## AUTOMATION



Quick Start

# UM QS EN PC WORX

Order No.: —

PC WorX



## **AUTOMATION**

## Quick Start PC WorX

2011-07-27	7
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Designation:	UM QS EN PC WORX
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- Revision: 03
- Order No.: —

This user manual is valid for:

Designation	Revision
PC WorX	ab 6.10
Part of the AUTOMATIONWORX Software Suite 2010	ab 1.60

## Please observe the following notes

In order to ensure the safe use of the product described, you have to read and understand this manual. The following notes provide information on how to use this manual.

### User group of this manual

The use of products described in this manual is oriented exclusively to qualified application programmers and software engineers, who are familiar with the safety concepts of automation technology and applicable standards.

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This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



### DANGER

This indicates a hazardous situation which, if not avoided, will result in death or serious injury.



### WARNING

This indicates a hazardous situation which, if not avoided, could result in death or serious injury.



### CAUTION

This indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

The following types of messages provide information about possible property damage and general information concerning proper operation and ease-of-use.



i

### NOTE

This symbol and the accompanying text alerts the reader to a situation which may cause damage or malfunction to the device, either hardware or software, or surrounding property.

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PC WorX

## 1 General

## 1.1 Introduction

PC WorX is the automation software, which combines programming according to IEC 61131, fieldbus configuration, and diagnostics.

The programming system is based on modern 32-bit Windows technology and enables easy handling for the user by means of zooming, drag & drop, and dockable windows. IEC configuration elements can be processed and libraries can be integrated. In addition, the programming system has a powerful debugging system. In PC WorX, all functions can be easily accessed via the menu and you can create a project using only a few dialog boxes. You can then immediately start developing your program.

## 1.2 Information about this manual

This document helps you to parameterize a bus configuration and to program the application program (according to IEC 61131-3) using example projects.

It is assumed the user has knowledge of and experience in the operation of PCs and Windows operating systems, and knowledge of IEC 61131 and Ethernet basics.



More detailed information about the individual functions of PC WorX can be found in the online help for the program. The entire help function can be called via "Help" in the menu bar. Help for specific functions can be called via F1.



Functions and commands requiring communication with the controller cannot be executed without a physical bus configuration.

However, complete parameterization is possible in the "offline" state. The application program can also be created and compiled.

## 1.3 System requirements

PC system, requirements	
Supported operating systems	MS Windows <sup>®</sup> XP Professional SP3 MS Windows <sup>®</sup> Vista Business MS Windows <sup>®</sup> 7 Professional (32-bit; 64-bit as of AUTOMATIONWORX Software Suite 1.60 SP1)
Hardware requirements	
CPU	Pentium 4/Celeron 1.6 GHz (minimum), 2 GHz (recommended)
Main memory	1 GB (minimum), 2 GB (recommended)
Hard disk space	2 GB free memory space
DVD-ROM drive	Yes
Interfaces	1 x Serial (V.24 (RS-232)), 1 x Ethernet (TCP/IP)
Monitor	XGA, resolution of 1024 x 768 pixels (minimum); SXGA, resolution of 1280 x 1024 pixels (recommended)
Operating devices	Keyboard, mouse
Web browser	Internet Explorer Version 7 or later

## 1.4 Ordering data

### Products

Description	Туре	Order No.	Pcs. / Pkt.
PC WORX DEMO license (software DVD), contains all 5 IEC languages, with MSFC compiler, maximum of 16 bytes of I/O data (mix)	PC WORX DEMO	2985725	1
PC WORX BASIC license, contains all 5 IEC languages, without MSFC compiler, maximum of 256 bytes of I/O data (mix), version-specific license key	PC WORX BASIC LIC	2985275	1
PC WORX PRO license, contains all 5 IEC languages, with MSFC compiler, maximum of 128 kbytes of I/O data (mix), version-specific license key	PC WORX PRO LIC	2985385	1
PC WORX PRO license, contains all 5 IEC languages, with MSFC compiler, maximum of 128 kbytes of I/O data (mix), version-specific license key, upgrade of an existing basic license to a full license with MSFC compiler	PC WORX BASIC-PRO LIC	2985259	1
PC WORX BASIC update, version update for PC WORX BASIC LIC (e.g., from 5.xx to 6.xx), maximum of 256 bytes of I/O data (mix), version-specific license key	PC WORX BASIC UPD	2985262	1
PC WORX PRO update, version update for PC WORX PRO LIC (e.g., from 5.xx to 6.xx), maximum of 128 kbytes of I/O data (mix), version-specific license key	PC WORX PRO UPD	2985372	1

All PC WorX versions support all five IEC programming languages according to IEC 61131-3.

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## 2 Installing and enabling the software

## 2.1 Prior to installation



Prior to installation, close all open Windows applications.

This PC WorX version can be installed parallel to an existing earlier version.

## 2.2 AUTOMATIONWORX Software Suite

PC WorX is part of the AUTOMATIONWORX Software Suite.

The AUTOMATIONWORX Software Suite includes the following programs:

Config+

Easy configuration and startup of INTERBUS networks

- Diag+
  - User-friendly network diagnostics during startup and operation
- Diag+ NetScan

User-friendly monitoring of multiple INTERBUS networks

- PC WorX Uniform IEC 61131 programming environment for all Phoenix Contact controllers
- PC WorX Express

Easy-to-use version of the PC WorX software tool designed to provide a more friendly introduction to the world of IEC 61131 programming using controller class 100 (ILC 1xx) from Phoenix Contact

AX OPC Server

Software used for data exchange between distributed INTERBUS networks and visualization systems

- WebVisit

Tool for creating web pages for web-based operator panels from Phoenix Contact

The desired programs can be selected individually or simultaneously for installation.

Diag+ should only be selected if you wish to use it independently of PC WorX. When installing PC WorX, Diag+ is installed as part of PC WorX.

When one of the software suite programs is started for the first time, it runs in demo mode with limited resources. A registration code is required to enable the full version. You will receive the registration code when a full version of the relevant program is purchased.

### 2.3 Starting the installation program

- Insert the "AUTOMATIONWORX Software Suite" DVD in your DVD-ROM drive. The installation program usually starts automatically after a few seconds.
- If it does not, start the "SETUP.EXE" file from the "[Drive]:\SETUP\" directory on the DVD-ROM. This file calls the installation wizard, which guides you through the installation process.
- Follow the instructions in the installation program.

The installation program generates all the directories required for operation and copies the files for the selected programs.



### **Restart the PC**

Following successful installation, you must restart your computer for the changes to the configuration files to take effect. To do this, click "Finish" at the end of the installation process.

• To restart the PC, click "Finish" at the end of the installation process.

## 2.4 Starting PC WorX

 For installation using the default settings, start PC WorX via "Start, All Programs, PHOENIX CONTACT, AUTOMATIONWORX Software Suite 201x 1.6x, PC WORX 6.1x".





When PC WorX is started for the first time, it runs in demo mode with limited resources. A maximum of 16 bytes is available for I/O data.

If the upper limits for demo mode are exceeded, the following error messages are generated **when compiling**:



Too many inputs/outputs in I/O configuration (16 maximum, XXXXX specified)! PC WORX running with limited resources.



Resource file cannot be compiled!

Regardless of the bus configuration, these error messages always appear when compiling for various controllers (e.g., RFC 470S PN 3TX) in demo mode as all system variables are entered in the I/O configuration.

If you wish to switch from demo mode to the full version, enable your PC WorX license.

## 2.5 Enabling the PC WorX license

After starting PC WorX, proceed as follows to enable your license:

• Select the "Register..." command in the "?" menu.

Register	
Enter registration code:	ОК
	Cancel

Figure 2-2 Registration dialog box for entering the license code

- Enter your registration code.
- Confirm your entry with "OK".





Registration dialog box for entering the license code

1

Alternatively, you can also license PC WorX via the License Manager in the AUTOMATIONWORX Software Suite.

Registration comes into effect the next time PC WorX is started.

## 2.6 License Manager

The License Manager can be used to enable all programs in the AUTOMATIONWORX Software Suite. Select the relevant program to be licensed and then enter the corresponding license key in the field provided.

Version	License (expiration date)	Serial Number	Functionality
AX OPC Server 2.2x	No License	Not Available	Demo
Config+ 1.0×	No License	Not Available	Demo
Diag+ 1.2x	No License	Not Available	Demo
Diag+ 2.x	No License	Not Available	Demo
Diag+ NetScan 1.0×	No License	Not Available	Demo
PC WorX 6.0x	No License	Not Available	Demo
WEBVISIT 1.×	No License	Not Available	Demo
License Key			Reset Fields

Figure 2-4 License Manager

#### Helpful information about PC WorX 3

#### 3.1 **Online help**

More detailed information about the individual functions of PC WorX can be found in the online help for the program. The entire help function can be called via "Help" in the menu bar. Help for specific functions can be called via F1.

#### 3.2 Selecting the language

When installing the software, the language in which PC WorX should be started can be selected. The program language can be changed at any time.

- Select the "Extras, Options..." menu. •
- Select the "General" tab.
- Select the language. ٠
- Confirm your selection with "Apply" and "OK". •

Options 🛛
Directories       Debug       Backup       Tooltips       Logic Analyzer Colors       Variables Grid         Text editor       Text colors       Graphical editor       Graphical editor         Graphical Editor (2)       Graphical editor colors       FFLD Editor         Toolbars       Commands       General       Cross References       Pagelayouts       Build         Language:       English       V       Spañia       Poeutsch       Fonglish         Vorkbook Style       Españal       Français       Poentast       Project on Prost       Italiano         Simplified Chinese       Simplified Chinese       Simplified Chinese       Simplified Chinese       Simplified Chinese
Reset Workspaces
Project tree ♥ Project overview ♥ POUs ♥ Librarigs ♥ Hardware ♥ Instances
OK Cancel Apply Help

Changing the language setting

## i

The selected language is activated the next time PC WorX is started.



The "Theme" element can be used to change the design of the PC WorX user interface. Default setting: "Office 2003".

٠ Close and restart the program.

### Exporting texts/importing translations

Texts previously created in one language can be exported and translated. The translated texts can then be imported back into PC WorX.

Please ensure that the project language has been set:

'Project'						X
Plc/Processor	Language	Pagelayouts	Security			
<u>P</u> roject La English ( <u>C</u> urrent La English ()	anguage: United Kingr anguage: United Kingr	dom)			×	
	пк	Cancel		olu	Help	
- iaure 3-	2	Proie	ct lan	iqua	ae	

Figure 3-2

- Open the "File, Export..." menu.
- Select the data you wish to export.
- Confirm your selection with "OK".

Import / Export	X
Cross references Export PLCopen xm file Extended IEC 131-3 Export Project translation export	OK Cancel
Description:	
Exports a translation file (translateable texts) of the current project	

Figure 3-3 Exporting files from the project

Once the files have been translated:

- Open the "File, Import..." menu. •
- Select the data you wish to import. •
- Confirm your selection with "OK".
- Specify the path for the data to be imported. •
- Confirm your selection with "Import". •

## 3.3 The PC WorX user interface

The user interface consists of the following main components: menu bar, toolbars, main window, and status bar. The contents of the main window depend on the workspace.



7127\_en\_03

### 3.4 Toolbars

The program contains several toolbars with different icons, which enable frequently used operations to be executed quickly. Alternatively, these operating steps can be called via menu items or predefined shortcuts.

By default, all the toolbars are shown. To display or hide a specific toolbar, use the "Extras, Options" dialog box.

When the mouse pointer is placed over an icon (without clicking on it), a tool tip appears. The tool tip displays the name of the current icon. In addition, a short function description appears in the status bar. If tool tips are not displayed, this feature can be activated in the "Extras, Options, Toolbars" dialog box.

### Icons for selecting the workspace

The workspace can be changed via the icons in the toolbar:





Activate IEC programming workspace.

- Activa
  - Activate bus configuration workspace.

Activate process data assignment workspace.



Activate project comparison workspace.

Activate FDT (Field Device Tool) workspace.



Which windows will actually be displayed depends on which windows have been toggled on (see also "Windows in the workspaces" on page 3-8). The last setting for each workspace is saved when the program is closed and restored when it is started again.

### Frequently used icons for compiling and debugging



Online modifications.

Make (compile project; corresponds to "Build, Make" in the menu bar).

Rebuild project (corresponds to "Build, Rebuild Project" in the menu bar).

Switch debug mode on/off.

Display project control dialog box.

## 3.5 Workspaces

PC WorX is divided into five workspaces:

- IEC programming
- Bus configuration
- Process data assignment
- Project comparison
- FDT (Field Device Tool)

The "View" menu or the corresponding icon in the toolbar can be used to switch between the workspaces. Following initial installation, the IEC programming workspace is the default setting.

Figure 3-5 to Figure 3-9 below show the default workspaces. Table 3-1 on page 3-8 provides an overview of the windows that can be usefully added to the default setting.

### IEC programming workspace



Figure 3-5 IEC programming workspace

### Bus configuration workspace

Sec WORX - Quickstart_PN			
File Edit View Project Build Online Extras ?			
	🖉 🔊 🔪  🖀		
Bus Structure	Device Details		
🗄 🍰 Quidstart, PN	ILB PN 24 DI16 DI016-2TX il-lb-dio2 192.168.0.3 (PROFI	vET Settings)	
🗟 🌉 1.C 390 PN 2TX-IB 192.168.0.2			
B R Resource	Name	Value	
- R STD_RES ILC390PN	C Vendor	Phoenix Contact	
B ## PROFINET	C VendorID	0x0080	
H ILB FN 24 D116 D1016-2TX I-Ib-dio2 192.168.0.3	Designation	ILB PN 24 DI16 DI016-2TX	
E IL PN BK DIB DO4 2TX I-pn-bk-2tx 192.168.0.4	DeviceID	0x0004	
	Functional description	PROFINET IO - Inline Block Device With 16 Digit	
# 115 IL 2400 40.1	Device type	I/O digital	
Libronnerted	Device family	1.8	
	D Order number	2878146	
: Device Catalog 🕴 🔺 🖪	L Revision	03/1.00	
B 😭 Phoenix Contact	DN5/PROFINET Device Name	1-lb-dio2	
+ Ch AXL	Station Name		
# 🔁 CP3xx	Device Name		
* 🖸 CT	Module Equipment ID	J	
🔹 🔁 ELR 👘 👘	IP Address	192.168.0.3	
# 🔁 FC2xx	L Subnetmask	255.255.255.0	
# 🔁 FC3xx	Default Gateway	0.0.0.0	
# 🔁 FDT	Realtime class	RT	
1 * 🖵 FL	Reduction ratio input	8 ms	
# FLM	Reduction ratio output	8 ms	
# FLS	Faulty telegrams until connection is aborted	24	
	Monitoring Time inputs (ms)	192	
a Due Courter	Monitoring Time Outputs (ms)	192	
	Operation in case of configuration differences	no	
<u>A</u>	Log connection state	yes	
Module Catalon	Dive b	yes	
	Ersatzwertvernaten Eingange	auf Null setzen	
- 🖫 @ILB PN 24 DI 16 DI016-21X Rev. >= 03/1.00	Yerbindungsaufbau Anlauf	yes	
DIDE ILB PN 24 DI 16 DIDI6 21X	Node ID	35	
A 4	PROFINET Settings ## PROFINET Stationnames	2 Bus interfaces 🛅 Data sheet	
	- Letter -		
IP/PROFINET: Configuration is checked.			
Resource is checked (STD_RES)			
INTERBUS is checked (ILC 390 PN 2TX-IB, 0.0.0)			
2			
Selection of the select	us Configurator 👌 FDT 🖊		
For Help, press F1			C:>2
Figure 3-6 Bus configu	iration workspace	2	
i igule 5-0 Dus connigi	and workspace	5	

### Process data assignment workspace

le Edit View Project Build Opine Extrac 2										
	-	1.000								
innen in see e in see	a 🖉 🖉 🖓 🤇									
ocess Data Assignment	- <b>4</b> -	calutate DAI							+ * 🛙	
phob/Maidales STD: CPR AND40 STD: CPS 11.CX99M StD: Default StD: STD: CPFALT STD: TARN STD: TARN STD: TARN STD: TARN STD: STD: STD: STD: STD: STD: STD: STD:		uidktart_PN ■ ILC 390 PN 2TX ■ Resource ■ Resource ■ Resource ■ Resource ■ RESOURCE ■ IL PN 2 ■ IL PN	-18 192.168.0.2 SS 11.C390PN 24 D16 D1016-27X iHb 01. PN BK D18 D04 27X i WINE 0.0 # 0 D04 0.2 # 0 D18 0.3 S0.0 12 4 D0 4 0.1 12 4 D14 0.2	-dio2 192.168.0. 2tx 192.168.0. *_Dest_Add:						
mbol Data Type Process Data Itam Decorption 30 800. # 218 82:404 31 800. # 218 82:404 32 800. # 218 82:4004	De #11 #11 #11 #11 #11	Process Data 1.1 2.1 1.4 2.4 ~000 4		Data Type BOOL BOOL BOOL BITSTRIN	Byte.Bit 0.0 0.1 0.3 0.0	Address	Symbol(Variable STD_CNF STD_RES \ V002	Function Text	Port 1.1 2.1 1.4 2.4	
19/HOOTUNET: Configuration is checkted. Berouzce is checkted (III. 253) IMTERBUS is checkted (ILC 390 PH STX-IB, 0.0.0)										

### Project comparison workspace

💆 PC WORX - Qui	ckstart_PN_2							<b>F</b> 🗙
File Edit View Pro	nject Build Online	Extras ?						
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Project Comparison P	Result Window					4 v 🖬		
Project Part	Source Type	Change Type	Source Line/Position(x)	y) Reference Line/Position(x/y)				
DOU 'Main.MainV'	Variable Worksheet	Added	Row: 4	Row: 3				
🐌 POU 'Main.Main'	Code Worksheet	Changed	Pos: 46/10 - 76/12	Pos: 46/10 - 56/12				
+ Properties	Worksheets /							
						10		_
C	omparing data a	nd code						
+ Libraries								
Data types								
Data type	worksheet: DT\s	ys_flag_typ	es					
POUs								
POU: POE\M	ain							
Configurat	ion: C\STD_CNF							
Resource:	CNELDISTD DES	RES						
2 differen	ces detected!	1010_104						
3 √0 errors,	0 warnings							
	irrors 👌 Warnings 👌 I	nfos 👌 PLC Erro	rs À Print À Multi-User	Bus Configurator				
For Help, press F1							11,17	C: >2GB
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Figure 3	-0	FIDJe	ci compa		Jace			

### FDT workspace



### 3.5.1 Windows in the workspaces

The windows that you wish to display can be defined at any time for each workspace. Table 3-1 lists which windows are set by default when PC WorX is started for the first time and which windows can be usefully added.

Window	IEC programming		Bus configuration		Process data assignment		Project comparison		FDT	
	D	Α	D	Α	D	Α	D	Α	D	Α
Project Tree Window	Yes	Yes	-	-	-	-	-	-	-	-
Message Window	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Edit Wizard	Yes	Yes	-	-	-	-	-	Ι	Ι	-
Cross References Window	-	Yes	-	-	-	-	-	-	-	-
Watch Window	-	Yes	-	-	-	-	-	-	-	-
Logic Analyzer	-	Yes	-	-	-	-	-	-	-	-
Project Comparison Result Window	-	-	-	-	-	-	Yes	Yes	-	-
Status bar	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bus Structure	-	-	Yes	Yes	-	-	-	-	Yes	Yes
Device Details	-	-	Yes	Yes	-	-	-	Ι	Ι	Yes
Device Catalog	-	-	Yes	Yes <sup>1</sup>	-	-	-	Ι	Ι	Yes
Module Catalog	-	-	-	Yes <sup>2</sup>	-	-	-	Ι	Ι	-
Process Data Assignment	-	-	-	-	Yes	Yes	-	Ι	Ι	-
Diag+	-	-	-	Yes <sup>3</sup>	-	-	-	Ι	Ι	-
Connected Bus	-	-	-	Yes	-	-	-	-	-	-
EXCEL Link	-	-	-	Yes	-	Yes <sup>4</sup>	-	-	-	-
LCD	-	Yes	-	Yes	-	Yes	-	-	-	-
Ethernet Topology	-	-	-	Yes	-	-	-	-	-	-
INTERBUS Topology	-	-	-	Yes	-	-	-	-	-	-
DTM View	-	-	-	-	-	-	-	-	Yes	Yes

Table 3-1 Windows in the workspaces

Key:

- <sup>1</sup> When inserted manually
- <sup>2</sup> For PROFINET
- <sup>3</sup> For troubleshooting
- <sup>4</sup> When using Excel
- D Default
- A Useful addition

### 3.5.2 Toggling windows on/off and docking/undocking windows

 Toggling on/off
 Each window can be toggled on/off via the "View" menu by selecting the corresponding menu item.

 For the windows recommended for the relevant workspace, please refer to "Workspaces" on page 3-5.

**Docking/undocking** For each window, you can specify whether or not it is to be docked in the other windows. There are various options for docking/undocking windows:

- Permanent docking/undocking: In the title bar or the blue/gray frame of the relevant window, right-click with the mouse and activate/deactivate the "Allow Docking" menu item. Move an undocked window to the position where it is to be inserted in the desktop.
- Temporary undocking: Double-click on the gray window frame or the title bar of the window. The window is then displayed as a "normal" window. Its size can be modified and it can be moved to any position on the screen. In order to re-dock the window, i.e., to reinsert it in the desktop, double-click on the title bar.

### 3.5.3 Auto-hide function

The auto-hide function can be toggled on/off for each window. This function ensures that the window is automatically displayed or hidden according to the cursor position. This function is particularly useful, for example, when working with a small monitor (e.g., a notebook).

The auto-hide function is enabled/disabled via the pin icon in the title bar.

Auto-hide is disabled. When you move the cursor out of the window, the window stays open (see A in Figure 3-10).

-

Auto-hide is enabled. When you move the cursor out of the window, the window is minimized. To show the window again, place the cursor on the minimized window (see B in Figure 3-10).



## 3.6 "Bus Structure" window

The "Bus Structure" window is used to display and edit the bus topology of the project.

### 3.6.1 Icons in the "Bus Structure" window

### 3.6.1.1 Logical device functions

The individual device functions are identified in the "Bus Structure" window with logical icons. The logical icons in the example bus configuration have the following meaning:

 Table 3-2
 Icons for logical device functions (examples)

lcon	Meaning
R Resource:	<b>Controller resource</b> When creating the project using a template, the controller resource is inserted below this icon. When creating the project using the wizard, the controller resource is inserted below this icon.
### PROFINET:	<b>PROFINET IO</b> controller Insert all PROFINET IO devices below this icon in the lower level.
A INTERBUS:	<b>INTERBUS</b> master Below this icon, insert the INTERBUS devices that are directly connected to the device that this icon refers to (local bus and remote bus).
IL Inline:	Inline Below this icon, insert the Inline terminals that are connected to the Inline bus coupler (local bus).
	PROFINET IO devices: Device proxy and modules For PROFINET IO devices, the display is divided into the device proxy (bus interface) and its modules. The device proxy is indicated with "@". The slot number is specified after the graphical representation of the device proxy or modules (setting in context menu under "Edit Device Representation").
	The icons for the device proxy and modules are stored in the device description file (e.g., FDCML, GSD). They may vary from manufacturer to manufacturer.
r8 ∎ <mark>8</mark> r8	PROFINET IO devices from Phoenix Contact (Example: ILB PN 24 DI16 DIO16-2TX)
$\bigcirc \bigcirc \bigcirc \bigcirc$	Default icons, if none are stored in the device description file.

ILB PN 24 DI16 DI016-2TX il-ilb-dio2 192.168.0.3

- 📲 0 @ILB PN 24 DI 16 DIO16-2TX

📲 1 DIO16: ILB PN 24 DI 16 DIO16-2TX

📲 2 DI16: ILB PN 24 DI 16 DIO16-2TX

Figure 3-11 Device proxy and modules of a PROFINET IO device

For the example in Figure 3-11:

- Slot 0 is the device proxy for the PROFINET IO device
- Slot 1 is the DIO module for the PROFINET IO device
- Slot 2 is the DI module for the PROFINET IO device

Since the modules are fixed components of the PROFINET IO device, each one is marked with a pin. These elements cannot be deleted or replaced.



PROFINET IO controller	Overall structure with PROFINET IO
	devices and INTERBUS devices

Figure 3-12 Example for the representation of devices in the bus configuration

### 3.6.1.2 Validity of actions

When editing the bus configuration with the mouse, the mouse pointer indicates the validity of your actions.

Table 3-3 Icons when editing the bus configuration

lcon	Meaning
	Insert at the same level
	The device can only be inserted in/moved to the same level as existing devices.
×	Insert in the lower level
N.	The device can only be inserted in/moved to a lower level than existing devices.
	Replace
J.	The device under the mouse pointer can be replaced by holding down the <ctrl> key and placing the mouse pointer on the existing device.</ctrl>
~	Not permitted
0	This icon indicates a mouse pointer position for which actions are not permitted.

### 3.6.1.3 Display of status information

In the "Bus Structure" window some icons, which superimpose other graphics, are used to display important status information.

Table 3-4 Icons for displaying status information

lcon	Meaning
0	The device is hidden or the bus is deactivated.
8	Errors have occurred for the device.
Δ	Warnings have occurred for the device.
Q	The pin indicates a module that is a fixed component of a device. This element cannot be deleted or replaced.

### 3.6.2 Display in the "Bus Structure" window

The display in the "Bus Structure" window can be adapted to your requirements.

- Switch to the bus configuration workspace.
  - In the context menu, open a device via the "Edit Device Representation..." menu item.

Renumber devices Exchange Data	+
Copy Device	Ctrl+C
Copy with Subdevices	Ctrl+T
Cut	Ctrl+X
Paste as Child	Ctrl+B
Paste as Sibling	Ctrl+V
Replace	
Blind out Device	Ctrl+Shift+D
Deactivate Bus	
Delete	Delete
Edit Device Representation	Ctrl+E
Print Bus	
Refresh View	F5

꾸

Figure 3-13 "Edit Device Representation..." menu item

• Select the criteria that you would like to see in the display.

Device Representation		×
Display Order of Characteristics Available Station name Device name	Used Designation Type	
Module equipment id Order number DNS/PROFINET Device Name Separator 1 Separator 2 Separator 3	L Address	
	>>	
	<u>D</u> K Cancej	

Figure 3-14 Device representations

Examples for different device representations:



Product designation

DNS/PROFINET device name, separator, and IP address



The selected representation only affects the representation of a specific device group.

Groups include, for example:

- Controllers
- PROFINET IO devices
- INTERBUS devices

For example, the setting for PROFINET IO devices does not have any influence on the representation of the ILC 390 PN 2TX-IB (see Figure 3-15).

### 3.7 "EXCEL Link" window

The Excel link enables:

- Data to be exported to an Excel file
- Data to be imported from an Excel file

Data that can be exported/imported includes:

- IEC variables
- IEC variable connections to signals
- Associated data and text

The data for all IEC variables can therefore be edited in an Excel worksheet rather than in various dialog boxes in the PC WorX user interface.

Since IEC variables are edited in this window, it is useful to toggle the window on in the process data assignment workspace.

The following functions can be executed with the Excel link:

- Export existing IEC variables.
- Adjust and import the IEC variables available in an Excel file with a specified format with the IEC variables available in a PC WorX project.
- Settings that specify how you wish to identify devices.



For more detailed information about the Excel link, please refer to the online help for PC WorX.

To toggle the "EXCEL Link" window on, select the "View, EXCEL Link" menu item.

### 3.8 "Diag+" window

Diag+ is a diagnostics tool for the seamless diagnostics of INTERBUS and PROFINET. When installing PC WorX, Diag+ is installed automatically and is integrated in PC WorX. It can be called from PC WorX via the "Diag+" window.

However, Diag+ can also be started separately via "Start, All Programs, PHOENIX CONTACT, AUTOMATIONWORX Software Suite 201x 1.6x, Diag+ 2.xx".



An online connection to the controller is required in order to use Diag+.

For the following description, the example bus configuration for the PROFINET and INTERBUS system has been selected (see Figure 3-15 on page 3-13). The IB IL 24 DI 4-ME Inline terminal has been removed from the bus configuration in order to prompt an error.

Start Diag+ via "View, Diag+".

Communication Path	ILC 390 PN 2TX-IB (192.168.0.2)	Connect
View	Settings	
User		
Name:		Login
Password:		Logout
Communication Path Registry Assignment File Custom DCP PC WORX		
liew		
Device Representation	n	1000
Device Type: INT	ERBUS Devices	×
Display: De	rice Number	~
Refresh: Ma	nual	~
Status Messages		
Message Time		
Message Time Offline 05.05.20	11 10:32:59	
Message Time Offline 05.05.20	11 10:32:59 Help on Status Message	
Message Time Offline 05.05.20 Version	11 10:32:59 Help on Status Message	
Message Time Offline 05.05.20 /ersion	11 10:32:59 Help on Status Message 2:40.56	
Message Time Offline 05.05.20 Version	11 10:32:59 Help on Status Message 2:40.56 Project Name:	

Figure 3-16 Diag+ start screen

 Under "Communication Path", select the device with which you would like to establish a connection.

The diagnostics represented depend on the communication path:

- PROFINET IO controller: INTERBUS diagnostics and diagnostics archive
- PROFINET IO devices: INTERBUS diagnostics

 Select, e.g., the ILC 390 PN 2TX-IB PROFINET IO controller as the communication path.



Figure 3-17 Selecting the communication path

- Click on "Connect" to activate the communication path.
- At the top under "View", select which general information is to be represented.

### **View: Settings**

At the bottom under "View", select which information is to be represented.

View		
Device Represen	tation	
Device Type:	PROFINET IO Devices	
Display:	PROFINET Device Name	
	Station Name	
	Module Equipment ID	
Refresh:	Manual	



### View: Diagnostic archive

•

All events that have occurred are displayed in list format. The display can be adapted to your individual requirements via the filter options at the top.

Communication	n Path	ILC 390 1	PN 2TX-IB (192.168.0.2)					×	Disconnect
	View	Diagnost	ic Archive					*	
Filter Options									
System 4	All			~	Device	All			
Message 4	All			~	Priority	All			
<]<				Page	1/1				
Message			Time 🗸	System	Device	Priority	Comment		
Configuration	Modific	ation	5/5/2011 11:03:13	AM PROFINE	r ilc-390-pn1	Information			
Program load	ed		5/5/2011 11:03:13	AM PLC	ilc-390-pn1	Information			
Control syste	m reset	1	5/5/2011 11:03:13	AM PLC	ilc-390-pn1	Information			
Control syste	m reset		5/5/2011 11:03:12	AM PLC	ilc-390-pn1	Information			
STOP State			5/5/2011 11:03:11	AM PLC	ilc-390-pn1	Information			
Diagnoses:		C	onnection establishm	ient					
Device Data:		P	ROFINET IO Device ROFINET IO Controlle	<u>ir</u>					
			C	onnection est	ablishment				
Connection b	etweer	n IO Con	troller and IO device s	uccessfully es	tablished.				
				PROFINET IC	) Device				
Station Name	e:								
Device Name	63								
Module Equip	oment	ID:							
IP Address:		1	92 168 0 3						
Subnet Mask		2	55 255 255 0						
PROFINET D	evice N	vame: il-	ilb-dio2						
			Project Name: Oui	kstart PN.mwt					
-									

Figure 3-19 Diagnostic Archive

### Helpful information about PC WorX

### View: INTERBUS Diagnostic



INTERBUS modules in an INTERBUS system can be diagnosed with Diag+ as usual. Various information can be called via the different tabs.

### Diagnostics in lower-level INTERBUS systems

Please note that for direct diagnostics of the Inline devices that are connected to the PROFINET bus terminal in the bus configuration in Figure 3-12 on page 3-11, the communication path can now be changed from the ILC 390 PN 2TX-IB to the FL IL 24 BK-PN-PAC. To this end, you must disconnect the communication path to the ILC 390 PN 2TX-IB, change it to the FL IL 24 BK-PN-PAC, and then activate the communication path ("Connect" button).

Switch to "View: INTERBUS Diagnostic".

- Under "View, Device Representation", select "INTERBUS Devices" as the device type.
- At the top, select "INTERBUS Diagnostic" as the view.

Communication Path	ILC 390 PN 2	TX-IB (192.168				Disconnect
View	INTERBUS Di	agnostic			1	*
Statistic		StatisticEx		SpecialTen		Settings
Solution Device	Diagnostic	History	Bus Architecture	Buc Info	Action	Optical Diagnostic
<ul> <li>ILC 390 PN 2T×</li> <li>0.1</li> <li>0.2</li> </ul>	-IB		<u> </u>	DUSTING	Action	
ILC 390 PN 2TX     0.1     0.2	-IB II 1	BETHIP[192.16 92.168.0.2	;8.0.2[5,5]N1_M	bus mo	ACION	Optical Diagnostic

Figure 3-20 INTERBUS Diagnostic: Bus Architecture (no error)

An error is simulated, the IB IL 24 DI 4-ME Inline terminal is disconnected.

	View	INTERBUS Dia	agnostic	0.0.2)			/ Disconnecc
Sta	tistic		StatisticEx		SpecialTen		Settings
Solution	Device	Diagnostic	History	Bus Architecture	Bus Info	Action	Optical Diagnostic
0.1							
Communicatio	n Path:	IE 1'	3ETHIP[192.16 92.168.0.2	58.0.2 5,5]N1_M			

Figure 3-21 INTERBUS Diagnostic: Bus Architecture (error)

Switch to the "Solution" tab.

Here, information is provided about how to remove the error.

	View INTERBUS D	iagnostic		*	
Ch.			Generalization	1	Calliana
Solution	Device Diagnostic	History Bus Archil	ecture Bus Info	Action	Optical Diagnostic
Current Error		~			Documentation
Additional Err Error Locatior Message Time	or Info: 0002 n: 0.2 e: 05.05.2011 11:10:24				Feedback
feaning					
Cause					
dditional Info	rmation				
Remedy:					
. Compare th	e bus configuration with	the current configuration.			
	th is entered in the conn	ected bus configuration is mi	ssing and not marked as sv	vitched off.	
A device whic					

Figure 3-22 INTERBUS Diagnostic: Solution

• Remove the error (here: insert Inline terminal again).

For PROFINET, the entire system is automatically restarted by the PROFINET IO controller.

If the bus is not restarted automatically, the "Action" tab can be used, for example, to acknowledge errors, reset the controller board, and start the bus.

	View	INTERBUS DI	annostic				1	~
		11121.000 01	agnosae a a					
Sta Talutian	Device	Disensable	StatisticEx	Dur Auchi	ha ah wa	pecial i en	Action	Settings
Control Co	optroller Boa	rd	1.50017	- Das Filler		545 1110		opical biogroup
Control Co								
				Start	BUS			
				Confirm Dia	agnostics			
				Reset Statist	ic Counter	1		
			Ackn	owledge all P	eripheral F	aults		
				Alarm	Stop			
			Cr	eate Configu	ration Fran	ne		
				Reset Contro	oller Board			
		Projec	t Name: Quick	start_PN.mw	t			
View: Ethernet Topology

i

The Ethernet topology can also be displayed in Diag+.

Please note that the Ethernet topology can only be displayed if it has been previously generated in PC WorX under "View, Ethernet Topology".

## 3.9 Visualization

The data generated in PC WorX can be used in other programs, e.g., to visualize processes (e.g., Visu+, WebVisit).

The AX OPC Server is provided in order to enable the use of data in OPC clients.

See also "AX OPC Server and WebVisit" on page C-1.

## 3.10 FDT (Field Device Tool) workspace

#### 3.10.1 Introduction

FDT (Field Device Tool) is the name of the software specification that standardizes the fieldbus-independent configuration, parameterization, and diagnostics of devices in an automation network.

To this end, the device manufacturer provides device-specific drivers and user interfaces known as DTMs (Device Type Managers). The DTM of a device or a device group contains, for example, a view of selected data from the device description and a device-specific user interface. Using the DTM, a device is integrated into the automation network via an FDT framework application (also known as FDT container software, e.g., PC WorX).

FDT GroupPhoenix Contact is a member of the FDT Group (www.fdtgroup.org). Various DTMs are<br/>available from Phoenix Contact, some of which are certified by the FDT Group.

Internet Device-specific DTMs, which are not included in the DTM library installed as part of the AUTOMATIONWORX Software Suite, can be downloaded at www.phoenixcontact.net/catalog. The latest DTM libraries are available at www.automationxplorer.phoenixcontact.com.

For DTMs for devices from other manufacturers, please contact the relevant manufacturer.

#### 3.10.2 General

PC WorX software is an FDT framework application for integrating DTMs. Once DTM support has been activated for PC WorX, the DTM library will be available the next time PC WorX is started. Any other DTMs from different manufacturers can be integrated.

Using DTMs, point-to-point communication, even beyond network boundaries, enables user-friendly parameterization and diagnostics of devices and sensors/actuators via, e.g., Ethernet, INTERBUS, PROFIBUS, HART, IO-Link protocol, and also PROFINET IO in the future.

#### 3.10.3 Installing DTM libraries

#### **Activating DTM support**

1

DTM support must be activated in PC WorX. Please note that this functionality is deactivated by default.

Close PC WorX before activating/deactivating DTM support.

 To activate the DTM functionality in PC WorX, select "Start, All Programs, PHOENIX CONTACT, AUTOMATIONWORX Software Suite 201..., Tools, Activate DTM support".





Figure 3-25 DTM support: Installing the DTM library



#### PC WorX

#### Installing the AX DTM Library

1

The AX DTM Library is also installed with AUTOMATIONWORX Software Suite 201x 1.6x.

To update the AX DTM Library, e.g., in order to integrate new devices in the software, a setup option is available which can be used to install a new version of the AX DTM Library.



- If the AX DTM Library is already installed, an update installation will be performed whenever the setup program is started. Only the features that were previously installed will be updated.
- If the AX DTM Library has not yet been installed, a brand new installation will be performed when the setup program is started. The features that have been selected automatically or manually will be installed.

Installing the DTM

- If a library has already been installed, there are two options for installing the DTM for the IB IL IFS-MA-PAC terminal:
- Uninstall the old library: Next time setup is executed, all automatically or manually selected features will be installed.
  - Install the new setup package without uninstalling the old library: Following installation, the newly added features (e.g., the IB IL IFS-MA-PAC terminal) are not yet available.

To activate the new features, proceed as follows:

- a) Select "Start, Control Panel, Add or Remove Programs".
- b) Select "AX DTM Library".
- c) Click on "Change".
- d) In the welcome screen of the installation wizard, click "Next".
- e) In the "Program Maintenance" window that appears, select the "Modify" option and confirm your selection with "Next".
- f) The installation wizard displays all the features available in the setup. The symbol before an entry indicates the status of the feature: Hard disk = Installed/install: Red cross = Not installed/remove

Click on an icon in the list below to change how a feature is installed. AUTOMATIONW SMMP Communication DTM Generic Device DTM Device Descriptions for IN Device Descriptions for IN	
AX DTM Library     AX DTM Library     Solution     S	
	ption VORX DTM Library
Device Descriptions for SN This feature rec your hard drive subfeatures set subfeatures set hard drive.	quires OKB on :. It has 0 of 7 lected. The quire OKB on your

Figure 3-27 Features in the setup

g) Click on the symbol before the entry to change the state of the feature (e.g., IB IL IFS-MA DTM).



Figure 3-28 Activating a feature

- h) Confirm your selection with "Next".
- i) Close the installation wizard by clicking on "Install".

#### Installing additional device DTMs individually (example: CONTACTRON DTM)



Please note that individual DTMs for devices from Phoenix Contact only have to be installed if these devices are not included in the installed DTM library. For devices from other manufacturers, installation is always required.

- Save the setup file for the device DTM to be installed onto your PC.
- Start setup for the CONTACTRON DTM by executing the setup file.
- Follow the instructions of the installation wizard.
- In the "Required components..." window, select the entry highlighted in Figure 3-29.

equired components for CONTAC	TRON-DTM-SUITE		
The choosen components are required t	to execute the CONT/	CTRON-DTM	-SUITE
CONTACTRON-DTM-IFS (3.23)			68286 K
FDT-Container Automation×plorer			OK 🔤
FDT-Container Interface Conf			28771 K 🗧
Microsoft .NET Framework 1.1			OK
Microsoft .NET Framework 2.0 SP2			ок —
Microsoft Windows Installer 3.1			0 K 🔽
Destination Folder			
C:\Program Files\Phoenix Contact			Browse
Space Required on C:	99284 K		
Space Available on C: IShield	35125676 K		Disk <u>S</u> pace

Figure 3-29 CONTACTRON DTM - Selection for PC WorX

Follow the instructions of the installation wizard.

#### 3.10.4 Creating a project and integrating DTMs in PC WorX

The next time PC WorX is started, a window appears indicating the progress of the search for new installed DTMs in the registry.

Example The		
Found DTM:		
EMMDtm.Dtm		

Figure 3-30 Search progress

- Create a new project with the controller used (here: ILC 150 ETH) via the "File, New Project" menu.
- Save the project via "File, Project, Save Project As / Zip Project As" (here: Quickstart\_PCW\_IFS\_MA, for example).
- To integrate the detected DTMs into the device catalog, select the "Import from DTM Catalog..." menu item.



Figure 3-31 Integrating DTMs into the device catalog

The message "Do you want to scan the complete registry again to find new installed DTMs?" appears. As the registry was scanned when PC WorX was restarted, you can answer this prompt with "No".

A prompt may then appear (possibly multiple times) for various device descriptions asking whether the existing devices in the device catalog should be replaced. Answer "Yes" to these prompts..



The process described applies to DTMs from Phoenix Contact as well as DTMs from other manufacturers.

The PC WorX message window indicates which devices have been imported.

In the device catalog, all the devices are now displayed sorted by company.

: Device Catalog	🕂 🔺 🖾
🗑 🧰 Festo	
B Generic	
B Phoenix Contact	
B - Phoenix Contact GmbH & Co. KG	
. ⊞ - 🔁 Universal	
AL AL	

Figure 3-32 Device catalog following import

# 3.10.5 Reading in the bus configuration and/or manually inserting devices

At this point you must now read in the current bus configuration or manually configure the desired bus configuration. For detailed instructions on how to proceed, please refer to Section 4, "Sequence for creating a project".

When you manually insert a DTM-compatible device into the bus configuration, depending on the device and the position of the device in the bus configuration in "DTM View" (menu: "View, DTM View"), more detailed information about the device is displayed. The following is displayed in the example in Figure 3-33:

DTM View			🖡 🔻 🔯
New Device • ILC 15	OETH		* * *
	IB IL IFS-MA ID 221 F Phoenix Contact 1.00	PD 448	
FDT Identifier: System Number: Segment Number: Position Number:		IB IL IFS-MA ID 221 PD 448(01) 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
		planningEngineer	.:

Figure 3-33 DTM View: New Device – ...

The following settings are shown in Figure 3-33:

-	FDT Identifier:	Specify a unique ID for the device here. This is particularly important if several devices of the same type are used in the bus configuration.
-	System Number:	Specifies the number of the controller to which the devices used in your application are connected. In an application with just one controller, the controller number is "1".
-	Segment Number*:	Number of the level in which the device is used in the application.
		Segment number = 1: Corresponds to the control level
		Segment number = x: Lower level than the controller
_	Position Number*:	Position of the device in the segment/bus configuration.
* =	For the segment and posi	tion number, you can refer to the "Bus Structure" window in

\* = For the segment and position number, you can refer to the "Bus Structure" window in PC WorX (bus segment number/position number)

#### Settings for DTMcompatible devices

Depending on the DTM-compatible devices to be inserted in the bus configuration, settings are required that may differ according to the device.

The following example shows the input window for a required device address and a device name. If the "DTM View" window is hidden, it can be displayed via the "View, DTM View" menu. The name ("Tag") and the device address of the DTM-compatible device can be edited.

DTM View		÷ 🔻 🖾
New Device - ILC 1	50 ETH New device - IB IL IFS-MA ID 221 PD 448	( ) X
	IB IL IFS-MA ID 221 PD 448 Phoenix Contact 1.00 / 2010-04-06	
Device Type	EEM 3-24DC/500AC-16-IFS	
Tag	EEM 3-24DC/500AC-16-IFS	
Device Address	0K Cancel	
	planningEngineer	.:;

Figure 3-34 "DTM View" window: Device address and name for EMM...

Changes to the default settings for the name and device address must be confirmed with "OK".

## 3.11 Calling DTM functions

• To call the DTM functions of a device, select the "DTM Functions" item in the context menu (right mouse button) followed by the desired function.

🖮 📲 # 1 IB IL 1	IFS-MA ID 221 PD 448 0 . 1			
EEM	Renumber devices Exchange Data		}	
	DTM Functions Assistent for configuration of multiple devices	Ctrl+W	•	Connect Disconnect
	Copy Device Copy with Subdevices Cut	Ctrl+C Ctrl+T Ctrl+X		Process data configuration Devicelist Datasheet
<b>F</b> :	O all's a DTM (see al' as a			

Figure 3-35 Calling DTM functions

### 3.11.1 General DTM functions

#### Connect

Establishes the connection between the DTM and the device.

#### Disconnect

Disconnects the connection between the DTM and the device.

Display of connected devices

Connected devices are represented with a connection symbol.



Figure 3-36 Connection representation

Key:



Device not connected



Device connected



Device actively connected



The connection representation in PC WorX only changes to green (active connection) when another DTM function is selected on this device.

#### 3.11.2 DTM functions of the controller

• To use the DTM functions of the controller, connect the controller.

Bus Structur E 🎝 UNTI	e TLED IC 150 FTH 192.168.0.2	‡ ▼ 🛛	DIM View
	Replace Create DNS/PROFINET Device Names Exchange Data	Ctrl+R	
	DTM Functions	•	Connect
	Assistent for configuration of multiple devices	Ctrl+W	Disconnect
	Copy Device Copy with Subdevices	Ctrl+C Ctrl+T	Options Diagnosis Device List



#### Settings

The settings for the communication path are displayed and can be modified, if required.



Make sure that the settings in this window match the settings in the "Communication" tab in the "Device Details" window of the controller.

: DTM View CommWay - ILC 150 ETH	■ ▼ <b>F</b> ×()
ILC 150 ETH Phoenix Contact 01/2.00 / 2006-11-27	Dentact
Master Settings	Connection Name Manual Input   IP Address  Change Timeout Period  Connect:   S sec.  Receive:  S sec.
Test	Apply Help

Figure 3-38 DTM functions: Settings – Communication path of the controller

#### Diagnostics

Diagnostic information is made available for the communication DTM. With regard to DTM functions, the same functions as those in Diag+ are available here.

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This function has been implemented within the DTM and is therefore also available in PC WorX. It corresponds to the displays in Diag+. This diagnostic display can be used in other FDT framework applications, such as AutomationXplorer+, which do not offer diagnostics.

DTM View		I 🔻 🖾
IBDiagPlusControl - IL	.C 150 ETH	• • ×
	ILC 150 ETH	
	Phoenix Contact	ONTACT
	01/2.00 / 2006-11-27	
Communication		Connect
lloor	View Settings	
Name:		Login
Password:		Logout
Assignment File     Custom     DCP     DTM     View     Device Represer	; Itabion	
Device Type:	INTERBUS Devices	<u> </u>
Display:	Device Number	<u> </u>
Refresh:	Manual	~
Status Messages -		
	Help op Status Message	
Version		
	2.40.56	
0.661:	Project Name:	
Urfline		?
	planningEngineer	.::

Figure 3-39 DTM functions: Diagnostics

#### **Device list**

The list of DTM-comptatible devices connected to a communication DTM or gateway DTM is displayed and can be modified, if required (e.g., entry of FDT identifier).

evice List - ILC 150 ETH					•
ILC 150 ETH					
Phoenix Contact				12	
01/2.00 / 2006-11-27					
FDT Identifier:	System Number	Segment Number:	Position Nu 🗠	Device Name:	System Identifier:
<ul> <li>IB IL IFS-MA ID 221 PD 448 - 01</li> </ul>	1	0	1	IB IL IFS-MA ID 221 PD 448	ce27d711.e7bd-4
IB IL AI 2-HART-PAC - 01	1	0	2	IB IL AI 2-HART-PAC	8cdecfe8-70c3-4a

Figure 3-40 DTM functions: Controller device list

#### 3.11.3 DTM functions of devices

• To use the DTM functions of the devices used, connect the relevant device.



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#### DTM functions of devices - Refer to user documentation

The order of the functions displayed in the context menu is not the same as the order in which they are processed.

For the execution of the relevant function, please refer to the device-specific user documentation.

## 4 Sequence for creating a project

This section describes the general procedure for creating a project.

The aim of this section is to provide an overview of the various options available for achieving a particular objective and to explain some points in detail that are only referred to briefly in later sections.

**The aim is not** to create a comprehensive project or to have an operational project at the end of the section. If you create a project using the description in this section, please note that you must adapt the explanations for your project.

If you have little or no experience in creating projects, please proceed as described in Sections 5, 6 or 7. Each of these sections provides a brief description of a specific project creation. The various sections focus on the following topics:

- Section 5, "Example project for an INTERBUS system"
- Section 6, "Example project for a system consisting of PROFINET IO and INTERBUS"
- Section 7, "Example project for a simulation with processor type "IPC" controllers"

The sections are labeled. The symbol next to the heading indicates the applicable versions:



SIM

INTERBUS project



Simulation project

7127\_en\_03





4.2

## Creating a new project

• Select the "New Project..." command from the "File" menu to create a new project using a template.

The tree structure and the selection of the controller are now prepared.

- Select the controller.
  - For some controllers there are several templates depending on the hardware and firmware version of the controller used.
- Confirm your selection with "OK".



Figure 4-2 Project templates (here: "ILC 390 PN 2TX-IB Rev. > 01/4.6F/3.00")

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"List" view has been selected in Figure 4-2. The view can be switched via the icons.

The ">" character in the selection stands for "later than" and not "greater than" in a mathematical sense. The specified version is the first supported version.

Select the "File, Save Project As / Zip Project As..." command.

Save/Zip project as **?**× Save in: 🛅 Projects 🔽 🕝 🤌 📂 🔜-Example Ì My Recent Documents Desktop 1 My Documents 5 My Computer File <u>n</u>ame: Quickstart\_PN.mwt ~ <u>S</u>ave Mu Network Save as type: Project Files (\*.mwt) ~ Cancel Zip Options Zip <u>U</u>ser-Libraries Zip Frontend-Code Zip F<u>W</u>-Libraries Zip Pagelayouts

Enter a project name and save the project.

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Figure 4-3 "Save/Zip project as" window

## IB PN SIM

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# 4.3 Specifying project information

• Switch to the bus configuration workspace.

After creating a new project, the project information is displayed in the bus configuration workspace.

• Adapt the project information to your project.

Bus Structure 📮 🔺	3 E Devi	ce Details		🕂 🔻 🖾				
🖃 約 Quickstart_PN 🖉 🖉	Quickstart_PN \Project\							
🖬 🌆 ILC 390 PN 2TX-IB 192.168.0.2								
Resource		Project name	Value					
R STD_RES ILC390PN		Project name	Quickstart_PN					
PROFINET	B	Creator	pyx124					
📥 # INTERBUS 0 . 0		Computer name at project creation	PYRW70006					
	B	MULTIPROG version at project creation	5.35.0.199					
	B	PC WORX version at project creation	PC WORX 6.10.52					
	B	Creation date	2010-11-05T10:28:22+01:00					
	B	Last editor	pypm07					
j2		Computer name at last project backup	PYRAM0095-VM01					
: Device Catalog 🕴 🖡 🔺	3    🗅	MULTIPROG version at last project backup	5.35.0.199					
E Festo		PC WORX version at last project backup	PC WORX 6.10.56					
Phoenix Contact	B	Date of last project backup	2011-05-05T14:41:19+01:00					
	B	Domain Postfix						
	B	Template for DNS/PROFINET Device Name gen						
	B	First IP Address	192.168.0.2					
	B	Last IP-Address	192.168.0.254					
	B	Subnetmask	255.255.255.0					
		Default Gateway						
	B	Use DHCP	no					
AII		Project						



Project information after creating a new project

During project creation, PC WorX automatically assigns an IP address area for a **local network** (area from 192.168.0.2 to 192.168.0.254). If you would like to use another address area (e.g., a **global network**), adapt the start and end address on the project node (here: Quickstart\_PN) to your application.



Make sure that all the components are in the same subnetwork.

For information about the IP parameters to be used within your system, please contact your system administrator.

If the start address of the new address area to be entered is higher than the previous end address, please modify the end address first.

When inserting PROFINET IO controllers and PROFINET IO devices, PC WorX automatically assigns IP parameters that are within the specified area. If later on you manually assign IP parameters that are outside the defined area, they will not be accepted.

If you are using a default gateway:

 Assign the address for the default gateway under "Default Gateway" in the "Device Details" window.

This address must be within the specified IP address area. If the default gateway is entered at the start of the project, it will be used automatically for all subsequent PROFINET IO devices that are inserted (see also "Default Gateway" on page 4-11).

• Assign the name suffix for the PROFINET device name (here: quickstart.de) in the "Device Details" window under "Domain Postfix".

The following characters are permitted for the "Domain Postfix":

Lower case letters without umlauts a to z

As separator: Dot



PN

Upper case letters without umlauts are permitted, however, they will be converted to lower case letters internally. The entry is therefore not case-sensitive.

If the "Domain Postfix" is entered at the start of the project, it will be used automatically for all subsequent PROFINET IO devices that are **inserted** in the PROFINET device name (see also "DNS/PROFINET Device Name" on page 4-10).



If the PROFINET IO devices are **read in**, the PROFINET device name for the devices will also be read in. In this case, the "Domain Postfix" may differ. Adapt it accordingly.

	Project name	Value	
ß	Project name	Quickstart_PN	
ß	Creator	pyx124	
ß	Computer name at project creation	PYRW70006	
ß	MULTIPROG version at project creation	5.35.0.199	
ß	PC WORX version at project creation	PC WORX 6.10.52	
ß	Creation date	2010-11-05T10:28:22+01:00	
ß	Last editor	pypm07	
ß	Computer name at last project backup	PYRAM0095-VM01	
ß	MULTIPROG version at last project backup	5.35.0.199	
ß	PC WORX version at last project backup	PC WORX 6.10.56	
ß	Date of last project backup	2011-05-05T14:41:19+01:00	
ß	Domain Postfix 🤇	quickstart.de	
ß	Template for DNS/PROFINET Device Name gen		
ß	First IP Address	192.168.0.2	
ß	Last IP-Address	192.168.0.254	
ß	Subnetmask	255.255.255.0	
ß	Default Gateway		
ß	Use DHCP	no	



PN

## 4.4 Preparing the PC for communication

• In the "Extras, PROFINET Configuration..." menu in PC WorX, select the network card for your computer that is to be used for communication.

PROFINET	$\mathbf{X}$
Communication	
Ethernet Network Board	Please choose
DCP Timeout	Please choose Intel(R) WiFi Link 5300 AGN - SecuRemote Miniport
	Marvell rukon 355 5005 PCI-5 Lagable Enternet Controller - Securi emote m Generic Marvell Yukon 8858053 based Ethernet Controller - Securemote f Check Point Virtual Network Adapter For SecureClient - SecuRemote Minip

Figure 4-6 Selecting the network card

192.168.0.1, with subnet mask 255.255.255.0.

Make sure that your PC has been assigned IP parameters that can be used to communicate with the connected network.
 If, e.g., when using PROFINET, you are working with a local network that is set by default (192.168.0.2 to 192.168.0.254), the IP parameters for the PC must be

## IB PN SIM

## 4.5 Checking/modifying IP settings for the controller

The IP settings for the controller are made when the project is created.



#### NOTE: Changes to project information are not applied automatically

If any modifications are made to the project information that affect the IP settings for the controller, a warning is displayed. However, the modification is not implemented automatically. When a new project is created, the default settings are specified under the IP settings.

Adapt these settings, if necessary.



- Switch to the bus configuration workspace.
- Select the controller node.
- In the "Device Details" window, switch to the "IP Settings" tab.
- Check the IP settings and modify them, if necessary.

Bus Structure	🕂 🔻 🔀	🗄 Device Details 🛛 📮 🔻 🗖							
🖃 🍰 Quickstart_PN	~	ILC 390 PN 2TX-IB 192.168.0.2 \IP Settings\							
E ILC 390 PN 2TX-IB 192.168.0.2									
R Resource			Name		Value				
R STD_RES ILC390PN		D Ve	endor	P	hoenix Contact				
PROFINET		D De	esignation	I	.C 390 PN 2TX-IB				
🔄 📥 # INTERBUS 0 . 0		E FL	inctional description	I	line Controller for PROFINE	T IO Networks			
- 🛃 Unconnected		D De	evice type	P	LC				
		D De	evice family	I	.C3xx				
			der number	2	985314				
		B Re	evision	0	1/4.6F/3.00				
		🗅 🗅 St	ation Name						
		De De	evice Name						
		ВМ	odule Equipment ID						
		D DI	NS/PROFINET Device Name	il	:-390-pn1				
		ВМ	AC Address						
		D IP	Address	1	92.168.0.2				
		B SL	ıbnetmask	2	55.255.255.0				
		D De	efault Gateway						
	~	📕 🔫 IP Sel	tings 📕 Extended Settings	d Communicatio	n 🛛 🗓 CPU Service Editor	🖀 Bus interfaces	🖹 Dal < 🔸		
·	7 15	12							

Figure 4-7 IP settings

• If an IP address has still not been assigned, assign one according to "Assigning the IP address for the controller" on page 4-23.



The IP parameters that are assigned here for the controller are also implemented as the IP parameters for the communication path via TCP/IP.

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#### 4.6 Decision: Working online or offline

If your system is installed, you can work online. In this case, skip this section and proceed to Section 4.17, "Setting the communication path".

If your system is not installed or you wish to work offline, proceed as follows:

- For PROFINET, see Section 4.7, "Inserting PROFINET IO devices".
- For INTERBUS or Simulation, see Section 4.9, "Manually inserting INTERBUS devices".
- PN

#### 4.7 Inserting PROFINET IO devices

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Make sure you are in the bus configuration workspace.

Insert the PROFINET IO devices below the PROFINET IO controller node.

- If the device catalog is hidden, show it by selecting the "View, Device Catalog" menu.
- Open the "Phoenix Contact" device catalog.

For example, the specified folders contain the following PROFINET IO devices:

PROFINET IO device	Folder				
FL IL 24 BK-PN-PAC	FL - Gateway				
ILB PN 24 DI16 DIO16-2TX	ILB - I/O digital				
FL PN/IBS	New: FL - Gateway				

Select the first PROFINET IO device (here: FL IL 24 BK-PN-PAC).



- Hold down the left mouse button and move the first PROFINET IO device in the "Bus Structure" window to the right of the PROFINET IO controller icon until the "Insert in the lower level" icon appears (see page 3-11).
- Move all other PROFINET IO devices to below the preceding PROFINET IO device until the "Insert at the same level" icon appears (see page 3-11).

Figure 4-9 shows the bus configuration with inserted PROFINET IO devices.





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## 4.8 Checking/modifying the PROFINET settings for PROFINET IO devices

When **inserting** each PROFINET IO device, the PROFINET settings are assigned automatically according to the entries defined in the project information.

The PROFINET settings can be checked and modified via the "PROFINET Settings" tab.

- Make sure you are in the bus configuration workspace.
  - In the "Bus Structure" window, select the PROFINET IO device.
  - Under "Device Details", select the "PROFINET Settings" tab.
  - Check the PROFINET settings and modify them, if necessary.

Bus Structure	Evice Details	🖡 🔻 🖾
🖃 🏘 Quickstart_PN	il-ilb-dio3.quickstart.de 192.168.0.4 \PROFINET Settings\	
🖃 🌆 ILC 390 PN 2TX-IB 192.168.0.2		
R Resource	Name Value	
R STD_RES ILC390PN	Phoenix Contact	
PROFINET	VendorID 0x0080	
🗐 🖷 I-ilb-dio3.quickstart.de 192.168.0.4	Designation ILB PN 24 DI16 DI016-2TX	
0 @ILB PN 24 DI 16 DIO16-2TX	DeviceID 0x0004	
1 DIO16: ILB PN 24 DI 16 DIO16-2TX	Functional description     PROFINET IO - Inline Block Device With 16 Digit	
2 DI16: ILB PN 24 DI 16 DI016-21X	Device type I/O digital	
- T-II-DK2.quickstart.de 192.168.0.3	Device family ILB	
□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	C Order number 2878146	
	Revision 03/1.00	
	DNS/PROFINET Device Name il-ilb-dio3.quickstart.de	
	Station Name	
	Device Name	
	Module Equipment ID	
	P Address 192.168.0.4	_
	<b>Subnetmask</b> 255.255.255.0	_
	Default Gateway	
	Realtime class RT	
	Reduction ratio input 8 ms	
	Reduction ratio output 8 ms	
	Faulty telegrams until connection is aborted 24	
	Monitoring Time Inputs (ms) 192	
	Monitoring Time Outputs (ms) 192	
	Operation in case of configuration differences     no	
	Log connection state yes	
	Drive BF yes	
	🚹 🕒 Ersatzwertverhalten Eingänge 🛛 auf Null setzen	
	Verbindungsaufbau Anlauf yes	
	▶ Node ID 41	
	ROFINET Settings 🚟 PROFINET Stationnames 🧘 Bus interfaces 🗎 Data sheet	
j.		

Figure 4-10 PROFINET settings for the ILB PN 24 DI16 DIO16-2TX

The PROFINET settings comprise:

**DNS/PROFINET Device**This name is the unique identification for the PROFINET IO device in the network. It must<br/>be known to the PROFINET IO device before it can be used in the network.

PC WorX automatically ensures that each device is assigned a PROFINET device name that is unique throughout the entire project. The "Domain Postfix" that was set on the project node is attached to this name (here: quickstart.de).

The PROFINET device name can be freely modified.

The following characters are permitted for the PROFINET device name:

Lower case letters without umlauts	a to z
Numbers	0 to 9
Hyphen	-

If the naming conventions have not been observed, an error message is output in the "Message Window" and the name is rejected.



Upper case letters without umlauts are permitted, however, they will be converted to lower case letters internally. The entry is therefore not case-sensitive.

The procedure that makes the device name known to the PROFINET IO device is either called "assigning device names" or "device naming". This procedure is described under "Transferring PROFINET device names and IP settings to PROFINET IO devices" on page 4-35.

**IP Address** 



During operation, the device can be accessed via the IP address. PC WorX selects the address from the area that is set on the project node.

If the area for the IP addresses is later modified in the project node, you will also have to adapt the addresses of the PROFINET IO devices accordingly.

Specify the IP address according to "Transferring PROFINET device names and IP settings to PROFINET IO devices" on page 4-35.

The subnet mask that was specified on the project node is assigned to each PROFINET IO device as the default subnet mask. It can be modified specifically for each individual device.

If a default gateway is used, enter its IP address here. The default gateway specified on the

project node is automatically assigned to each PROFINET IO device.

Subnetmask

**Default Gateway** 



"IP Address", "Subnetmask", and "Default Gateway" represent the **IP parameters** for a device.

Reduction ratio input/ Reduction ratio output The time in which the inputs/outputs of the PROFINET IO device are updated. It can be set individually for each PROFINET IO device for both data directions.

The reduction ratio (update time) directly affects the number of PROFINET IO devices that can be operated via a PROFINET IO controller. The default setting displayed in PC WorX is the value that was stored in the FDCML file for the corresponding PROFINET IO device. If this setting exceeds the performance level of the PROFINET IO controller, a corresponding error message appears when translating the project. In this case, select a longer update time for certain devices.

 

 Monitoring Time
 The monitoring time can be set automatically by PC WorX according to the update times. The monitoring time specifies how long PROFINET IO devices may receive no valid PROFINET telegrams before substitute values are enabled at the outputs. This setting can affect the "noise immunity" of the network.

 Image: Note: Please note that excessively high settings can result in errors in the process as the PROFINET IO device "freezes" the last output value until the error is detected.



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## 4.9 Manually inserting INTERBUS devices

### 4.9.1 Manually inserting INTERBUS devices - General

If the bus configuration is not actually available yet or you wish to create the configuration offline, the bus configuration can be created manually.

- Select a point in the "Bus Structure" window where a device is to be inserted (e.g., INTERBUS node for the controller).
- In the device catalog, open the product range for the inserted device (e.g., IL for Inline) under "Phoenix Contact".
- Under the product range, open the product group (e.g., I/O analog).
- Select the device to be inserted (e.g., IB IL AO 1/SF).



Figure 4-11 Selecting the device

Hold down the mouse button and drag the selected device to the insertion point.
 Please refer to the information about the mouse pointer in "Icons in the "Bus Structure" window" on page 3-10.



Figure 4-12 Device inserted (here: IB IL AO 1/SF)

Insert all the other devices. ٠

Example 1: Simple bus configuration





Folders in the device catalog where the listed devices can be found:

RFC 430 ETH-IB	RFC4xx - PLC
IBS IL 24 BK-T/U	IL - Bus coupler
IB IL 24 D	IL - I/O digital
IB IL A	IL - I/O analog

#### Example bus configurations









Example 3: Bus configuration with bus coupler for connecting a remote bus branch

Figure 4-15 Bus configuration with branch terminals

Folders in the device catalog where the devices listed in Figure 4-14 and Figure 4-15 can be found:

ILC 350 ETH	ILC3xx - PLC
IBS IL 24 RB-T; IBS IL 24 RB-LK	IL - Bus coupler
IBS IL 24 BK RB-LK	IL - Bus coupler
IB IL 24 D	IL - I/O digital
IB IL A	IL - I/O analog
FLS IB M12 DIO 8/8	FLS - I/O digital
ILB IB 24 DI 32	ILB - I/O digital
IBS ST 24 BK-LK	ST - Bus coupler
IBS ST 24 D	ST - I/O digital

#### 4.9.2 Inserting INTERBUS devices below an INTERBUS proxy

 Insert the required INTERBUS devices from the device catalog at the "INTERBUS" node of the INTERBUS proxy (e.g., FL PN/IBS).



Figure 4-16 FLM modules inserted below an INTERBUS proxy

PN

PN

# 4.9.3 Inserting Inline terminals below a PROFINET IO bus coupler

• Insert the required Inline terminals from the device catalog at the "Inline" node of the PROFINET IO bus coupler (e.g., FL IL 24 BK-PN-PAC).



Figure 4-17 Inline terminals inserted below a PROFINET IO bus coupler

PN

### 4.9.4 INTERBUS devices below the PROFINET IO controller

Manually insert the PROFINET IO modules connected to the INTERBUS controller in the same way as described above.

 Insert the required INTERBUS modules from the device catalog at the "INTERBUS" node of the PROFINET IO controller (e.g., ILC 390 PN 2TX-IB).



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## 4.10 Compiling after completing the bus topology

At this point you can compile your project in order to detect any errors that may have occurred.

**Compiling a project** 

When compiling a project for the first time, select the "Rebuild Project" command from the "Build" menu. For subsequent compiling processes, the "Make" command in the "Build" menu can also be used (see also "Compiling (additional information)" on page 4-16).

<u>M</u> ake	F9
<u>P</u> atch POU	ALT+F9
Compile <u>W</u> orksheet	UMSCHALT+F9
<u>R</u> ebuild Project	STRG+F9
<u>S</u> top Compile	
Go to Next Error	STRG+F12
Go to Pre <u>v</u> ious Error	UMSCHALT+F12
Build Cross References	F12
Remove unused variables	and FB instances

Figure 4-18 Compiling a project

 If errors occur when compiling, remove the errors and repeat the compiling process until it is completed successfully. Error messages must be removed. Warning messages do not have to be removed.

If you are compiling the project but have not yet programmed anything, you will receive the "Empty worksheet" warning message. This warning message does not affect the next step and can be ignored.

The results of the compiling process are displayed in the "Message Window" together with details of the number of errors and warnings.

#### Sending a project: Special notes for PROFINET

When translating the controller project, the PROFINET IO configuration is generated automatically. This is also displayed in the "Message Window".

#### **Compiling (additional information)**

There are two options for compiling:

- 1 "Build, Make"
- 2 "Build, Rebuild Project"

**Rebuild Project** Use this command to compile an **entire** project for the first time or after modifying a user library.

"Rebuild Project" compiles and links all worksheets. Errors and warnings that are discovered by the compiler are logged in the "Message Window". After the syntax has been checked successfully, the system automatically generates the IEC code and the special PLC code. Finally, the project can be sent to the PLC.

The "Rebuild Project" command should only be used if errors occurred when compiling with "Make" or your project was unpacked without frontend.

Make

Both

The "Make" command is the standard mode for compiling. Use this command after editing and completing your project.

When the "Make" menu item is executed, all **modified** worksheets are compiled/linked and the modified PLC code is generated.

This command can be executed from the menu bar via "Build, Make", with the "Make" icon in the toolbar or using the shortcut <F9>.

Modified worksheets in the project tree are identified by an asterisk that appears after the worksheet name.

After the compiler has been started, the "Message Window" appears automatically if it was closed before. This window shows the steps the compiler is currently performing. In addition, errors, warnings, and additional information about the process are logged here.

Once the compiling process has been completed successfully, i.e., no errors have been reported, the modified project can be sent to the PLC.



## 4.11 Creating the program

Create the program.

To program the example program, proceed as described in "Example program" on page 8-1.



It is now assumed that you have created the program. If you skip this point, this may result in deviations.



## 4.12 Compiling after creating the program

At this point you can compile your project in order to detect any errors that may have occurred.



Select the "Build, Make" command.



## 4.13 Generating variables and assigning process data

This section provides a general description for generating variables and assigning process data. Process data assignment for the example bus configuration is explained in later sections.



#### 4.13.1 Generating variables

Usually, variables are either generated during **program creation** or they are created individually. If all the previous steps for creating a project including programming have been performed, variables will have been created.

Variables can also be **generated automatically** for the process data of all devices (PROFINET IO and INTERBUS). The variable names are assigned automatically according to the following pattern:

<I or Q>\_<PROFINET device name>\_<IBS segment>\_<IBS position>\_<PD name>

Key:

I or Q I = Input; Q = Output

IBS INTERBUS

PD name Name of the process data item

For direct inputs/outputs or PROFINET IO status data, no INTERBUS data is required.

To generate variables, proceed as follows:



- Switch to the process data assignment workspace.
- Select the controller in the top right window. The standard configuration is displayed in the top left window, "Symbols/Variables".
- In the top left window, select the resource or program (in Figure 4-19: resource "STD\_RES: ILC390PN").



Please note the following:

- If the resource has been selected, global variables are generated/displayed that can be used in all POUs of the project (VAR\_GLOBAL).
- If the program (POU) has been selected, global variables are generated/displayed that can be used in all POUs of the project (VAR\_GLOBAL\_PG).

(POU = Program Organization Unit; see online help for PC WorX or IEC 61131-3)

- In the top right window, select the device for which you would like to link the process data to variables (e.g., IB IL AO 1/SF in Figure 4-21).
- Select the process data item for which you would like to generate a variable (~AO 16 in Figure 4-19).
- In the context menu for the process data item, select the "Create Variable" menu item.

Symbols/Variables  StD_CNF : ARM_L_40  StD_CNF : ARM_L_40  StD_RES : ILC390PN  B Default  System Variables  System Variables  System Variables  D STD_TSK : DEFAULT  D Main : Main  D Default				Quickstart     C	N PN 2TX-IB 192,168.0.2 Jurce STD_RES ILC390PN FINET HII-bk12.quickstart.de 192 HIIb-di013 quickstart.de 19 I-pn-ibs14.quickstart.de 19 RBUS 0.0 IB IL AO 1/SF 0.1 scted	.168.0.4 2.168.0. 92.168.0	3 .5				7 🛛
Symbol/Vari	Data Type	Process Data Item		Device	Process Data Item	I/Q	Data Type	Byte.Bit	Address	Symbol/Variable	
Q_0_1_AO_16	WORD	IB IL AO 1/SF 0 . 1	\~AO 16	IB IL AO 1/SF 0 . 1	1.1.1 Output voltage	Q	WORD	0.0			
				IBILAO 1/SE0.1	2.1.1 Output current	Q	WORD	0.0			
				IB IL AO 1/SF 0 . 1	~AO 16	ŏ	WORD	0.0		STD CNF STD RES \ O 0	1 AO 16
<			>	<							>

Figure 4-19 Variable generated for process data item "~AO 16"

Figure 4-20 shows examples of automatically generated variables.

Symbol/Variable	Data	Process Data Item
I_FL_PN_IB54_1_2_I3	BOOL	3 FLM DI 8 M12 \ I3
Q_FL_PN_IB54_1_3_01	BOOL	4 FLM DIO 4/4 M12-2A \01
I_IL_ILB_DIO3_DI32	DWORD	ILB PN 24 DI16 DIC16-2TX \~DI32
I_FL_PN_IBS4_PNIO_DATA_VALID	BOOL	FL PN/IBS \ PNIO_DATA_VALID
<		>

Figure 4-20 Examples of generated variables



#### 4.13.2 Assigning process data

Process data and control variables are assigned in the process data assignment workspace.

The assignment is seamless for INTERBUS and PROFINET IO.



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Please note the following:

- If the resource has been selected, global variables are generated/displayed that can be used in all POUs of the project (VAR\_GLOBAL).
- If the program (POU) has been selected, global variables are generated/displayed that can be used in all POUs of the project (VAR\_GLOBAL\_PG).

(POU = Program Organization Unit; see online help for PC WorX or IEC 61131-3)



#### EasySim simulation

Only the states of the global variables that have been linked to a physical address (inputs/outputs) as part of process data assignment are displayed in the simulation.

- Switch to the process data assignment workspace to assign the variables to the process data.
  - Select the controller in the top right window. The standard configuration is then displayed in the top left window, "Symbols/Variables".
  - In the top left window, "Symbols/Variables", select the standard resource (STD\_RES RFC450ET in Figure 4-21).
  - In the top right window, select the device for which you would like to link the process data to variables (e.g., IB IL 24 DO 8 in Figure 4-21).
  - Select the process data item to be linked (1.1.1 in Figure 4-21).

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Please note that the variables shown in Figure 4-21 had to be created in the IEC programming workspace first before they could appear under "Symbols/Variables" in the process data assignment workspace.

Using drag & drop, link the selected variable to one of the variables on the left-hand side (OUT1 in Figure 4-21).

In the bottom left window, the assignment between variables and process data is displayed.

Symbols/Variables         ■ 参 SIM           ■ ★ STD_CNF : IPC_40         ■ ↓ RFC 450 ETH-IB 192.168.0.2           ■ ★ STD_RES : RFC450ET         ■ R Resource           ■ ★ STD_RES : RFC450ET         ■ R STD_RES RFC450ET	
Image: Default       Image: Default         Image: Default       Image: De	
Symbol/Variable         Data         Process Data Item         Device         Process Data Item         I/Q         Data Type         Byte.Bit         Address         Symbol/Variable         Function Text         Pro	ort
VO WORD IB IL 24 DO 81 . 2 1.1.1 Q BOOL 0.0 STD_CNF STD_RES \ OUT1 1.1	1
51 BOOL IB IL 24 DO 81.2 1.2.1 Q BOOL 0.1 2.1	1
T2 TIME IB IL 24 DO 81.2 2.1.1 Q BOOL 0.2 1,1	1
IN2 BOOL IB IL 24 DO 81.2 2.2.1 Q BOOL 0.3 2.1	1
IN3 BOOL IB IL 24 DO 81.2 3.1.1 Q BOOL 0.4 1.1	1
OUT2 BOOL IB IL 24 DO 81 . 2 3.2.1 Q BOOL 0.5 2.1	1
OUT1 BOOL IB IL 24 DO 81.2 \1.1.1 IB IL 24 DO 81.2 \4.1.1 Q BOOL 0.6 1.1	1
IB IL 24 DO 81.2 4.2.1 Q BOOL 0.7 2.1	1
IB IL 24 D0 81.2 ~D0 8 Q BYTE 0.0	

Figure 4-21 Process data item 1.1.1 assigned to variable OUT1

Repeat this procedure for all inputs to be evaluated and for all outputs to be controlled.

Please note for a PROFINET IO device with inputs and outputs that this is represented with





Figure 4-22 Representation of a PROFINET IO device with its modules

In this case, select the module where the required inputs or outputs are located.



Figure 4-23 Assigning process data for a PROFINET IO device

The result of the process data assignment process is shown in the figure below.



Figure 4-24 All used process data assigned to variables

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System variables (e.g., ONBOARD\_INPUT\_BIT10) are not displayed in this process data view.

# 4.14 Setting the communication path: EasySim simulation



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At present, this function is only available for processor type "IPC" controllers (RFC 4xx and S-MAX 4xx).

Select the EasySim simulation with this function. The simulation can be used to create a bus and develop and test a program without the hardware having to be available.



For more detailed information about the EasySim simulation, please refer to the online help for PC WorX.



• Switch to the bus configuration workspace to set the simulation (select the communication path).

- In the "Bus Structure" window, select the node for the controller.
- Select the "Communication" tab in the "Device Details" window.
- Select the "Simulation" interface type/communication path.
- Click on "Apply" to activate the simulation.



Figure 4-25 "Simulation" communication path

After setting the simulation, the project must be compiled and then written to the memory area of the simulated controller. Please refer to "Compiling and sending a project, and performing a cold restart" on page 4-40.

## IB PN

## 4.15 Switching to working with the system (online)

Apart from during simulation, the following work can only be carried out if a system has been installed and a connection has been established between your PC with PC WorX and the controller.



## 4.16 Assigning the IP address for the controller

An IP address must first be assigned to a controller that communicates via Ethernet in order to enable communication.

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For some controllers (e.g., RFC 430 ETH-IB), the IP address can only be set via the diagnostic display or a special firmware service (see user manual for the controller).

For a number of controllers (e.g., ILC 350 ..., ILC 370 ...) BootP is activated by default upon delivery for assigning the IP address via Ethernet. In this case, when setting the IP address for the first time a BootP server can be used.

However, the first IP address can also be set manually using the PC WorX software via the serial interface. The IP address can be changed later via the serial connection or Ethernet using the PC WorX software. Address assignment using PC WorX is described below.



After assigning the IP parameters, PC WorX automatically sets the connection via TCP/IP as the communication path to the controller.

## 4.16.1 Address assignment via the PC WorX BootP server

- Establish an Ethernet connection between your PC and the controller.
- In the menu bar, select the

"Extras, BootP/SNMP/TFTP-Configuration ..." menu.



Figure 4-26 Extras, BootP/SNMP/TFTP-Configuration ...

Activate the "BootP Server active" checkbox.

- Switch to the bus configuration workspace.
  - Select the controller node (e.g., "ILC 390 PN 2TX-IB").
  - Select the "IP Settings" tab in the "Device Details" window.
  - Enter the MAC address of the controller. This can be found on a label on the device. It starts with "00.A0.45.".

Bus Structure 📮 🔻 🖬	📔 Device Details 🛛 📮 🔻				
🖃 🏄 UNTITLED	LC 390 PN 2TX-IB 192.168.0.2 \IP Settings\				
E ILC 390 PN 2TX-IB 192.168.0.2					
Resource		Name	Value		
R STD_RES ILC390PN		Vendor	Phoenix Contact		
PROFINET	Designation		ILC 390 PN 2TX-IB		
A INTERBUS 0 . 0		Functional description	Inline Controller for PROFINET IO Networks		
		Device type	PLC		
		Device family	ILC3xx		
		Order number	2985314		
		Revision	01/4.6F/3.50		
	Station Name     Device Name				
		Module Equipment ID			
		DNS/PROFINET Device Name	ilc-390-pn1		
		MAC Address	00-A0-45-26-3E-74		
		IP Address	192.168.0.2		
		Subnetmask	255.255.255.0		
		Default Gateway			
IP Settings 📴 Extended Settings 🏼 🏕 Communication 🗒 🔢 CPU Service Editor 🛛 🦨 Bus interfaces 📄 Data sher					

Figure 4-27 Entering the MAC address

• Reset the controller.

The controller is temporarily assigned the IP address which is specified in the project for the controller.

• Select the "Extended Settings" tab in the "Device Details" window.

The specified IP parameters are displayed under "Manual definition of the TCP/IP settings".

: Device Details		<b>₽ ▼</b> 🛛
ILC 390 PN 2TX-IB 192.168.0.2 \Extended 1	Settings\	
IO device status SNMP agent PROFINET Device	Manual definition of the TCP/IP settings IP Address:  192 . 168 . 0 . 2	
INTERBUS slave	Subnet Mask: 255 , 255 , 255 , 0	
	Gateway Address:	
	Usage of a BootP Server	Send
	- DNS/PROFINET Device Name ilc-390-pn1	Send

Figure 4-28 IP address of the PROFINET IO controller

· Confirm the displayed IP parameters or your modifications via "Send".

The IP address is now permanently stored on the controller memory card.
#### 4.16.2 Address assignment with PC WorX via the serial interface



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If the IP parameters were assigned using the BootP server, this section can be skipped.

- Establish a serial connection between your PC and the controller.
- Switch to the bus configuration workspace.
- Select the controller node (e.g., "ILC 390 PN 2TX-IB").
- Select the "Communication" tab in the "Device Details" window.
- Set the communication path (here: serial interface COM1).
- Click on "Test" to check the specified communication path. The communication path has been tested successfully if a green status indicator appears in the window. If a red status indicator appears, check the communication path and change it, if necessary.
- If the PROFINET IO controller had an IP address, the IP address of the PROFINET IO controller read via the serial connection is displayed under "Extended Settings".

E Device Details ILC 390 PN 2TX-IB 192,168,0,2 \Extended S	iettings\	<b>‡ ▼ ⊠</b>
Network Settings Ethernet IO device status SIMP agent PROFINET Device INTERBUS slave	Network Settings  Manual definition of the TCP/IP settings IP Address:  192 . 168 . 0 . 2  Subnet Mask:  255 . 255 . 255 . 0  Gateway Address:	
	Usage of a BootP Server	Send
	DNS/PROFINET Device Name	Send

Figure 4-29 Read IP address of the PROFINET IO controller

- If you would like to change the network settings, specify the new settings.
- Confirm the display or your entry with "Send".
- In the "Settings Communication Path" dialog box that opens, set serial interface COM1 and confirm your setting with "OK".
- Reset the controller in the "Activate Network Settings" area via "Reset Control System".

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The controller needs some time before it is ready to operate again. It indicates that it is ready via the RUN LED that is either permanently on or flashing cyclically.



## 4.17 Setting the communication path

For a controller that supports Ethernet (e.g., ILC 3xx ETH, ILC 350 PN, ILC 390 PN 2TX-IB, RFC 4xx), the communication path is automatically set to "Ethernet" by default with the IP parameters of the controller specified under "IP Settings". If you would like to send your project to the controller via this Ethernet connection, the communication path does not have to be set.

Since both the INTERBUS and PROFINET project have been created using the example of an ILC 390 PN 2TX-IB, the communication path setting displayed applies to this controller.



 Switch to the bus configuration workspace to set the communication path between the programming PC with PC WorX and the controller.

- In the "Bus Structure" window, select the controller node.
- Select the "Communication" tab in the "Device Details" window.
- Select the communication path to the controller.



Figure 4-30 Setting the communication path

 Depending on the communication path, proceed as described in Section 4.17.1, "Communication via the serial interface" or Section 4.17.2, "Communication via Ethernet".



BootP is activated by default upon delivery for assigning IP parameters with an Inline Controller via Ethernet.

If you would like to change this setting, select the serial interface as the communication path and specify the IP parameters in the "Extended Settings" dialog box. This setting is activated following a controller reset.

#### 4.17.1 Communication via the serial interface

The controller must be connected to the programming PC via the connecting cable.



IB PN

#### Ordering data:

Connecting cable for connecting the controller to a PC (V.24 (RS-232)) for PC WorX, 3 m in length (order designation: PRG CAB MINI DIN, Order No. 2730611).

- In the "Device Details" window, select the "Serial Port" interface type in the "Communication" tab.
- Select the interface (e.g., COM1).
- Click on "Test" to check the specified communication path. The communication path has been tested successfully if a green status indicator appears in the window. If a red status indicator appears, check the communication path and change it, if necessary.
- Save your settings in the project via "Apply".

Device Details ILC 390 PN 2TX-IB 192.168.0.2 \Communication\	‡ ▼ 🖸
Communication Path  Communication Path  Serial Interface  User-defined  Station Name	⊙ physical O emulate Serial Port: COM1 ✓
Resource:	STD_RES
Test A	pply Help
🛛 🔫 IP Settings 🛛 🛃 Extended Settings 🛛 🔏 Comm	unication 📲 CPU Service Editor 🗣 Bus interf < 🕨

Figure 4-31 "Serial interface" communication path



#### **Communication via Ethernet** 4.17.2

A physical Ethernet connection to the controller is required for communication via Ethernet.

Furthermore, the IP address must also be set in the controller.

- In the "Device Details" window, select the "Ethernet" interface type in the "Communication" tab.
- Enter the IP address set in the Inline Controller in the "IP Address" field or select it from the menu.

Device Details     ILC 390 PN 2TX-IB 192.168.0.2 \Communication\	L 🔺 🗖
Interface Type Connection Name Manual Input Communication Path Communi	
Resource: STD_RES	
Test Apply Help	
🔫 IP Settings 🛛 🛃 Extended Settings 🛛 🔏 Communication 📲 CPU Service Editor 🗋 🦨 Bus interfaces	< >
Figure 4-32 "Ethernet" communication nath	

⊢igure 4-32 'Ethernet" communication path

Click on "Test" to check the specified communication path and therefore the IP address entered.

The communication path has been tested successfully if a green status indicator appears in the window. If a red status indicator appears, check the communication path and settings and change them, if necessary.

If a red status indicator appears, an IP address may not have been assigned or the IP address needs to be changed. To assign and change the TCP/IP settings, please proceed as described in "Assigning the IP address for the controller" on page 4-23 (general), "Assigning the IP address for the controller" on page 5-5 (for INTERBUS) or "Assigning the IP address for the PROFINET IOcontroller" on page 6-7 (for PROFINET).

Click on "Apply" to save your settings in the project.

**NOTE:** The Inline Controller can be accessed via a network using the Ethernet interface and the TCP/IP protocol. Please note that with all networked devices/computers, there is a risk that third parties may access the Inline Controller or the PC WorX computer and make changes, either intentionally or unintentionally. Prevent unauthorized access to the Inline Controller and your PC.

## 4.18 Reading in and importing PROFINET IO devices

If you have inserted the PROFINET IO devices manually, skip this section.

#### 4.18.1 Reading in PROFINET IO devices

- Make sure you are in the bus configuration workspace.
- In the "Bus Structure" window, select the PROFINET node.
- Open the context menu and select the "Read PROFINET..." menu item.

🥠 UNTITLED	-IB 192.168.0.2	
😑 Ŗ Resource		
R STD_RE	S ILC390PN	
	Exchange Data	
-	Copy Device	Ctrl+C
	Copy with Subdevices	Ctrl+T
	Cut	Ctrl+X
	Paste as Child	Ctrl+B
	Paste as Sibling	Ctrl+V
	Replace	
	Blind out Device	Ctrl+Shift+D
	Deactivate Bus	
	Delete	Delete
	Edit Device Representation	Ctrl+E
	Print Bus	
	Refresh View	F5

Figure 4-33 Reading in PROFINET

All the connected PROFINET IO devices are displayed. When reading in, the device name and the IP parameters are imported for each device - if present.

Select the devices that are to be included in your project.

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If your PROFINET IO controller already contains a project, a different name can be specified for the controller in the "Read PROFINET" window from the one assigned in the current project. If you are sure you are communicating with the right controller this will not have any adverse effects. The PROFINET IO devices displayed are connected to the controller - regardless of its name. The current name is also transmitted when the current project is sent to the controller.

elected FRUFINE FIU CONT	oller			
Name: ilc-390-n	n1	IF	Address: 192.1	68.0.2
Device Type: ILC 390	PN 2TX-IB	Sub	net Mask: 255.2	55.255.0
		Default	Gateway:	
vailable on Network				
Name	Туре	MAC Address	IP Address	Subnet Mask
fl-switch-mcs-16tx	[IOD]: FL SWITCH MCS 16TX	00:A0:45:05:F0:A4	192.168.0.6	255.255.255.0
ilc-390-pn1	[IOD/IOC]: ILC 390 PN 2TX-IB	00:A0:45:26:3E:74	192.168.0.2	255.255.255.0
il-ilb-dio2	[IOD]: ILB PN 24 DI16 DI016-2TX	00:A0:45:02:FB:15	192.168.0.3	255.255.255.0
il-pn-bk19	[IOD]: IL PN BK DI8 DO4 2TX	00:A0:45:04:50:C8	192.168.0.7	255.255.255.0
Filter: 🗌 unnamed	not in Project			
Filter: 🗌 unnamed	not in Project			
Filter: unnamed	🗌 not in Project	Inset		Refresh
Filter: unnamed	not in Project	Insert		Refresh

PROFINET device names and IP addresses are already present

Name: ilc-390-pn1 Device Type: ILC 390 PN 2TX-IB		IF Sub Default	PAddress: 192.1 net Mask: 255.2 Gateway:	68.0.2 55.255.0
ailable on Network			=	
Name	Туре	MAC Address	IP Address	Subnet Mask
fl-switch-mcs-16tx	[IOD]: FL SWITCH MCS 16TX	00:A0:45:05:F0:A4	192.168.0.6	255.255.255.0
	[IOD/IOC]: ILC 390 PN 2TX-IB	00:A0:45:26:3E:74	0.0.0.0	0.0.00
	[IOD]: ILB PN 24 DI16 DI016-2TX	00:A0:45:02:FB:15	0.0.0.0	0.0.0.0
	[IOD]: IL PN BK DI8 DO4 2TX	00:A0:45:04:50:C8	0.0.0.0	0.0.0.0
lter: 🗌 unnamed	[IOD]: IL PN BK DI8 D04 2TX	00:A0:45:04:50:C8	0.0.0	0.0.0.0
ter: unnamed	[IOD]: IL PN BK DI8 D04 2TX	00:A0:45:04:50:C8	0.0.0	Refresh
ter: unnamed	[IOD]: IL PN BK DI8 D04 2TX	00:A0:45:04:50:C8	0.0.0	0.0.0 Refresh

#### 4.18.2 Importing PROFINET IO devices into the project

• Click on "Insert" to include the selected PROFINET IO devices in your project.

# 4.18.3 Naming PROFINET IO devices without a PROFINET device name

If a PROFINET device name does not yet exist for a device, a name should be assigned at this point.

Insert PROFINET Device	X
Selected Device	
PROFINET Device Name: fl-pn-ibs4.quickstart.de	1
Device Type: FL PN/IBS MAC-Adresse: 00:A0:45:05:09:34	
Name Device	
PROFINET device will be added to the project with the name and IP parameters specified!	
Flashing On OK Cancel	

Figure 4-36 Naming a device

- Activate the "Name Device" checkbox.
- Check the displayed PROFINET device name (see also "DNS/PROFINET Device Name" on page 4-10).
- Assign the name to the relevant device.
- Confirm the display or your entry with "OK".

If you do not wish to assign a name at this point, deactivate the "Name Device" checkbox. A name will have to be assigned later to the relevant device (here: FL PN/IBS).

Device Type. 160 000	PN 2TX-IB	Sub	net Mask: 255.2	68.0.2 55.255.0
		Default	Gateway:	
ailable on Network				
Name	Туре	MAC Address	IP Address	Subnet Mask
fl-switch-mcs-16tx	[IOD]: FL SWITCH MCS 16TX	00:A0:45:05:F0:A4	192.168.0.6	255.255.255.0
ilc-390-pn1	[IOD/IOC]: ILC 390 PN 2TX-IB	00:A0:45:26:3E:74	192.168.0.2	255.255.255.0
il-ilb-dio2	[IOD]: ILB PN 24 DI16 DI016-2TX	00:A0:45:02:FB:15	192.168.0.3	255.255.255.0
lter: 🔲 unnamed	not in Project			
Iter: unnamed	not in Project	Inser		Refresh

Figure 4-37 Devices named

• Click "Close" to close the "Read PROFINET" dialog box.

#### 4.18.4 Bus configuration with read in PROFINET IO devices



The PROFINET structure is displayed in the "Bus Structure" window.

The settings can also be checked in the "Read PROFINET" window. All PROFINET IO devices should now have a PROFINET device name. The IP parameters are assigned later.

#### 4.18.5 Subsequent naming of a PROFINET IO device

If a device is displayed in the list without a device name, assign the PROFINET device name to this device.

- Select the device in the bus configuration.
- In the "Device Details" window, switch to the "PROFINET Stationnames" tab.
- Select the device with no name.

: Bus Structure 📮 🔻 🖪 📔	: Device Details				4 🔻 🖾
🖃 🎒 Quickstart_PN	il-pn-bk12.quickstart.de 192.168.0.	4 \PROFINET Stationnames\			
LC 390 PN 2TX-IB 192.168.0.2	Selected Device				
R STD_RES ILC390PN	Name: il-pn-bk12	.quickstart.de	1	P Address: 192.1	168.0.4
■ ₩ PROFINET     ■ □ □ □ □□□□□□□□□□□□□□□□□□□□□□□□□□	Device Type: IL PN BK	DI8 DO4 2TX	Sut Defaul	onet Mask: 255.; t Gateway:	255.255.0
- P 2 DI16: ILB PN 24 DI 16 DI016-21X	Available on Network				
0 @IL PN BK DI8 DO4 2TX	Name	Туре	MAC Address	IP Address	Subnet Mask
IL INLINE 0.0	il-ilb-dio6.quickstart.de	IO-Dev.: ILB PN 24 DI16 DI016-2TX	00:A0:45:04:04:34	0.0.0.0	0.0.0.0
😑 🇊 fl-pn-ibs49.quickstart.de 192.168.0.5		IO-Dev.: FL IL 24 BK-PN-PAC	00:A0:45:05:2A:3F	0.0.0.0	0.0.0
	fl-pn-ibs4.quickstart.de	IO-Dev.: FL PN/IBS	00:A0:45:05:09 34	0.0.0.0	0.0.0
	Filter: unnamed	not in Project	E	]same Type	
	Flashing On	Assign Name Delete Name	e Assign		Refresh
		3 PROFINET devices reacha	ble on the network!		
					Help
	ROFINET Settings	vice parameters 🚟 PROFINET Station	names 🛛 🧘 Bus interf	aces 📄 Data	sheet

Figure 4-39 Assigning the PROFINET device name

• Click on "Assign Name".

The updated list contains the PROFINET IO devices together with their PROFINET device names.

Name	Туре	MAC Address	IP Address	Subnet Mask
il-ilb-dio6 fl-switch-mcs-16tx5 fl-il-bk4 fl-pn-ibs3	IO-Dev.: ILB PN 24 DI16 DI016-2TX IO-Dev.: FL SWITCH MCS 16TX IO-Dev.: FL IL 24 BK-PN-PAC IO-Dev.: FL PN/IBS	00:A0:45:04:04:34 00:A0:45:02:9D:21 00:A0:45:05:2A:3F 00:A0:45:05:09:34	0.0.00 192.168.0.6 0.0.0 0.0.0 0.0.0	0.0.0.0 255.255.255.0 0.0.0.0 0.0.0.0
Filter: 🔲 unnamed	not in Project			

Figure 4-40 Example: All devices with PROFINET device names

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## 4.19 Checking/modifying the PROFINET settings for PROFINET IO devices

If you have made the PROFINET settings for the PROFINET IO devices offline after inserting the PROFINET IO devices, skip this section.

When **reading in**, the PROFINET settings of the relevant PROFINET IO devices are imported with default values. Check these settings and modify them, if necessary.

- Make sure you are in the bus configuration workspace.
- In the "Bus Structure" window, select the PROFINET IO device.
- Under "Device Details", select the "PROFINET Settings" tab.
- Check the PROFINET settings and modify them, if necessary.

Bus Structure 📮 🔻 🛛	E Device Details	÷ 🛪 🖬
🖃 🌆 Quickstart_PN	il-ilb-dio3.quickstart.de 192.168.0.4 \PROFINET Settings\	
🚊 🌆 ILC 390 PN 2TX-IB 192.168.0.2		
Resource	Name	Value
R STD_RES ILC390PN	🗅 Vendor	Phoenix Contact
PROFINET	VendorID VendorID	0x00B0
🗀 🏣 il-ilb-dio3.quickstart.de 192.168.0.4	Designation	ILB PN 24 DI16 DI016-2TX
0 @ILB PN 24 DI 16 DIO16-2TX	DeviceID	0x0004
1 DIO16: ILB PN 24 DI 16 DIO16-2TX	Functional description	PROFINET IO - Inline Block Device With 16 Digit
2 DI16: ILB PN 24 DI 16 DI016-21X	Device type	I/O digital
- T-II-DK2.quickstart.de 192.168.U.3	Device family	ILB
□ I # Inine: 0.0	Crder number	2878146
# TNTEPRIS-0_0	Revision	03/1.00
	DNS/PROFINET Device Name	il-ilb-dio3.quickstart.de
	Station Name	
	Device Name	
	Module Equipment ID	
	IP Address	192.168.0.4
	🗅 Subnetmask	255.255.255.0
	Default Gateway	
	Realtime class	RT
	Reduction ratio input	8 ms
	Reduction ratio output	8 ms
	Faulty telegrams until connection is aborted	24
	Monitoring Time Inputs (ms)	192
	Monitoring Time Outputs (ms)	192
	Operation in case of configuration differences	no
	Log connection state	yes
	Drive BF	yes
	Ersatzwertverhalten Eingänge	auf Null setzen
	Verbindungsaufbau Anlauf	yes
	Node ID	41
	ROFINET Settings III PROFINET Stationnames	🦨 Bus interfaces 📄 Data sheet
J		11

Figure 4-41 PROFINET settings for the ILB PN 24 DI16 DIO16-2TX

The individual setting options are described in "Checking/modifying the PROFINET settings for PROFINET IO devices" on page 4-10.

# 4.20 Transferring PROFINET device names and IP settings to PROFINET IO devices

Before a PROFINET IO device can be operated in a PROFINET IO network, the PROFINET device name and IP address configured in PC WorX must also be made known to the device itself.

- Make sure that the PROFINET IO controller can establish communication with the PROFINET IO devices.
- Compile the project, send it to the controller, and perform a cold restart. Proceed as described in "Compiling and sending a project, and performing a cold restart" on page 4-40.

During startup, the PROFINET controller automatically assigns the IP settings and device parameterizations specified in the project to the PROFINET IO devices.

• To check the assignment of device names and IP settings, select the "PROFINET Stationnames" tab in the "Device Details" window.

The updated list contains the PROFINET IO devices together with their PROFINET device names and the IP parameters.

Name	Туре	MAC Address	IP Address	Subnet Mask
fl-switch-mcs-16tx	[IOD]: FL SWITCH MCS 16TX	00:A0:45:05:F0:A4	192.168.0.6	255.255.255.
ilc-390-pn1	[IOD/IOC]: ILC 390 PN 2TX-IB	00:A0:45:26:3E:74	192.168.0.2	255.255.255.
il-ilb-dio2	[IOD]: ILB PN 24 DI16 DI016-2TX	00:A0:45:02:FB:15	192.168.0.3	255.255.255.
il-pn-bk12.quickstart.de	[IOD]: IL PN BK DI8 DO4 2TX	00:A0:45:04:50:C8	192.168.0.4	255.255.255.

Figure 4-42 All devices with PROFINET device names and IP addresses

When the tab is selected, the list is updated. If you would like to update the list again later, click on "Refresh".

In order to limit the search results, various options are available:

No constraints	All devices that are available in the network are listed.
Unnamed	All those devices that do not yet have a PROFINET device name are listed.
Not in project	All those devices that are not included in the project are listed.
Same type	Only those devices that are the same type as the device selected in the bus configuration are listed.

The BF LED is now off on all PROFINET IO devices. The PROFINET network is running.



For additional information about assigning PROFINET device names and IP addresses, please also refer to "Additional information" on page 6-15.



If you have inserted the INTERBUS devices manually, skip this section.

The bus configuration must actually be available and power must be supplied to the modules.

 Select the "Connected Bus" command from the "View" menu to read in the connected INTERBUS system.



Figure 4-43 "View, Connected Bus" command

Select the controller in the "Connected Bus" window.



For PROFINET, the PROFINET IO devices can also be selected as the controller (FL IL 24 BK-PN-PAC in Figure 4-44).



Figure 4-44 Selecting the controller

This activates the "online" operating state and the controller reads in the connected INTERBUS configuration.

Once the controller has read in the connected INTERBUS system, the INTERBUS devices must be imported into the project.

- Select the controller in the "Connected Bus" window.
- Open the context menu and select the "Import to Project, With Device Description" command.



Figure 4-45 "Connected Bus" window

The "Select Device" window that opens lists the modules whose device description corresponds to that of the connected devices.

	e		
A suitable entry for the following c	omponent could not l	pe found. Please select a device	which matches the searched one.
Nar	ne Digital local bus o	levice with Output	
		in the second second	
Ident Co	de 189		
	2		
Process Data Leng	th 4		
Device Type	Ident Code	Process Data Length	
LR PN IP 500 R 1.1KW Rev	189;190;190;189	4;8;4;2	
B IL 24 DO 4	189	4	
B IL 24 DO 4-2MBD	189	4	
B IL 24 DO 4-ME	189	4	
B IL 24/230 DOR 4/W	189	4	
B IL 24/230 DOR 4/W-2MBD	189	4	
1 U 04/000 DOD 44// DC	189	4	
5 IL 247230 DUH 47W-FC	199	4	
BIL 24/230 DOH 4/W-FC BIL DO 4 AC-1A	105		

Figure 4-46 "Select Device" window

- Select the device that is actually connected in the INTERBUS system, and repeat this step until all the devices are linked to their device description.
- Disconnect the link to the controller by selecting "Offline" under "Selected Control System" in the "Connected Bus" window.

nnected Bus	
Selected Control System:	
東 ILC 390 PN 2TX-IB (192.168.0.2)	🚽 Config <sup>+</sup> • PC WorX (
0/filine FL PN/BS (192.168.0.6) FL II. 24 BK-PN-PAC (192.168.0.7) ILC 390 PN 2TX-IB (192.168.0.2)	Key
	The following colors and characters indicate the result for the comparison of the physically connected bus configuration and the configured bus configuration:
	ID-Code and process data length of the devices are different.
	TD, Code and presses

Figure 4-47 "Connected Bus" window

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#### Please note for PROFINET:

The process for reading in INTERBUS modules that are connected to a PROFINET IO controller or a PROFINET IO device is essentially the same.

#### **PROFINET IO controller**

After the communication path to the PROFINET IO controller has been set, the INTERBUS devices connected to the controller can be read in.

#### **PROFINET IO device**

After device names and IP parameters for the PROFINET IO devices have been assigned, the PROFINET IO devices connected to the INTERBUS devices can be read in.

- Select all the "controllers" that are connected to the INTERBUS devices. These include the Inline Controller as well as all the PROFINET IO devices displayed in the "Connected Bus" window.
- Read in the INTERBUS devices as described above.



The product designation or the station name is displayed under "Selected Control System". If several devices of the same type are used in a project, first assign the devices a station name. This enables the unique identification of the devices.



## 4.22 Compiling after reading in the bus topology

At this point you can compile your project in order to detect any errors that may have occurred.



Select the "Build, Make" command.



### 4.23 Creating the program

If the program has been created offline, skip this section.

To program the example program, proceed as described in "Example program" on page 8-1.



## 4.24 Compiling after creating the program

At this point you can compile your project in order to detect any errors that may have occurred.



Select the "Build, Make" command.



#### 4.25 Assigning process data

If the process data has been assigned offline, skip this section.

To assign the process data, proceed as described in "Generating variables and assigning process data" on page 4-18.





Figure 4-48 Project control dialog box

• Click on "Download".

Another dialog box opens. There are various options for sending the project to the controller or the simulated controller.

- 1. Click on "Download" in the "Project" area.
- 2. Click on "Download" in the "Bootproject" area.
- 3. Activate the "Include Bootproject" checkbox in the "Project" area and click on "Download" in this area.

In the first option, the project is sent. However, it is not loaded automatically when booting the controller.

For option 2 and 3, the project is written as a boot project to the parameterization memory of the controller and is loaded automatically after the controller has been booted.

Option 3 is shown in Figure 4-49 on page 4-41.

• Activate the "Include Bootproject" checkbox in the "Project" area and click on "Download" in this area.

Download	X
Project	Bootproject
<u>D</u> ownload	Download
Dow <u>n</u> load Changes	Activate
Ensure real-time for Download Changes     Include Bootproject	Delete on Target
Include OPC data	
Do <u>w</u> nload Source	
User-Libraries	
Include User-Libraries	
<ul> <li>Include Pagelayouts</li> <li>Include Backend-Code</li> </ul>	
Delete Source on Target	Download <u>F</u> ile
<u>C</u> lose	<u>H</u> elp
Figure 4-49 "Download" dial	og box

For controllers that support the "Download Changes" function, the "Download" dialog box appears as shown in Figure 4-50. If the "Download Changes" function is used, activate the "Ensure real-time for Download Changes" and "Include Bootproject" checkboxes.

Project	Bootproject
Download	Download
Dow <u>n</u> load Changes	Activate
Ensure real-time for Download Changes     Include Bootproject	Delete on Target
Include <u>S</u> ources	
Do <u>w</u> nload Source	
User-Libraries	
Include User-Libraries	
Include Pagelayouts Include Backend-Code	
	Download Eile

Figure 4-50 "Download" dialog box

The project is now in the real or simulated main memory of the controller.

#### 4.26.2.1 Sending a project: Special notes for PROFINET

When sending the project to the controller, the desired PROFINET IO configuration is transmitted and activated. If activation was successful, the PNIO\_CONFIG\_STATUS\_ACTIVE system variable is set.

The PROFINET IO controller attempts to start up all the devices in the desired configuration.



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#### 4.26.2.2 Sending a project: Special notes for the EasySim simulation

The EasySim simulation is started when the project control dialog box is opened. This is shown in the taskbar with the following icon:



EasySim simulation: Icon in the taskbar

The following options are available for the simulation in the context menu:

 Open

 Show I/Os

 Show Expert Mode

 Exit

Figure 4-52 EasySim simulation: Context menu

Selecting the "Open" menu item opens the simulation window.

🕞 EasySim 1		
	Hide I/Os >>	
EasySim - ProC	onOS	
Figure 4-53	EasySim sir	nulation opened

The "Show I/Os" menu item or "I/Os" button opens EasySim input and output view.

0	EasySim 1									
	<b>©</b>		A V					<< 1/	'Os Hide	
	Y	Name	Value	Preset 1	Preset 2	Preset 3	Data type	Description	Terminal	
<								)	3	>
	10205-012 1002	1								ī
	Set Preset 1	Set	Preset 2 9	Set Preset 3					Expert Mode >>	

Figure 4-54 EasySim simulation: I/O view

The "Show Expert Mode" menu item or "Expert Mode" button opens expert mode for the simulation. This enables periods to be shown according to the simulated input and output states.

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#### 4.26.3 **Performing a cold restart**

In order to activate the project, it is necessary to perform a cold restart.

• To do so, click on "Cold" in the project control dialog box.

STD_RES	
State: Stop	
Stop	C <u>o</u> ld
<u>R</u> eset	<u>W</u> arm
	Hot
<u>D</u> ownload	Upload
Error	<u>I</u> nfo
<u>C</u> lose	<u>H</u> elp

Figure 4-55 Project control dialog box

If the system cannot be started up, a corresponding error message appears on the diagnostic display (for controllers with diagnostic display) and in the "Message Window" in PC WorX and Diag+.



For an explanation of the error message, please refer to the Diagnostics Guide (IBS SYS DIAG DSC UM E, Order No. 2747280).

For example, the ILC 350 ETH controller has been started up successfully if the green PLC RUN LED is on.

Communication to the PROFINET IO devices has been established successfully if the BF LED does not flash on any of the PROFINET IO devices.

## Simulation following cold restart



When sending, the project is written to the main memory of the simulated controller. Following a successful cold restart, you can simulate the behavior of your application.

Only the states of the global variables that have been linked to a physical address (inputs/outputs) as part of process data assignment are displayed in the simulation.

Figure 4-56 below shows expert mode for the simulation of an example project, in which a run sequence is illustrated for various I/O states in the area at the bottom.

🕞 Eas	ySi	m 1											
ß	1	F	A A	Y							<< 1/0s	н	ide
	V	11	Name	Value F	Preset 1	Preset 2	Pr	eset 3	Data type	Descri	ption T	ermina	
7		😂 In_I	06	0	0	0		0	BOOL		961	X2.6	
8		😂 ln_!	07	0	0	0		۲	BOOL		961	X2.7	
9		🗱 Out	t_00	0					BOOL		%(	QX2.0	
10		🗱 Out	t_01						BOOL		%(	QX2.1	
11		🗱 Out	t_02	0					BOOL		%(	QX2.2	
12		w⊃ Out	t_03						BOOL		%(	QX2.3	
13		🗱 Out	t_04	9					BOOL		%(	QX2.4	
14		🗱 Out	t_05	9					BOOL		%0	QX2.5	
15		🗱 Out	t_06	9					BOOL		%(	QX2.6	
16		🗱 Out	t_07	9					BOOL		%(	QX2.7	
17		🕸 Inp	ut_Analog	500	0	0		0	INT		%N	WO	0
18		w⊃ Out	tput_An	1000					INT		%(	2VVD	
											1		1
·													-
-	Ē	ન્દ્		<b>.</b>					_ [	2	1		
			T2	T3	T4	T5		T6		T7	T8		
1	Tin	ne/ms	1000	1000	1000	1000		1000	1000	-	1000		
2	In_I	00	0	0	0	<u> </u>		6	· · · · · · · · · · · · · · · · · · ·	۲	6		
3	In_I	02	0	0	<b>O</b>	<b>(</b>		0		۲	0		
4	In_I	04		<u> </u>				0		0	0		
5	In_I	06	<u> </u>		<u> </u>	9		9		0	9		
6	Out	t_00				9							
7	Out	_02				- <u>·</u>		9			9	2	
8	JOu	_04		<u> </u>				9		2	9	2	
9	10u	1_06										1.00	
10	Inp	ut_Anal	40	10	0	200	500		1000	500	-	100	
11	Jou	put_An	80	20	0	400	1000		2000	1000		U	
-													
5													

Figure 4-56

EasySim simulation: I/O view - Expert mode

## PN SIM 4.27 Operation

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#### 4.27.1 Setting the task properties

If no settings have been made for the task, a default task is used. If necessary, change the properties of the task (in the example below a default task is changed to a cyclic task).

- Switch to the IEC programming workspace.
  - Select "STD\_TSK : DEFAULT".
  - In the context menu, select the "Properties..." menu item.



Figure 4-57 Standard task: Properties

• Under type, select "Cyclic". This selects a cyclic task.

'STD_TSK'	×
Name Type	]
Task Type:	
DEFAULT	
DEFAULT	
EVENT SYSTEM	
STOLEM.	
OK Cancel Apply Help	
Figure 4-58 Standard task: "Cyclic" type	

- Apply your setting with "Apply".
- In the standard task context menu, select the "Settings..." menu item (see Figure 4-57 on page 4-45).
- Change the watchdog time setting, e.g., to 1000 ms.



Figure 4-59 Changing the setting

- Confirm your settings with "OK".
- Compile the project, send it to the controller, and perform a cold restart.

If the process is now running too slowly, change the settings.

- In the standard task context menu, select the "Settings..." menu item.
- Change the watchdog time setting, e.g., to 250 ms.
- Compile the project, send it to the controller, and perform a cold restart.



#### 4.27.2 Debug mode

In order to use debug mode, a program must have been created in your project. The method of operation of the program can be monitored in debug mode.



- Activate debug mode.
- Switch to the IEC programming workspace.

The status of all global variables used in the program is displayed in the "MainV" variables worksheet in the "Project Tree Window".

Project Tree Window 🕴 🔻 🛛	Name	Online value	Type	Usage	Description
Project : C:\Documents and Settings\pypm07\Dest	🗆 Default		) //	<u> </u>	<u> </u>
Libraries	IN2	TRUE	BOOL	VAR_EXTERNAL	
🖃 🔄 Data Types	IN3	TRUE	BOOL	VAR_EXTERNAL	
	OUT2	TRUE	BOOL	VAR_EXTERNAL	
E Cogical PUUs	OUT1	FALSE	BOOL	VAR_EXTERNAL	
⊡ Main	V0	16#0000	WORD	VAR_EXTERNAL	
Main	ONBOARD_INPUT_BIT0	TRUE	BOOL	VAR_EXTERNAL	Local input IN1
MainV	TP_1		TP	VAR	
- D Main	T1	15.000	TIME	VAR_EXTERNAL	
Physical Hardware	T2	15.000	TIME	VAR_EXTERNAL	
STU_UNF: ARM_L_40					
i 🖓 Taka					
🖃 🛄 Main, Main					
Clabal Variables					
TO_Conligation					
	<				>
0 (C) (F) (F) (F) (F) (F) (F) (F) (F) (F) (F	• • • • • • • • • • • • • • • • • • •				
	🕒 Main:Main 🔝 MainV:M	ain			

Figure 4-60 Variables in debug mode: Global variables (VAR\_EXTERNAL)

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For PROFINET IO devices, the PNIO\_DATA\_VALID system variable can be assigned, for example. You can read the status here. This bit must be set for the PROFINET IO device to supply valid data and all other process values to be valid. In this way, you can check in this window whether all PROFINET IO devices supply valid data. For information about system variables, please refer to Appendix B "Status information for a PROFINET IO system".

* Droject Tree Window					
	Name	Online value	Туре	Usage	Description
Project : C:\Documents and Settings\pypm07\Desk	🖃 Default				
	🖃 Auto				
🖃 🔄 Data Types	I_IL_PN_BK24_PNIO_DATA	TRUE	BOOL	VAR_GLOBAL	
	I_IL_ILB_DIO23_0_PNIO_DA	TRUE	BOOL	VAR_GLOBAL	
🖃 🔄 Logical POUs	I_FL_PN_IBS25_PNIO_DAT	TRUE	BOOL	VAR_GLOBAL	
🖃 🔲 Main					
— <u>i</u> MainT					
MainV					
Main					
G G ATR BER # COOPERIN					
STD_RES: ILC390PN					
⊟∐ Main : Main					
A out with Many					
IU_Configuration					
					2
	🖶 Main:Main 🔝 Global_Vari.	📄 MainV:Main	👔 MainV:STD		
Figure 4-61 Variables in de	bug mode: Syste	em variabl	es of PROF	INET IO d	evices



The program status of a POU is displayed by opening the program worksheet (in Figure 4-62 under "Main" in the "Project Tree Window" or under "Main:Main" on the tab in the workspace).





The status of all global variables is displayed under "Global Variables" in the "Project Tree Window".

: Project Tree Window 📮 🔻 🗖		Name	Online value	Type	Usage	Description	~
🖃 🔄 Project		🗆 Default					-
Libraries		IN2	TRUE	BOOL	VAR GLOBAL		ΤΞ
🖨 🔄 Data Types		IN3	FALSE	BOOL	VAR_GLOBAL		
sys_flag_types		OUT2	FALSE	BOOL	VAR_GLOBAL		-
🖻 🔄 Logical POUs		OUT1	TRUE	BOOL	VAR_GLOBAL		-
□ Main		OUT11	TRUE	BOOL	VAR_GLOBAL		
i MainT		🗆 System Variables					
MainV		PLCMODE_ON	FALSE	BOOL	VAR_GLOBAL	PLC status ON	<
- Man	F	PLCMODE_RUN	TRUE	BOOL	VAR_GLOBAL	PLC status R	۲.
Physical Hardware     Physical Hardware     STD_CNF:ARM_L40     Amount Store St		PLCMODE_STOP	FALSE	BOOL	VAR_GLOBAL	PLC status S	۲.
		PLCMODE_HALT	FALSE	BOOL	VAR_GLOBAL	PLC status H	۲.
		PLCDEBUG_BPSET	FALSE	BOOL	VAR_GLOBAL	Breakpoint set	۰.
		PLCDEBUG_FORCE	FALSE	BOOL	VAR_GLOBAL	Variable(s) f	¢
B-D STD_ISK: DEFAULT		PLCDEBUG_POWERFLOW	FALSE	BOOL	VAR_GLOBAL	Powerflow ON	۲.
Main : Main		PLC_TICKS_PER_SEC	1000	INT	VAR_GLOBAL	System ticks	4
ManV		PLC_SYS_TICK_CNT	160193910	DINT	VAR_GLOBAL	Number of s	۰.
		PLC_TASK_AVAILABLE	16	INT	VAR_GLOBAL	Number of a	¢
IU_Configuration		PLC_TASK_DEFINED	1	INT	VAR_GLOBAL	Number of ta	¢
		PLC_TASK_1		Ext	VAR_GLOBAL	Task 1 infor	4
		PLC_TASK_2		Ext	VAR_GLOBAL	Task 2 infor	۲.
		PLC_TASK_3		Ext	VAR_GLOBAL	Task 3 infor	¢
		PLC_TASK_4		Ext	VAR_GLOBAL	Task 4 infor	¢
		PLC_TASK_5		Ext	VAR_GLOBAL	Task 5 infor	4
		PLC_TASK_6		Ext	VAR_GLOBAL	Task 6 infor	•~
	<					>	j
(† 1) (1) (1) (1) († 1)	1	🕨 Main:Main 🔢 Global_Vari					

Figure 4-63 Variables in debug mode: Global variables

• Switch to the window that provides the best display of the required information.

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#### 4.27.3 PLC stop/run

If the PLC is set to STOP, all outputs are set to their safe state. When the controller is started, process values are output again.

## **SIM** 4.28 Switching from simulation to real hardware

Once you have successfully completed the simulation for your program, you can switch to your hardware. To do this, the actual bus configuration must correspond to the simulated bus configuration.

- Stop debug mode. To do this, click on "Debug on/off".
- Stop the simulation. To do so, click on "Stop" in the project control dialog box.
- Close the project control dialog box.
- Exit the simulation, e.g., via the "Exit" menu item in the context menu for the simulation icon in the taskbar.



- Switch to the bus configuration workspace.
- In the "Device Details" window, switch to the "Communication" tab.
- Select the required communication path to enable you to communicate between PC WorX and your hardware (see "Setting the communication path" on page 4-26).
- Send the project to the controller and perform a cold restart (see "Compiling and sending a project, and performing a cold restart" on page 4-40).

PC WorX

## 5 Example project for an INTERBUS system

The creation of a project is described in detail in Section 4, "Sequence for creating a project".

This section covers:

- All steps to be taken in reference to the corresponding section in Section 4, "Sequence for creating a project"
- Project-specific settings
- Information and special notes for an INTERBUS project

## 5.1 **Project description**

In the following, an example project is developed using function block diagram (FBD).



In order to obtain the best possible results, please use the same identifiers and names as used in this manual.

**Project name** 

#### Quickstart

- Project hardware
- Controller: ILC 390 PN 2TX-IB Inline Controller
- I/O modules: IB IL 24 DO 16, IB IL 24 DO 8, and IB IL 24 DI 8





#### PC WorX

## Inputs and outputs/process data

Inputs and outputs used in the example including process data and assigned variables.

Device	Inputs/outputs according to the device data sheet	Signal at	Variable	Process data item					
ILC 390 PN 2TX-IB	Input IN11	Co 3 TP 1.4	ONBOARD_INPUT_BIT10	3.1.4					
IB IL 24 DI 8	Input IN2 Input IN5	Co 1 TP 2.1 Co 3 TP 1.1	IN2 IN3	1.2.1 3.1.1					
IB IL 24 DO 8	Output OUT1 Output OUT6	Co 1 TP 1.1 Co 3 TP 2.1	OUT1 OUT2	1.1.1 3.2.1					
IB IL 24 DO 16	Outputs OUT1 to OUT16	Co 1 to 4 TP x.1 and x.4	VO	~DO16					
No assignment required	ł	T1 T2							

- Co Connector
- TP Terminal point
- x Row on the Inline connector

## 5.2 Sequence for creating the INTERBUS project

The sequence for creating the Figure 5-2 project is shown in INTERBUS.

When implementing the project, some of the tasks can be performed offline (without a connection to the INTERBUS system).

All tasks relating to communication must be performed online (with connection to the INTERBUS system).

In Figure 5-2 and in the description in this section, it is assumed that the system has been fully installed and all tasks are performed online. This is the quickest way to start up an INTERBUS system.

If the INTERBUS system has not yet been fully installed or if you would like to perform as many preparatory tasks as possible offline, follow the sequence described in Section 4, "Sequence for creating a project".





Sequence for creating the INTERBUS project

### 5.3 Creating a new project

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See also "Creating a new project" on page 4-3.

- Select the "New Project..." command from the "File" menu.
- Select the controller (here: ILC 390 PN 2TX-IB Rev. > 01/4.6F/3.00) and confirm your selection with "OK".
- Select the "File, Save Project As / Zip Project As..." command.
- Enter the project name "Quickstart" and save the project.

## 5.4 Specifying project information



See also "Specifying project information" on page 4-4.

- Ŧ
- Switch to the bus configuration workspace.
- Adapt the project information to your project.

## 5.5 Checking/modifying IP settings for the controller



See also "Checking/modifying IP settings for the controller" on page 4-7.



The IP settings for the controller are made when the project is created.

#### NOTE: Changes to project information are not applied automatically

If any modifications are made to the project information that affect the IP settings for the controller, a warning is displayed. However, the modification is not implemented automatically. When a new project is created, the default settings are specified under the IP settings.

Adapt these settings, if necessary.



• Switch to the bus configuration workspace.

- Select the controller node.
- In the "Device Details" window, switch to the "IP Settings" tab.
- Check the IP settings and modify them, if necessary.
- If an IP address has still not been assigned, assign one according to "Assigning the IP address for the controller" on page 5-5.

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The IP address that is assigned here for the controller is also implemented as the IP address for the communication path via TCP/IP.

## 5.6 Assigning the IP address for the controller

See also "Assigning the IP address for the controller" on page 4-23.

An IP address must first be assigned to the controller in order to enable communication.

For the ILC 390 PN 2TX-IB controller, BootP is activated by default upon delivery for assigning the IP address via Ethernet. In this case, when setting the IP address for the first time a BootP server can be used. The corresponding procedure is described below. For all other options, please refer to "Assigning the IP address for the controller" on page 4-23.

- Establish an Ethernet connection between your PC and the controller.
- In the menu bar, select the "Extras, BootP/SNMP/TFTP-Configuration ..." menu.
- Activate the "BootP Server active" checkbox.

• Switch to the bus configuration workspace.

- Select the controller node (e.g., "ILC 390 PN 2TX-IB").
- Select the "IP Settings" tab in the "Device Details" window.
- Enter the MAC address of the controller. This can be found on a label on the device. It starts with "00.A0.45.".
- Reset the controller.

The controller is temporarily assigned the IP address which is specified in the project for the controller.

• Select the "Extended Settings" tab in the "Device Details" window.

The specified IP parameters are displayed under "Manual definition of the TCP/IP settings".

• Confirm the displayed IP parameters or your modifications via "Send".

The IP address is now permanently stored on the controller parameterization memory.

## 5.7 Setting the communication path

See also "Setting the communication path" on page 4-26.

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For a controller that supports Ethernet (e.g., ILC xxx ETH, ILC 390 PN 2TX-IB, RFC 4xx), the communication path is automatically set to "Ethernet" by default with the IP address of the controller specified under "IP Settings". If you would like to send your project to the controller via this Ethernet connection, the communication path does **not** have to be set.

If not using this path, please proceed as described in "Setting the communication path" on page 4-26.

## 5.8 Reading in INTERBUS



See also "Reading in INTERBUS" on page 4-36.

- Select the "Connected Bus" command from the "View" menu to read in the connected INTERBUS system.
- Select the controller in the "Connected Bus" window (here: "ILC 390 PN").
- Open the context menu and select the "Import to Project, With Device Description" command.

The "Select Device" window that opens lists the modules whose device description corresponds to that of the connected devices.

- Select the device that is actually connected to the INTERBUS system, and repeat this step until all the devices are linked to their device description. According to the example, the following I/O modules are connected: IB IL 24 DO 16, IB IL 24 DO 8, and IB IL 24 DI 8.
- Disconnect the link to the controller by selecting "Offline" under "Selected Control System" in the "Connected Bus" window.





## 5.9 Compiling after completing the bus topology



See also "Compiling after completing the bus topology" on page 4-16.



Select the "Build, Make" command.

## 5.10 Creating the program

To program the example program, proceed as described in "Example program" on page 8-1.

• Set variable V0 to initial value 1. This set bit is then rotated to the left during program processing.



It is now assumed that you have created the program. If you skip this point, this may result in deviations.

## 5.11 Compiling after completing the program



See also "Compiling after creating the program" on page 4-17.

\*\*

• Select the "Build, Make" command.

## 5.12 Assigning process data



See also "Generating variables and assigning process data" on page 4-18.



• Switch to the process data assignment workspace to assign the variables to the process data.

- Select the controller in the top right window. The standard configuration is then displayed in the top left window, "Symbols/Variables".
- In the top left window, "Symbols/Variables", select the standard resource (STD\_RES ILC390PN in the example).
- In the top right window, select the device for which you would like to link the process data to variables (IB IL 24 DI 8 in Figure 5-4).
- Select the process data item to be linked (3.1.1 in Figure 5-4).
- Variables are created when the program is created. Using drag & drop, link the selected variable to one of the variables on the left-hand side (IN3 in Figure 5-4). If you would like to link further process data but no corresponding variables have been created yet, select "Create Variable" in the context menu.

The created variable is displayed in the bottom left window.

Repeat this procedure for all inputs to be evaluated and for all outputs to be controlled.

#### PC WorX

#### Process data assigned

The result of the process data assignment process is shown in the figure below.



Figure 5-4 All used process data assigned to variables

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Since the ONBOARD\_INPUT\_BIT10 variable is a system variable, it is not shown in Figure 5-4.

# 5.13 Compiling and sending a project, and performing a cold restart

See also "Compiling and sending a project, and performing a cold restart" on page 4-40.

**Compile project** 

Select the "Build, Make" command.

Send project

- Open the project control dialog box.
- Activate the "Include Bootproject" checkbox in the "Project" area.
- Click on "Download" in the area on the left.

## 5.14 Operation

See "Operation" on page 4-45.

5-8 PHOENIX CONTACT

# 6 Example project for a system consisting of PROFINET IO and INTERBUS

The creation of a project is described in detail in Section 4, "Sequence for creating a project".

This section covers:

- All steps to be taken in reference to the corresponding section in Section 4, "Sequence for creating a project"
- Project-specific settings
- Information and special notes for a project with PROFINET IO and INTERBUS

## 6.1 **Project description**

In the following, an example project is developed using function block diagram (FBD).



In order to obtain the best possible results, please use the same identifiers and names as used in this manual.

Project name

Quickstart\_PN

**Project hardware** 

Specify the system structure during configuration. A system consisting of PROFINET IO and INTERBUS comprises the PROFINET IO controller, PROFINET IO devices, and INTERBUS devices. The example system is shown in Figure 6-1.



Several PROFINET IO controllers can be used within a project. In this example, only one PROFINET IO controller is used.
#### Example project for a system consisting of PROFINET IO and INTERBUS

outputs/process data					
Device	Connected to	Input/output according to the device data sheet	Signal at	Variable	Process data item
FL SWITCH MCS 16TX					
ILC 390 PN 2TX-IB		Input IN11	Co 3 TP 1.4	ONBOARD_ INPUT_BIT10	3.1.4
ILB PN 24 DI16 DIO16-2TX		Output OUT1 to OUT16	Co 1 to 4 TP x.1 and x.4	VO	~DO16
IB IL AO 1/SF	ILC 390 PN 2TX-IB				
IB IL 24 DO 4-ME	FL IL 24 BK-PN-PAC	Output OUT3	TP 1.4	OUT1	1.4
IB IL 24 DI 4-ME	FL IL 24 BK-PN-PAC	Input IN1	TP 1.1	IN2	1.1
FLS IB M12 DI 8 M12	FL PN/IBS	Input IN3	FC 3 pin 4	IN3	IN3
FLS IB M12 DO 8 M12-2A	FL PN/IBS	Output OUT3	FC 3 pin 4	OUT2	OUT3
No assignment required				T1 T2	

Inputs and

Inputs and outputs used in the example including process data and assigned variables.

Co Connector

TΡ Terminal point

FC Female connector

#### 6.2 Sequence for creating the PROFINET project

The sequence for creating the Figure 6-2 project is shown in PROFINET.

When implementing the project, some of the tasks can be performed offline (without a connection to the PROFINET IO system).

All tasks that require communication must be performed online (with connection to the PROFINET IO system).

In Figure 6-2 and in the description in this section, it is assumed that the system has been fully installed and all tasks are performed online. This is the quickest way to start up a PROFINET system. This path is shown in a dark color in Figure 6-2. Other possible paths are grayed out.

If the PROFINET system has not yet been fully installed or if you would like to perform as many preparatory tasks as possible offline, follow the graved out sequence. This is described in detail in Section 4, "Sequence for creating a project".





# 6.3 Creating a new project

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See also "Creating a new project" on page 4-3.

- Select the "New Project..." command from the "File" menu.
- Select the controller (here: ILC 390 PN 2TX-IB Rev. > 01/4.6F/3.00) and confirm your selection with "OK".
- Select the "File, Save Project As / Zip Project As..." command.
- Enter the project name "Quickstart\_PN" and save the project.

# 6.4 Specifying project information



See also "Specifying project information" on page 4-4.

- Ŧ
  - Switch to the bus configuration workspace.
  - Adapt the project information to your project.
  - Assign the name suffix for the PROFINET device name (here: quickstart.de) in the "Device Details" window under "Domain Postfix".

# 6.5 **Preparing the PC for communication**



See also "Preparing the PC for communication" on page 4-6.

• In the "Extras, PROFINET Configuration..." menu in PC WorX, select the network card for your computer that is to be used for communication.

# 6.6 Checking/modifying IP settings for the PROFINET IO controller



See also "Checking/modifying IP settings for the controller" on page 4-7.

The IP settings for the controller are made when the project is created.



#### NOTE: Changes to project information are not applied automatically

If any modifications are made to the project information that affect the IP settings for the controller, a warning is displayed. However, the modification is not implemented automatically. When a new project is created, the default settings are specified under the IP settings.

Adapt these settings, if necessary.



- Switch to the bus configuration workspace.
- Select the controller node.
- In the "Device Details" window, switch to the "IP Settings" tab.
- Check the IP settings and modify them, if necessary.
- If an IP address has still not been assigned, assign one according to "Assigning the IP address for the PROFINET IOcontroller" on page 6-7.



The IP address that is assigned here for the controller is also implemented as the IP address for the communication path via TCP/IP.

# 6.7 Assigning the IP address for the PROFINET IOcontroller

See also "Assigning the IP address for the controller" on page 4-23.

An IP address must first be assigned to the PROFINET IO controller in order to enable communication.

For the ILC 390 PN 2TX-IB PROFINET IO controller, BootP is activated by default upon delivery for assigning the IP address via Ethernet. In this case, when setting the IP address for the first time a BootP server can be used. The corresponding procedure is described below. For all other options, please refer to "Assigning the IP address for the controller" on page 4-23.

- Establish an Ethernet connection between your PC and the PROFINET IO controller.
- In the menu bar, select the "Extras, BootP/SNMP/TFTP-Configuration ..." menu.
- Activate the "BootP Server active" checkbox.
- Switch to the bus configuration workspace.
- Select the controller node (e.g., "ILC 390 PN 2TX-IB").
- Select the "IP Settings" tab in the "Device Details" window.
- Enter the MAC address of the controller. This can be found on a label on the device. It starts with "00.A0.45.".
- Reset the controller.

The controller is temporarily assigned the IP address which is specified in the project for the controller.

- Select the "Extended Settings" tab in the "Device Details" window.
- The specified IP parameters are displayed under "Manual definition of the TCP/IP settings".
- Confirm the displayed IP parameters or your modifications via "Send".

The IP address is now permanently stored on the controller parameterization memory.

# 6.8 Setting the communication path



See also "Setting the communication path" on page 4-26.

For a controller that supports Ethernet (e.g., ILC 350 PN, ILC 390 PN 2TX-IB, RFC 4xx), the communication path is automatically set to "Ethernet" by default with the IP address of the PROFINET IO controller specified under "IP Settings". If you would like to send your project to the controller via this Ethernet connection, the communication path does **not** have to be set.

If not using this path, please proceed as described in "Setting the communication path" on page 4-26.

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## 6.9 Reading in and importing PROFINET IO devices

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See also "Reading in and importing PROFINET IO devices" on page 4-29.

- Make sure you are in the bus configuration workspace.
  - In the "Bus Structure" window, select the PROFINET node for the controller.
- Open the context menu and select the "Read PROFINET..." menu item.

All the connected PROFINET IO devices are displayed. When reading in, the device name and the IP parameters are imported for each device - if present.

- Select the devices that are to be included in your project.
- Click on "Insert" to include the selected PROFINET IO devices in your project.

If a PROFINET device name does not yet exist for a device, a name should be assigned at this point.

- Activate the "Name Device" checkbox.
- Check the displayed PROFINET device name (see also "DNS/PROFINET Device Name" on page 4-10).
- Assign the name to the relevant device.
- Confirm the display or your entry with "OK".
- Click "Close" to close the "Read PROFINET" dialog box.

The PROFINET structure is displayed in the "Bus Structure" window.



#### Figure 6-3 Bus configuration with read in PROFINET IO devices

# 6.10 Checking/modifying the PROFINET settings for PROFINET IO devices

See also "Checking/modifying the PROFINET settings for PROFINET IO devices" on page 4-34.

When **reading in**, the PROFINET settings of the relevant PROFINET IO devices are imported with default values. Check these settings and modify them, if necessary.



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- Make sure you are in the bus configuration workspace.
- In the "Bus Structure" window, select the PROFINET IO device.
- Under "Device Details", select the "PROFINET Settings" tab.
- Check the PROFINET settings and modify them, if necessary.

# 6.11 Transferring PROFINET device names and IP settings to PROFINET IO devices

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See also "Transferring PROFINET device names and IP settings to PROFINET IO devices" on page 4-35.

Before a PROFINET IO device can be operated in a PROFINET IO network, the PROFINET device name and IP address configured in PC WorX must also be made known to the device itself.

- Make sure that the PROFINET IO controller can establish communication with the PROFINET IO devices.
- Compile the project, send it to the controller, and perform a cold restart. Proceed as described in "Compiling and sending a project, and performing a cold restart" on page 4-40.

During startup, the PROFINET controller automatically assigns the IP settings and device parameterizations specified in the project to the PROFINET IO devices.

 To check the assignment of device names and IP settings, select the "PROFINET Stationnames" tab in the "Device Details" window.

The updated list contains the PROFINET IO devices together with their PROFINET device names and the IP parameters.

When the tab is selected, the list is updated. If you would like to update the list again later, click on "Refresh".

In order to limit the search results, various options are available:

No constraints	All devices that are available in the network are listed.
Unnamed	All those devices that do not yet have a PROFINET device name are listed.
Not in project	All those devices that are not included in the project are listed.
Same type	Only those devices that are the same type as the device selected in the bus configuration are listed.

The BF LED is now off on all PROFINET IO devices. The PROFINET network is running.



For additional information about assigning PROFINET device names and IP addresses, please also refer to "Additional information" on page 6-15.

# 6.12 Reading in INTERBUS

1	See also "Reading in INTERBUS" on page 4-36.				
	The process for reading in INTERBUS modules that are connected to a PROFINET IO controller or a PROFINET IO device is the same.				
PROFINET IO controller	After the communication path to the PROFINET IO controller has been set, the INTERBUS devices connected to the controller can be read in.				
PROFINET IO device	<ul> <li>After device names and IP parameters for the PROFINET IO devices have been assigned, the PROFINET IO devices connected to the INTERBUS devices can be read in.</li> <li>Select the "Connected Bus" command from the "View" menu to read in the connected INTERBUS system.</li> <li>Select one of the controllers displayed in the "Connected Bus" window.</li> <li>Open the context menu and select the "Import to Project, With Device Description" command.</li> <li>The "Select Device" window that opens lists the modules whose device description corresponds to that of the connected devices.</li> <li>Select the device that is actually connected to the INTERBUS system, and repeat this step until all the devices are linked to their device description.</li> <li>Select all the "controllers" that are connected to the INTERBUS devices. These include the Inline Controller as well as all the PROFINET IO devices displayed in the "Connected Bus" window.</li> <li>Disconnect the link to the controller by selecting "Offline" under "Selected Control System" in the "Connected Bus" window.</li> </ul>				

# 6.13 Compiling after completing the bus topology



See also "Compiling after completing the bus topology" on page 4-16.

- · •
- Select the "Build, Make" command.

# 6.14 Creating the program

To program the example program, proceed as described in "Example program" on page 8-1.

• Set variable V0 to initial value 1. This set bit is then rotated to the left during program processing.



It is now assumed that you have created the program. If you skip this point, this may result in deviations.

# 6.15 Compiling after creating the program



See also "Compiling after creating the program" on page 4-17.



Select the "Build, Make" command.

# 6.16 Assigning process data

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See also "Generating variables and assigning process data" on page 4-18.



- Switch to the process data assignment workspace to assign the variables to the process data.
- Select the controller in the top right window. The standard configuration is then displayed in the top left window, "Symbols/Variables".
- In the top left window, "Symbols/Variables", select the standard resource (STD\_RES ILC390PN in the example).
- In the top right window, select the device for which you would like to link the process data to variables.

Please note for a PROFINET IO device with inputs and outputs that this is represented with its modules.



Figure 6-5 Representation of a PROFINET IO device with its modules

- In this case, select the module where the required inputs or outputs are located (DIO16: ILB PN 24 DI16 DIO16-2TX in Figure 6-6).
- Select the process data item to be linked (~DO16 in Figure 6-6).
- Variables are created when the program is created. Using drag & drop, link the selected variable to one of the variables on the left-hand side (V0 in Figure 6-6).

The created variable is displayed in the bottom left window.

Process Data Assi	gnment								1	1 🔺 🕅
Symbols/Variable STD_CNF STD_CNF STD_	E ARM_L_40 RE5 : ILC390P efault ystem Variable uto TO_TSK : DEF- D_TSK : DEF- Main : Main	N IS AULT	Quickstart_PN Quickstart_PN RC 390 PN 2TX-IB 192.168. R Resource R STD_RES ILC390PN PROFINET PROFINET PROFINE	0.2 quickstart.de 192.168. t.de 192.168.0.4 116 DIO16-2TX 24 DI 16 DIO16-2TX 24 DI 16 DIO16-2TX :.de 192.168.0.5 t.de 192.168.0.6	0.3					
Symbol/Variable	Data Type	Process Data Item	Device	Process Data Item	I/Q	Data Type	Byte.Bit	Address	Symbol/Variable	<u>^</u>
IN2	BOOL		1 DIO16: ILB PN 24 DI 16 DIO16-2TX	IN11	Ι	BOOL	0.3			
IN3	BOOL		1 DIO16: ILB PN 24 DI 16 DIO16-2TX	IN12	I	BOOL	0.4			
OUT2	BOOL		1 DIO16: ILB PN 24 DI 16 DIO16-2TX	IN13	I	BOOL	0.5			
OUT1	BOOL		1 DIO16: ILB PN 24 DI 16 DIO16-2TX	IN14	I	BOOL	0.6			
VO	WORD	1 DIO16: ILB PN 24 DI 16 DIO16-2TX \~D	1 DIO16: ILB PN 24 DI 16 DIO16-2TX	IN15	I	BOOL	0.7			
			1 DIO16: ILB PN 24 DI 16 DIO16-2TX	~DO16	Q	WORD	0.0		STD_CNF STD_RES \ VO	ן 🗐 (
			1 DIO16: ILB PN 24 DI 16 DIO16-2TX	OUTO	Q	BOOL	1.0			
			1 DIO16: ILB PN 24 DI 16 DIO16-2TX	OUT1	Q	BOOL	1.1			
			1 DIO16: ILB PN 24 DI 16 DIO16-2TX	OUT2	Q	BOOL	1.2			
			1 DIO16: ILB PN 24 DI 16 DIO16-2TX	OUT3	Q	BOOL	1.3			
			1 DIO16: ILB PN 24 DI 16 DIO16-2TX	OUT4	Q	BOOL	1.4			
			1 DIO16: ILB PN 24 DI 16 DIO16-2TX	OUT5	0	BOOL	1.5			<u> </u>
1		2	12							5
		· · · · · · · · · · · · · · · · · · ·								<u> </u>

Figure 6-6 A

Assigning process data for a PROFINET IO device

- Repeat this procedure for all inputs to be evaluated and for all outputs to be controlled.
- For the specified example, assign the inputs and outputs to the created variables according to "Inputs and outputs/process data" on page 6-3.

The result of the process data assignment process is shown in the figure below.



Figure 6-7 All used process data assigned to variables

i

Since the ONBOARD\_INPUT\_BIT10 variable is a system variable, it is not shown in Figure 6-7.

# 6.17 Compiling and sending a project, and performing a cold restart

1

See also "Compiling and sending a project, and performing a cold restart" on page 4-40.

**Compile project** 

• Select the "Build, Make" command.

Send project

- Open the project control dialog box.
- Activate the "Include Bootproject" checkbox in the "Project" area.
- Click on "Download" in the area on the left.

## 6.18 Operation

See "Operation" on page 4-45.

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# 6.19 Additional information

### 6.19.1 Changing the PROFINET device name

If, following device naming, you wish to change device names, proceed as follows:

If a project is located on the PROFINET IO controller, the controller attempts to start up the PROFINET IO devices with the information stored in the project. In this case, a PROFINET device name cannot be assigned. Therefore, if there are Ethernet connections between the PROFINET IO devices and the PROFINET IO controller with the project, these connections must be aborted first. To do this, proceed as follows:

- Open the project control dialog box.
- Click on "Stop".
- Click on "Reset".

All Ethernet connections are aborted and the PROFINET device names can now be assigned.



- Make sure you are in the bus configuration workspace.
- In the bus configuration, select the PROFINET IO device which is to be assigned the name.
- Select the "PROFINET Settings" tab in the "Device Details" window.
- Change the device name under "DNS/PROFINET Device Name".
- In the "Device Details" window, select the "PROFINET Stationnames" tab.

When the tab is selected, the list is updated. If you would like to update the list again later, click on "Refresh".

In order to limit the search results, various options are available:

No constraints	All devices that are available in the network are listed.
Unnamed	All those devices that do not yet have a PROFINET device name are listed.
Not in project	All those devices that are not included in the project are listed.
Same type	Only those devices that are the same type as the device selected in the bus configuration are listed.

Selected Device Name: ihilb-dio23. Device Type: ILB PN 24 Available on Network Name fl-switch-mcs-16tx ile-390.pr1	quickstart.de D116 DI016-2TX Type [I0D]: FL SWITCH MCS 16TX	IF Subi Default MAC Address	PAddress: 192.1 net Mask: 255.2 Gateway:	168.0.4 255.255.0	
Available on Network           Name         Illine interview           fl-switch-mcs-16tx         illine 390-pn1	Type (IOD): FL SWITCH MCS 16TX	MAC Address	ID Address		
Name fl-switch-mcs-16tx ilc-390-pn1	Type [IOD]: FL SWITCH MCS 16TX	MAC Address	ID Address		
i⊪ino-unoz-s quickstart.de il-pn-bk24. quickstart.de fl-pn-ibs25. quickstart.de	[IOD/IOC]: ILC 390 PN 2TX-IB [IOD]: ILB PN 24 DI16 DI016-2TX [IOD]: IL PN BK DI8 D04 2TX [IOD]: FL PN/IBS	00:A0:45:05:F0:A4 00:A0:45:26:3E:74 00:A0:45:02:FB:15 00:A0:45:02:81:15 00:A0:45:07:81:1A	0.0.0 0.0.0 0.0.0 0.0.0 0.0.0 0.0.0 0.0.0	0000 0000 0000 0000 0000 0000	
Filter: unnamed	not in Project		same Type		
Flashing On	Assign Name Delete Nam	e Assign	IP	Refresh	
5 PROFINET devices reachable on the network!					
	Filter: unnamed	Filter:       unnamed       not in Project         Flashing On       Assign Name       Delete Nam         5 PROFINET devices reaches         PROFINET Settings       Image: PROFINET Stationnames       Image: Profine stationnames	Filter:       unnamed       not in Project         Flashing On       Assign Name       Delete Name       Assign         Flashing On       Assign Name       Delete Name       Assign         5 PROFINET devices reachable on the network!       PROFINET Settings       PROFINET Stationnames       Set Bus interfaces       Data sheet	Filter:       unnamed       not in Project       same Type         Flashing On       Assign Name       Delete Name       Assign IP         5 PROFINET devices reachable on the network!         PROFINET Settings       ## PROFINET Stationnames       # Bus interfaces       Bot a sheet	

Figure 6-8 List of all PROFINET IO devices that can be accessed in the network

In the "Selected Device" area, the PROFINET IO device name specified under "IP Settings" is displayed.

• From the list, select the corresponding PROFINET IO device (e.g., using the indicated MAC address).

Bus Structure 🕴 🔻	Device Details					4 1		
🖃 🏄 Quickstart_PN	il-ilb-dio23.quickstart.de 192.168.	0.4 (PROFINET Stationnames)						
ILC 390 PN 2TX-IB 192.168.0.2	Selected Device							
R STD RES ILC390PN	Name: ikib.dio	22 guidketart de		Address: 192	169.0.4			
	Device Tunes II P PM		" •.+	met Masky 2651	DEE 2EE 0			
<ul> <li>Image: Second state of the second</li></ul>	Device Type. ILB PN	24 0116 01016-217	Default	233.233.0				
2 Ports	Available on Network	Available on Network						
Indiana Structure 192.168.0.4 Diana Structure 192.168.0.4	Name	Туре	MAC Address	IP Address	Subnet Mask			
1 DIO16: ILB PN 24 DI 16 DIO16-2TX	fl-switch-mcs-16tx	(IDD]: FL SWITCH MCS 16TX)	00:A0:45:05:F0:A4	0.0.0.0	0.0.0			
🛛 🖓 2 DI16: ILB PN 24 DI 16 DIO16-2TX	ilc-390-pn1	[IOD/IOC]: IEC 390 PN 2TX-IB	00:A0:45:26:3E:74	0.0.0.0	0.0.0			
🕀 🎦 il-pn-bk24.quickstart.de 192.168.0.5	il-ilb-dio23.quickstart.de	[IOD]: ILB PN 24 DI16 DI016-2TX	00:A0:45:02:FB:15	0.0.0.0	0.0.0.0			
😥 💕 fl-pn-ibs25.quickstart.de 192.168.0.6	il-pn-bk24.quickstart.de	[IOD]: IL PN BK DI8 DO4 2TX	00:A0:45:04:50:C8	0.0.0	0.0.0.0			
	inpinuszu; quickstar, u	9 (IOD) I'L HWID3	00A04307.01.1A	0.00.0				
	Filter: unnamed	🗌 not in Project		same Type				
	Flashing On	Assign Name Delete Nam	ne Assign		Refresh			
		5 PROFINET devices reacha	able on the network!					
	PROFINET Settings	ROFINET Stationnames 🛛 🧘 Bus interfac	es 📄 Data sheet					
Fig	ure 6-9 Selecti	ng the device						

A flashing display can be triggered on the device via "Flashing On". This display can be used to find the selected device in the field.

When the button is activated, the devices in the example system flash as follows:

ILB PN 24 DI16 DIO16-2TX	RDY LED flashing
FL IL 24 BK-PN-PAC	Double-zero flashing on the 7-segment display
FL PN/IBS	Double-zero flashing on the 7-segment display

The flashing process is also indicated in the list.

• Send the name to the device via "Assign Name".

1

If you receive an error message, first delete the name via "Delete Name" and then assign the name again.

The PROFINET device name is transferred from the PC to the PROFINET IO device. The previous parameters are still displayed as the IP parameters. The IP parameters are not assigned until the next step.

- Assign the appropriate PROFINET device name to each PROFINET IO device.
- Compile the project, send it to the controller, and perform a cold restart (see "Compiling and sending a project, and performing a cold restart" on page 4-40).

#### 6.19.2 Renumbering devices

There is also the option of automatically regenerating the IP parameters (e.g., IP addresses, Domain Postfix) for all devices. The settings from the project information are used for this.

- Select the project node.
- Select "Renumber Devices/Whole project" and then the menu item for renumbering the devices (e.g., "All DNS/PROFINET Device Names").



Figure 6-10 Renumbering devices

In this example, the newly specified names (e.g., il-ilb-dio27) are extended to include the Domain Postfix "quickstart.de" specified in the project node. This is the complete PROFINET device name.

• If necessary, the IP addresses can also be renumbered, e.g., to view the IP addresses in the bus configuration in ascending order.





Renumbering devices (PROFINET device names and IP addresses)

All the devices **in the project** now have the correct IP parameters. In the section below, these parameters must **actually** be assigned to the devices.

• Compile the project, send it to the controller, and perform a cold restart (see "Compiling and sending a project, and performing a cold restart" on page 4-40).

### 6.19.3 Assigning IP parameters for the PROFINET IO device

In order to enable the connected INTERBUS modules to be read into the bus configuration, the IP parameters must be assigned to the PROFINET IO devices.

There are two options for assigning IP parameters. Select an option based on the specified requirements.

# 6.19.3.1 Option 1: IP parameter assignment during PROFINET IO controller startup

This option always works provided the PROFINET IO controller is able to establish communication with the PROFINET IO devices.



- Make sure you are in the bus configuration workspace.
- In the "Device Details" window, select the "PROFINET Stationnames" tab. You can later check whether the IP parameters have been assigned.
- Compile the project, send it to the controller, and perform a cold restart. Proceed as described in "Compiling and sending a project, and performing a cold restart" on page 4-40.

During startup, the PROFINET IO controller assigns the IP parameters specified in the project to the PROFINET IO devices.

Click on "Refresh".

The updated list contains the PROFINET IO devices together with their PROFINET device names and the IP parameters.

Name	Туре	MAC Address	IP Address	Subnet Mas
fl-switch-mcs-16tx	[IOD]: FL SWITCH MCS 16TX	00:A0:45:05:F0:A4	192.168.0.3	255.255.255.
ilc-390-pn1	[IOD/IOC]: ILC 390 PN 2TX-IB	00:A0:45:26:3E:74	192.168.0.2	255.255.255.
il-ilb-dio23.quickstart.de	[IOD]: ILB PN 24 DI16 DI016-2TX	00:A0:45:02:FB:15	192.168.0.4	255.255.255
il-pn-bk24.quickstart.de	[IOD]: IL PN BK DI8 DO4 2TX	00:A0:45:04:50:C8	192.168.0.5	255.255.255
fl-pn-ibs25.quickstart.de	[IOD]: FL PN/IBS	00:A0:45:07:81:1A	192.168.0.6	255.255.255
	Durat in Desirat		T	

Figure 6-12 All devices with PROFINET device names and IP parameters

# 6.19.3.2 Option 2: IP parameter assignment without project on the PROFINET IO controller

This option is specifically designed to read in INTERBUS modules that are connected to a PROFINET IO device **without** first sending a project to the PROFINET IO controller.

#### This option only works under the following conditions:

- There is no project on the PROFINET IO controller, i.e., the PROFINET IO controller did not yet establish a connection to the PROFINET IO devices.
   Or
- There is no connection between the PROFINET IO controller and the PROFINET IO devices (Ethernet cable not plugged in or no supply voltage at the PROFINET IO controller).

In each case, the **BF LED must flash** on each of the PROFINET IO devices. If the BF LED of a PROFINET IO device does not flash, no IP parameters can be assigned to this device as it is currently communicating.

- Select the device to which you would like to assign the IP parameters. Proceed as described in "Transferring PROFINET device names and IP settings to PROFINET IO devices" on page 6-10.
- Send the IP parameters to the device via "Assign IP".
- Assign the IP parameters to each PROFINET IO device.

Name	Туре	MAC Address	IP Address	Subnet Mask		
fl-switch-mcs-16tx	[IOD]: FL SWITCH MCS 16TX	00:A0:45:05:F0:A4	192.168.0.3	255.255.255.0		
ilc-390-pn1	[IOD/IOC]: ILC 390 PN 2TX-IB	00:A0:45:26:3E:74	192.168.0.2	255.255.255.0		
il-ilb-dio23.quickstart.de	[IOD]: ILB PN 24 DI16 DI016-2TX	00:A0:45:02:FB:15	192.168.0.4	255.255.255.0		
il-pn-bk24.quickstart.de	[IOD]: IL PN BK DI8 DO4 2TX	00:A0:45:04:50:C8	192.168.0.5	255.255.255.0		
fl-pn-ibs25.quickstart.de	[IOD]: FL PN/IBS	00:A0:45:07:81:1A	192.168.0.6	255.255.255.0		
ilter: unnamed 🗌 not in Project 🔲 same Type						

Figure 6-13 All devices with PROFINET device names and IP parameters

Now the INTERBUS modules connected to the devices can be read in.

If there was already a project on the PROFINET IO controller and the connection was aborted in order to send the IP parameters, please note the following:

On startup, the PROFINET IO controller starts up the PROFINET IO devices with the IP parameters stored in this project (which may be an old one). Only after compiling, sending, and performing a cold restart for the new project can the IP parameters be transferred from this project to the PROFINET IO devices.



If error messages are displayed and the IP parameters are not applied:

Check whether the **BF LED is flashing**. **If so**: Check all Ethernet connections as well as your previous actions. **If not**: You cannot assign any IP parameters. Either interrupt communication or proceed according to "Option 1: IP parameter assignment during PROFINET IO controller startup" on page 6-19.

# 7 Example project for a simulation with processor type "IPC" controllers

For processor type "IPC" controllers (RFC 4xx and S-MAX 4xx), PC WorX can be used to simulate a project completely without hardware. A program can be created and tested without having to actually connect hardware. The EasySim simulation in PC WorX is available for this.



For more detailed information about the EasySim simulation, please refer to the online help for PC WorX.

# 7.1 Project description

In the following, an example project is developed for the simulation using function block diagram (FBD).



In order to obtain the best possible results, please use the same identifiers and names as used in this manual.

Project name: SIM

Project hardware:

- Controller: RFC 430 ETH-IB
- Bus coupler: IBS IL 24 BK T/U
- I/O modules: IB IL 24 DO 16, IB IL 24 DO 8, and IB IL 24 DI 8



Figure 7-1 Example bus configuration

#### PC WorX

#### Inputs and outputs/process data

Inputs and outputs used in the example including process data and assigned variables.

• •				
Device	Inputs/outputs according to the device data sheet	Signal at	Variable	Process data item
IB IL 24 DI 8	Input IN1 Input IN2 Input IN5	Co 1 TP 1.1 Co 1 TP 2.1 Co 3 TP 1.1	S1 IN2 IN3	1.1.1 1.2.1 3.1.1
IB IL 24 DO 8	Output OUT1 Output OUT6	Co 1 TP 1.1 Co 3 TP 2.1	OUT1 OUT2	1.1.1 3.2.1
IB IL 24 DO 16	Outputs OUT1 to OUT16	Co 1 to 4 TP x.1 and x.4	VO	~DO16
No assignment required	t		T1 T2	

Co Connector

TP Terminal point

x Row on the Inline connector

# 7.2 Sequence for creating the simulation project

The sequence for creating the simulation project is shown in Figure 7-2.

When implementing the project, all of the tasks are performed offline (without a connection to the system).





## 7.3 Creating a new project



See also "Creating a new project" on page 4-3.

- Select the "New Project..." command from the "File" menu.
- Select the RFC 430 ETH-IB controller and confirm your selection with "OK".
- Select the "File, Save Project As / Zip Project As..." command.
  - Enter the project name "SIM" and save the project.



If you want to use a different controller for the example project then select a different project template. Please note that the following descriptions may differ. Always select only one processor type "IPC" controller.

# 7.4 Specifying project information



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See also "Specifying project information" on page 4-4.

- Switch to the bus configuration workspace.
- Adapt the project information to your project.

# 7.5 Checking/modifying IP settings for the controller



See also "Checking/modifying IP settings for the controller" on page 4-7.

The IP settings for the controller are made when the project is created.

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#### NOTE: Changes to project information are not applied automatically

If any modifications are made to the project information that affect the IP settings for the controller, a warning is displayed. However, the modification is not implemented automatically. When a new project is created, the default settings are specified under the IP settings.

Adapt these settings, if necessary.



- Switch to the bus configuration workspace.
- Select the controller node.
- In the "Device Details" window, switch to the "IP Settings" tab.
- Check the IP settings and modify them, if necessary.

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The IP address that is assigned here for the controller is also implemented as the IP address for the communication path via TCP/IP.

# 7.6 Manually inserting INTERBUS devices



See also "Manually inserting INTERBUS devices" on page 4-12.

The following devices are used for the example project:

- Controller: RFC 430 ETH-IB
- Bus coupler: IBS IL 24 BK-T/U
- I/O modules: IB IL 24 DO 16, IB IL 24 DO 8, and IB IL 24 DI 8
- Select a point in the "Bus Structure" window where a device is to be inserted. To insert the bus coupler, select the INTERBUS node for the controller, as the first INTERBUS device can only be inserted here.
- In the device catalog, open the product range for the inserted device (e.g., IL for Inline) under "Phoenix Contact".
- Under the product range, open the product group (e.g., bus coupler, I/O digital).
- Select the device to be inserted (e.g., IBS IL 24 BK-T/U).
- Hold down the mouse button and drag the selected device to the insertion point.
- Insert all the other devices.

In the example: Insert the Inline modules (I/O digital) below the bus coupler.

The bus configuration with the INTERBUS modules used in the example is shown in Figure 7-3.



Figure 7-3

Complete bus configuration for the example project

# 7.7 Compiling after completing the bus topology



See also "Compiling after completing the bus topology" on page 4-16.

• Select the "Rebuild Project" command from the "Build" menu.

## 7.8 Creating the program

To program the example program, proceed as described in "Example program" on page 8-1.

• Set variable V0 to initial value 1. This set bit is then rotated to the left during program processing.

It is now assumed that you have created the program. If you skip this point, this may result in deviations.

# 7.9 Compiling after creating the program



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See also "Compiling after creating the program" on page 4-17.



Select the "Build, Make" command.

## 7.10 Assigning process data



See also "Generating variables and assigning process data" on page 4-18.



• Switch to the process data assignment workspace to assign the variables to the process data.

- Select the controller in the top right window. The standard configuration is then displayed in the top left window, "Symbols/Variables".
- In the top left window, "Symbols/Variables", select the standard resource (STD\_RES: RFC430ET in the example).
- In the top right window, select the device for which you would like to link the process data to variables (IB IL 24 DO 16 in Figure 7-4).
- Select the process data item to be linked (~DO16 in Figure 7-4).
- Variables are created when the program is created. Using drag & drop, link the selected variable to one of the variables on the left-hand side (V0 in Figure 7-4).

Process Data Assi Symbols/Variables STD_CNF S	gnment : IPC_40 RES : RFC430 efault ystem Variable TD_TSK : DEF. ] Main : Main	ET IS AULT		SIM     SIM     RFC 430 ETH-IB 192.166.0     Resource     R assource     R To_RES RFC430ET     REBUS     INTERBUS     INTERBUS     INTERBUS     INTERBUS     ID IL 24 DO 16     ID IL 24 DO 16     ID IL 124 DO 8     ID IL 124 DO 8	.2 T					<del>4</del> • 🖬
Symbol/Variable	Data Type	Process Data Item	Description	Device	Process Data Item	I/Q	Data Type	Byte.Bit	Address	Symbol/Vari
51	BOOL			IB IL 24 DO 16	1.1.1	0	BOOL	1.0		
OUT1	BOOL			IB IL 24 DO 16	1.2.1	õ	BOOL	1.1		
VO	WORD	IB IL 24 DO 16 \~DO 16		IB IL 24 DO 16	1.1.4	õ	BOOL	1.2		
IN2	BOOL			IB IL 24 DO 16	1.2.4	Q	BOOL	1.3		
IN3	BOOL			IB IL 24 DO 16	2.1.1	Q	BOOL	1.4		
OUT2	BOOL			IB IL 24 DO 16	2.2.1	Q	BOOL	1.5		
				IB IL 24 DO 16	2.1.4	Q	BOOL	1.6		
				IB IL 24 DO 16	2.2.4	Q	BOOL	1.7		
				IB IL 24 DO 16	3.1.1	Q	BOOL	0.0		
				IB IL 24 DO 16	3.2.1	Q	BOOL	0.1		
				IB IL 24 DO 16	3.1.4	Q	BOOL	0.2		
				IB IL 24 DO 16	3.2.4	Q	BOOL	0.3		
				IB IL 24 DO 16	4.1.1	Q	BOOL	0.4		
				IB IL 24 DO 16	4.2.1	Q	BOOL	0.5		
				IB IL 24 DO 16	4.1.4	Q	BOOL	0.6		
				IB IL 24 DO 16	4.2.4	Q	BOOL	0.7		
				IB IL 24 DO 16	~DO 16	Q	WORD	0.0		STD_CNF ST
				<						>

Figure 7-4 Variable V0

The created variable is displayed in the bottom left window.

• Repeat this procedure for all inputs to be evaluated and for all outputs to be controlled.

The result of the process data assignment process is shown in the figure below.

Process Data Assi	gnment									🕂 🔻 🖾
Symbols/Variables       ■ STD_CNF: IPC_40       ■ STD_CR5: IFC430ET       ■ DeFault       II System Variables       ■ STD_TSK: DEFAULT       II System Variables			SIM     RFC 430 ETH-IB 192.168.0.     RR essource     R Resource     R RESOURCE     NITERUS     ID IL 24 BK T/U     ID IL 24 DK T/U     ID IL	2						
Symbol/Variable	Data Type	Process Data Item	Description	Device	Process Data Item	I/Q	Data Type	Byte.Bit	Address	Symbol/Vari
51	BOOL	IB IL 24 DI 8 \1.1.1		IB IL 24 DI 8	1.1.1	I	BOOL	0.0		STD_CNF ST
OUT1	BOOL	IB IL 24 DO 8 \ 1.1.1		IB IL 24 DI 8	1.2.1	I	BOOL	0.1		STD_CNF ST
VO	WORD	IB IL 24 DO 16 \~DO 16		IB IL 24 DI 8	2.1.1	I	BOOL	0.2		
IN2	BOOL	IB IL 24 DI 8 \1.2.1		IB IL 24 DI 8	2.2.1	I	BOOL	0.3		
IN3	BOOL	IB IL 24 DI 8 \ 3.1.1		IB IL 24 DI 8	3.1.1	I	BOOL	0.4		STD_CNF ST
OUT2	BOOL	IB IL 24 DO 8 \ 3.2.1		IB IL 24 DI 8	3.2.1	I	BOOL	0.5		
				IB IL 24 DI 8	4.1.1	I	BOOL	0.6		
				IB IL 24 DI 8	4.2.1	I	BOOL	0.7		
				IB IL 24 DI 8	~DI 8	I	BYTE	0.0		
				1						
				5 x 10						
]				<						>

Figure 7-5 All used variables and assigned process data

#### Setting the communication path 7.11

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See also "Setting the communication path" on page 4-26.

#### Switch to the bus configuration workspace to set the communication path.

- In the "Bus Structure" window, select the node for the controller.
- Select the "Communication" tab in the "Device Details" window.
- Select the "Simulation" interface type.
- Activate the EasySim simulation by clicking on "Apply".

#### 7.12 Compiling and sending a project, and performing a cold restart

See also "Compiling and sending a project, and performing a cold restart" on page 4-40.

**Compile project** 

Send project



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Open the project control dialog box.

Select the "Build, Make" command.

The EasySim simulation is started when the project control dialog box is opened. This is shown in the taskbar with the following icon:



< D 🙀 12:0

Figure 7-6 EasySim simulation: Icon in the taskbar

- Click on "Download" in the project control dialog box.
- In the "Download" dialog box that opens, activate the "Ensure real-time for Download ٠ Changes" and "Include Bootproject" checkboxes in the "Project" area.
- Click on "Download" in the area on the left.

When sending, the project is written to the main memory of the simulated controller.

٠ Open I/O view of the simulation by selecting the corresponding menu item in the context menu for the EasySim icon in the taskbar.

#### Example project for a simulation with processor type "IPC" controllers

🕞 EasySim 1 H **#** << 1/0s Hide Y V Name Value Preset 1 Preset 2 Preset 3 Data type Description Terminal 🕸 S1 0 0 BOOL **≪**⊅ OUT1 ۲ BOOL %QX2.0 WORD \*> V0 16#0000 %QVVD 健 IN2 BOOL %IX0.1 C IN3 BOOL %IX0.4 CUT2 BOOL %QX2.5 Set Preset 2 Set Preset 3 Set Preset 1 Expert Mode >

Only the states of the global variables that have been linked to a physical address (inputs/outputs) as part of process data assignment are displayed in the simulation.



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Using the "Preset..." column, the states of the input values can be preset (click on green LEDs). These can be activated using the corresponding buttons.

#### **Cold restart**

Perform a cold restart as described in "Compiling and sending a project, and performing a cold restart" on page 4-40.

Α	STD_RES		В	STD_RES	_ 🗆 🗙
	State: Stop	Ì		State: Run	V
	<u>S</u> top			Stop	C <u>o</u> ld
	<u>R</u> eset	<u>W</u> arm		<u>R</u> eset	<u>W</u> arm
		Hot			Hot
	Download	Upload		Download	Upload
	Error	Info		Error	Info
	<u>C</u> lose	Help			<u>H</u> elp
		Deufeure			



Performing a cold restart

The cold restart activates the project. The simulation can now be started.

# 7.13 Operation

#### 7.13.1 Setting the task properties

If no settings have been made for the task, a default task is used. If necessary, change the properties of the task (in the example below a default task is changed to a cyclic task).

- Switch to the IEC programming workspace.
- Select "STD\_TSK : DEFAULT".

**F** 

• In the context menu, select the "Properties..." menu item.



Figure 7-9 Standard task: Properties

• Under type, select "Cyclic". This selects a cyclic task.

'STD_TSK'	×
Name Type	
Task Type:	
DEFAULT	
DEFAULT	
EVENT SYSTEM	
OK Cancel Apply Help	

Figure 7-10 Standard task: Type

• Apply your setting with "Apply".

• Change the setting, e.g., to 1000 ms (see Figure 7-11 on page 7-11).

Task settings for	r IPC_40	
Interval:	1000 ms	ОК
<u>P</u> riority:	0	Cancel
Watchdog Time:	500 ms	<u>H</u> elp
Stack:	Options:	
<ul> <li>Sm<u>a</u>ll</li> <li>Medium</li> <li>Large</li> <li>XLarge</li> </ul>	Save FPU Bypass No Suspend	

Figure 7-11 Changing the setting

- Confirm your settings with "OK".
- Compile the project, send it to the controller, and perform a cold restart.

If the process is now running too slowly, change the settings.

- In the standard task context menu, select the "Settings..." menu item.
- Change the setting, e.g., to 250 ms.
- Compile the project, send it to the controller, and perform a cold restart.

#### 7.13.2 Simulation and debug mode

Following the cold restart, the animated arrows (see figure below) indicate that the simulation is running. The arrows "move" from left to right.



The program simulation can now be started. To monitor all variables, switch to debug mode. The status of the variables can be monitored online in debug mode.



- Activate debug mode.
- Switch to the IEC programming workspace.
- Switch to the window that provides the best display of the required information. The "MainV" window has been selected for the description below.
- Arrange the screen display so that the "MainV" and "EasySim I/O View" windows can be seen.

Project Tree Window	- T 🛛 🕅	Name	Online value	Tupe	Usage	Description	<b>Address</b>	Init	Betain	lennlo	PC TR	П
😑 🔄 Project : C:\Documents and Settin	gs\pypmC	Default	onano raido	1900	otago	Decemption	Hadroot	1116	riotain	1.0010		<u> </u>
- Libraries		M	EALSE	8001	AR EVTERNAL							T F
🖨 🔄 Data Types		7	15,000	TIME	AR_DOTENNAL	-		T#15000ms				
🖃 sys_flag_types			FALSE	BOOL	AR EVTERNAL	-		1#100001110				1
🖨 🔄 Logical POUs		·0	0.000	TIME	AR_DOTEINAL							÷
🖮 🔲 Main		2/0	16#0001		AR EVTERNAL							1
🔚 🚺 MainT		10	FALSE	POOL 1	AR_CATERNAL							1
MainV		42	FALSE	BOOL	AR_EXTERNAL							
🗗 Main			FALSE	BOOL	AR_EXTERNAL							
🗉 💼 Physical Hardware		D 1	I ALOL	TD 1	AR_CATERIAR							
		·_·			100							
												>
🗇 🛍 🛄 🌆		Main:Main	ainV:Main									_
			an w.w.an									
A										(		
😕 EasySim 1												$\mathbf{\nabla}$
	1									1		1
	7									<< 1/0s	Hide	
	-											
Value	Preset 1	Preset 2	Preset 3	Data t	ype Description	n Terminal						
1 🗌 😂 S1 🧊 🧳		<i>(</i>	<b>a</b>	BOOL		%IX0.0						
2 🗌 📽 OUT1 🌘				BOOL		%QX2.0						
3 🗌 📽 V0 16#0	0001			WORD		%QVV0						
4 🗌 🖙 IN2 🧳	A 1	<b>a</b>	<u> </u>	BOOL		%IX0.1						
5 🗌 🔿 IN3 🧳	A 1	A 1	<b>(</b>	BOOL		%IX0.4						
6 🗌 🗋 🚓 OUT2 👘 🙆				BOOL		%QX2.5						
Cat Brand 1 Cat Brand 2	Cat Provat 2	1								Furrer	t Mode à	
Set Preset 1 Set Preset 2	Set Preset 3									Exper	t Mode >	,

Figure 7-13 Program output state

In the program output state, S1 = FALSE, all LEDs are off, and variable V0 is set to initial value "1" (16#0001).

In I/O view, click on the green LED for input S1. The following actions are performed (see Figure 7-14 on page 7-13):

- Variable S1 = TRUE (see S1 in the "MainV" window)
- The counter for the elapsed time, T2, is started (see T2 in the "MainV" window).
- Output 0 of IB IL 24 DO 8 (variable OUT1) is set.
- The chasing light is started (see change to V0 in the "MainV" window or in I/O view).
   Since only the physical outputs that have been linked to a variable as part of process data assignment are displayed in the simulation, the individual outputs of the IB IL 24 DO 16 cannot be shown in this example project. Display is by means of WORD variable V0.

Project Tree Window	N		Name In	Inline velual	Tupe	Usage	Description	Address	l loit	Betain	ennlos	or TP	T
🖃 🔄 Project : C:\I	Documents and Set	tings\pypmC	E Default	shimle value	Type	osage	Description	Addless		ricialit	100 01	0 10	1
🗌 🛄 Libraries				RUE	BOOL V.	AR EXTERNAL							
🖨 🔄 Data Tyj	pes		ri 1	5.000	TIME V.	AR			T#15000ms			1 8	
	flag_types			RUE	BOOL V.	AR EXTERNAL			THE TOODONING				
🚊 🚖 Togical F	POUs		12 3	240	TIME V.	AR						1 8	
🚊 🔲 Mair	n		V0 1	6#0008	WORD V.	AR EXTERNAL						1 8	
<b>i</b>	MainT		N2 F	ALSE	BOOL V.	AR EXTERNAL						i H	
<b>i</b>	MainV		N3 F	ALSE	BOOL V.	AR EXTERNAL						i H	
	Main		OUT2 F	ALSE	BOOL V.	AR EXTERNAL						iΠ	
🗄 🛅 Physical	Hardware		TP_1		TP V.	AR						iп	ti l
			-										
2		5 2											5
				_		illi							
9 🖻 🖳 🗓	Ψ <u>Ψ</u>		Main:Main 🔝 Maii	nV:Main									
EasySim 1											ſ		X
Casysiii 1											U		
		-											
	<i>8</i> 8	Y								<-	< 1/0s	Hide	
<u> 7</u> 1	lame Valu	le Preset 1	Preset 2	Preset 3	Data ty	pe Description	Terminal						
1 🗌 🕰 S1			A 1	<u> </u>	BOOL		%IX0.0						
2 📃 🗌 🗱 OUT	1 🧉				BOOL		%QX2.0						
3 🚺 🗌 🗱 VO	16	#4000			WORD		%QVV0						
4 🗌 🛋 🗠 IN2	Ø		<u> </u>	<u> </u>	BOOL		%IX0.1						
5 🚺 🔍 🔿 IN3	<b>(</b>		<i>(</i>	<b></b>	BOOL		%IX0.4						
6 🔄 🗌 🗱 ООТ	2 🧧				BOOL		%QX2.5						
								_					
Set Preset 1	Set Preset 2	Set Preset 3									Expert	Mode >	>

Figure 7-14 S1 has been activated

After 15 seconds the pulse output (variable OUT1) is set to FALSE, output OUT0 of the IB IL 24 DO 8 is switched off, and the chasing light is switched off (variable V0 stops with a random final value). Timer T2 has reached its final value of 15 seconds.

Project	t Tree W	indow	7 🕈		Name	Online value	Tupe	Usage	Description	<u>Address</u>	Init	Betain	lenni ne	CL TR H
□- <del>``</del>	Project	: C:\Documents	s and Settings\pyp	omC 🔤	Default		1	Oldgo	Docomption	Hadrood		riotain	1.00101	<u>of 10   11</u>
	📄 Libi	raries		51		TRUE	BOOL	VAR EXTERNAL						
Ē.	🔄 🗖	ta Types		T1		15.000	TIME	VAR			T#15000ms			
		sys_flag_types		0	JT1	FALSE	BOOL	VAR_EXTERNAL						
<b>-</b>	🔄 Log	gical POUs		T2		15.000	TIME	VAR						
	ė- <u>I</u>	Main			l	16#4000	WORD	VAR_EXTERNAL						
		📋 MainT		IN2	2	FALSE	BOOL	VAR_EXTERNAL						
		🔢 MainV		INS	}	FALSE	BOOL	VAR_EXTERNAL						
		🗊 Main		OL	JT2	FALSE	BOOL	VAR_EXTERNAL						i o i
	- 📰 Phy	vsical Hardware		TP	_1		TP	VAR						
<				2 4										2
lon	53 D@											_		<u> </u>
<b>A</b>	<u>س</u> س			- 🛃 M	lain:Main 🔝 M	tainV:Main								
🕞 Eas	ySim 1													. 🗆 🛛
22	- 1			1									1	1
5													<< 1/0s	Hide
	Y	Name	Value	Preset 1	Preset 2	Preset 3	Data	type Descriptio	n Terminal					
1	🗌 🕸	S1	<u>(</u> )		A 1	۵	BOOL		%IX0.0					
2	i 🗖 🐲	OUT1	0				BOOL		%QX2.0					
3	i 🗌 🗱	V0	16#4000				WORD		%QIV/0					
4	🔲 🕸	IN2	0		0	۵	BOOL		%IX0.1					
5	🔲 🕸	IN3	0	0		0	BOOL		%IX0.4					
6	1 🗠	OUT2					BOOL		%QX2.5					
Set	: Preset 1	Set Pr	eset 2 Set	Preset 3									Expert	Mode >>

Figure 7-15 Program run complete

If input S1 is set to TRUE when the maximum time is reached, T2 remains set to 15000. As soon as S1 switches to the FALSE state, T2 is set to 0.

• Activate and deactivate S1 to check the validity of this program part.

The program part with the AND block operates independently of the program part with the pulse timer (see Figure 7-16 on page 7-15).

• Activate/deactivate the simulated LEDs (by clicking) that are assigned to inputs IN2 and IN3.

Output OUT5 of the IB IL 24 DO 8 module responds according to the result of ANDing.



Figure 7-16 ANDing in "Main"

# 7.14 Switching from simulation to real hardware

Once you have successfully completed the simulation for your program, you can switch to your hardware. To do this, the actual bus configuration must correspond to the simulated bus configuration.

- Stop debug mode. To do this, click on "Debug on/off".
- Stop the simulation. To do so, click on "Stop" in the project control dialog box.
- Close the project control dialog box.
- Exit the simulation, e.g., via the "Exit" menu item in the context menu for the simulation icon in the taskbar.

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- Switch to the bus configuration workspace.
  In the "Device Details" window, switch to the "Communication" tab.
- Select the required communication path to enable you to communicate between PC WorX and your hardware (see "Setting the communication path" on page 4-26).
- Send the project to the controller and perform a cold restart (see "Compiling and sending a project, and performing a cold restart" on page 4-40).

# 8 Example program

A different example project is described in each of the previous sections. The various sections focus on the following topics:

- Section 5, "Example project for an INTERBUS system"
- Section 6, "Example project for a system consisting of PROFINET IO and INTERBUS"
- Section 7, "Example project for a simulation with processor type "IPC" controllers"

The procedure for creating the program in the software is the same. This is described in this section.

# 8.1 **Program description**

The program is created in function block diagram (FBD).

The program controls the following sequence:

On an edge change from FALSE to TRUE at input **IN**, a timer (**TP function block**) generates a pulse, which is output at output **Q** for the period of time **PT**. The associated output is set for this time. The state of the output is indicated at the corresponding status LED.

The elapsed time is output at output ET.

If IN switches from FALSE to TRUE for a second time while the pulse is still active (within PT), this does not affect the duration of the pulse generated at output Q. This signal is ignored.

If a TRUE signal is present at output **Q**, the **ROL function block** is activated, which rotates the operands associated with the **IN** input parameter bit-by-bit to the left. This means that for an initial value equal to 1, the associated outputs (e.g., OUT1 to OUT16 of a 16-bit module) switch in succession from FALSE to TRUE and back again. This state change is indicated by a "chasing light" at the corresponding status LEDs.

Once the pulse time has elapsed, the output that indicates the presence of the pulse and the chasing light are switched off.

Independent of this, inputs **IN1** and **IN2** are logically ANDed. IN1 and IN2 map the status of the inputs to which the toggle switches are connected. The result of ANDing is output at output **OUT** (OUT2).

## 8.2 Function blocks used



#### **TP timer function block**

Table 8-1	Timer TP_1
-----------	------------

Para- meter	Variable name	Data type	Use	Initial value	Description
IN	S1 <sup>*</sup>	BOOL	VAR_GLOBAL		Start: If a rising edge is detected, a pulse is generated.
PT	T1	TIME	VAR	T#15000ms	Pulse time Setting: 15 s = 15000 ms
Q	OUT1	BOOL	VAR_GLOBAL		Pulse output TRUE if IN = TRUE and ET < PT; FALSE if IN = FALSE or ET >= PT
ET	T2	TIME	VAR		Elapsed time

In this example, variable S1 is defined as a global variable to match the simulation example with the RFC 430 ETH-IB controller in Section 7. This means that the variable status can be displayed in the EasySim simulation.

In the examples in Section 5 and Section 6, a system variable is used for each of the onboard inputs of the ILC 390 PN 2TX-IB Inline Controller (ONBOARD\_INPUT\_BIT10). If you would like to use the example in this section for the projects in Section 5 and Section 6, do not connect input IN of the TP function block to variable S1, but to system variable ONBOARD\_INPUT\_BIT10 instead.

#### VAR/VAR\_GLOBAL (VAR\_EXTERNAL)

If a variable will only be used internally and will not be assigned to a process data item, it can be declared as VAR. However, if you would like to monitor this variable in the simulation, declare it as VAR\_GLOBAL. This is why in the example program the variables that are linked to a process data item (input/output) are declared as VAR\_GLOBAL.

In the "Global\_Variables" worksheet, these variables are indicated as VAR\_GLOBAL in the "Usage" column (see Figure 4-63 on page 4-48) and as VAR\_EXTERNAL in the POU variables worksheet (see Figure 4-60 on page 4-47).

#### BOOL\_TO\_DINT format conversion function block

To use the output signal of the TP\_1 block as the input signal for the ROL block, the format must be converted from BOOL to DINT.

Variables are not declared for this block.
### **ROL** rotation function block

Table 8-2	Rotate to le	eft ROL			
Para- meter	Variable name	Data type	Use	Initial value	Description
IN	V0	WORD	VAR_GLOBAL		Input value
N		DINT			Number of characters to be rotated (in the example 0 or 1, defined by OUT1)
(Out- put)	V0	WORD	VAR_GLOBAL		Output value ROL

### AND ANDing function block

Table 8-3AND ANDing function block

Para- meter	Variable name	Data type	Use	Initial value	Description
IN1	IN2	BOOL	VAR_GLOBAL		Input value 1
IN2	IN3	BOOL	VAR_GLOBAL		Input value 2
OUT	OUT2	BOOL	VAR_GLOBAL		Output value AND

### 8.3 **Programming**

For programming, proceed as follows:

- Switch to the IEC programming workspace.
  - Double-click on "Main" in the "Project Tree Window" to activate the IEC programming interface.
  - In the "Main" worksheet, click on the empty position where you would like to insert the function block.



Figure 8-1 IEC programming workspace

 In the "Edit Wizard" window, select the "TP" function block by double-clicking on the corresponding function block. Enter the name "TP\_1" for this function block in the "Variable Properties" window and confirm your entry with "OK".

Variable Properties		X
Name:	Definition scope	OK Cancel <u>H</u> elp
Description:	Show all variables of worksheets	

Figure 8-2 "Variable Properties" window

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The function block is inserted in the worksheet.





- Double-click on the "IN" input parameter of the function block to define the variable properties.
- In the "Variable Properties" window, enter or select the name for the "IN" input parameter under "Name".
- Enter the name S1.

Variable Properties		
Name: S1 Data Type: BOOL Usage: VAR_EXTERNAL Initial value: 1/0 address: Dgscription:	Definition scope ©ocol Local Variable Groups: Default Global Variable Groups: Global Variable Groups: Total Ardware STD_CNF STD_RES Default STD_RES Default STD_RES Default Main	OK Cancel Help
■ PDD ■ OPC ■ Hidden ■ Initvalue as default	Show all variables of worksheets	

Figure 8-4 "Variable Properties" window: S1 (VAR\_GLOBAL)

- Specify the data type. The variable is a bit variable and therefore "BOOL" data type.
- Select "VAR\_GLOBAL" in the "Usage" selection box because the variable will later be assigned to a process data item.

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If you have created a variable as VAR, and you would like to use this later as VAR\_GLOBAL, to change it select "VAR\_GLOBAL" in the "Usage" selection box and confirm your selection with "OK".

- Confirm your entries with "OK".
- Double-click on the "PT" input parameter of the function block to specify the variable properties.
- In the "Variable Properties" window, enter the name "T1".
- "TIME" is specified in the "Data Type" selection box.
- Select "VAR" in the "Usage" selection box because the variable will only be used internally and will not be assigned to a process data item.
- Enter a pulse width of 15 seconds (T#15000 ms) as the "Initial value".

Name: T1 Definition scope           Definition scope	OK Cancel
Data Type:   TIME   Usage:   VAR   Initial value:   T#15000ms   I/0 addregs:   Description:	Help
PDD       OPC       Hidden         Initvalue as default       Show all variables of worksheets	

Figure 8-5 "Variable Properties" window: T1 (VAR)

- Confirm your entries with "OK".
- Proceed in the same way for the output parameters of this block. Use the values in Table 8-1 "Timer TP\_1" on page 8-2.





- Insert the BOOL\_TO\_DINT function block. A parameter declaration is not required for this block.
- Insert the ROL block.
- Declare the required parameters according to Table 8-2 "Rotate to left ROL" on page 8-3.
- Insert the AND block.
- Declare the required parameters according to Table 8-3 "AND ANDing function block" on page 8-3.

All function blocks are shown in Figure 8-7 with the required parameters.





Link the required inputs and outputs according to Figure 8-8 on page 8-8. To do this, proceed as follows:

• Select variable OUT1 and drag it to the same level as the BOOL\_TO\_DINT block.



- Activate the "Link" icon to link the objects.
- Click in the part of the line for output OUT1.
- Link this item to the input of BOOL\_TO\_DINT by dragging the mouse pointer onto the input and clicking on the input.

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Alternatively, without having to activate the "Link" icon, you can click in the part of the line for output OUT1 and, holding down the left mouse button, drag the mouse pointer onto the input of BOOL\_TO\_DINT. Release the left mouse button as soon as the input of BOOL\_TO\_DINT is highlighted.

Link the output of BOOL\_TO\_DINT to input N of the ROL block.

The finished program is shown in Figure 8-8 below.



### **Deleted and renamed variables**

Variables created during program creation are created in different worksheets. If you do not rename or delete a variable in all the workspaces it appears in, this will generate error messages when compiling. Please follow the corresponding instructions.

## 8.4 Setting the initial value

If you would like to set an initial value, proceed as follows:

- Switch to the IEC programming workspace.
  - Double-click on the "Global\_Variables" item.
- Set the initial value for the variables (here: V0 to initial value 1).

🗄 Project Tree Window 🛛 📮 🔻 🕅		1		L	I	I I.				-		
		Name	Туре	Usage	Description	Address	Init	Retain	PDD	OPC	TB   Hid.	🛆
Project : U:\Documents and Settings\pypmU/		🖃 Default										
Libraries		S1	BOOL	VAR_GLOBAL								
🖃 🔄 Data Types		OUT1	BOOL	VAR_GLOBAL		_						
sys_flag_types		1/0	WORD	VAR GLOBAL		1						
😑 🔄 Logical POUs		IN2	BOOL	VAR GLOBAL					<b>n</b>	T T		
🖻 🔲 Main		IN3	BOOL	VAR GLOBAL						<b>F</b>		
— 🚺 MainT		OUT2	BOOL	VAR GLOBAL					H	H-	F F	
		🖃 System Variables										-
- 🔂 Main		PLCMODE ON	BOOL	VAR GLOBAL	PLC mode ON	%MX1						
🖻 📾 Physical Hardware		PLCMODE RUN	BOOL	VAR GLOBAL	PLC mode RUN	%MX1			H	H	F F	
🖻 📾 STD_CNF: IPC_40		PLCMODE STOP	BOOL	VAR GLOBAL	PLC mode STOP	%MX1			H	H	F F	
🖻 📾 STD_RES : RFC430ET		PLCMODE HALT	BOOL	VAR GLOBAL	PLC mode HALT	%MX1			H	H	ㅋㅋ	
🖃 📾 Tasks		PLCDEBUG BPSET	BOOL	VAR GLOBAL	Breakpoint set	%MX1			H	H	ㅋㅋ	
⊡ STD_TSK : DEFAULT		PLCDEBUG FORCE	BOOL	VAR GLOBAL	Variable(s) forced	%MX1			<b>H</b>			
🖻 🔲 Main : Main		PLCDEBUG POWERFLOW	BOOL	VAR GLOBAL	Powerflow ON	%MX1			<b>H</b>	<b>H</b>		
📑 MainV		PLC TICKS PER SEC	INT	VAR GLOBAL	System ticks per second	%MV/1			H			
Global_Variables		PLC SYS TICK ONT	DINT	VAR GLOBAL	System tick count	%MD1			H	H		
IO_Configuration		PLC TASK AVAILABLE	INT	VAR GLOBAL	Number of available PLC tasks	%MV/1			<b>n</b>	<b>T</b>		
		PLC TASK DEFINED	INT	VAR GLOBAL	Number of used tasks	%MV/1			<b>n</b>	<b>T</b>		
		PLC TASK 1	Extended Task I	VAR GLOBAL	Task 1 information	%MB1				<b>H</b>		~
	<										>	2
	-	· · · · ·										
		🕨 Main:Main 📑 MainV:M	ain 📳 Global_Vari									
	_											

Figure 8-9 Setting the initial value (here: V0 = 1)

# 8.5 Additional options for PROFINET

The following additional data can be evaluated in a PROFINET IO system:

- For each PROFINET IO controller: System variables that indicate the configuration status
- For each PROFINET IO device: Pre-defined process data that indicates the status

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See also "Status information for a PROFINET IO system" on page B-1.

PC WorX

# A Additional software functions

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# A 1 Setting the realtime clock

In the "Extended Settings" tab, the time and date can be set for the internal system clock of the controller.

The current controller time is read and displayed every time the "Extended Settings" tab is opened. The display then indicates this value until the "Extended Settings" tab is opened again.

If you want to apply the system time and date from your PC:

Requirement: Connection between the PC and the controller.

- Switch to the bus configuration workspace.
- Select the controller node (e.g., "ILC 390 PN").
- Select the "Extended Settings" tab in the "Device Details" window.
- Click on the "System Time" button.
- Then immediately click on "Send" to transmit the data in the "Real-time Clock Settings" area to the controller.

If you would like to set different values:

- Enter the values for the time and date.
- Then click on "Send" to transmit the data in the "Real-time Clock Settings" area to the ILC 390 PN.

Real-t T	ime Clock Settings - ime:				
[	14:43:38			*	System Time
[	Date:				
	Mittwoch , 25.	Mai	2011	*	Send

Figure A-1 Realtime clock settings



# A 2 Options for modifying a project

PC WorX provides two functions that can be used to send project modifications to the controller(s) and activate them there without having to stop the active PLC.

Table A-1Options for modifying a project

Options:	Download changes	Online modifications				
Special features:	Send the entire project (also known as "Download Changes")	Only send the modifications that have been made, e.g., individual function blocks				
Sequence:	Debug mode ON: /	An error is detected				
	Debug mode OFF					
	Modify					
	Compile					
	Send via project control dialog box	Send via the "Build, Online Modifications" menu				
Application:	Extensive modifications	Minor modifications				
Advantage:	Fewer restrictions	Fast				

### A 2.1 Download Changes

For details of the controllers for which the "Download Changes" function is available, please refer to the "AH EN BASIC DATA ILC... / RFC... / FC..." application note.

### Download

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Download	$\mathbf{X}$
Project	Bootproject
Download	Download
Dow <u>n</u> load Changes	Activate
Ensure real-time for Download Changes     Include Bootproject	Delete on Target
Include <u>S</u> ources	
Do <u>w</u> nload Source	
User-Libraries	
Include User-Libraries	
Include Pagelayouts Include Bac <u>k</u> end-Code	
D <u>e</u> lete Source on Target	Download <u>Fi</u> le
<u></u> lase	<u>H</u> elp
Figure A-2 Download chang	ges



With the "Download Changes" function, the retain data is only retained if the current project has been saved to the parameterization memory.

Therefore, when sending activate "Include Bootproject" (see Figure A-2 on page A-2) to avoid inconsistencies. For additional information about retain handling, please refer to "Extended retain handling" on page A-8.

When downloading changes to one or more controllers, it is possible to specify whether the system should ensure the realtime behavior of the PLC before starting the download process.

If the "Ensure real-time for Download Changes" option is activated, the system attempts to execute the "Download Changes" function without violating the realtime conditions of the tasks executed on the controller.

If the modifications cannot be sent, for example, because the amount of data to be copied is too large, an error message is output. In this case, disable the "Ensure real-time..." option (i.e., permit realtime violations) so that all modifications can be executed.



### NOTE: Realtime violations - Consider the effects

If realtime violations are permitted, first ensure that your PLC application is running within safe limits. Please note that each realtime violation may result in unexpected consequences in the automation system, as under certain circumstances user tasks are not processed for a short time. Therefore, check the level of risk before disabling this option.



For more detailed information about the "Download Changes" function and ensuring realtime with detailed background information, please refer to the online help for PC WorX.

To determine when the "Download Changes" function can or cannot be used, please refer to the table below.

Table A-2	Application options and restrictions for "Download Changes"
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Area	Can be used after	Do not use after			
POU	<ul> <li>Modifying the code in existing POUs</li> </ul>	<ul> <li>Using an MSFC POU in the project</li> </ul>			
	<ul> <li>Using new POU types in a resource</li> <li>In principle, modifications in SFC POUs and states if the "Download Changes" function the execution of an SFC step chain could modifications include:         <ul> <li>Modifying a previous/subsequent rela</li> <li>Modifying step properties (type).</li> <li>Modifying step/action relationships.</li> <li>Modifying qualifiers (action qualifiers) In these cases, a warning is generated. Claprocess by confirming the warning.</li> </ul> </li> </ul>	e permitted. However, they can result in critical PLC is executed when the PLC is running. For example, be blocked if an active step is deleted. These SFC tionship.			
Variables	<ul> <li>Adding/deleting local and global variables</li> <li>Modifying local and global variables (including</li> </ul>				
	initial value)				

### PC WorX

Area	Can be used after	Do not use after
Data types	<ul> <li>Modifying the data type of variables, as a result of which the variables are reinitialized</li> </ul>	
	<ul> <li>Adding/deleting data types</li> </ul>	
	<ul> <li>Modifying data type declarations. Modified data variables are initialized.</li> </ul>	
	<ul> <li>Modifying the data area</li> </ul>	
Function blocks	<ul> <li>Declaring new function block instances (user/firmware)</li> </ul>	
Program	<ul> <li>Modifying comments in the program code</li> </ul>	
	<ul> <li>Adding/deleting program instances</li> </ul>	
Tasks	<ul> <li>Modifying task cycle times</li> </ul>	<ul> <li>Adding or deleting tasks</li> </ul>
	<ul> <li>Modifying watchdog times for tasks</li> </ul>	<ul> <li>Modifying task properties other than the cycle time and the watchdog time (i.e., task type, priority, event number, SPG assignment, stack size)</li> </ul>
I/O configuration	<ul> <li>Modifying driver parameters in the I/O configuration</li> </ul>	<ul> <li>Modifying VAR_CONF groups in the I/O configuration</li> </ul>
	<ul> <li>Adding/deleting an I/O group in the I/O configuration</li> </ul>	<ul> <li>Modifying I/O group properties other than the driver parameters (e.g., addresses, the driver itself, task assignment, etc.)</li> </ul>
Other	<ul> <li>Adding new configurations and resources</li> </ul>	

 Table A-2
 Application options and restrictions for "Download Changes" (Continued)

If a restriction is not observed, the system displays an error message in the "Message Window". Call the help information for the error message by right-clicking on the entry in the "Message Window" and selecting the "Message Help" context menu item. Undo the relevant modification, rebuild the project, and execute "Download Changes" again.



For more detailed information, please refer to the online help for PC WorX.

### A 2.2 Online modifications

"Online modification" of a POU means that in a single step the modifications in the project are compiled and the code is generated and automatically sent to the active PLC. During the entire process the PLC continues running, i.e., the program executed on the PLC is not interrupted during compilation and transmission.



The "Online Modifications" menu item is only available in offline mode. The affected worksheet can be set to online and offline mode via the "Debug on/off" icon in the toolbar.

"Online Modifications" can be called via the "Build, Online Modifications" menu item or via the corresponding icon (see "Frequently used icons for compiling and debugging" on page 3-4).

The "Online Modifications" command can be used in two ways:

1. Correcting errors in the code.

If a programming error is discovered in online mode and you have switched to offline mode to correct the error, the modifications made can be compiled with "Online Modifications".

2. Further development of a basic project.

In some cases it is easier and more convenient to develop a project using online modifications rather than via the "Make" command. Once a basic project has been compiled for the first time with "Make", this "skeleton project" can be completed by editing the individual POU code worksheets and using "Online Modifications" to add these extensions to the PLC program, which is already running on the target system.

In both cases, the modifications are sent automatically to the PLC without interrupting PLC operation, i.e., the modifications can then be seen in online mode.

To determine when the "Online Modifications" function can be used, please refer to the table below.

Area	Can be used after	Do not use after
Variables	<ul> <li>Adding new local and global variables</li> <li>Deleting variables which are not used in the CSV file (*.csv)</li> <li>Adding global variables which are not on direct inputs and outputs</li> <li>Removing variables from the program worksheet</li> <li>Adding a user-defined function block*</li> <li>* Requirement: An instance of this function block has already been declared in a variable worksheet</li> </ul>	<ul> <li>Modifying variable properties</li> <li>Modifying variable initial values (initialized variables cannot be modified online)</li> </ul>
Functions	<ul> <li>of any POU of the same resource</li> <li>Adding new IEC-defined functions</li> <li>Adding a user-defined function*</li> <li>Adding a function from a firmware or user library*</li> <li>* Requirement: This function has already been called in any POU of the same resource.</li> </ul>	<ul> <li>Modifying the formal parameters of functions</li> <li>Adding new formal parameters</li> </ul>
Function blocks	<ul> <li>Adding new IEC-defined function blocks</li> <li>Adding a user-defined function block*</li> <li>Adding a function block from a firmware library or a user library*</li> <li>* Requirement: An instance of this function block has already been declared in a variable worksheet of any POU of the same resource</li> </ul>	<ul> <li>Modifying the formal parameters of function blocks (VAR_INPUT, VAR_OUTPUT, and VAR_IN_OUT)</li> <li>Adding new formal parameters</li> </ul>
Other	See Table A-4 "Rules for the specific programming languages" on page A-7	<ul> <li>Modifying character strings/constants or user- defined character strings</li> <li>Deleting POUs or libraries</li> <li>Modifying the hardware structure</li> </ul>

Table A-3 Application options and restrictions for "Online Modifications"

Please note the following when modifying functions and function blocks:



For online modifications to be possible in the above cases, the project must have been compiled with "Make" and sent to the target system. In addition, online mode must already be active.

Lan- guage	Online modification possible after
All	<ul> <li>Adding line breaks and blank lines</li> </ul>
	<ul> <li>Adding or modifying comments</li> </ul>
IL	<ul> <li>Adding or modifying IL operators</li> </ul>
	<ul> <li>Modifying the nesting depth</li> </ul>
ST	<ul> <li>Modifying instructions or expressions</li> </ul>
FBD	<ul> <li>Modifying existing networks</li> </ul>
	<ul> <li>Modifying graphics, e.g., moving lines or function blocks</li> </ul>
	<ul> <li>Networks have been modified or added</li> </ul>
LD	<ul> <li>Modifying existing networks</li> </ul>
	<ul> <li>Modifying graphics, e.g., moving lines or function blocks</li> </ul>
	<ul> <li>Networks have been modified or added</li> </ul>
SFC	<ul> <li>Modifying variables, FBD or LD networks which are directly connected</li> </ul>
	<ul> <li>Modifying time intervals for time qualifiers</li> </ul>
	<ul> <li>Modifying variable names in action blocks</li> </ul>

### Table A-4 Rules for the specific programming languages



online again.

Use "Make" if online modifications cannot be implemented.

If some of the restrictions are not observed, the online modification process is aborted and a corresponding error message appears in the "Message Window". Once the "Online Modifications" command has been aborted, compile the project with "Make", and send it manually to the controller. Modifications can now be implemented



For more detailed information, please refer to the online help for PC WorX.

## A 3 Extended retain handling

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Retentive variables are declared with the keyword "RETAIN". The value of a retentive variable is retained even if the controller is switched off. The last value of the variable is used for a warm start.

**Application:** Your application program is already running on the controller. Modifications to the retentive variables are now required or new RETAIN variables must be added.

Without the retain handling function, a **cold restart** would have to be carried out after the modifications. In this case, all the variables are reinitialized.

With the retain handling function of the programming system, a controller cold restart is no longer required after the retentive variables have been modified. Instead, a **warm start** is possible.

The retain handling function receives the value of all retentive **symbolic** variables, by uploading them before the modified and newly compiled project is sent to the controller. Once the modified program has been sent to the controller, the system sends the previously saved variable values back to the relevant memory addresses.

Please note:

- When adding new retentive variables:

Each newly added variable is initialized with the assigned initial value on a warm start. If an initial value was not assigned when the new variable was declared, it is initialized with the default value for the relevant data type.

- When modifying existing retentive variables:

The retain handling function identifies each retentive variable using its instance path, variable name (not case-sensitive), and data type. If any one of these three items has been modified, the retentive variable is considered a newly declared variable and initialized (either with the declared initial value or with the default value, as described above).

Please note that modifications within a user-defined data type result in the initialization of all variables of this data type. Example: Following the modification of the data type of a structure, all elements in this structure are initialized (see above).

- When deleting retentive variables: Deleted retentive variables are not relevant for the retain handling function. However, it may be that the remaining retentive variables are moved to the memory image of the controller.
- When moving retentive variables:
   Please note that variables can be moved to the memory image of the controller if variables are added, deleted, and moved to the variables table.

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With the "Download Changes" function, the retain data is only retained if the current project has been saved to the parameterization memory.

Therefore, when sending activate "Include Bootproject" (see Figure A-2 on page A-2) to avoid inconsistencies.

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For more detailed information, please refer to the online help for PC WorX.

# A 4 Simulation

For processor type "IPC" controllers (RFC 4xx and S-MAX 4xx), PC WorX can be used to develop a project completely without hardware and to simulate operation. If you then install the hardware according to the simulated configuration, you can start up your project on the hardware by changing the communication path.

For an example of the simulation, please refer to Section 7, "Example project for a simulation with processor type "IPC" controllers".

# A 5 Comparing projects

The "Project, Compare Projects" menu can be used to compare two compiled projects.

- Open the first of the projects to be compared.
- In the "Project" menu, select the "Compare Projects" menu item.
- In the dialog box that opens, open the second of the projects to be compared.
- Open the project comparison workspace.

All the differences are displayed in table format in the "Project Comparison Result Window".

# A 6 Visualization

The data generated in PC WorX can be used in other programs, e.g., to visualize processes.

In order to use the data, AX OPC Server and/or a visualization software program are required.



For more detailed information about visualization and AX OPC Server, please refer to "AX OPC Server and WebVisit" on page C-1.

# A 7 Replacing a controller (hardware replacement)

To simply replace one controller with another, a wizard is provided for replacing complex devices. It may be necessary to replace the controller, e.g., if you have carried out the simulation of a project with an RFC 450 ETH-IB, but would like to use an ILC 370 PN 2TX-IB for the actual project.



- Switch to the bus configuration workspace.
- In the "Bus Structure" window, select the controller to be replaced (RFC 450 ETH-IB in Figure A-3 on page A-10).
- Open the context menu for the controller.
- Select the "Replace..." menu item.



Figure A-3 Replacing a device

The wizard opens.

• Confirm the window that opens with "Next".

The window displays a selection of all the controllers that can replace the controller currently used in the project.

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If the window is empty, the controller that is currently being used cannot be replaced with another one.

Select the new controller to be used (e.g., ILC 370 PN).



Figure A-4 Selecting the new controller

• Confirm your selection with "Next".

The wizard replaces the device.

Depending on which controllers are replaced with one another, the bus topology may have to be adapted. In addition, it may be necessary to insert additional devices.

In this example, a bus coupler (IBS IL 24 BK-T/U) is connected to the RFC 450 ETH-IB. This cannot be simply connected to the ILC 370 PN 2TX-IB. In order to continue using the bus coupler, a terminal with remote bus branch (e.g., IBS IL 24 RB-T) must be connected to the ILC 370 PN 2TX-IB.

If this type of adaptation is required, a window opens with a list of devices recommended for the adaptation.

• Select the device that you would like to use for the adaptation.

Complex Devices Exchange Wizard	
Adaptation of a connected network Please select a device.	$\odot$
The connected network must be adapted. This requires the insertion of an additional device.	
FLM BK IB M12 IBS IL 24 RB-LK IBS IL 24 RB-T DI 8 M12 Re Rev.>= xx RB-LK-2M IBS IL 24 RB-T Rev.>= xx	
IBS IL 24 RB-T-2M	
< <u>B</u> ack <u>N</u> ext> Cancel	Help

Figure A-5 Selecting the device to adapt the structure

The wizard indicates whether the controller was replaced successfully and also displays special information.

Complex Devices Exchange Wizard		
	Completing the Complex Devices Exchange Wizard You have successfully completed the Wizard. The configuration and resource type of the replaced device has changed compared to the original device. A new adapter was inserted in order to adapt your existing network to the replaced device. Please check whether the corresponding program has changed due to this adaptation. Click 'Finish' to close the Wizard.	
	Kack Finish Cancel Help	

Figure A-6 Completing replacement

- . . .
- Confirm replacement with "Finish".

The bus configuration with the new controller is displayed.



Figure A-7 Bus configuration with new controller

In the example, an INTERBUS controller was replaced with a PROFINET IO controller. When comparing the bus topology in Figure A-3 and Figure A-7, you can see that the structure has been adapted accordingly as a result of replacing the controller. The dedicated INTERBUS structure has been replaced by a PROFINET structure.

In this example, it would be better to connect the Inline terminals directly to the Inline Controller instead of using a branch terminal and a bus coupler.

- In this case, adapt the bus configuration.
- Move the Inline I/O terminals directly to the INTERBUS node of the controller.
- First delete the bus coupler (IBS IL 24 BK-T/U) and then the branch terminal (IBS IL 24 RB-T).



Figure A-8

A-8 Manually adapted bus configuration with new controller

# Adapting the standard configuration resource

In rare cases, the following error message may appear in the "Message Window" following controller replacement: "Resource: Invalid configuration type for resource "STD\_CNF.STD\_RES". The current type is "IPC\_40". However, type "ARM\_L\_40" is expected.", if so proceed as follows:

- In this case, first adapt the configuration then the resource.
- Switch to the IEC programming workspace.
- Open the context menu for the configuration and select the "Properties..." menu item.



Project Tree Window			<b>₽ ▼ </b>
Project : C.\Documents and Se     Libraries     Josta Types     Josta Typ	ettings\pypm07\De	esktop/PC Worx S	creensł
G - G STD_RES : F G - G Tasks G - □ STD	Insert Delete	► ENTF	
	Cut	STRG+X	
🙃 Global V, 🖻	Сору	STRG+C	
IO_Confic 🐚	Paste	STRG+V	
	Expand All		
	Save As <u>N</u> etwork	< Template	
	Define Place <u>h</u> old	ers	
<	Properties		>
Project 🖻 POUs 🕼 Lib 🕅	Settings		

Figure A-9 Configuration context menu: Properties

- Switch to the "Plc/Processor" tab.
- Select the corresponding processor type for the controller. In the example this is ARM\_L\_40.

GTD_CNF'	<
Name Plc/Processor Attributes Security	
PLC Type:	
IPC_40	
M68_32 IPC_40 IPC_72	
ARM_L_40 ARM_L_32	
ECCH	
OK Cancel Apply Help	)

Figure A-10 Selecting the processor type

• Confirm your selection with "Apply".

A message then informs you that under certain circumstances other parts of your project may have to be adapted.

PC WORX	
Due plea and	to the change of the PLC Type se check the settings of the resources the tasks and correct them if necessary!
	ОК
Figure A-	11 Warning

- Confirm the warning with "OK".
- Confirm the processor type selection with "OK".
- Open the context menu for the resource and select the "Properties..." menu item.



Figure A-12 Resource context menu: Properties

- Switch to the "Plc/Processor" tab.
- Select the corresponding processor type for the controller. In the example this is ILC370PN.

'STD_R	ES'		
Name	Plc/Processor	Attributes Security	
F			
j	ILC350ET	✓	
[	CP3XX EC350PCI		
	ILC330ET		
	ILC350ET	le	elp
	ILC370ET		
	ILC390PN		
ر Figure	A-13	Selecting the processor typ	е

Confirm your selection with "Apply".

A message then informs you that under certain circumstances other parts of your project may have to be adapted.

- Confirm the warning with "OK".
- Confirm the processor type selection with "OK".
- Compile the project to detect any errors.
- If special POUs have been used, adapt them accordingly.
- Compile the project.

### A 8 Device description files

Device description files are FDCML or GSD files, which provide a complete description of a device. If the device catalog does not contain a corresponding device description file, it must be imported.

### A 8.1 Phoenix Contact device description files

When PC WorX is reinstalled, the device description files for the devices available at the time are also installed. These descriptions are also found in the device catalog. When installing PC WorX service packs, new device description files are installed in folder "...\FDCML10\...\Phoenix Contact". These new descriptions are not included in the device catalog yet. They must be imported as necessary.

- Select "Phoenix Contact" in the "Device Catalog" window in PC WorX.
- Open the context menu and select "Import Device...".



Figure A-14 Device Catalog: Import Device

Select the device description file. If you have used the suggested standard installation, the files are located in directory:
 C:\Documents and Settings\All Users\Shared
 Documents\FDCML10\xxx\Phoenix Contact
 xxx = System (e.g., ETHERNET, INTERBUS, PROFINET)





Confirm your selection.

The "Message Window" indicates whether the device has been imported successfully.

### A 8.2 Device description files for Inline Controllers

If you have used the suggested standard installation, the device description files together with all configuration options for Inline Controllers are located in directory: C:\Documents and Settings\All Users\Shared Documents\FDCML10\INTER-BUS\Phoenix Contact\modification



Figure A-16

Directory for the device description files

- Copy the required device description file to directory: ...\FDCML10\INTERBUS\Phoenix Contact
- Proceed as described above.

# A 8.3 Device description files from other manufacturers (GSD files)

GSD files can be used to integrate devices from manufacturers other than Phoenix Contact in PC WorX.

- Copy the GSD file for your device, e.g., from the Internet to your PC hard disk.
- Select "Phoenix Contact" in the "Device Catalog" window in PC WorX.
- Open the context menu and select "Import GSD File...".



Figure A-17 Device Catalog: Import GSD File

Select the device description file and confirm with "Open".

PC WorX creates an entry for the device in the device catalog. This entry is located in directory: C:\Documents and Settings\All Users\Shared Documents\FDCML10\... (for standard installation).

The "Message Window" indicates whether the device has been imported successfully.

When reading a modular device, only the device, and not its modules, is displayed in the bus configuration.

Manually insert the modules for these devices. To do this, proceed as follows:

- Open the module catalog via "View, Module Catalog".
- Select the device modules one at a time from the module catalog and drag and drop them in the lower level below the device entry.

### A 8.4 Creating device description files

If a device description file is not available, one can be created. For this, a device description editor is included on the AUTOMATIONWORX Software Suite DVD.

## A 9 Ethernet topology

PC WorX can be used to automatically detect Ethernet topologies. All the Ethernet devices in the project can be displayed with the connections in the "Ethernet Topology" window. For all devices with LLDP functions, the connections are displayed automatically with the port number.

For this, there must be an online connection between PC WorX and a complete bus configuration.



For more detailed information about Ethernet topology view, please refer to the online help.

Ethernet topology view offers the following display options, which can be selected in the context menu:

Device context menu	
Device Properties	Call the "Device Properties" window via the context menu of a device. Properties include, e.g., IP Address, DNS/PROFINET Device Name, Device Name, Firmware Version, etc If required by your application, you can adapt the device properties using this dialog box.
Web Interface	Call the web interface of a device in the browser, if available (e.g., for a switch), via the context menu of the device in question.
Topology context menu	
Topology	You can update, delete, and read the Ethernet topology in again manually or in adjustable cycles. In addition, you can save a desired topology status or reopen a saved one.
Online View	The availability of devices can be shown online. Devices in the network that cannot be accessed are indicated.
	Devices that can be accessed are indicated with a green dot, devices that cannot be accessed are indicated with a red dot with a white cross. Any changes with regard to availability are displayed when the view is refreshed.
Link Mode	In link mode, the connections between connected devices can be marked if they are not displayed.
View The display in the "Ethernet Topology" window can be enlarged/reduced, printed, and product information ca displayed.	
Magnifier	The magnifier function enables you to enlarge/reduce the size of sections of the network in order to provide a detailed view of individual sections or a better overview of extensive network sections.

The connection information is displayed by clicking on a connection or port number in the topology.

For a clearer view of extensive networks, switches that have a lower-level network branch are displayed in a tab. To display a different network branch, click on the tab for the corresponding switch.

## A 10 INTERBUS topology



PC WorX can be used to automatically detect INTERBUS topologies. The INTERBUS structure can be viewed in the "INTERBUS Topology" window.

Figure A-18 INTERBUS topology for an INTERBUS system

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If this function is used with PROFINET, only the INTERBUS topology is displayed that is connected to the INTERBUS node for the controller.

To print the entire bus topology, another function can be used in PC WorX:

- In the bus configuration, activate the context menu via any element.
- Select the "Print Bus Configuration" menu item.

# **B** Status information for a PROFINET IO system

# B 1 Status of the PROFINET IO controller

The PROFINET IO controller has status information that indicates its configuration status.

This can be requested via the PNIO\_CONFIG\_STATUS system variable. The system variable is available as a word and as individual bits under "Global\_Variables".

: Project Tree Window 📮 🔻 🔟		Name	Tune	Usane	Description
🖃 📹 Project : C:\Documents and Settings\All Users\Application Data\Phoenix C		MASTER DIAG PARAM 2 REG HI	BYTE	VAR GLOBAL	Extended master diagnostic paramet
Libraries		MASTER DIAG PARAM 2 REG LOW	BYTE	VAR GLOBAL	Extended master diagnostic paramet
🖨 🔄 Data Types		PNIO FORCE FAILSAFE	BOOL	VAR GLOBAL	All PROFINET devices are prompted
		PNIO_CONFIG_STATUS	WORD	VAR_GLOBAL	Current configuration status of the c
🖃 🔄 Logical POUs		PNIO_CONFIG_STATUS_READY	BOOL	VAR_GLOBAL	Context manager active
□ Main		PNIO_CONFIG_STATUS_ACTIVE	BOOL	VAR_GLOBAL	Communication started
i Manl		PNIO_CONFIG_STATUS_CFG_FAULT	BOOL	VAR_GLOBAL	Configuration error
Manv		PNIO_SYSTEM_BF	BOOL	VAR_GLOBAL	Missing connection to a configured F
D Man		PNIO_SYSTEM_SF	BOOL	VAR_GLOBAL	Diagnostic alarm for a configured PF
Physical Hardware		PNIO_DIAG_AVAILABLE	BOOL	VAR_GLOBAL	Diagnostic available
		PNIO_MAINTENANCE_REQUIRED	BOOL	VAR_GLOBAL	Maintenance required
STD_RES: ILC390PN		PNIO_MAINTENANCE_DEMANDED	BOOL	VAR_GLOBAL	Maintenance demanded
		IBS_FORCE_SYSFAIL	BOOL	VAR_GLOBAL	Drive Sysfail
		COP_DIAG_STATUS_REG_RT_ERR	BOOL	VAR_GLOBAL	Runtime error (control processor)
		COP_DIAG_STATUS_REG_FAT_ERR	BOOL	VAR_GLOBAL	Fatal error (control processor)
Clobal V(ariablea		COP_DIAG_STATUS_REG_WARN	BOOL	VAR_GLOBAL	Warning (control processor)
		COP_DIAG_STATUS_REG_PON	BOOL	VAR_GLOBAL	Power on (control processor)
		COP_DIAG_STATUS_REG_FC_RUN	BOOL	VAR_GLOBAL	Runtime system RUN
		COP_DIAG_STATUS_REG_FC_STOP	BOOL	VAR_GLOBAL	Runtime system STOP
		COP_DIAG_STATUS_REG_FC_HALT	BOOL	VAR_GLOBAL	Runtime system HALT
	1				>
Project 🗗 POUs 🕼 Libraries 🛱 Hardware 🧖 Instances		Global_Vari			

Figure B-1 PNIC

PNIO\_CONFIG\_STATUS system variable

PNIO_CONFIG_	The variable is set if the PROFINET IO controller has been initialized correctly. No desired
STATUS_READY	configuration has been loaded by PC WorX yet. Connection establishment to the devices
	has been completed.

 PNIO\_CONFIG\_
 The variable is set if the desired configuration for the PROFINET IO controller has been

 STATUS\_ACTIVE
 loaded. In this state the PROFINET IO controller attempts to establish a connection

 cyclically to all devices in the desired configuration (under the PROFINET icon). In this way, it attempts to find each device with the corresponding "PROFINET device name" in the current subnetwork.

If the connection to a PROFINET IO device has been established successfully, the corresponding "PNIO\_DATA\_VALID" process data item is set.

For inaccessible devices, the PROFINET IO controller cyclically attempts to establish a connection approximately every 5 seconds.

A connection cannot be established, e.g., if the corresponding device is ready, but a correct PROFINET device name has not yet been assigned to it.

PNIO\_CONFIG\_ STATUS\_CFG\_FAULT This system variable is set if an error occurred when configuring the PROFINET IO controller.

# B 2 Status of a PROFINET IO device

The status of a PROFINET IO device can be queried using predefined process data.

	Device         Process Data Item         I/Q         Data Type         Byte.Bit         Addr           0 @JLB PN 24 D1 16 DIO16-2TX         ~~PMIO_DATA_STATE         I         BYTE         0.0           0 @JLB PN 24 D1 16 DIO16-2TX         PNIO_DSPENMARY         I         BOOL         0.0           0 @JLB PN 24 D1 16 DIO16-2TX         PNIO_DATA_VALID         BOOL         0.2           0 @JLB PN 24 D1 16 DIO16-2TX         PNIO_DATA_VALID         BOOL         0.4           0 @JLB PN 24 D1 16 DIO16-2TX         PNIO_APPL_RUN         I         BOOL         0.5           1 DIO16: ILB PN 24 D1 16 DIO16-2TX         PNIO_N_DIAG         I         WORD         0.0         ¥							
	Figure B-2 PROFINET IO device: Predefined process data The "~PNIO_DATA_STATE" byte that contains corresponding status bits is available. A PROFINET IO device only provides valid data if this bit is set.							
PNIO_DATA_VALID	For PROFINET IO, it may be normal during operation that a PROFINET IO device within the network cannot be accessed (e.g., undocking devices).							
	Use this variable to specify for your application whether or not the operation of all other PROFINET IO devices is to be continued despite a device failure.							
	In either case, the application program must receive information as to whether or not a PROFINET IO device is supplying valid data. This is why each PROFINET IO device has a PNIO DATA VALID process data item.							
	This bit must be set for the PROFINET IO device to supply valid data and all other process values to be valid.							
PNIO_IS_PRIMARY	This process data item is reserved for future redundancy functions.							
PNIO_APPL_RUN	This bit indicates that the application is running on the PROFINET IO device.							
PNIO_NO_DIAG	If this bit is set, there are no device diagnostics present.							
Ì	Not all bits of the "~PNIO_DATA_STATE" byte are used. To prevent unused bits being used by mistake, hide them in the control program by linking to a corresponding bit mask.							
	<ul><li>To query the status, assign the process data to variables.</li><li>Switch to the process data assignment workspace.</li></ul>							
	<ul> <li>In the top left window, "Symbols/Variables", select the resource ("STD_RES : ILC390PN" in the example).</li> </ul>							

- In the top right window, select the device for which you would like to link the process data to variables (e.g., ILB PN 24 DI16 DIO16-2TX).
- Select the variable in order to link it (e.g., PNIO\_NO\_DIAG).

 If variables have already been created, use drag & drop to link the selected variable to one of the variables on the left-hand side.
 If a corresponding variable has not yet been created, select "Create Variable" in the context menu.

The created variable is displayed in the bottom left window.

Process Data Assi	ignment		_					🕂 🔻 🔀
Symbols/Variables	S : ARM_L_40 RES : ILC390P Jefault ivystem Variable vuto :TD_TSK : DEFA Main : Main Main : Main	N s NULT	✓ Quickstart_PN     ✓ Quickstart_PN     ✓ ILC 390 PN 2TX-IB 192.168.0.2     ✓ R Resource     ✓ R Resource     ✓ R Resource     ✓ R Secource     ✓ P STD_RS5 ILC390PN     ↔ W PNOFINET     ↔					
Symbol/Variable	Data Type	Process Data Item	Desc	Device	Process Data Item	I/Q	Data Type	Byte. I 📥
IN2	BOOL			0 @ILB PN 24 DI 16 DIO16-2TX	~PNIO_DATA_STATE	I	BYTE	0.0
IN3	BOOL			0 @ILB PN 24 DI 16 DIO16-2TX	PNIO_IS_PRIMARY	I	BOOL	0.0
OUT2	BOOL			0 @ILB PN 24 DI 16 DIO16-2TX	PNIO_DATA_VALID	I	BOOL	0.2
OUT1	BOOL			0 @ILB PN 24 DI 16 DIO16-2TX	PNIO_APPL_RUN	I	BOOL	0.4
VO	WORD			0 @ILB PN 24 DI 16 DIO16-2TX	PNIO_NO_DIAG	I	BOOL	0.5
T1	BOOL			1 DIO16: ILB PN 24 DI 16 DIO16-2TX	~DI16	I	WORD	0.0
T2	BOOL			1 DIO16: ILB PN 24 DI 16 DIO16-2TX	INO	I	BOOL	1.0
51	BOOL			1 DIO16: ILB PN 24 DI 16 DIO16-2TX	IN1	I	BOOL	1.1
I_IL_ILB_DIO2	BOOL	0 @ILB PN 24 DI 16 DIO16-2TX \ PNIO_NO_DIAG		1 DIO16: ILB PN 24 DI 16 DIO16-2TX	IN2	I	BOOL	1.2
				1 DIO16: ILB PN 24 DI 16 DIO16-2TX	IN3	I	BOOL	1.3
				1 DIO16: ILB PN 24 DI 16 DIO16-2TX	IN4	I	BOOL	1.4 💙
				<				>
1								1

Figure B-3 PROFINET IO device: Variable created for querying the status

## **B** 3 INTERBUS registers

The registers of an INTERBUS master are available directly as process data. If necessary, assign the corresponding process data to the variables of the controller.

	RES : ILC390P efault ystem Variable uto TD_TSK : DEF/ Main : Main	N PS AULT		ce D_RESILC390PN IET witch-mcs-16tx .quickstart.de 192.168.0.3 ~dio23.quickstart.de 192.168.0.5 ~bk24.quickstart.de 192.168.0.5 ~bb25.quickstart.de 192.168.0.6 US				
Symbol/Variable	Data Type	Process Data Item	Desc	Device	Process Data Item	I/Q	Data Type	Byte. [ 🔨
IN2	BOOL			INTERBUS:	~IB MASTER REG IN	I	LWORD	0.0
IN3	BOOL			INTERBUS:	~IB MASTER REG OUT	0	DWORD	0.0
OUT2	BOOL			INTERBUS:	IB_MASTER_DIAG_STATU	I	BYTE	1.0
OUT1	BOOL			INTERBUS:	IB_MASTER_DIAG_STATU	I	BYTE	0.0
VO	WORD			INTERBUS:	IB_MASTER_DIAG_STATU	I	BOOL	0.0
T1	BOOL			INTERBUS:	IB_MASTER_DIAG_STATU	I	BOOL	0.1
T2	BOOL			INTERBUS:	IB_MASTER_DIAG_STATU	Ι	BOOL	0.2
51	BOOL			INTERBUS:	IB_MASTER_DIAG_STATU	Ι	BOOL	0.3
I_IL_ILB_DIO2	BOOL	0 @ILB PN 24 DI 16 DIO16-2TX \PNIO_NO_DIAG		INTERBUS:	IB_MASTER_DIAG_STATU	I	BOOL	0.4
				INTERBUS:	IB_MASTER_DIAG_STATU	I	BOOL	0.5
				INTERBUS:	IB_MASTER_DIAG_STATU	I	BOOL	0.6
				INTERBUS:	IB_MASTER_DIAG_STATU	I	BOOL	0.7
				INTERBUS:	IB_MASTER_DIAG_STATU	I	BOOL	1.0
				INTERBUS:	IB_MASTER_DIAG_STATU	I	BOOL	1.1
				INTERBUS:	IB_MASTER_DIAG_STATU	Ι	BOOL	1.2
				INTERBUS:	IB_MASTER_DIAG_STATU	Ι	BOOL	1.3
				INTERBUS:	IB_MASTER_DIAG_STATU	Ι	BOOL	1.4
				INTERBUS:	IB_MASTER_DIAG_STATU	I	BOOL	1.5
				INTERBUS:	IB_MASTER_DIAG_STATU	I	BOOL	1.6
				INTERBUS:	IB_MASTER_DIAG_STATU	I	BOOL	1.7
				INTERBUS:	IB_MASTER_DIAG_PARAM	I	BYTE	3.0
				INTERBUS:	IB_MASTER_DIAG_PARAM	I	BYTE	2.0
				INTERBUS:	IB_MASTER_DIAG_PARAM	I	BYTE	5.0
				INTERBUS:	IB_MASTER_DIAG_PARAM	I	BYTE	4.0
				INTERBUS:	IB_MASTER_STD_FNC_ST	I	WORD	6.0
				INTERBUS:	IB_MASTER_STD_FNC_ST	Q	WORD	0.0
				INTERBUS:	IB_MASTER_STD_FNC_PA	Q	WORD	2.0 🗸
				<				>
	1	1	1	<b>J</b> - 2				

Figure B-4 INTERBUS registers

## **B4** Setting all PROFINET IO devices to a defined state

In many cases, a machine/system can no longer be operated in the event of a PROFINET IO device failure. This is normal in modern INTERBUS systems where neither bus couplers nor isolated disconnection are used.

In the example system, a PROFINET IO device failure does not affect the operation of all the other PROFINET IO devices. If you would like to set all the outputs to a defined state in the event of an error, the PNIO\_FORCE\_FAILSAFE system variable can be used for this. It can be found under "Global\_Variables" in the IEC programming workspace.



Figure B-5 PNIO\_FORCE\_FAILSAFE system variable

If the variable is set, all the PROFINET IO devices output zero values or defined substitute values (the substitute values are currently set to "0" by default). The corresponding inputs are set to zero.

# C AX OPC Server and WebVisit

#### **C**1 **AX OPC Server**

For information about using AX OPC Server, please refer to the corresponding documentation.

AX OPC Server includes:

- The "OPC Configurator" for establishing a connection between PC WorX and an OPC \_ client (e.g., Visu+).
- An "OPC Test Client" for testing the connection. \_

AX OPC Server is also installed as a demo version. To register your license, proceed as follows:

- Start the "OPC Test Client". .
- In the taskbar, activate the context menu for the "OPC Test Client" icon. .

Register	
regiscorra	
Reactivate OPC Server	
Info - Logging	
Info - Statistics	
Exit	
DE 🔇	10:58



Registering the "OPC Test Client"

Select the "Register" menu item and enter the registration code.

#### C 1.1 Preparatory tasks in PC WorX

- In order to use a variable in AX OPC Server, activate the "OPC" checkbox:
- When creating variables in the "Variable Properties" window (Figure C-2)
- Or in the variables worksheet (Figure C-3 on page C-2) \_

Variable Properties		X
Name: V0_OPC   Data Type: BOOL   Usage: VAR_GLOBAL   EETAIN Initial value: I/O address: Dgscription:	Definition scope	OK Cancel Help
DD DO Hidden	Show all variables of worksheets	
Figure C-2 Creating va	riables for AX OPC Serve	er

Creating variables for AX OPC Server

Name	Retain	PDD (	DPC
🖃 Default			
IN2			<ul> <li>Image: A set of the set of the</li></ul>
IN3			<ul> <li>Image: A set of the set of the</li></ul>
OUT2			<ul> <li>Image: A set of the set of the</li></ul>
OUT1			
V0			<b>~</b>
T1			
T2			

Figure C-3 Activating "OPC" in the variables worksheet

• When sending the project, activate the "Include OPC data" checkbox.

De	wnload	
ſ	Project	Bootproject
		Download
	Dow <u>n</u> load Changes	Activate
<	Ensure real-time for Download Changes     Include <u>B</u> ootproject     Include <u>Sources</u> Include OPC data	Delete on Target
	Download Source	
	User-Libraries Include User-Libraries	
	Include Frontend-Code	
	Include Pagejayouts Include Backend-Code	
	Delete Source on Target	Download <u>F</u> ile
		Help

Figure C-4 Download: Include OPC data

## C 1.2 OPC Configurator

- Start the "OPC Configurator" program.
- The configurator commands can be accessed via context menus.
- Select the resource type.

OPC Configurator		
	Besource type:         ILC 3xx (FW/2=V1.41)           Description:         ILC 3xx (FW/2=V1.40)           COMMUNICATION TOF IP Address: 127.0.0.1         ICC 3xx (FW/2=V1.41)           Timeout: 2000 ms         FC 3xx (FW/2=V1.41)           DLL: Socomm.dll         State: ONLINE	
	<u>S</u> ettings	I

Figure C-5 Selecting the resource type

- Open the context menu for the "TestResource" entry.
- Select the "Settings" menu item.

OPC Configurator		
Cochoiect	Besource type: Description: Hete Resource	ILC 3ж (РW >= V1.41)
		Settings

Figure C-6 Settings

• Under "IP Address", enter the IP address of the controller for which you would like to use the OPC data.



Figure C-7 Specifying the IP address of the controller

This completes the configuration for using OPC data through an OPC client.



Figure C-8 OPC configuration completed

### C 1.3 OPC Test Client

The test client can be used to test the OPC configuration.

- Open the "OPC Test Client" program.
- Connect the test client to the OPC server by selecting "Connect..." in the "Server" menu.

وي 🖸	ntitled	- Phoe	enix Co	ontac	t - OPC	Test Client				
File	Server	Group	Item	View	Help					
₩	Conn Disco	ect nnect		_]	?					
Item	Serve	er status						Value	Variant type	
	Enum	ierate gr	oups							
l										
elect	an instal	lled OPC	server	to conr	nect					
	-	-	-							

Figure C-9 Connecting the test client

In the "Group" menu, select "Add all items" to display all variables defined as OPC variables.

🚾 PhoenixContact.AX-Server.21 - Phoenix Contact - OPC Test Client								
File Server Group Item View	Help							
Parameters Add item	8							
Item Add all items		Value	Variant type					
Refresh								
	1							
Add all available items to the group			11					

Figure C-10 Add all Items – Displaying OPC variables

The defined variables are displayed.
To set variables in the test client, e.g., to test the connection, proceed as follows:

• Select the variable to be set and then click on the "Write item" button.

💀 PhoenixContact.AX-Server. 21 - Phoenix Contact - OPC T	est Client	
File Server Group Item View Help		
Item Write item	Value	Variant type
TestResource.IN2	0	VT_BOOL
TestResource.IN3	0	VT_BOOL
TestResource.OUT1	0	VT_BOOL
Write value to selected item		
Write value to selected item		

Figure C-11 OPC variables and "Write item" button

• In the "Write Item Value" window, enter the required value (in the example: IN2 = 1 (BOOL)).

Write Item Value	
1	ОК
Asynchronou:	Cancel



• Confirm your entry with "OK".

The result is displayed in the "Value" field.

## C 2 WebVisit

The WebVisit software is used to visualize the global variables of the Inline Controller used under PC WorX. WebVisit is a software tool used to generate web pages. The software runtime component is a web server, which is stored in PC WorX. The variable values are actually visualized via a Java-compatible standard browser.

To visualize variables from your PC WorX project in WebVisit, activate the "PDD" checkbox:

- In the "Variable Properties" window (Figure C-13)
- Or in the variables worksheet (Figure C-14)

Variable Properties		
Name: Niveau	Definition scope Local Variable Groups: Default Global Variable Groups: Physical Hardware STD_CNF STD_CNF STD_CNF STD_CNF STD_CNF STD_CNF STD_CNF STD_CNF STD_CNF Main	OK Cancel <u>H</u> elp
PDD DPC Hidden	Show all variables of worksheets	

Figure C-13 Creating variables for WebVisit

Name	Туре	Usage	Description	Address	Init	Retain	PDD	OPC
🖃 Default							0	
Zeitdauer	TIME	VAR			T#5000ms			
Runtime	TIME	VAR						
Pulseingang	BOOL	VAR_EXTERNAL						
START	BOOL	VAR_EXTERNAL 💌						

Figure C-14 Activating "PDD" in the variables worksheet

When compiling the project, a file called "pdd.csv" is generated, which is used by WebVisit for the visualization.

In WebVisit, enter the PC WorX project used (recommended) or the corresponding pdd.csv file.



For information about using WebVisit, please refer to the corresponding documentation.

## **D** Phoenix Contact controllers

When creating a new project, several versions are provided for different controllers. The versions differ with regard to the hardware and firmware version used. The scope of functions in PC WorX may therefore differ for the various controller versions.

For additional information about the various controllers, please refer to the "AH EN BASIC DATA ILC... /RFC... /FC..." application note.

The aim of this document is to provide an overview of Phoenix Contact controllers for control technology. It contains the basic specifications for controllers from the Phoenix Contact controller range broken down into controller classes, as well as the ordering data for the individual controllers.

PC WorX



## ООО "ЛайфЭлектроникс"

ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 3010181090000000703 БИК 044030703

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- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
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