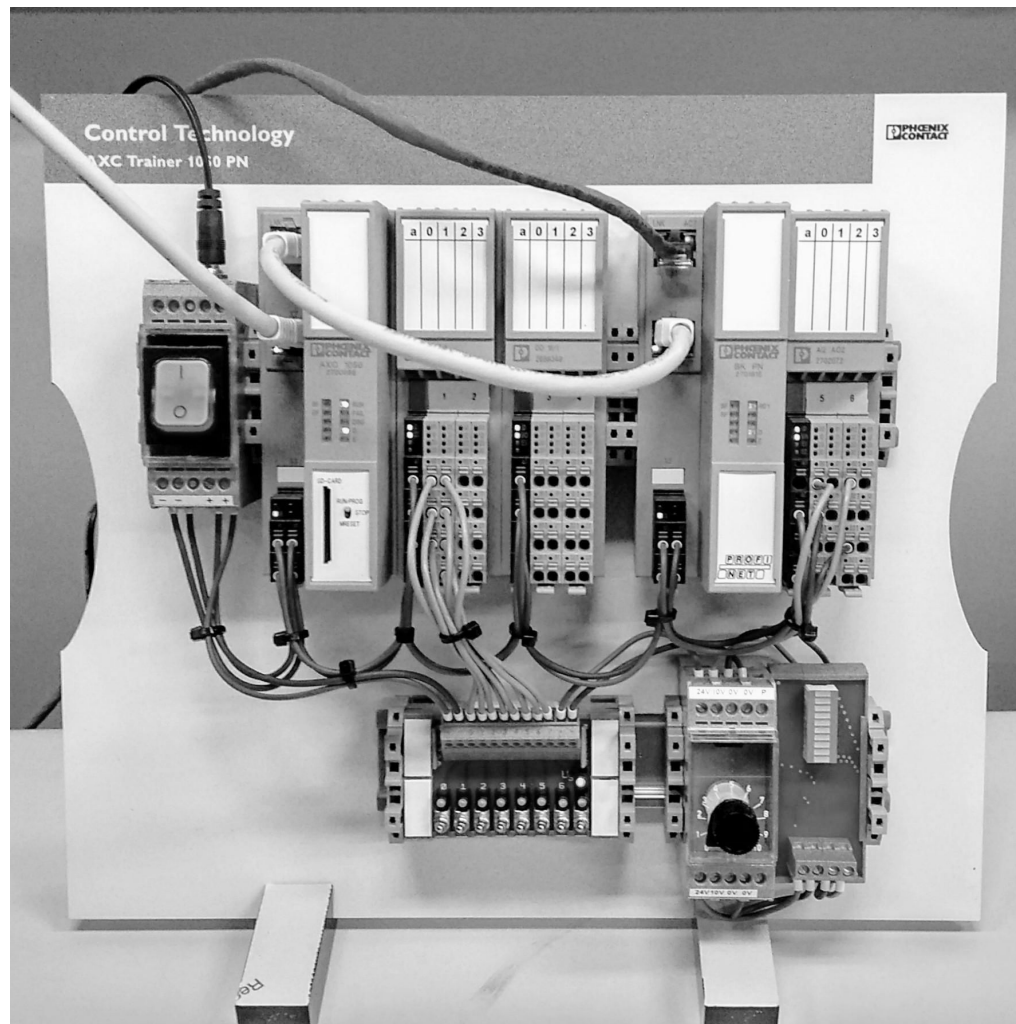


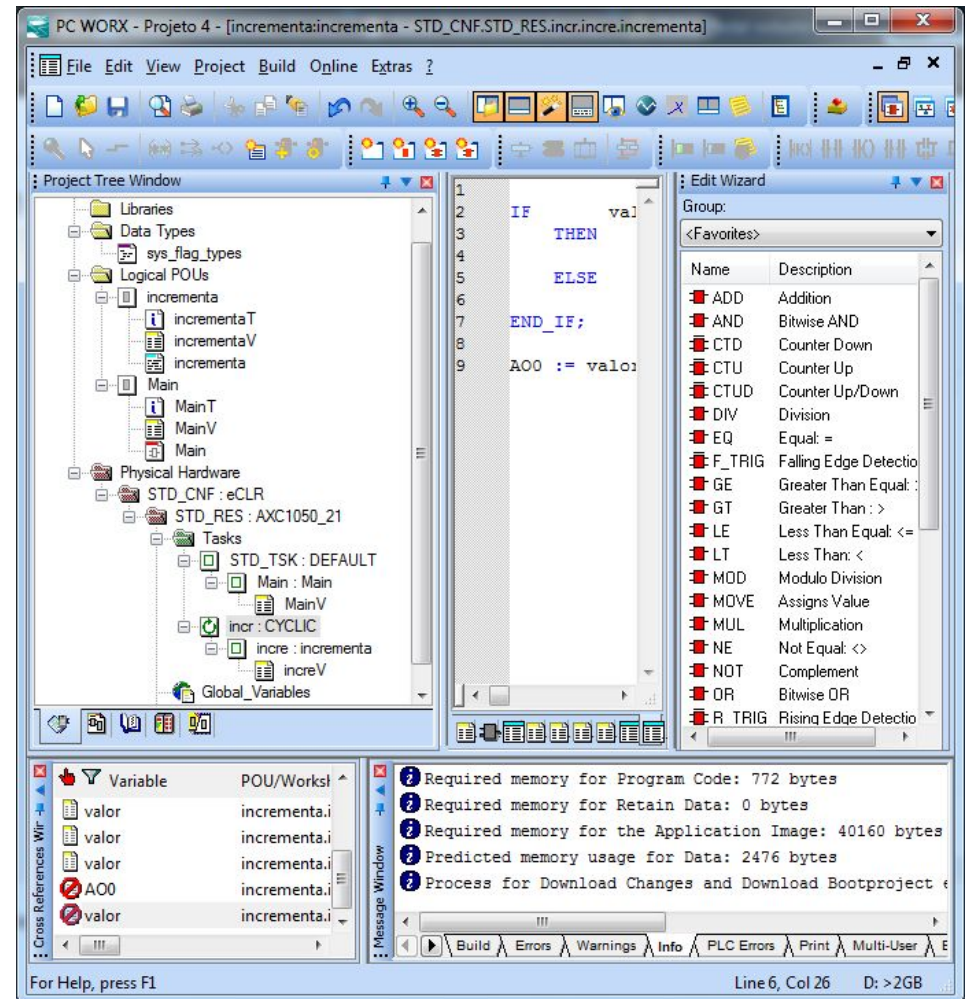
AXC Trainer 1050 - Primeiros passos



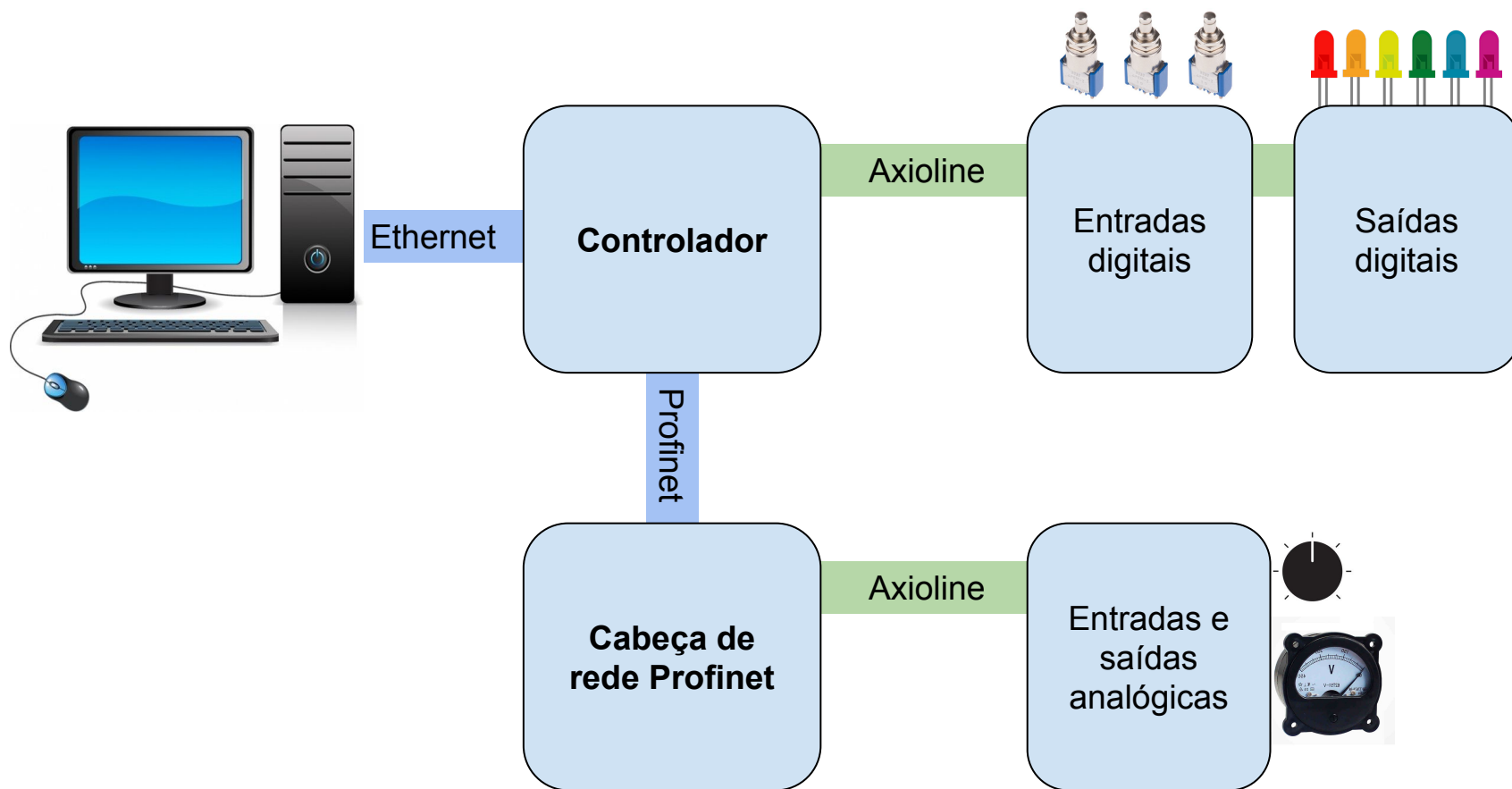
Laboratório B-003
Prof. Thiago A. R. Passarin - DAELT - UTFPR

Etapas

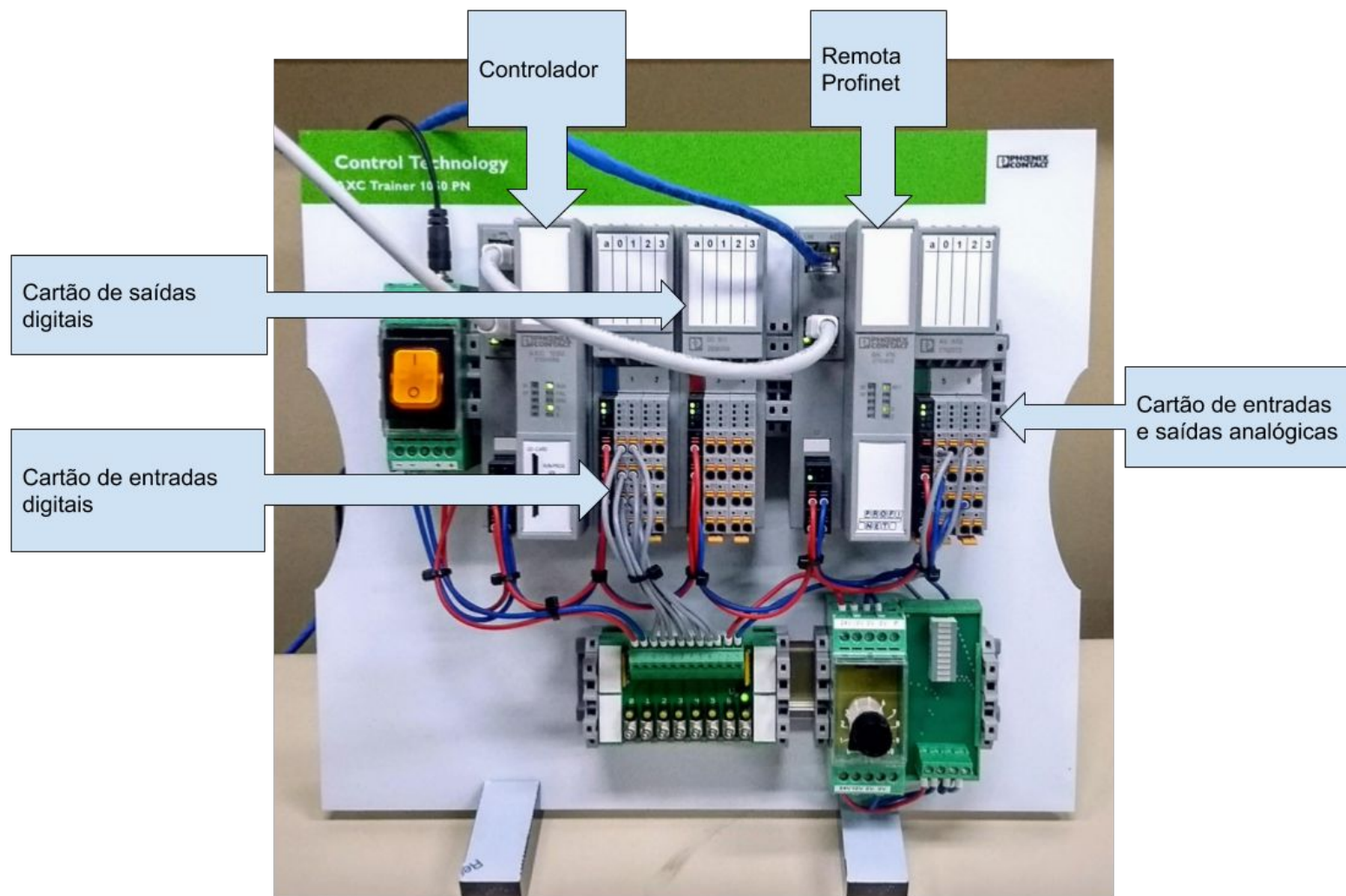
1. Criar projeto
2. Salvar projeto
3. Configurar rede
4. Adicionar cartões
5. Criar variáveis
6. Associar variáveis aos cartões
7. Programar
8. Make
9. Download
10. Debug



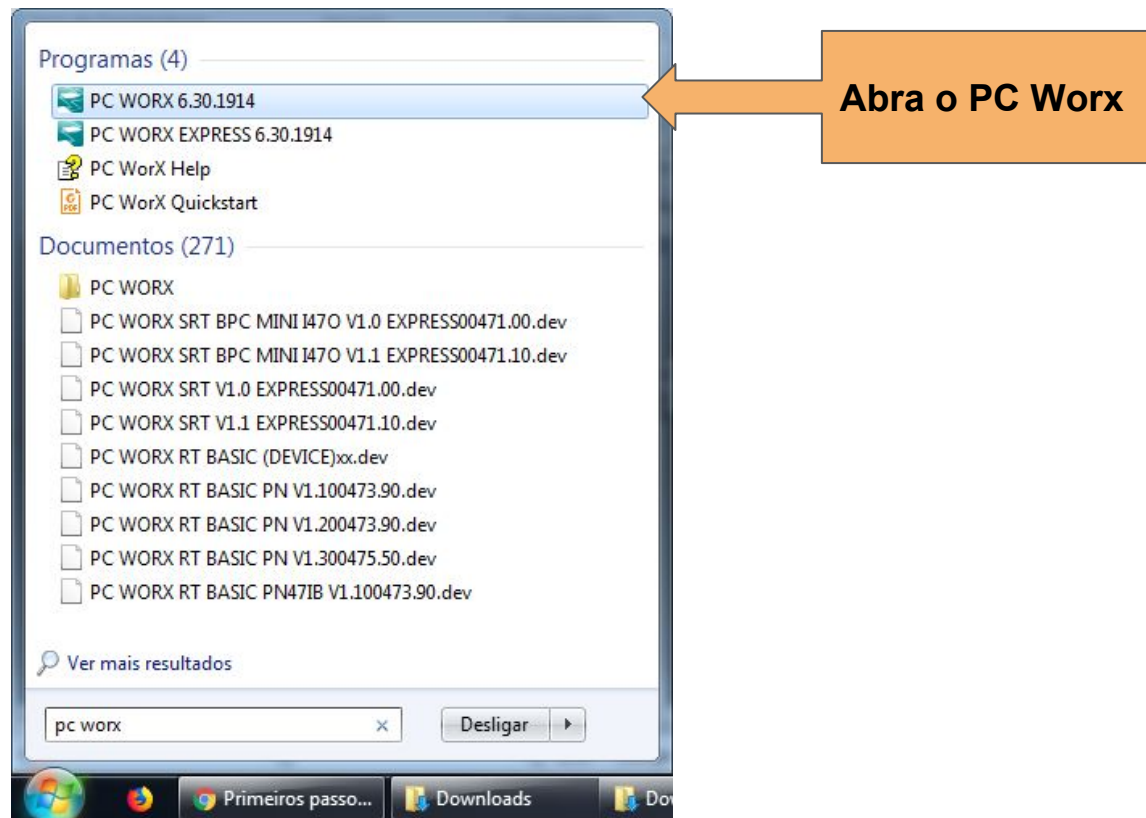
Estrutura do kit



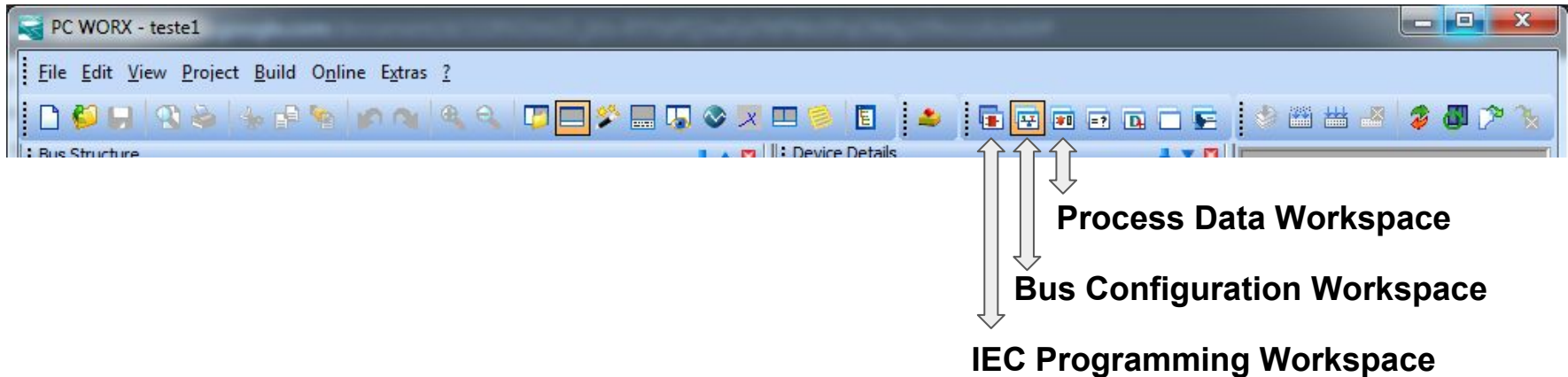
Estrutura do kit



Ambiente PC Worx

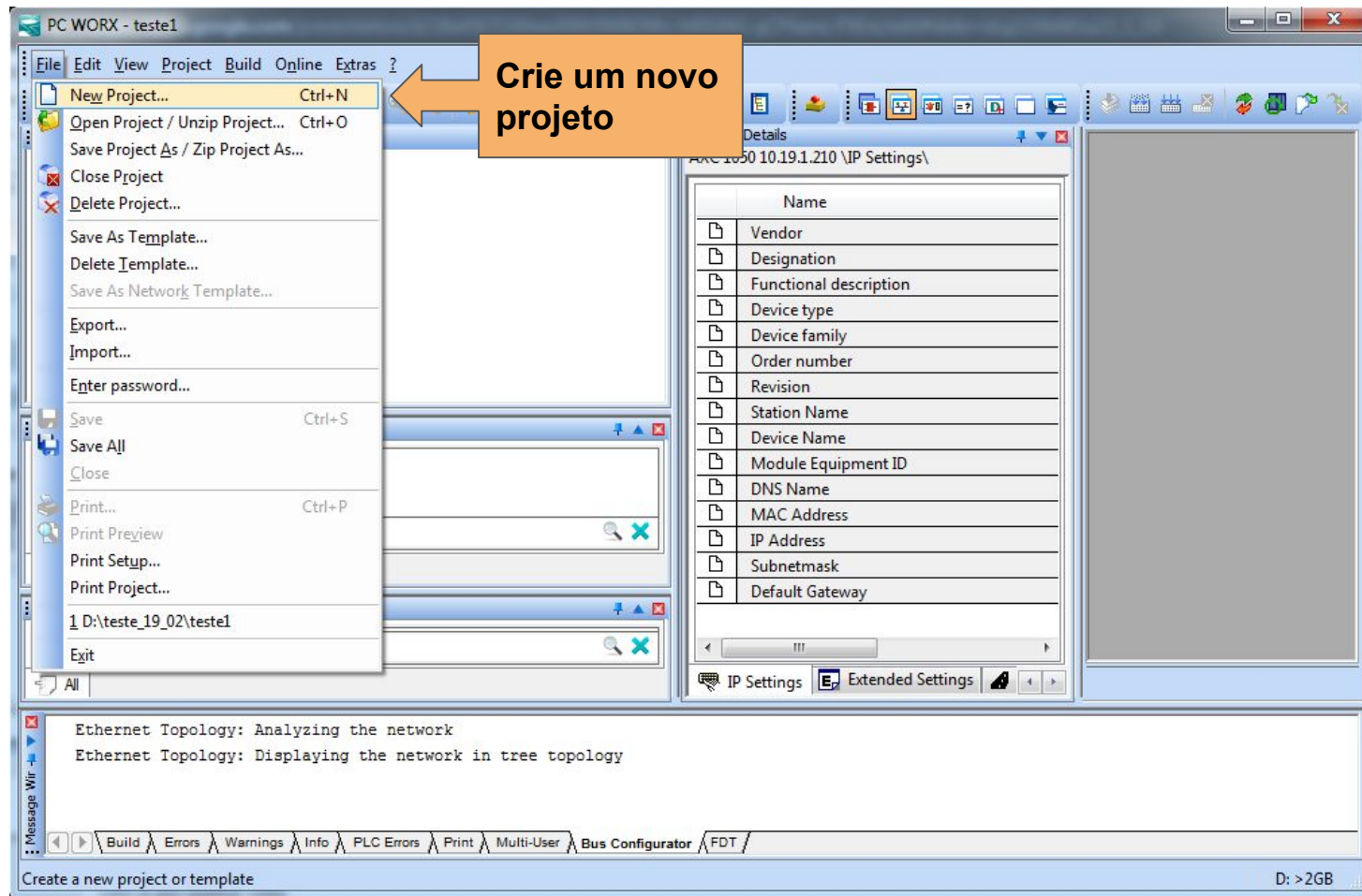


Ambiente PC Worx



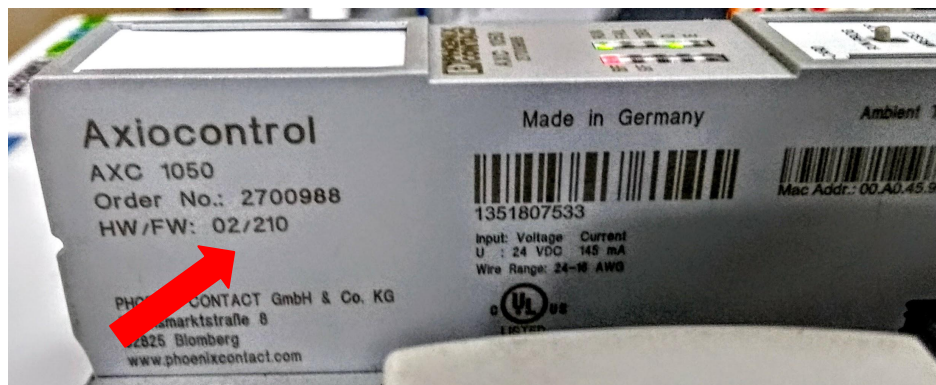
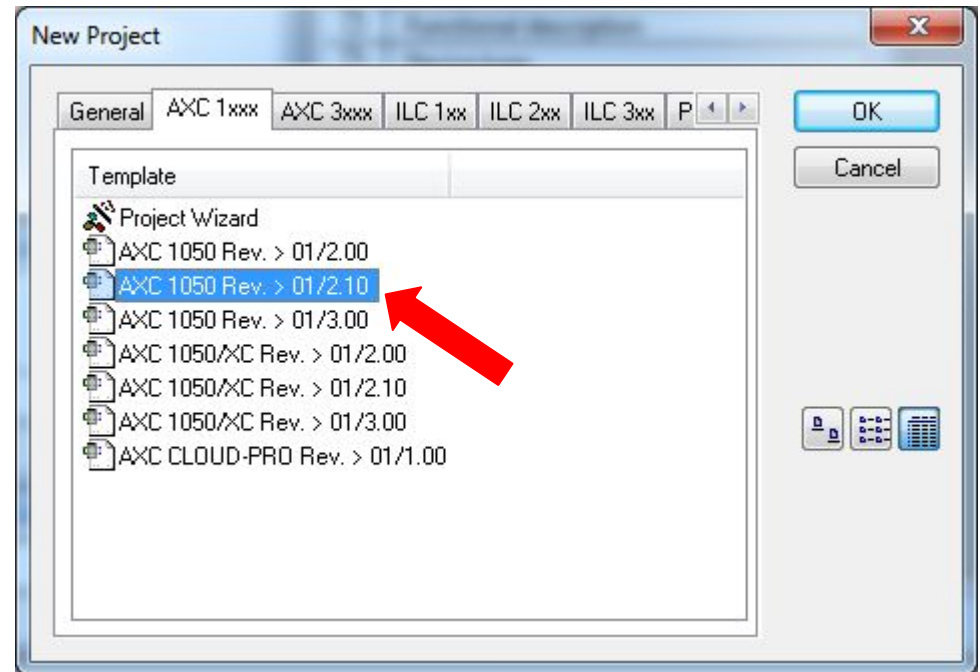
- **Bus Configuration Workspace**
 - Topologia (controlador, remota, cartões, IHM, etc.)
- **IEC Programming Workspace**
 - Código (programas, funções, blocos de funções)
 - Variáveis
 - Debug
- **Process Data Workspace**
 - Atribuição de variáveis às entradas e saídas físicas

1. Crie um projeto

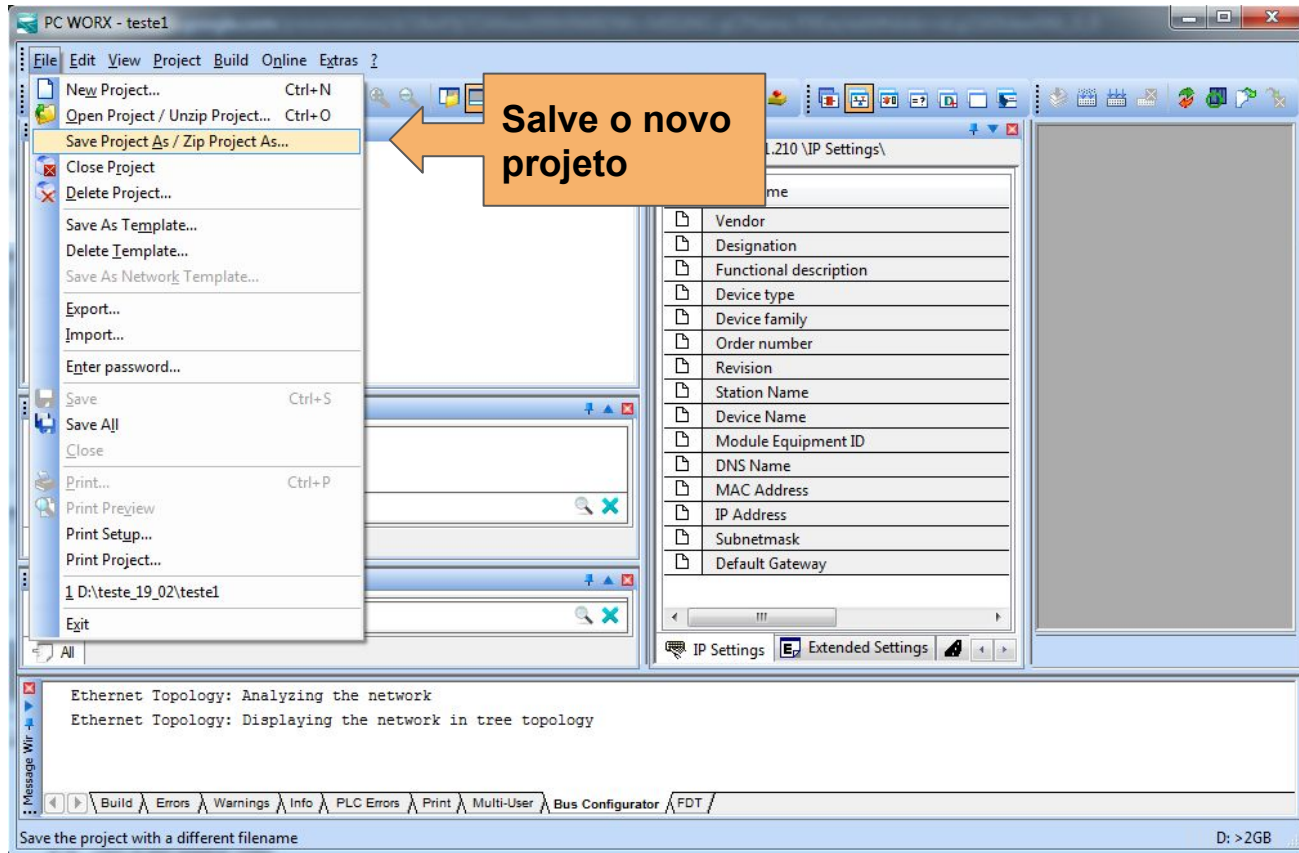


1. Crie um projeto

- AXC 1050 Rev. > **HW/FW**
- Tanto versão do HW quanto do FW devem ter valor menor ou igual ao do dispositivo.



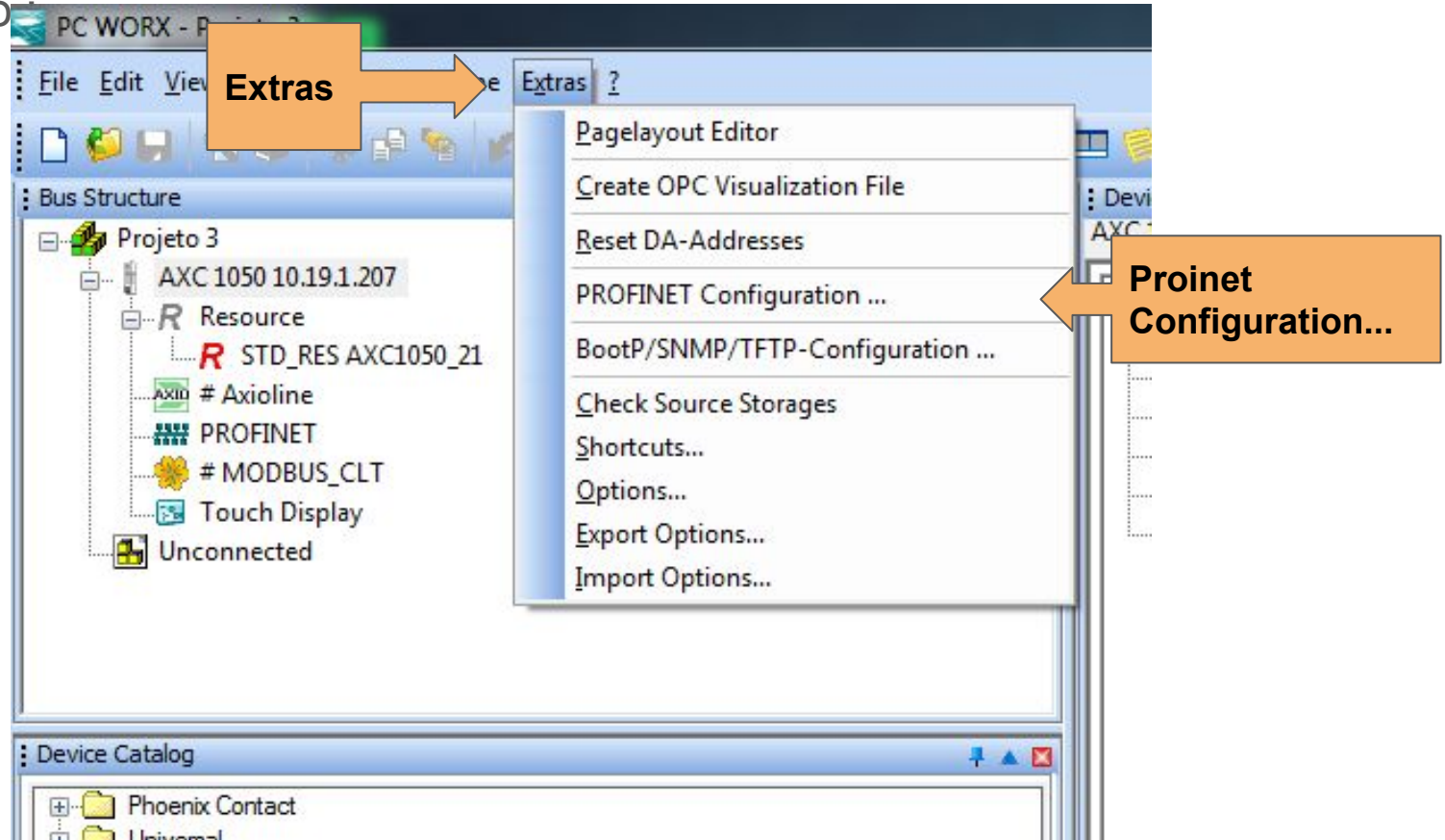
2. Salve o projeto



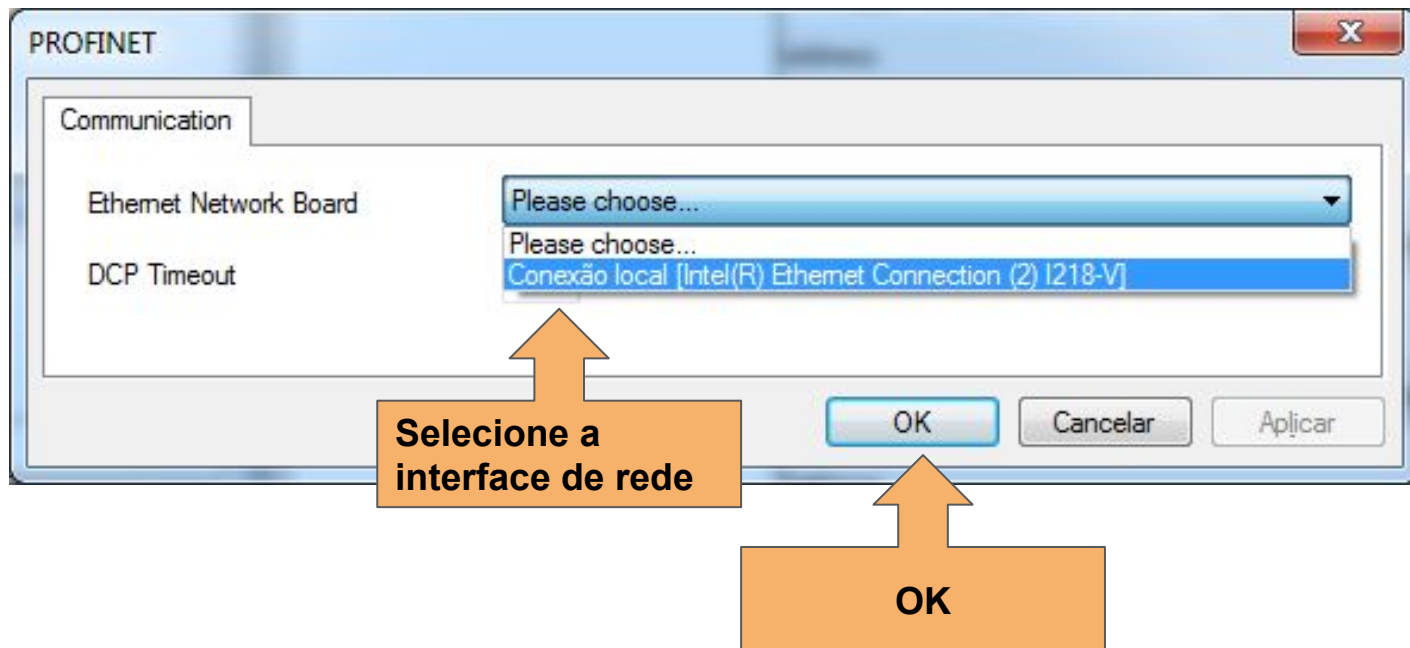
- Lembre-se que todas as informações salvas no drive C:\ são excluídas a cada inicialização.

3. Configure a rede

Cobrir o caso



3. Configure a rede



3. Configure a rede

The screenshot displays the PC WORX software interface for a project named 'projeto2'. The 'Bus Structure' panel on the left shows a hierarchical tree of components: 'projeto2' (AXC 1050 192.168.0.2) containing a 'Resource' (STD_RES AXC1050_21), an 'Axioline' (# Axioline), 'PROFINET', a 'MODBUS_CLT' (# MODBUS_CLT), a 'Touch Display', and an 'Unconnected' state. An orange callout box with the text 'Seleção o projeto' points to the 'projeto2' node. The 'Device Details' panel on the right shows a table of project metadata and configuration parameters.

	Project name	Value
Project name	projeto2	
Creator	7WRNZF	
Computer name at project creation	PXCSW-N0082	
MULTIPROG version at project creation	5.51.8.0	
PC WORX version at project creation	PC WORX 6.30.1503	
Creation date	2015-09-22T08:46:08+01:00	
Last editor	B003	
Computer name at last project backup	B003-PC	
MULTIPROG version at last project backup	5.51.245.0	
PC WORX version at last project backup	PC WORX 6.30.1914	
Date of last project backup	2018-02-20T13:49:22-03:00	
Domain Postfix		
Template for DNS name creation		
First IP Address	192.168.0.2	
Last IP-Address	192.168.0.254	
Subnetmask	255.255.255.0	

The bottom of the interface features a 'Message Window' with the text: 'Ethernet Topology: Analyzing the network' and 'Ethernet Topology: Displaying the network in tree topology'. The status bar at the very bottom indicates 'For Help, press F1' and 'D: >2GB'.

3. Configure a rede

- First/Last IP Address
 - Faixa de IPs do projeto. A faixa vai de 10.19.1.(X) até 10.19.1.(X+2), onde 10.19.1.(X) é o IP do seu computador.
- Subnet mask
 - 255.255.255.0

```
Administrador: C:\Windows\system32\cmd.exe
Microsoft Windows [versão 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. Todos os direitos reservados.

C:\Users\B003>ipconfig

Configuração de IP do Windows

Adaptador Ethernet Conexão local:

    Sufixo DNS específico de conexão. . . . . : fe80::7ca7-1...f8:41b4:91c9%11
    Endereço IPv6 de link local . . . . . : fe80::7ca7-1...f8:41b4:91c9%11
    Endereço IPv4. . . . . : 10.19.1.210
    Máscara de Sub-rede . . . . . : 255.255.255.0
    Gateway Padrão. . . . . : 10.19.1.254

Adaptador de túnel isatap.{96872C8D-7F3B-464D-8499-69FBB6A8F04E}:

    Estado da mídia. . . . . : mídia desconectada
    Sufixo DNS específico de conexão. . . . . :

C:\Users\B003>
```

Device Details		
projeto2 \Project\		
	Project name	Value
	Project name	projeto2
	Creator	7WRNZF
	Computer name at project creation	PXCSW-N0082
	MULTIPROG version at project creation	5.51.8.0
	PC WORX version at project creation	PC WORX 6.30.1503
	Creation date	2015-09-22T08:46:08+01:00
	Last editor	B003
	Computer name at last project backup	B003-PC
	MULTIPROG version at last project backup	5.51.245.0
	PC WORX version at last project backup	PC WORX 6.30.1914
	Date of last project backup	2018-02-20T13:49:22-03:00
	Domain Postfix	
	Template for DNS name creation	
	First IP Address	192.168.0.2
	Last IP-Address	192.168.0.254
	Subnetmask	255.255.255.0
	Default Gateway	
	Use DHCP	No
	Subnet Check for Multi MAC Devices	On
	Certificate information	
	Organization	PHOENIX CONTACT GmbH & Co. KG
	Organizational Unit	
	Locality	Blomberg
	State or Province	Nordrhein-Westfalen
	Country	DE

3. Configure a rede

The screenshot displays the PC WORX software interface for 'projeto2'. The 'Bus Structure' pane on the left shows a tree view with 'AXC 1050 192.168.0.2' selected. An orange arrow points to this selection with the text 'Selezione o controlador'. Below this, the 'Device Catalog' and 'Module Catalog' panes are visible. The 'Device Details' pane on the right shows the 'AXC 1050 192.168.0.2 \IP Settings\' configuration. An orange arrow points to the 'IP Settings' tab with the text 'IP settings'. The status bar at the bottom shows 'Bus Configurator / FDT /'.

Selezione o controlador

IP settings

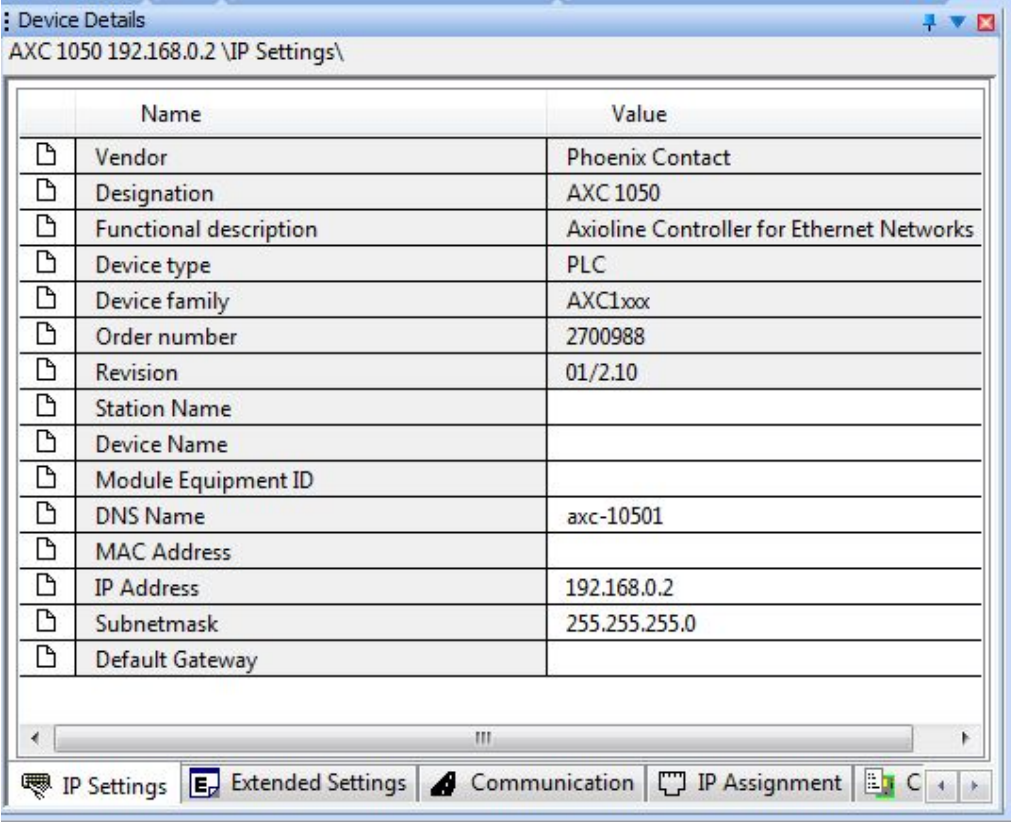
Name	Value
Vendor	Phoenix Contact
Designation	AXC 1050
Functional description	Axioline Controller for Ethernet Networks
Device type	PLC
Device family	AXC1xxx
Order number	2700988
Revision	01/2.10
Station Name	
Device Name	
Module Equipment ID	
DNS Name	axc-10501
MAC Address	
IP Address	192.168.0.2
Subnetmask	255.255.255.0
Default Gateway	

For Help, press F1

D: >2GB

3. Configure a rede

- Device Name
 - Nome do controlador (à sua escolha)
- DNS Name
 - Nome do controlador na rede Profinet (à sua escolha, mas recomenda-se utilizar o mesmo Device Name)
- IP Address
 - 10.19.1.(X+1)



Device Details
AXC 1050 192.168.0.2 \IP Settings\

	Name	Value
	Vendor	Phoenix Contact
	Designation	AXC 1050
	Functional description	Axioline Controller for Ethernet Networks
	Device type	PLC
	Device family	AXC1xxx
	Order number	2700988
	Revision	01/2.10
	Station Name	
	Device Name	
	Module Equipment ID	
	DNS Name	axc-10501
	MAC Address	
	IP Address	192.168.0.2
	Subnetmask	255.255.255.0
	Default Gateway	

IP Settings Extended Settings Communication IP Assignment C

3. Configure a rede

The screenshot displays the PC WORX - projeto2 interface. The 'Bus Structure' pane on the left shows a tree view with 'projeto2' at the root, containing 'AXC 1050 10.19.1.208', 'Resource', 'STD_RES AXC1050_21', 'Axioline', 'PROFINET', 'MODBUS_CLT', and 'Touch Display'. The 'Device Catalog' and 'Module Catalog' panes are also visible. The 'Device Details' pane on the right is titled 'AXC 1050 192.168.0.2 \IP Assignment\' and shows a table of devices available on the network. The table has columns for Name, Type, MAC Address, and IP Address. The device 'bancada05' is selected. Below the table, there are filter options: 'unnamed', 'not in Project', and 'same Type'. A red box highlights these filter options with the text 'Remova os filtros'. At the bottom of the 'Device Details' pane, there are tabs for 'IP Settings', 'Extended Settings', 'Communication', 'IP Assignment', and 'CPU Se'. An orange arrow points to the 'IP Assignment' tab with the text 'IP Assignment'. The 'Message' pane at the bottom shows a warning: 'ETHERNET/PROFINET: IP address of the device (axc-10501) is not in the IP address range.'

PC WORX - projeto2

File Edit View Project Build Online Extras ?

Bus Structure

- projeto2
 - AXC 1050 10.19.1.208
 - Resource
 - STD_RES AXC1050_21
 - Axioline
 - PROFINET
 - MODBUS_CLT
 - Touch Display
 - Unconnected

Device Catalog

- Phoenix Contact
- Universal

Module Catalog

Device Details

AXC 1050 192.168.0.2 \IP Assignment\

available on Network

Name	Type	MAC Address	IP Address
remotacp	[IOD]: AXL F BK PN	00:A0:45:9F:24:84	10.19.1.230
axc-1050-adriano	[IOC]: AXC 1050	00:A0:45:92:3D:45	10.19.1.205
b003-pc	[IOC]: S7-PC	AC:9E:17:DF:94:C1	10.19.1.207
b003-pc	[IOC]: S7-PC	AC:9E:17:DF:98:2E	10.19.1.204
bancada05	[IOC]: AXC 1050	00:A0:45:9F:8E:60	10.19.1.229
axc-passarin	[IOC]: AXC 1050	00:A0:45:92:3E:BD	10.19.1.208
b003-pc	[IOC]: S7-PC	08:62:66:99:B7:0A	10.19.1.210
b003-pc	[IOC]: S7-PC	08:62:66:99:B7:02	10.19.1.228
bknpassin	[IOD]: AXL F BK PN	00:A0:45:9D:18:3D	10.19.1.209
axl-f-bk-pn-adriano	[IOD]: AXL F BK PN	00:A0:45:9F:24:A4	10.19.1.206

Filter: ☐ unnamed ☐ not in Project ☐ same Type

Refresh Flashing On

Assign Name Delete Name

IP Settings Extended Settings Communication IP Assignment CPU Se

Message

Ethernet Topology: Analyzing the network

Ethernet Topology: Displaying the network in tree topology

ETHERNET/PROFINET: IP address of the device (axc-10501) is not in the IP address range.

Build Errors Warnings Info PLC Errors Print Multi-User Bus Configurator FDT

For Help, press F1

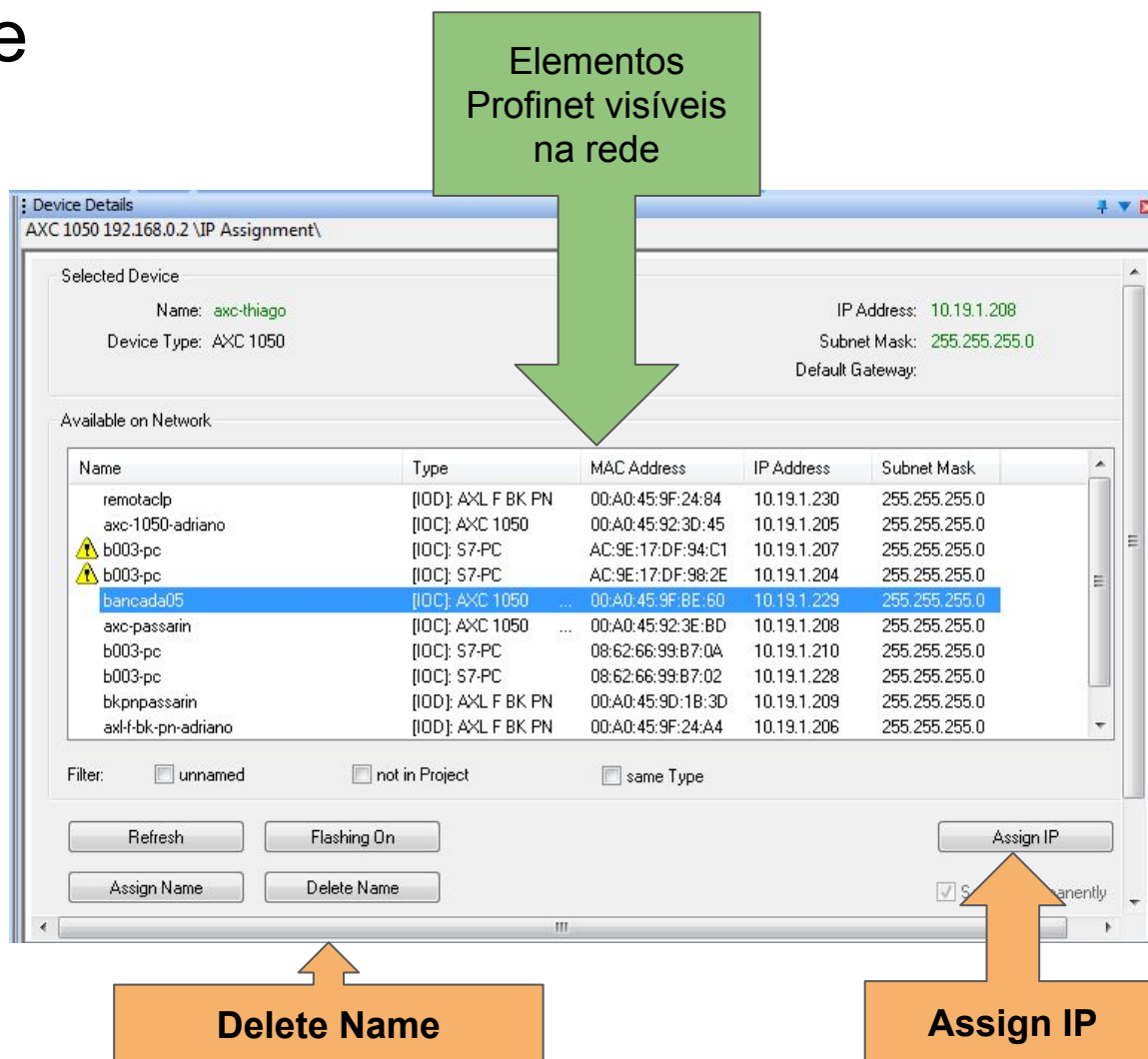
D: >2GB

Remova os filtros

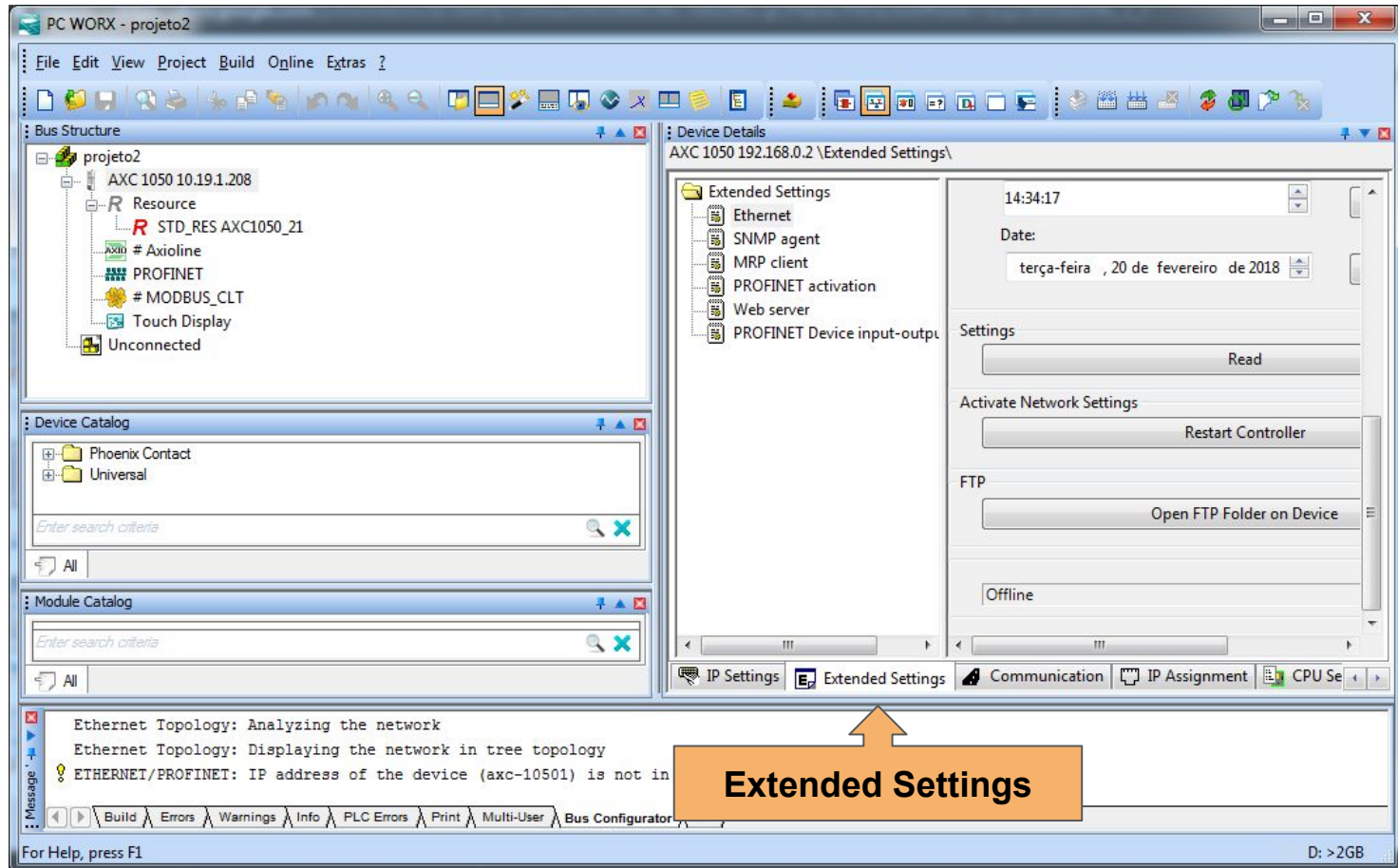
IP Assignment

3. Configure a rede

- Atribua o IP ao controlador
 - Assign IP
- Exclua o nome DNS atual do controlador
 - Delete Name

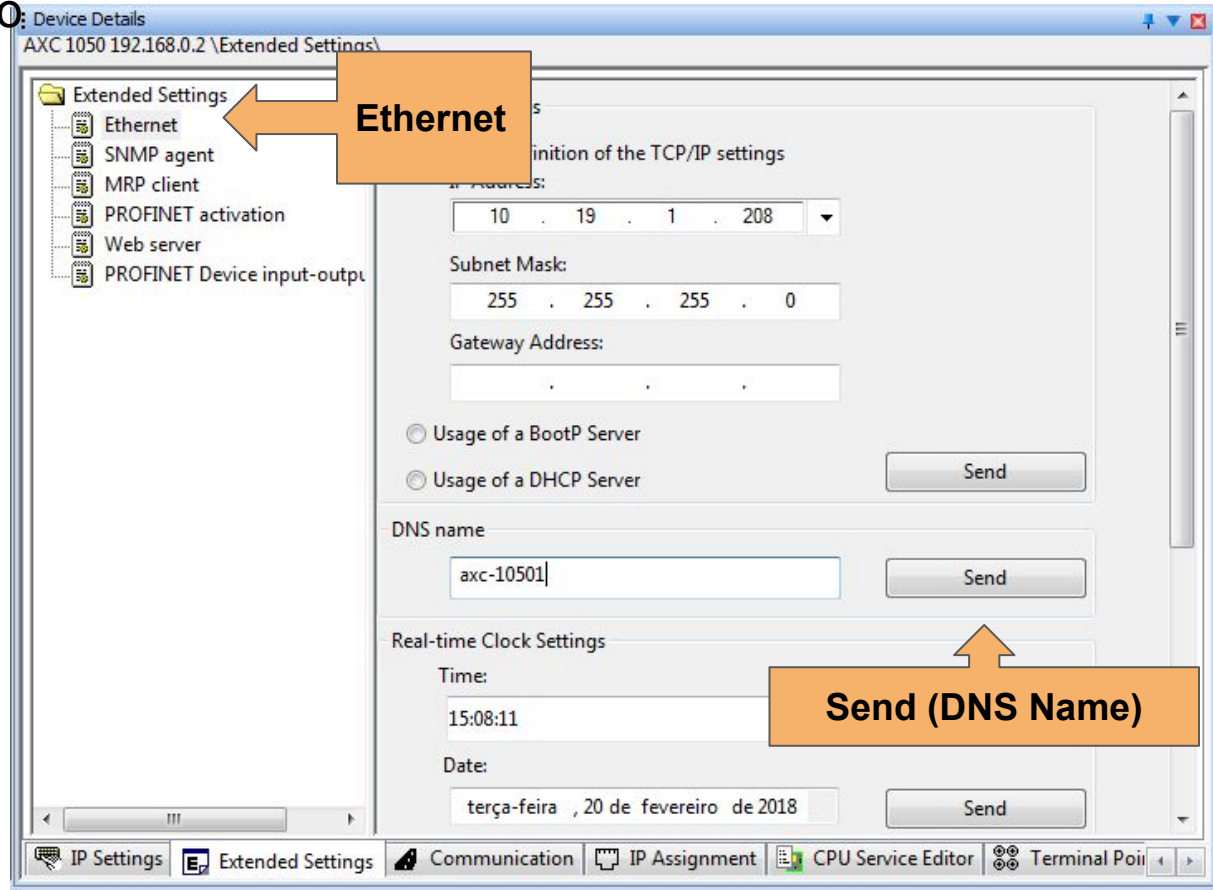


3. Configure a rede



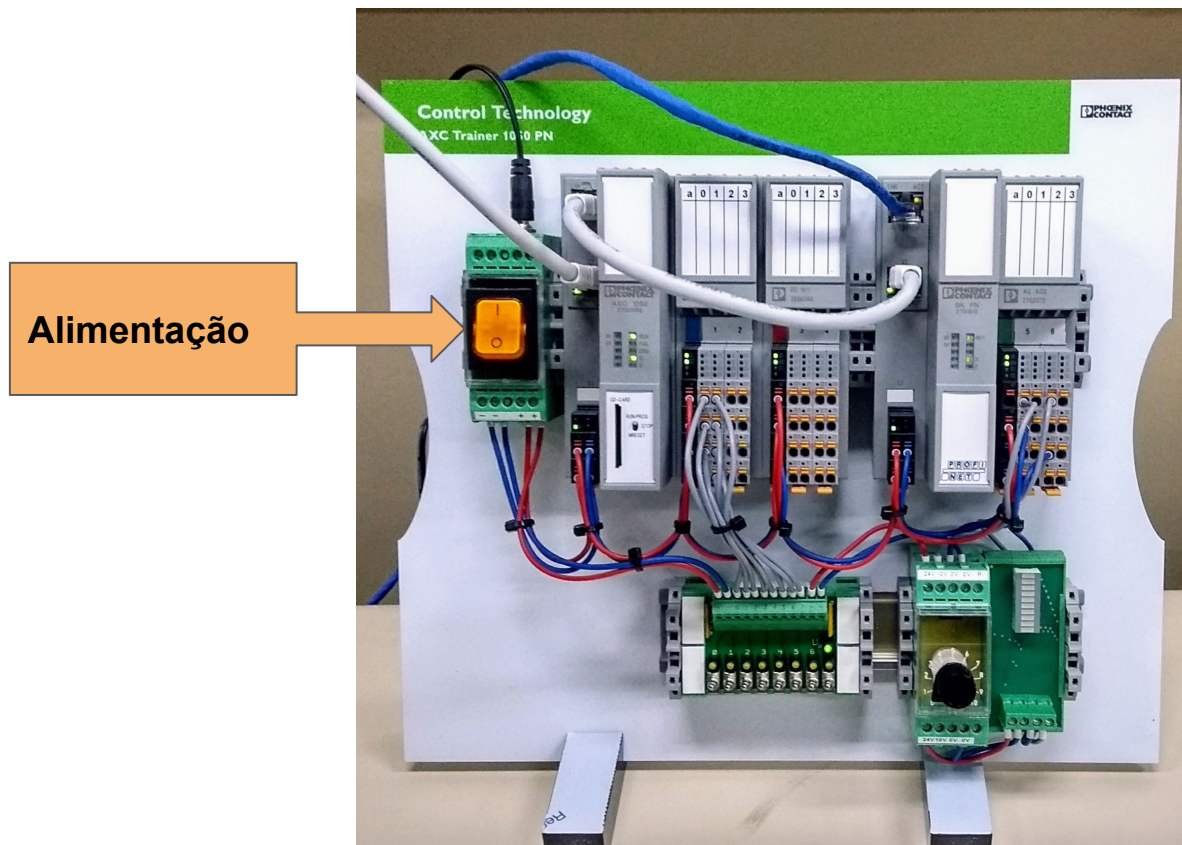
3. Configure a rede

- Atribuir o DNS Name ao controlador
 - Send

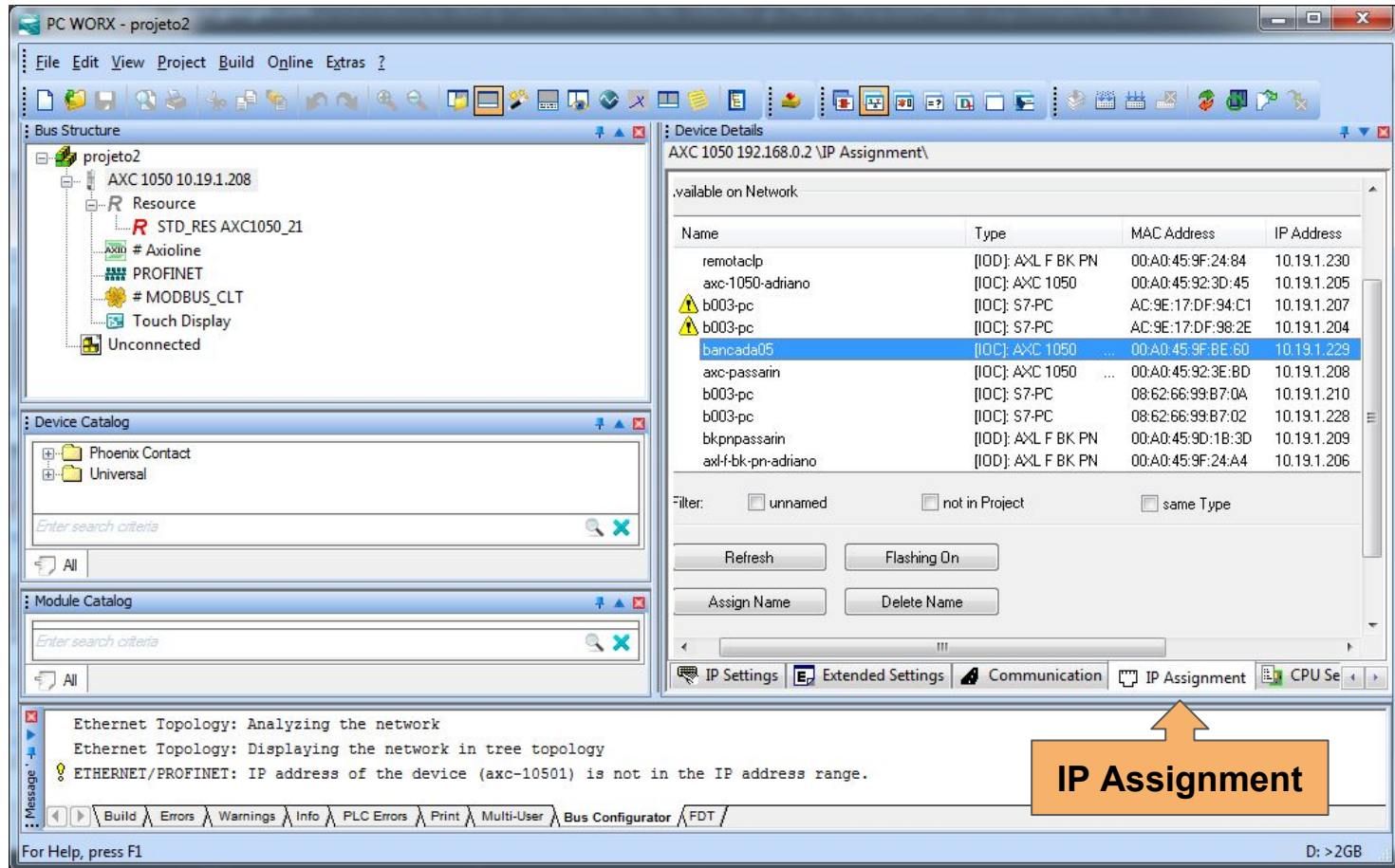


3. Configure a rede

- Reinicie o kit
 - Desligue a alimentação até os LEDs se apagarem e ligue novamente.

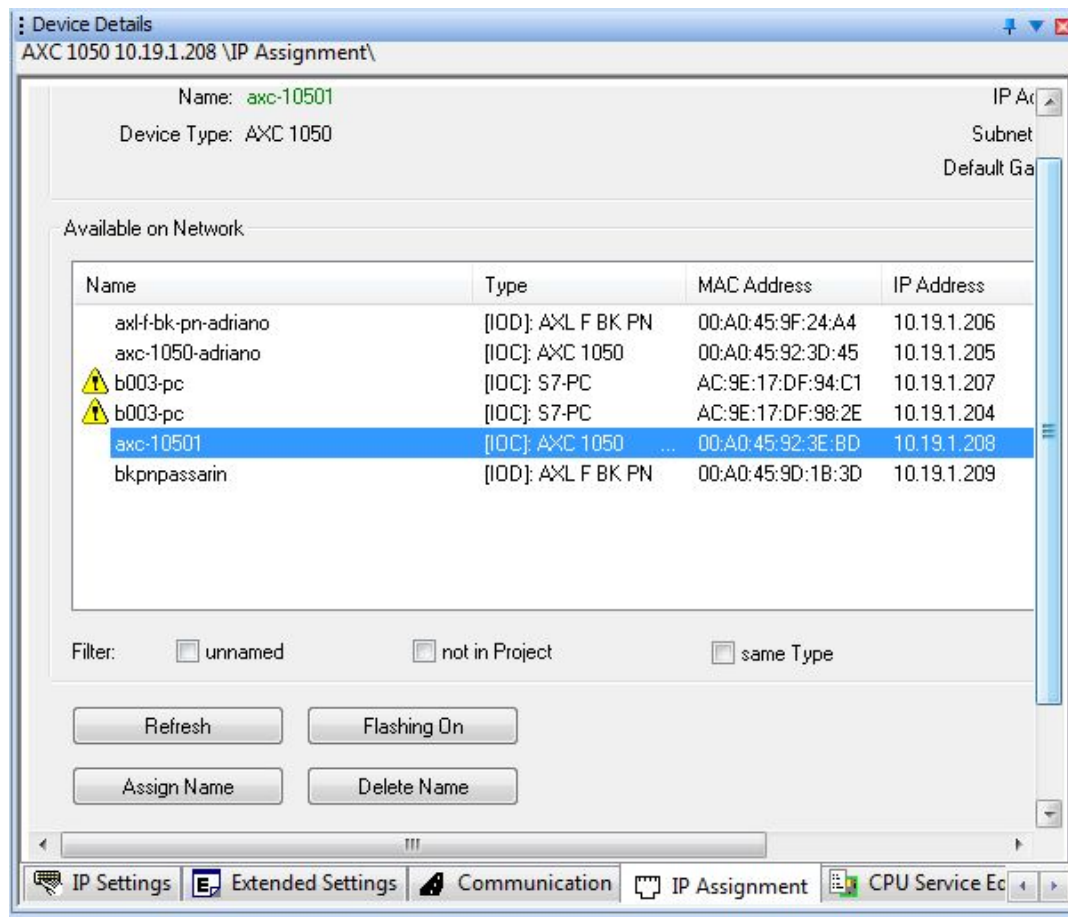


3. Configure a rede



3. Configure a rede

- Certifique-se de que o controlador foi devidamente batizado
 - Atualize (Refresh) a lista de dispositivos visíveis na rede



4. Adicionar cartões de I/O digitais

The screenshot shows the PC WORX - projeto2 interface. The 'Bus Structure' tree on the left shows a project named 'projeto2' with a resource 'AXC 1050 10.19.1.205'. A context menu is open over the 'Axioline' device, with the 'Read Axioline' option highlighted. An orange arrow points from the 'Axioline' label to the device in the tree. Another orange arrow points from the 'Read Axioline' menu item to the 'Device Details' window on the right. The 'Device Details' window shows a table of device information for 'Axioline \Axioline Settings\'.

Axioline

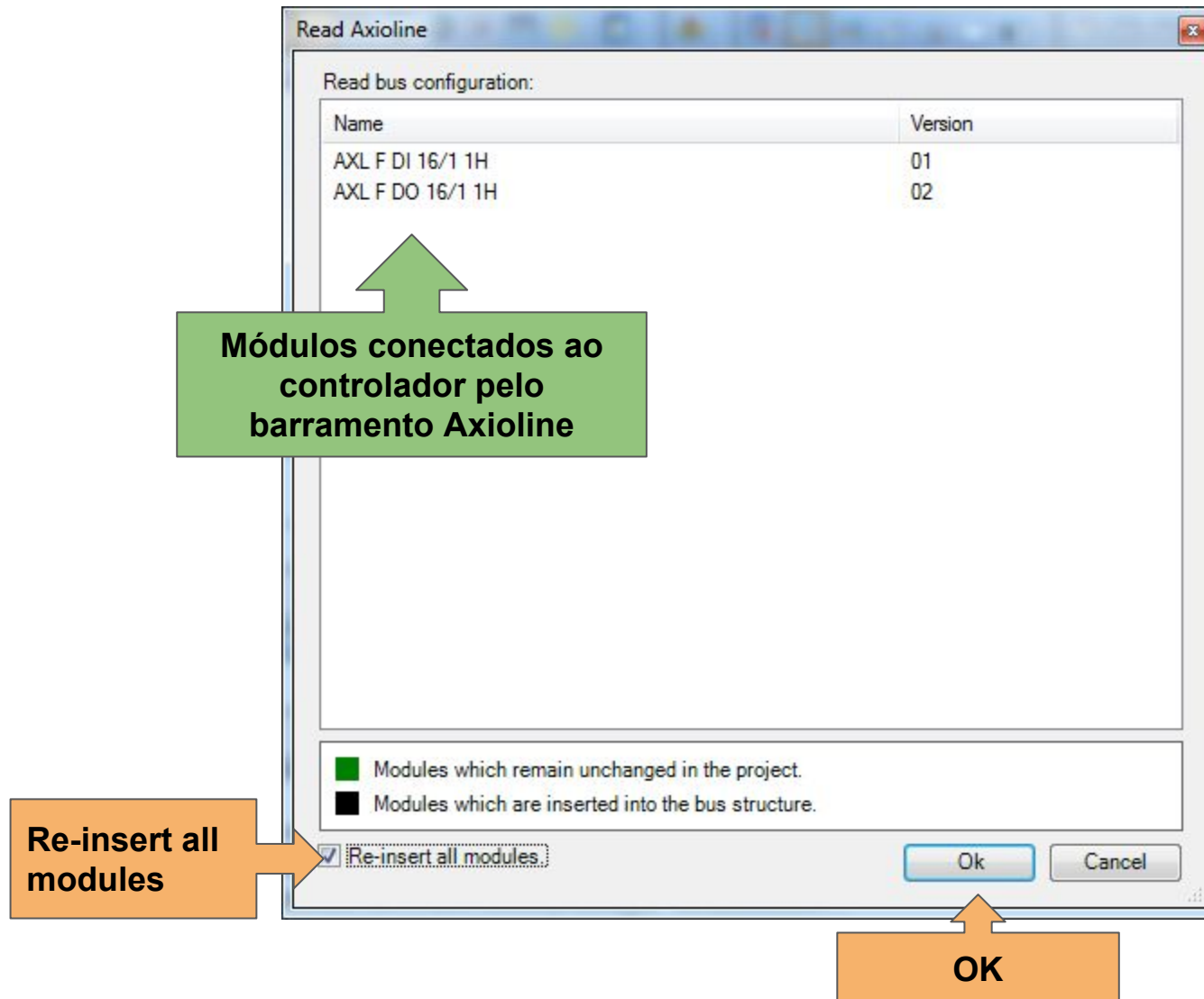
Read Axioline

Name	Value
Vendor	Phoenix Contact
Model	AXC 1050
Description	Axioline Controller for Ethernet
Device Type	PLC
Device ID	AXC1xxx
Serial Number	2700988
Revision: HW / Master FW (/COP FW)	01/2.10
Station Name	
Device Name	
Module Equipment ID	
Number of connectable devices	63
max. current output at UL	without boost terminal (2000 m
Node ID	15

For Help, press F1

D: >2GB

4. Adicionar cartões de I/O digitais



5. Criar variáveis

The screenshot displays the PC WORX software interface. The Project Tree on the left shows the hierarchy: Data Types > sys_flag_types* > Logical POU's > Main* > MainT > MainV* > Main*. The Global Variables table is open, showing a list of variables with their names, types, usages, and descriptions. An orange callout box with an arrow points to the 'Global Variables' entry in the Project Tree, with the text 'Global Variables (2 cliques)'. The Message Window at the bottom shows a series of status messages related to network analysis and device connection.

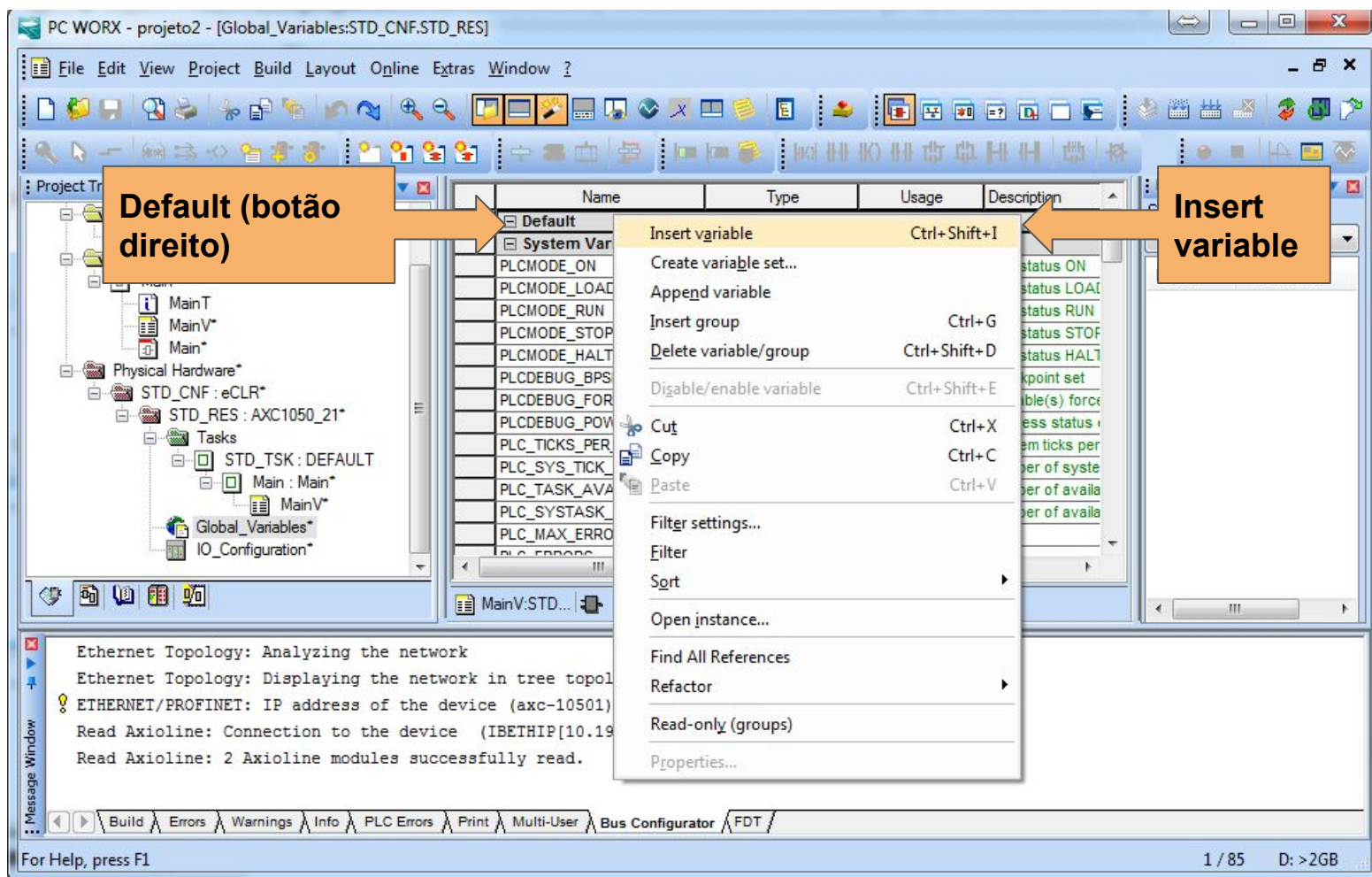
Name	Type	Usage	Description
Default			
System Variables			
PLCMODE_ON	BOOL	VAR_GLOBAL	PLC stati
PLCMODE_LOADING	BOOL	VAR_GLOBAL	PLC stati
PLCMODE_RUN	BOOL	VAR_GLOBAL	PLC stati
PLCMODE_STOP	BOOL	VAR_GLOBAL	PLC stati
PLCMODE_HALT	BOOL	VAR_GLOBAL	PLC stati
PLCDEBUG_BPSET	BOOL	VAR_GLOBAL	Breakpoi
PLCDEBUG_FORCE	BOOL	VAR_GLOBAL	Variable
PLCDEBUG_POWERFLOW	BOOL	VAR_GLOBAL	Address
PLC_TICKS_PER_SEC	INT	VAR_GLOBAL	System t
PLC_TICKS_PER_SEC	DINT	VAR_GLOBAL	Number o
PLC_TICKS_PER_SEC	INT	VAR_GLOBAL	Number o
PLC_TICKS_PER_SEC	AVAILABLE	VAR_GLOBAL	Number o
PLC_TICKS_PER_SEC	INT	VAR_GLOBAL	Number o
PLC_TICKS_PER_SEC	DINT	VAR_GLOBAL	Number o
PLC_TICKS_PER_SEC	DINT	VAR_GLOBAL	Number o

Global Variables (2 cliques)

Message Window:

- Ethernet Topology: Analyzing the network
- Ethernet Topology: Displaying the network in tree topology
- ETHERNET/PROFINET: IP address of the device (axc-10501) is not in the IP address range.
- Read Axioline: Connection to the device (IBETHIP[10.19.1.205|10,10]FIB01_M) established...
- Read Axioline: 2 Axioline modules successfully read.

5. Criar variáveis



5. Criar variáveis

- Crie três variáveis do tipo BOOL e com uso VAR_GLOBAL:
 - Entrada1
 - Entrada2
 - Saida1

	Name	Type	Usage	Description
	[-] Default			
	Entrada1	BOOL	VAR_GLOBAL	
	Entrada2	BOOL	VAR_GLOBAL	
	Saida1	BOOL	VAR_GLOBAL	
	[-] System Variables			
	PLCMODE_ON	BOOL	VAR_GLOBAL	PLC status ON
	PLCMODE_LOADING	BOOL	VAR_GLOBAL	PLC status LOAD
	PLCMODE_RUN	BOOL	VAR_GLOBAL	PLC status RUN
	PLCMODE_STOP	BOOL	VAR_GLOBAL	PLC status STOP
	PLCMODE_HALT	BOOL	VAR_GLOBAL	PLC status HALT
	PLCDEBUG_BPSET	BOOL	VAR_GLOBAL	Breakpoint set
	PLCDEBUG_FORCE	BOOL	VAR_GLOBAL	Variable(s) force
	PLCDEBUG_POWERFLOW	BOOL	VAR_GLOBAL	Address status e
	PLC_TICKS_PER_SEC	INT	VAR_GLOBAL	System ticks per
	PLC_SYS_TICK_CNT	DINT	VAR_GLOBAL	Number of system
	PLC_TASK_AVAILABLE	INT	VAR_GLOBAL	Number of availa
	PLC_SYSTASK_AVAILABLE	INT	VAR_GLOBAL	Number of availa
	PLC_MAX_ERRORS	DINT	VAR_GLOBAL	

Global_Vari...

6. Associar variáveis aos cartões

Default

Cartão de entradas digitais

Arraste as variáveis para associá-las às entradas do cartão de entradas digitais

Symbol/...	Data Type	Process Data Item	Description
Entrada2	BOOL		
Entrada1	BOOL		
Saida1	BOOL		

Device	Process Data Item	I/Q	Data Type
# 1 AXL F...	IN00	I	BOOL
# 1 AXL F...	IN01	I	BOOL
# 1 AXL F...	IN02	I	BOOL
# 1 AXL F...	IN03	I	BOOL
# 1 AXL F...	IN04	I	BOOL
# 1 AXL F...	IN05	I	BOOL

6. Associar variáveis aos cartões

PC WORX - projeto2

File Edit View Project Build Online Extras ?

Process Data Assignment

Symbols/Variables

- STD_CNFR: eCLR
 - STD_RES: AXC1050_21
 - Default
 - System Variables
 - STD_TSK: DEFAULT
 - Main: Main

projeto2

- AXC 1050 10.19.1.205
 - Resource
 - STD_RES AXC1050_21
 - AXIOLINE
 - # 1 AXL F DI16/1 1H
 - # 2 AXL F DO16/1 1H
 - PROFINET
 - # MODBUS_CLT
 - Touch Display
 - Unconnected

Symbol/...	Data Type	Process Data Item	Description
Entrada2	BOOL		
Entrada1	BOOL		
Saida1	BOOL		

Device	Process Data Item	I/Q	Data Type
# 2 AXL F...	OUT0	Q	BOOL
# 2 AXL F...	OUT1	Q	BOOL
# 2 AXL F...	OUT2	Q	BOOL
# 2 AXL F...	OUT3	Q	BOOL
# 2 AXL F...	OUT4	Q	BOOL
# 2 AXL F...	OUT5	Q	BOOL

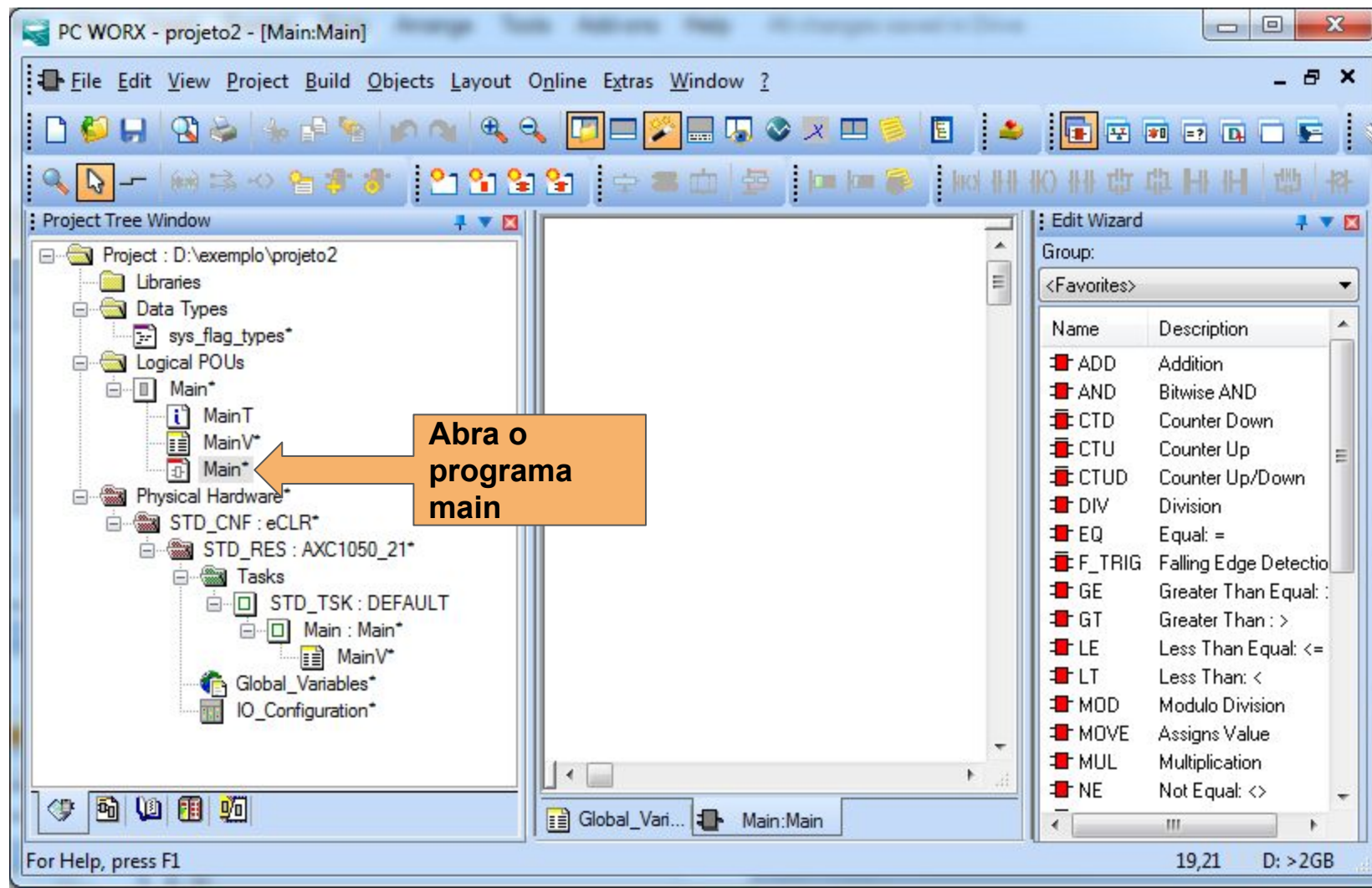
Entrada2:

Faça o mesmo para a saída digital.

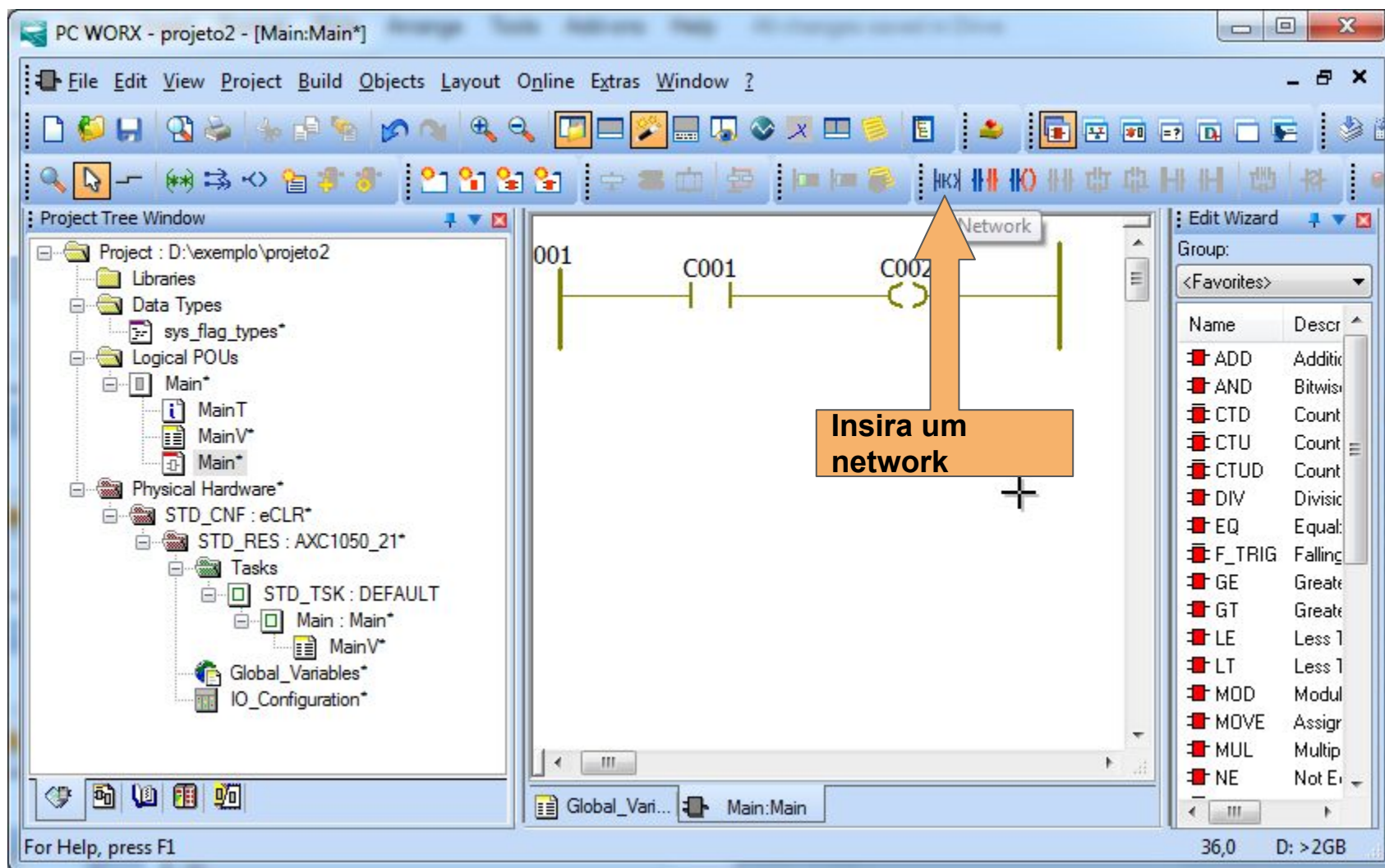
For Help, press F1

4 / 88 D: >2GB

7. Programar



7. Programar



7. Programar

The screenshot displays the PC WORX software interface for a project named 'projeto2'. The main window shows a ladder logic diagram with a power rail labeled '001' connected to a series of components: a normally open contact 'C001', a parallel branch containing a coil 'C005', and another normally open contact 'C002'. An orange arrow points from a text box to the 'Edit Wizard' panel on the right, which lists various logic components.

Insira contato em paralelo

Group:	Name	Descr
<Favorites>	ADD	Addic
	AND	Bitwis
	CTD	Count
	CTU	Count
	CTUD	Count
	DIV	Divisic
	EQ	Equal
	F_TRIG	Falling
	GE	Greate
	GT	Greate
	LE	Less 1
	LT	Less 1
	MOD	Modul
	MOVE	Assign
	MUL	Multip
	NE	Not E

7. Programar

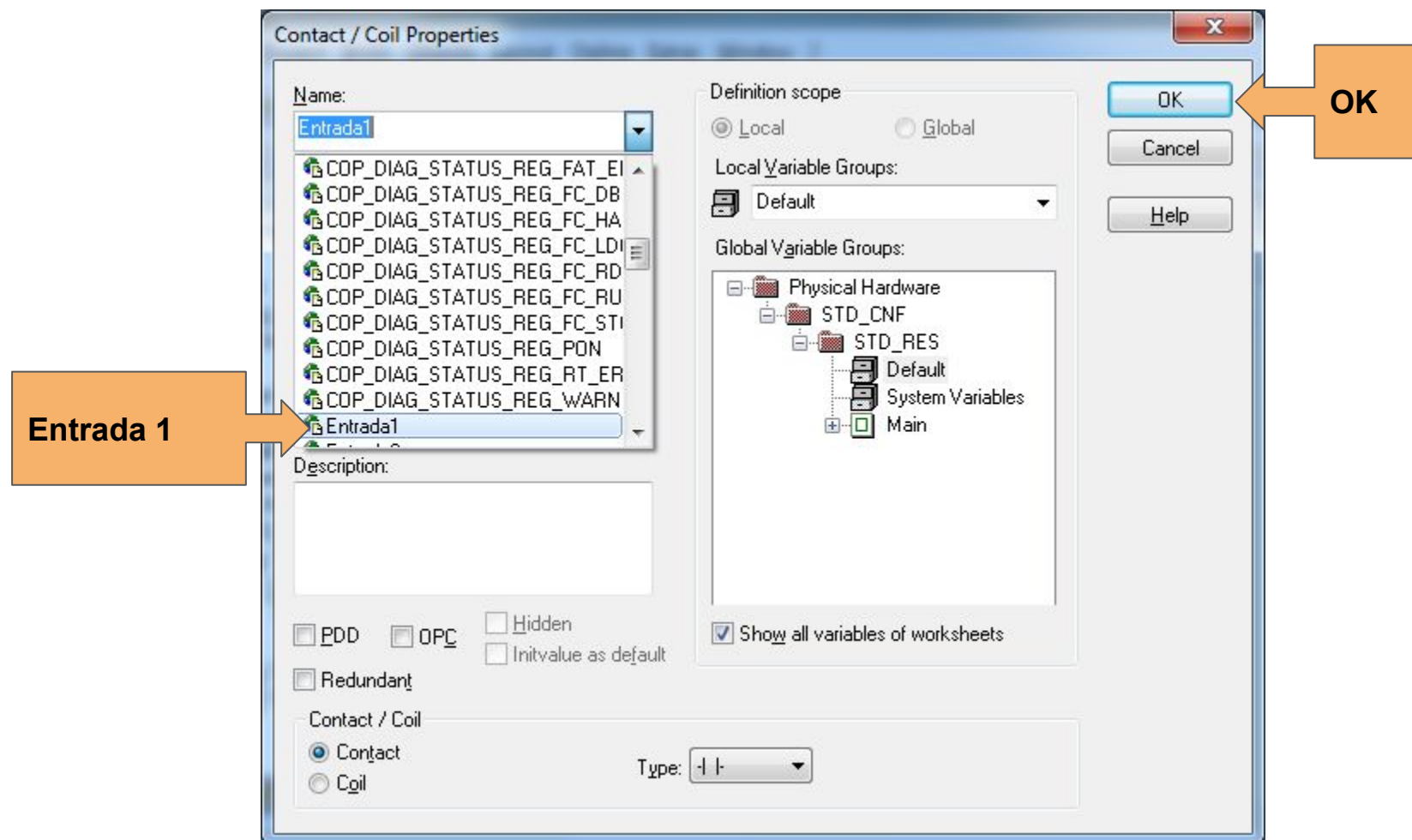
The screenshot displays the PC WORX software interface for a project named 'projeto2'. The main workspace shows a ladder logic diagram with a network starting at 001. It features a coil labeled C001, a normally open contact labeled C002, and a normally closed contact labeled C005. An orange arrow points from a text box to the C001 coil, indicating the next step in programming.

Dê duplo clique para escolher a variável

The Project Tree Window on the left shows the project structure, including Libraries, Data Types, Logical POUs, Physical Hardware, and Tasks. The Edit Wizard on the right is open, showing a list of variables for selection.

Name	Descr
ADD	Addit
AND	Bitwis
CTD	Count
CTU	Count
CTUD	Count
DIV	Divisic
EQ	Equal
F_TRIG	Falling
GE	Great
GT	Great
LE	Less 1
LT	Less 1
MOD	Modul
MOVE	Assign
MUL	Multip
NE	Not E

7. Programar



7. Programar

The screenshot displays the PC WORX software interface for a project named 'projeto2'. The main window shows a ladder logic diagram with a power rail labeled '001' on the left. Two parallel branches connect this rail to a common output line. The top branch contains a normally open contact labeled 'Entrada1'. The bottom branch contains a normally open contact labeled 'Entrada2'. This common line then connects to a coil labeled 'Saida1'. An orange callout box with the text 'Repita para as outras variáveis, para obter o resultado acima.' (Repeat for the other variables to get the result above.) is positioned over the diagram.

The Project Tree Window on the left shows the project structure:

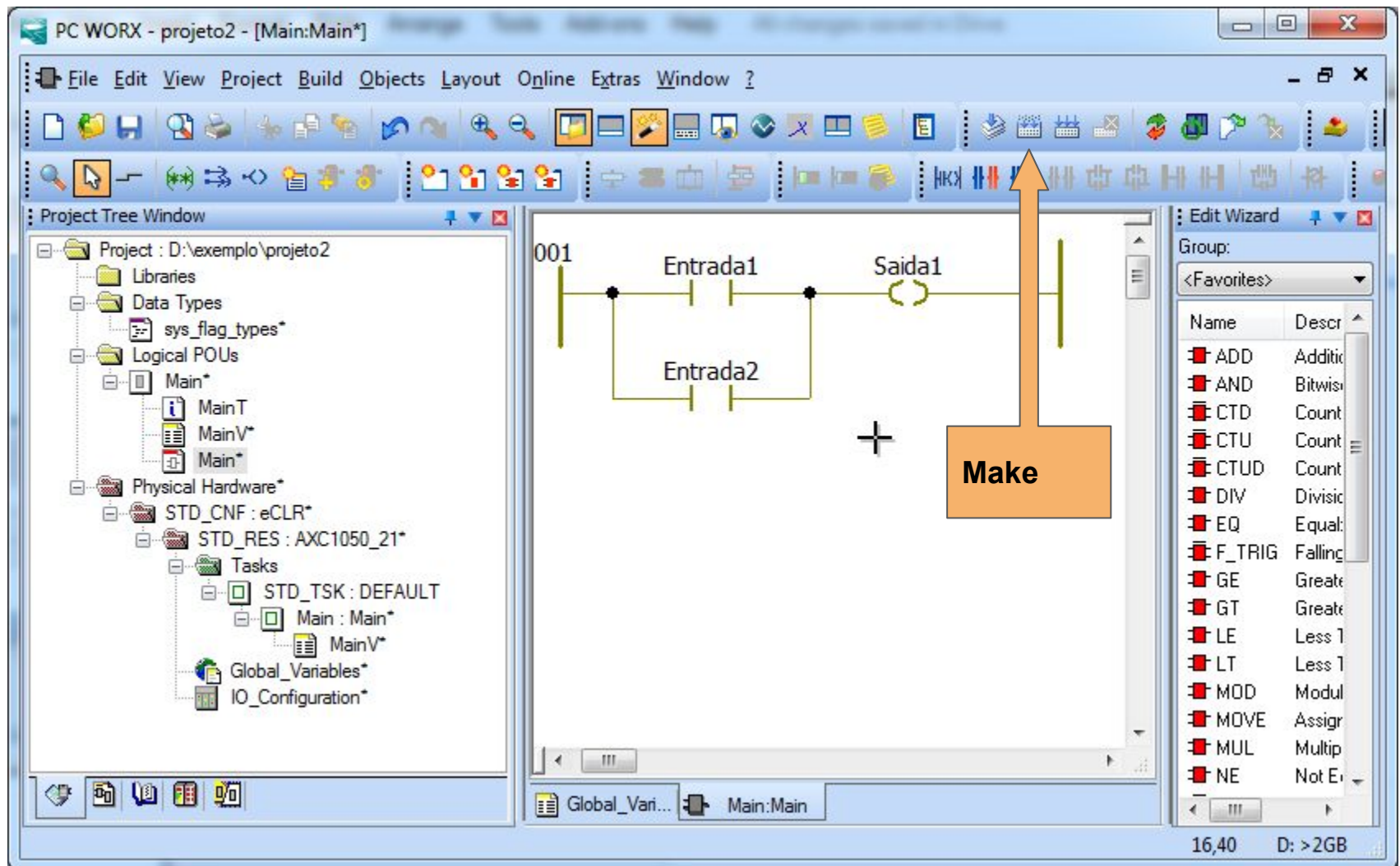
- Project : D:\exemplo\projeto2
 - Libraries
 - Data Types
 - sys_flag_types*
 - Logical POUs
 - Main*
 - MainT
 - MainV*
 - Main*
 - Physical Hardware*
 - STD_CNF : eCLR*
 - STD_RES : AXC1050_21*
 - Tasks
 - STD_TSK : DEFAULT
 - Main : Main*
 - MainV*
 - Global_Variables*
 - IO_Configuration*

The Edit Wizard window on the right shows a list of functions:

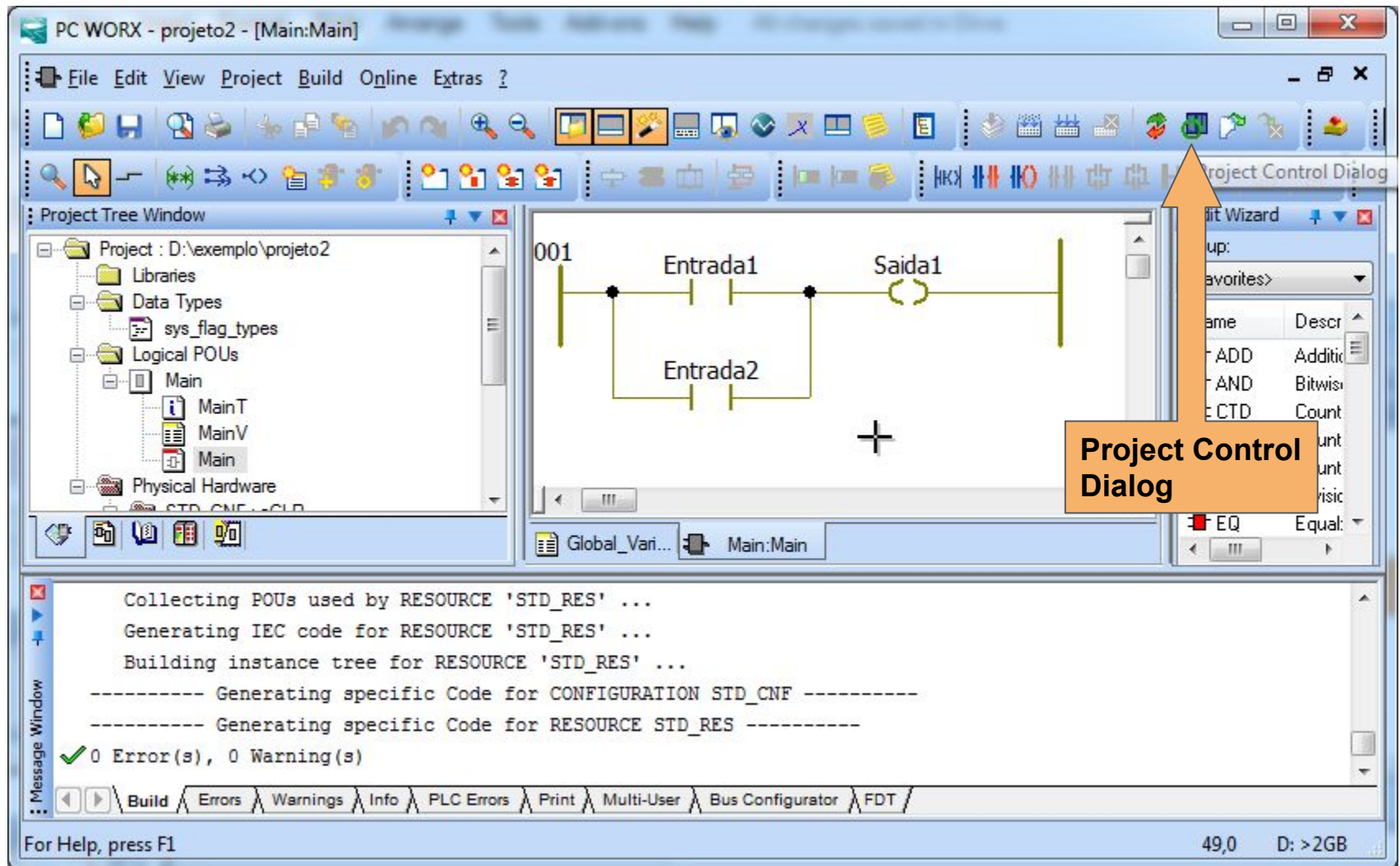
Name	Descr
ADD	Addit
AND	Bitwis
CTD	Count
CTU	Count
CTUD	Count
DIV	Divisic
EQ	Equal
F_TRIG	Falling
GE	Greate
GT	Greate
LE	Less 1
LT	Less 1
MOD	Modul
MOVE	Assign
MUL	Multip
NE	Not E

The status bar at the bottom indicates '31,17' and 'D: >2GB'.

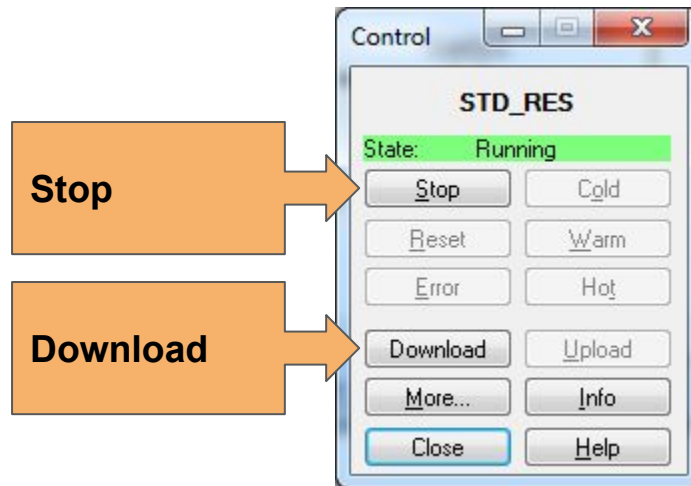
8. Make



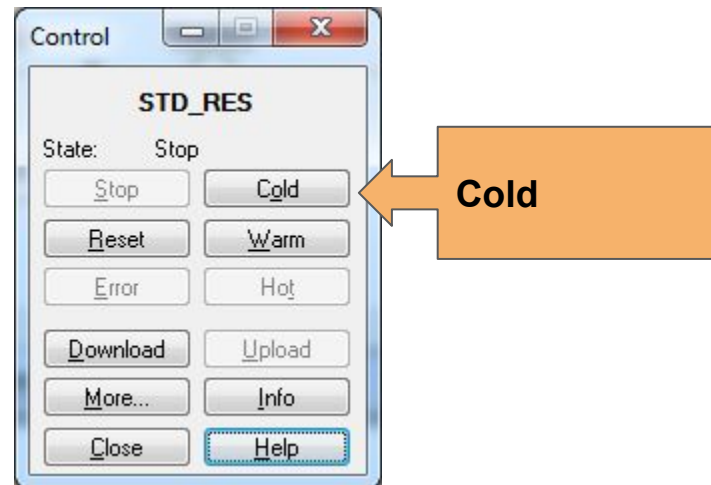
9. Download



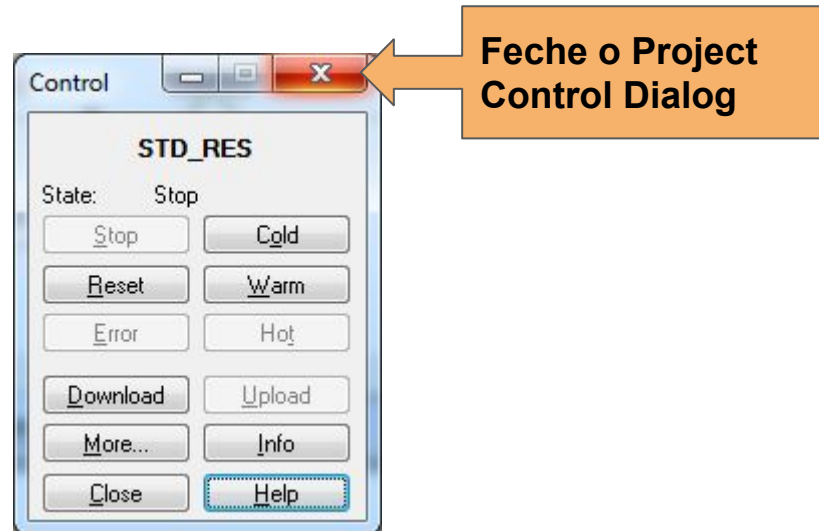
9. Download



10. Debug



10. Debug



10. Debug

The screenshot displays the PC WORX software interface for a project named 'projeto2'. The main workspace shows a ladder logic diagram with three rungs. The first rung starts with a normally open contact labeled '001', followed by a parallel combination of two normally open contacts labeled 'Entrada1' and 'Entrada2'. This parallel combination is connected to a coil labeled 'Saida1'. The second rung is empty. The third rung is also empty. A plus sign is visible below the diagram, indicating a connection point.

On the left, the Project Tree Window shows the project structure:

- Project : D:\exemplo\projeto2
 - Libraries
 - Data Types
 - sys_flag_types
 - Logical POU's
 - Main
 - MainT
 - MainV
 - Main
 - Physical Hardware
 - STD_CNF - STD_RES

On the right, the Edit Wizard is open, showing a list of functions. An orange arrow points from the 'Debug ON' text to the 'Debug' button in the toolbar.

At the bottom, the Message Window displays the following information:

- Required memory for Program Code: 348 bytes
- Required memory for Retain Data: 0 bytes
- Required memory for the Application Image: 37164 bytes
- Predicted memory usage for Data: 2112 bytes
- Process for Download IEC Project and Download Bootproject ended for resource 'STD_CNF.STD_RES' at 28/02/2018 17:

The status bar at the bottom indicates 'For Help, press F1' and shows the current page is 49.4 out of 2GB.

10. Debug

The screenshot displays the PC WORX software interface for a project named 'projeto2'. The main window shows a ladder logic diagram with a red rail labeled 'Entrada1' and 'Saida1', and a blue rail labeled 'Entrada2'. A yellow callout box with the text 'Acione as chaves no kit e acompanhe o estado das variáveis.' (Press the keys on the kit and follow the state of the variables.) is overlaid on the diagram.

The Project Tree Window on the left shows the project structure:

- Project : D:\exemplo\projeto2
 - Libraries
 - Data Types
 - sys_flag_types
 - Logical POUs
 - Main
 - MainT
 - MainV
 - Main
 - Physical Hardware

The Edit Wizard window on the right shows a list of functions:

Name	Descr
ADD	Addit
AND	Bitwis
CTD	Count
CTU	Count
CTUD	Count
DIV	Divisic
EQ	Equal

The Message Window at the bottom displays the following information:

- Required memory for Program Code: 348 bytes
- Required memory for Retain Data: 0 bytes
- Required memory for the Application Image: 37432 bytes
- Predicted memory usage for Data: 2112 bytes
- Process for Download Changes and Download Bootproject ended for resource 'STD_CNF.STD_RES' at 28/02/2018 17:28:43
- Process for Download Bootproject ended for resource 'STD_CNF.STD_RES' at 28/02/2018 17:28:43

The status bar at the bottom shows 'For Help, press F1' and '21,0 D: >2GB'.