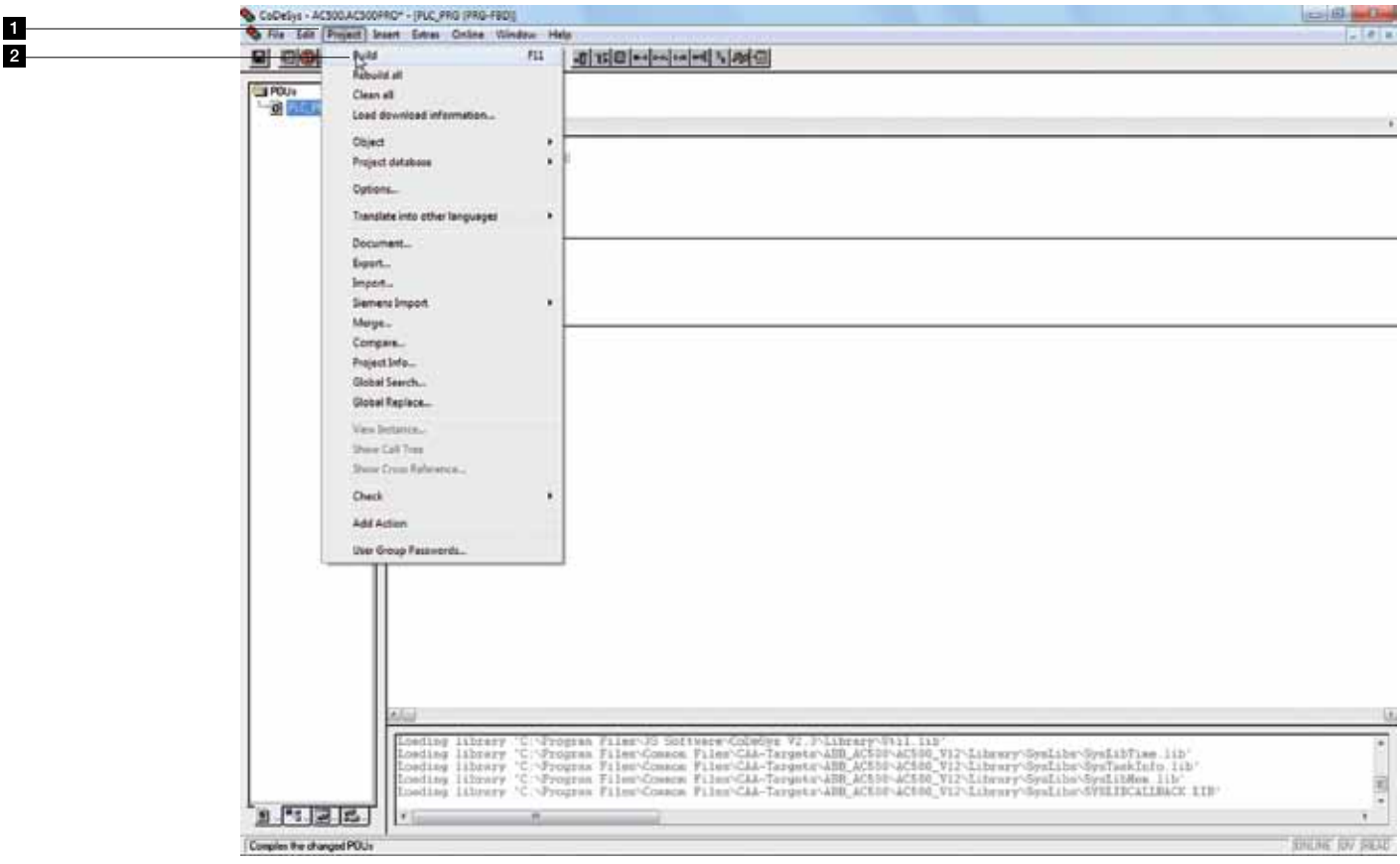


AC500-eCo Starter kit Control Builder Plus
Building the project

Compiling the program is achieved using the **Build** function under the project menu.
Make sure to save your project after compilation.

1 To use the Build command, go to **Project**.

2 Then, click **Build**.



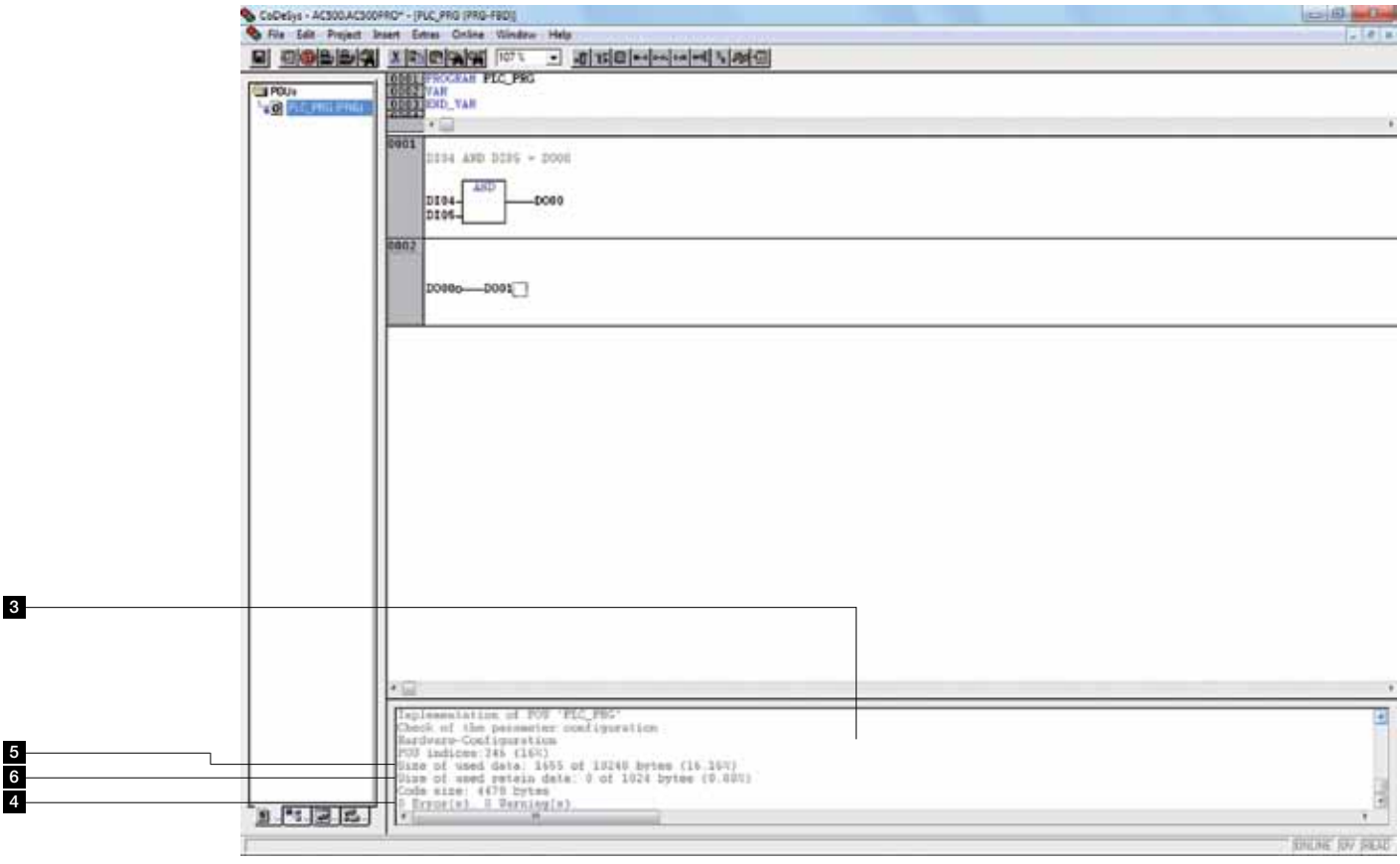
AC500-eCo Starter kit Control Builder Plus
Building the project

3 After your project has been compiled successfully, a message similar to below will be displayed.

4 The program cannot be downloaded if there's an Error in the compilation. Double clicking on the error message will bring you to the program window that contains the error.

5 Size of used data is the total variable that you have declared and used in the program.

6 Size of used retain data is the total RETAIN variable that you have declared and used in the program.

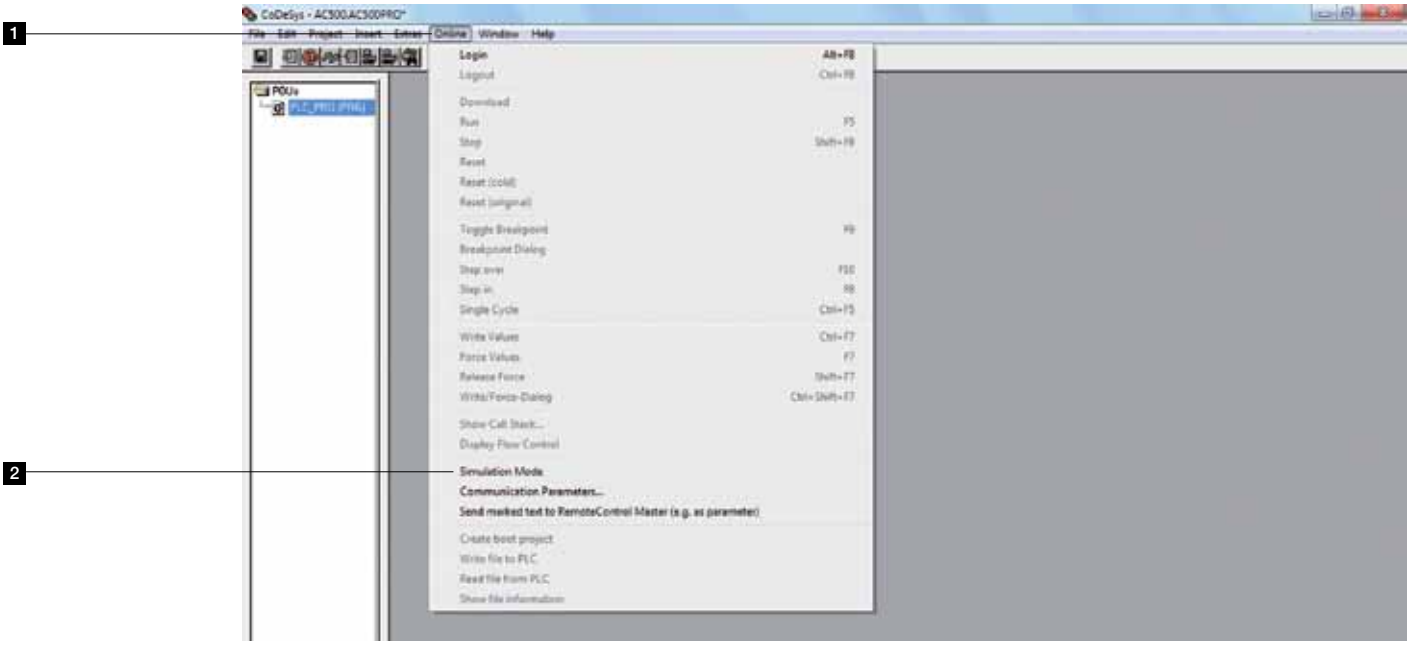


AC500-eCo Starter kit Control Builder Plus
Testing the program without connecting the PLC hardware

You can test your program in offline simulation mode. In this mode, no PLC hardware is required.

1 Select the **Online** menu.

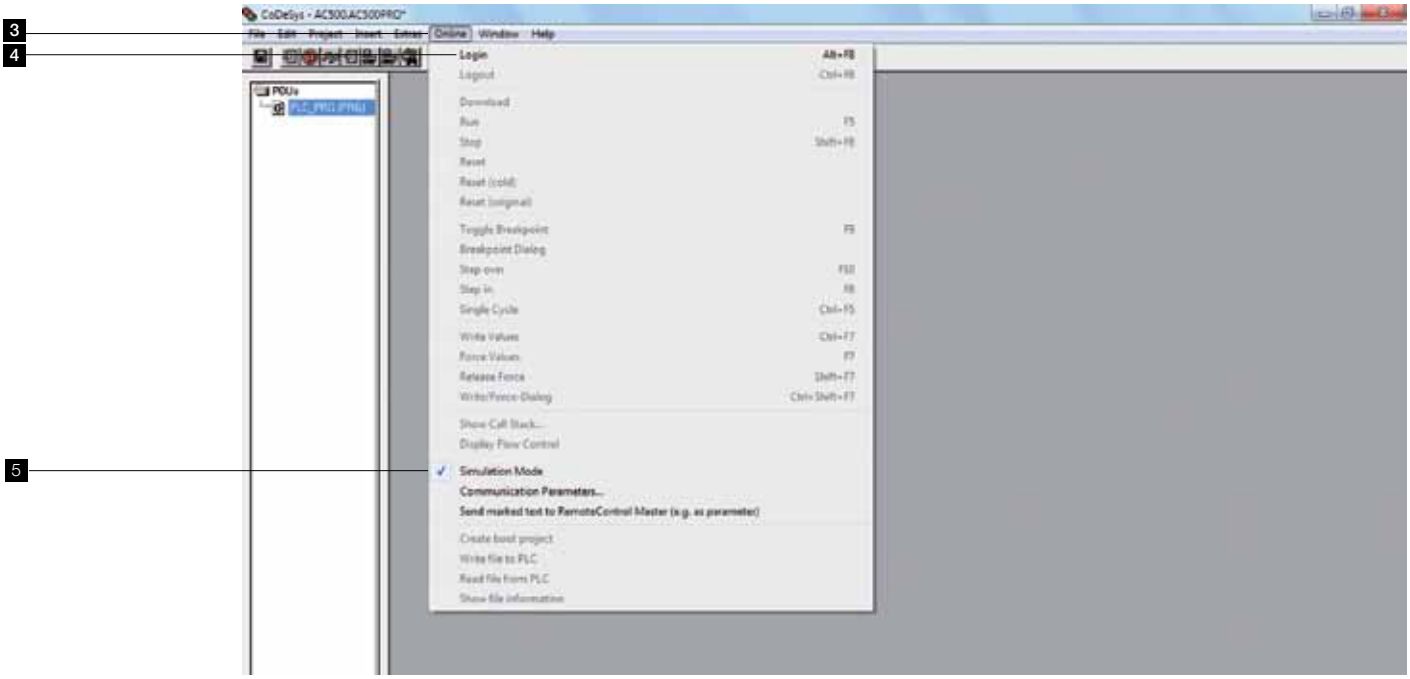
2 Then select **Simulation Mode** menu item.



3 Once again, select the **Online** menu.

4 Then, select **Login** menu item to actually start the simulation mode.

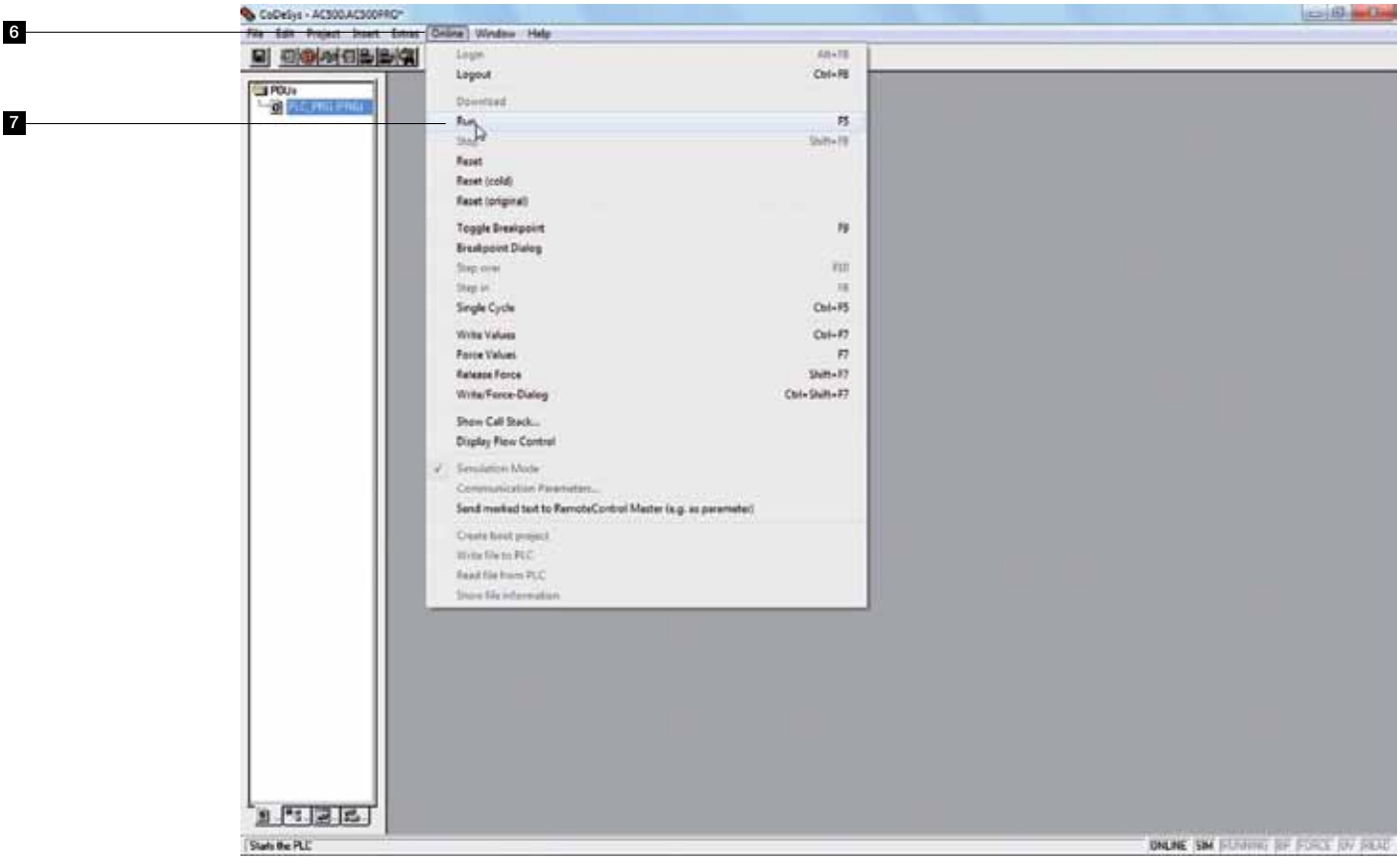
5 The symbol in front of the **Simulation Mode** menu indicates the simulation mode is active.



AC500-eCo Starter kit Control Builder Plus
Testing the program without connecting the PLC hardware

6 To simulate your PLC program, select the Online menu.

7 Then, select Run.



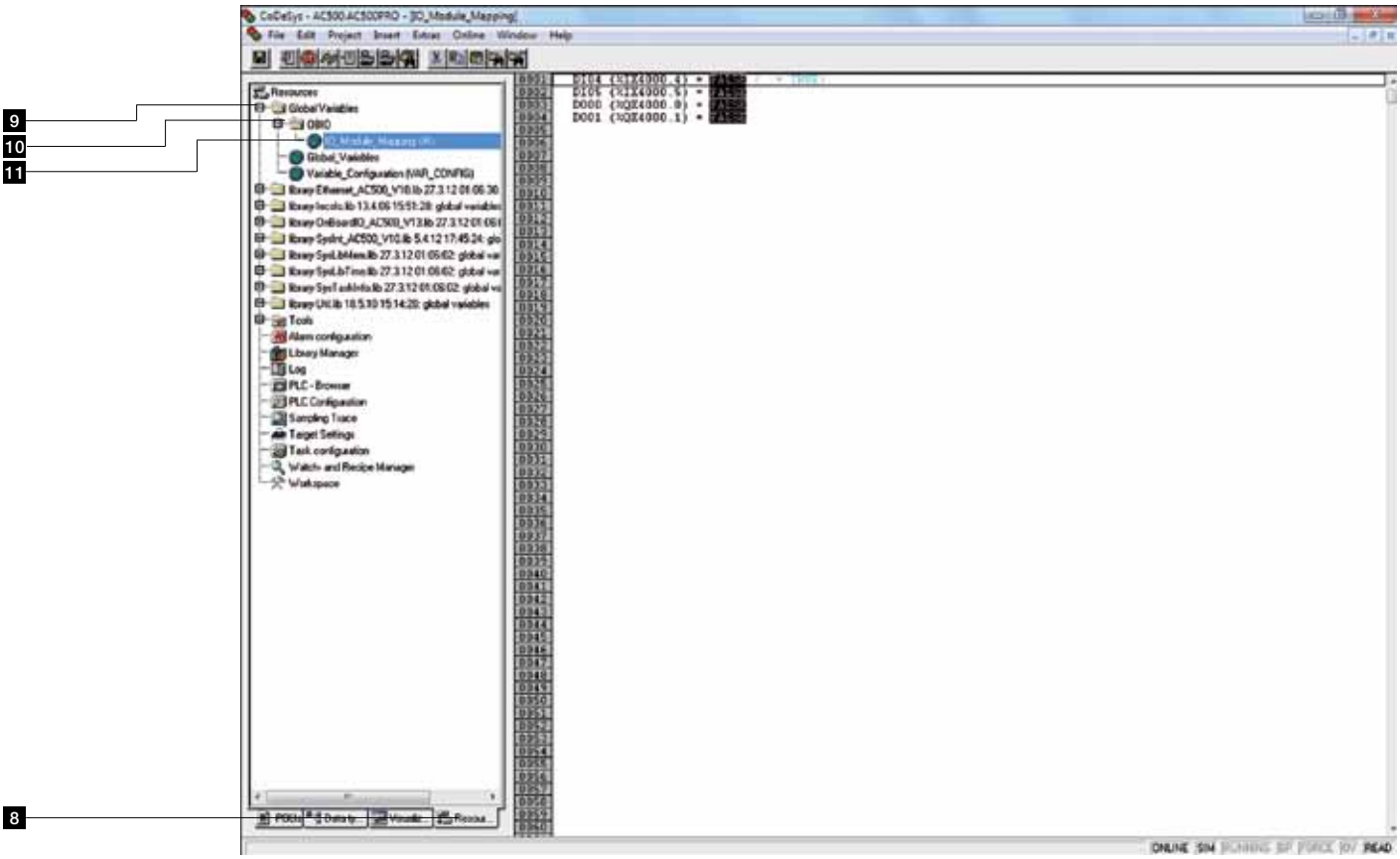
AC500-eCo Starter kit Control Builder Plus
Testing the program without connecting the PLC hardware

8 Open the **Resources** tab

9 Open **Global Variable** by clicking the ⊞ left of Global Variables.

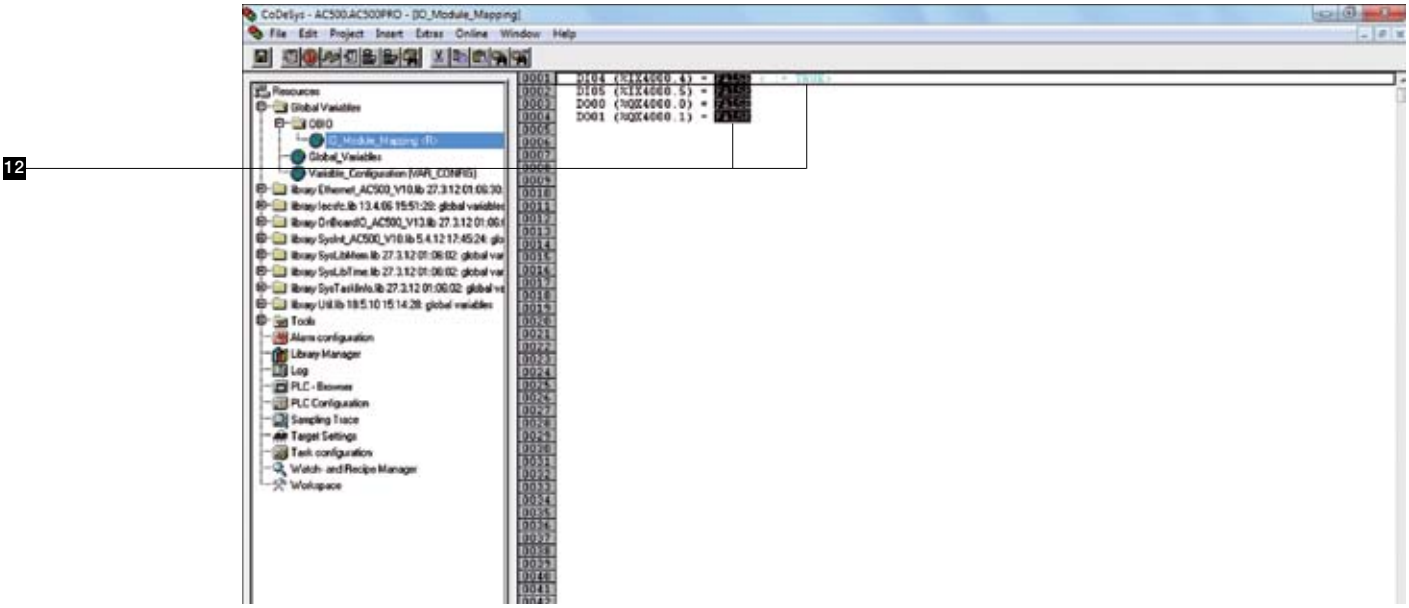
10 Then, open the **OBIO** folder by clicking the ⊞.

11 Double click on "**IO_Modules_Mapping**". A window will be opened on your right showing each input and output that you have declared earlier.



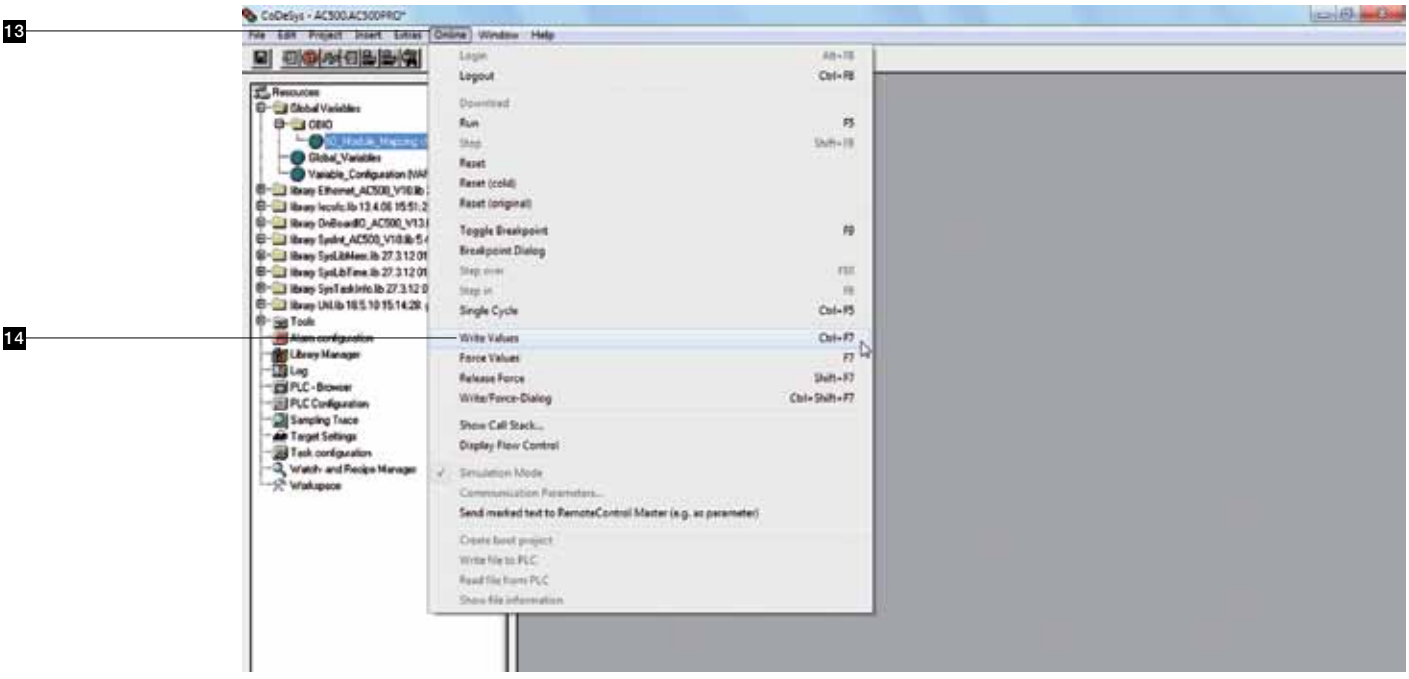
AC500-eCo Starter kit Control Builder Plus
Testing the program without connecting PLC hardware

12 In Online Mode, you will see the status as shown below. **FALSE** is indicated as black color and **TRUE** is always indicated as blue color. To change (i.e., toggle) the state of an input, double-click the box of the desired input. The change value will be shown right of the box.



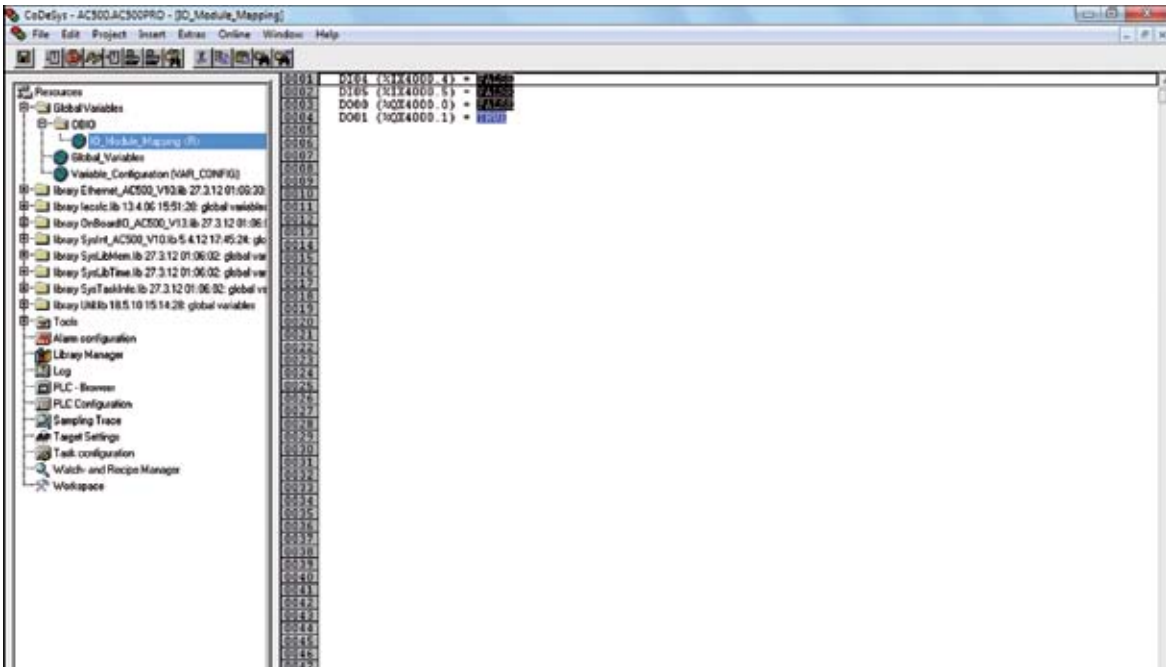
13 WRITE the value of any input or FORCE any output using the **Online** menu.

14 Select Write Values or Force Values. (Write has an one time effect while Force writes the value in every program cycle.)



AC500-eCo Starter kit Control Builder Plus
Testing the program without connecting PLC hardware

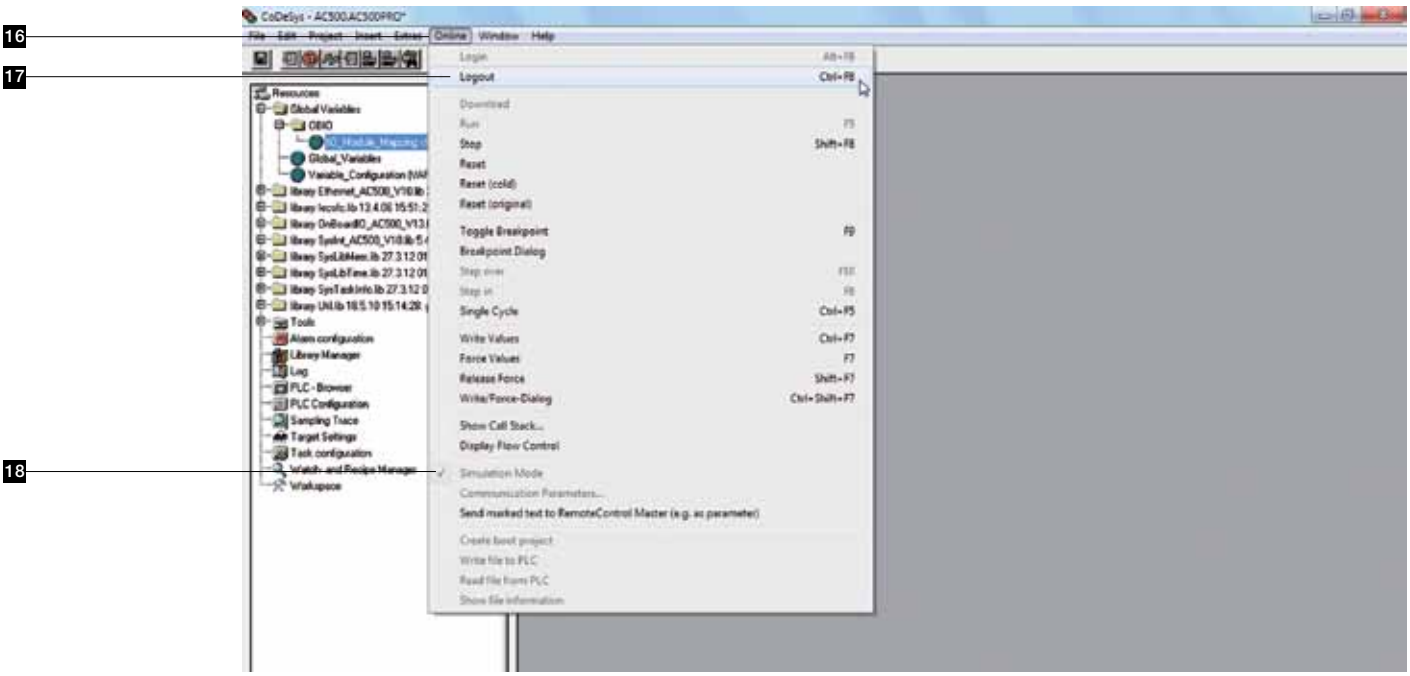
15 This way, you can see the status of the simulated inputs and outputs in the PLC Configuration (as well as in the POUs view). To verify the function of the AND and the negation, you can set both inputs DI04 and DI05 to TRUE. After execution of Write Value you can see the state change of DO00 and DO01.



16 To stop the simulation mode, select **Online**.

17 Then, select **Logout**.

18 Then, select Online again and deactivate **Simulation Mode**.

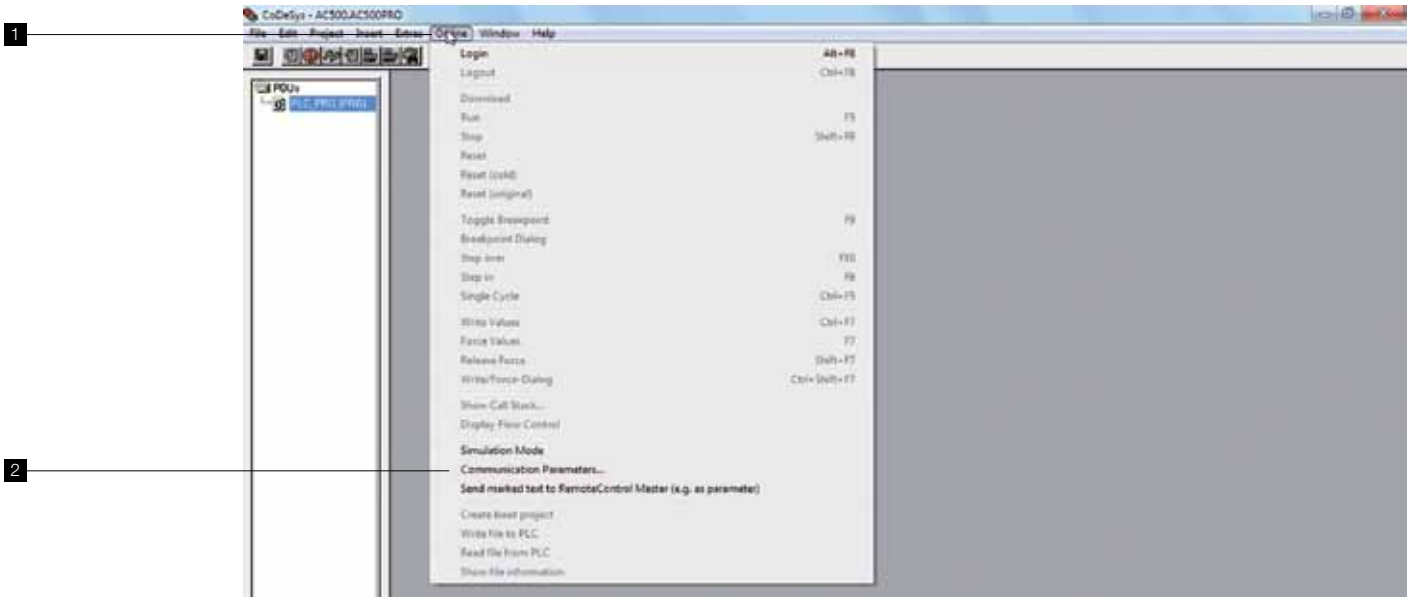


AC500-eCo Starter kit Control Builder Plus
Setting communication parameters in CoDeSys using Ethernet

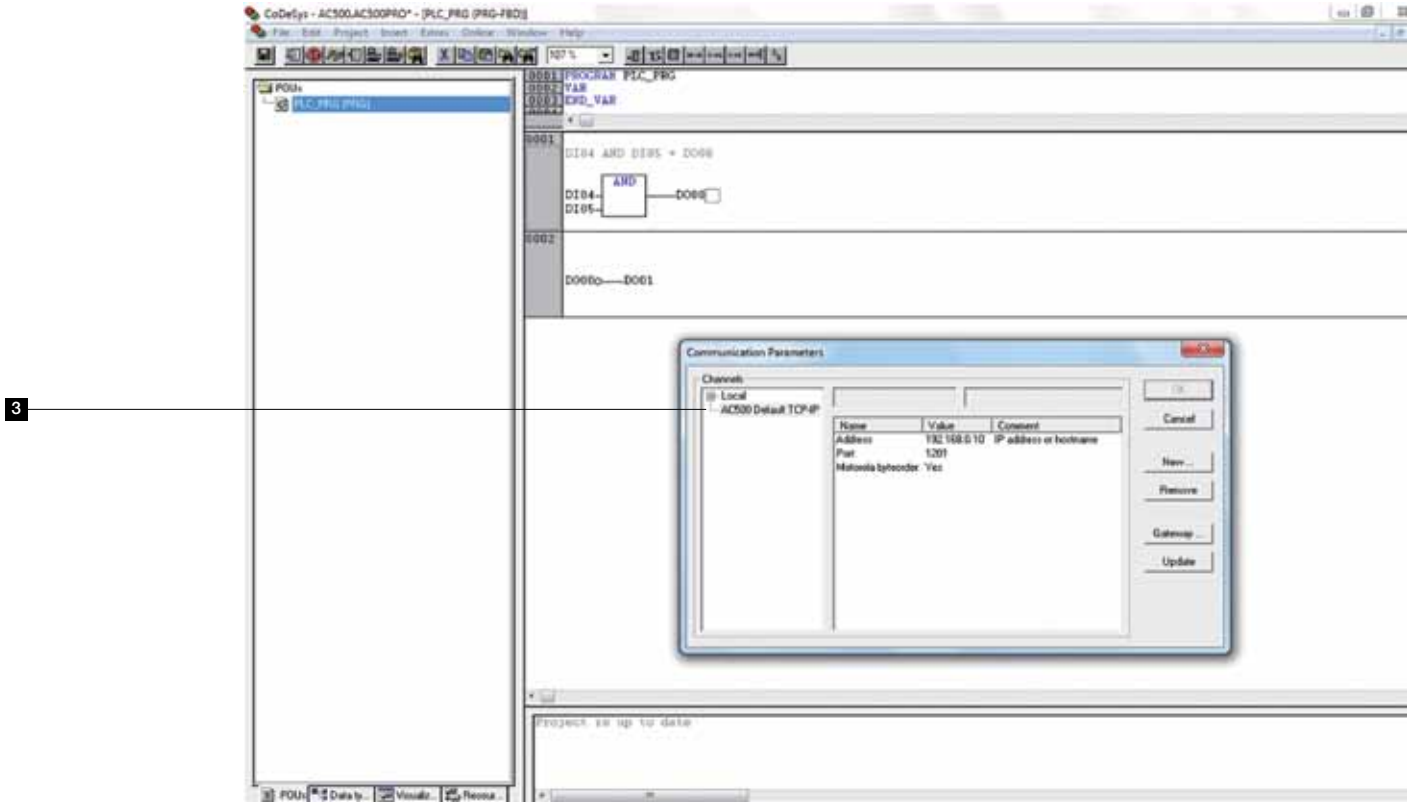
To set the communication parameter (Pre-condition is configuration of the Ethernet interface of the computer as described in Page 16)

1 Go to Online menu in CoDeSys screen.

2 Select Communication Parameter to set the Communication Parameter.



3 On the pop up, select the channel **AC500 Default TCP-IP** and confirm with **OK**. You can now proceed to **Page 46** to download and run the program in the PLC.



AC500-eCo Starter kit Control Builder Plus
Setting communication parameters in Windows for USB Serial Cable

Option 2: Serial connection using the TK503 cable:

1 First we need to find out which COM port Windows has set the serial cable to. In order to do so, the cable TK503 must be connected to the USB port of your computer.

2 In the Windows 7 Start menu, Select **Control Panel** (For **Windows XP** you can point your mouse on **My Computer**, right click to select **Properties**, in the pop up window, click on **Device Manager**).

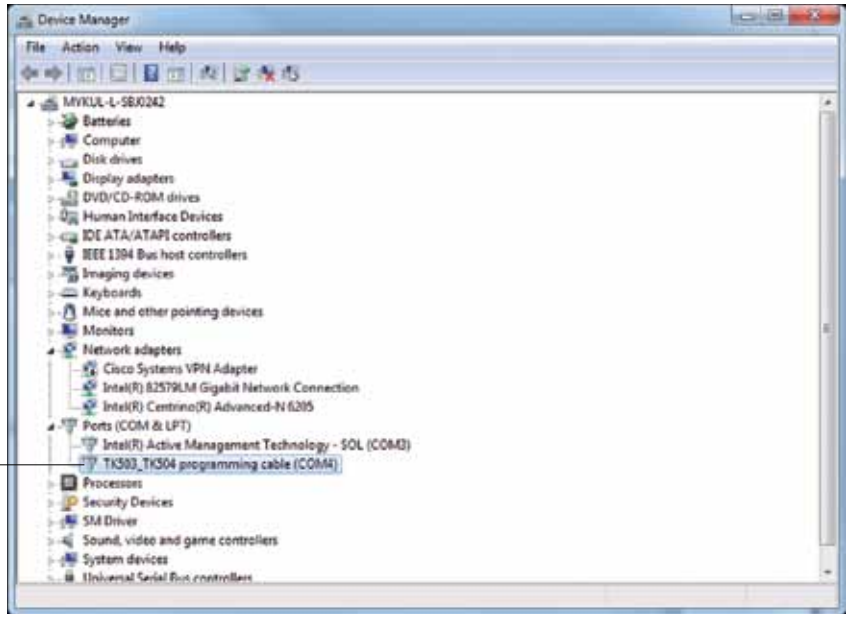
3 In Control Panel, select view by **Small icons**.

4 In the appearing System Properties menu, click the **Device Manager** icon.

The communication parameters have to be consistent with the COM1 parameters of the CPU specified in the PLC configuration. The port number must be the same as the port number listed in the Windows Device Manager (see section Detecting the correct Port Number (COM Interface) below).

AC500-eCo Starter kit Control Builder Plus
Setting communication parameters in Windows for USB Serial Cable

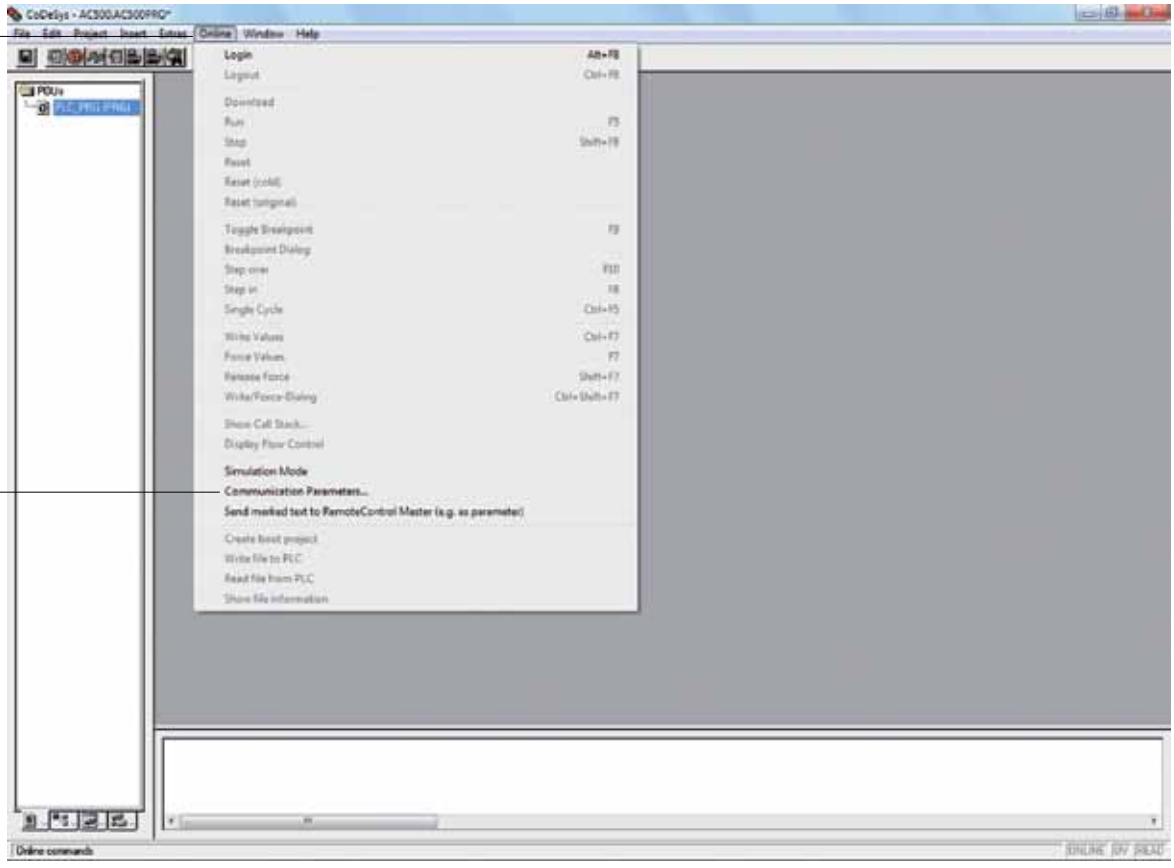
5 In the devices tree, open the Ports (COM & LPT) node. At the end of the TK503/TK504 programming cable entry the needed COM port number is displayed (COM4 in our example).



5

6 In CoDeSys, go to **Online** menu.

7 Select **Communication Parameters**.



6

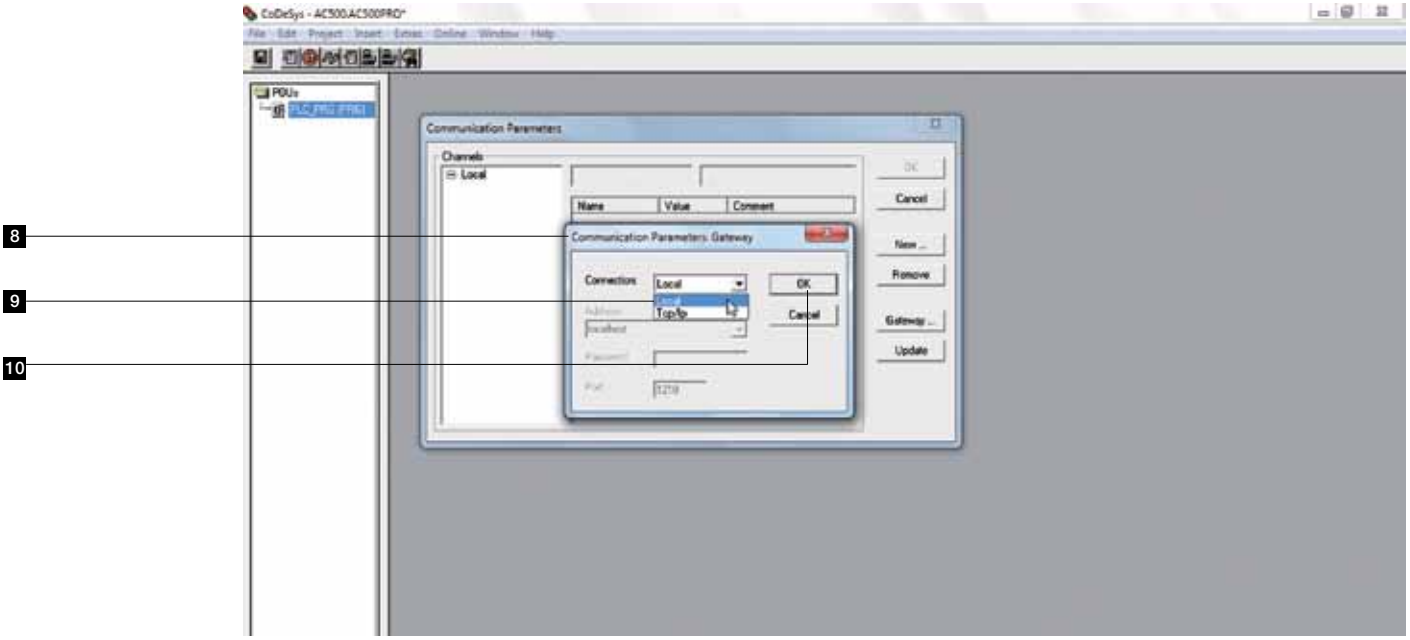
7

AC500-eCo Starter kit Control Builder Plus
Setting communication parameters in CoDeSys for USB Serial Cable

8 In the Communication Parameters dialog, click the Gateway button.

9 In the Connection field, select Local.

10 And click **OK** to confirm.

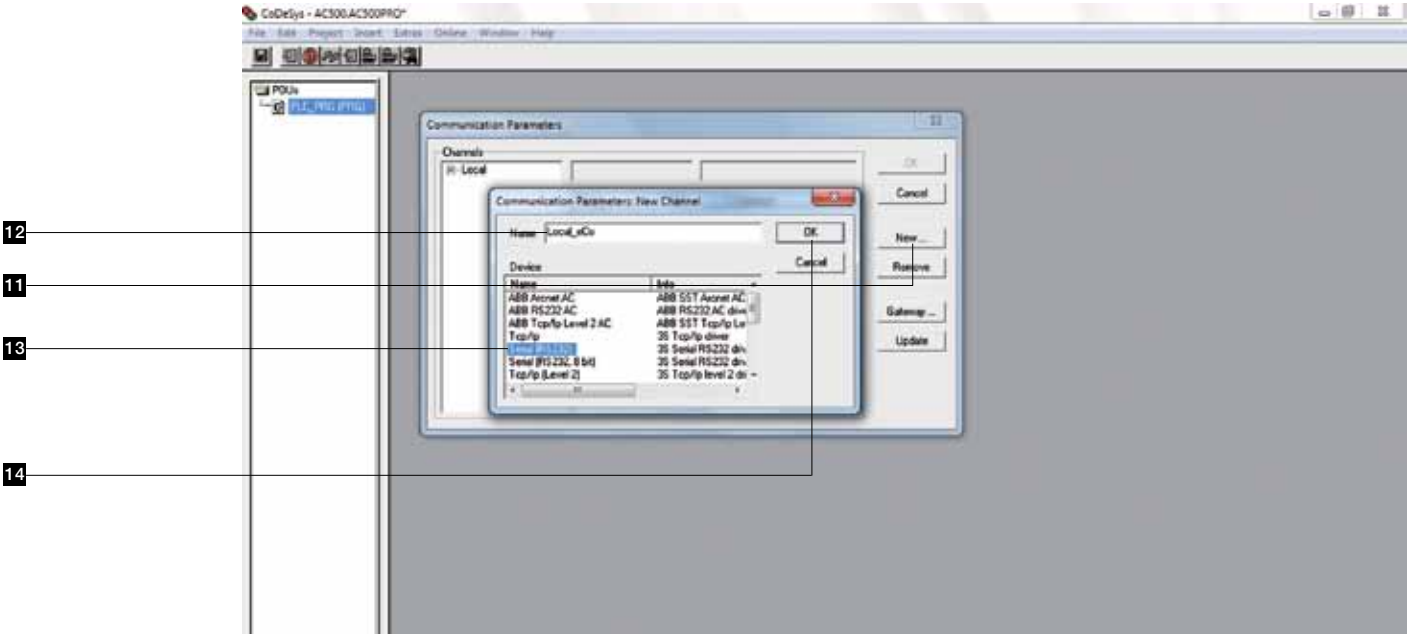


11 Click the **New** button to add a new channel.

12 In the appearing New Channel dialog, fill in the **Name** field.

13 Then, select **Serial (RS232)** as Device.

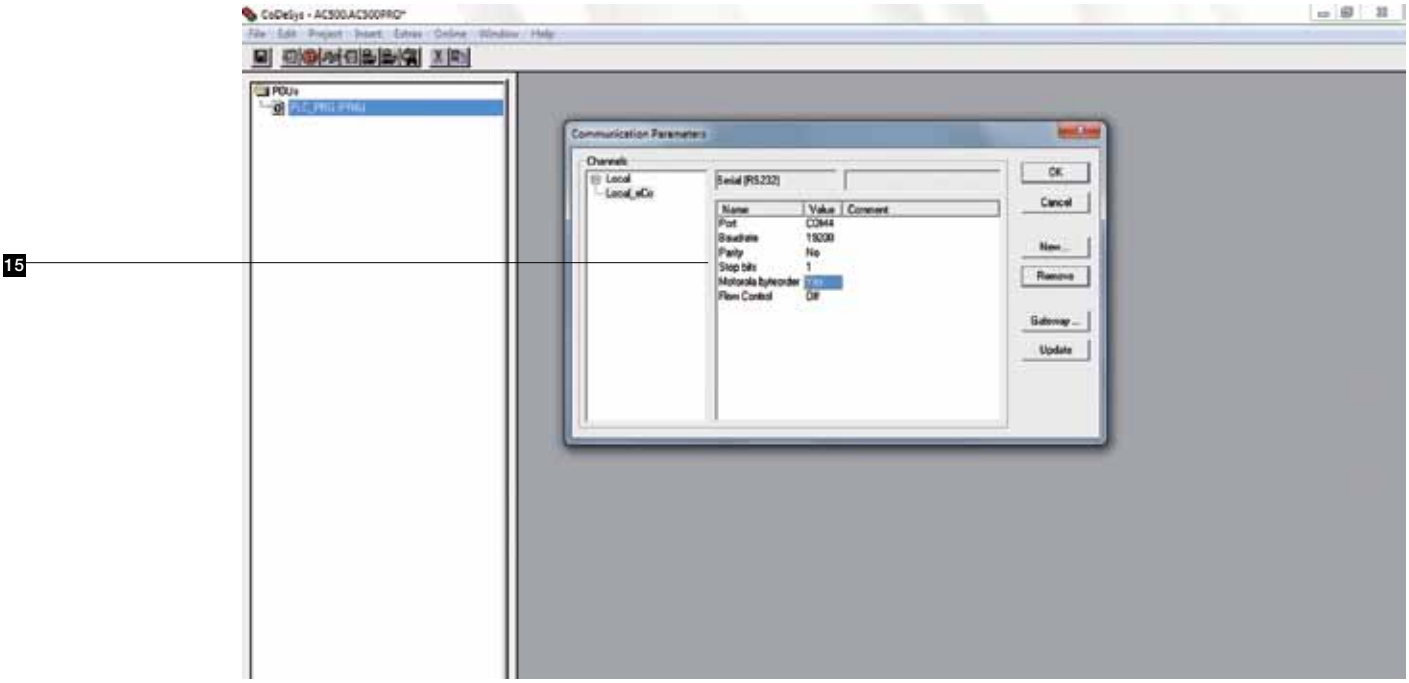
14 Finally, confirm with **OK**.



AC500-eCo Starter kit Control Builder Plus
Setting communication parameters in CoDeSys for USB Serial Cable

15 Set the parameters as shown below and confirm your settings by clicking **OK**.
The **Port Value** is the **COM Port** number which is detected by the PC after you have installed the TK503 cable driver.

- To change the **Port Value**, double click on the highlighted blue box.
- Each double click increases the port number by 1.
- Make sure **Motorola byteorder** is set to **Yes**, click **OK** when complete.



AC500-eCo Starter kit Control Builder Plus
Downloading the program to the PLC

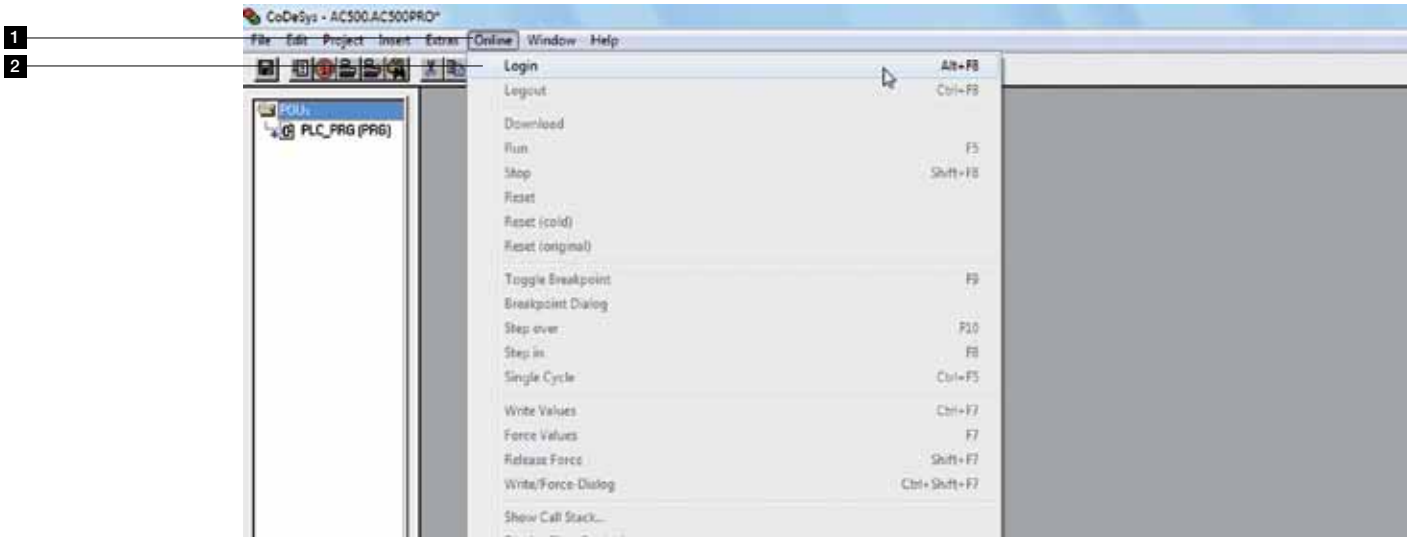
Prior to downloading the program to the PLC:

- The project must be compiled successfully.
- If not yet done, connect the PLC to the PC using the programming cable.
- Ensure that the RUN/STOP switch on the PLC is in RUN position.
- Make sure that simulation mode is deselected. To exit the simulation mode, select the Online > Simulation Mode menu item. After deselecting the menu item, the ✔ checkmark disappears.

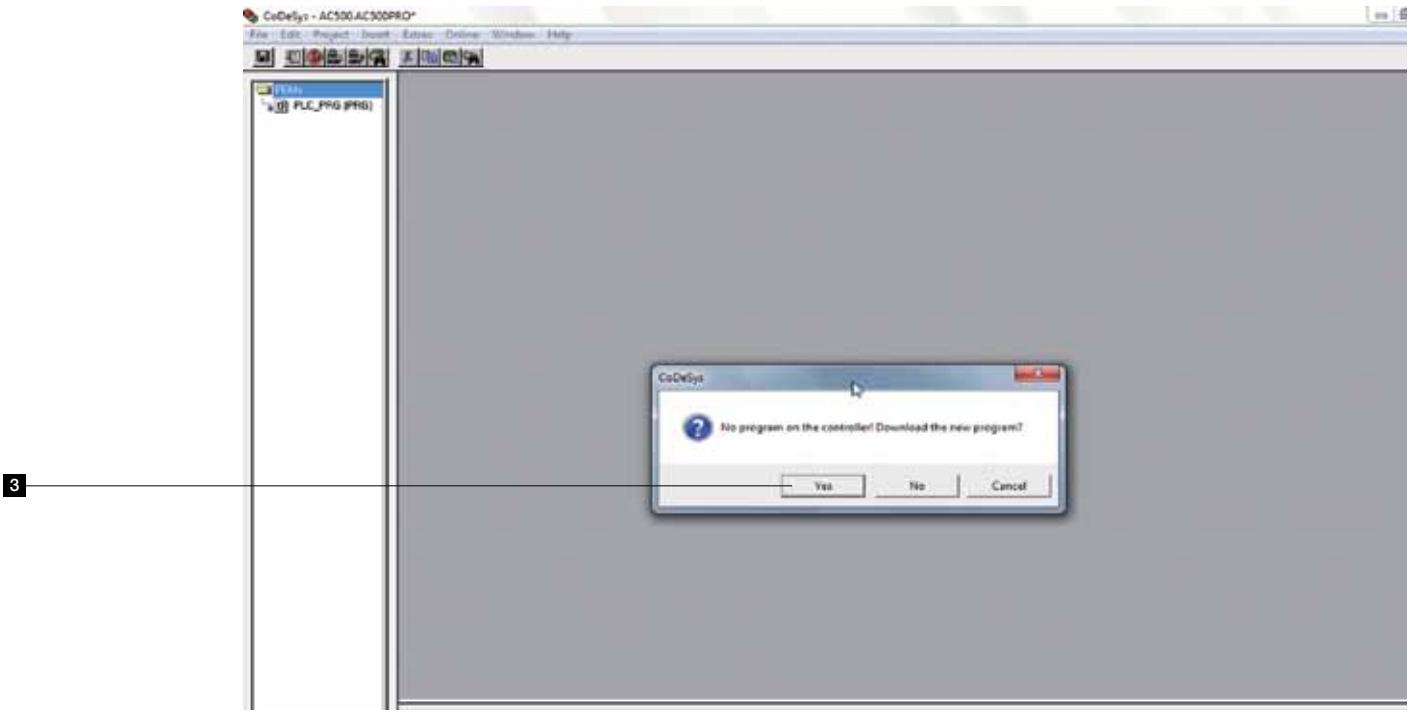
Proceed as follows:

1 Select **Online**.

2 Then, select **Login**.



3 A pop up window will appear requiring your confirmation to download. Click **Yes** and the new project will be downloaded to the PLC.



AC500-eCo Starter kit Control Builder Plus
Saving the program to the PLC

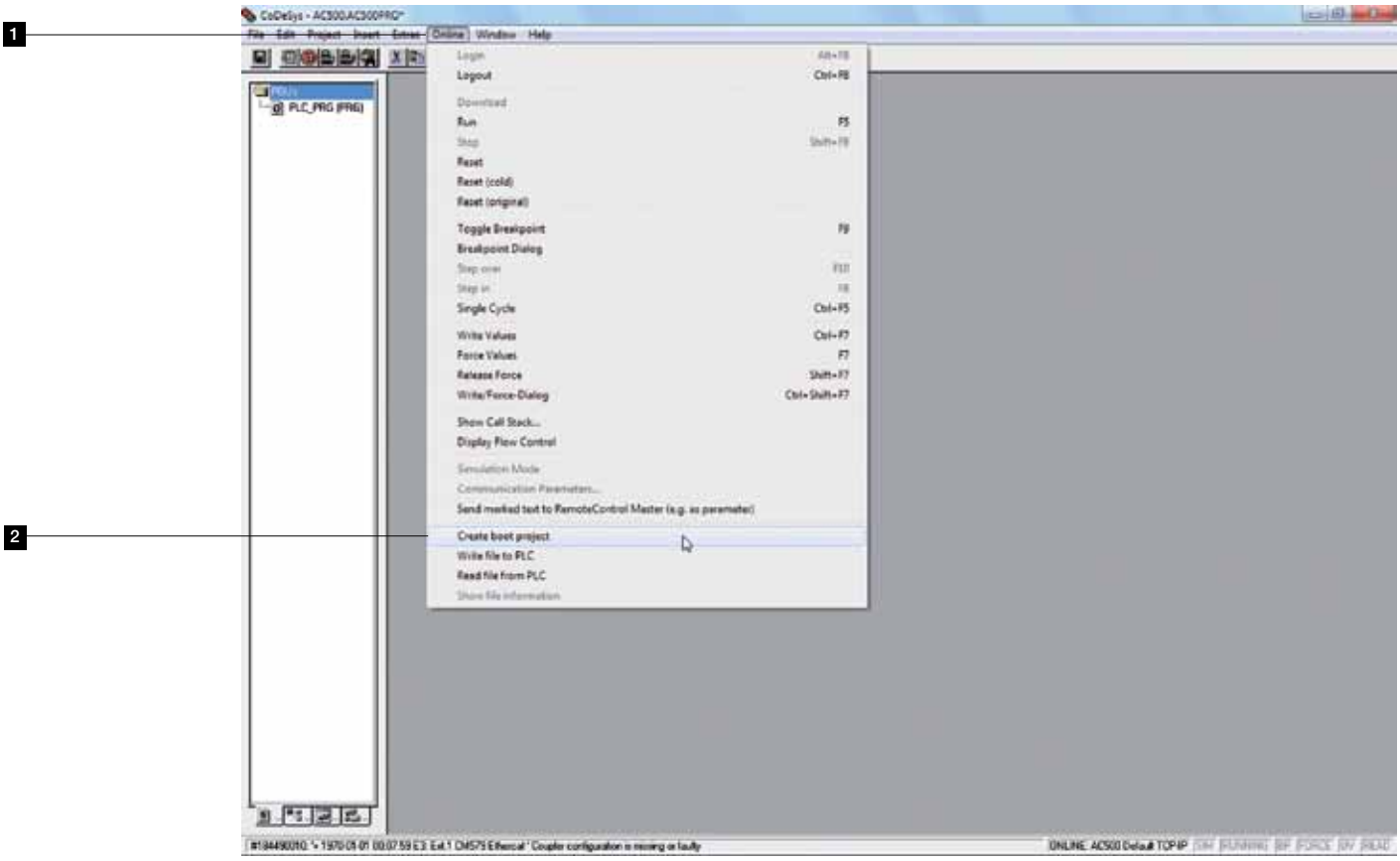
How to create a boot project (save RAM to ROM):

The application project is stored in the volatile memory of the PLC. The PLC can be enabled to automatically load and execute the application project after a restart. This is achieved by storing the downloaded program in a non-volatile memory (Flash memory). Otherwise, if this command is not used, the program has to be reloaded manually (i.e., downloaded) each time the PLC is powered up.

Once the program is stored in the non volatile memory, it can only be overwritten by another program or deleted with the **delappl** command in the PLC browser (Double click PLC-Browser in the Resource tab and enter the command **delappl** in the command line).

1 Select **Online**.

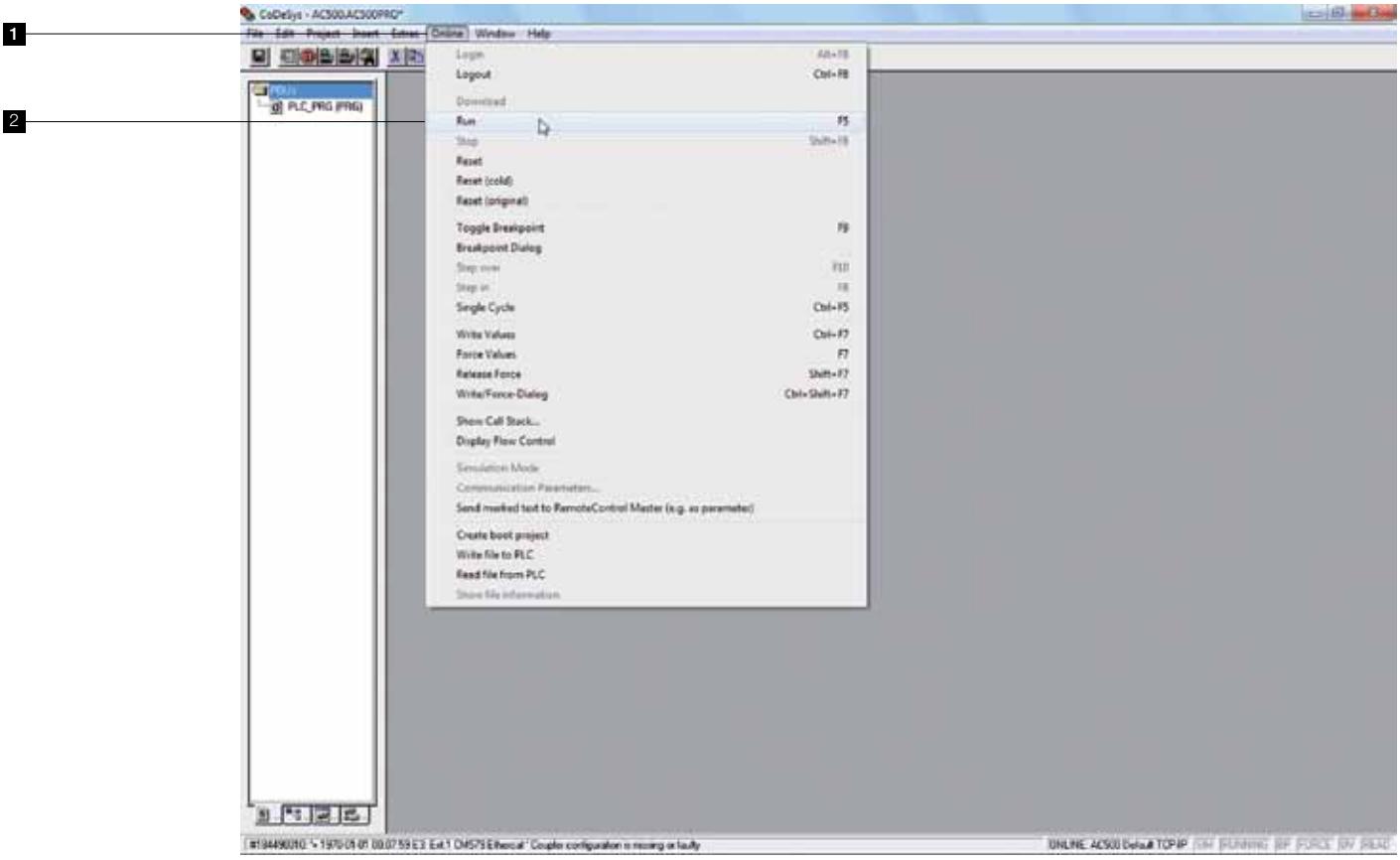
2 Then, select the **Create boot project** command (save RAM to ROM).



AC500-eCo Starter kit Control Builder Plus
Checking status of the PLC

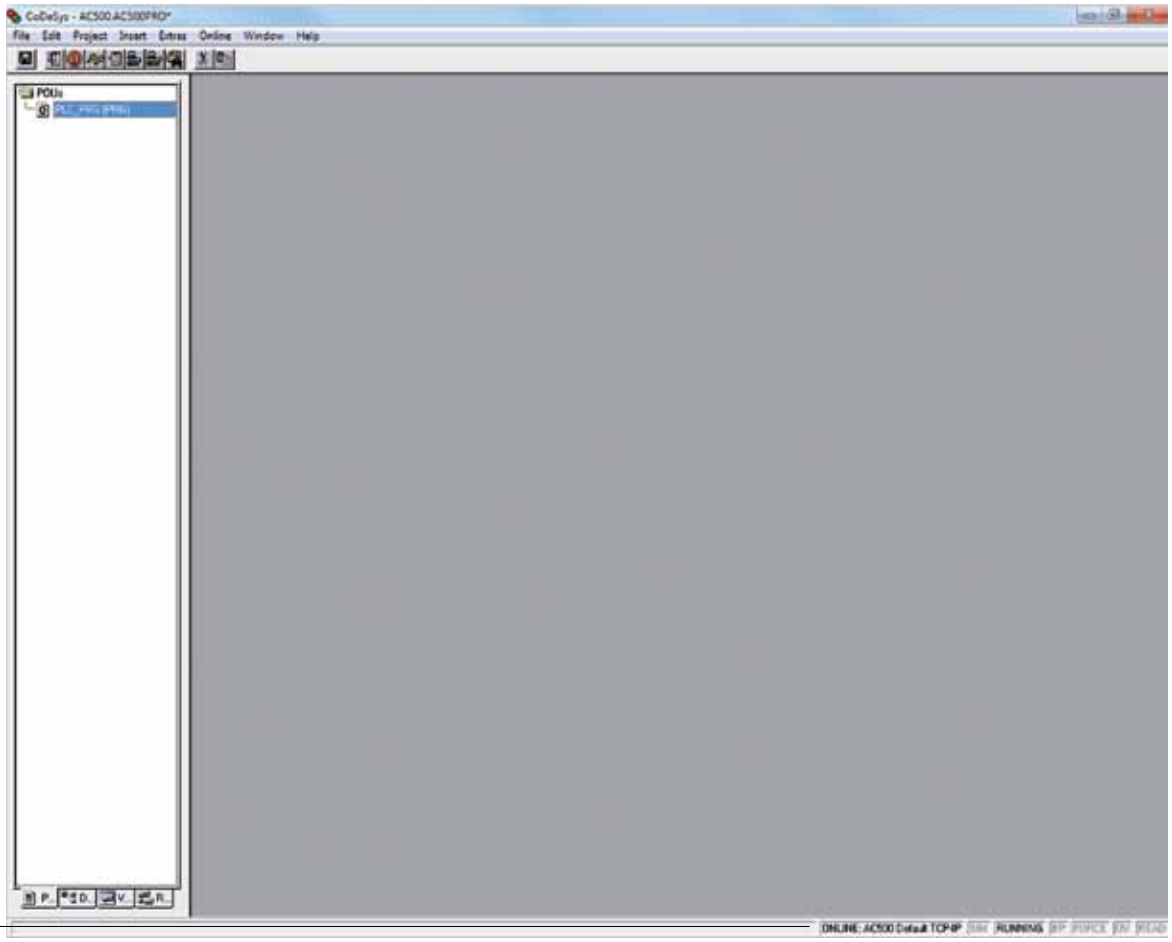
1 To run the PLC, once again go to **Online**.

2 Then, select **RUN**.



AC500-eCo Starter kit Control Builder Plus
Checking status of the PLC

3 The message will come in black indication when the CPU is running on the bottom right corner of the screen.



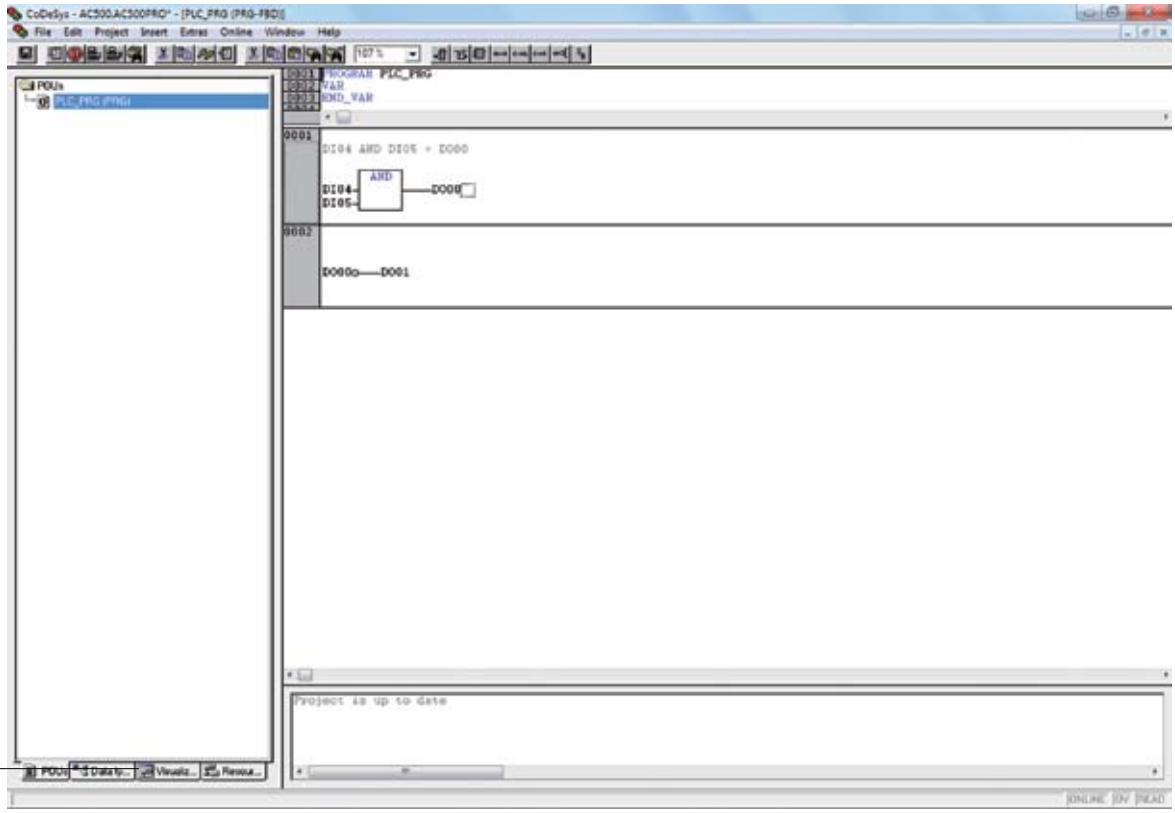
3

AC500-eCo Starter kit Control Builder Plus
Program visualization

The visualization allows designing a graphical representation of project variables. In online mode, these graphical elements can change, for example, their color, size or position according to the actual variable status (value). Furthermore, it is possible to influence variables values.

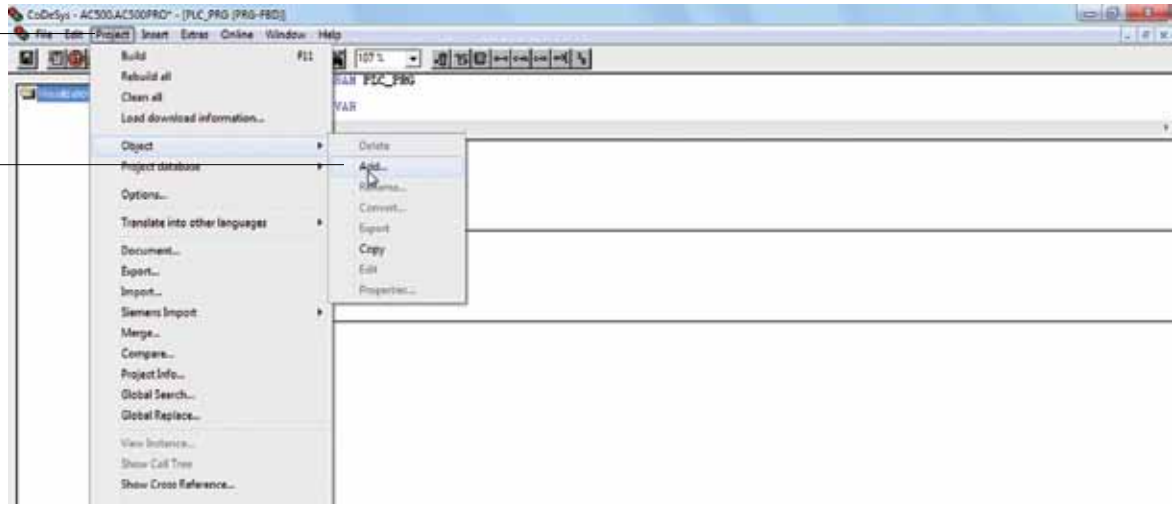
The PLC has to be disconnected (i.e., you have to go offline), before you can modify the program.
For that purpose select the **Online > Logout** menu item.

1 Click the **Visualizations** tab (at the bottom of the pane).



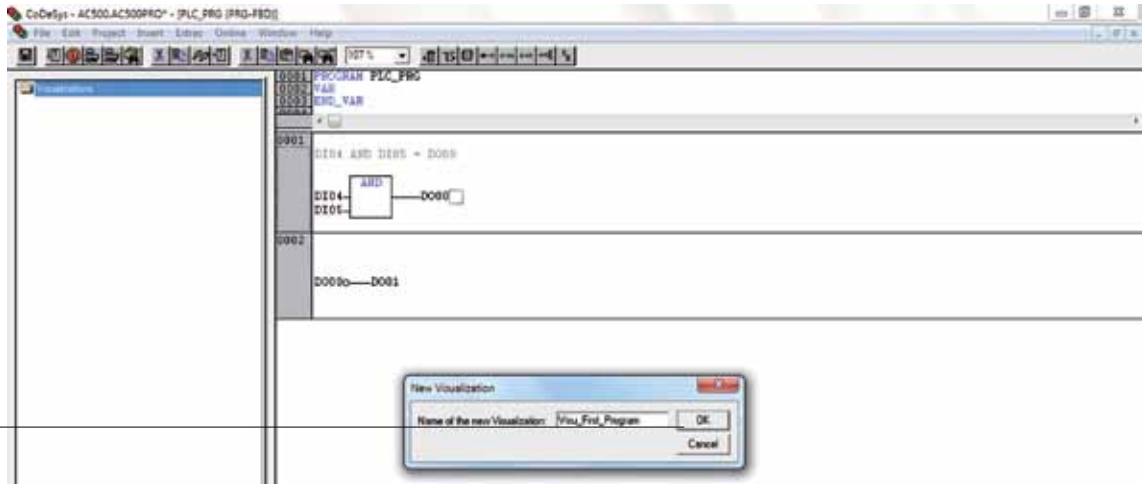
2 Select **Project**, then, go to **Object**.

3 Click **Add** to insert a new visualization object.



AC500-eCo Starter kit Control Builder Plus
Program visualization

4 Type **Visu_First_Program** as name for the new visualization and confirm with "**OK**".

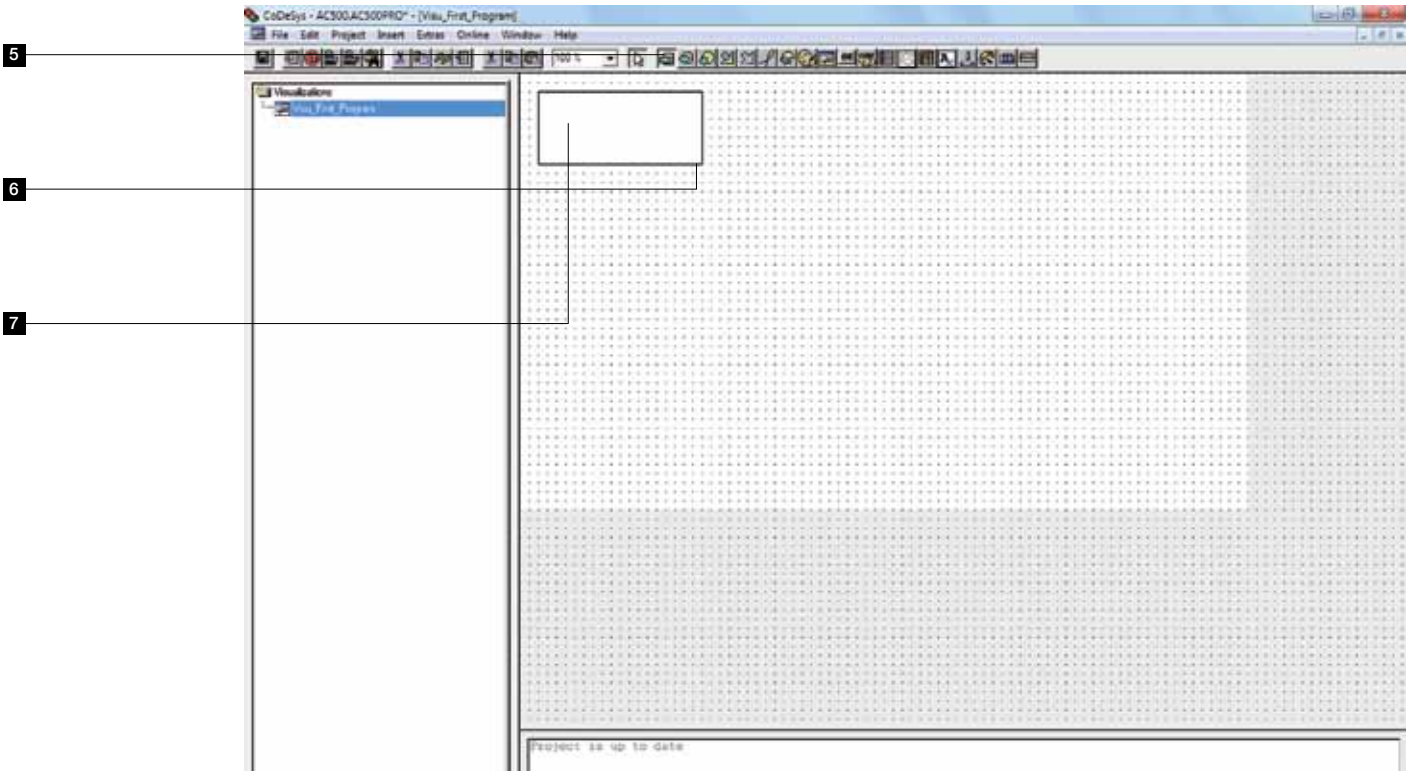


The new visualization object is inserted and you can start designing. In the toolbar, various graphical elements are available for designing your visualization. To select an element click the desired icon, for example insert a rectangle to be used as input element.

5 Click the rectangle icon.

6 Draw the rectangle as follows:

7 In the visualization sheet, left-click at the desired starting point of the element to be inserted. In our example, this is the upper left corner of the rectangle. Hold the mouse button down and drag the mouse to the desired destination point (lower right corner). Release the mouse button to insert the object.

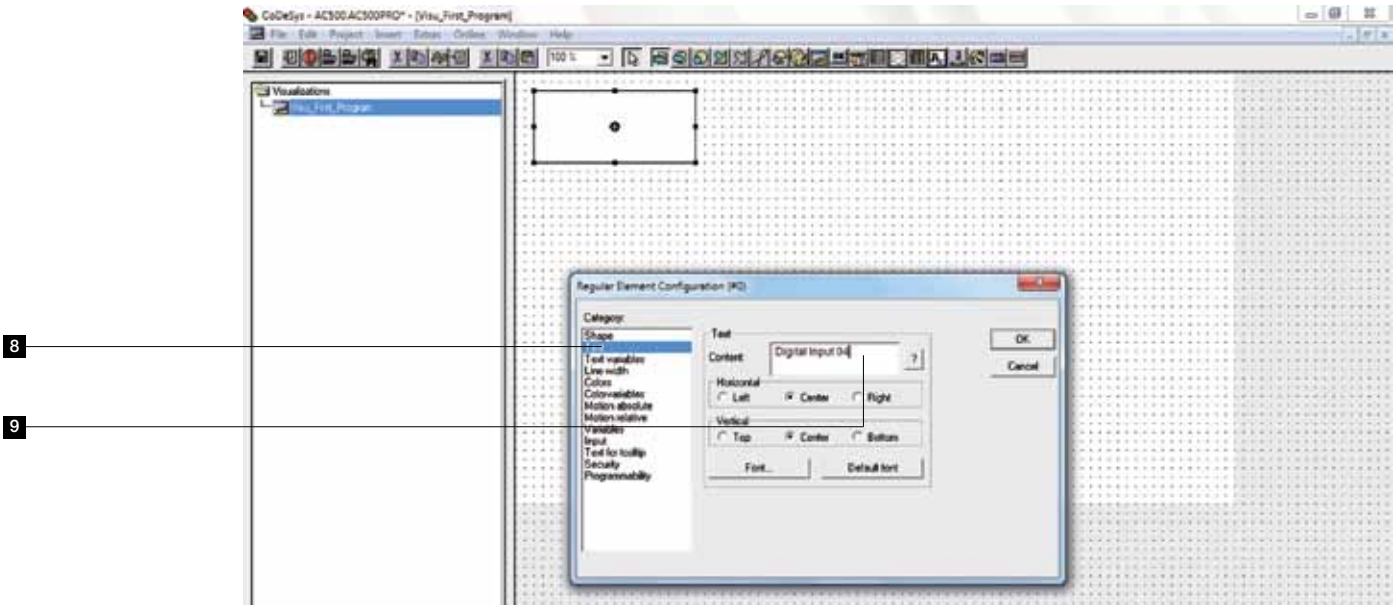


AC500-eCo Starter kit Control Builder Plus
Program visualization

Configure the new element by double-clicking it. In the appearing configuration dialog, specify the following properties.

8 In the **Category** box, select **Text**.

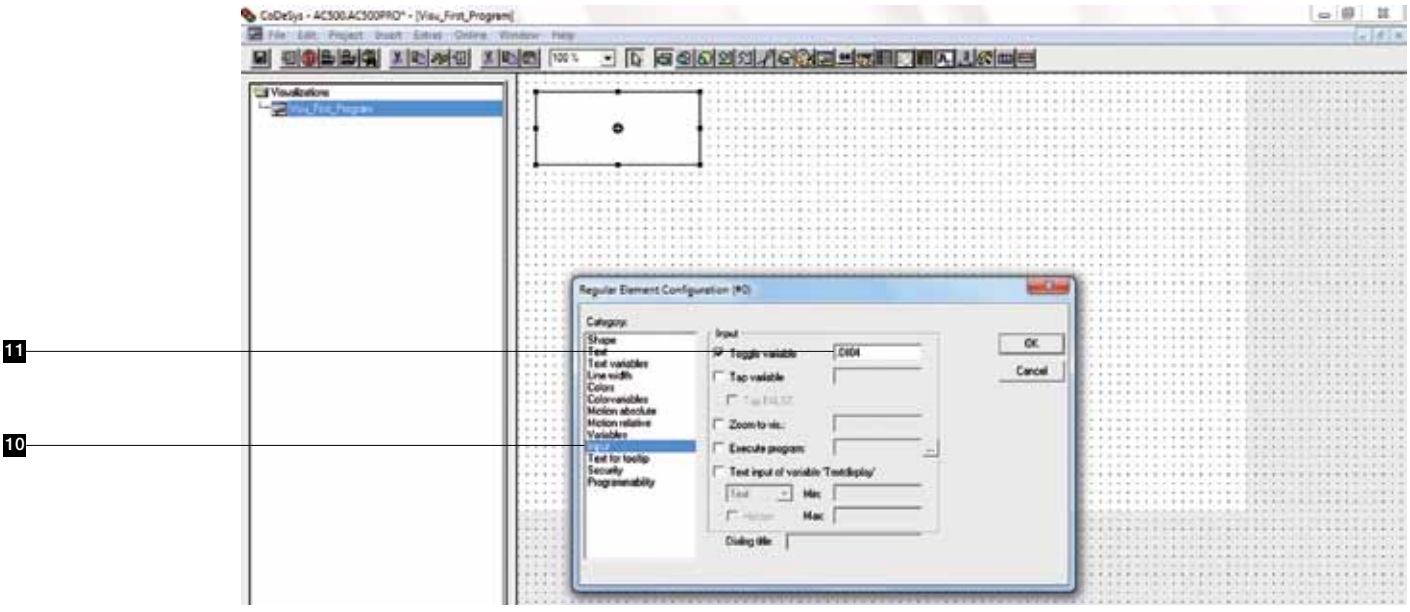
9 Enter **Digital Input 04** into the Content field. This text will appear in the element. You can also change the font and the position of the text.



10 Go to Input to tie a variable to the button, first click Toggle variable, then to put variable point cursor in the blank and press F2 (the inputs and outputs can be selected from the section **IO_Module_Mapping**).

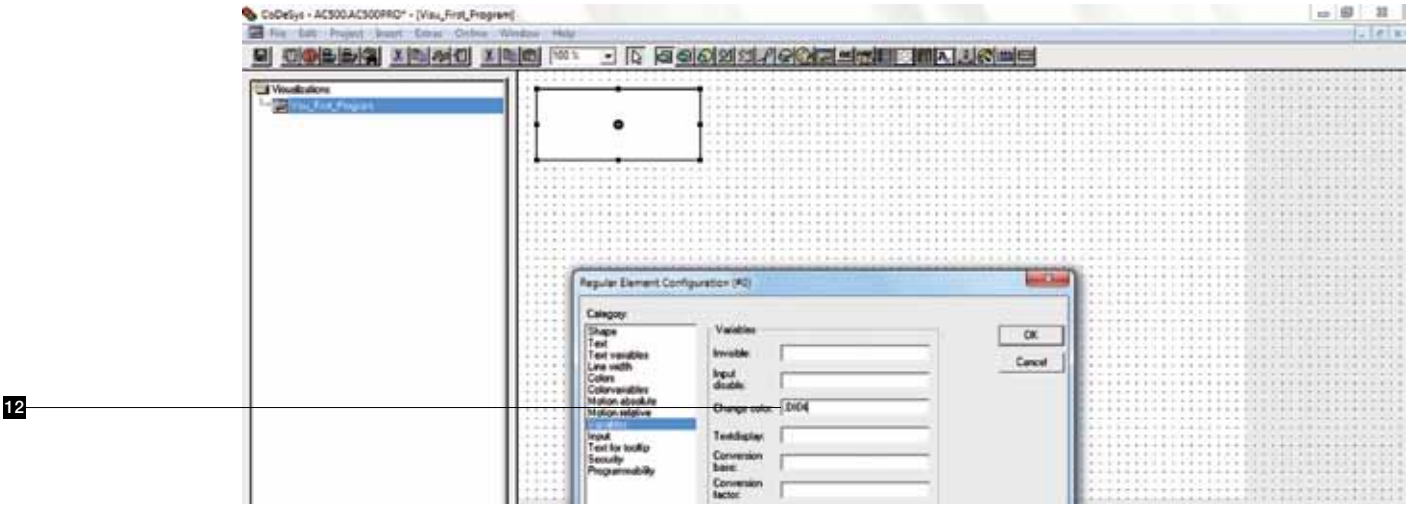
If the cursor is set to an input field, the Input Assistant can be called by pressing the F2 key. Here, already declared variables can be selected.

11 In the **Category** box, left-click Input and enter **.DI04** into the **Toggle variable** field to define the relation between the element and digital input 04.



AC500-eCo Starter kit Control Builder Plus
Program visualization

12 In the **Category** box, left-click Variables and enter **.DI04** into the **Change color** field. Due to this setting, the element will change its color during runtime, depending on its status.



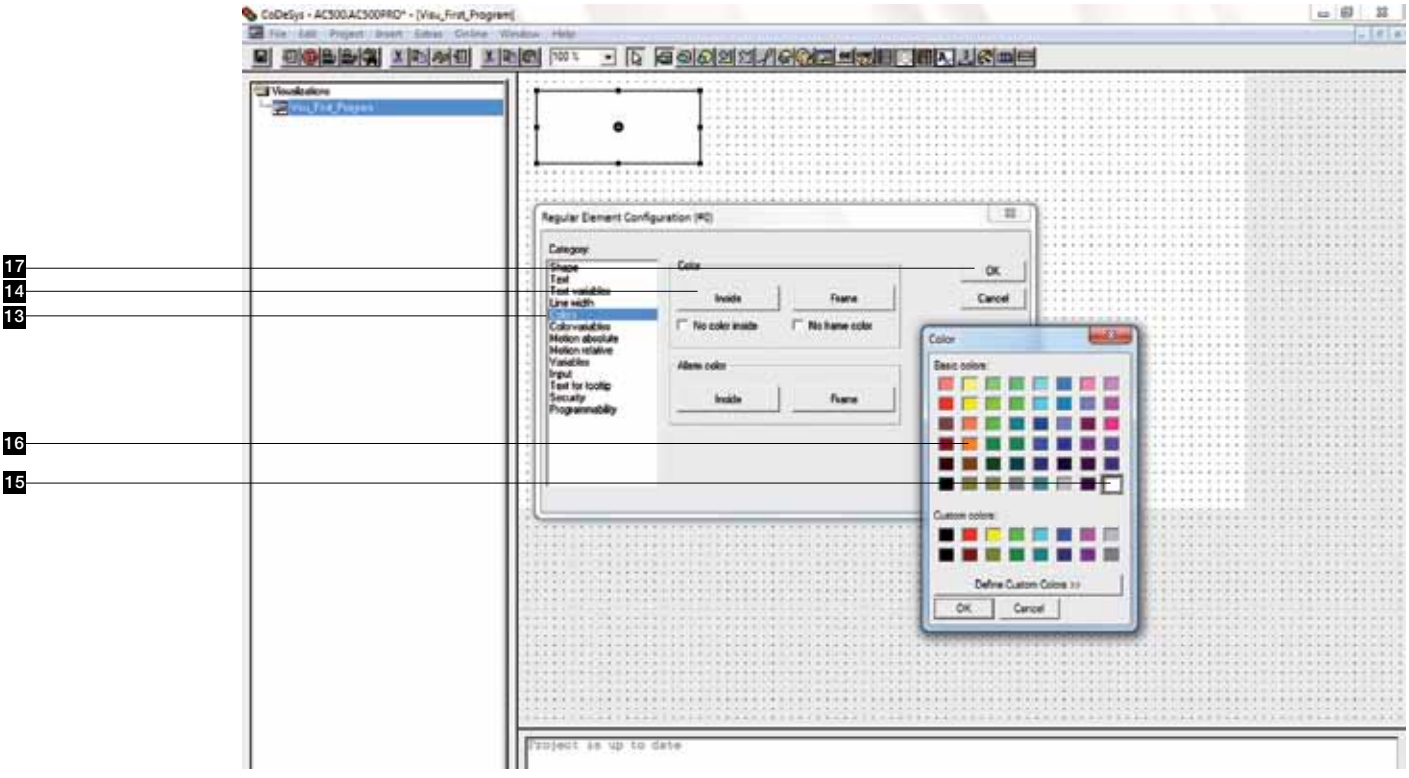
13 Define a color for each state (TRUE and FALSE). Click Color in the Category box.

14 For that purpose, click the **Inside** button for both states (i.e., in the Color area as well as in the Alarm color area). In the appearing color table, select a color and confirm with “OK”.

15 **Color** represents the color when it is on a **FALSE** state. Select color **white**.

16 **Alarm Color** represents the color when it is on a **TRUE** state. Select color **orange**.

17 In the Regular Element Configuration, click **OK** to confirm.



AC500-eCo Starter kit Control Builder Plus
Program visualization

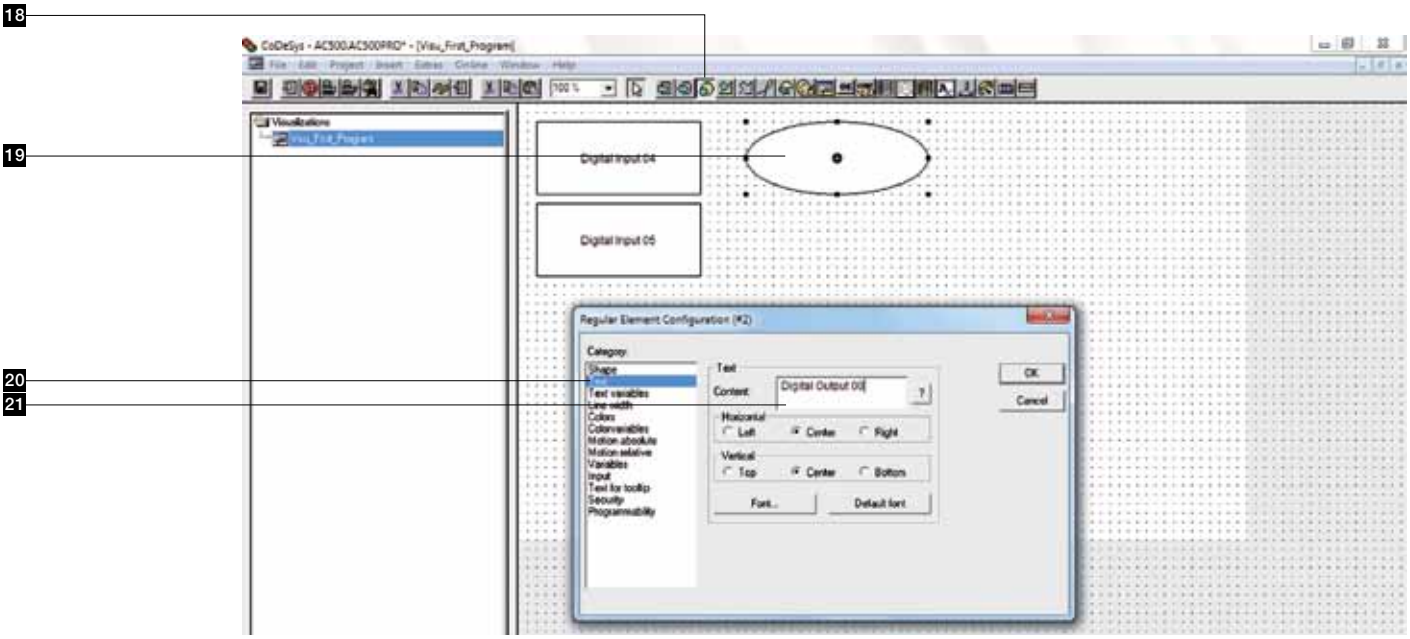
Repeat the steps 5 to 17 to create and configure a second input button titled Digital Input 05 associated to DI05.

18 Create an output element. This is done in a similar way as for an input element. However, for an output there is no need to specify any characteristics in the Input category. Click the Ellipse icon.

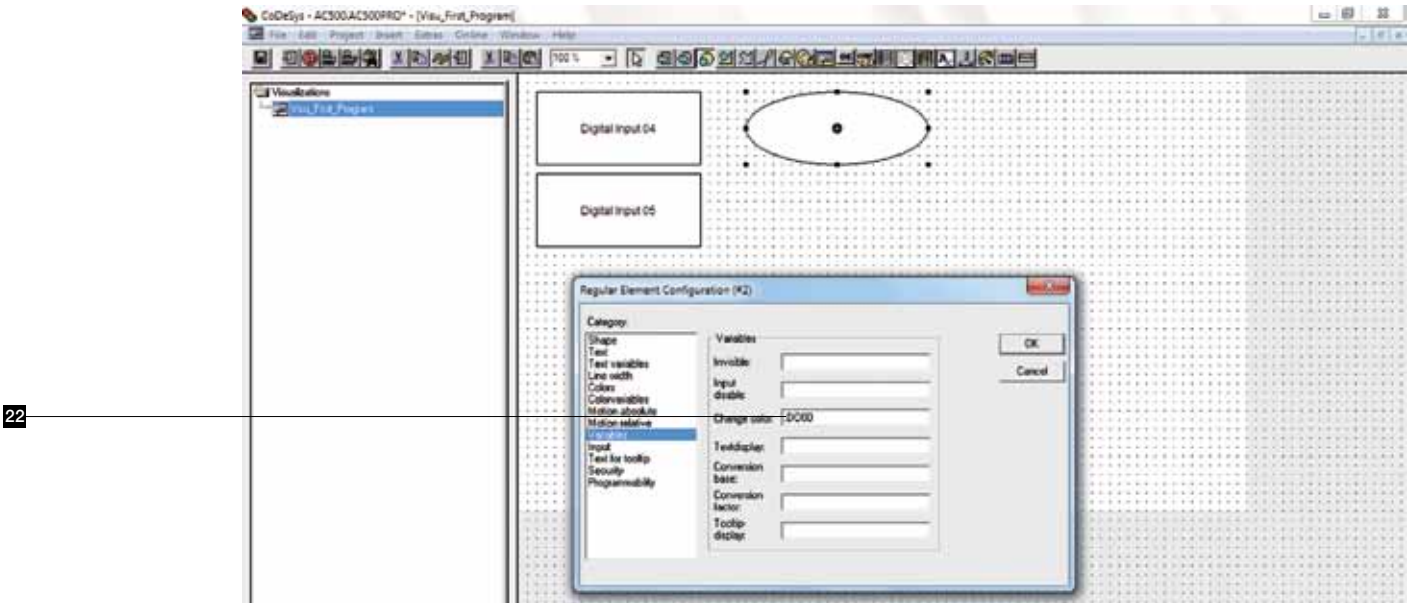
19 Draw an ellipse to be used as output element.

20 In the Category box, select **Text**.

21 Enter **Digital Output 00** into the Content field. This text will appear in the element. You can also change the font and the position of the text.



22 In the Category box, left-click Variables and enter .DO00 into the Change color field.
Due to this setting, the element will change its color during runtime, depending on its status.



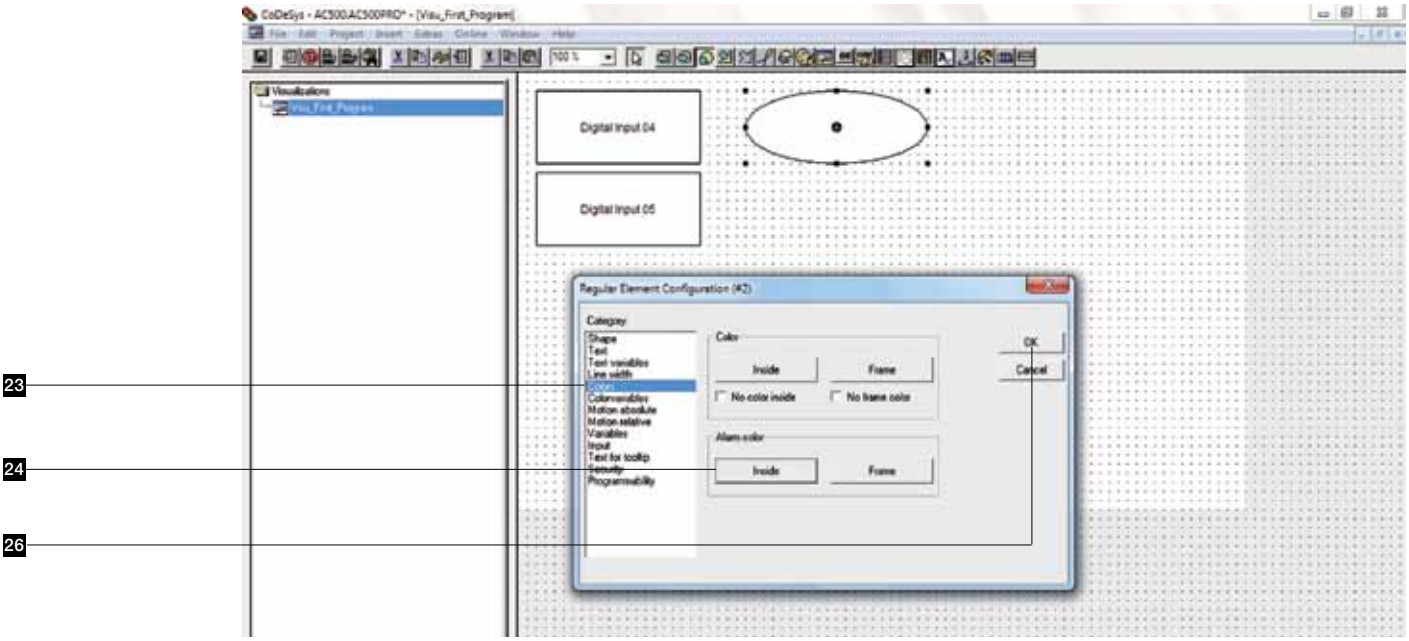
AC500-eCo Starter kit Control Builder Plus
Program visualization

23 Define a color for each state (TRUE = ON and FALSE = OFF).

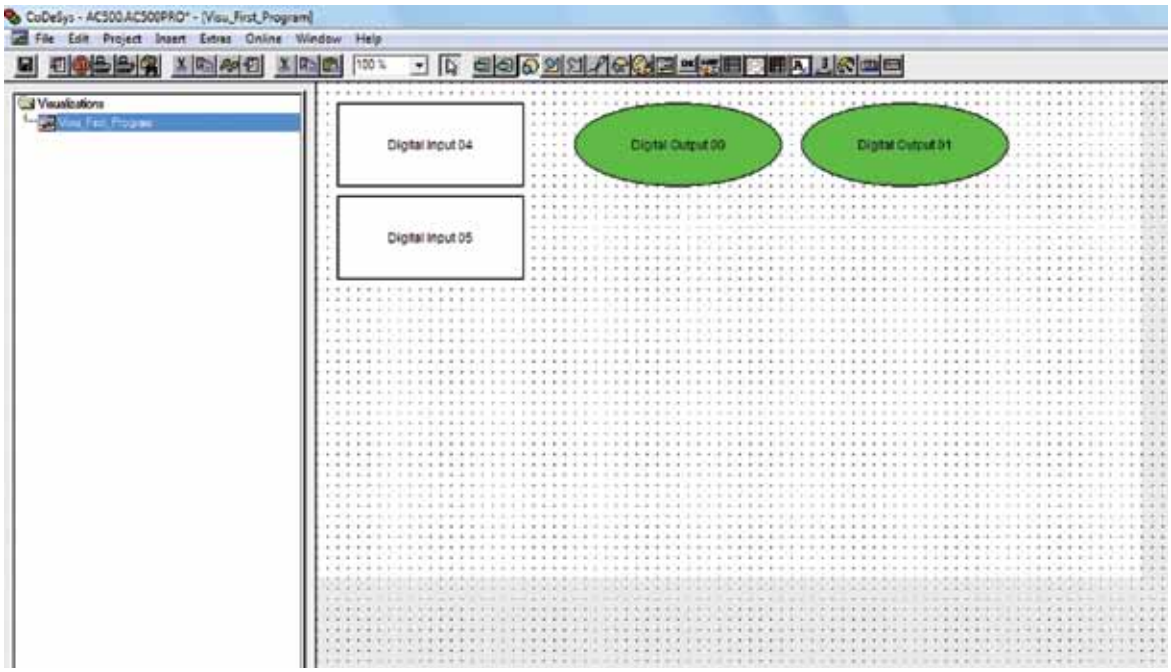
24 For that purpose, click the Inside button for both states (i.e., in the Color area as well as in the Alarm color area).

25 In the appearing color table, select a color and confirm with OK. Select **green** for **FALSE** (color) and red for **TRUE** (Alarm color).

26 In the element‘s properties dialog, click **OK** to confirm the set element configuration.



27 Repeat step **19 to 27** for a second output element titled digital output 01 using variable DO01.The design of the sample visualization is now completed.



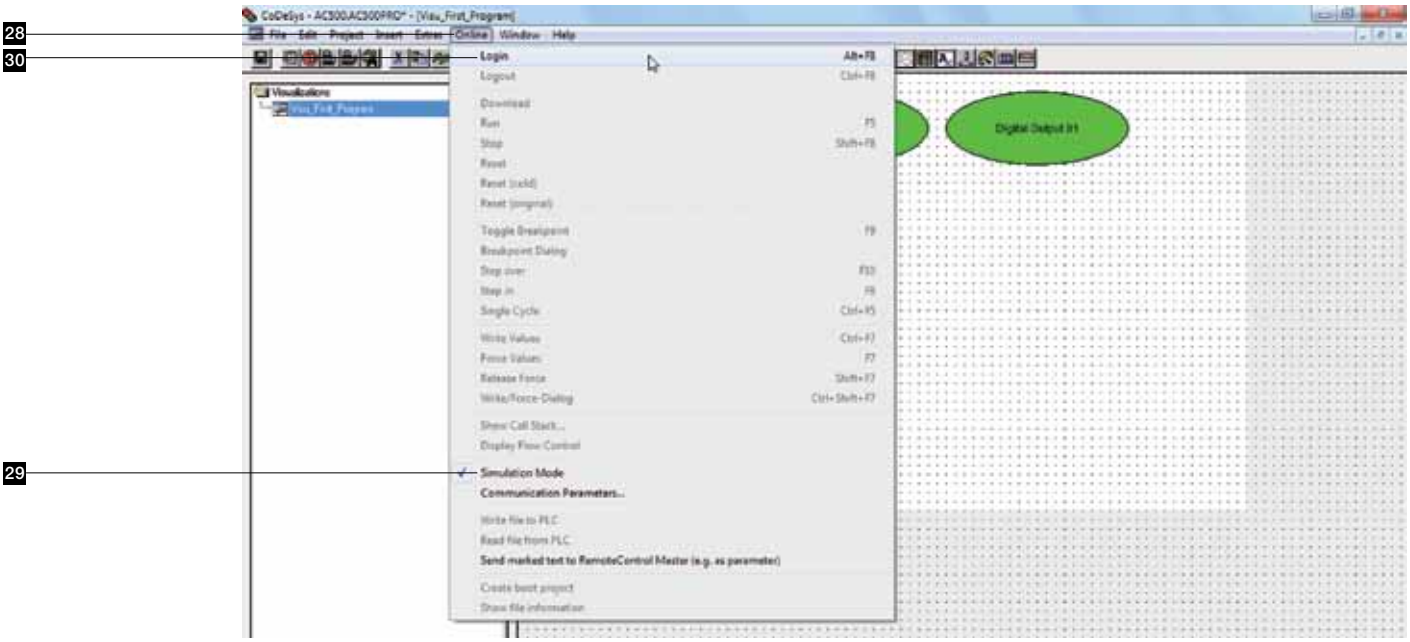
AC500-eCo Starter kit Control Builder Plus
Program visualization

For verification, start the program execution in the simulation mode:

28 Go to **Online**.

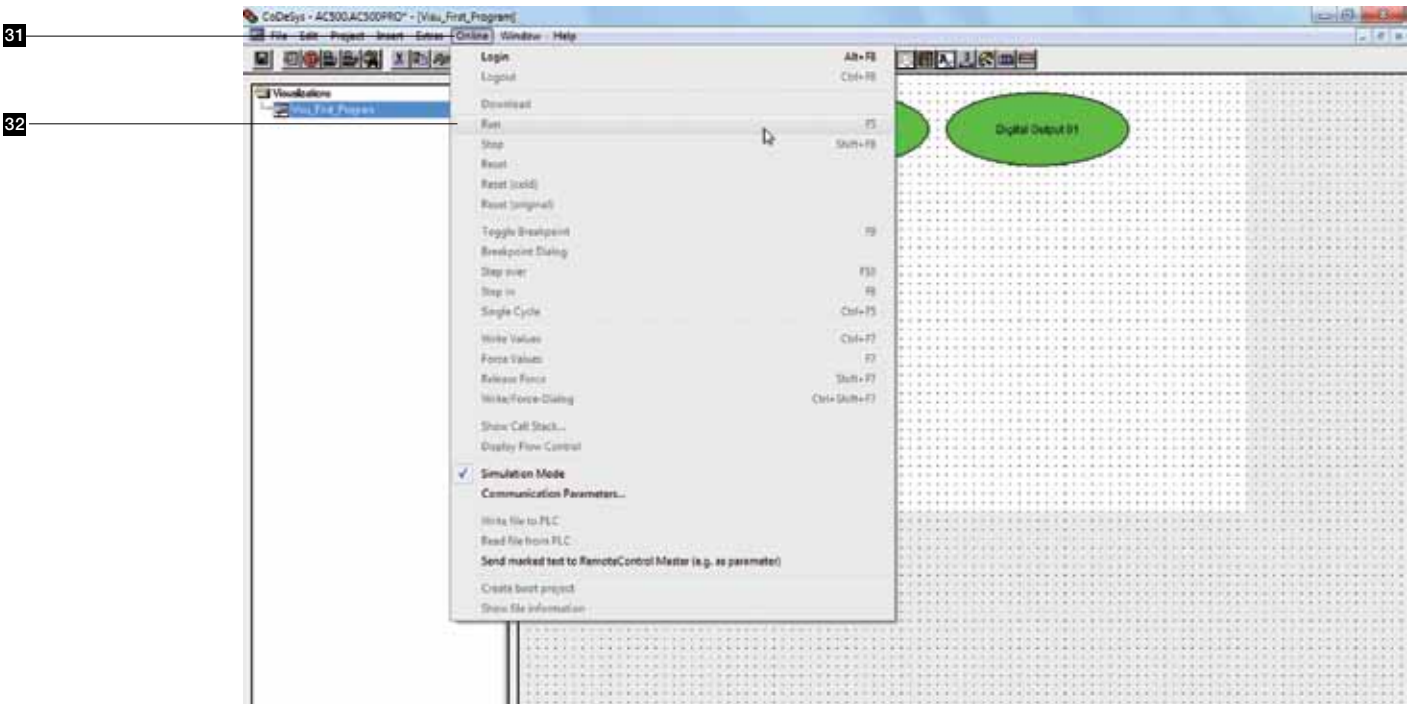
29 Then, click **Simulation Mode** menu item.

30 Then, select **Online** and **Login**.



31 Select **Online**.

32 After that, select **Run**.



AC500-eCo Starter kit Control Builder Plus
Changing the input states

After applying the input signals DI04 and DI05 by left-clicking the box of the desired input in the visualization, their status and status changes are displayed in the visualization during runtime.

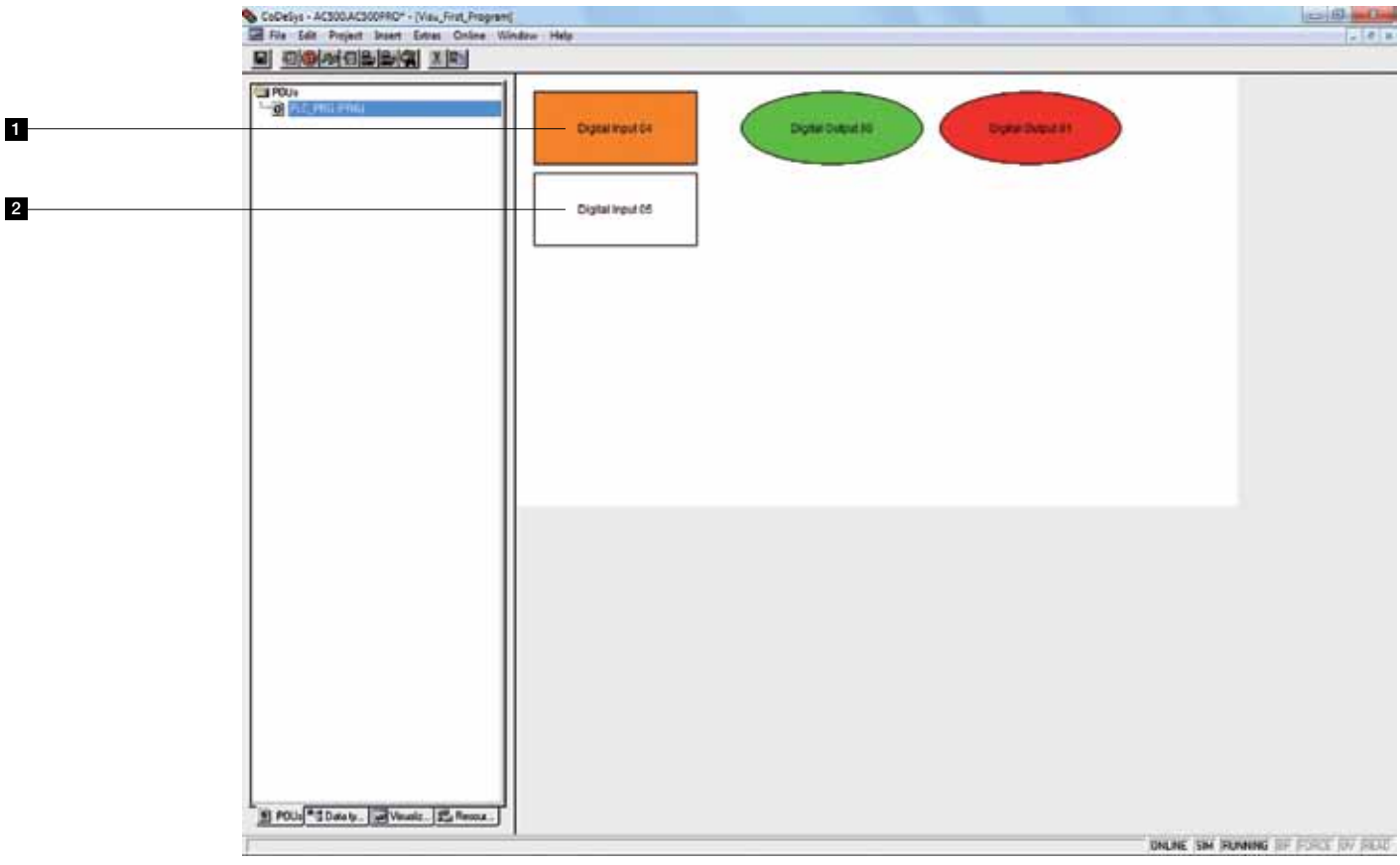
Depending on the applied input states, the outputs will be driven and change their color in the visualization sheet.

The screenshot has been taken at the following conditions:

1 Digital Input 04 = TRUE and digital input 05 = FALSE;

2 Digital Output 00 = FALSE and digital output 01 = TRUE

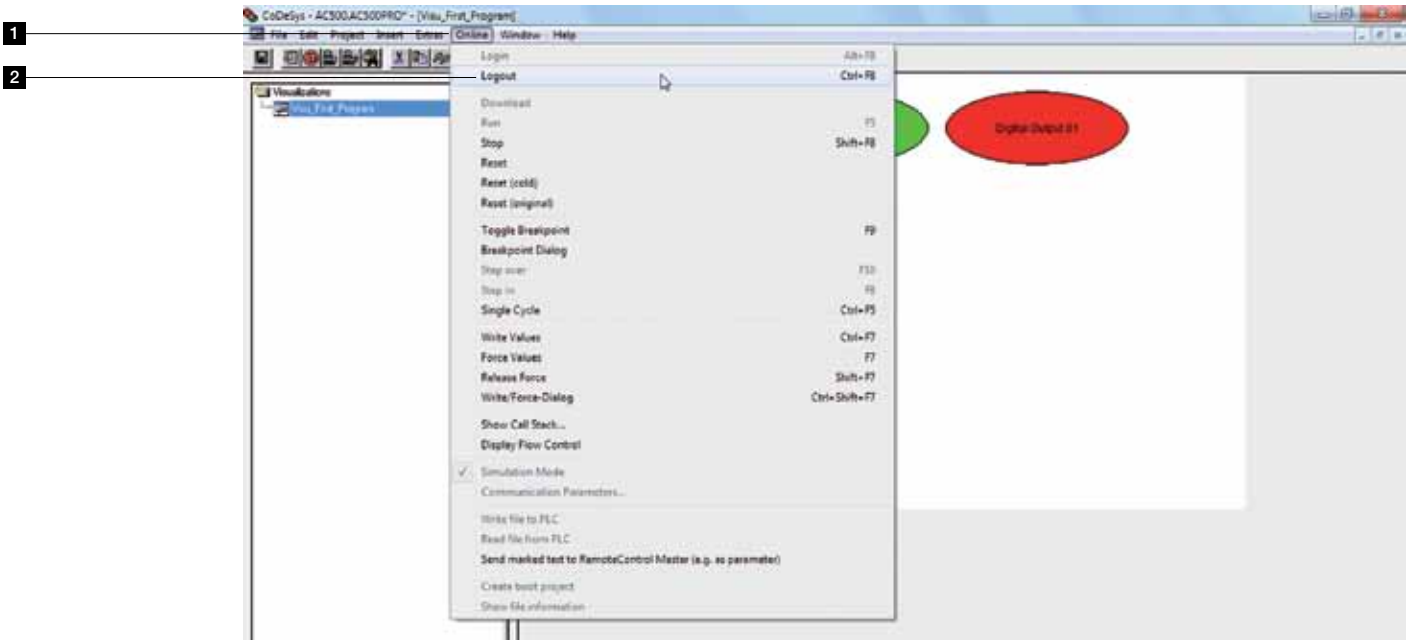
You can also use this visualization to show the status of the inputs and outputs of your PLC during execution of the program on the PLC. To do this, de-activate **Simulation Mode** in **Online**. Connect the PLC to the computer, select **Online/Login** and let CoDeSys download the program when it asks for. Start program execution with **Online/Run**. Now the visualization shows the status of inputs and outputs of the PLC.



AC500-eCo Starter kit Control Builder Plus
Exiting the software

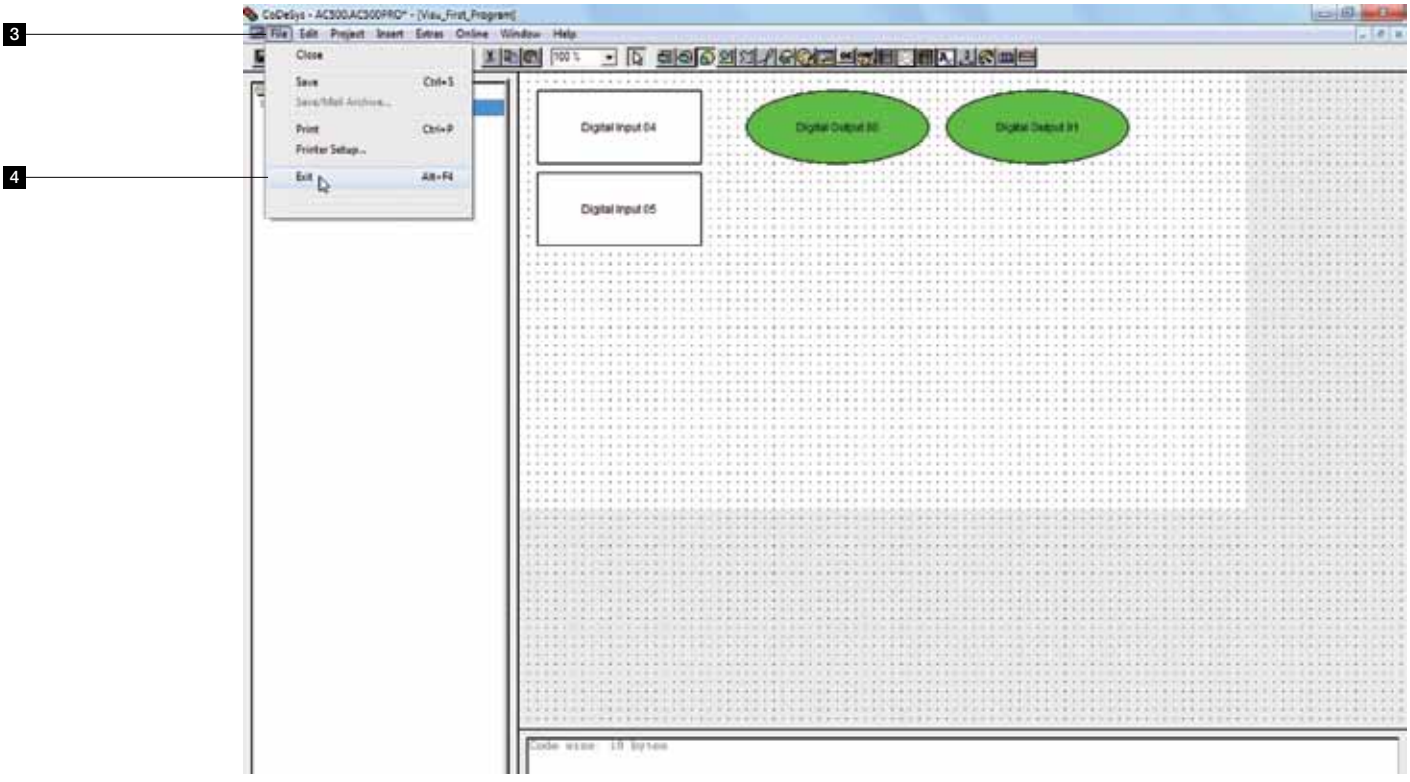
1 To exit the software, first select the **Online** menu.

2 Second, click **Logout** menu item. Then select **Online** and deactivate **Simulation Mode** if set.



3 Having switched the software **Offline**, you can go to File.

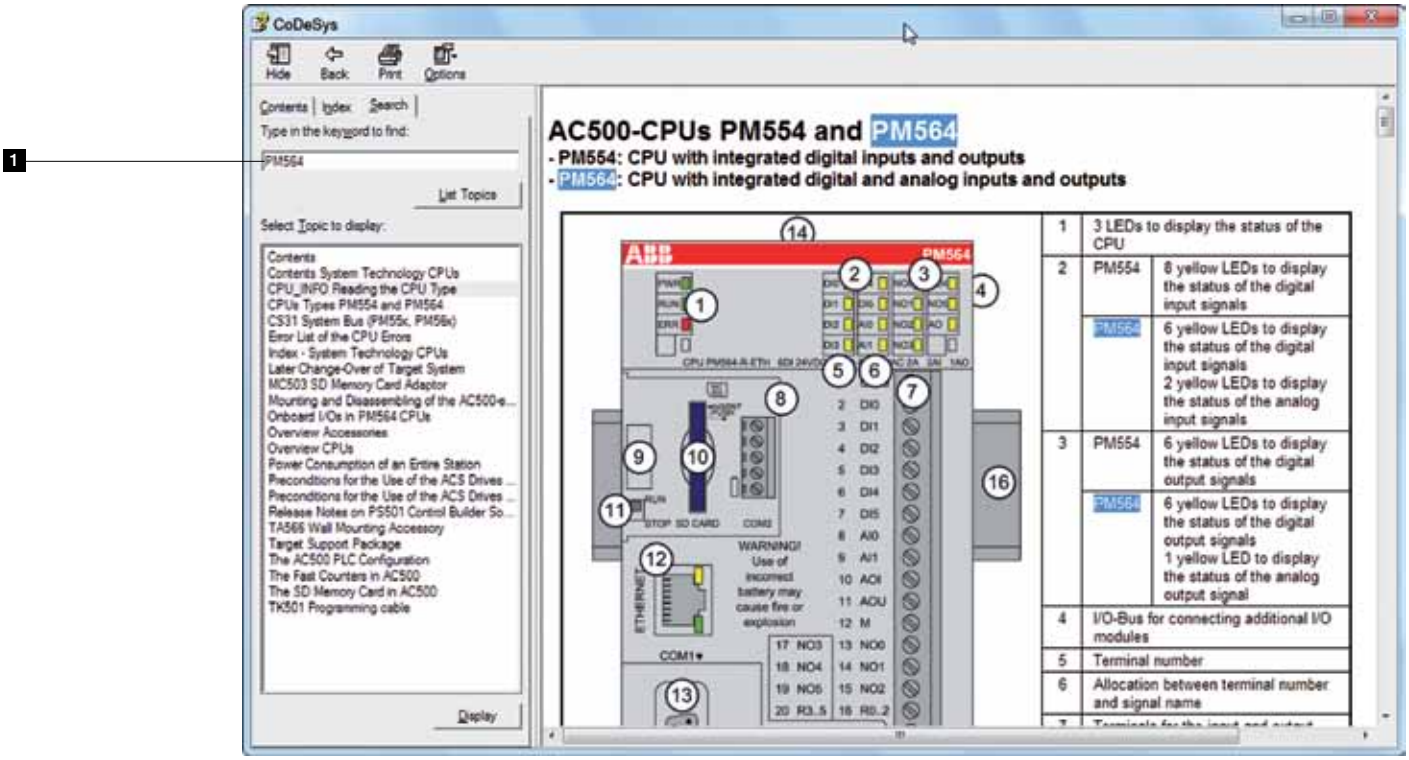
4 Then select **Exit**. If the project has not been saved, you will be asked to save the project. Select **Yes** to save your last changes to the project. Select **No** to leave the project unchanged.



AC500-eCo Starter kit Control Builder Plus
Getting help

For detailed information please refer to the integrated online help system.

To open the online help window, press the F1 key in an active window, in a dialog box, or while the mouse pointer is located on a menu item.

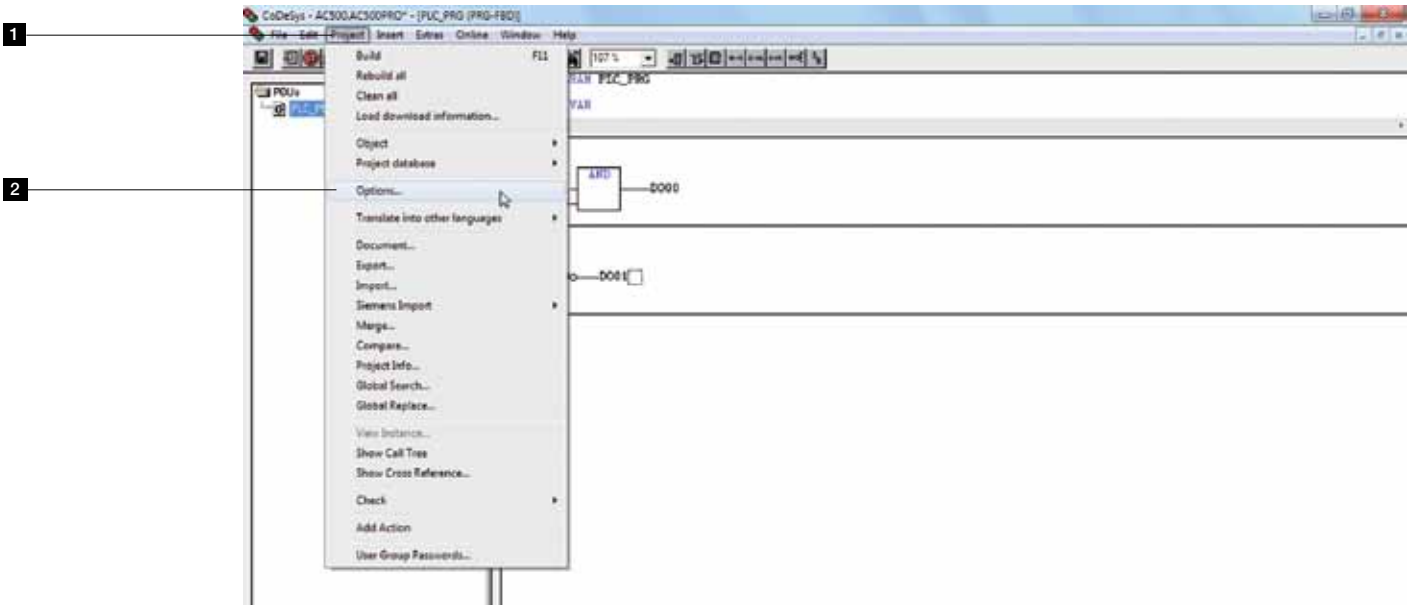


AC500-eCo Starter kit Control Builder Plus
Changing the user interface language

The user interface can be displayed in various languages. You can switch the displayed language at any time as follows:

1 Select the **Project** from menu.

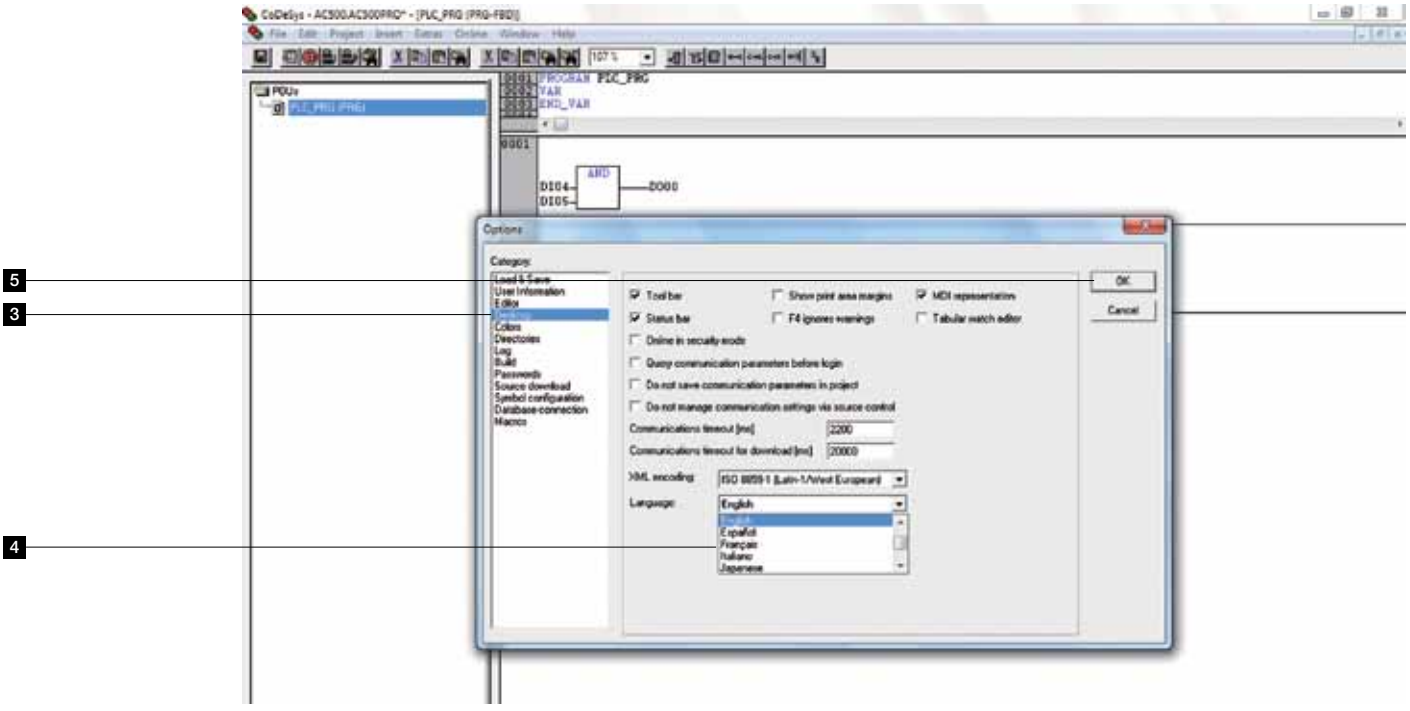
2 Then, select the **Option** from menu.



3 In the Category box, left-click **Desktop**.

4 Select the desired entry from the Language combo box.

5 Confirm the Options dialog with **OK**.



AC500-eCo Starter kit Control Builder Plus
Completion of AC500-eCo Starter kit

Congratulations!

Now you know how to program the AC500-eCo PLC.

You will find more technical information of AC500-eCo in the online help of the PS501 Control Builder Plus engineering tool.

Please visit the ABB website: **http://www.abb.com/plc** for more information about AC500 products and helpline services.

Notes

Notes

Contact us

ABB Automation Products GmbH
Wallstadter Str. 59
68526 Ladenburg, Germany
Phone: +49 (0) 6221 701-1444
Fax: +49 (0) 6221 701-1382
E-mail: plc.sales@de.abb.com

www.abb.com/plc
www.abb.com/drives

ABB Global Contact Directory
The ABB Contact Directory (http://www.abb.com/contacts/) helps you find local contacts for ABB products in your country.
Please select the relevant product group from the dropdown menu to the right or from the page.

Note:
We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB AG does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

Order number 3ADR 025 039 M0201 printed in Germany (09.2012)

Power and productivity
for a better world™