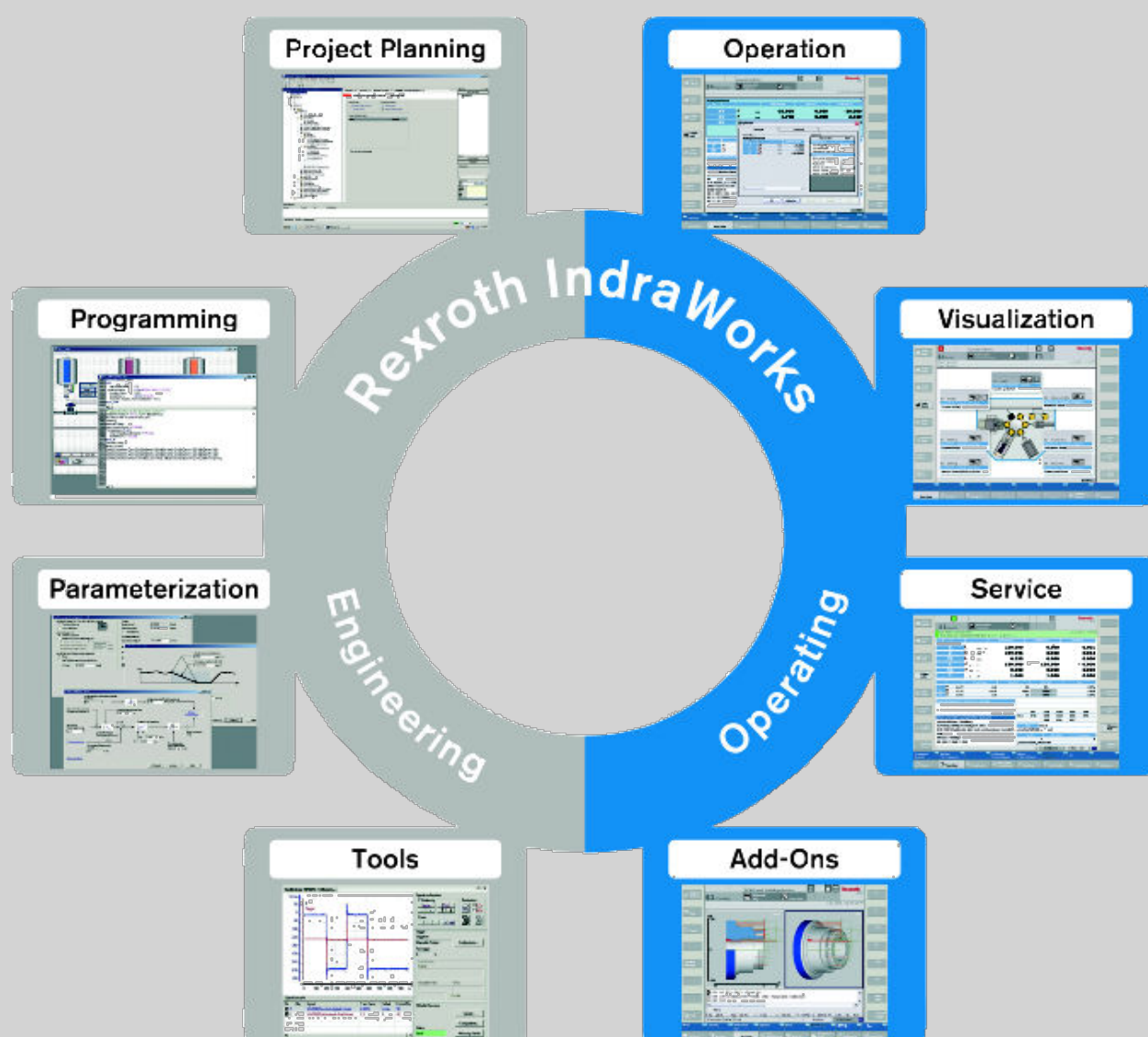


IndraWorks 14VRS

Engineering

Application Description
R911343566

Edition 09



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Copyright	© Bosch Rexroth AG 2020 All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.
Liability	The specified data is intended for product description purposes only and shall not be deemed to be a guaranteed characteristic unless expressly stipulated in the contract. All rights are reserved with respect to the content of this documentation and the availability of the product.
Editorial Department	Development Software and Control Firmware, GeKu (MiNi/MePe)

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1 About this documentation

Editions of this documentation

Edition	Release Date	Note
01	2014-05	First edition
02	2014-11	Migration FDT 2.0 - Iteration 3, enable FDT 2.0 Comparison display Import/export EPLAN link list in/to IndraWorks, apply EPLAN data to IndraWorks (step 1)
03	2015-06	Comparison display EPLAN export from IndraWorks
04	2015-07	Note regarding printing, comparison project/device data, update oscilloscope
05	2016-09	New chapter "Parallel engineering"
06	2017-09	Changes in the chapters "Projects and project data", "Version control" Chapter "Multilingual projects" revised (Defdb00193505) Chapter "Oscilloscope function" revised Chapter "Remote service" removed
07	2018-06	New: chapter 3.4.11 "Device application" on page 55 Update: chapter 3.11 "Online comparison of project and device data" on page 110
08	2019-02	New: - Chapter Axis stop overview, see chapter "Axis stop overview" on page 65 Update: Oscilloscope Saving measurements, supported file formats, see chapter "Saving a measurement" on page 291
09	2020-02	Supplement: "Memory response of the options if IndraWorks instances are opened parallelly" on page 252 chapter 3.4.8 "Offline and online mode" on page 47

Tab. 1-1: Change Record

1.1 Validity of the documentation

Purpose	This documentation describes the application of IndraWorks in that the Rexroth Engineering tools are integrated. It includes instructions on how to work with IndraWorks and how to operate the oscilloscope function.
Overview on target groups and product phases	In the following illustration, the framed activities, product phases and target groups refer to this documentation. Example: In the product phase "Engineering", the target group "programmer" can execute the activities "parameterizing", "programming", "configuring" and "simulating".

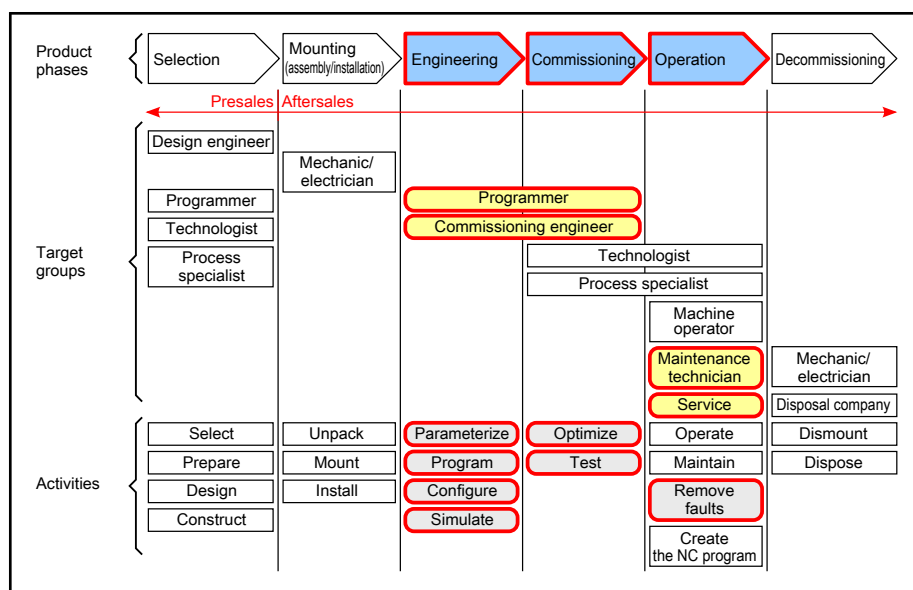


Fig. 1-1: Assigning this documentation to the target groups, product phases and target group activities

1.2 Required and supplementing documentation IndraWorks

1.2.1 Engineering

Documentation titles with type codes and part numbers

IndraWorks 14VRS Software Installation DOK-IWORKS-SOFTINS*V14-CORS-EN-P, R911344286 This documentation describes the IndraWorks installation.
IndraWorks 14VRS Engineering DOK-IWORKS-ENGINEE*V14-APRS-EN-P, R911343566 This documentation describes the application of IndraWorks in which the Rexroth Engineering tools are integrated. It includes instructions on how to work with IndraWorks and how to operate the oscilloscope function.
IndraWorks 14VRS PLC Programming System IndraLogic 2G DOK-IWORKS-IL2GPRO*V14-APRS-EN-P, R911343571 This documentation describes the PLC programming tool IndraLogic 2G and its use. It includes the basic use, first steps, visualization, menu items and editors.
IndraWorks 14VRS Basic Libraries IndraLogic 2G DOK-IL*2G*-BASLIB**V14-LIRS-EN-P, R911343920 This documentation describes the system-comprehensive PLC libraries.
IndraWorks 14VRS WinStudio 7.4 DOK-IWORKS-WINSTUD*V14-APRS-EN-P, R911341585 This "User Manual and Technical Reference Book" facilitates working with the "Rexroth WinStudio"™ software for optimal results. This document provides technical information and step-by-step instructions to create web-enabled HMI/SCADA programs.
Rexroth IndraWorks 13VRS CamBuilder DOK-IWORKS-CAMBUIL*V13-APRS-EN-P, R911336291 This documentation describes the basic principles and operation of the CamBuilder, the cam editing tool.

IndraWorks 14VRS Field Buses

DOK-IWORKS-FB*****V14-APRS-EN-P, R911341485

This documentation describes the field bus and local periphery connections supported by the IndraLogic XLC, IndraMotion MLC and IndraMotion MTX systems. The focus of this documentation is on the configuration, parameterization, commissioning and the diagnostics of the different periphery connections.

WebAssistant

DOK-GENERL-WEB*ASSIST*-APRS-EN-P, R911381469

This documentation describes the WebAssistant. The WebAssistant is a webbased diagnostic tool used to access a control system via an Ethernet highspeed connection. The WebAssistant allows OEMs, end users and service engineers to access and to remotely diagnose a system. A PC with Internet Explorer version 11 or higher, Firefox version 45 or above or Google Chrome version 54 or above is required.

The following control variants are supported:

- IndraMotion MLC L45/L65/L75/XM21/XM22/XM42/VPx
- IndraLogic XLC L45/L65/L75/VEP

IndraWorks IndraMotion Service Tool

DOK-IWORKS-IMST*****-APRS-EN-P, R911341383

This documentation describes the IndraMotion Service Tool (IMST). IMST is a web-based diagnostic tool used to access a control system via an Ethernet high-speed connection. The IMST allows OEMs, end users and service engineers to access and remotely diagnose a system. The PC has to use at least Internet Explorer 8, Firefox 3.5 or a higher version.

The following control variants are supported:

- IndraMotion MLC L45/L65/L75/XM21/XM22/XM42/VPx
- IndraLogic XLC L45/L65/L75

Rexroth IndraDrive Service Tools IMST/IDST

DOK-IM*MLD-IMSTIDSTV13-RERS-EN-P, R911342652

This documentation describes the IndraMotion Service Tools (IMST and IDST). It is a web-based diagnostic tool used to access a drive system via a high-speed Ethernet connection. Using these service tools OEMs, end users and service engineers can access and remotely diagnose a system from anywhere.

IndraWorks SafeLogic 14VRS First Steps

DOK-IWORKS-SL*STEP*V14-CORS-EN-P, R911341520

This documentation provides information to facilitate an easy start in the safety control engineering SafeLogic. By using project examples, information about the installation, configuration, commissioning, troubleshooting and diagnostics is provided to the user.

Rexroth IndraWorks 12VRS FDT Container

DOK-IWORKS-FDT*CON*V12-APRS-EN-P, R911334398

This documentation describes the IndraWorks FDT Container functionality. It includes the activation of the functionality in the project and working with DTMs.

IndraWorks 14VRS Field Buses Libraries

DOK-IWORKS-FB*LIB**V14-LIRS-EN-P, R911343575

This documentation describes field bus libraries for the IndraLogic XLC, IndraMotion MLC and IndraMotion MTX systems.

IndraWorks 14VRS Remote Support

DOK-IWORKS-REMOTE**V14-APRS-EN-E, R911382628

This documentation supports the user while installing and using a remote support software compatible to the current operating systems from Win7 - Win10.

Rexroth IndraWorks Remote Condition Monitoring RMB_TechRCM

DOK-IWORKS-TEC*RCM*V14-LIRS-EN-E, R911343671

This documentation describes the individual functions of the "Remote Condition Monitoring" systems as well as the most important use cases for a quick status assessment of the connected machines/systems.

IndraWorks 14VRS SafeLogic - Project Configuration, Version 02V08

DOK-IWORKS-SL**PRJ*V14-APRS-EN-P, R911341694

This documentation describes the creation and programming of SafeLogic projects in IndraWorks Engineering.

Tab. 1-2: *IndraWorks documentation overview - Engineering*

1.2.2 Engineering & visualization

Documentation titles with type codes and part numbers

IndraWorks 14VRS Energy Efficiency Management

DOK-IWORKS-4EE*****V14-APRS-EN-P, R911339229

This document describes the use of the Energy Efficiency Management function within the MLC, XLC and MTX systems. Using example applications, this documentation provides information about the project planning, configuration and visualization of the system.

Tab. 1-3: *IndraWorks documentation overview - Engineering & visualization*

1.2.3 Visualization

Documentation titles with type codes and part numbers

IndraWorks 14VRS HMI

DOK-IWORKS-HMI*****V14-APRS-EN-P, R911343569

This documentation describes the HMI operating interface IndraWorks Operation, its operation and functions as well as the configuration in IndraWorks Engineering.

Tab. 1-4: *IndraWorks documentation overview - Visualization*

1.3 Using safety instructions

1.3.1 Structure of the safety instructions

The safety instructions are structured as follows:

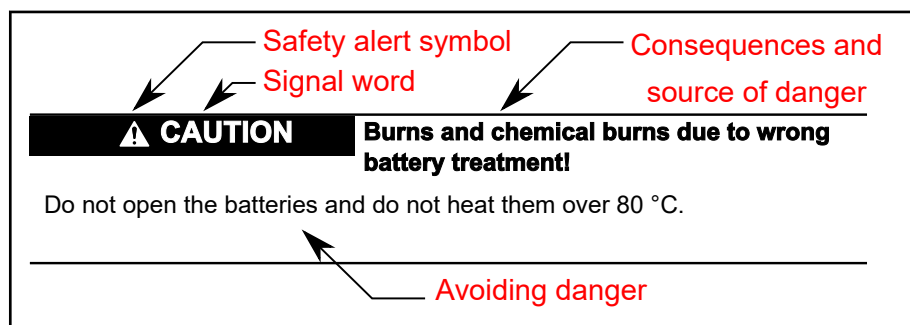


Fig. 1-2: *Structure of the safety instructions*

1.3.2 Explaining signal words and safety alert symbol

The safety instructions in this documentation contain specific signal words (danger, warning, caution, notice) and, if necessary, a safety alert symbol (according to ANSI Z535.6-2006).

The signal word draws attention to the safety instruction and indicates the risk potential.

The safety alert symbol (triangular safety reflector with exclamation marks), preceding the signal words Danger, Warning, Caution indicates hazards for persons.

** DANGER**

In case of non-compliance with this safety instruction, death or serious injury **will** occur.

** WARNING**

In case of non-compliance with this safety instruction, death or serious injury **can** occur.

** CAUTION**

In case of non-compliance with this safety instruction, minor or moderate injury can occur.

NOTICE

In case of non-compliance with this safety instruction, material damage can occur.

1.3.3 Symbols used

Pointers are displayed as follows:



This is a note.

Tips are displayed as follows:



This is a tip.

1.3.4 Explaining the signal alert symbol on the device



If this symbol is on your device, you have to observe the documentation on the device. The respective documentation informs on the type of hazard as well as the steps required to avoid this hazard.

1.4 Names and abbreviations

Term	Explanation
Checkout	Term in the field of version control Changes possible
Hijack	Term in the field of version control Changes possible (local)
IWE	IndraWorks Engineering
IWO	IndraWorks Operation
NC	Numerical Control
OEM	Original Equipment Manufacturer
VCS	Version Control System

Tab. 1-5: Names and abbreviations used

1.5 Customer feedback

Customer requests, comments or suggestions for improvement are of great importance to us. Please email your feedback on the documentations to Feedback.Documentation@boschrexroth.de. Directly insert comments in the electronic PDF document and send the PDF file to Bosch Rexroth.

2 Important instructions on use

2.1 Intended use

2.1.1 Introduction

Bosch Rexroth products represent state-of-the-art developments and manufacturing. The products are tested prior to delivery to ensure operating safety and reliability.

The products may only be used as intended. If they are not used as intended, situations occur that result in damage to property or personal injury.



Bosch Rexroth shall not assume any warranty, liability or payment of damages in case of damage resulting from a non-intended use of the products; the use shall solely bear all risks from unintended use of the products.

Before using Rexroth products, ensure that all the prerequisites for an intended use of the products are met:

- Anybody handling Bosch Rexroth products in any way is obliged to read and consent to the relevant safety instructions and the intended use.
- The original condition of hardware products may not be altered; in other words, no structural modifications are permitted. It is not permitted to decompile software products or alter source codes.
- Do not install damaged or defective products or use them in operation.
- It has to be ensured that the products have been installed as described in the relevant documentation.

2.1.2 Areas of use and application

IndraWorks Engineering is used for configuration, parameterization, programming and diagnostics.

IndraWorks Engineering is used for selected Bosch Rexroth drive and control systems.

Additionally, the specifications given in the "Areas of Use and Application" for the control and drive systems used with the IndraWorks Engineering do also apply.



IndraWorks Engineering is designed for a screen setting of 96 DPI. The use of other settings is considered as unintended and can cause an incomplete or incorrect display of screen elements.

2.1.3 Unintended use

Any use of IndraWorks Engineering in applications other than those specified above or under operating conditions and other than those described in the documentation and the technical specifications is considered as "unintended".

Furthermore, IndraWorks Engineering must not be used in any applications not expressly approved by Bosch Rexroth.

3 Working with IndraWorks

3.1 Basic terms - IndraWorks

3.1.1 General information

IndraWorks is the carrier system for the integration of the Bosch Rexroth engineering tools.

Comprehensive functions, such as project navigation, project administration as well as the generation of project data and configuration data, are centrally executed.

Basically, there are two integration types:

- In case of full integration, all user actions are performed in the IndraWorks main window.

Examples are:

- The parameterization of devices in an IndraWorks project.
- The configuration of HMI control elements for visualization panels.
- The PLC programming tool IndraLogic 2G.
- The connection to IndraWorks allows a comfortable integration of 3rd party tools. 3rd party tools can be called directly from the IndraWorks project management in their own display format.

Example:

- The PLC programming tool IndraLogic 1x.



Basic information on the IndraWorks operation can be found in [chapter 3.2 "First steps - IndraWorks" on page 14](#).

3.1.2 About this documentation

This manual provides information on:

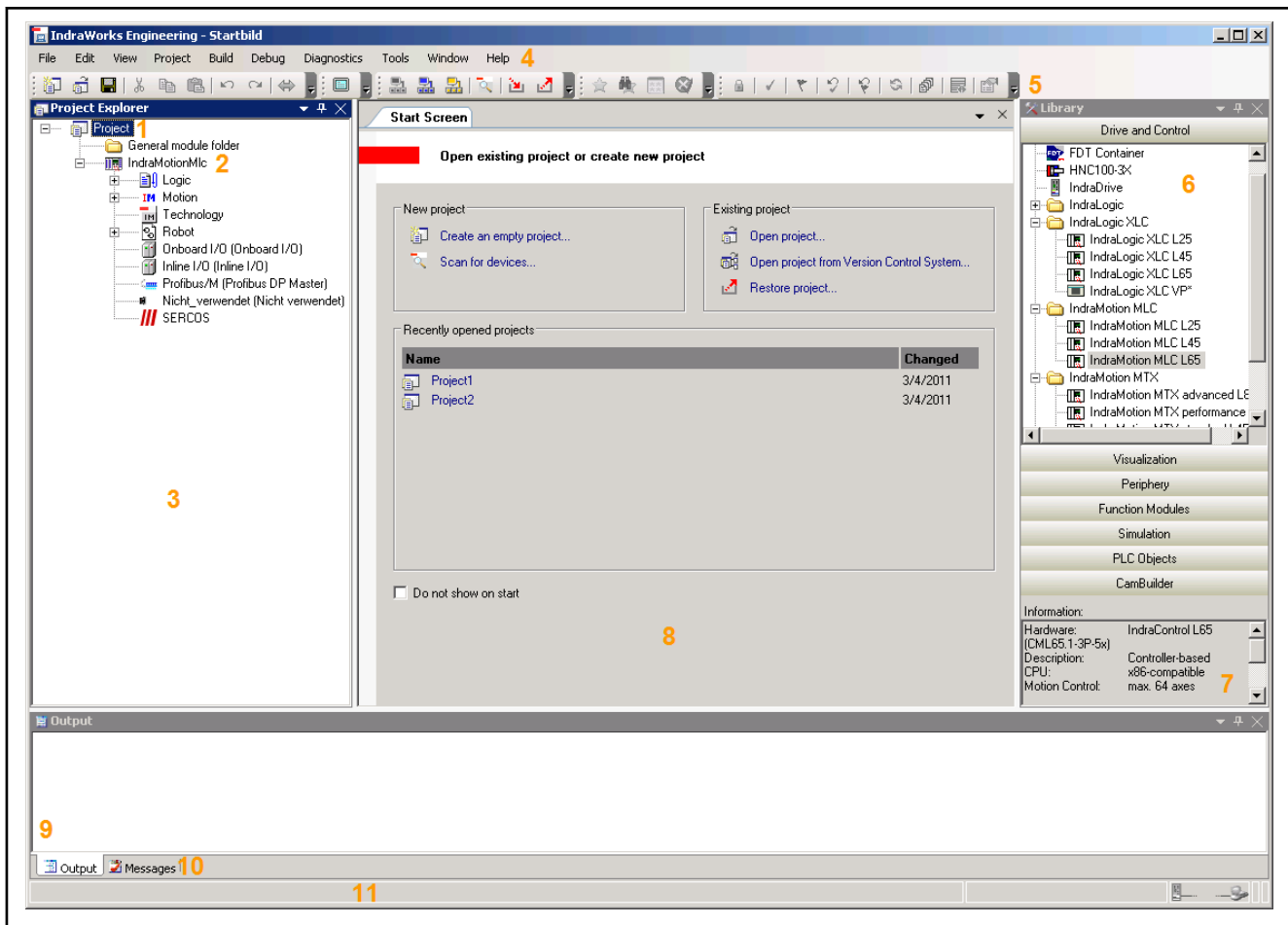
[Elements of the IndraWorks user interface, page 10](#)

This section provides an overview on the visual IndraWorks components and their functions.

[chapter 3.2 "First steps - IndraWorks" on page 14](#).

Instructions and templates to facilitate the use of IndraWorks are given in the following chapters. They provide a detailed description of the most important IndraWorks components.

3.1.3 Elements of the IndraWorks user interface



1	Project
2	Device
3	Project Explorer
4	Menu
5	Toolbars
6	Library
7	Library information
8	Workspace
9	Output window and diagnostics
10	Messages
11	Status bar

Fig. 3-1: IndraWorks user interface

3.1.4 Title, menu and status bar

The IndraWorks main window is enclosed by the title bar and menu bar as well as by the status bar.

The title bar shows the name of the active window in the workspace.

The menu bar contains the menu entries with the corresponding commands. Select a command to execute an action.

The status bar provides information on the current project and menu commands.

3.1.5 Toolbars

Toolbars permit quick access to frequently used menu entries and buttons.

Own toolbars can be created, menus and buttons can be added. Newly created toolbars are displayed under **View ► Toolbars**. Toolbars can be shown or hidden there.

When exiting IndraWorks, the toolbar modifications and all new toolbars are saved. The last settings are activated when restarting IndraWorks.

Default toolbar

When IndraWorks is started, the "default" toolbar is shown below the main menu. If necessary, this toolbar can be moved with the mouse or hidden via **View ► Toolbars**.



Fig. 3-2: Default toolbar

It provides the following commands:

- Create New Project (see main menu **File ► New ► Project**)
- Open Project (see main menu **File ► Open ► Project**)
- Cut (see main menu **Edit ► Cut**)
- Copy (see main menu **Edit ► Copy**)
- Paste (see main menu **Edit ► Paste**)
- Undo (see main menu **Edit ► Undo**)
- Redo (see main menu **Edit ► Redo**)
- Highlights the active document in the Project Explorer
- Toolbars (see main menu **Tools ► Customize... ► Toolbars**)

3.1.6 Workspace

General information

IndraWorks provides various options and tools supporting the management of the windows opened in the workspace.

Two window types are distinguished in IndraWorks:

- Document windows
- Tool windows



To enable a window, a list of all windows opened in IndraWorks can be shown using the shortcut <Ctrl>+<Tab>. This list remains open until the <Ctrl> button is pressed. Select the window to be enabled with the cursor keys or press <Tab>. The list is closed and the selected window is enabled when releasing the <Ctrl> key.

Document windows

IndraWorks supports two views for the document windows – tabs and sub-windows (MDI - Multiple Documents Interface).

In the subwindow mode, all document windows are arranged in the workspace. Several windows can be displayed at the same time (e.g. overlapping).

In the tab mode, only one document window is displayed. It occupies the entire workspace. The other open document windows are represented as tabs at the upper edge of the workspace. To show such a window, click on its tab.

Windows in the Workspace

To switch between the two modes, select **Windows ► Windows as Tabs**.

Double-click on an object in the Project Explorer to open a window in the workspace. Data or properties of that object can now be edited. Depending on the object type, the window is either a dialog or an editor. All open document windows are listed in the **Windows** menu. To display a window in the foreground, select the corresponding menu item or click on a visible part of the window in the workspace.



In the register tab mode, a list of all open document windows can be opened via the arrow icon on the top right or in the workspace. Select the document window to be displayed in the foreground via double-click or cursor keys and "Enter".

Select **Windows ► Windows** to open the "Window List" dialog to manage the open windows in the workspace.

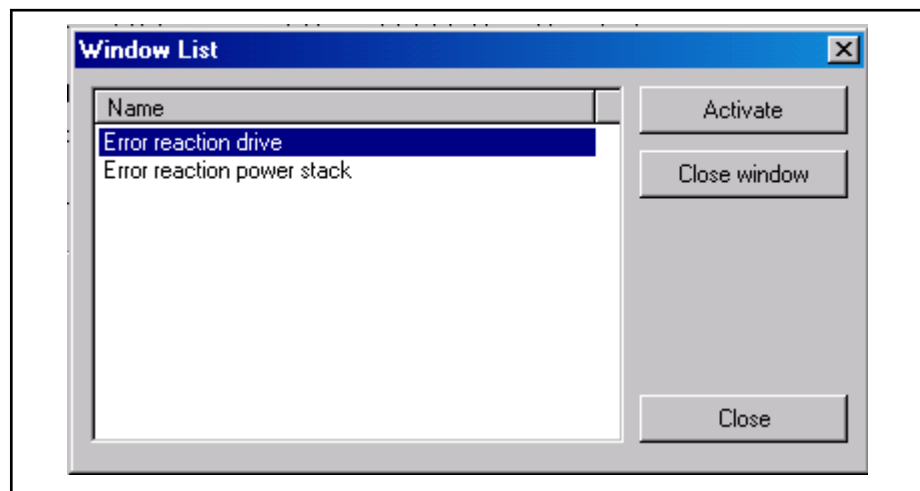


Fig. 3-3: "Window List" dialog

Tool windows

Tool windows are listed under **View** or in **View ► Other Windows**. To change the behavior of the tool windows, either use the system menu (right-click on the title bar of the tool window) or the **Windows** menu.

- Dockable** Tool windows are "dockable" by default. A tool window is opened either floating (undocked) or docked to the edge of the workspace. To dock a floating tool window at the edge of the workspace, deselect the "dockable" property. The window is arranged as additional tab in the workspace. If the "dockable" property is selected again, the window returns to its position it had before its arrangement in the workspace.
- Hide** This command hides the active window. The window can be shown again via the menu item **View**.
- Floating** This command changes the window mode from floating to docked and vice versa.
- Auto Hide** This setting hides the tool windows at the edge of the border in such a way that they are only indicated by a tab displaying the window title. To maximize the window again, the mouse pointer is to be moved over the tab. Thus, the workspace can be enlarged.

Arranging windows

Overlapping, Cascading, Tiled

In the subwindow mode, the windows in the workspace can be arranged in overlapping, cascading or tiled modes. Therefore, select the command from the **Window** menu.

Grouping Document Windows

In the tab mode, document windows can be grouped. Use the system menu commands of the document windows. The document windows can be arranged in vertical and horizontal groups and easily be moved from one group to another.



In the tab mode, the document windows can be dragged and dropped within the document window area.

System menu of document windows

Using the system menu of the document windows in the subwindow mode, these windows can be minimized, restored, closed and moved as well as zoomed in and out. Using the system menu in the tab mode, new horizontal and vertical groups can be created, document windows moved from one group to the other and document windows closed. To activate the document windows one after the other, press <Ctrl>+<F6>.

Full Screen

To display the area of your document as large as possible on the screen, activate the full-screen mode via **View ► Full Screen**. All tool windows are hidden and the workspace occupies the entire remaining area. The menu bar is still shown. Any toolbars via the "Customize..." dialog. Display tool windows in full-frame mode via **View**. The configuration selected is stored when exiting the full screen mode and is restored when it is called the next time. To return to the normal display mode, click on the "Full Screen" button of the "Full Screen" toolbar. Alternatively, press <Ctrl>+<Alt>+<F> or use the menu.

Supporting several screens: Floating document windows

Document windows can be dragged from the workspace and to another screen in the tab mode as well as in the subwindow mode (MDI - Multiple Documents Interface) using tabs and title bars.

- This allows an optimum use of the available screen area.
- Floating document windows are always displayed with a individual button on the Windows task bar and can be enabled like other Windows applications via <Alt>+<Tab>.
- If a floating document window is to be displayed again in IndraWorks Engineering, drag it back to the workspace.



Even floating document windows can create outputs in the status bar or in the message windows of IndraWorks Engineering.

3.1.7 Project Explorer

General information

The Project Explorer is located left from the workspace in the IndraWorks main window. The Project Explorer represents the projects and their components structured as tree.

Project

A project contains all devices, communication connections and other components required for operating a machine or a system. The tree structure of these components reflects the device topology of the automation solution.

Device

A device is a component of a project, e. g. a control or a drive. Usually, a device consists of a hardware part and a software part.

In IndraWorks, devices are selected from a library and added to a project. Subsequently, the functions available in the devices are called or lower-level devices are configured.

3.1.8 Library Explorer

The library explorer is located right from workspace in the IndraWorks main window. It represents all libraries available for your projects in a structure. Libraries can contain hardware components such as devices and software components such as function blocks.

3.2 First steps - IndraWorks

3.2.1 General information

This section describes a few typical operating sequences in IndraWorks.

If you proceed according to these descriptions, you will become familiar with how IndraWorks functions and you will recognize how the individual components interact.

3.2.2 Starting IndraWorks

Start IndraWorks via **Start ► All Programs ► Rexroth ► IndraWorks (version xxx) ► Engineering**.

3.2.3 Create new project

A new project can be created via **File ► New ► Project...**

The following dialog is shown:

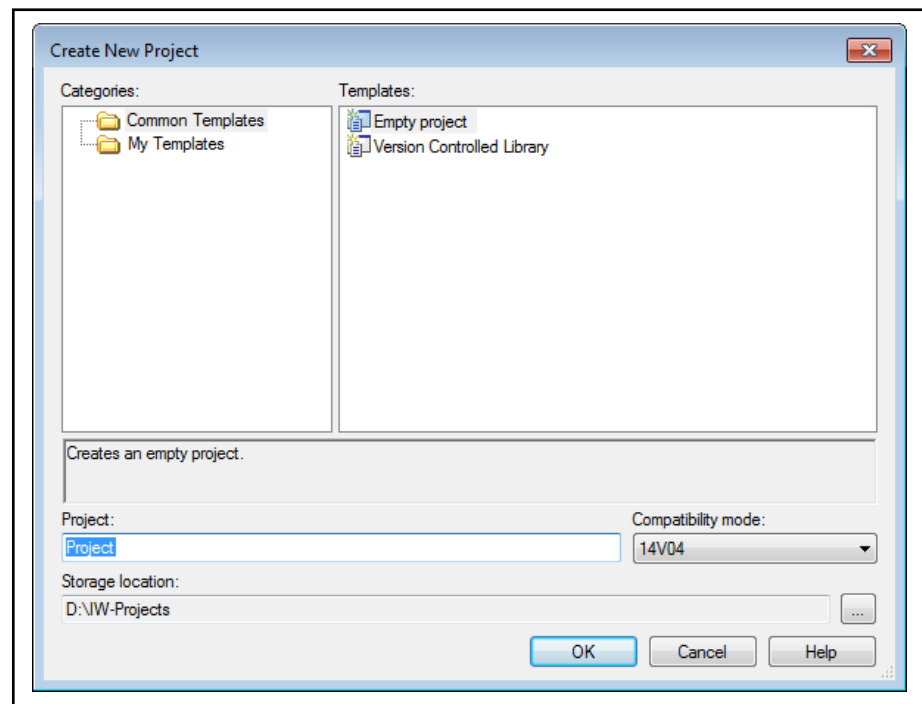


Fig. 3-4: Create a new project

Select a project template in the upper part of the dialog. The project template contains configured elements that are automatically applied to your new project. If you want to start with an empty project, select the "Empty project" template.

Certain properties can be set for the new project using the controls at the bottom of the dialog box:

- "Project.:" Enter the name of the project.
- "Compatibility mode.:" Specify the minimum version of IndraWorks required to edit the project.
- "Storage location.:" and button "...": The text box specifies the path your project is saved under. The path can be changed using the button. The dialog "Select storage location" is started.

Confirm your entries with "OK". The dialog is closed. The new project is created and opened.

Use "Cancel" to close the dialog. No new project is generated. Use "Help" to start the help system. The dialog "Create new project" remains open.

3.2.4 Open project

Open an existing project via **File ► Open... ► Project.....**

The dialog "Open project" is started. Select the project file (.xiwp).

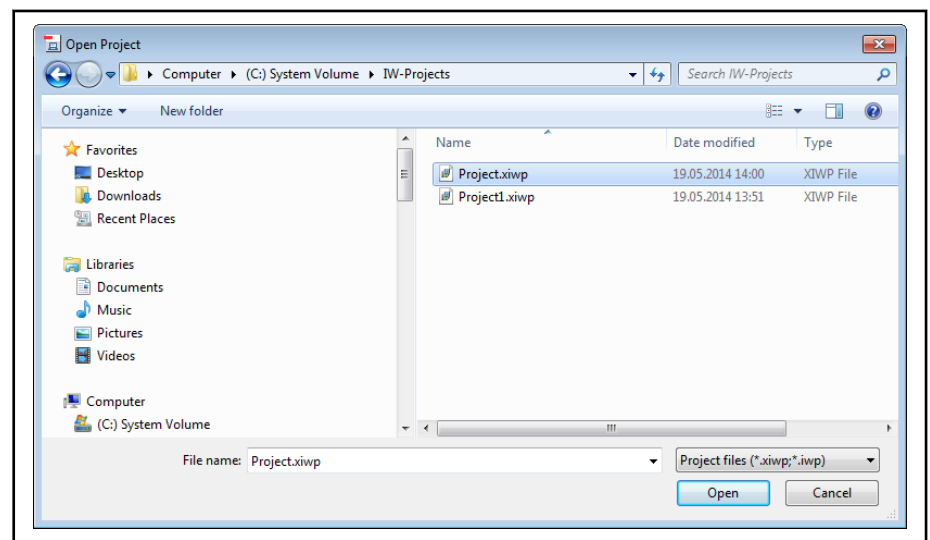


Fig. 3-5: Open project



You can also open a project file by double-clicking on a .xiwp file. Thus, the project is opened with the last used IndraWorks installation.

In case of directory-based projects, first open the project folder (here: Project2) and select the .iwp file. Confirm the selection with "Open". The project is now loaded and displayed in the Project Explorer window.

3.2.5 Add new device to project

In the library explorer, all available devices of the installed libraries are displayed.

Insert a device into the current project by dragging the device from the library to the project. Please note that the device can only be dragged directly into

the project folder or to the devices of the project, accepting the currently selected device type as subdevice.

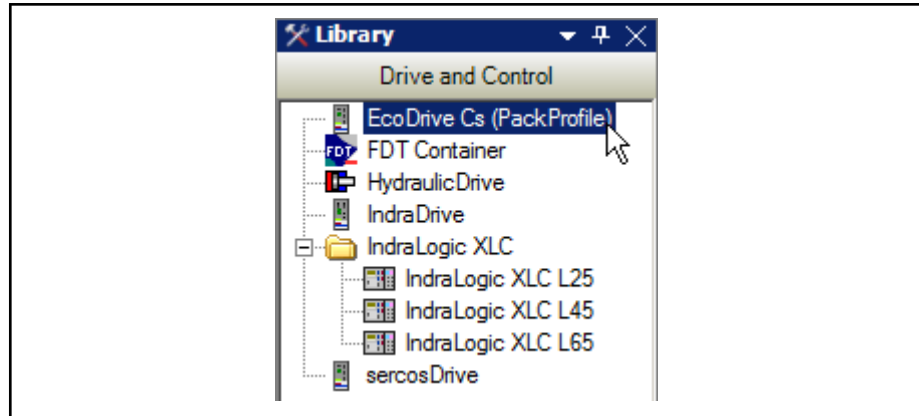


Fig. 3-6: Library (devices)

3.2.6 Exit IndraWorks

Exit IndraWorks via **File ► Exit.** or via <Alt>+<F4>.

3.3 General information

In IndraWorks, you work with objects of various contents, the so-called application data. These objects can be created, managed, edited and filed as files in a structure in an IndraWorks project. The workspace in IndraWorks consists of a top-level project. Each project can contain a collection of folders and files. These objects are also called resources.

3.4 Working with projects and devices

3.4.1 Projects and project data

In IndraWorks, devices and objects are compiled into projects represented as a tree structure in Project Explorer.

The project node constitutes the top-level of a project hierarchy. All child nodes in the tree representation represent devices, communications, functions, or even structuring elements such as folders, in a similar way to directories in a file system.

The following graphic shows a project with a drive as an example:

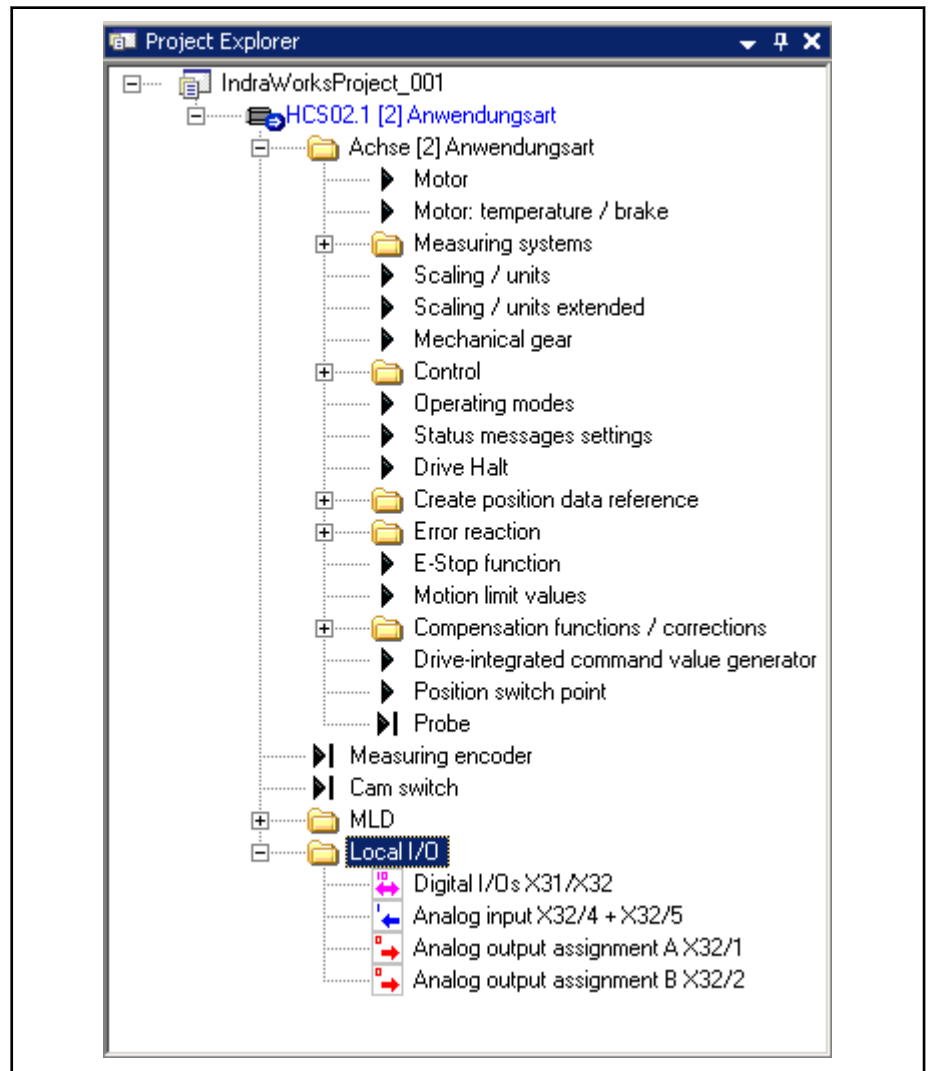


Fig. 3-7: Project Explorer (tree representation of a project)

In principle, each node can offer a main menu item with sub items and a context menu. The content and function of the commands in this menu depend on the respective node.

The "Project" toolbar can be displayed if needed. The first time the toolbar is displayed, it is free-floating and can be moved to the desired position using the mouse.



Fig. 3-8: Toolbar: Project

The toolbar contains the commands:

- Switch project offline (see main menu **Project** ► **Switch devices offline...**)
- Switch the project online (see main menu **Project** ► **Switch devices on-line...**)
- Start offline parameterizations (see main menu **Project** ► **Start offline parameterizations...**)
- Scan for a device (see main menu **Project** ► **Scan for devices ...**)

- Archive the project (see main menu **Project** ► **Archive**)
- Restore the project (see main menu **Project** ► **Restore...**)

Creating a new project

Start the function via the menu item **File** ► **New** ► **Project...** or using the key combination <CTRL>+<Shift>+<N>.

The following dialog is shown:

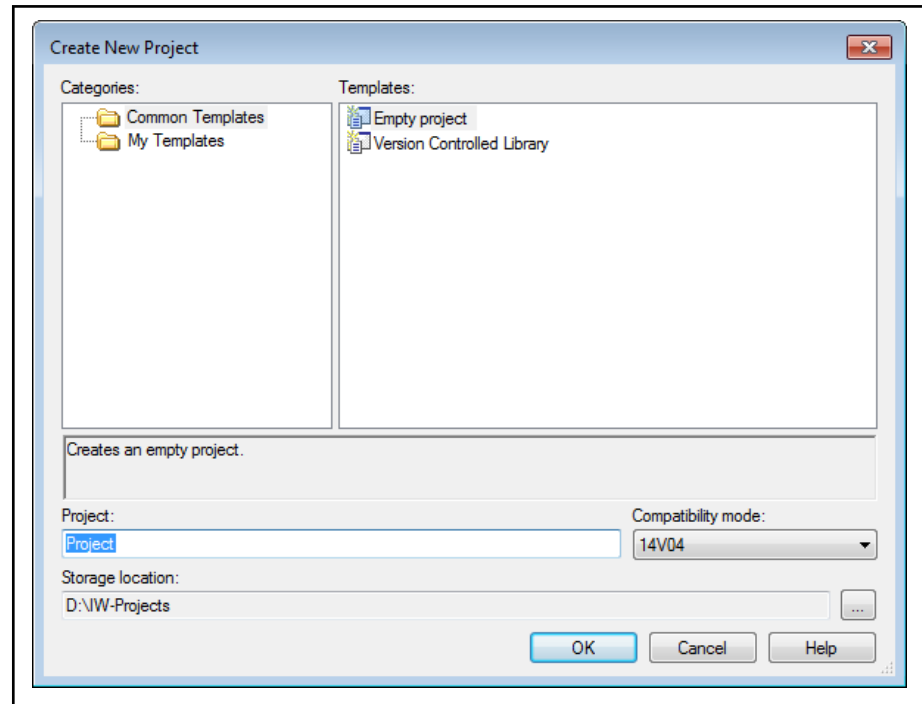


Fig. 3-9: Create a new project

Select the project template in the upper part of the dialog box. The project elements of the dialog are imported into the new project upon completion of the dialog.

Certain properties can be set for the new project using the controls at the bottom of the dialog box:

- "Project:" Enter the name of the project. IndraWorks proposes a name. The proposed name can either be accepted or changed, the chosen name is then used as the project name and the name of the repository (file or directory).
- "Compatibility mode:" Specify the minimum version of IndraWorks required to edit the project.



If a compatibility mode < 13V06 is selected, IndraWorks saves the project as a directory, otherwise the single-file format is used (single file with the extension .xiwp).

- "Storage location:" The project is stored in this folder.
- Button "...": This is used to start the "Select storage location" dialog, which allows the storage location of the project to be set.
- Confirm entries with **OK** and close the dialog. The new project is created and displayed in the Project Explorer window.

- Using **Cancel** signals that the entries are to be discarded and the operation is to be cancelled. The dialog is closed, a new project is not created.
 - The help system is started using "Help" or <F1>. The relevant chapter is displayed automatically. The dialog "Create new project" remains open.
- Create an empty project** Select the project template "Empty project" contained under the category "General Templates".
- Adjust the project name, compatibility mode and storage location to the desired requirements and press the **OK** button. IndraWorks creates a new, empty project.
- Create a new project from a template** Various different template folders can be found under "Categories". Select the desired folder with a mouse click (or using <Tab> and cursor control button). All templates in this category are then displayed in the "Templates" box. When the mouse pointer is hovers over a template, a tooltip provides information on this template. Select the desired template, e.g. with a mouse click. The corresponding short description is displayed in the window below the list of templates. Furthermore, the proposal for the project name (input field "Project:") as well as the content of the drop-down list "Compatibility mode" is adjusted. The compatibility mode that is specified in the template corresponds to the minimum selectable value in the list.
- If necessary, adjust the settings and complete the input with **OK**. IndraWorks initially creates a new project. Subsequently, the contents of the selected template are imported - the import process can take some time. The result is a new project that already contains the pre-defined elements.
- Change project** Projects change as soon as an open single-file project is changed, and in IndraWorks this is indicated by an asterisk before the project file name in the title row.

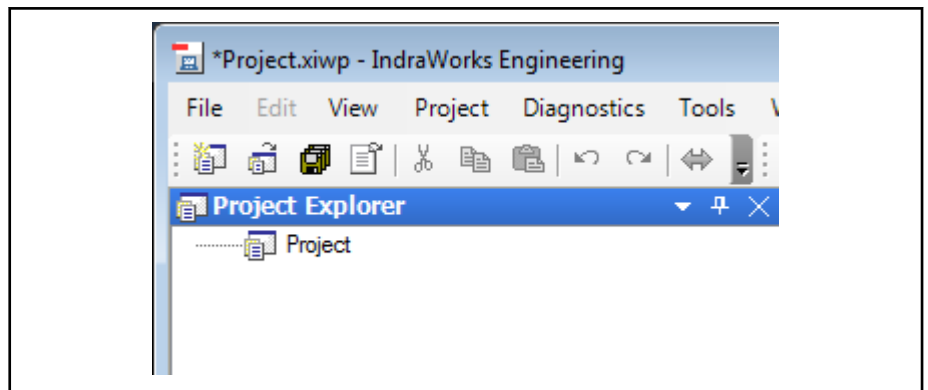


Fig. 3-10: Change indicator in the window title

This change indicator triggers two actions:

- A function is started in which a reminder window is displayed at a specific interval for approximately 5 seconds. This window contains a link, via which the project memory function can be called (see below) with a mouse click. The reminder function and interval can be set via the Options dialog.
- When closing the project, a reminder is given that the project contains as yet unsecured data. This information can then either be saved or discarded.

Directory based projects are not monitored for changes, the memory function is not started, always save before closing.

Save the project This function saves the contents of the currently open project in the project file or in the project directory. It can be called up using the menu item **File ► Save project** which is located in the File menu as well as in the context menu of the project node. The function can also be enabled using **File ► Save all** or the corresponding key combination <CTRL>+<S>.

For projects in the single-file format, the change indicator is cleared after saving and the reminder function disabled.

Save working copy This function is only available for one-file-projects and it is opened via the menu item **File ► Save working copy...** or in the context menu of the project node via **Save working copy...**. It allows to save the current working copy to a new project file without changing the original project file. This is useful if you want to back up intermediate states to return to them whenever required.

In contrast to "Save project as", there is no change to the new project file. Thus, the original project file is still used when saving.

Closing project The currently open project can be closed via **File ► Close project** or via the command **Close project** in the context menu of the project node.

Directory based projects are automatically saved before closing. Projects in single-file format (.xiwp), where no changes have been made since the last save operation are only closed and not saved. The following section explains how to proceed with these changes.

**Closing the project - saving/
discarding changes or canceling
the process**

When closing a project in single-file format (.xiwp) that contains unsaved changes, the user can decide how to close the project. The following prompt is displayed in IndraWorks:

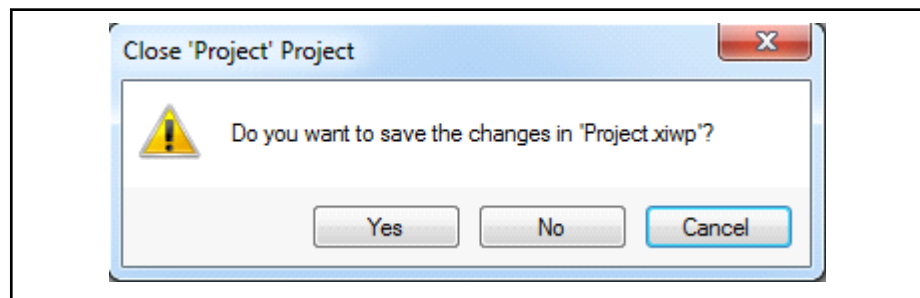


Fig. 3-11: Save or discard changes

Select "Yes" to save all changes and subsequently close the project. "No" indicates that the changes should be discarded. The project is closed without saving. "Cancel" terminates the operation, i.e. the project remains open.

Opening an existing project Already existing projects can be opened using **File ► Open ► Project...** or using <CTRL>+<Shift>+<O>. The dialog "Open project" is displayed.

Projects created greater than or equal to 13V06 in the compatibility mode are available as files of the type * .xiwp. Select the desired file to be opened and click on **Open**. The file is opened by double clicking on the file.

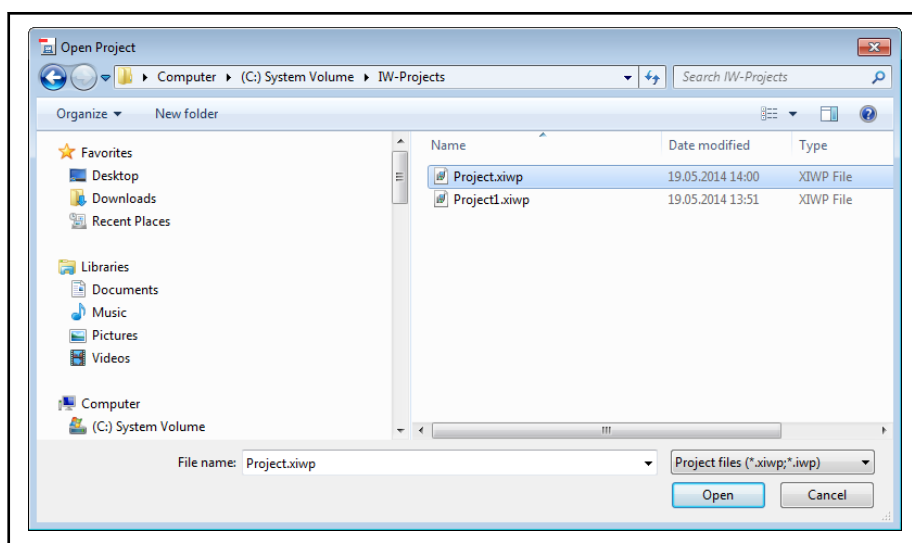


Fig. 3-12: Open project - Project is in the extended storage format .xiwp

Projects in a compatibility lower than 13V06 are project directories. To select, first open the project directory, then select the saved .iwp file and click on "Open". The mouse double-click can also be used here.

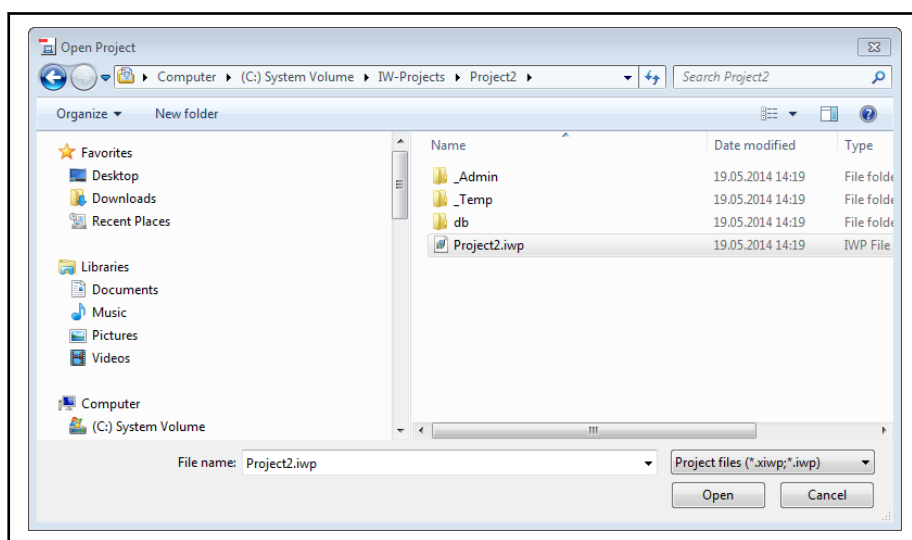


Fig. 3-13: Open project - Project is a directory

IndraWorks detects if the selected project was created with an earlier version and whether a conversion is possibly required prior to opening.

In this case, the required conversion can be confirmed and the loading of the project continues. Loading is canceled if the conversion is not confirmed.

IndraWorks also offers the possibility of creating a backup copy of the project before the conversion. If a backup copy is desired, it is filed in the same directory that contains the project to be converted, under the name of the project to be converted (with the extension ".bak").

During the conversion process, a conversion dialog is displayed showing the executed conversion steps. If an error occurs during the conversion, the error is logged in a log file and loading of the project is canceled. In the event of an error, the log file can be opened directly from the conversion dialog. The file is located under the name "ComponentConverter.log" in the project directory.

Recently opened projects The menu item **File ► Open** opens a list of the paths of those projects which were last opened or newly created.

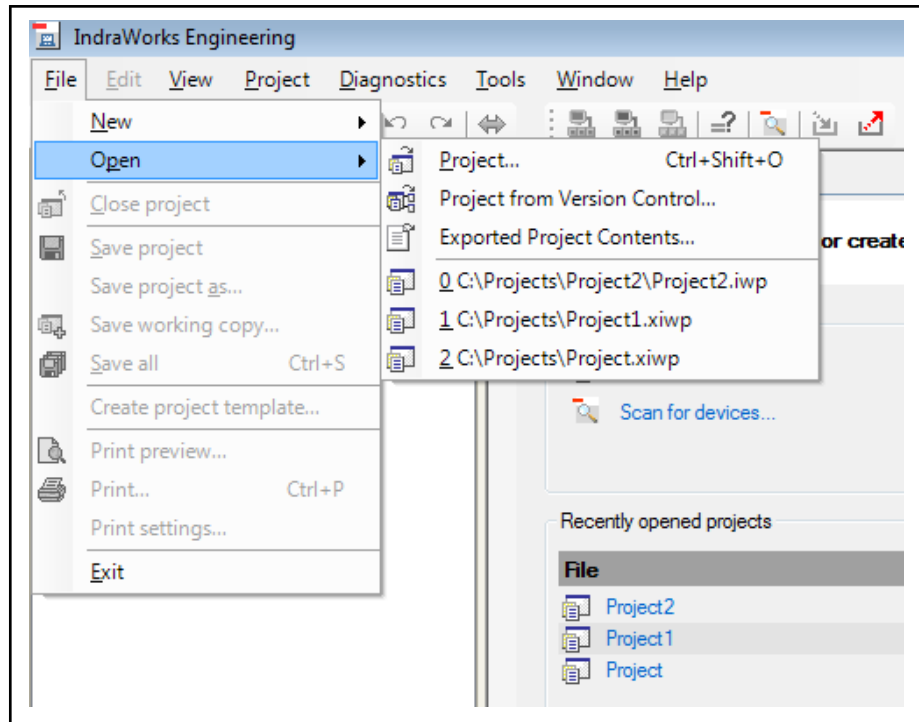


Fig. 3-14: Menu: Recently opened projects

The selection of the project to be opened is made by using the mouse to click on the corresponding path, or by using the cursor control keys or keyboard shortcut (see figure).

Renaming a project The name of a project can be changed. Select the root node of the desired project and select the context menu item **Rename**. Alternatively, the process can be started with <F2> or a second mouse click. The project name can now be modified. Close the entry with <Enter>. IndraWorks verifies the new name and returns a message if the name cannot be used. If the new name is valid, the project is renamed.

If the project is a single-file project (.xiwp), the project remains open and only the project name (name of the project node) is changed. The name of the project file remains the same (in the title line of IndraWorks).



In single-file projects, the project name and the name of the project file can be different following a name change.

With a directory based project (.iwp), project directory name and project file name has to be adjusted to the new project name.

Execute the following steps:

- Save the project.
- Close project.
- Rename the project, project directory, and the project file.
- Open the project.

Deleting the project An open project is deleted by selecting the project node in Project Explorer and selecting either the context menu item **Delete** or by pressing the <Del> key.



After approval of the safety query, the project open in IndraWorks is permanently deleted.

Properties

To open the Properties dialog, select the project node and select **Properties** in the context menu.

- The Properties dialog displays the most important settings for the current project.
- The Properties dialog allows comments to be entered on the current project.

Save project as

The currently opened project can be saved under a different name and different save location using **File ► Save project as....**

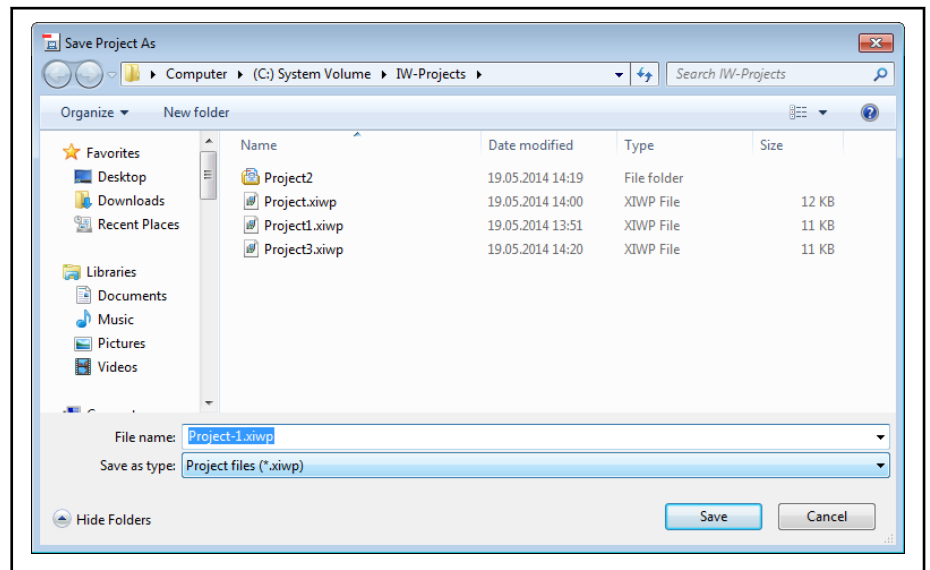


Fig. 3-15: Save project as

The dialog proposes a new name for the project, which can be changed by the user. A different storage location can also be specified. Using the selection box "File type", select the storage type of the new project. Select *.xiwp for the extended project format.



A directory based project (.iwp) whose compatibility mode is > 13V06 cannot be saved in the single-file format (.xiwp). The corresponding versions of IndraWorks do not support this format.

When selecting *.iwp, the new project is created as a directory.

Close the entry with "Save". The dialog is closed and the internal process started:

- If a directory based original project (.iwp) exists, any changes are also saved in the original project. Changes are not applied to the original project for an original project in single-file format.
- The original project file is closed, the project content is retained.
- The project content is saved under the new project path as a file or directory.



If the original project was versioned, the version control link is now deleted.

If the target project is filed as a single-file format (.xiwp), the project name (name of the project node) of the original project is retained even if the name of the project file changes. Therefore, there is NO implicit renaming process.

If the target project is directory-based (.iwp) and the name of the project directory is changed, the project name is adjusted, as with this form of filing both terms have to be identical. In this case, there is an implicit renaming process.

3.4.2 Start screen

The start screen is used for quick selection of functions to create or edit projects. It is displayed automatically when no project is loaded. After closing the current project and under certain circumstances, the start screen might also be displayed after launching IndraWorks. The start screen can also be manually displayed using the menu item **View ► Start screen**.

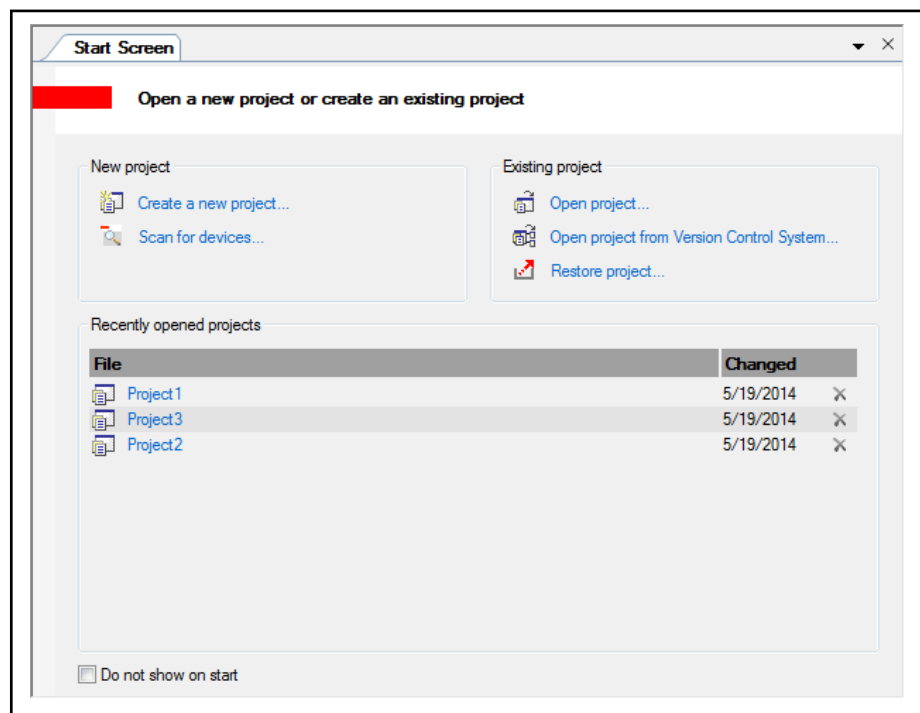


Fig. 3-16: Start Screen

All selection items shown in blue font are also accessible from the IndraWorks menu bar. The desired selection item is selected with <Tab>, and the respective function is started using <Enter>. Selection and start can also be executed with a mouse click.

"Create a new project..."

Corresponds to menu item **File ► New ► Project...**:

A new project is created. Here, it is possible to specify whether the project should remain empty or if items of a desired project template are to be inserted.

"Scan for devices..."

Corresponds to menu item **Project ► Scan for devices...**:

Scans for devices that are connected to the computer via various communication links. The devices found can be added as project items in the project

	currently open. If no project is open, a new project is created (see also chapter 3.4.7 "Search for devices" on page 38).
"Open project..."	Corresponds to menu item File ► Open ► Project.... An existing project is selected and opened.
"Open project from version control system..."	Corresponds to menu item File ► Open ► Project from version control system.... A copy of a project that is under version management is created and opened. The project elements are processed in this copy.
"Restore project...."	Corresponds to menu item Project ► Restore.... The project contained in an archive is unpacked and opened. If the archive still contains libraries, they are also unpacked and adopted.
"Recently opened projects"	This area lists recently opened projects. The name of the project file (without the file name extension) and the last modified date are displayed for each project. The full path of the project file is displayed in the tooltip when the mouse pointer moves over the file name. A mouse click on the file name opens the project, a click on the symbol "X" deletes the project from the list. The keys <Tab> and <Enter> can be used instead of a mouse click.
"Do not show on start"	If the "Do not show on start" check box is selected, the start screen is no longer automatically shown. After closing the start screen or after the next start, the screen can only be opened using the above-mentioned menu item.

3.4.3 Devices

Inserting devices from the library

	Use "drag-and-drop" or use the context menu to add devices to a project from the library.
Context menu	The context menu offers commands that are available in the respective context. The commands for manipulating devices such as Cut , Delete , Copy and Paste can be found in the menu under Edit .
Inserting from the library via "drag-and-drop"	Select a device in the device library and drag it into Project Explorer. The appearance of the mouse pointer indicates possible insert positions. An arrow with a plus sign on a target device with a blue background (also the project itself) indicates that it is possible to insert at that position.

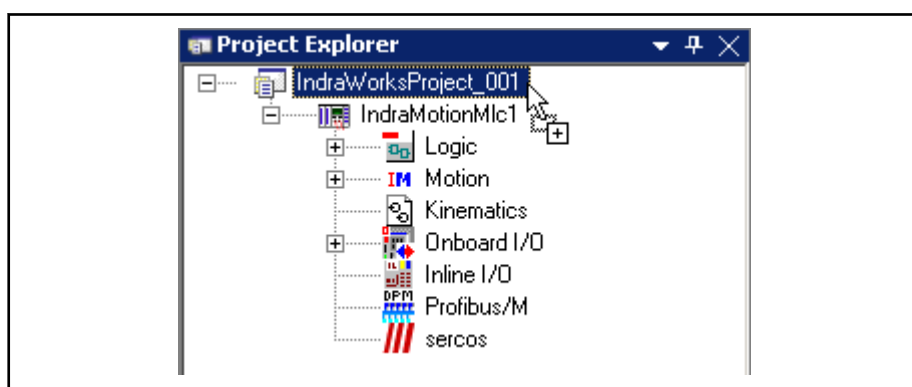


Fig. 3-17: Project Explorer (inserting from the library via drag-and-drop)

The new device will be attached after all devices inserted in this element.

A crossed circle symbolizes that no device can be inserted at this position.

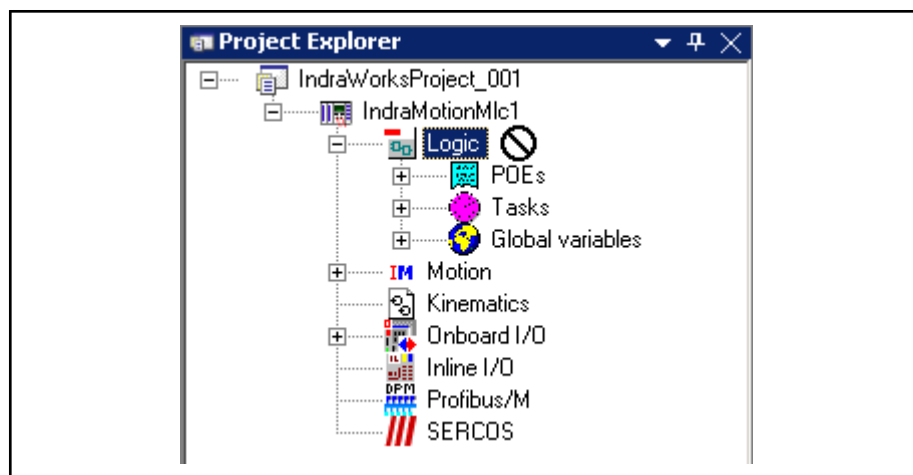


Fig. 3-18: Project Explorer (inserting via drag-and-drop not possible)

There is also the possibility of adding new devices at specific locations in the project.

In the following example, the new device has been inserted beneath the Sercos node.

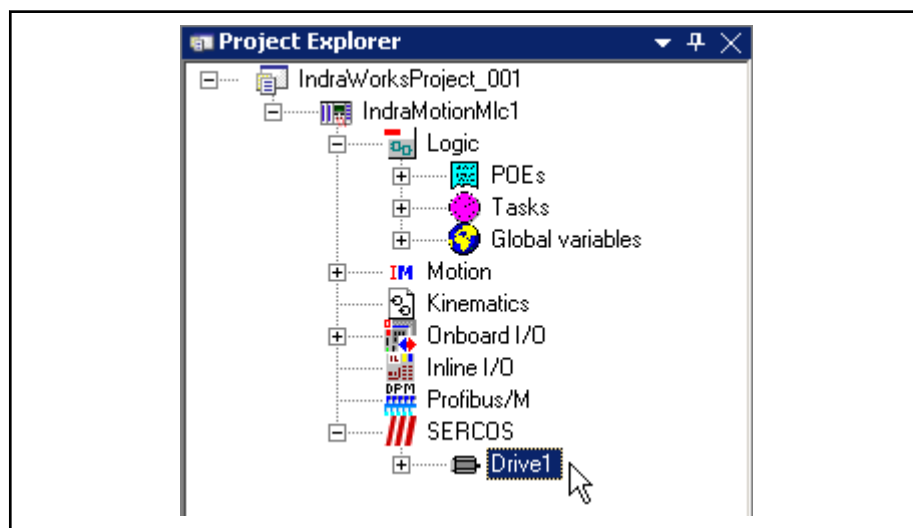


Fig. 3-19: Project Explorer (inserting at the desired target position)

In the second example, the new device is added under the element previously created.

Move the mouse to the desired target position. This is represented by a line. The corresponding target element is highlighted in blue.

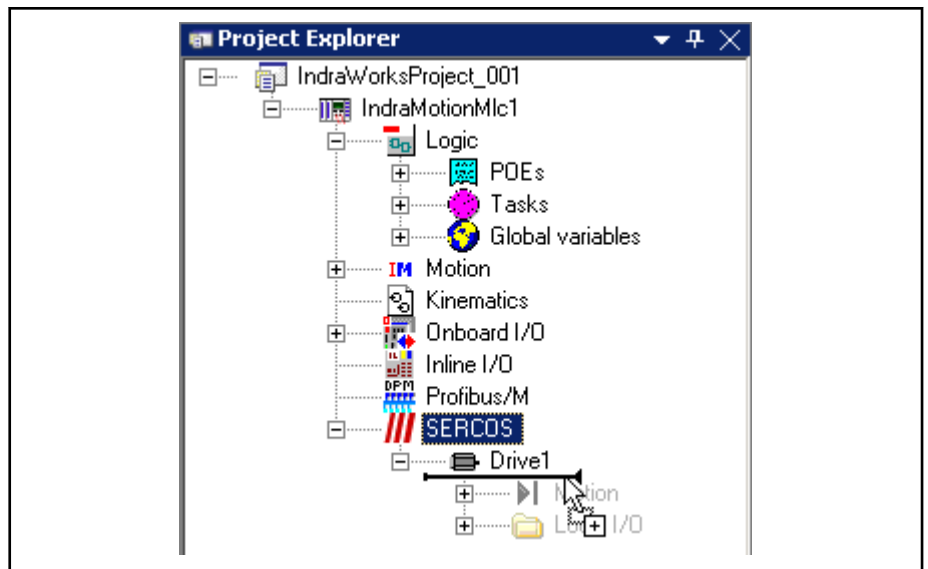


Fig. 3-20: Project Explorer (inserting between project nodes)

Inserting using the clipboard

The clipboard can be used to add devices to a project. Therefore, select the device in the library and use the **Copy** command.

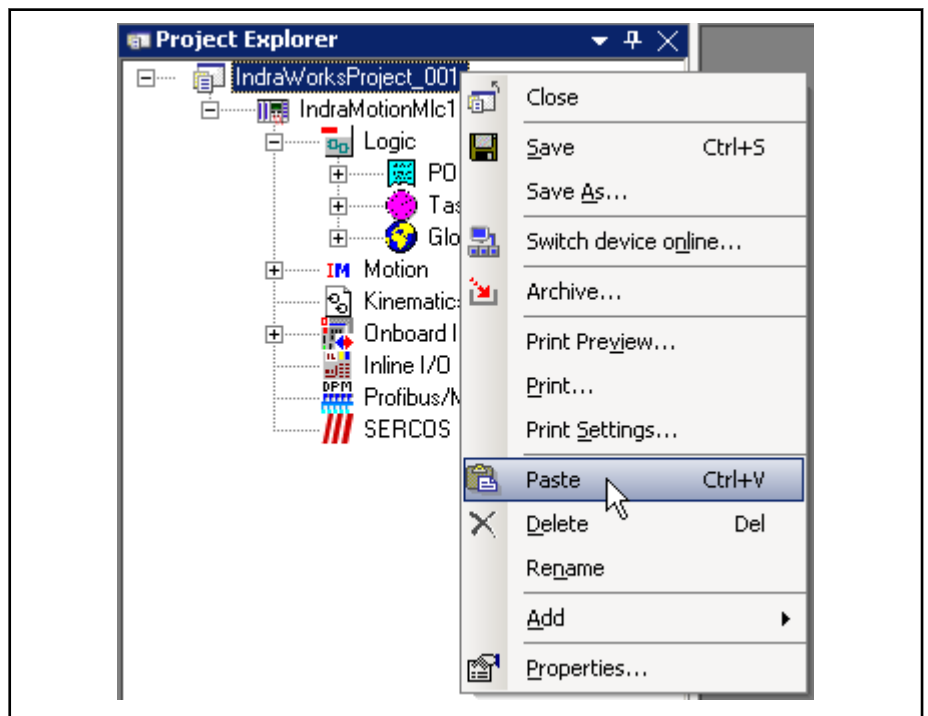


Fig. 3-21: Project Explorer (inserting devices from the clipboard)

Inserting via the menu item "Add"

A selection of available items that can be attached to the selected item in Project Explorer is provided in the context menu under **Add**.



For the project node, the "Add" function is also available in the main menu under **Project ► Add**.

The Add dialog is particularly useful for multiple add or insert tasks at a defined position. To open the "Add" dialog, go to the first entry in the context

menu **Add....** To dock the dialog permanently to any window, enable the docking capability via the context menu on the title page and drag the dialog to the desired area and drop it.

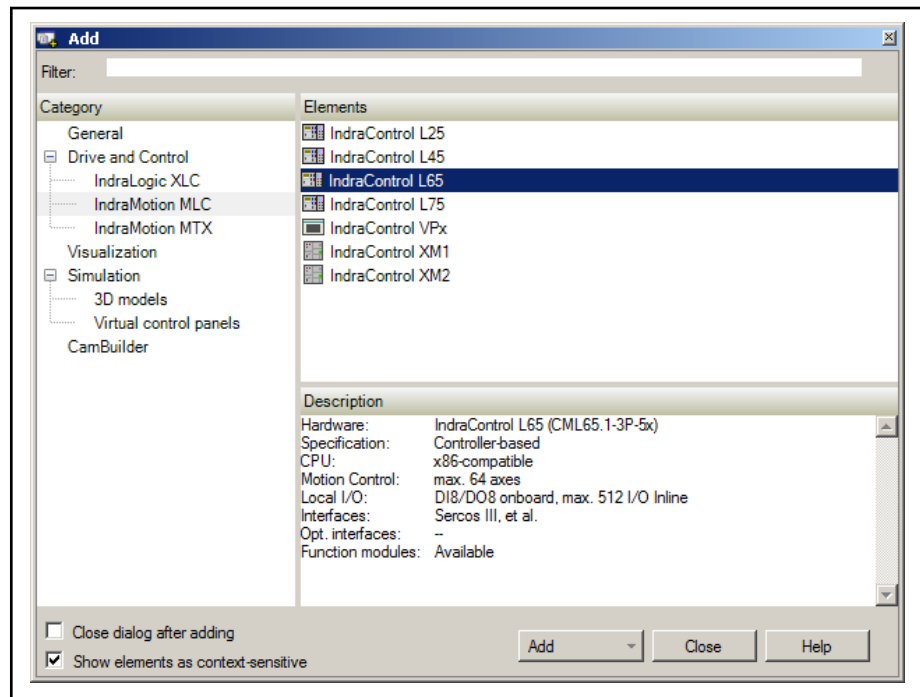


Fig. 3-22: Add

First select a category and then the element to be inserted. Further information on the selected element is available in the "Description" field.

If an item provides a Help document, this can be opened from the context menu by right clicking on the item.



The number of selectable categories and elements can be limited by entering a character string in the input field "Filter". This character string has to be included in the element names. Thus, if "L65" is entered, only devices of that type are provided.

Closing the dialog after adding

The dialog remains open if the checkbox **Close dialog after adding** is not set after adding. This provides the option of adding more elements. The selection in Project Explorer can be altered and elements appropriate for inserting are automatically displayed. In this mode, the dialog remains in the foreground.

Displaying the elements context-sensitive

If the checkbox is set to **Show elements context-sensitive**, the only elements displayed are those that can be added in the current selection in Project Explorer. Clear the checkbox to display all the elements in the library. In this mode, changing the selection in Project Explorer has no effect on the display of elements in the Add dialog.

Add

The **Add** button is used to add the element selected in the Add dialog to the selected element in Project Explorer as the last child element.



The right part of the **Add** button is used to insert at a defined position: Down arrow. Clicking on the arrow opens a context menu that enables an insert in front of an element.

Close

The **Close** button stops the adding process and closes the Add dialog.

Help

Help opens help for the Add dialog.

Devices in Project Explorer

Deleting the devices

Devices are deleted using <Del> or **Delete**.

Cutting the devices

The **Cut** command is stored in the clipboard with a reference to the selected device.

The device prepared for cutting is identified by a special icon (arrow top right) and a gray font for as long as the device information is located in the clipboard. <Esc> cancels the process.

The device is removed from its original position if it is inserted at a new position.

Copying the devices

Copy is used to take a copy of the selected element into the clipboard. The element can now be inserted at the desired target position.

Once again, the device prepared for copying is identified by a special icon (arrow top right with a plus sign) and a gray font for as long as the device information is located in the clipboard. <Esc> cancels the process.

It is possible to insert directly on an element or on positions between elements.

Copy, cut, and insert using the mouse

Devices can also be copied, cut and inserted using via drag-and-drop. If a device is dragged to another position, it will be moved to that position. If <Ctrl> is also held down, a copy of the device is created at the target position.

Renaming the devices

The name of a device can be changed by clicking on the enabled element, using the context menu or via <F2>.

The name of the element is shown in enter mode. The editing process can be canceled at any time using the <Esc> button. If the name entered is not accepted, the original name is automatically entered again.

Opening element-specific dialogs and editors

Double-clicking on an item in the Project Explorer opens the dialog or editor associated with the element. Optionally, focus the element and press <Enter>.

If the dialog or editor is already open, this is brought to the foreground.

Dialog or editor can also be opened using the "Open" command in the context menu or in the main menu specific to the element.



If an element has no dialog or editor, but has sub-elements, the subtree below the element is expanded or collapsed with a double click.

Tool tips

Hold the mouse pointer over a device for longer than one second to display brief information about the device.

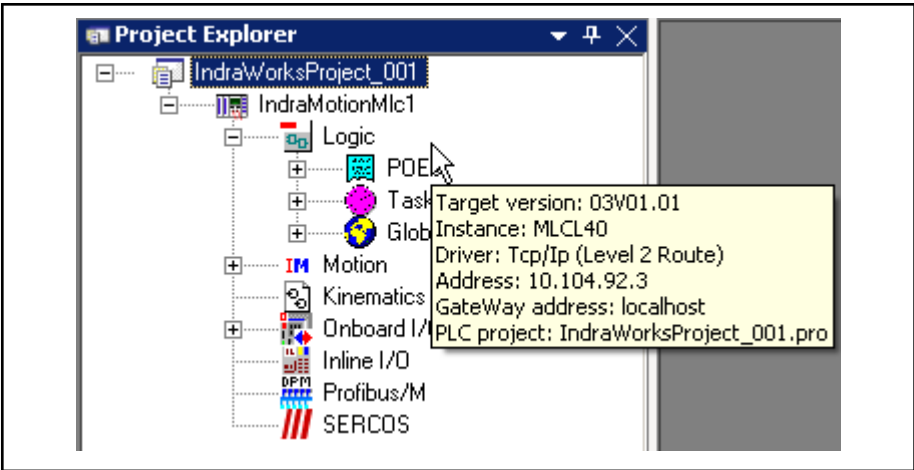


Fig. 3-23: Project Explorer (displaying tool tips on devices)

Displaying error states

If the device-specific software reports an error, the corresponding device is shown in red font. If it is located in a part of the tree that is not expanded, the visible device next higher in the hierarchy is shown in red. The faulty element itself is marked with a white cross on a red background in the icon. An error text is also displayed to further aid location.

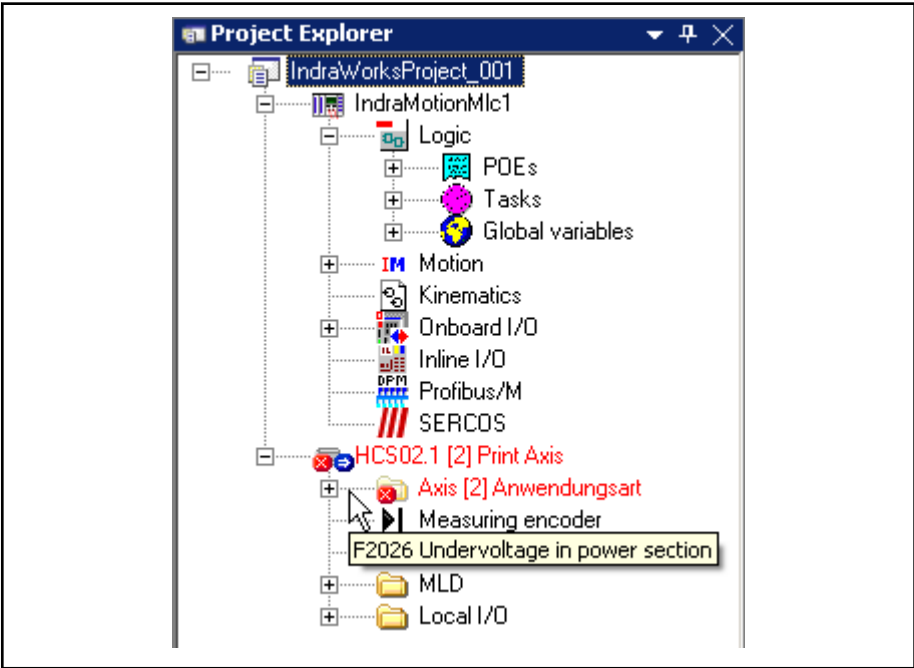


Fig. 3-24: Project Explorer (displaying error states on devices)

Faulty elements are immediately visible in the tree view.

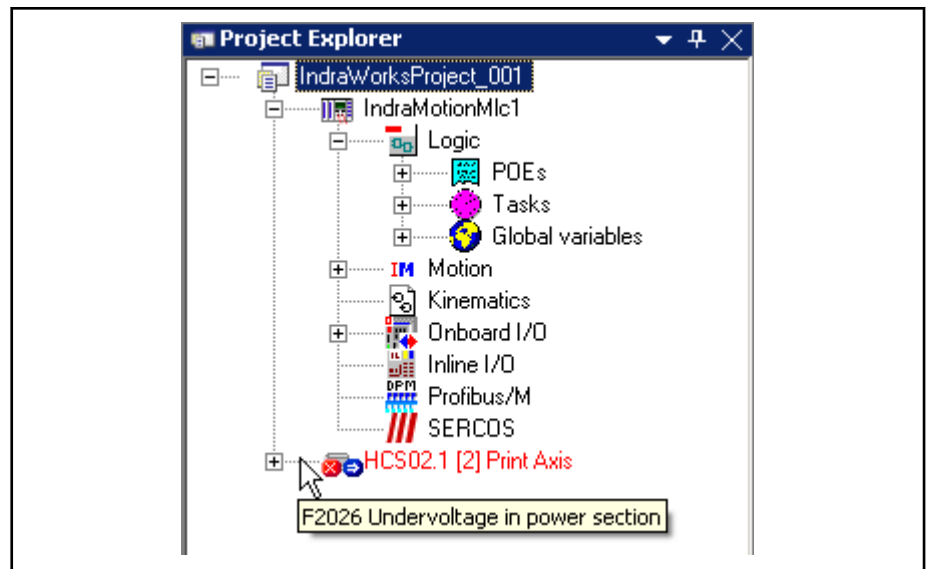


Fig. 3-25: Project Explorer (displaying error states on device nodes)

Locked elements

Elements may be locked, for example, if the element is not accessible in the context. In the tree display, locked elements are represented in light gray font, and the device icon is lightened. Such elements can no longer be reached or modified by commands.

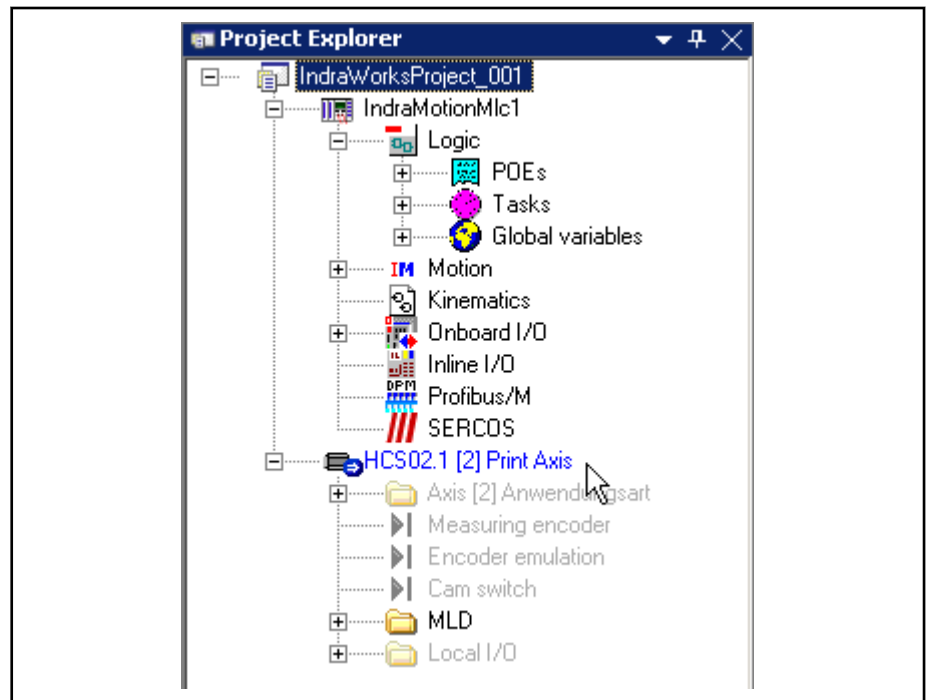


Fig. 3-26: Project Explorer (locked elements in the Project Explorer)

Tree structure using folders

New folders can be added into the structure at permitted locations using the context menu **Add ► Folder**.

Folders can be moved, copied, deleted, and renamed in the same way as devices. Parallel partial views of the project can also be opened using the folder context menu.

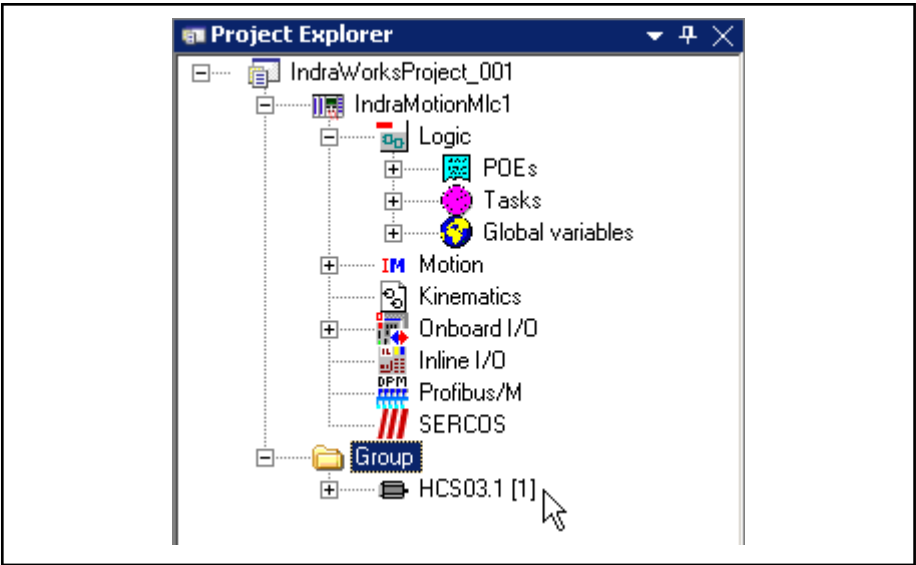


Fig. 3-27: Project Explorer (tree structure using folders)

Select multiple elements

Project Explorer supports the selection of several elements (multiple selection) to execute simultaneous commands on them. Only commands that can be performed on all of the elements selected will be offered in the context menu.

Selecting individual elements

Individual elements can be selected and deselected by holding down the <Ctrl> key and clicking with the mouse.

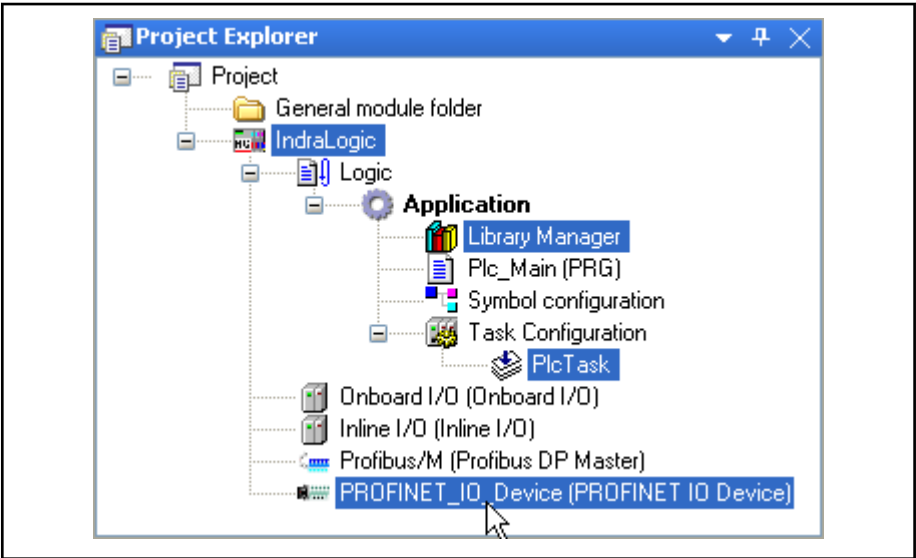


Fig. 3-28: Project Explorer (selecting individual elements)

Selecting the range

Select the start element with a mouse click. With the <Shift> key held down, select the end element with a mouse click. This automatically selects all visible elements between the start and end element.

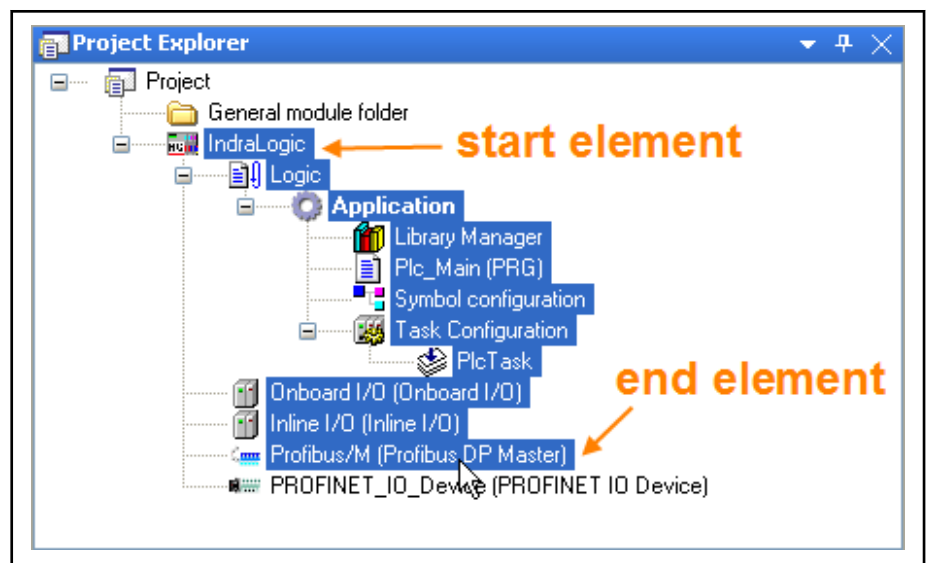


Fig. 3-29: Project Explorer (selecting the range)

A range can also be selected using the keyboard. Select the start element using the cursor keys. With the <Shift> key held down, navigate to the end element using the <Cursor up> or <Cursor down> keys. This automatically selects all visible elements between the start and end element.

Selecting the level

Select the start element with a mouse click. With the <Ctrl>+<Shift> keys held down, select the end element with a mouse click. This automatically selects all visible elements on the same level between the start and end element. This means, subelements are not selected.

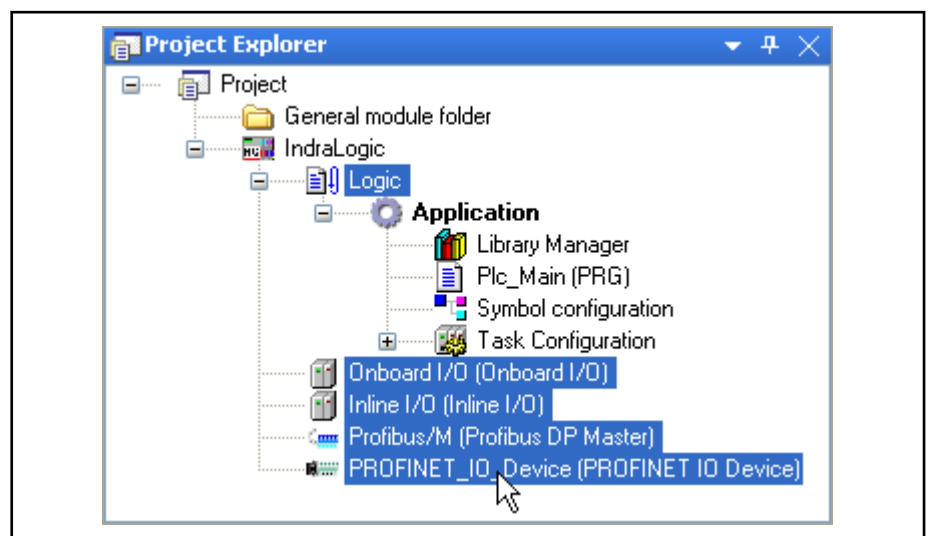


Fig. 3-30: Project Explorer (selecting the level)

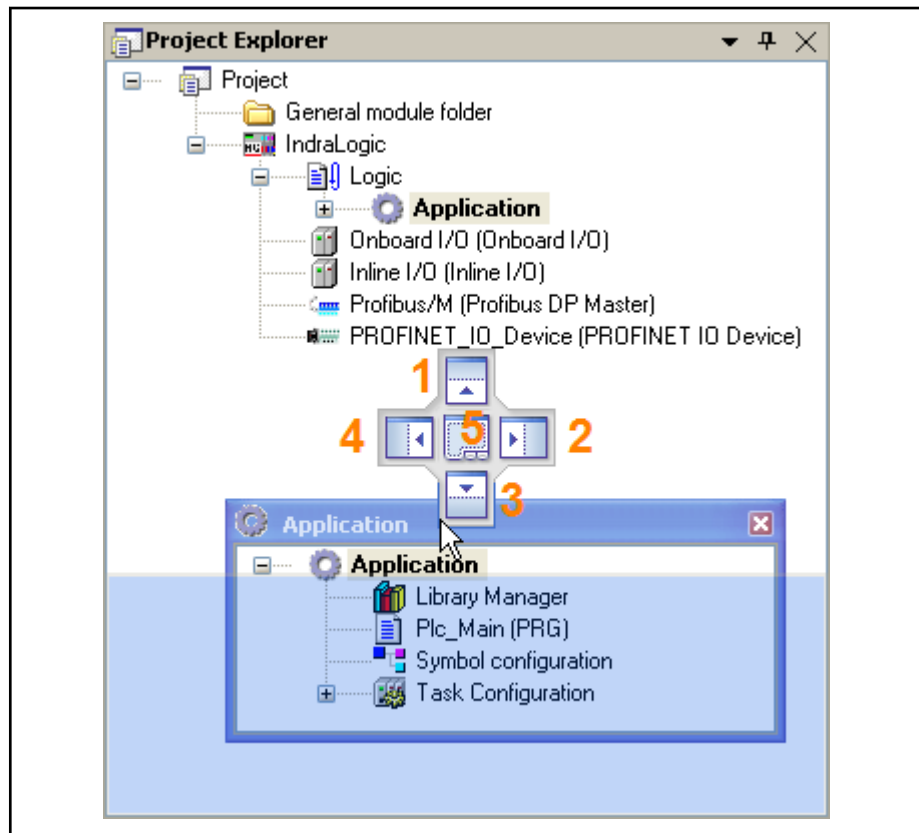
3.4.4 Views in Project Explorer

New views can be created only on elements that support this functionality. In this process, the selected element is created as the root element in the viewing window, and the viewing window is added to the main window (Project Explorer). This gives the user the possibility to better organize the display of their projects and to facilitate navigating within the project.

Creating a new view

If an element supports the command "New view", then this is shown in the context menu. Activating this command creates a new viewing window that is added as another tab to the main window (Project Explorer).

Arranging the view The viewing window can be arranged as desired. Moving over the tab with the left mouse button pressed causes a navigation cross to appear that represents the different possible arrangements.



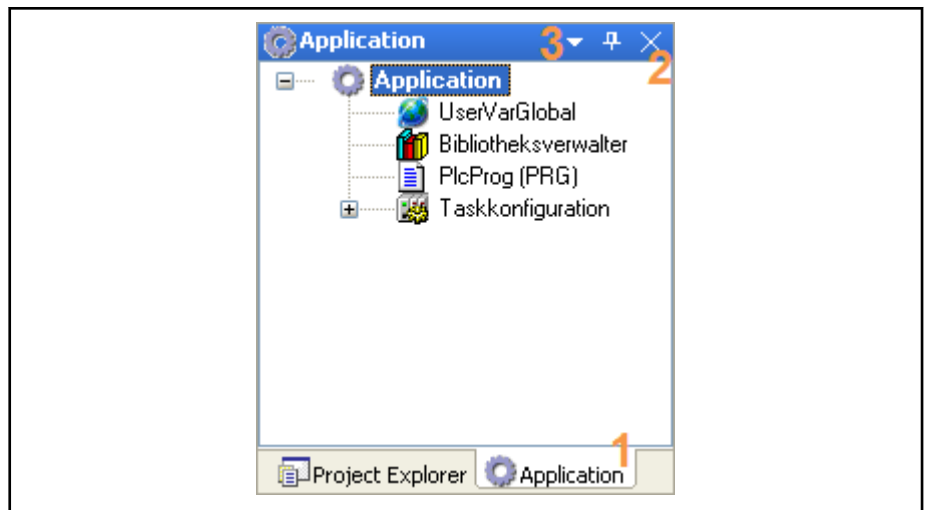
- 1 The viewing window is placed above.
- 2 The viewing window is placed adjacent to the right.
- 3 The viewing window is placed below.
- 4 The viewing window is placed adjacent to the left.
- 5 The viewing window is added as a tab to the window.

Fig. 3-31: Project Explorer (arranging the view)



The arrangement of the views can only be saved by closing the project if these are arranged one above the other or as tabs. It is therefore recommended that Points 1 and 3 (arrangement above and below), or Point 5 (arrangement as a tab) are used.

Closing the view A viewing window can be closed using one of the following actions:



- 1 "Close" in the context menu of the "Application" tab.
 2 "X" in the window title
 3 "Close" in the window title under "Window position"

Fig. 3-32: Project Explorer (closing the view)

3.4.5 Using the library

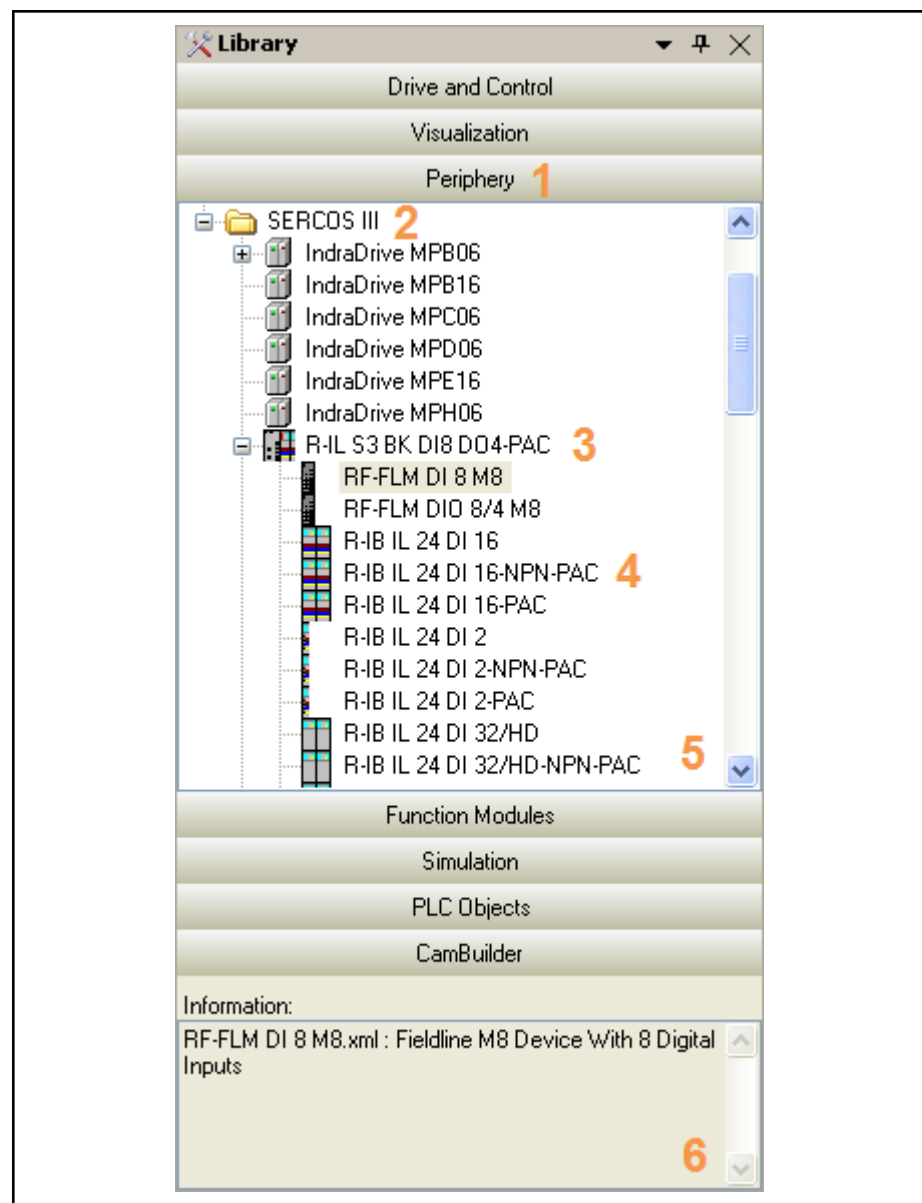
General information

The library contains all available devices. It uses the data from the standardized device description files, which are needed for configuration and parameterization.

Function areas

The library is divided into a navigation pane with the tree view of all available devices, and a pane with current information about the selected device.

Navigation area	The navigation area is divided into library groups. The division into different groups is according to manufacturers and functional components. The devices are defined by their name and the device-specific icon.
Information area	Once an element is selected in the navigation area, the current notes on the device are displayed in the information area.



- 1 Library group with own tree
- 2 Folder
- 3 Devices
- 4 Module for the device
- 5 Navigation area
- 6 Information area

Fig. 3-33: Library (function areas)

Operation

Navigation In the tree view for the devices, navigation is performed using the cursor keys and mouse.

Nodes can be expanded using the "Plus" character with <Cursor right> or a double click and closed with the "Minus" character with <Cursor left> or double click.

Taking devices into the project Apply devices from the library to the Project Explorer via drag-and-drop (refer to [chapter "Inserting devices from the library" on page 25](#)). After the device has been inserted, the software package of the device is started.

Copy and Paste via the clipboard can also be used to transfer devices.

3.4.6 Search element in the project

Search element enables the project to be searched for elements that contain a specific string in their name. The command "Search element" can be accessed from the Project Explorer context menu, provided the selected element contains at least one sub-element.

The project elements found are displayed in the "Search results" window. For more information, please refer to [chapter 3.31.1 "Message windows" on page 262](#).

The command "Search element" opens the following dialog:

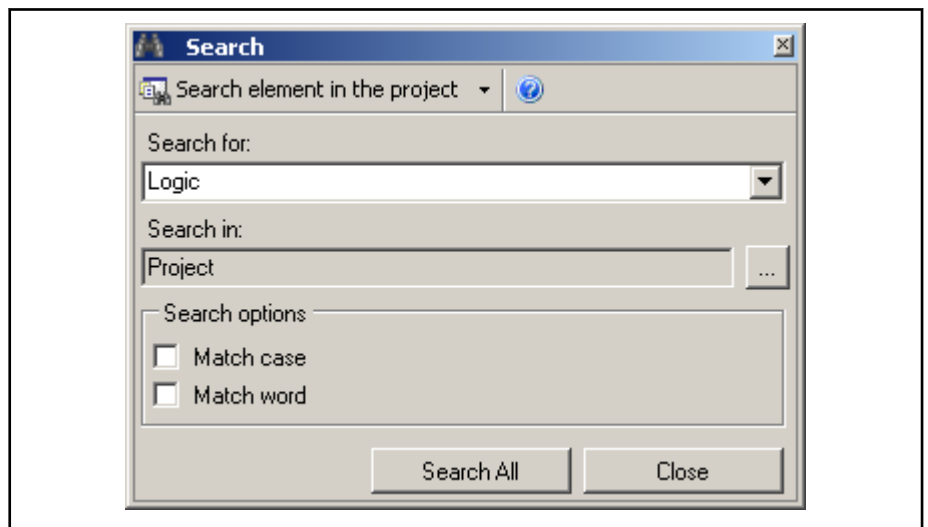


Fig. 3-34: Search (the project elements found are displayed in the project)

For "Search element in the project", the following can be specified:

- what string to search for
- where to locate the string
- what search options are used

Find:

In the input field "Search for", enter the string to be scanned. The button offers the last 20 strings entered in a selection list.

Search in:

The input field "Search in" displays the starting element from which all sub-elements are compared with the string being scanned. The current selection can be applied from Project Explorer using the button.



Multiple start elements can be listed in the "Search in" field. All start elements are taken into account during the search.

To do this, select multiple items (multiple selection) in advance in Project Explorer and adopt this selection using the button.

Search options:

Select the desired search options:

- **Match case**
Search is case sensitive in regards to the string.
- **Match whole words only (Match word)**
Only elements that match exactly the searched string are found.

Search all: Click on "Search all" to view a list of all of the elements found in the "Search results" window. The status bar displays the progress of the search process.

Close: Click on the "Close" button to exit the search.

3.4.7 Search for devices

General information

IndraWorks offers the possibility to scan for devices that are connected to the PC. A wizard is provided for this task.

Depending on the type of device, the devices can be found via the serial, Ethernet, PCI or the PROFIBUS interfaces.

Starting the scanner To call up the wizard, select **Project ► Scan for devices...** in the menu or click on the icon "Scan for devices" in the toolbar.

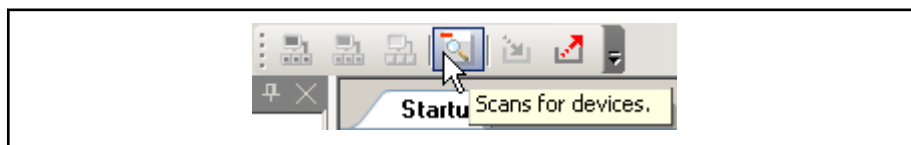


Fig. 3-35: Scanning for devices

Tips on use When a page in the wizard is opened for the first time, the input fields are already filled with default values.

If invalid characters, symbols, or numbers outside of the valid value range are typed, a red circle with a white exclamation point appears when the input field is left. The tooltip for this icon displays the cause of this message.

The "Default settings" button allows changes to be reset to the default value.

The "<<Back" and "Next>>" buttons are used to switch between the individual pages in the wizard, provided that the value input set allows this.

Exit the wizard at any time with "Cancel".

Tips on timeout settings Using "Advanced...", the timeout value that should be used for scanning can be set in some dialogs.



The scanner attempts to establish a communication connection to the devices to be scanned. The timeout is the period which is available to the connected devices to respond to a request of the scanner and thus to identify themselves. A high timeout reduces the speed of the scanning process whereas a low timeout increases the speed of the scanning process. If the timeout is too low, it is possible that not all devices will be detected.

It is recommended to use the default value for the timeout!

Operation

Selecting the devices First, select the type of device to be scanned. To do this, mark the appropriate entries in the "Installed" list and apply them using the "Right arrow", by double clicking or via drag-and-drop. Selected devices can also be deselected using the "Left arrow", by double click or via drag-and-drop. The search order can be changed using "Arrow up" and "Arrow down".

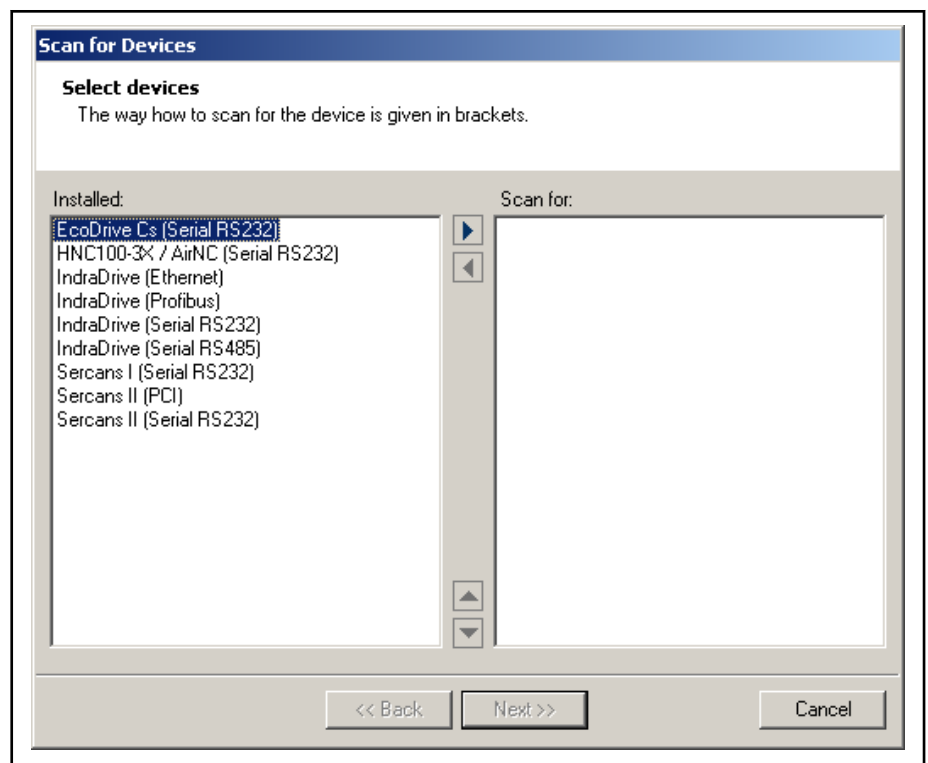


Fig. 3-36: Searching for devices (selecting the devices)

Press **Next>>** to go to the dialog. This depends on the interface through which the device is searched. The interface (serial RS232, serial RS485, Ethernet, PCI, Profibus) is specified in the device type.

Settings for the serial RS232 interface

If the type of device selected allows a search via a serial RS232 interface, the following dialog appears:

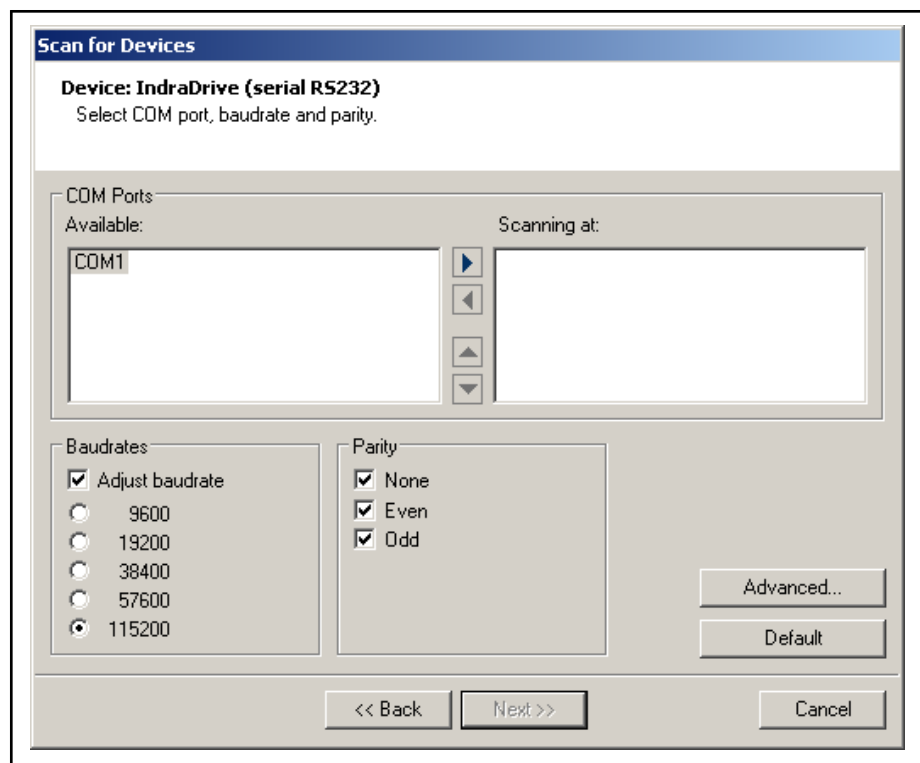


Fig. 3-37: Scan for devices (serial RS232 device data)

To establish which COM ports should be used to search for a device, apply the appropriate entries from the "Available" list using the "Right arrow", by double click or via drag-and-drop. The selected COM ports can also be deselected. The order can be changed using "Arrow up" and "Arrow down".

The parity and the baud rate also have to be set for the search. Activating the checkbox "Adjust baud rate" causes the scanner to set the devices connected to this interface to the selected baud rate.



Adjusting the baud rate may cause the baud rate of already configured devices to be changed. As a result, communication with this device may no longer be possible. In this case, the device configuration needs to be readjusted to reinstate communication!

The **Advanced...** button is used to open a dialog to input the timeout setting that the scanner uses for this type of device.

Once the COM port, baud rate, and parity have been selected, **Next >>** is used to move to the next dialog.

Settings for the serial RS485 interface

If the type of device selected allows a search via a serial RS485 interface, the following dialog appears:

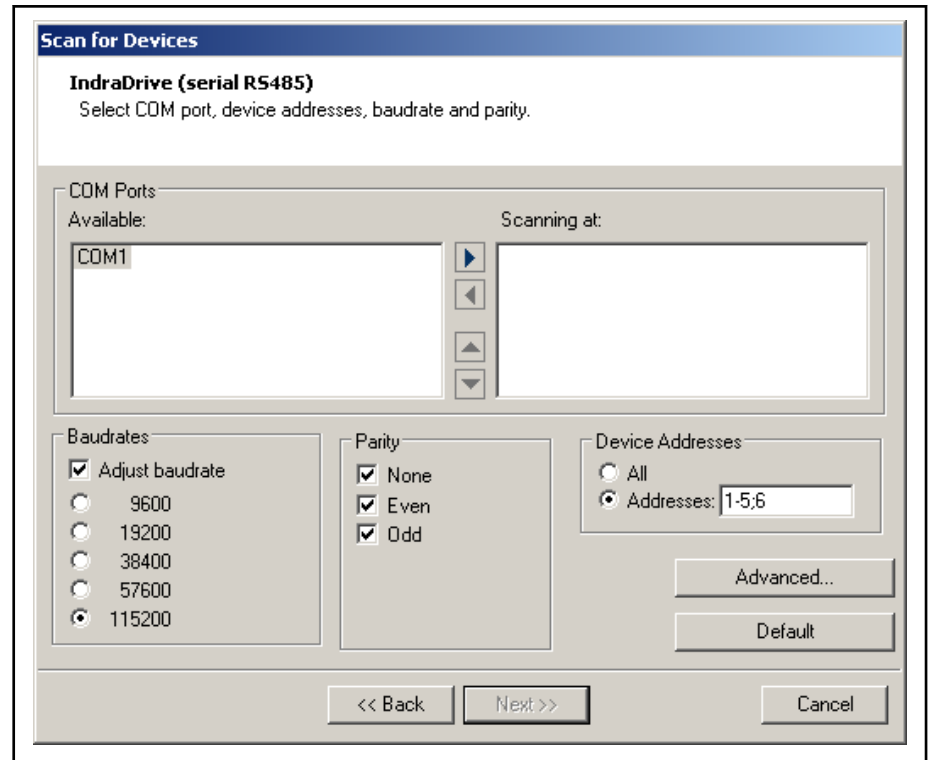


Fig. 3-38: Scan for devices (serial RS485 device data)



To address multiple devices via one serial interface, it is possible to create an RS485 bus using RS232/RS485 converters.

The scanner settings for the serial RS485 interface essentially correspond to the settings for the RS232 interface. At this point, only the differences to the RS232 interface are explained.

In contrast to the RS232 interface, a scanning range for the device addresses to be scanned have to be specified. The valid range lies within 0 and 99. Individual addresses can be specified by separating the individual addresses with semicolons. A range is specified by separating the start address from the end address with a hyphen. Clicking on "Advanced..." opens a dialog where further settings can be made.

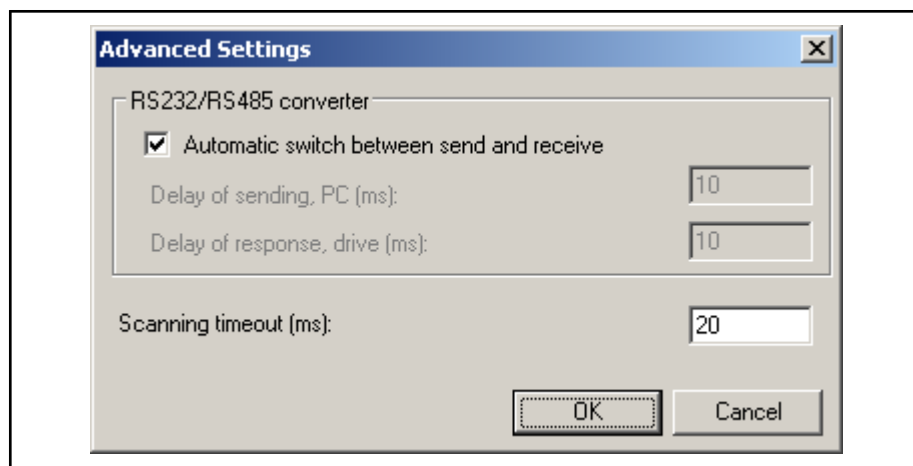


Fig. 3-39: Advanced settings (serial RS485 device data)

"Automatic switch between send and receive"

When using RS232/RS485 converters with automatic switching between send and receive (recommended), the settings for "Delay of sending, PC" and "Delay of response, drive" are not used and are therefore disabled.

When using a converter for switching between send and receive that requires a signal, the times for send delay in the PC and response delay in the drive have to be selected such that reliable communication is ensured.



When using a converter without automatic switching between send and receive, the appropriate serial interface has to be disabled in the FIFO buffer. Information on how to do this is given in the operating system documentation.



Further information on the RS485 is given in the documentation for the commissioning of the drives.

Settings for the Ethernet interface

If the type of device selected allows a search via an Ethernet interface, the following dialog appears:

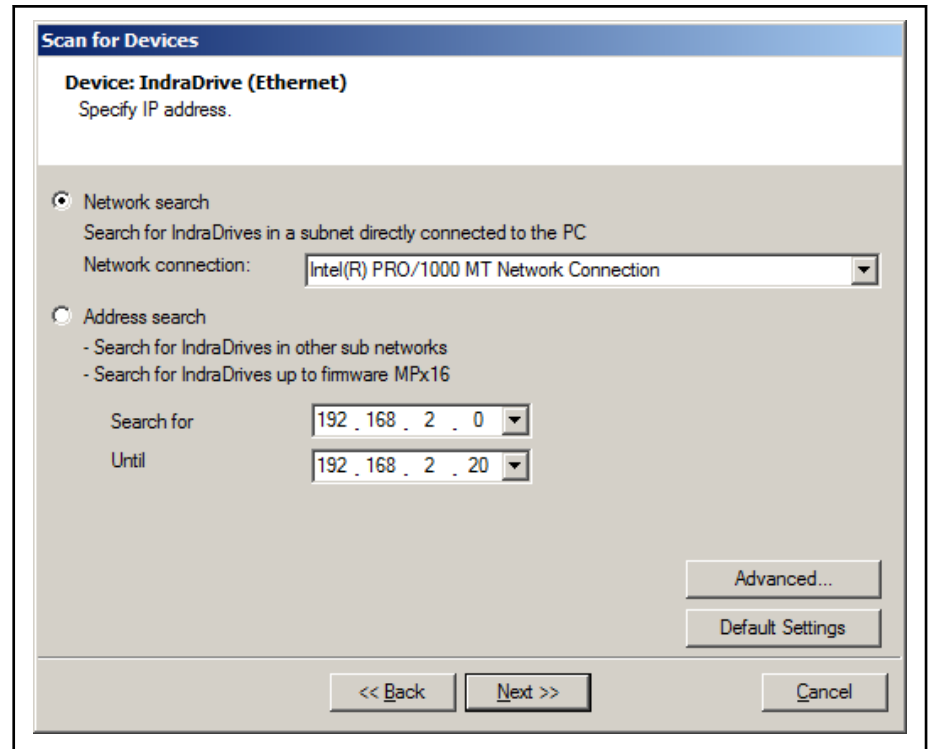


Fig. 3-40: Search for devices (Ethernet device data)

- **Network search:**
Network search searches for drives in a subnet directly connected to the PC
- **Address search:**
Address search is used to search for drives in a specified address range



Drives with firmware versions up to MPx16 can only be found via the address search.



With network search, drives are also found for which the network settings of the PC or the IP address of the device found need to be adjusted before being adopted into IndraWorks projects. If such devices are found, the user is notified in the device transfer dialog and is given assistance for adjusting the configuration using special dialogs. These dialogs are explained below.

Adjusting the PC network configuration

If Ethernet devices that can be accessed by adding an additional IP address on the network adapter of the PC via TCP/IP are to be adopted in the IndraWorks project, then the following dialog will appear:

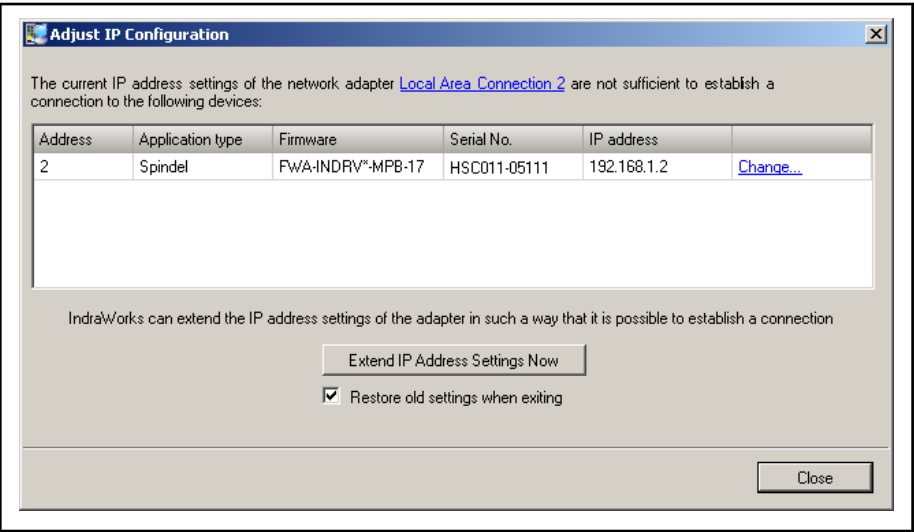


Fig. 3-41: Adjust IP configuration (additional IP address on the PC)

Clicking on **Extend IP address settings now** assigns an additional IP address to the network adapter to which the device is connected. **Restore old settings when exiting** is used to control whether the new settings are withdrawn when exiting IndraWorks.

When the PC is next started, any changes undertaken are discarded regardless of the **Restore old settings when exiting** checkbox.

By adjusting the PC network configuration it is possible to connect to devices on a running system without changing their configuration.

Adjusting the device IP address

If Ethernet devices that can only be accessed by changing the IP address on the device using TCP/IP are to be adopted in the IndraWorks project, then the following dialog appears:

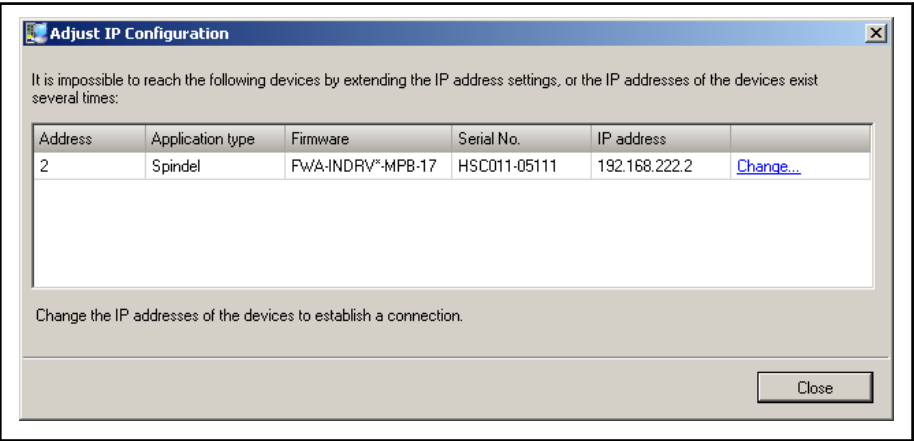


Fig. 3-42: Adjust IP configuration (adjust IP address on the device 1)

Clicking on "Change..." opens the following dialog, via which the user can change the IP address of the device:

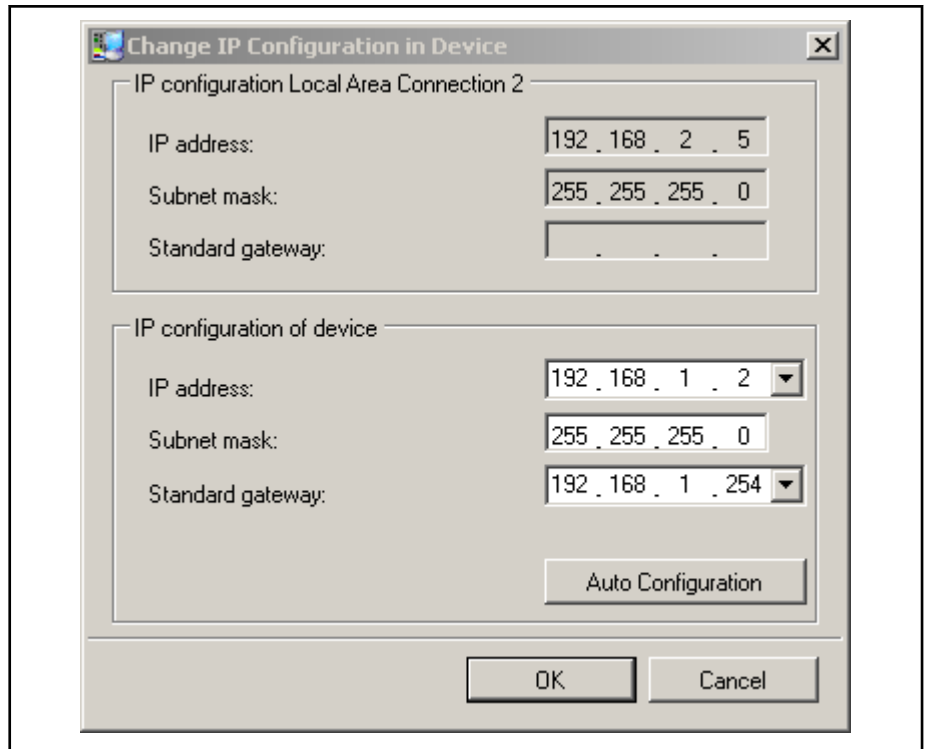


Fig. 3-43: Change IP configuration in device (adjust IP address on device 2)

⚠ WARNING

Changing the IP address of a device changes its configuration. This can lead to the connection with other devices being lost.

Settings for PCI

If a device type has been selected that allows the search to be performed via a PCI interface, no further data input is necessary. The next setting dialog or search dialog appears immediately.

Settings for PROFIBUS

If the type of device selected allows a search via a PROFIBUS interface, the following dialog appears:

Scan for Devices

Device: IndraDrive (Profibus)
Select address and baud rate for bus master

Bus master

Address (0 - 125):

Baudrate:

- ☐ 9600 Baud
- ☐ 19200 Baud
- ☐ 93.75 kBaud
- ☐ 187.50 kBaud
- ☒ 500 kBaud
- ☐ 1500 kBaud
- ☐ 3 MBaud
- ☐ 6 MBaud
- ☐ 12 MBaud

Device type

Ident number:

Note:
The scanner searches for drives via a Profibus card installed in the PC. The drives master communication is executed via the Profibus. The Hilscher cards CIF50-PB and CIF60-PB are supported.

Advanced...

Default

<< Back Next >> Cancel

Fig. 3-44: Search for devices (Profibus device data)



Using a Hilscher PROFIBUS card installed in the PC, the scanner searches for drives whose leadership communication takes place via Profibus.

For this purpose, it is required to install a Hilscher Profibus card CIF50-PB/CIF60-PB on the PC. For information about the installation of this card, please refer to the documents supplied with the cards.

The baud rate and an address for the PROFIBUS bus master have to be entered.

The device identity number is also displayed, but this cannot be edited.

The "Advanced..." button is used to open a dialog to input the timeout setting that the scanner uses for this type of device.

When an address and a baud rate have been selected for the bus master, move to the next dialog by clicking **Next >>**.

Search dialog

Once the setting dialog has been processed for each selected interface, a search dialog is displayed. This starts the search automatically. This can be

stopped at any time by clicking on "Stop scanning for devices" and restarted by clicking on "Start scanning for devices".

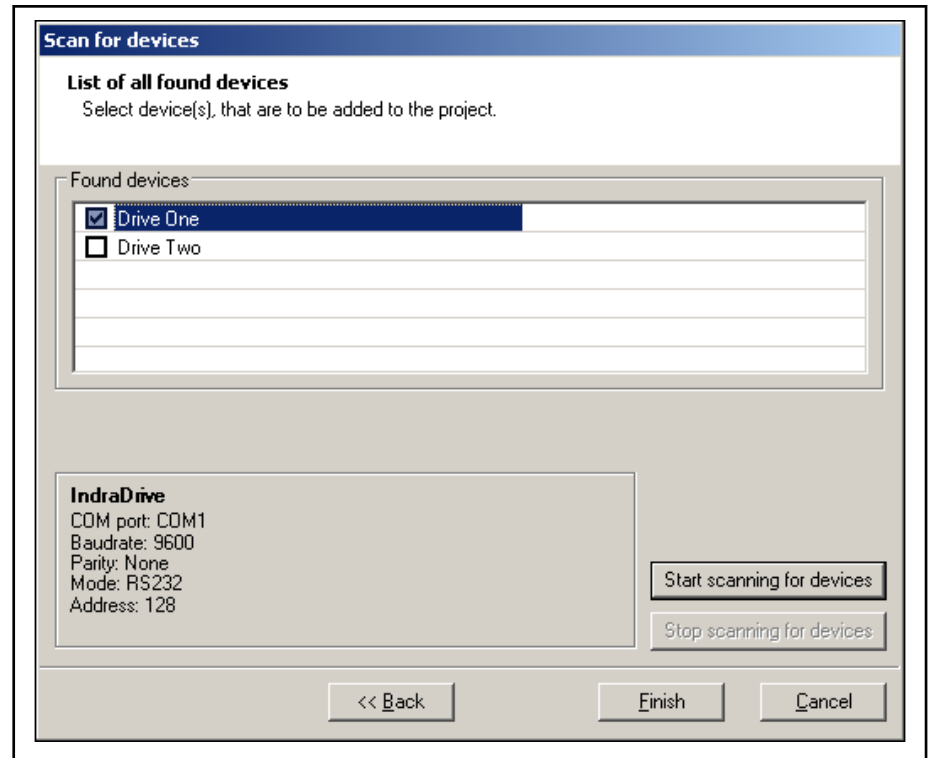


Fig. 3-45: Search for devices (devices found)

Applying the devices found

As soon as a device is found, it is displayed in the list.

If a device in the list is selected, additional information about this device is displayed.

Enable the checkbox to the left of the device that is to be adopted in the project.

Enable the **Identify** checkbox to start the device flashing. This checkbox is not available for all devices.

For some devices, adjust the configuration before applying the devices to the project.

Click on **Finish** to end the search and take the selected devices into the project. Depending on the device type, taking the selected devices into the project may start a further wizard to enter additional parameters.

3.4.8 Offline and online mode

The connection status "IndraWorks with a control" differentiates between "connected" and "not connected". Different communication channels are used. They can also be used parallelly.

Offline

When creating a new project or after opening an existing project, IndraWorks is **offline** with regard to the currently connected device. Thus, there is no communication between the configured control and IndraWorks allowing to access configuration data. All changes made to project data in IndraWorks are saved in the project, but they are not applied to the target device.

If the control can be reached in the network, the following control areas can also be accessed **offline**:

- Firmware management
- Device data explorer
- Error/diagnostic memory

Offline mode display

For the offline operating state of a control, go to the node representation in the project tree or to the IndraWorks status bar:

-  **Control1** Control node in the Project Explorer in the operating state "Offline", indicated by the device name in black.
-  Operating state display in the IndraWorks status bar in the operating state "Offline", indicated by the open connection.

Online

Control data such as system variables, parameters and the Motion configuration are accessed using a proprietary communication channel. The required communication channel to the control is set up in **online** state. Otherwise, the connection to the control is **offline**.

The communication to the integrated PLC uses a different communication channel. Only the states **logged-in** and **logged-out** are relevant.

Login:

To connect to the PLC, select **Application ► Login**. Alternatively, go to the Project Explorer and select **Login** from the context menu of the "Application" node.

Logout:

To disconnect from the PLC, select **Application ► Logout** from the menu. Alternatively, go to the Project Explorer and select **Logout** from the context menu of the "Application" node.

In both cases, the configured control has to be reachable in the network.

Overview on the connection status:

Online	Logged-in
• Transferring the Motion configuration • Retrieving or setting the control parameters • Accessing the extended device diagnostics • Saving changes to the project and simultaneously transferring those changes to the data memory of the target device	• Transferring the PLC project to the control • Accessing the PLC operating state (start/stop) • Retrieving PLC variables • Debugging the PLC program

Tab. 3-1: Comparison of the states **Online** and **Logged-in**

NOTICE

Risk of material damage due to erroneous control of motors and moving elements!

⇒ In **online** state, accidental transfer of data to the target device can cause damage. Before making any change to the project data, ensure that the change will not cause damage.

Representing the online state

The "online state" is indicated by the node representation in the project tree or in the IndraWorks status bar:

-  **Control1 [P2]** Control node in the Project Explorer in the operating state "Online", indicated by the device name in blue and by the blue icon in the device symbol.
-  Operating state display in the IndraWorks status bar in the state "Online", indicated by the closed connection.

3.4.9 Switching from offline to online mode

What happens when switching from offline to online mode?

Four steps for switching

As soon as a device is switched online, the following steps are performed by IndraWorks:

- First, IndraWorks attempts to establish communication with the device (communication comparison)
- Then IndraWorks checks whether the projected device structure matches with the existing device structure (structure synchronization).
- The next step checks whether the projected device configuration matches the existing device configuration (configuration synchronization).
- Finally, IndraWorks compares the device data in the project and in the target device (data synchronization).

The device is only switched online after all of these steps have been completed.

A detailed description of these steps is given below.

Performing the switching operation

To switch a device online, go to **Project ► Switch devices online....** Alternatively, select **Switch online** from the context menu of the device node.

If multiple devices are connected, a prompt is given to select the device to be brought online:



Fig. 3-46: Switching devices online (device selection)



Use the "Log in" command to work online with a PLC application of a device. For details, please refer to the description of the device.

Communication adjustment

Checking the communication link

Firstly, the communication link to the project device is checked. If IndraWorks communicates with all devices, the next step of the structure synchronization is automatically performed.

Otherwise it is possible to

- scan for a device as an option
- or repeat the online switch for this device.
- or cancel the online switch for this device.



Fig. 3-47: Online switch (communication link not possible)

Scanning for a device

The scanner is used to search for devices (see [chapter 3.4.7 "Search for devices" on page 38](#))

If the device is found, its communication settings are adopted. If no device is found, the switch is canceled.

Structure synchronization

Structure synchronization checks whether the projected device structure matches the existing device structure.

For example, a control peripheral device is checked as follows:

- Number and type of connected drives.
- Number and type of connected I/O bus participants.



The structure synchronization is dependent on the device type. For details on switching the device online, refer to its documentation.

If the projected and existing structures match, the configuration synchronization is performed as the next step.

Resolving differences in the structure

Differences in the data in project and the target device are displayed in a tool window.

The tool window contains the following information:

- Overview of the deviations in the structure.
- The data set in the project.
- The data in the target device.
- The cause of the problem.
- Tips on possible elimination of the problem.

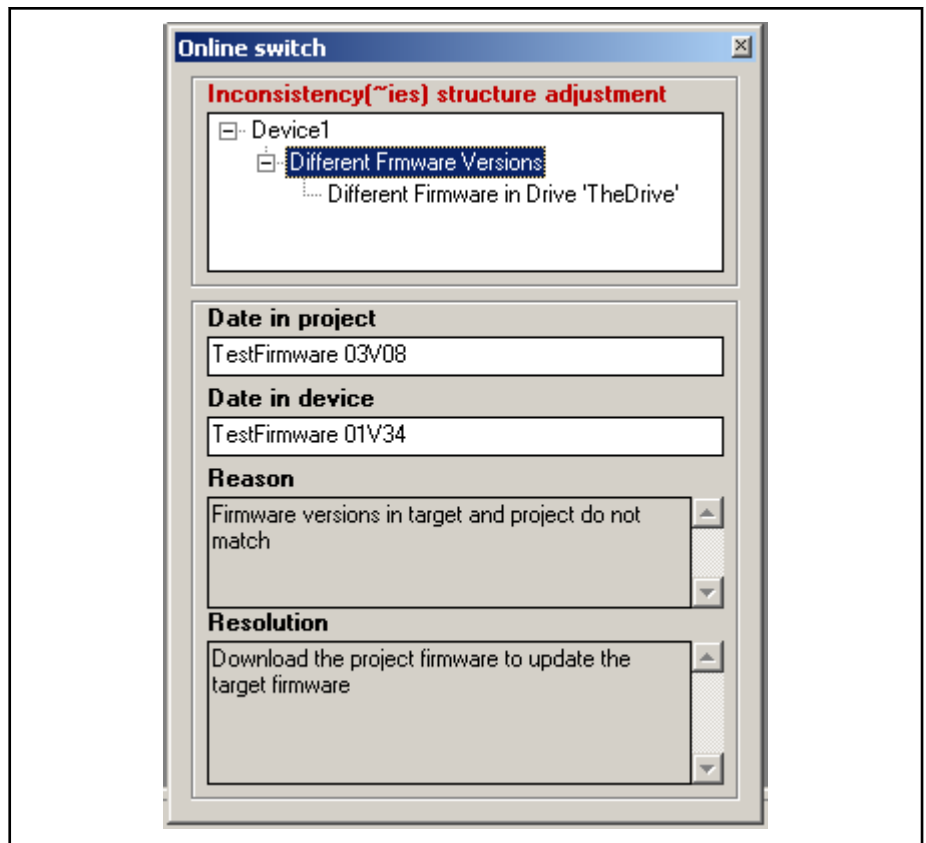


Fig. 3-48: Online switch (inconsistency(ies) in the structure synchronization)

Once the deviations have been eliminated, the switch operation can be repeated. If no further deviations in the structure are detected, then IndraWorks performs the configuration synchronization as the next step.

Configuration synchronization

The configuration of the individual devices have to be synchronized (e.g. the projected and actual drive number set for a drive of a Sercos ring can differ).



The configuration synchronization is dependent on the device type. For details on switching the device online, refer to its documentation.

If the projected and existing configuration match, the data synchronization is performed as the next step.

Resolving differences in the configuration

Differences in the data in project and the target device are displayed in a tool window.

The tool window contains the following information:

- Overview of the differences in the configuration
- The data set in the project
- The data in the target device
- The cause of the problem
- Tips on possible elimination of the problem

The differences can now be corrected and the switch operation repeated. If no further differences in the configuration are detected, then IndraWorks performs data synchronization as the next step.

Data synchronization

The data of the individual devices have to be synchronized, e.g.:

- Motion program of a control.
- Speed limitation of a drive.



The data synchronization is dependent on the device type. For details on switching the device online, refer to its documentation.

Resolving differences in the data

Differences in the data in project and the target device are displayed in a tool window.

The tool window contains the following information:

- Overview of the differences in the data
- The data set in the project
- The data in the target device
- The cause of the problem
- Tips on possible elimination of the problem

The differences can now be corrected and the switch operation repeated. If no further differences in the data are detected, then the switch is completed.

3.4.10 Parallel Engineering

General information

Up to five IndraWorks applications can simultaneously connect to the control for the following controls. It is then possible to execute the known online function in different IndraWorks applications and different projects simultaneously:

- IndraControl L75
- IndraControl XM22
- IndraControl XM4*
- IndraControl VPX



In case of a conventional application layout, i.e. in case of controls with only one application object, the restriction that only one user can log in to an application at a time applies.

The device application concept is recommended, see [chapter 3.4.11 "Device application" on page 55](#).

The device application extends the PLC programming flexibility by dividing the PLC programming into several applications in functional groups.

Advantages:

- Parallel working at PLC programming ¹⁾
- Lower compilations and project loading times
- Separate online mode for individual applications

¹⁾ Only one user per application

Working in "parallel mode"



By using this functionality, several users can simultaneously influence the machine behavior. As effects can occur that cannot be reproduced by the individual user, a continuous coordination of the different operation is important.

The following rules apply in case of parallel operation:

- Each online user has read and write access to all parameters (control, drives, I/Os,...)
- Command are processed in the order in which they were triggered (irrespective of the user).
- Each change a user makes on the device is immediately visible for all other users (e.g. changing a parameter). If a dialog changes due to such a change (appearance, number of entries), this change is also executed everywhere the dialog is opened.
- If a user changes the system configuration (e.g. by creating and deleting axes or function modules) and if he transmits these changes to the device, all users connected to the device are switched to partially synchronous.
- If a project should be partially synchronous before, it stays partially synchronous if the requirements for synchronous operation cannot be met by the change. In the other case, it is automatically switched to synchronous operation.
- Conflicting commands are usually interlocked (e.g. simultaneous starting of oscilloscope recordings on the control, simultaneous firmware downloads to the control or to the drives). In case of a conflict, an error dialog is displayed, informing about the conflict and the user causing the conflict.

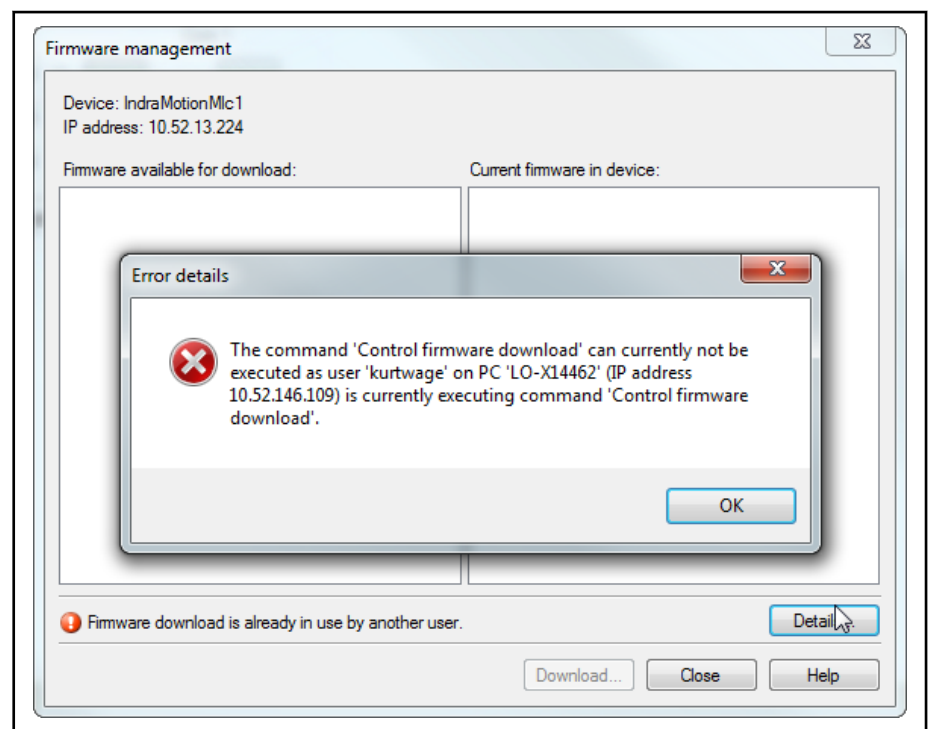


Fig. 3-49: Conflict during firmware download, triggered by parallel Engineering



Conflicting actions can have different reasons: For example, it is not possible, to switch the Sercos phase while a firmware is downloaded to a drive.



Not all conflicts can be interlocked so that coordination between the users is required (e.g. in the Axiscommissioning dialog).

Display of connected users

For all controls in the project switched online with their respective device, it is displayed if other users are connected.

In this case, the following information is displayed on the IndraWorks status bar: "Other users connected".

- Device names in the local project
- Windows user name, PC name, IP address, connected via Motion

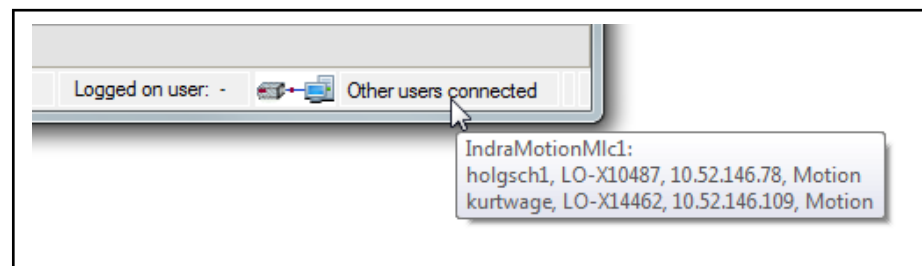


Fig. 3-50: Status bar display if other users are connected to the control



If several IndraWorks instances are opened on the PC, and several users are connected to the same device via these instances, this user is displayed multiple times.



The control name is determined from the respective local project and not from the control.

Applying changes from other users

Changes to the project executed by other users can be applied to the individual project using the following methods:

- Transferring changed elements by using the online comparison on a control (Online comparison)
- Use of the Version Control
- Export and import of the changed project data (Export/import)
- Applying a device configuration completely to the individual project by using the context menu commands (right-click) on the affected control "Synchronizing/Upload control configuration to PC"

Advice on parallel working on a control

If several users work simultaneously on the control, the load on the resources is higher so that performance problems can occur.

These restrictions on the performance can be reduced when taking the following advice into consideration:

Cycle times

The cycle time can influence the processor capacity utilization depending on the PLC program type. In case of a high level of capacity utilization of the processor (see dialog -> Link diagnostics/capacity utilization), the communication slowed down and IndraWorks could be slowed down. If possible: Check if a temporary cycle time increase (Motion & Sercos) results in a better performance.

IP channel	The IP channel availability is a requirement on Sercos for high-performance parallel Engineering. The IP channel availability can be checked as follows: Control parameters: C-0-0036, bit 2=0 and bit 17=0.
Communication to Sercos devices (S-/P-parameters)	In case of intensive communication via Sercos (e.g. caused by cyclic reading of S-parameters and P-parameters of many Sercos devices), increased performance problems occur during parallel Engineering (slow reading, opening of dialog...) as the bad width of the IP channel is restricted. This can for example be caused by opened dialogs (parameter overview). In case of performance problems, it is recommended to only keep dialogs opened that are necessarily required. This also applies to dialogs in the background.
PLC influence	If the CPU load is high and the PLC is not required for commissioning, stopping the PLC can sporadically accelerate the communication.
MLPI connections (OpenCoreInterface)	If many dialogs are opened, the number of simultaneously possible connections via the OCI (OpenCoreInterface) reached its limit value. In this case, an error occurs upon opening a new dialog of an error message. Remedy: Close dialogs opened in IndraWorks or dialogs opened by other simultaneously connected users. Subsequently, repeat the failed command.

3.4.11 Device application

Using the device application

General information



The "device application" is only supported from IndraWorks 14V22 by IndraMotion MLC controls.

By using a "device application" (referred to as "**DeviceApplication**" object in the Project Explorer), facilitates the separation of the globally required data from the control programs.

The global data used by all control applications of a device are managed in an individual object, i.e. the "device application". The global data are compiled and loaded to the control during commissioning. The "device application" does not contain any control programs developed by the user.

The size of the control applications of the device is reduced and the applications take less time to load as the global data do not have to be loaded upon each download or online change.

However, loading of global data requires more memory space and download time in comparison to the use of stand-alone applications. This is due to the fact that all reference data and the code have to be loaded to the control with the device application as it is sure which parts of the project are used later.

The following applications can be decisive for the use of the device application:

- The device application facilitates the independent processing of several applications, i.e. an application can be stopped while other applications continue to run.
- Thus, the PLC user program division into different applications, for example in applications, controlling axes and interpolating axes.
- All resources (libraries, variables) assigned to the device application are globally valid and are not transmitted again after a download with subordinate applications. Actions such as an online change can thus be executed much quicker.
- By using several applications, the user program structure could be improved. A re-use of PLC applications for the same use cases is thus not possible.

Organization in the Project Explorer

- By separating the I/O configuration and the logic implementation in the device application (I/O) and at least one application (logic), commissioning is supported by several programming engineers.

The device application can only be activated from IndraWorks 14V22 by IndraMotion MLC controls, see [chapter "Create device application" on page 59](#).

The application can be activated when creating the control or later in the control properties.

In case of an enabled device application, the "DeviceApplication" object is displayed below the control node in the Project Explorer. The object manages the global data and parts of the code used by all control applications of the device by means of child objects of a different type.

Examples: I/Os, library manager, Global Variable List, network variable list.

The control program code is contained in one or several "regular" application objects, represented below the "DeviceApplication" object in the Project Explorer.

The application objects can access global data and variables of the device application.

They do not have mutual access and cannot have any child applications.

The data exchange between application objects can be realized via global data of the device application.

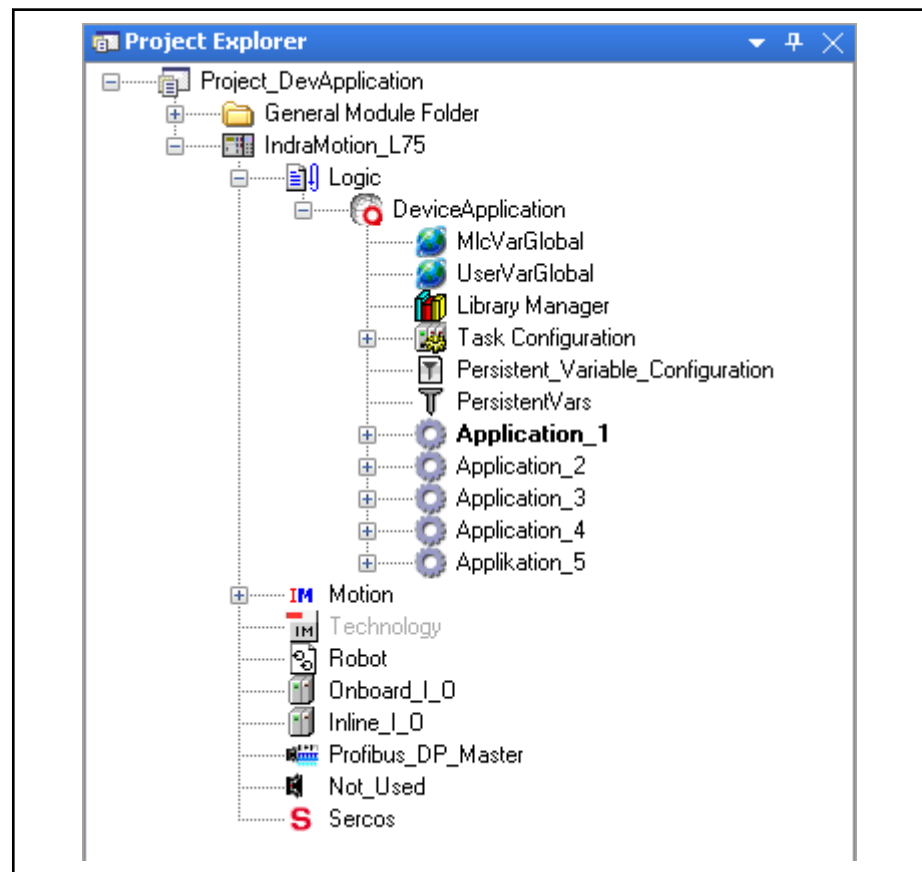


Fig. 3-51: Project Explorer "DeviceApplication" object

Control and behavior

- No online change possible for the device application.

Changes to the device application result in a new download of the device application and thus the child applications (located below the "DeviceApplication" in the Project Explorer).

- After a download or reset (warm or cold), the device application is initially in state "Stop".

All applications of the device application can be logged in, logged out, started, stopped or reset individually or simultaneously.

- Upon the first login and download of an application, the device application is downloaded automatically.
- If you want to delete the device application, the child applications are also deleted from the device.
- When generating a boot application for one of the applications of the device, a boot application for the device application is automatically generated.
- The device application usually refreshes the I/O image automatically via the bus cycle task (BCT).
- The device application automatically starts the bus cycle task.
- The bus cycle task is stopped automatically during a download or an exception.
- For each bus master requiring a bus cycle task (BCT), a separate BCT can be selected.
- The device application continues to run in case of an application stop.
- When changing the device application, all subordinate applications are deleted on the control (after a query). Logged in users are logged out.
- The device application contains libraries whose contents can be used by all subordinate applications.
- The device application only exists once per device and contains:
 - MlcVarGlobal
 - UserVarGlobal
 - Shared Memory data (AxisData, ControlData, TouchProbe, kinematics...)

Logging in to the device application and data access

Login to the device application is, amongst others, required to display global variable values and for debugging. Login takes place by user action (e.g. login of a subordinate user application or when opening the GVL).

Values in global variable lists in the device application area can be monitored, written and forced without explicit login of the device application as long as an application of the project is logged in.

By introducing the device application, the following extensions are available:

- Upon the first application download, the device application is also downloaded.
- A download/OnlineChange of an application is possible without downloading the device application if the device application is available or compatible.
- Data and code of the device application can be accessed from all applications but not vice versa.

Notes on libraries

Libraries integrated in the library manager of the device application

- are transmitted to the device together with the device application irrespective of their actual use.

- are not transmitted during the online change and do not decelerate the online change anymore (accelerated login of the applications).
- Variables declared in a library assigned to the device application are global for subordinate applications.
- The search order for identifier resolution is still bottom to top. This means, in the object hierarchy in the Project Explorer, the search is carried out as follows:

"Application" → "DeviceApplication" → "Project"

Realization of library allocation: Velocity during Online change vs. low memory utilization on the device due to optimized download of only required libraries. The default libraries of the control (libraries contained when inserting the control) are inserted in the library manager of the device application by default.

Notes on task configuration

Do not call any POU's in the task configuration of the device application. This task configuration is used by the bus master to achieve an approximation to the bus cycle task clocking during program execution. There are two options, provided the device supports these options:

- Define a task of type "External" in the task configuration.
Enter the call of the implicitly provided bus master event as external event for triggering this task.
Thus, an asynchronous cycle adjustment with the bus master is achieved.
- Define a task of type "Parent task" in the task configuration of an application.
Select the cyclic task of the bus master as parent task from the device application tasks.
Thus, a synchronous cycle adjustment with the bus master is achieved.



Note the following restriction:

The device application state decides whether or not the synchronous call is executed. If the task is running while the child application is not running, the code is still called.

Notes on persistent variable lists

In case of devices with static memory administration, the entire memory for non-volatile data is administered by the device application. If a persistent variable list is to be created in an application, allocate a memory area. Even an empty list takes up several bytes of memory space.

Use the object "Persistent variable configuration" to divide the memory for non-volatile data also into "global" and "application-specific" data.

To allocate the non-volatile memory to subordinate applications, it is recommended to use several independent applications. This is also recommended to avoid having to upload all applications to the control again upon each change to a persistent variable list of the device application. The "Persistent variable configuration" object cannot be deleted.

Notes on symbol configuration

- A "symbol configuration" as child application of a "device application" is not supported!
- References to the symbol configuration libraries of an application can also be applied to the library manager of the device application.
This has the advantage that libraries do not have to be loaded with the applications, i.e. the application size decreases. See the option "Add li-

brary placeholder to device application" when adding an object "Symbol configuration" or the identical command in the "Tools" menu of the symbol configuration editor.

Refer to:

"PLC Programming System IndraLogic 2G" application description

DOK-IWORKS-IL2GPRO*V14-AP06-EN-P

R911343570

Chapter:

- Object 'DeviceApplication'
- "Symbol configuration" object
- Object 'Persistent variable configuration'

Application

PLC applications with more than one PLC application, are referred to as "Multi application mode". The IndraLogic toolbar is only active in the active application (start/stop button).

- Applications can be started and stopped independently.
- Each application can be selected as active application.
- Each application can be debugged individually via the following functions: watch, trace, force, breakpoint.
- Applications cannot be cascaded.
- Login to more than one application of the same project is possible.
- Applications can contain all objects available in single applications.

Create device application



The "device application" is exclusively supported from IndraWorks 14V22 by IndraMotion MLC controls.

The device application can be created as follows:

- When adding a control to the project.
- It can be added to existing projects at a later point in time via "Extended settings" of the control.

Call: **Properties ► Extended settings ► device application** in the Project Explorer via the context menu of the control

Enabling device applications when creating a control

1. Add a control to the current project and follow the wizard up to step 3: "Extended settings"
2. Enable the option "Device application"

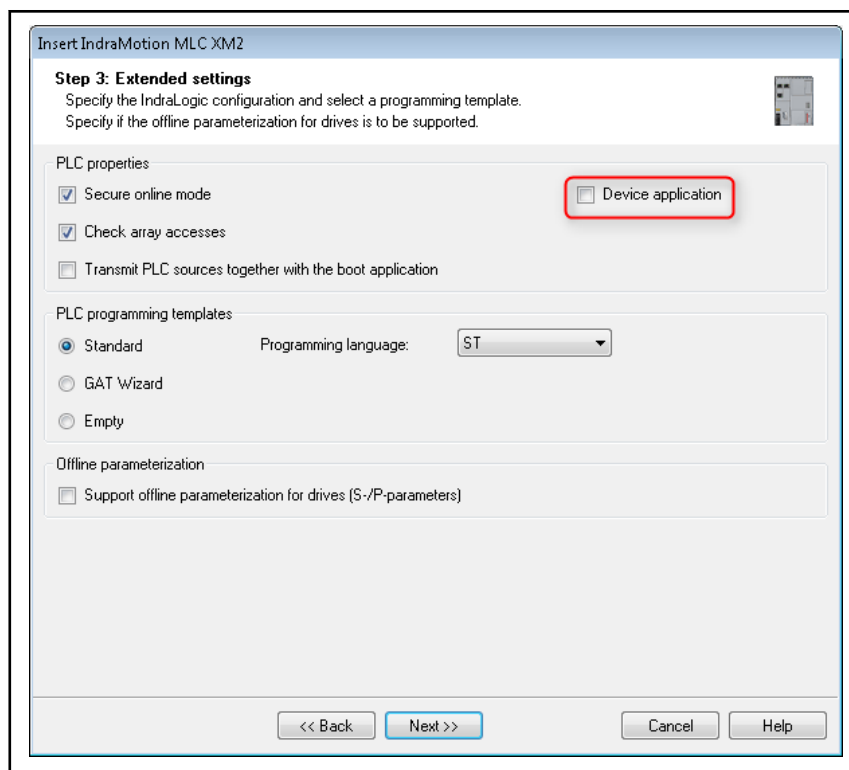


Fig. 3-52: Extended settings - Enable the option "device application"

3. Execute all steps for control configuration.

Insert device application into an existing project with a conventional application organization

If the user wants to insert the "DeviceApplication" into an existing project with a conventional application organization, proceed as follows:

1. Open the control properties
Select control node in the Project Explorer and select **Properties**
The "Property" dialog is opened
2. Enable the "Device application" option in the "Extended settings" tab and confirm the dialog with "OK".

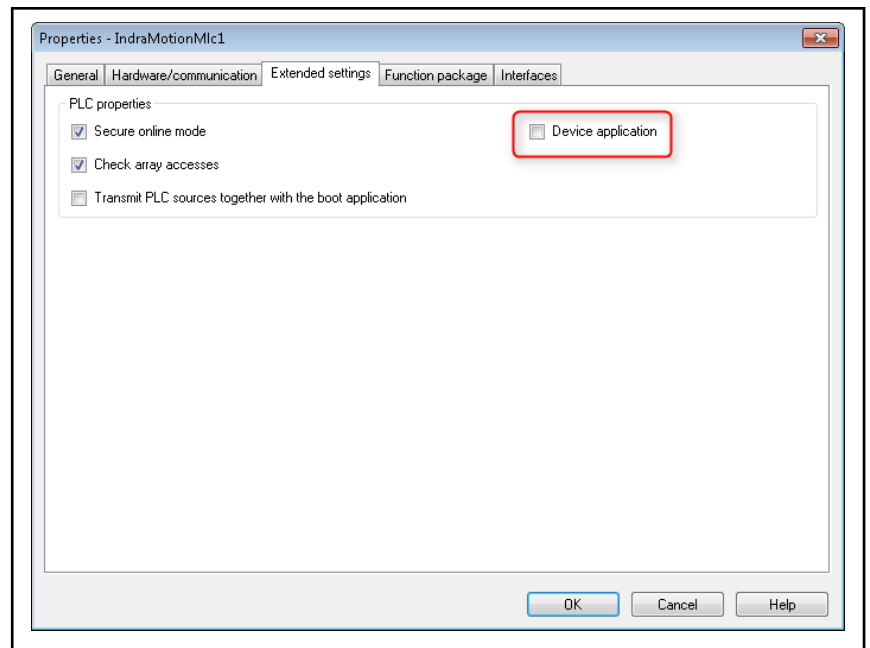


Fig. 3-53:

"Change list" dialog.

3. The "Change list" dialog shows all changes required in the project structure.

Confirm the dialog with "OK".

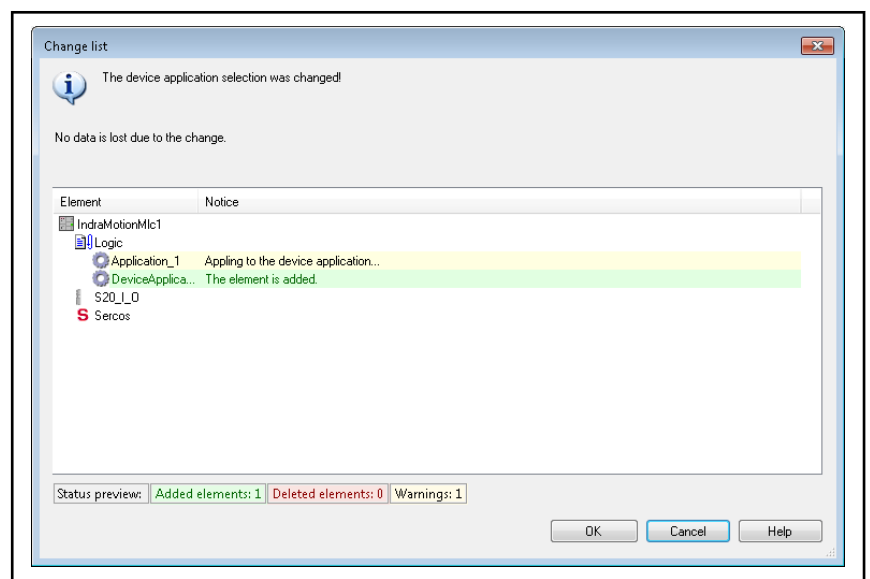


Fig. 3-54: "Change list" dialog.

IndraLogic automatically adjusts the project structure and inserts the "DeviceApplication" object below the "Logic" node. The previously existing application can now be found under the "DeviceApplication" object. Device application inserted.

Also refer to:

- [chapter "Using the device application" on page 55](#)

Bus cycle task in device application

The bus cycle task is a IEC task. It is required by some I/O drivers to refresh the I/O data of the field bus. The set cycle time of the bus cycle task directly influences the I/O response time.

In a standard application (only one application object/device application disabled), the user can select one PLC task from the PLC program as bus cycle task per I/O driver instance.

The following changes can be noted in a device application compared to a standard application:

For each I/O driver instance requiring the StartBusCycle() (also Safety), a bus cycle task that is part of the device application is automatically generated.

The following can be set for each bus cycle task:

- Priority
- Cycle time
- Watchdog

Each bus cycle task (BCT) generates a task event per cycle directly after reading the inputs of a task event. The user can configure the so-called “externally event-controlled” tasks, triggered by an event of a bus cycle task. Thus, the user tasks can be synchronized to the bus cycle task. [chapter "Using the device application" on page 55](#)



Recommendation to react consistently and runtime-optimized with the task within the BCT cycle:

- In the application, an “externally event-controlled” task is available that is triggered by the above-mentioned TaskEvent of the BCT (externally). This task has a higher priority than the BCT.
- Temporal sequence: BCT reads inputs -> Application interrupts BCT and is edited -> BCT writes outputs
- This also works with several applications as long as they remain within the valid time frame of the BCT (take watchdog into consideration)

Furthermore, the bus cycle task can also be triggered externally by interrupts.

Device application with Safety

- Response**
- Only one user can be logged in to the Safety PLC.
 - However, it is possible that one user is logged in to the safe application and several other users are logged in to the gray applications.
 - The Safety control is considered as one application. This means that parallel to the gray applications, one user can be logged in to the Safety control.

Device application Convert project

Converting a standard application to a device application

Via the control property "Device application", existing projects can be subsequently be converted to projects with device application using standard applications, see ["Insert device application into an existing project with a conventional application organization" on page 60](#).

During the conversion, the existing PLC application is converted to a project structure with device application. Conversion result: a PLC application with

the "DeviceApplication" object and a subordinate application object. Existing mappings of global variables are retained in the application. Thus, a conversion from a release without device application to an identical release with device application is possible.

Converting a device application to a standard application



The configuration of some elements can sporadically be lost when converting a device application to a standard application (application objects).

Projects with standard application can only contain a single application object.

When converting a device application with several subordinate application objects to a standard application, only the first application object is transmitted from the device application to the standard application (sorting according to alphanumerical order).

All other application objects are deleted!

To convert a project with device application to a project with standard application, proceed as follows:

Disabling the control option "Device application"

1. Open the context menu of the device in the Project Explorer and select **Properties...**

The Property dialog is opened

2. In the property dialog, change to the tab "Extended settings"

3. Enable the option "Device application"

The change list is opened:

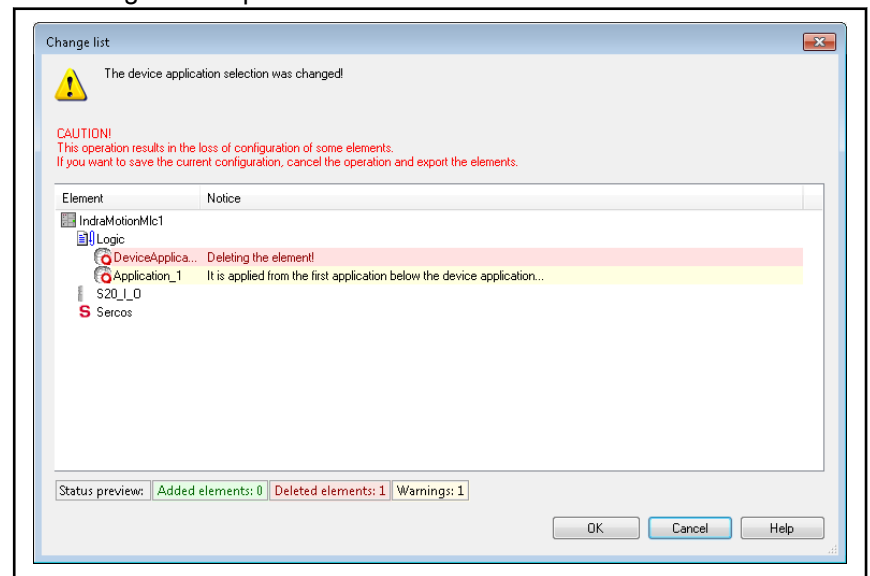


Fig. 3-55: Convert device application to standard application - Change list

The dialog provides information that the configuration of some elements will be lost if the change is implemented.

If required, the affected applications have to be backed up prior to the conversion (export).

Controller axes

General information

If controller function blocks of different applications are called simultaneously, multi-threading issues can occur.



All controller axes have to be processed in one application.

The following has to be complied with:

- Incorrect configurations are output as error during the validation process, e.g. if controller axes are processed in different applications.

For example, this state can be caused by a VCS²⁾ action.

The download of such a configuration is not possible.

- If not all applications are processed in one application, the application start is prevented by the firmware.

This is done to intercept potential complications which can for example occur during parallel engineering of several users.

In case of error, an error entry is generated in the logbook.

Hydraulic controller axes

As all controller axes have to be processed in one application, the name "ControlApp" is suggested by the hydraulic axis wizard for the controller application (can be changed by the user) when creating the first controller axis.

Optionally, an existing application can be selected in the hydraulic axis wizard.

If the application for the controller axes changes due to the selection in the axis wizard, all other controller axes are moved to the newly selected application.

- The hydraulic controller axes are declared in the "DeviceApplication" object, see [chapter 3.4.11 "Device application" on page 55](#).
- The program organization unit for the hydraulic controller is automatically generated below the automatically generated folder "HydrControl".



The PLC has to be restarted if the controller axis configuration changes as a global variable is modified by a global variable change within the "DeviceApplication" object (in "HCVarGlobal").

Freely-programmable controller axes

The behavior of freely programmable controller axes is identical with the behavior of hydraulic controller axes. If a control contains both axis types, both controller axes are processed in the same "ControlApp" application.

When creating a controller axis, a note is output informing the user that all controller axis have to be edited in the "ControlApp" application (including hydraulic controllers).

Automatic stop of controller axes

The automatic stop of controller axis behavior is the same as the general axis stop behavior when using the "device application", see [chapter 3.4.11 "Device application" on page 55](#)

Stopping axes in the PLC user program

As all controller axes have to be processed in an application, other applications using these controller axes have to be able to react to the operating status of the controller axis application (e.g. in case of stoop, error or break-points).

²⁾ **VCS** – Version Control System
Facilitates parallel working of several users at a versioned project (team server)

When stopping one application, all axes are automatically stopped. The stop can be realized by declaring a global variable in the relevant application.

In this case, controller axes can be commanded in an application, while traversing and controlling the controller axes takes place in a different application. However, this procedure assumes that the operating status of the controller application is known to all other applications at any time to be able to react to operating status changes of the controller application.

The operating status can be queried with the following example code:

Example code to determine the operating status of the controller application

```

PROGRAM PlcProg
VAR
  currentApp: POINTER TO APPLICATION;
  app       : POINTER TO APPLICATION;
  appName   : STRING;
  result    : RTS_IEC_RESULT;
END_VAR

currentApp:= AppCurrent (ADR(result));

appName:= 'Application_2';
app      := AppFindApplicationsByName(pszString:= appName, (ADR(result)));

IF result = CmpErrors.Errors.ERR_OK AND THEN
  app^.udiState <> CmpApp.ApplicationState.AS_RUN THEN
    currentApp:= AppGetCurrent (ADR(result));
    AppStopApplication (currentApp);
  END_IF

```

Error reaction



If an error occurs in a controller application (e.g. exception), the application is stopped.

If the command "Reset cold" has to be executed to debug the error, the entire memory of the controller axis is initialized.

Result: phase switching is required to be able to start the controller axis again.

To be able to switch the phase, all Motion applications on the control have to be set to standstill (no axis must move, no axis must be in control).

The other applications do not necessarily have to be stopped. It has to be ensured that all axes are at standstill.

Axis stop overview

Standard axis behavior at PLC application stop

Standard axis behavior: all axes are stopped if a PLC application is stopped. The error "F50D2000, Forced stop enabled" is entered in the error/diagnostic memory.

For operation in a device application with several applications, the standard axis behavior might not be ideal.

The following chapter describes how to change the standard axis behavior.

Global Variable List "UserVarGlobal"

By default, the object node of the device application (in the Project Explorer "DeviceApplication") contains the Global Variable List "UserVarGlobal" with the STRING "StopAxesCommon".

In the "StopAxesCommon" string, it can be defined which axes are to be stopped if an application is stopped, see ["Changing the axis behavior at stop of any application" on page 66](#).

The entries of the "UserVarGlobal" are converted to commas, including "StopAxesCommon".

This means that all axes are stopped as soon as an application is stopped unless there are definitions in the Global Variable lists of the applications. Refer to ["Changing the axis behavior at stop of a certain application" on page 66](#)



If `StopAxesCommon` is defined as empty string, it has the same effect as being converted to `comas`.

The Global Variable List (`UserVarGlobal`) of the "DeviceApplication" object is structured as follows:

Example code for `UserVarGlobal`

```
{attribute 'linkalways'}
{attribute 'qualified_only'}
VAR_GLOBAL CONSTANT
{attribute 'symbol' := 'read'}
  StopAxesCommon: STRING:='1-10,99'; (* Axes with axis numbers 1 to 10
                                     and axis number 99 are always stopped *)
END_VAR
```

Changing the axis behavior at stop of any application

Axes that are always to be stopped if any application of the device application is stopped, have to be defined as follows:

1. Expand the "DeviceApplication" object in the Project Explorer
2. Open the Global Variable List "UserVarGlobal" by double-clicking in the Project Explorer
3. Remove the comment characters in "StopAxesCommon"
4. Define the axis numbers of the axes to be stopped as string, refer to ["Example code for UserVarGlobal" on page 66](#).

Changing the axis behavior at stop of a certain application

By default, each application of the "DeviceApplication" object contains a Global Variable List "UserVarAppGlobal" with the string "StopAxes". This string defines which axes are to be stopped when the application is stopped.

The defined axes are stopped together with the axes defined in the Global Variable List "UserVarGlobal" in the "DeviceApplication" object, see ["Global Variable List UserVarGlobal" on page 65](#).



By default, the entries of the "UserVarGlobal" Global Variable List are converted to commas. Thus, all axes are stopped when stopping this application (standard axis behavior).

This stop takes precedence over the axes defined in "UserVarGlobal" of the device application.

In case of an empty string of a "UserVarAppGlobal", all axes are stopped that are defined in the "UserVarGlobal" of the device application. If no axes are defined in "UserVarGlobal" either, **no** axes are stopped when the application is stopped.

Axes to be stopped have to be defined as follows in "StopAxes":

1. Expand the "DeviceApplication" object in the Project Explorer and open the respective application
2. Open the Global Variable List "UserVarGlobal" by double-clicking in the editor
3. Remove the comment characters in "StopAxes" in the editor
4. Define the axis numbers of the axes to be stopped as string, as shown in the following example code:

Example code for UserVarAppGlobal

```
{attribute 'linkalways'}
{attribute 'qualified_only'}
VAR_GLOBAL CONSTANT
  {attribute 'symbol' := 'read'}
  StopAxes: STRING:='5,6'; (* Axes with axis numbers 5 and 6 are stopped with
                             of this application*)
END_VAR
```

Dialog "Axis stop overview"

Call:

In the Project Explorer via the context menu of the "Motion" **Axis stop overview** object.

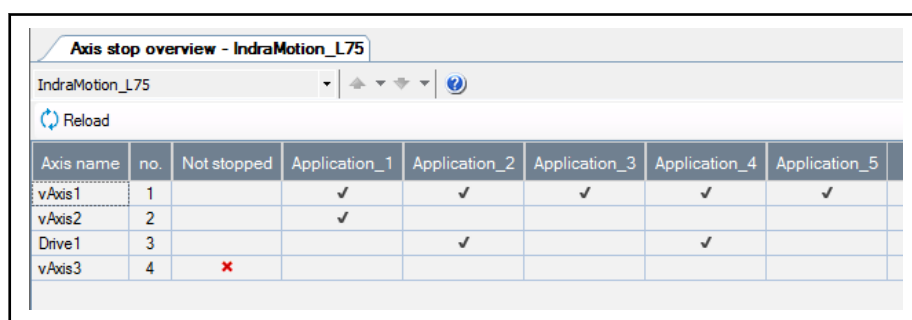
Function:

The dialog "Axis stop overview" provides an overview of all axis stop definitions of the "DeviceApplication" object and its subordinate applications.

All configured axes and applications are displayed in a table:

- Axes stopped in case of an application stop are identified by symbol .
- Axes stopped in case of an application stop are identified by symbol  in the column "Not stopped".

Additionally, information about the number of axes that are not stopped is provided in the status line of the dialog.



Axis name	no.	Not stopped	Application_1	Application_2	Application_3	Application_4	Application_5
vAxis1	1						
vAxis2	2						
Drive1	3						
vAxis3	4						

Fig. 3-56: Dialog "Axis stop overview"

Axis stop definitions displayed in the dialog are achieved by the following definitions:

- **Device application (DeviceApplication):** UserVarGlobal => StopAxes-Common: STRING := '1';
By defining axis no. 1 in the UserVarGlobal in the "DeviceApplication" object, axis no. 1 is always stopped if any application is stopped.
→ Axis no.1 is identified by symbol  in the dialog in each application.
- **Application_1:** UserVarAppGlobal => StopAxes: STRING := '2';
By defining axis no. 2 (vAxis2) in the UserVarAppGlobal of Application_1, axis no. 2 is only stopped if Application_1 is stopped. The stop of other applications does not have an impact on axis no. 2
→ Axis no.2 is only identified by symbol  in the dialog for Application_1.
- **Application_2:** UserVarAppGlobal => StopAxes: STRING := '3';
Axis no. 3 is only stopped if Application_2 is stopped.
However, the dialog shows that axis no. 3 is also stopped when stopping Application_4.

- **Application_3:** UserVarAppGlobal => StopAxes: STRING :=' ';
The empty string in the definition of Application_3 is converted to commas.
If Application_3 is stopped, only axis no. 1 is stopped as this axis is defined in the UserVarGlobal of the "DeviceApplication" object.
- **Application_4:** UserVarAppGlobal => StopAxes: STRING :='3';
Axis no. 3 has already been defined in Application_2.
Due to the additional definition in Application_4, axis no. 3 is only stopped if Application_2 or Application_4 is stopped.
- **Application_5:** UserVarAppGlobal => StopAxes: STRING :=' ';
Definition as for Application_3
If Application_5 is stopped, only axis no. 1 is stopped.



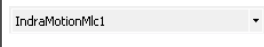
Axis no. 4 is not taken into consideration in any application, that is why is assigned the symbol  in column "Not stopped".

The axis is not stopped if an application is stopped!

The following note is output in the status bar of the dialog:

 There are 1 axes on the control which are not stopped by any application!

Elements of the dialog "Axis stop overview"

Toolbar	
	Control selection for projects with several controls in the Project Explorer
	In this dialog without function (grayed out)
	Calling the online help
	Status display "Online mode"
	Reload dialog data The data are initially loaded when calling the dialog. Stop definition changes are only displayed after reloading.
Table field	
Axis name	Axis name
No.	Axis number
Not stopped	Axes identified by  in this column, are not stopped if an application is stopped!
<Application>	Axes identified by  in the column are stopped when the <Application> is stopped
Status bar	

Message line	Information if there axes on the control that are stopped at "no" application stop.
Time specification	Time of last dialog update

Examples of definition of controlled axis stop behavior

The following examples show how the axes of a control can be stopped in a controlled manner upon an application stop via the global variables `StopAxesCommon` and `StopAxes`.

The examples contain 2 applications (Application_A, Application_B) and 4 axes (A1, A2, B3, B4).

For the use cases, the following assignment applies for application and axis:

- Application _A commands axis A1 (axis number 1) and A2 (axis number 2)
- Application _B commands axis B3 (axis number 3) and B4 (axis number 4)

Example 1 Project requirements:

The application consists of two application independent of each other.

Stop condition:

If one application stops, the axes of both applications should stop.

Solution:

1. → Disable the stop definition in the UserVarGlobal of the "DeviceApplication" object (convert to comment).

Otherwise, the axes no. 1 to no. 4 are stopped if one of the two applications is stopped. The condition would thus not be fulfilled!

2. → Enable the stop definitions in UserVarAppGlobal of the applications for the corresponding axes.

Configuration example:

Object "DeviceApplication" (UserVarGlobal)

```
VAR_GLOBAL CONSTANT
(*_StopAxesCommon : STRING := '1-4'; *)
END_VAR
```

APPLICATION A (UserVarAppGlobal)

```
VAR_GLOBAL CONSTANT
StopAxes : STRING := '1,2';
END_VAR
```

APPLICATION B (UserVarAppGlobal)

```
VAR_GLOBAL CONSTANT
StopAxes : STRING := '3,4';
END_VAR
```

Example 2 Project requirements:

The application consists of two application depending on each other.

Stop condition:

If one application stops, the axes of both applications should be stopped.

Solution:

→ Enable the standard axis behavior during which all axes are stopped if an application is stopped.

The standard axis behavior is enabled by converting all stop definitions in the UserVarGlobal of the "DeviceApplication" object and in the UserVarAppGlobal of the subordinate applications to commas.

Configuration example:

Object "DeviceApplication" (UserVarGlobal)

```
VAR_GLOBAL CONSTANT
(*_StopAxesCommon : STRING := '1-4'; *)
END_VAR
```

APPLICATION A (UserVarAppGlobal)

```
VAR_GLOBAL CONSTANT
(*_StopAxes : STRING := '1,2'; *)
END_VAR
```

Application B (UserVarAppGlobal)

```
VAR_GLOBAL CONSTANT
(*_StopAxes : STRING := '3,4'; *)
END_VAR
```

Example 3 Project requirements:

The application consists of several applications.

Stop condition:

Irrespective of the stop of the applications, the axes should continue to run.

Solution:

- Disable the stop definition in the UserVarGlobal of the "DeviceApplication" object (convert to comment).
Otherwise, the axes no. 1 to no. 4 are stopped if one of the two applications is stopped. The condition would thus not be fulfilled!
- Enable the stop definition in the UserVarGlobal of the subordinate applications without specifying an axis number.

Configuration example:

Object "DeviceApplication" (UserVarGlobal)

```
VAR_GLOBAL CONSTANT
(*_StopAxesCommon : STRING := '1-4'; *)
END_VAR
```

APPLICATION A (UserVarAppGlobal)

```
VAR_GLOBAL CONSTANT
StopAxes : STRING := ' ';
END_VAR
```

APPLICATION B (UserVarAppGlobal)

```
VAR_GLOBAL CONSTANT
StopAxes : STRING := ' ';
END_VAR
```

Example 4 Project requirements:

The application consists of several applications.

Stop condition:

The axes no. 1 to no. 4 should always be stopped when stopping any application.

Furthermore, no axes should be stopped application-specifically.

Solution:

- Enable the stop definition in the UserVarGlobal of the "DeviceApplication" object (remark tags removed) and define the axes no. 1 to 4 in the string.

Thus, axes no. 1 to no. 4 are stopped if any application is stopped.

- Enable the stop definition in the UserVarGlobal of the subordinate applications (convert to comment).

Configuration example:

Object "DeviceApplication" (UserVarGlobal)

```
VAR_GLOBAL CONSTANT
  StopAxesCommon : STRING := '1-4';
END_VAR
```

APPLICATION A (UserVarAppGlobal)

```
VAR_GLOBAL CONSTANT
  (* StopAxes : STRING := '1,2'; *)
END_VAR
```

APPLICATION B (UserVarAppGlobal)

```
VAR_GLOBAL CONSTANT
  (* StopAxes : STRING := '3,4'; *)
END_VAR
```

Example 5 Project requirements:

The application consists of several applications.

Stop condition:

- The axes no. 1 to no. 4 should always be stopped when stopping any application.
- When stopping application A, the axes 1 and 2 should be stopped. Upon stop of Application B, axes 3 and 4 should be stopped additionally.

Furthermore, no axes should be stopped application-specifically.

Solution:

- Enable the stop definition in the UserVarGlobal of the "DeviceApplication" object (remark tags removed) and define the axes no. 1 to 4 in the string.

Thus, axes no. 1 to no. 4 are stopped if any application is stopped.

- Enable the stop definition in the UserVarGlobal of the subordinate applications and define the respective axes in the string.

Configuration example:

Object "DeviceApplication" (UserVarGlobal)

```
VAR_GLOBAL CONSTANT
  StopAxesCommon : STRING := '1-4';
END_VAR
```

APPLICATION A (UserVarAppGlobal)

```
VAR_GLOBAL CONSTANT
  StopAxes : STRING := '1,2';
END_VAR
```

APPLICATION B (UserVarAppGlobal)

```
VAR_GLOBAL CONSTANT
  StopAxes : STRING := '3,4';
END_VAR
```

3.5 Adding files to IndraWorks project

3.5.1 Introduction

Existing files can be added to an IndraWorks project so that documentations, data sheets or additional information are transferred with the project.

The embedded file is displayed in the project. To edit the file, call the currently registered application in IndraWorks.



If **Automation Interface** is used HTML sites with embedded script code providing access functionality to the Automation Interface can be added or run in an IndraWorks project.

3.5.2 Adding a file

If a project node allows files to be added, **Add ► File** can be selected in the context menu.

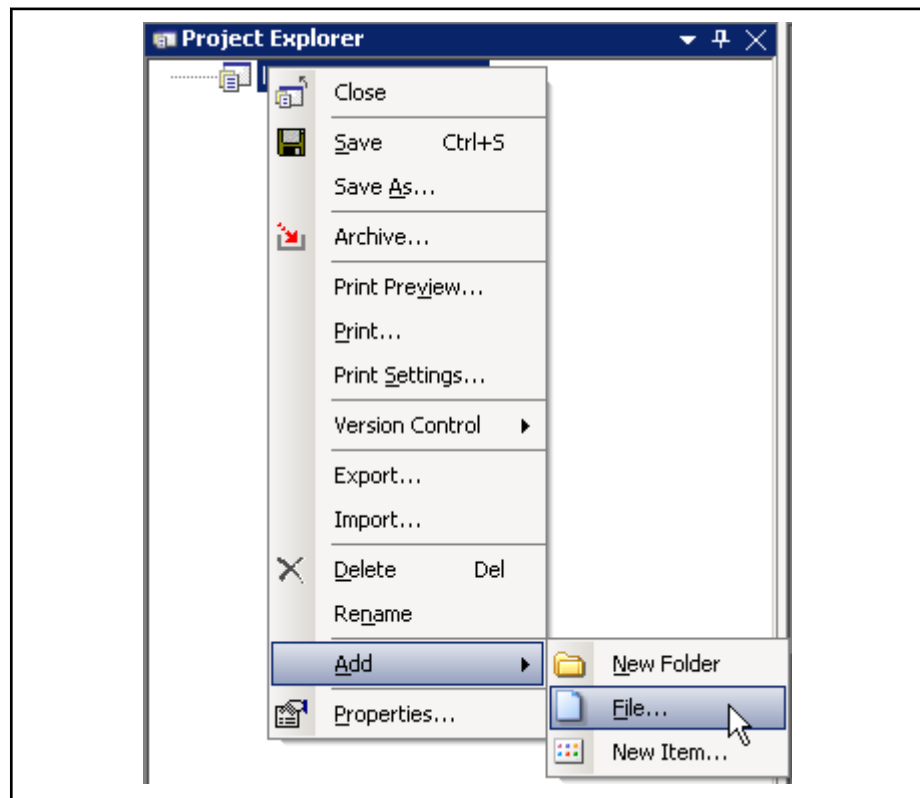


Fig. 3-57: Adding files to a project

When selecting this menu item, the "Open" dialog opens.

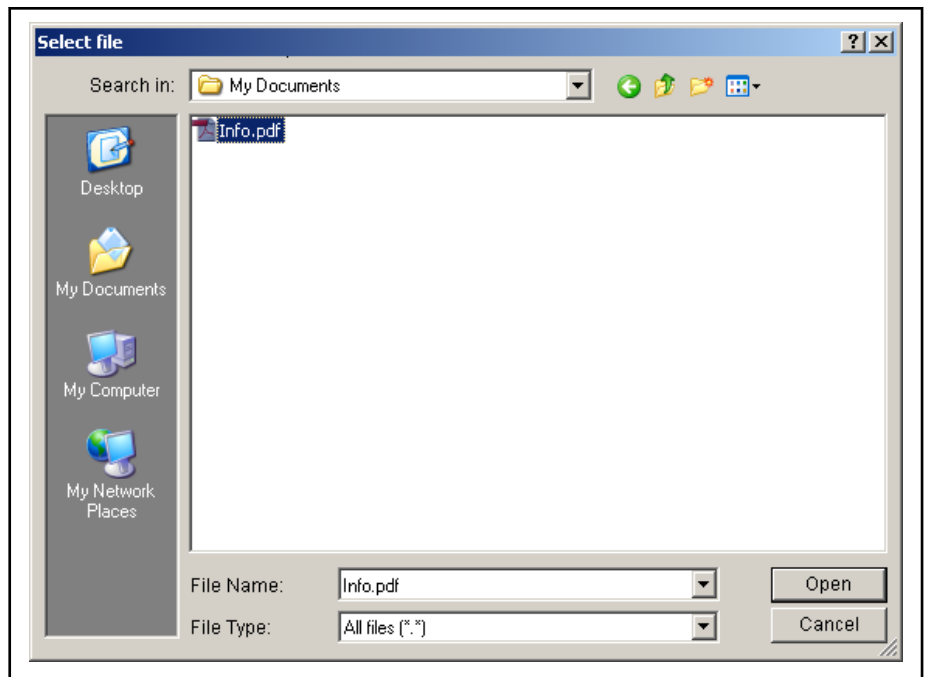


Fig. 3-58: "Select file" dialog

Select a file and add a copy of this file to your project by clicking on "Open". The file can be edited there.

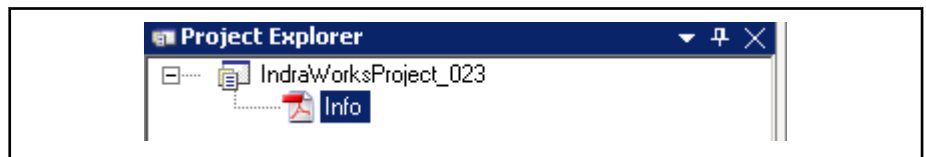


Fig. 3-59: File added to the project

The icon used is the default icon of this file type. The name is the file name without the file name extension.

3.5.3 Editing a file

Open

To open the embedded file, double-click on it, press <Enter> or use the context menu. IndraWorks starts the application registered for editing in the Windows operating system.

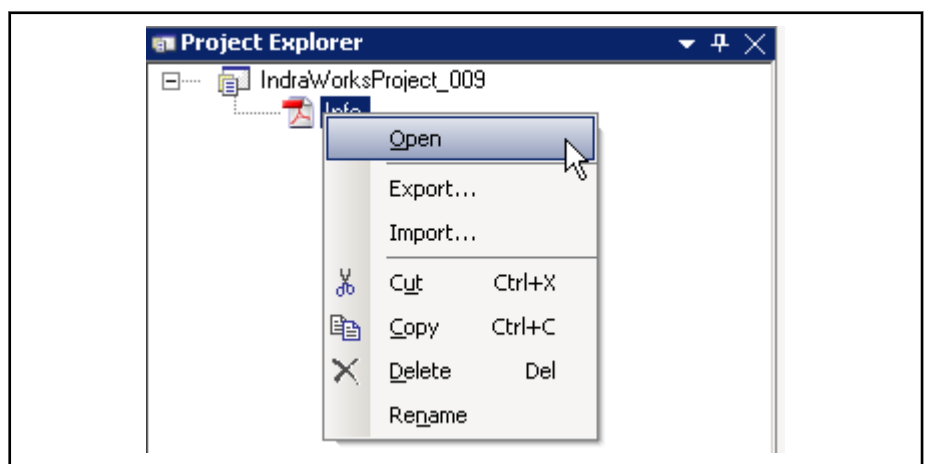


Fig. 3-60: Editing an embedded file

In the case shown above, the PDF reader is started.



IndraWorks can start the editing application when the file is opened and exits it when the project is closed or the user interface is shut down.

All other actions, such as printing or saving a file, are executed by the editing application.

Automation Script...

After adding an HTML page with embedded Automation Script to the project, the context menu provides the **Automation Script...** menu item. Use this menu entry to obtain access to the Automation Script properties.

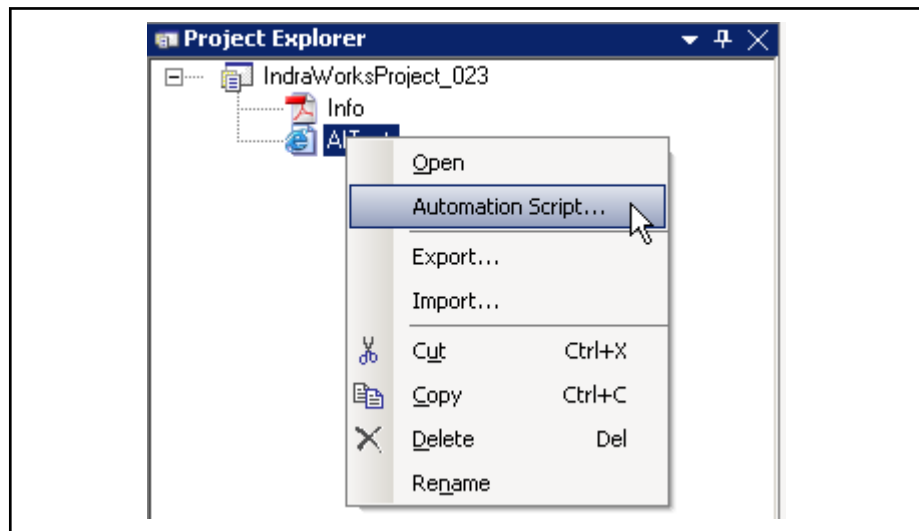


Fig. 3-61: Embedded file, Automation Script...

When selecting this menu item, the "Automation Script Configuration" dialog opens.

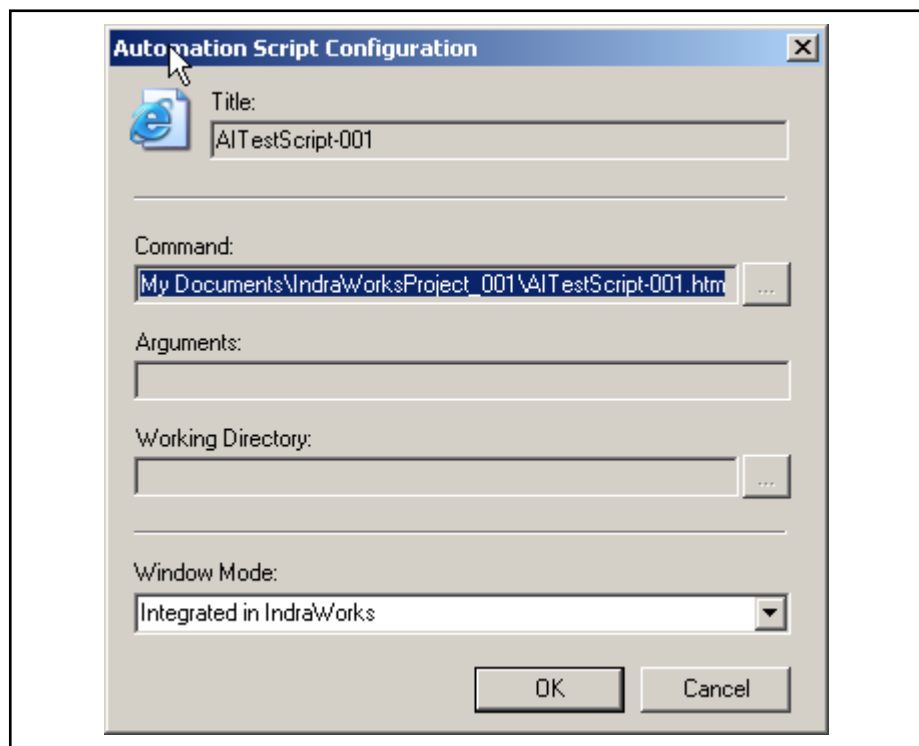


Fig. 3-62: "Automation Script Configuration" dialog

The "Automation Script Configuration" dialog displays the file name and the storage location of the HTML file. In the Window Mode list, it can be defined whether the HTML page is to be started as integrated in IndraWorks or externally.

The current version runs HTML pages only integrated in IndraWorks.

Cut, copy, paste To move the file into the project, select **Cut** and **Paste**. Also use Drag and Drop.

Use **Copy** and **Paste** to create a copy of the file at a different position in the project.

Delete To remove the file from the project, select **Delete**. If started, the editing program is exited.

Rename To rename the file, press <F2> or use the context menu.

3.5.4 Deleting a file from project

Remove the inserted files from the project with **Delete**. The subdirectory containing the file is moved together with the file to the Windows Recycle Bin.

3.6 Archiving and restoring projects

3.6.1 General information

With IndraWorks, projects can be archived on the local file system and on an FTP server (device or computer) connected via network. These archives can be restored on the file system of the local computer.

A wizard supports working with archives. Switch between the wizard pages via "<<Back" and "Next>>" if allowed due to the entered values.

When a page is opened for the first time, the input boxes contain default values. Otherwise, your last entries are displayed.

Exit the wizard at any time with "Cancel". Values entered up to that point are not saved and archiving is canceled.

3.6.2 Archiving a project

Starting the archiving wizard To archive a project, select the project node in the Project Explorer and select **Archive...** in the context menu.

Alternatively, select **Project ► Archive...** in the main menu or the following icon in the toolbar:

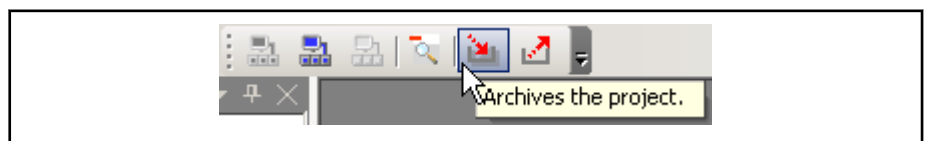
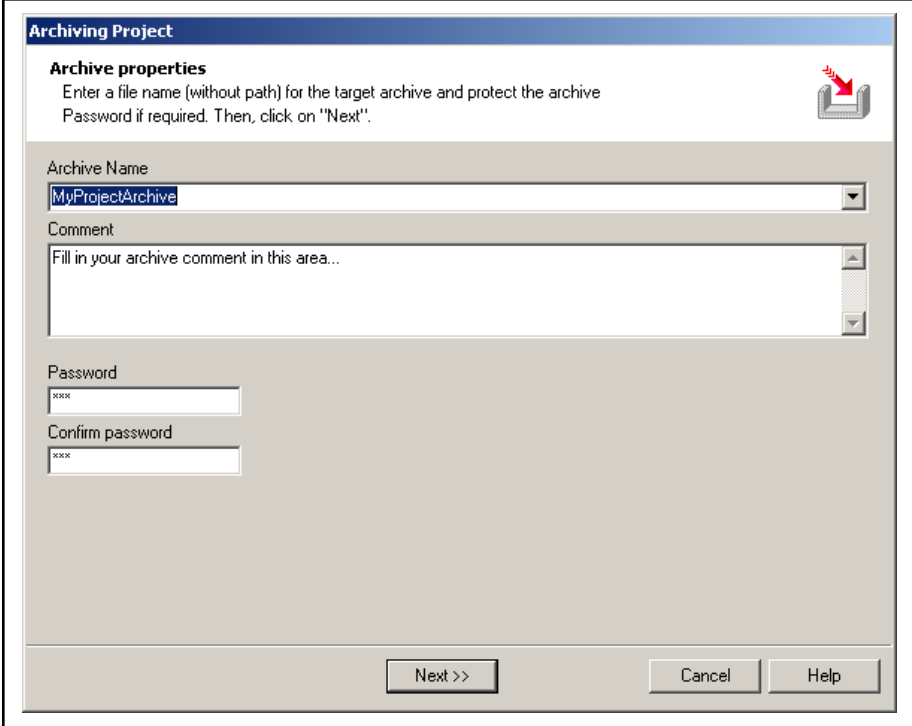


Fig. 3-63: Archives the project

Archive properties On the first page of the wizard, a name and comment can be specified for the archive. Optionally, the archive can be protected by a password. Enter the password a second time in "Confirm password" to verify your entry. Confirm with "Next>>".



Archiving Project

Archive properties
Enter a file name (without path) for the target archive and protect the archive Password if required. Then, click on "Next".

Archive Name
MyProjectArchive

Comment
Fill in your archive comment in this area...

Password
xxx

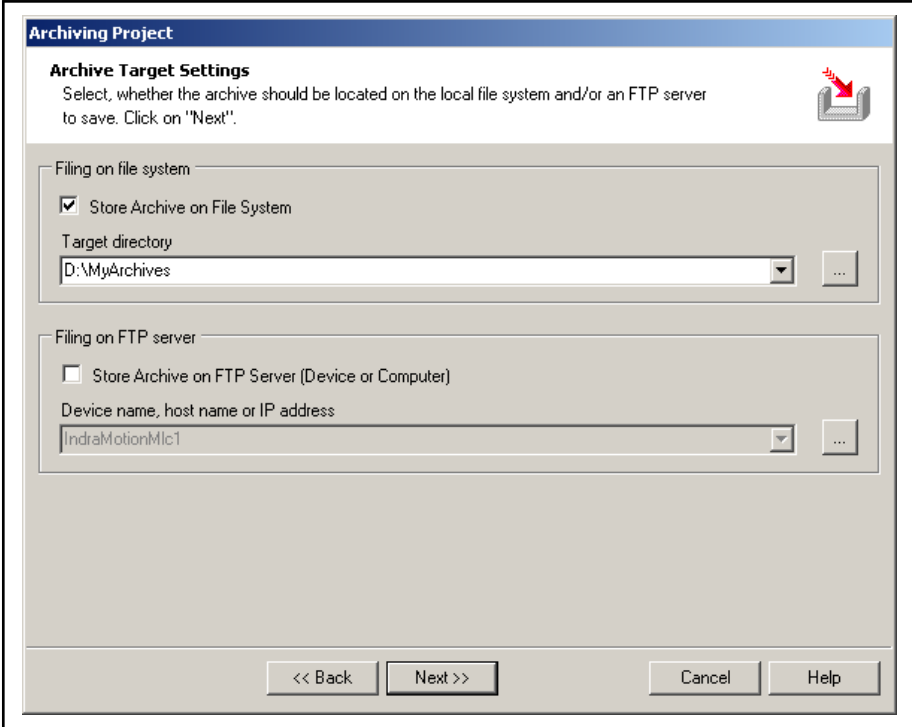
Confirm password
xxx

Next >> Cancel Help

Fig. 3-64: Archiving Project (Archive Properties)

Archive target settings

On this page, specify whether to save the archive on a local file system and/or on an FTP server (device or computer) connected via network.



Archiving Project

Archive Target Settings
Select, whether the archive should be located on the local file system and/or an FTP server to save. Click on "Next".

Filing on file system
☒ Store Archive on File System
Target directory
D:\MyArchives

Filing on FTP server
☐ Store Archive on FTP Server (Device or Computer)
Device name, host name or IP address
IndraMotionMlc1

<< Back Next >> Cancel Help

Fig. 3-65: Archiving Project (Archive Target Settings)

Storing archive on file system

Specify in the input box "Target directory" in which directory of your local file system the archive to be created is to be stored. Alternatively, click on the "..." button to select a target directory.

Storing on FTP server Specify the target device the archive is to be stored in via the input box "Device name, host name or IP address".

There are four possibilities:

- IP address (nnn.nnn.nnn.nnn)
- Computer name of the target device
- Selection via drop-down list. This list contains all FTP-compatible devices of the active project as well as the last five target devices (device name, IP address or host name) used during archiving.
- Add the target device from the list of all FTP-compatible devices shown for the active project using the "..." button.

Click on "Next>>" and the wizard establishes automatically a connection to the set device. Any connection interferences to the target device are displayed in an error message.

Parts of archive Define the archive parts on this page. Select the archiving scope in the right range for every archivable element or device displayed in the left navigation area.

Confirm with "Next>>".

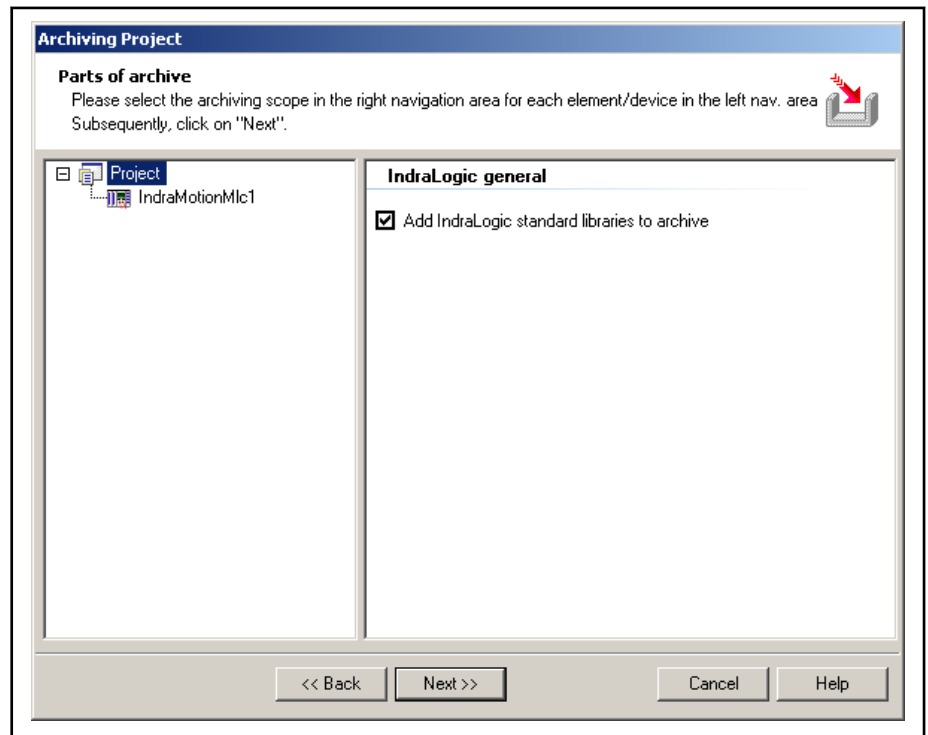


Fig. 3-66: Archiving Project (Parts of archive)

Verifying entries Verify entries on this page. Start the archive creation with "Finish".

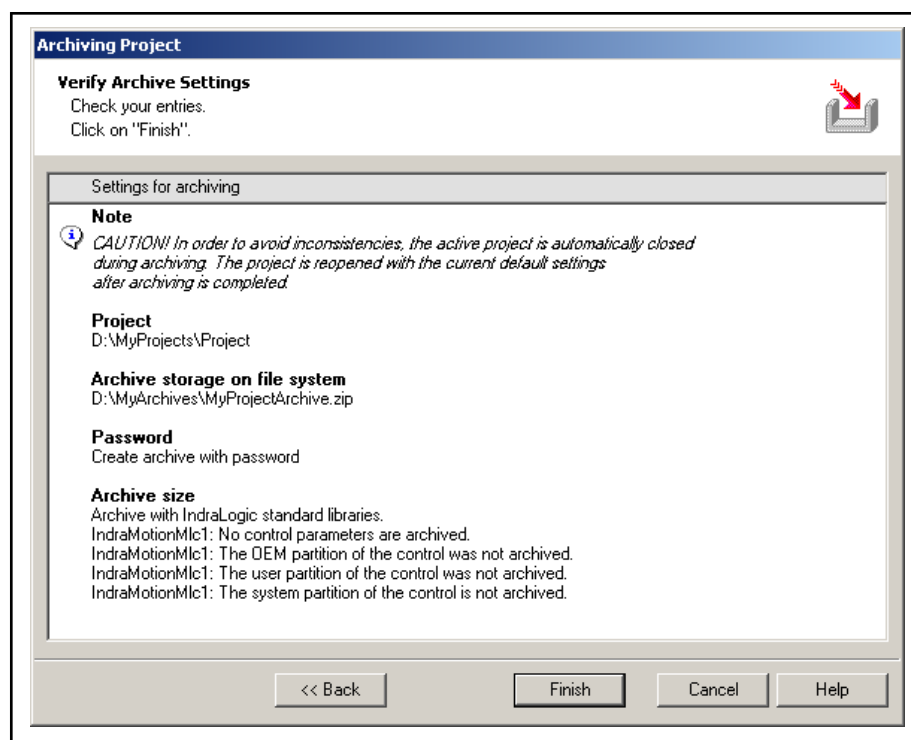


Fig. 3-67: Archiving Project (verify user entries)

"Create Archive" progress bar

The archive is created and stored in the specified target location. This process is displayed via a progress bar.

Summary

After archiving, settings and results are displayed.



To avoid inconsistencies during archiving, the active project is closed before archiving and then opened again.

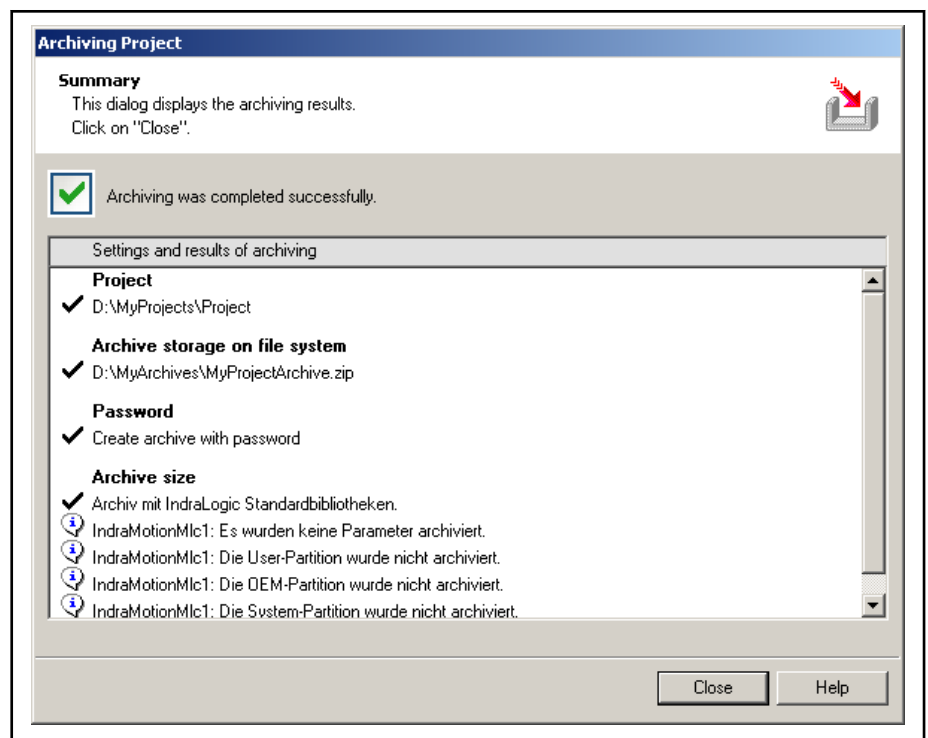


Fig. 3-68: Archiving Project (Summary)

3.6.3 Restoring a project

To restore a project, select **Project ► Restore...** from the main menu or click on the following button in the toolbar:

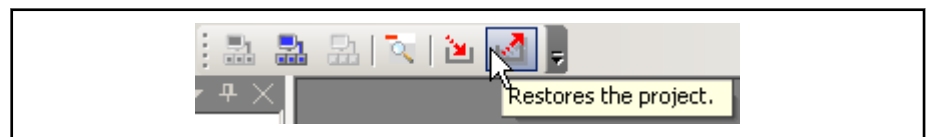


Fig. 3-69: Restores the project

3.6.4 Restoring a project from a file system

Selecting restoration type	On the first page of the wizard, select whether to restore the project from an archive of the local file system or from an FTP server (device or computer) connected via network. Select "Restore from File System".
Selecting archive	Select the archive on the next page. Click on the "... " button to scan for the archive. A comment is displayed for the selected archive.

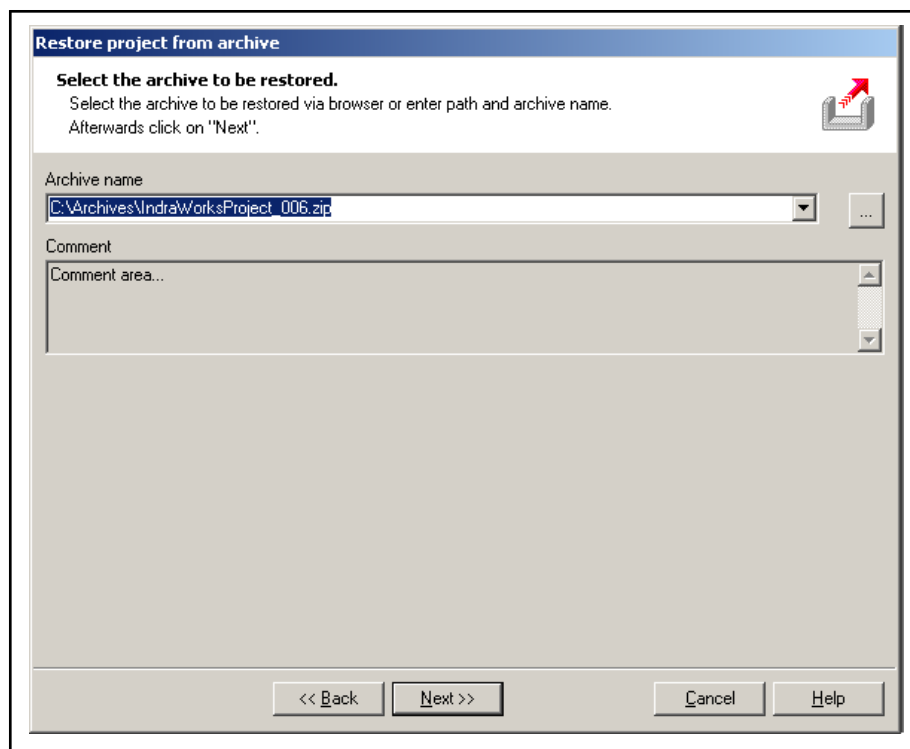


Fig. 3-70: Restore Project from File System (select archive)



If the archive type is unknown, the comment area displays "****ATTENTION! The selected archive is not an IndraWorks project archive ****". In this case, continue the restoration after the safety prompt confirmation.

Selecting target directory

On the next page, select the directory in which the project is to be restored.

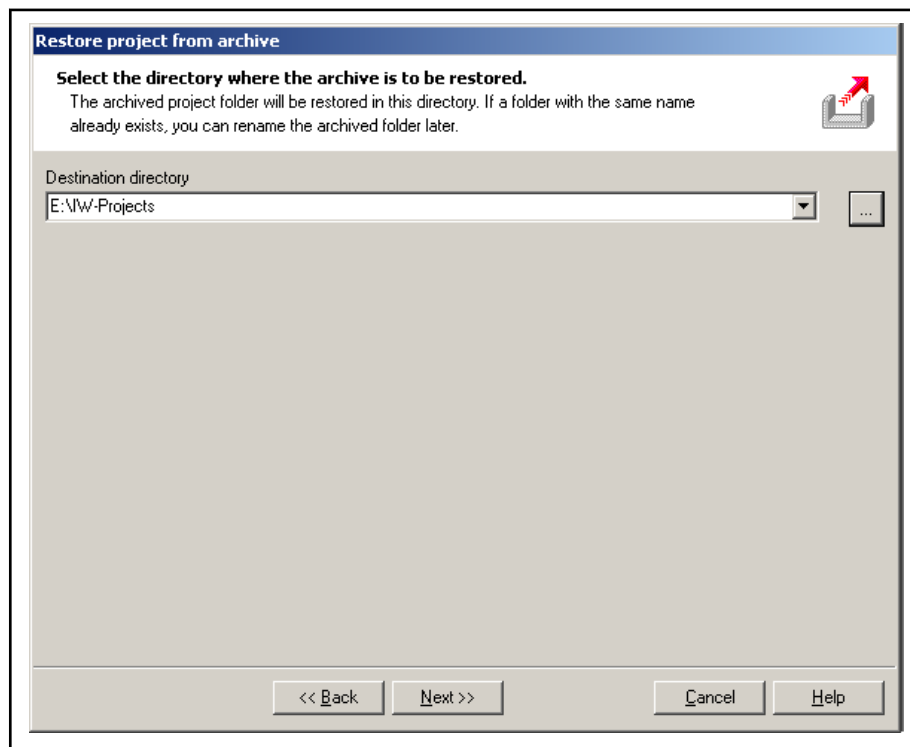


Fig. 3-71: Restore Project from Archive (select target directory)

Verifying entries

Entries can be verified on this page. Start restoring the project from the archive with "Finish".

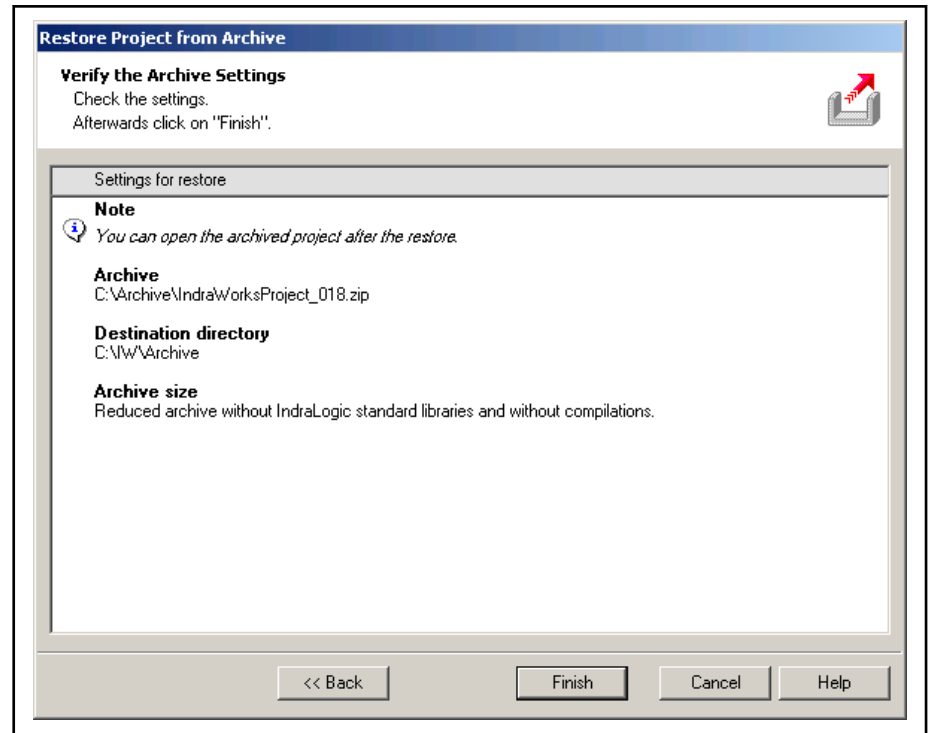


Fig. 3-72: *Restore Project from Archive (verify user entries)*

Entering password

If the archive was created with a password, you are prompted to enter the password.

"Restore to Temporary Directory" progress bar

First, the project is restored from the archive in a temporary directory of the local drive. This process is displayed via a progress bar. Subsequently, the project is copied to the target directory.

If a project folder already exists in the specified target directory, you are prompted to rename the project folder.

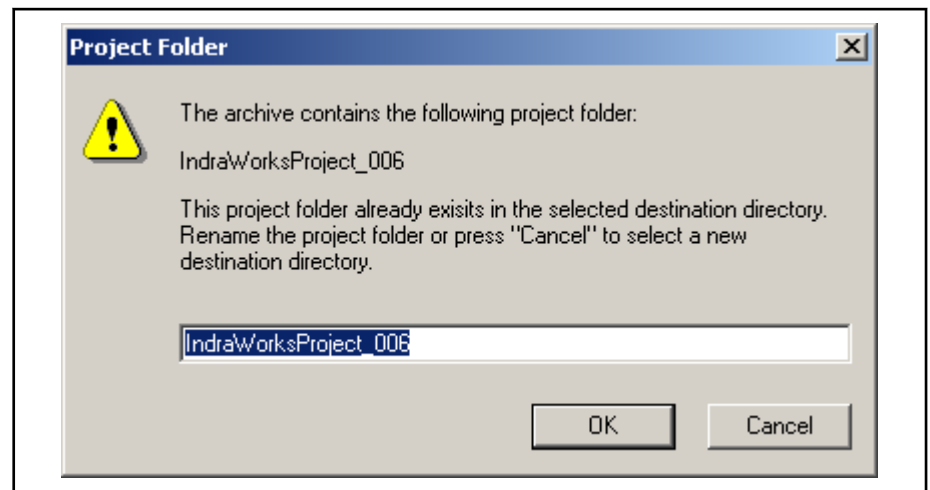


Fig. 3-73: *Project Folder (rename project folder)*

Summary

After the restoration, settings and results are displayed.

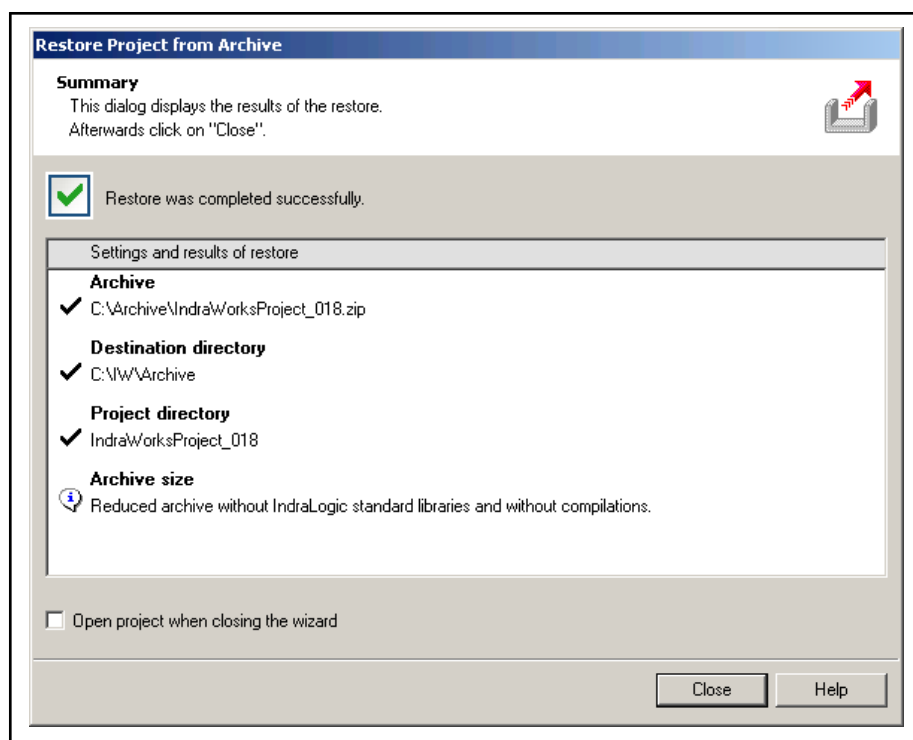


Fig. 3-74: *Restore Project from Archive (Summary)*

Select the checkbox "Open project when closing the wizard" to open the restored project automatically.

3.6.5 Restoring a project from device

Selecting restoration type On the first page, select whether to restore the project from an archive of the local file system or from an FTP server (device or computer) connected via network. Select "Restore from FTP Server (device or computer)".

Selecting archive On this page, select device and archive name.

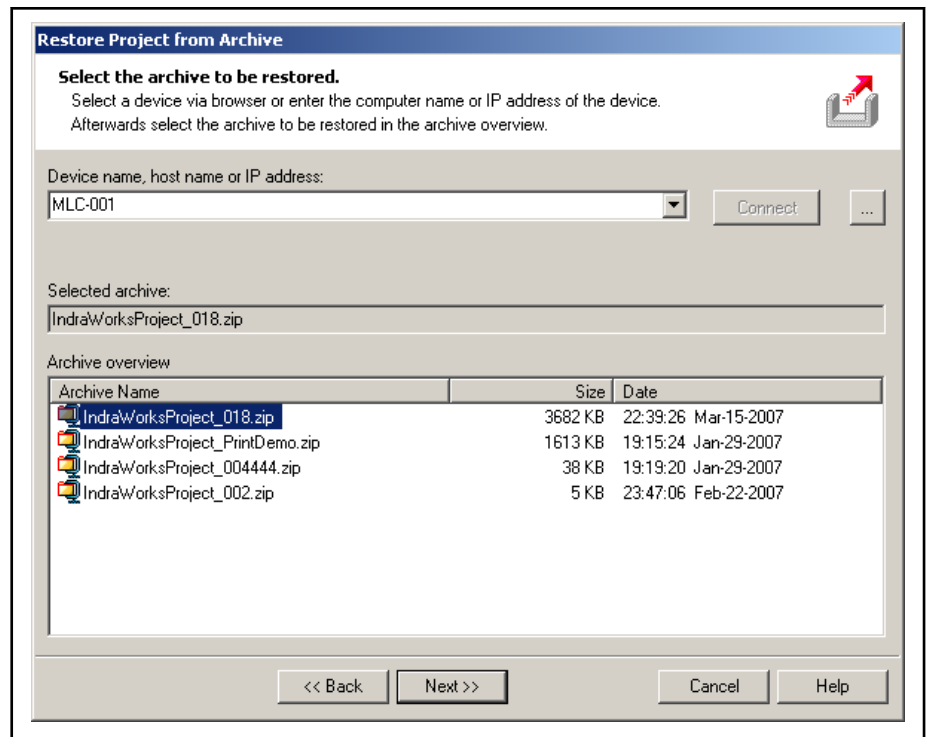


Fig. 3-75: Restore Project from Archive (select archive)

Device name, host name or IP address

Enter the device containing the archive to be restored in the "Device name, host name or IP address" input box.

There are four possibilities:

- IP address (nnn.nnn.nnn.nnn)
- Computer name of the target device
- Selection via drop-down list. This list box contains all FTP-compatible devices of the active project as well as the last five target devices (device name, host name or IP address) used during restoration
- Select a device using the "..." button

When selecting the device via the selection list or the device browser, the connection to the selected device is established automatically.

When entering the IP address or computer name, establish the connection to the target device via "Connect".

After the connection has been established, all archives available on the device are displayed in the "Archive overview" list. Select the archive to be restored and click on "Next>>".

Selecting target directory

Select a directory on the local drive in which the project is to be restored from the archive.

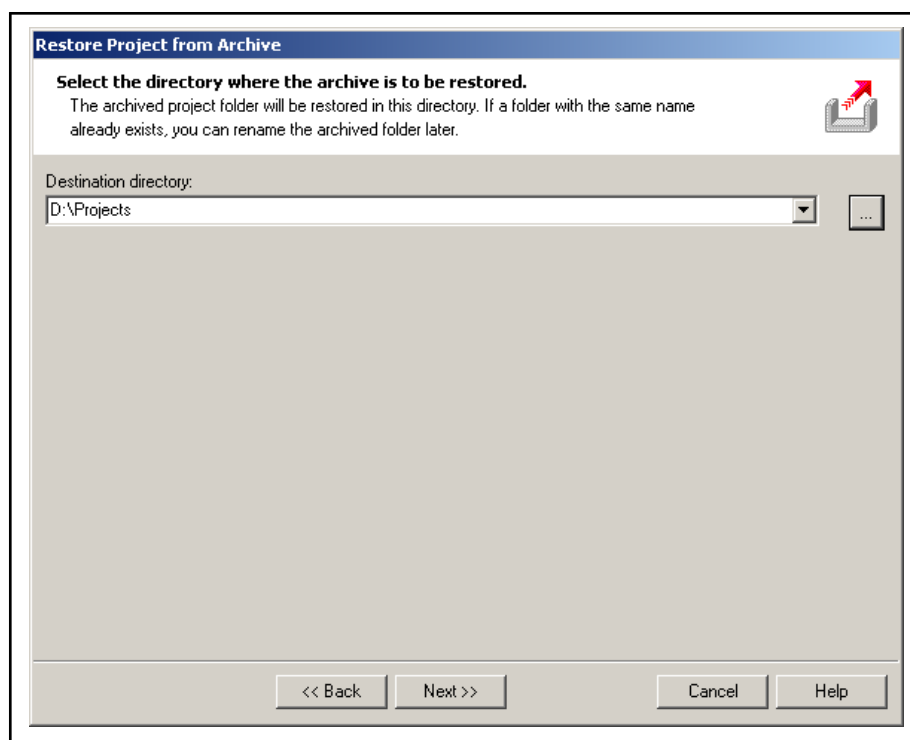


Fig. 3-76: Restore Project from Archive (select target directory)

Verifying entries

Entries can be verified on this page. Start the restoration with "Finish".

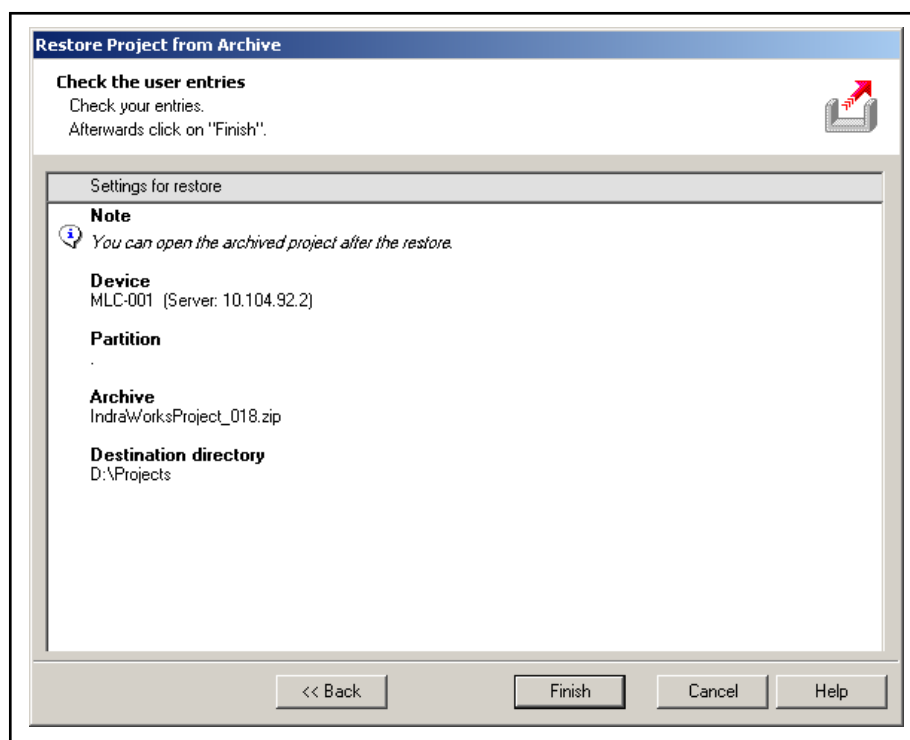


Fig. 3-77: Restore Project from Archive (Check the user entries)

1. "Get Archive from Target Device" progress display

Entering password

During restoration, the archive is copied from the device to the local drive first. This process is shown in a progress bar.

If the archive was created with a password, you are prompted to enter the password.

2. "Restore to Temporary Directory" progress bar

Subsequently, the project is restored from the archive to a temporary directory on the local drive. This process is shown in a progress bar. Subsequently, the project is copied to the target directory.

If the selected target directory already exists, you are prompted to enter a new one.

Summary After restoration, settings and results are displayed.

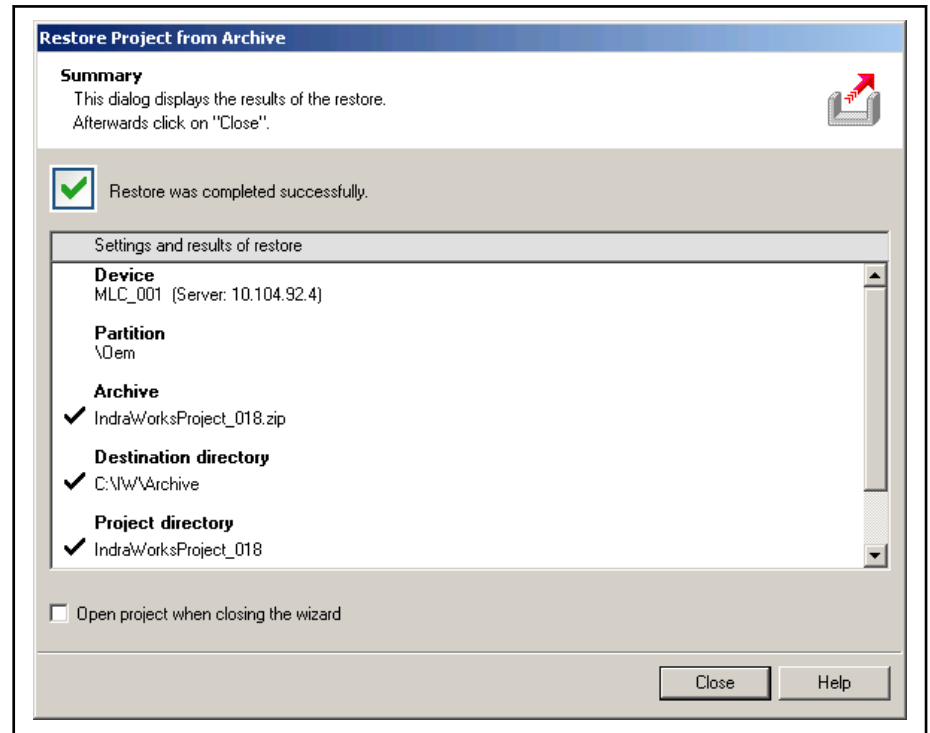


Fig. 3-78: Restore Project from Archive (Summary)

Select the checkbox "Open project when closing the wizard" to open the restored project automatically.

3.7 Exporting and importing project data

3.7.1 Overview

IndraWorks Engineering can export and import project elements. The prerequisite is that the respective elements support this functionality.

3.7.2 Exporting elements

Starting the export wizard

IndraWorks Engineering provides two export options:

- To export a project, select **Project ► Export...** in the main menu
- To export a certain project element, highlight the element in the Project Explorer and select **Export...** in the context menu

The export wizard is displayed:

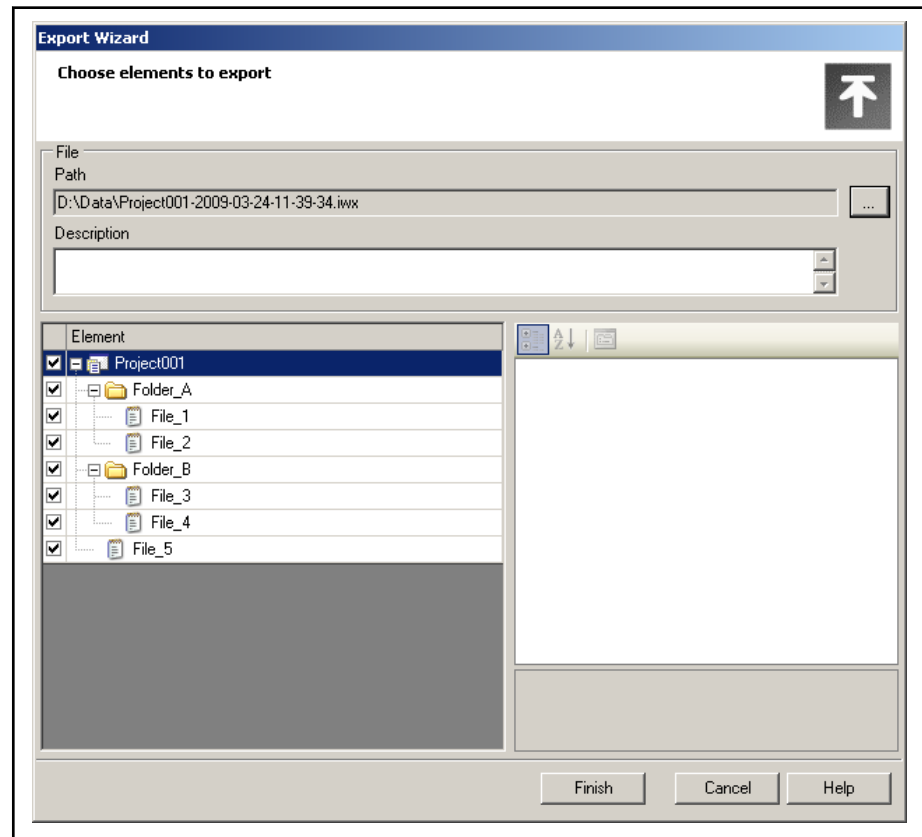


Fig. 3-79: Export Wizard

Selecting elements for export

First, verify name and location of the export file and adjust the details if necessary. Information on the content of the export file can be optionally entered in the "Description" field.

The elements to be exported are displayed in a tree structure:

- Click on the "+" or "-" symbols in the tree to reduce or expand the display of the tree. All sublevels of an element can also be selected or deselected via the context menu.
- Click on the checkbox next to the element to select or deselect an element for export. Sub-elements can also be selected or deselected via the context menu of an element.
- Individual elements provide specific export options. Highlight an element in the tree to show its options in the right section of the dialog and to make settings.

Exporting the selected elements

Click on the "Finish" button in the export wizard to start exporting the selected elements with the corresponding settings.

Verifying results

After the export, a summary of the procedure is displayed on the "Verify Export Results" page.

- The symbol shows you whether the export has been successful or whether errors have occurred.

- For information on the performed operations, warnings and errors, refer to the result list.
- Click on the individual entries in the result list to display further details.

End the export wizard with "Close".



The messages of the latest export are also listed in an own category in the IndraWorks message window. If there is detailed information on a message, double-click on an entry in the message window to display it. Double-click on a message and the corresponding project element is additionally selected in the Project Explorer if the element is still available in the project.

3.7.3 Viewing the content of the export file

To view the content of an export file, select **File ► Open ► Export file...** in the main menu. Select the export file in the "Open Export File" dialog to see the file content in an individual window:

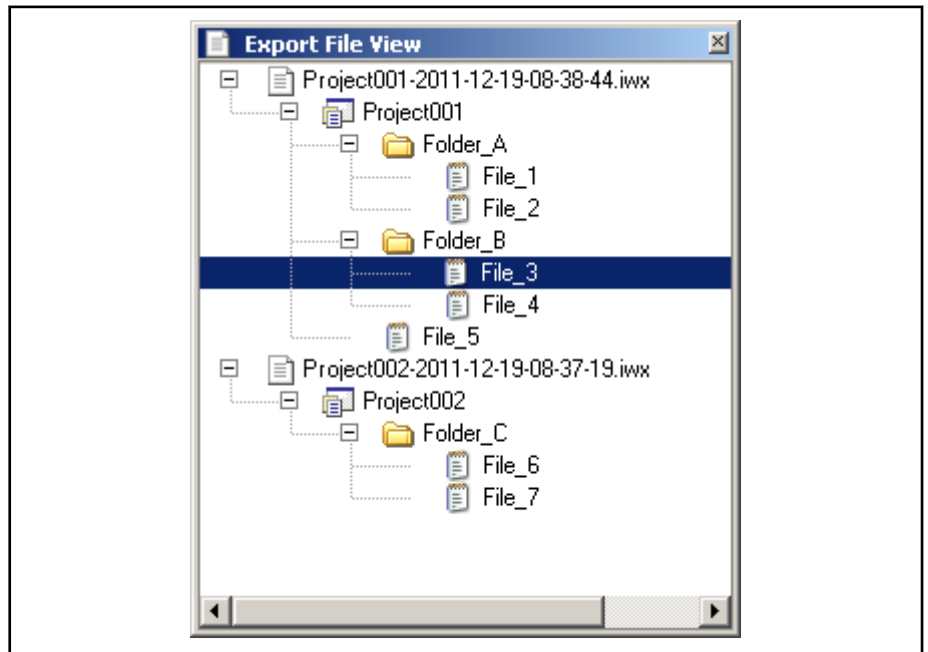


Fig. 3-80: View of the export file



To display multiple file contents at the same time, select the export files in the dialog.

- Click on the "+" or "-" symbols in the tree to reduce or expand the file content. All sublevels of an element can also be selected or deselected via the context menu.
- Select **Open Export File...** in the context menu to display the content of a different export file.
- Select **Close Export File** in the context menu to close the selected export file.
- Click on **Properties of Export File...** in the context menu to receive information on storage location, size, date of creation and other properties of the export file.



Import elements from the export file view to the project via drag&drop (see [chapter Starting Import Wizard, page 88](#)).

It can also be imported by copying an element in the export file view and pasting it to an element in the Project Explorer. Select **Copy** in the context menu to copy an element from the export file. Subsequently, select **Paste** in the context menu of the project to paste the copied element to the selected location in the project.

3.7.4 Importing elements

Starting the import wizard

With IndraWorks Engineering, contents from an export file can be imported to a project via drag&drop:

- Open the export file as described in [chapter 3.7.3 Viewing Content of an Export File, page 87](#).
- Drag the element to be imported from the export file view to the target element in the Project Explorer.

Drag with the left mouse button to directly start the import wizard when dropping the element. If possible, press <Ctrl> to change the presetting from "Insert" to "Overwrite" before dropping the element. Press <Alt> again to preselect "Replace" instead of "Overwrite".



While replacing, elements are **removed** from the project if they are not in the export file.

While overwriting, elements are **maintained** in the project if they are not in the export file.

See [chapter Configuring Import, page 89](#).

Drag with the right mouse button to get possible import and comparison operations displayed when dropping.

If the element to be imported cannot be imported to the target element, a respective symbol is displayed and dropping is impeded.

- Drop the element to be imported on the target element to start the import wizard

Alternatives for drag&drop:

- Select the main menu item **Project ► Import...** to import a project. Select an export file containing a project.
- Highlight the target element for the import in the Project Explorer and select **Import...** in the context menu of the element. Select an export file whose contents can be directly imported into the element in the Project Explorer.

Configuring the import

The import can be configured in detail using the import wizard:

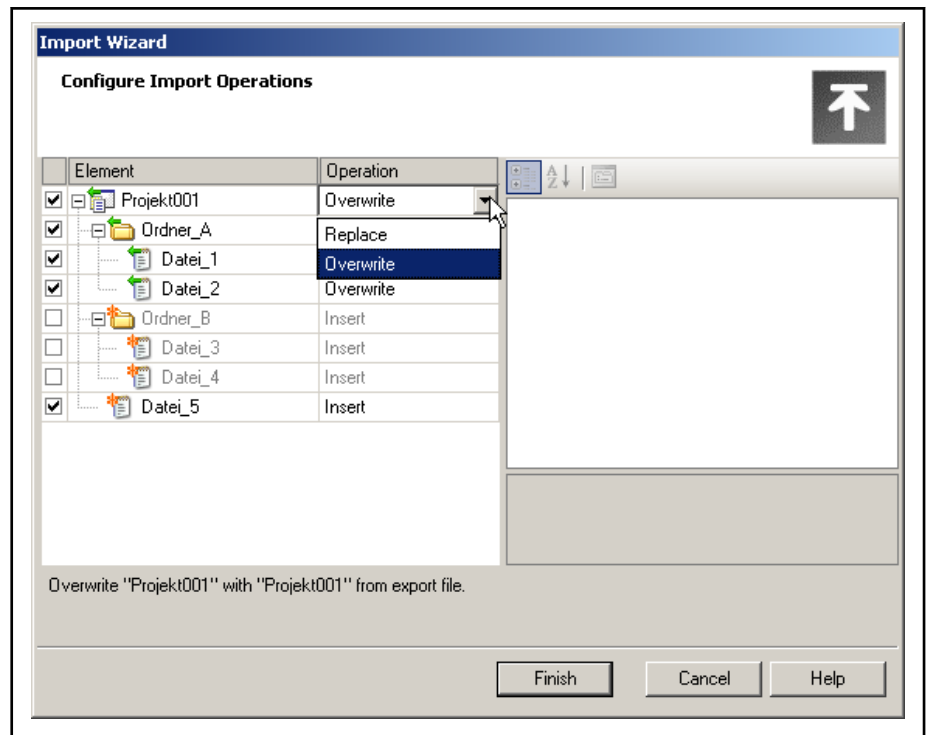


Fig. 3-81: Import Wizard

An alternative procedure for an element can be selected in the selection list:

- **Paste:** The element from the export file is added - including its sub-elements - to the target element in the project.
- **Overwrite:** The target element in the project is overwritten by the element from the export file. Already existing sub-elements in the project are overwritten and new ones are added.
- **Replace:** The target element in the project is overwritten by the element from the export file. Already existing sub-elements in the project are overwritten and new ones are added. Elements available in the project, but not in the export file, are deleted.
- **Delete:** The project element and all its sub-elements are deleted.

Additionally, there are the following options:

- Click on the "+" or "-" symbols in the tree to reduce or expand the display. All sublevels of an element can also be selected or deselected via the context menu.
- Click on the checkbox next to the element to enable or disable an import. Furthermore, use the context menu to select or deselect the operations for the respective sub-elements.
- Select **Exclude element...** in the context menu to exclude an individual element from the import. This option is only available for the operations "Overwrite" and "Replace".
- Select **Compare...** in the context menu to show the differences between the element from the export file and the target element in the project. This option is only available for the operations "Overwrite" and "Replace".

- Highlight an element in the right section of the dialog to show additional options and to make settings.



The configured import is summarized as brief description in the lower section of the dialog.



The setting options vary according to the element type and import procedure. For example, certain individual procedures cannot be disabled and not all procedures provide additional options.

Importing selected elements

Click on **Finish** in the import wizard to start the import of the selected elements.

Verifying results

After the import, a summary of the procedure is shown on the "Verify Import Results" page:

- The icon shows whether the import was successful or whether errors occurred.
- For information on the performed operations, warnings and errors, refer to the result list.
- Click on the individual entries in the result list to display further details.

Exit the import wizard with **Close**.



The messages of the latest import are also listed in an own category in the IndraWorks message window. If there is detailed information on a message, double-click on an entry in the message window to display it. Double-click on a message and the corresponding project element is additionally selected in the Project Explorer if the element is still available in the project.



After the import in a versioned project, all element changed during the import are hijacked. [chapter "Applying the hijacked version" on page 159](#) describes how to apply the project changed by the import to the Version Control.

3.8 Data exchange with EPLAN

3.8.1 General information

In the first step, the automation system is planned using an electric CAD system such as EPLAN Electric P8. The electrical design of the system, i.e. wiring, topology, and the design of the cabinet are planned in detail. The PLC variables are assigned for sensors and actuators wired with the input and output channels in EPLAN.

After completing the electrical design, the next step is the transition to an engineering tool (IndraWorks) which can be used to carry out the programming and commissioning of the system.

With this functionality, data between EPLAN and IndraWorks can be exchanged bi-directionally. Apply data of the automation system created in EPLAN to IndraWorks, based on an EPLAN PBF export file, edit the data and export it from IndraWorks to EPLAN using EPLAN export. The standard EPLAN Export format V2.3 and V2.4 is supported.

The following data is transferred during the data exchange between EPLAN and IndraWorks (IndraWorks functions "EPLAN Import" and "EPLAN Export"):

- Devices (MLC, XLC, MTX, HMI, bus couplers and inline modules) including device topology, e.g. control system including function modules and inline modules
- Field buses including topology, i.e. bus connections, addresses, and the connections of each bus device for Profibus DP, Sercos and Profinet buses
- Mapping of PLC variables to input / output channels of the I/O modules used (variable name, type, comment). Mapping is entered in IndraWorks in the I/O editor for the "I/O-Image" tab of the relevant module.

Limitation for the drive I/O: Parameter mapping for the drive I/O is not available in EPLAN and cannot be applied to IndraWorks.

In addition to the import of EPLAN project data (IndraWorks function "EPLAN Import"), it is also possible to import only the EPLAN mapping list (I/O mapping) to IndraWorks. In this case, only the I/O mapping is adopted, but not the devices and bus topology.



The software "EPLAN Electric P8" and the module "PLC & BUS Extension" are needed to use export/import in EPLAN.



The IndraWorks functions "EPLAN Import" and "EPLAN Export" (data exchange of device data, bus topology and I/O mapping) and are not enabled in the current version. Please contact the customer service if you are interested in the functionality and would like to test it. The functionality can be enabled for test purposes.

Current limitations:

- Only devices of the types MLC, XLC, MTX, HMI and I/Os (IndraLogic 2G) are supported
- Not all analog I/O modules are supported
- I/O mapping added to IndraWorks cannot be assigned to the correct function (= connection) in EPLAN

Future developments:

- Supports all I/O modules
- Expanding the device support for drives, new control generation (XM controls) and S20 I/O modules
- I/O mapping added to IndraWorks is assigned correctly in EPLAN

3.8.2 Important notes on working with EPLAN

To ensure that data exchange between IndraWorks and EPLAN Electric P8 is supported as described in this document, the following points have to be taken into account when working on projects or creating devices in EPLAN:

- **Device topology: Racks and modules in EPLAN**

The device topology configured in EPLAN of racks and extension modules must correspond to the real device topology. This means that bus couplers and controllers, (e.g., CML65.1-3P-500-NA-NNNN-NW) that are extended via other modules need to be configured as "racks". Modules that are inserted on controllers or bus couplers for extension purpo-

ses, such as function or inline modules, have to be configured as "modules" of this "rack" in EPLAN.

Sporadically, racks in EPLAN are configured as empty PLC boxes with a DIN rail without having to configure more control functionality. All inserted modules (e.g. bus couplers and inline modules) together then form an automation device. This approach is currently not supported, i.e. IndraWorks cannot process this device topology during the import process.

- **Bus topology: Bus configuration in EPLAN**

To be able to process all data from EPLAN after the import, it is important that all buses used are completely and correctly configured in EPLAN. In EPLAN V2.3, the bus can be configured in the device properties under the "bus data" tab. In EPLAN V2.4, the "bus data" can be found in the properties of the respective bus port.

Ensure that for each strand/network, only one bus master is configured and that the slave modules refer to this bus master. Also be sure to assign bus addresses and that the correct bus system is used (e.g. SERCOS or PROFIBUS...).

For a complete bus configuration in EPLAN V2.4, the bus ports have to be "connected" in a single-pole representation.

An incomplete or incorrect bus configuration may result in the import not being executed or being only partially executed.

- **Device identifier: Creating devices in EPLAN**

When creating devices in EPLAN, it has to be ensured that, in the property dialog under the "PLC box" tab, the device type key (e.g. R-IB IL 24 DI 8-PAC) is entered in the property table as "PLC type name". If the type key is missing, it must be entered manually. The type key is required for device identification during import to IndraWorks.

- **Naming of symbolic variables in EPLAN**

Any character can be used for symbolic variable names in EPLAN. In IndraWorks, it is only possible to use IEC 61131 compliant variable names. When importing to IndraWorks, non-IEC compliant variable names are therefore adapted. To avoid name changes, we recommend that only IEC compliant variable names are used in EPLAN already.

- **Equipment identifier (BMK) in EPLAN**

In EPLAN, device instances are clearly identified in the project using the term known as the equipment identifier (BMK). In EPLAN, any character can be given for this BMK. The bus coupler and the I/O modules are assigned the resource identifier as name during the import. Characters that do not comply with IEC61131 are replaced by underscores.

- **Dealing with third-party devices on EPLAN**

In the following, automation devices not manufactured by Bosch Rexroth are called third-party devices. Third-party devices can be included in an IndraWorks project, for example as a bus device (bus coupler) at the Profibus. A device master data file (GSD file) is required for the integration of the third-party device in IndraWorks. This file is provided by the manufacturer of the module and can usually be downloaded from its internet site. The GSD file provides all the information necessary to integrate the third-party device into IndraWorks. The GDS file also contains information on how modules of third-party devices can be expanded. For example, a bus coupler can be expanded with I/O modules.

When adding a third party device to EPLAN (example: Siemens Profibus bus coupler), make sure that the type key (e.g. "6ES7151-1AA02-0AB0") of the third-party device is entered in the property dialog under the "PLC box" tab in the property table as "PLC type name". In addition, the name of the associated GSD file (without the path) has to be entered in the field "Device ID / GSD file name". The GSD file must also be installed in the IndraWorks device database. To do this, select the menu item **Tools ► Device database.....** in IndraWorks and then press the "Add devices..." button in the "Device database" dialog. Now the GDS file of the third-party device can be selected and imported into the IndraWorks device database.

If the Siemens Profibus bus coupler inserted in EPLAN is to be extended with I/O modules, proceed as follows: Attach the Siemens I/O module to the previously inserted bus coupler. When inserting data, make sure that the type key (e.g. "6ES7131-4CD00-0AB0") of the I/O module is entered in the property dialog under the "PLC box" tab in the property table as "PLC type name". Enter the module name in the "Device ID/GSD file name" field (e.g.: "6ES7 131-4CD00-0AB0 4DI UC"). The module name has to be manually determined from the GSD file. Open the GDS file and select the module to be inserted in EPLAN in the module list. This module name is required by IndraWorks to find the module description of the third-party module (in this case the Siemens I/O module) in the IndraWorks device library during import.

3.8.3 Importing the EPLAN mapping list

The aim of the import is to create a global variable list from an I/O mapping list from EPLAN P8.

In EPLAN P8, there is the option of displaying the PLC variables used in circuit diagrams in a list known as the mapping list and to save this list in a defined format also using the Export function.



In EPLAN, the export of this mapping list is via the menu **Project data ► PLC ► Addresses / Mapping list**

All PLC variables to be exported are shown in the dialog "Addresses / Mapping lists". The mapping map can be exported from EPLAN by using the pull-down menu at the **Tools** button and by selecting the menu item **Export Mapping List....** First set the "PLC-specific settings" to "Rexroth" or if not available to "BOSCH".

Call in IndraWorks

The import is called up on the PLC application node via the menu item **Import**. The general import dialog opens. The import filter is the "EPLAN mapping list (*.txt)".

Alternatively, the dialog can be opened via the menu item **File ► Open ► Export file**. Selecting "Open" displays the content of the file in "Export file view". From this window the global variable list can then be inserted in the IndraWorks project explorer by Drag&Drop.

Data description

The file to be imported is checked for correct data. The syntax of the lines is as follows:

[I/O address <TAB> Symbol <TAB>;Function text]

Excerpt from a mapping list exported from EPLAN

E1.0	=EB3+ET1-S9:12	;Pneumatic switched on
E1.1	=EB3+ET1-X3:16	;Reserve

```

E1.2      =EB3+ET1-X3:17      ;Reserve
E1.3      =EB3+ET1-X3:18      ;Reserve
E1.4      =EB3+ET1-X3:19      ;Reserve
E1.5      =EB3+ET1-X3:20      ;Reserve
E1.6      =EB3+ET1-X3:21      ;Reserve
E1.7      =EB3+ET1-X3:22      ;Reserve
E10.0     =EB3+ET2-Q1:14;Conveyor belt malfunction
E10.1     =EB3+ET2-B1:4       ;Conveyor belt reserved
E11.0     =EB3+ET2-S2:4       ;Workpiece fixed 1
E11.1     =EB3+ET2-S3:4       ;W

```



The imported Global Variable List is always called "EPLAN_IO_Mapping".

If a file already exists with the name "EPLAN_IO_Mapping", it is overwritten. If changes are made by the user, they are not retained after the import has been completed.

As icons in IndraWorks may only contain characters in accordance with the IEC61131 definition, impermissible characters are replaced by "_".

The original icon name is attached to the comment (this can be a hidden identification text from EPLAN).



If errors occur during import, i.e. the file contains an invalid format, these errors are reported. Correct entries are applied.

If there is no icon saved in a line, then the line is adopted as a comment

In accordance with the selected EPLAN "PLC specific settings" "BOSCH", the PLC addresses are limited to:

Permitted prefix for PLC addresses

Inputs	Outputs
E	A
DI	DO
%IX	%QX

3.8.4 EPLAN import

This function is used to transfer the following EPLAN project data to IndraWorks:

- Device and bus topology
All devices including their mapping as racks or extension modules (e.g. control with function and inline modules) and the bus topology, i.e. all buses including configuration and master and slave connections configured in EPLAN.
- I/O mapping
All symbolic variables configured in EPLAN including comment and type.

A new project is created in IndraWorks upon the initial import.

Call in IndraWorks

The import of EPLAN project data to IndraWorks can be performed either by "Project import" or using the function "Open exported project contents".

Option 1 - "Project import":

In the main menu, click on **Project ► Import..** or select the context menu item **Import...** in the project node. The dialog "Open export file" is opened. In this dialog, an EPLAN export file can be selected after selecting the filter "EPLAN export file (*.pbf)". Clicking on "Open" prompts the EPLAN export file to be read. The contents of the file are then displayed in the IndraWorks import wizard.

The import wizard is described in the [chapter "Configuring the import" on page 89](#).

Option 2 - "Open exported project content":

Click on the toolbar button "Open exported project content". The dialog "Open export file" is opened. In this dialog, an EPLAN export file can be selected after selecting the filter "EPLAN export file (*.pbf)". Clicking on "Open" prompts the EPLAN export file to be read. The file contents are then displayed in the right section of the main window under "Export details view".

The contents can then be imported by Drag&Drop between the "Export details view" and the Project Explorer. The import wizard is started by this process.

The import wizard is described in the [chapter "Configuring the import" on page 89](#).

Import - Conflict handling

When reading in the EPLAN export file, information in the export file for creating the device in IndraWorks can sporadically be insufficient to create the corresponding device in IndraWorks. In this case, the "Import - Conflict handling" dialog is opened.

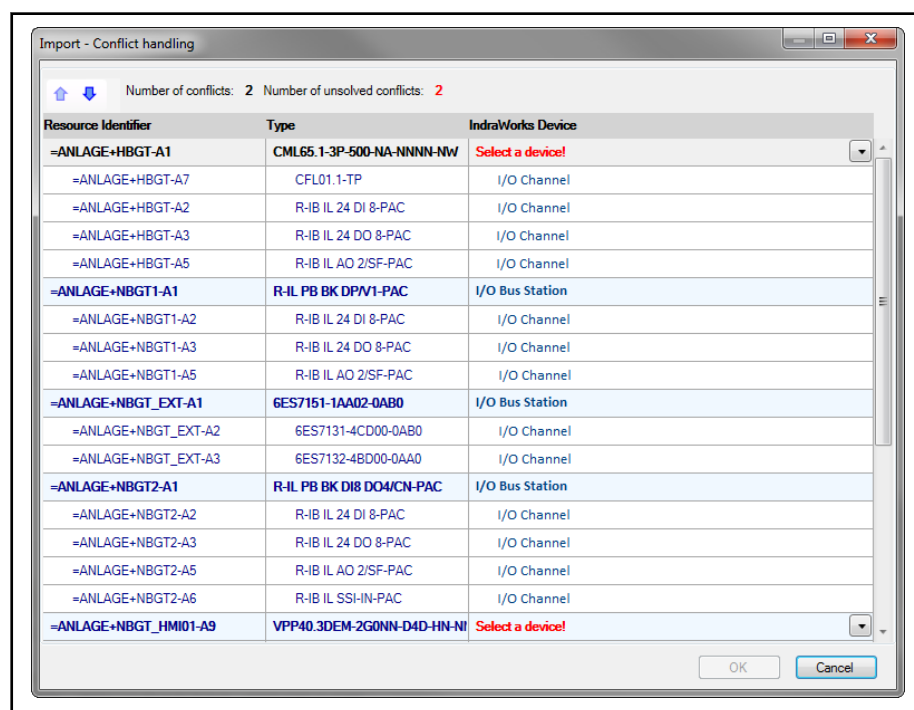


Fig. 3-82: EPLAN Import: "Import - Conflict handling"

The dialog provides an overview of all devices available in the EPLAN export file and shows potential conflicts. In the following, the dialog columns are explained.

Column "Resource identifier": In this column, the relevant resource identifier number is displayed for each module. Resource identifiers in bold indicate that the module is used as rack. The indented resource identifiers in regular font stand for the modules plugged into this rack.

Column"Type": In this column, the type code of the module is displayed.

Column - "IndraWorks device": In this column, the device created in IndraWorks is displayed.

Conflicts:

Conflicts are displayed in red. The text provides information for troubleshooting. Click on the button to the far right to solve/edit the conflict. In the figure above, a type conflict is displayed in the first line. The type code "CML65.1-3P-500-NA-NNNN-NW" does not specify which IndraWorks device is to be created. Click on the button on the far right and select which device is to be created.

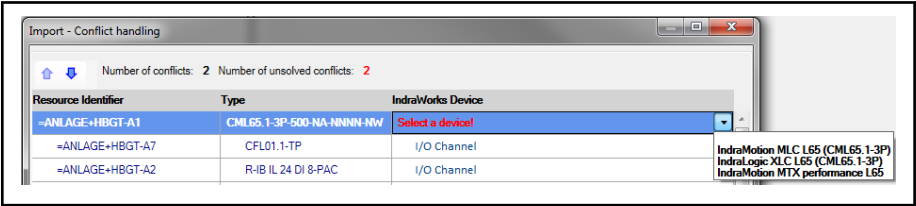


Fig. 3-83: "Import - Conflict handling": Resolving a type conflict

By selecting the device, the conflict is solved. The dialog automatically selects the next conflict. Only once all conflicts have been resolved, the "OK" button is enabled and the import can be continued by clicking on "OK".

 The "Import - Conflict handling" dialog is optional and is only active in case of pending conflicts occur.

Output of errors and information

Errors that occur when reading the EPLAN export file (* .pbf) are logged by the IndraWorks message window.

Errors that occur during the subsequent import are logged by the import wizard or by the message window.

3.8.5 Importing an EPLAN assignment list as GVL

The aim of the import is to create a Global Variable list from an I/O mapping list generated by EPLAN 2.x below a PLC application.

 Requirement for data import: IndraWorks project with an MLC/XLC control.

Design

The import is called via the context menu of the PLC application node: Menu item "Import", import filter "EPLAN assignment list (*.txt)", general import dialog.

Format description

The new format of the assignment list is CSV-based.

Use a tab stop as separator between I/O address and symbol.

A comment always starts with a semicolon.

The entire line ends at the word-wrap.

EPLAN mapping list

```
%IX6.6      ;xxxx
%IX6.7      switch_control_voltage_on      ;Steuerspannung ein
```

3.8.6 EPLAN export

Use this function to export IndraWorks project data to the EPLAN export format "*.pbf". This format can be imported by EPLAN. During the export, it can

be selected if an export is to be executed for EPLAN Electric P8 V2.3 or for version V2.4.

The following IndraWorks project data is supported:

- **Device and bus topology**
All devices including their mapping as racks or extension modules (e.g. control with function and inline modules) and the bus topology, i.e. all buses including configuration and master and slave connections configured in EPLAN.
- **I/O mapping**
All symbolic variables configured in EPLAN including comment and type.

Call in IndraWorks The EPLAN export can be executed in IndraWorks via a "Project export". In the main menu, click on **Project ► Export.. ► EPLAN 2.3... / EPLAN2.4...** or select the context menu item **Export...** in the project node. The "Export wizard" program editor opens.

The "Export wizard" is described in the [chapter "Selecting elements for export" on page 86](#).

Output of errors and information Errors that occur during the subsequent import are logged by the "export wizard" or by the message window.

3.8.7 Show/find ECAD resource identifier

Show resource identifier For modules generated in IndraWorks using the "EPLAN Import", the resource identifier (RI) is saved. The resource identifier of a module is displayed via the tooltip in the Project Explorer.

Find resource identifier You have the option to search for a resource identifier in the project. Click on **Find ECAD Resource Identifier...** in the Project Element context menu. The dialog "Find" opens. Select the search string and the search options and start the search using "Find all". The results are displayed in the "Search results" window.

Go through the events step-by-step in this window. Double-click on the search result to select the corresponding project element in the Project Explorer.

3.9 Creating project templates

3.9.1 Installed project templates - Creating user-defined project templates

IndraWorks installed project templates offer sample solutions when creating a new project. Alternatively, user-defined project templates can be created. The following chapter describes how to proceed.

3.9.2 Settings in the Options dialog

User-defined templates are stored in a directory. The directory path is set in the Options dialog.

Start the dialog via **Tools ► Options**

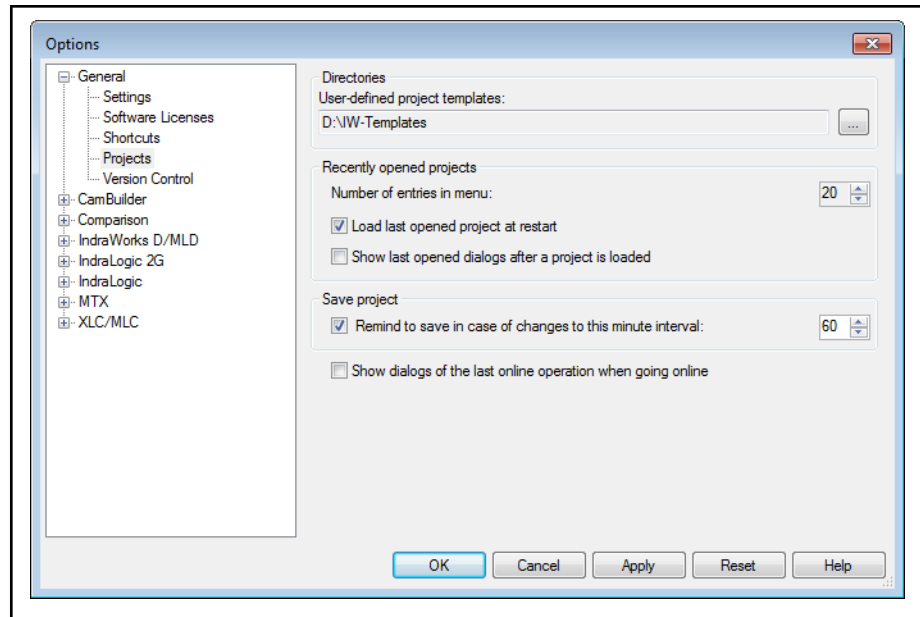


Fig. 3-84: Options dialog - General/projects

Select the category "General / projects". The path setting "User-defined project templates" can be changed by clicking on the button to the right. The dialog "Select directory for your personal project templates" is started. Select the desired folder and confirm the selection with **OK**. The Option dialog is also closed with **OK**.

3.9.3 Creating a project template from the project

A project template can also be created from an opened project. Select the menu item **File ► Project template...** and follow the subsequent dialog.

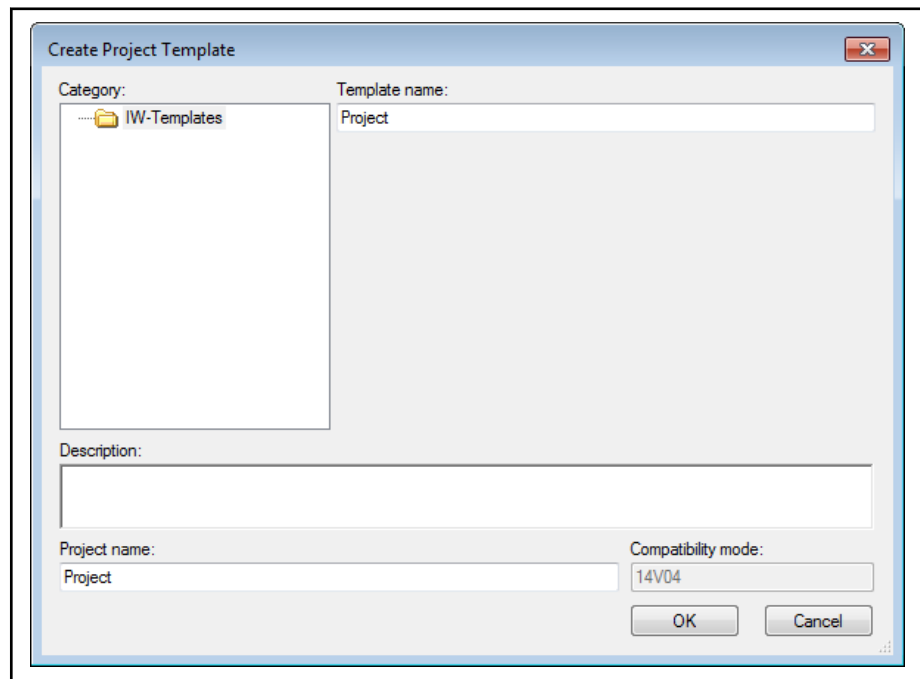


Fig. 3-85: Creating a project template

Select the desired category in the tree view "Category". A folder is provided for each category in the file repository on the file system. If more categories are desired, for example subfolders, select any category node and start the

dialog of the same name via the context menu item **Edit category**. The directory structure can be extended by clicking the **New file** button. Clicking on **OK** or **Cancel** closes the folder dialog and returns to the original dialog.

Here, the following settings can also be made for the new project template:

- **Template name:** Enter the name under which the template should be shown in the "Create new project" dialog. The project name is used as a default value.
- **Description:** A multiline text describing the personal template can be entered here. The project comment is used as a default value.
- **Project name:** What the default for the project file name should be when creating a new project is set here. The preset default is the name of the current project file.
- **Compatibility mode:** When creating the new template, the project elements are exported according to the compatibility mode of the source project. The project created using the new project template must be created in exactly the same compatibility mode to facilitate the trouble-free import of the project elements. This information cannot therefore be changed, it is only used for information.

When setting is complete, finish the input with **OK**. The dialog is closed and a dialog for saving the template data opened. Select the desired folder and confirm the selection with the "Save" button.

The **Cancel** button cancels the process in both dialogs without effect.



When creating a new project, only categories whose folder actually contains project templates appear in the "Create new project" dialog. When attaching subfolders / sub categories to a filing system for personal project templates, the project template should also be saved in these repositories.

3.10 Comparing project data

3.10.1 General information

In IndraWorks, individual elements of the project can be compared. Optionally, individual elements or their properties can also be merged.



The "Compare" function is supported by the following systems:

- IndraLogic XLC/IndraMotion MLC/IndraMotion MLD
- IndraDrive

For more system-specific and component-specific information, refer to:

- **IndraLogic XLC/IndraMotion MLC:** "Compare" and "Merge" in the XLC/MLC
- **IndraLogic 2G:** "Compare" and "merge" PLC objects
- **FDT container:** "Compare" in the FDT Container

The basis: Elements

A project consists of a hierarchy of elements. Elements are displayed as nodes in the Project Explorer. Elements are also called objects.

An element is defined via its properties.

The comparison always refers to an element that is compared to another element. Comparison takes place for each property of the elements.



Two elements are identical if all their properties match. It applies irrespective of the fact whether the complete hierarchy of the sub-elements is the same.



Two elements can even be identical if their sub-elements differ from each other.

Additionally, an element has references to their direct sub-elements (direct child elements).

If an element has direct subelements (direct child elements), these elements are also compared.



If a subelement has further subelements, they are not automatically included during comparison.

To compare the complete hierarchy of the sub-elements, use the **"Compare all sub-elements"** function.

Overview on "Compare" functions

In IndraWorks, the following can be compared via the Project Explorer using the context menu:

- Project elements with elements of an export file
- Elements within a project

Furthermore, elements of two export files can be compared via the menu **Tools ► Compare...**

The "Compare" function is also available with the following functions under version control:

- Open project from version control
- Change project version
- Show version history
- Manage library projects

3.10.2 Starting the "Compare" function

Starting "Compare" function

There are two possibilities to start the "Compare" function:

1. Via the context menu in the Project Explorer

- If two elements of one project are to be compared, select the desired two elements in the Project Explorer and activate the **Compare...** function in the context menu. The comparison is started.

The prerequisite is that the respective elements support this functionality and provide it in the context menu.

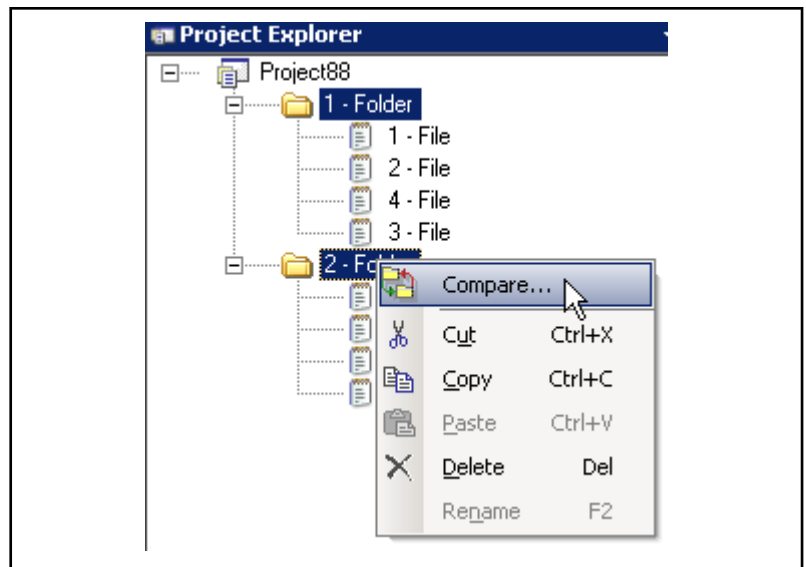


Fig. 3-86: Context menu Compare (two project elements)

- To compare an element of a project with an export file, select the respective element in the Project Explorer and activate the **Compare...** function in the context menu. Subsequently, the dialog "Select sources for comparison" is displayed to select the export file.

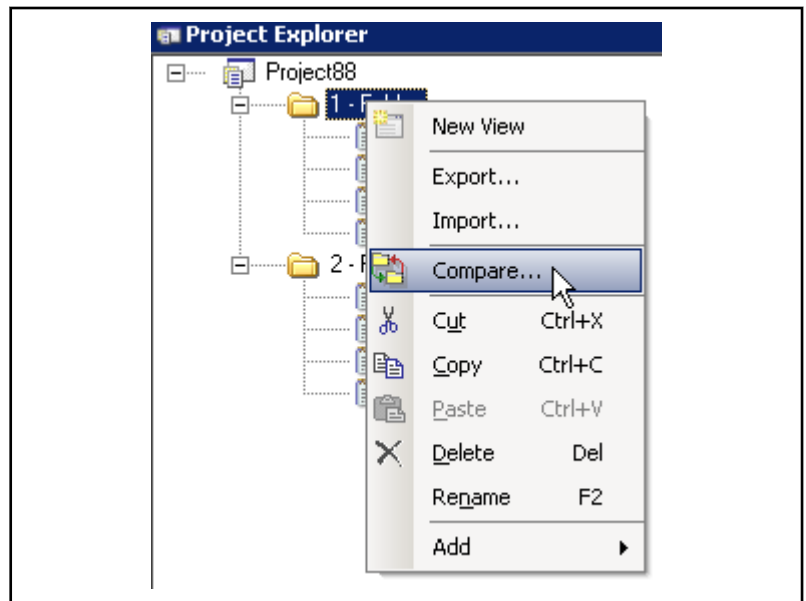


Fig. 3-87: Context menu Compare (project element with export file)

2. **Start the "Compare" function via the menu item Tools**

To compare the two export files with each other, select **Tools ► Compare...** in the menu.

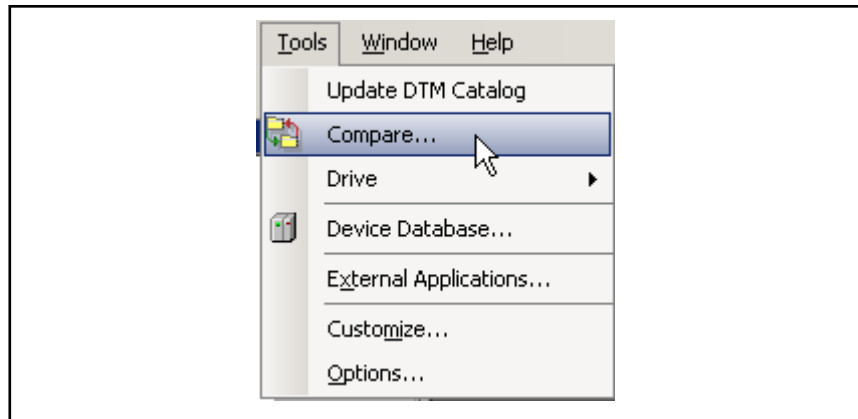


Fig. 3-88: Menu Compare (two export files)

Selecting sources

If an export file is part of the comparison, the "Select sources for comparison" dialog is opened after the "Compare..." function has been enabled. Select the sources for comparison.

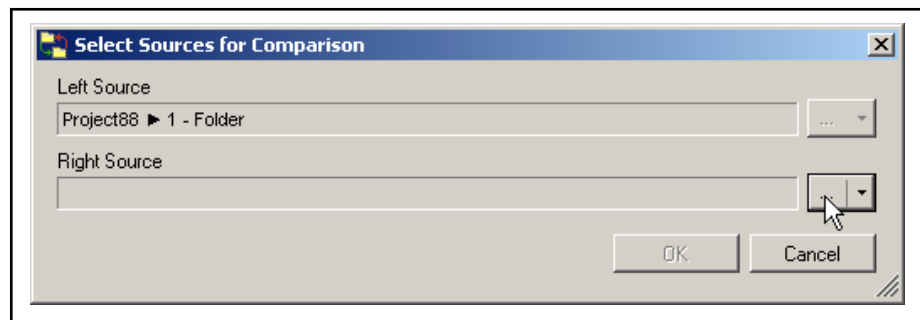


Fig. 3-89: Selecting sources for comparison dialog (project element with export file)



The "Select sources for comparison" dialog is not displayed if two elements of the same project are compared.

If an element of a project is compared with an export file, the selected element is automatically displayed as path in the text field "Left source". In this case, only the right source file has to be selected. Click on the left part of the button and select the export file for comparison in the "Open" dialog.

Export files compared last



Click on the right part of the button with the arrow and the submenu opens. It shows a list of the latest compared export files. Left click on an entry in this list and the selected export file opens.

Selecting the start element

The elements in the export file are presented in a tree structure. Select the element to start the comparison with in the dialog.



Open the dialog and the root element is preselected by default.

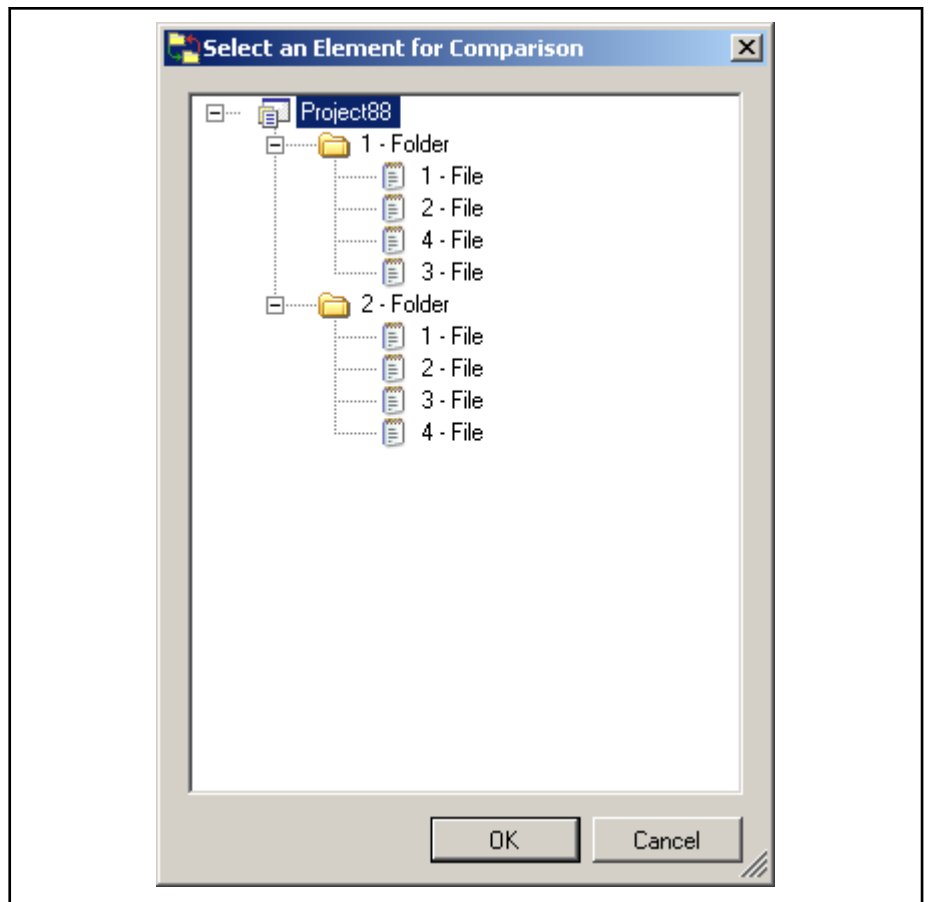


Fig. 3-90: Selecting an element for comparison dialog

Click "OK" to select the highlighted element as start element for comparison.

3.10.3 Working with the function "Compare"

The result of the comparison is displayed in a separate dialog called "Comparison".

The dialog can be divided into the following sections:

- Toolbar
- "Properties" section
- Comparison status of the properties
- "Direct subelements" section
- Comparison status of direct subelements
- "Compare all sub-elements" function

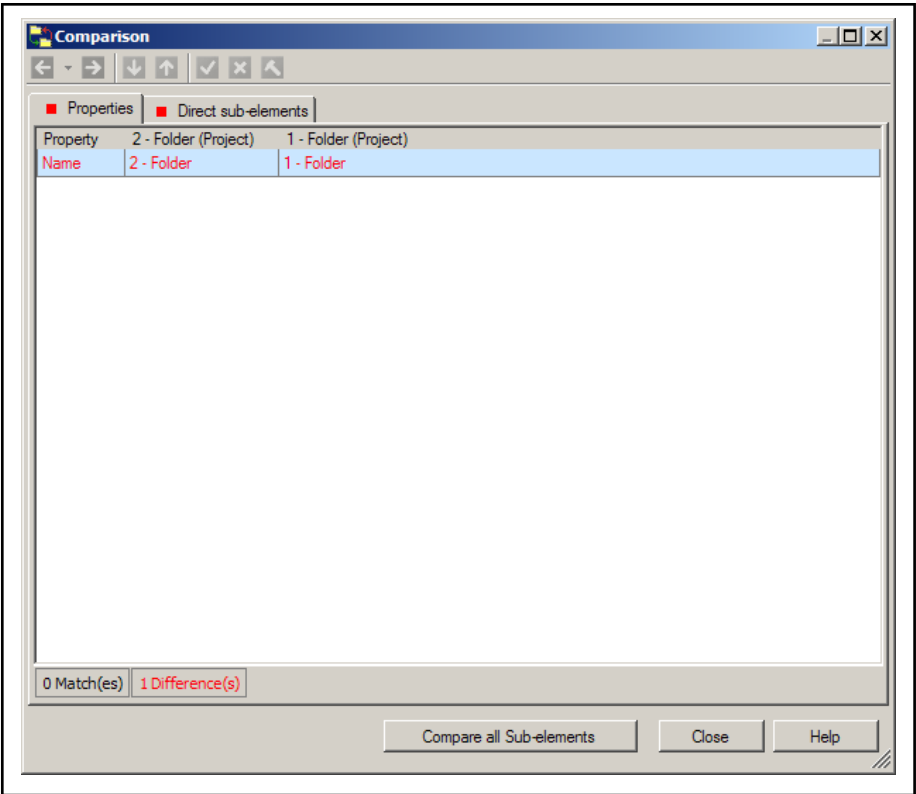


Fig. 3-91: Comparison dialog

Toolbar The toolbar in the upper part of the dialog serves the navigation and provides the following functions for comparison/merger:

Icon	Description
	Show previous element: Click on this icon to navigate to the previous element in the history of the already displayed elements.
	Show next element: Click on this icon to navigate to the next element in the history of the already displayed elements.
	Select next difference: Click on this icon to select the next difference.
	Select previous difference: Click on this icon to select the previous difference.
	Preselect for merging: Click on this icon to preselect the selected line for merging. Note: If no merger is possible for the selected line, no preselection can be made.
	Reset preselection for merging: Click on this icon to stop the preselection of the selected line for merging.
	Start merging: Click on this icon to merge all preselected lines.

Tab. 3-2: Toolbar

"Properties" section The comparison results for each property of the element are displayed in this section.



The view of the comparison results varies according to the element. In the figure below, a comparison of two text files is shown in list view.

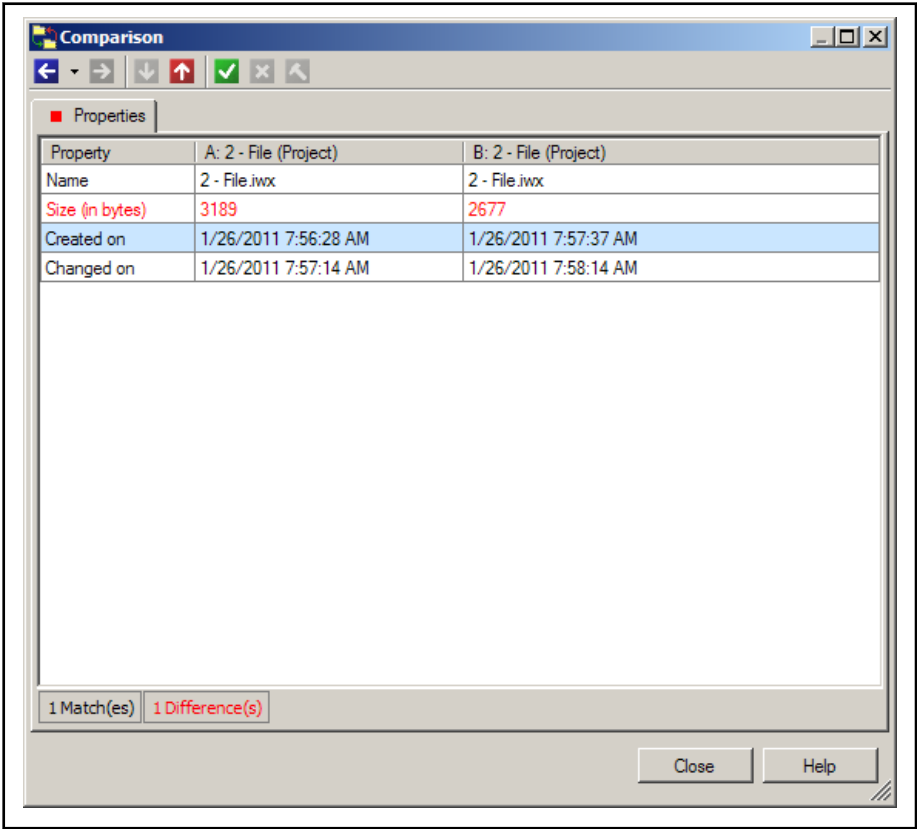


Fig. 3-92: Dialog: Comparison

In the list, matching properties are shown in black font color by default. If there are differences, the respective property is shown in red font color by default. Color and font of the comparison can be individually adapted in the "Text settings" screen in the menu **Tools ▶ Options**. A detailed description of these functions can be found in [chapter 3.10.5 "Options" on page 109](#).



The toolbar buttons are enabled or disabled depending on the selected property.

Comparison status of the properties

Below the "Properties" list is a comparison status displaying the number of matches and differences of the element properties compared.



Two elements are identical if all their properties match. It applies irrespective of the fact whether the complete hierarchy of the sub-elements is the same.



Two elements can even be identical if their sub-elements differ from each other.

"Direct subelements" section

In this section, the direct sub-elements of the two compared elements are shown in a list view.

The display comprises:

- Icon
- Left element and left source position
- Right element and right source position

In the "Direct sub-elements" list, matching elements and source positions are shown in black font color by default. If there are differences, the respective element and source position are shown in red font color by default.



If a subelement has further subelements, they are not automatically included during comparison.

To compare the complete hierarchy of the sub-elements, use the **"Compare all sub-elements"** function.

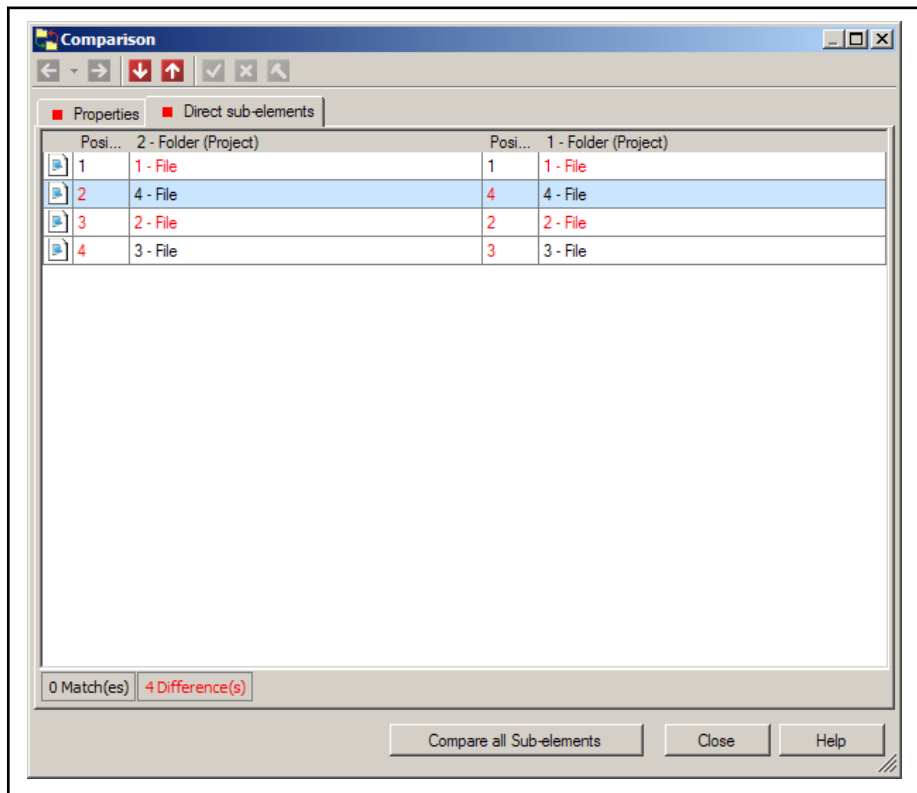


Fig. 3-93: Comparison dialog ("Direct subelements" section)



Double-click on the selected element in the "Direct sub-elements" section to start the comparison for the highlighted element and to display its result. The prerequisite is that the left and right element exist.

If the element is under version control, it has to be available in the labeled version.

Comparison status of direct sub-elements

Below the "Direct subelements" section is the corresponding comparison status which displays the number of matches and differences of the directly compared subelements and corresponding source positions.



Matches are found only if the properties and source positions of the compared elements are identical.

"Compare all sub-elements" function

Click on the "Compare all sub-elements" button to compare the complete hierarchy of the sub-elements from the start element up to the deepest sub-elements.



The "Compare all subelements" function is not available if:

- The element does not have any sub-elements
- The element is under version control but not available in a labeled version.

The comparison results are displayed for the individual elements in a list view.

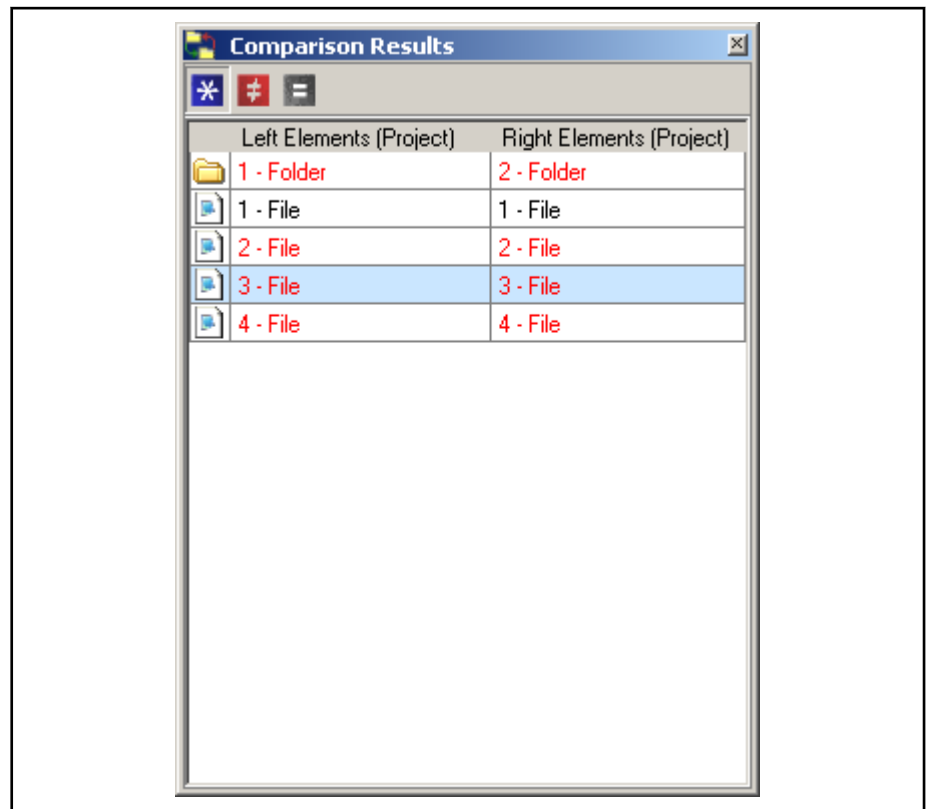


Fig. 3-94: Comparison results dialog



The "Comparison results" dialog is a tool window. It can be moved and docked at the margin of the workspace at any time.

The toolbar in the upper part of the "Comparison results" dialog serves as filter and provides the following functions:

Icon	Description
	Show all elements: Click on this icon to display all differing and matching elements.
	Show only differing elements: Click on this icon to display only the differing elements.
	Show only complying elements: Click on this icon to display only the matching elements.

Tab. 3-3: Toolbar

A right click on the element in the list displays the respective context menu:

1. If a left and a right element exist in the list, the following context menu is displayed:

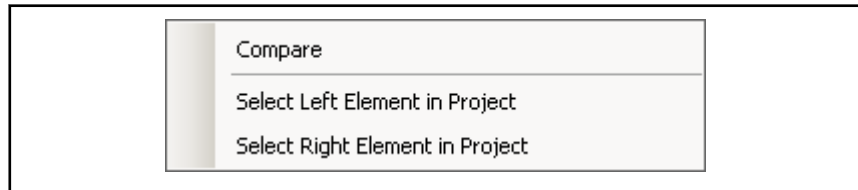


Fig. 3-95: Context menu items in the list of the comparison results

Select the context menu item **Compare** to compare all elements and to show the result in the "Comparison" dialog.

Select the left element in the Project Explorer via the context menu item **Select Left Element in Project**.

Select the right element in the Project Explorer via the context menu item **Select Right Element in Project**.

2. If only the left or the right element exists in the list, the following context menu is displayed:

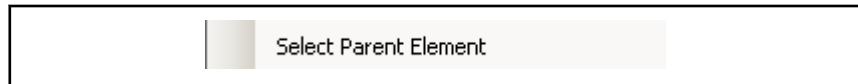


Fig. 3-96: Context menu selecting parent element

Display the parent element of the selected element via the context menu item **Select Parent Element**.

3.10.4 Merging

The "Comparison" dialog can also merge individual lines. The prerequisite is that the left side of the comparison is a project.

The required functions are provided in the toolbar.

Proceed as follows:

1. If working under version control, ensure that writing to the target for merging is possible. If required, use the "Check out" function for the target element.
2. Select the lines to be merged via the  symbol.
3. Click on the  symbol and merging starts for all preselected lines. The data is transferred from the right side (source) to the left side (target).

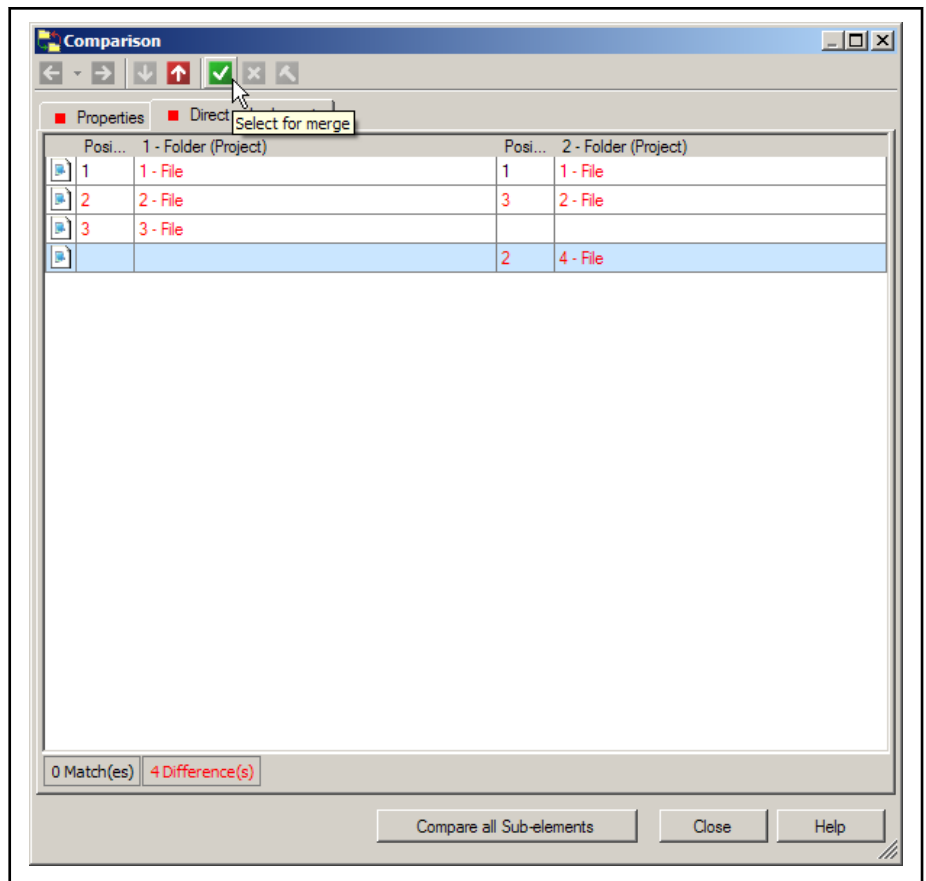


Fig. 3-97: Comparison dialog (merging)



If no merger is possible for the selected line, no preselection can be made.



Mainly, the individual properties can be merged.

Furthermore, lines from the list "Direct subelements" can be merged.

This is possible in the following cases:

- No element is on the left (target). One element is on the right. When merging, the element is inserted on the left.
- One element is on the left (target). No element is on the right. When merging, the element is removed from the left side.

If working under version control, ensure that the target (parent element) allows write access for merging and that the element on the right is available in a labeled version.



The merging procedure varies in some details depending on the element type.

3.10.5 Options

There are setting options in the "Options" dialog to individually adjust the comparison options for the **Project comparison**. For the "Options" dialog, go to **Tools ► Options...**

Node comparison

Text settings	To adjust color and font for the comparison
External application	To specify an external comparison application to display the file differences. However, the comparison application has to be installed on the PC. Click on "..." and select the external application in the "Open" dialog.
PLC options	To specify the comparison for PLC elements. Enter whether to observe spaces, comments or properties.

For the **online comparison**, go to the context menu of the "Properties" dialog of the control to apply the PLC program sources to the control.

Control ► Properties ► PLC

Transferring PLC sources together with the boot application	To compare the program sources, this option has to be enabled additionally.

3.11 Online comparison of project and device data

3.11.1 General information

In IndraWorks, devices of a project can be compared to their online device data. This **Online comparison** can be executed for the entire device or for certain subelements.

The element called for the device and each of its subordinate elements are compared individually.



The "Online comparison" function is supported by the following systems:

- IndraLogic XLC/IndraMotion MLC

For more system-specific and component-specific information, refer to:

- **IndraLogic XLC/IndraMotion MLC: Comparison control and project configuration**
- **IndraLogic 2G: Online comparison of PLC objects**

The basis: Elements

A project consists of a hierarchy of elements. Elements are displayed as nodes in the Project Explorer. Elements are also called objects.

An element is defined via its properties.

The comparison always refers to an element that is compared to its corresponding element. Comparison takes place for each property of the elements.



Two elements are identical if all their properties match. It applies irrespective of the fact whether the complete hierarchy of the subelements is the same.



Two elements are also identical if the above mentioned criteria applies but the subelements differ.



Two elements are almost identical if their properties differ, but the machine behavior does not change after a comparison operation is completed (e.g. deviation of comments at objects).

Exception:

If sources are only saved on the control for comparison and if they differ from the sources on the PC, not identical is displayed as these sources are exclusively transferred to the control for comparison purposes (e.g. PLC commissioning visualization).



If no sources are stored on the control, the online comparison can still verify if the project on the control corresponds to the project on the PC by using the checksums.

Additionally, an element has references to their direct sub-elements (direct child elements).

If an element has direct subelements (direct child elements), these elements are also compared.

3.11.2 Starting the online comparison

Start the online comparison via the context menu in the Project Explorer. Select the element and activate the "Online comparison" function in the context menu. The comparison overview is displayed in a document window.

The online comparison is possible for the following project elements:

- A control "IndraLogic XLC" or "IndraMotion MLC" is available.
- PLC application
- "Motion" nodes
- "Robot" node
- "Sercos" node

3.11.3 Working with the function "Online comparison"

Mode of operation

The project elements are compared to the corresponding elements of the on-line device in the comparison overview in a tree structure. The comparison results are also displayed in the overview.

In the comparison overview, the detailed differences can be displayed for each node in the detail comparison.



The online comparison is a "snapshot". Subsequent changes to project or device data do not affect the comparison display. If required, the comparison has to be restarted or manually refreshed.

Dialog structure "Comparison overview"

The dialog is divided into the following sections:

- Toolbar
- Area to display the compared content
- Information line

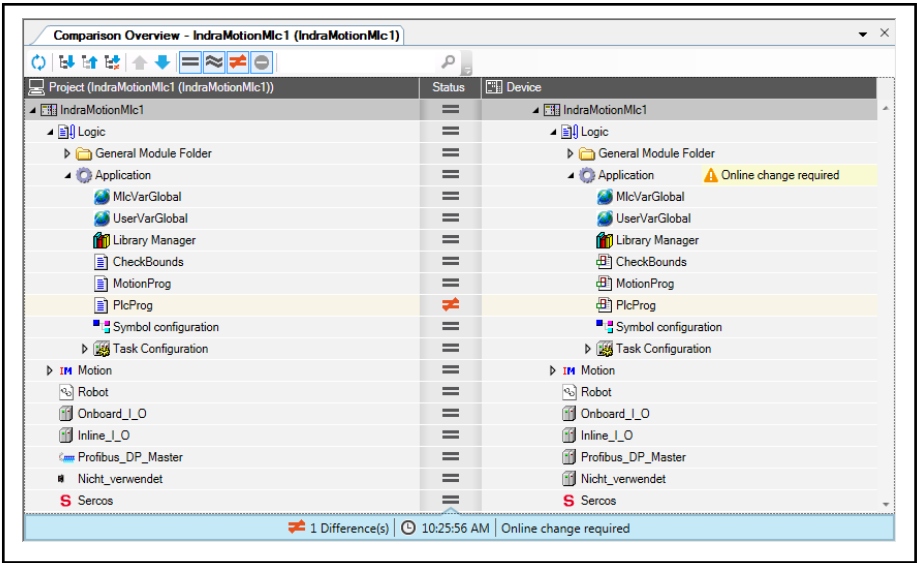


Fig. 3-98: Comparison overview

Toolbar The symbol bar is at the upper dialog border and contains the following functions:

Icon	Description
	Find function
	Discards the last comparison results and restarts the comparison
	Expands the tree completely
	Collapses the tree so that only the first and second level is visible
	Label
	Highlights the previous difference
	Highlights the next difference
	Switches the filter to display identical nodes
	Switches the filter to display almost identical nodes
	Switches the filter to display nodes that are not identical
	Switches the filter to display nodes that cannot be compared

Tab. 3-4: Toolbar functions

Comparison content The comparison is represented in a tree structure, with a table with three columns. The left column contains the project elements, the right column contains the elements of the device. The column in the center displays the comparison status of the respective data.

If no corresponding element to a project element is available in the device, the right side of the corresponding line is left blank. The left side remains blank if no project element was found for an element of the device.

Comparison results The comparison results in the column in the center have the following meaning:

Icon	Description
 (rotary)	The comparison of the element or subelement has not yet been completed
	The element is identical Collapsed node: all subelements are identical
	The element is almost identical
	The element is not identical
	The element cannot be compared
	Collapsed folder: at least one subelement is not identical or almost identical
	Collapsed folder: at least one subelement cannot be compared

Tab. 3-5: Comparison results

Note displays

Notes can also be displayed in the comparison overview. Notes display information relevant for the comparison. However, the information does not refer to the result of the comparison.

The notes are displayed in the right column as error or warning with an icon and text.

Information line

The information line is located at the lower margin of the dialog and displays the number of differences, if filters are active and the time of the comparison.

Detail comparison

The user has several options to call a detail comparison:

- Double-click on a node.
- Right-click on a node and select "Open detail comparison" from the context menu.
- Select a node and press <Enter>.



If the elements of a node cannot be compared, the detail comparison cannot be called.

The detail comparison is displayed in a pane, separated from the detail overview by a horizontal splitter. The pane height can be changed via the splitter.

The detail comparisons are not element-specific and depend on the data to be compared. They can, for example, be represented as table, as text or as graphic.

SafeLogic objects in online comparison

Before SafeLogic objects can be compared online, execute **Debug ► Login** of the standard PLC. The required configuration data is thus transferred to the PLC. "Transferring PLC sources together with the boot application" has to be enabled in the "Properties" dialog of the control. When subsequently logging in to the Safety application, data is transferred to the flash card of the standard control for the online comparison of the Safety objects, thus allowing to also generate the comparison overview for the Safety objects. For the Safety application to go into the "Secure" state, the user has to generate the respective boot application and to log in again. When the Safety application is in the "Secure" state, the user can adjust data belonging to the Safety application to the project. Safety objects cannot be visualized in the detailed comparison. The following error message is displayed: **"No comparison view available for this object"**.

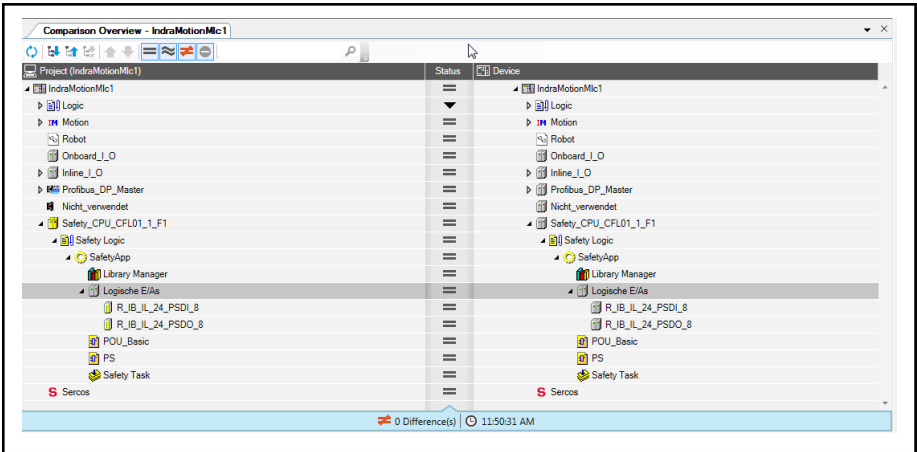


Fig. 3-99: Safety elements in the online comparison overview

Drives, axes and Sercos I/Os in online comparison

Axes below the Motion node are shown in the comparison overview and the physical axes are again shown below the Sercos node. Except for real axes, all axes are compared below the Motion node and can also be adjusted there. For real axes, only the A-parameters are compared below the Motion node. An adjustment can only be initiated on real axes of the Sercos node. If the offline parameterization is disabled in the “Properties” dialog of the control **Properties** ▶ **Advanced settings**, the following message is shown in the comparison overview: "The offline parameterization is disabled for drives (S-/P-parameters)". In this case, the comparison and the adjustment contain only the A-parameters.

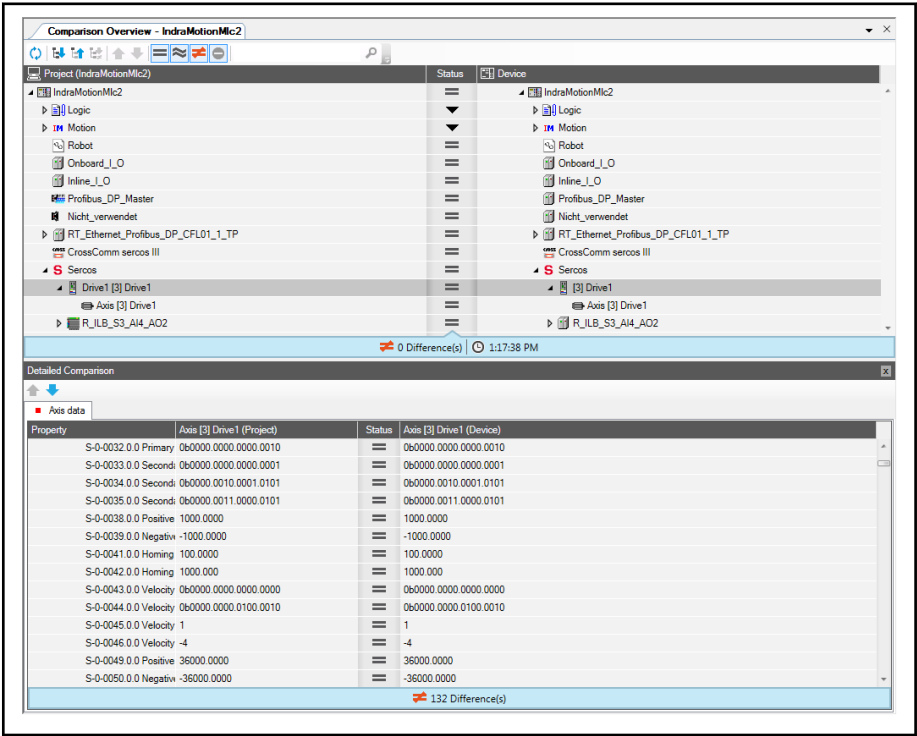


Fig. 3-100: Drive parameters in the online comparison overview



Due to the missing functionality, some parameters are displayed as **not available** on the device in older drive versions.

3.11.4 Transferring control data "Project adjustment"

Transferring project data via the comparison overview

By means of the project adjustment, the device data can be synchronized with the PC. All data or only selected data objects can be transferred.

The user can select the data to be transferred via the black arrow, to the right of the status icon.

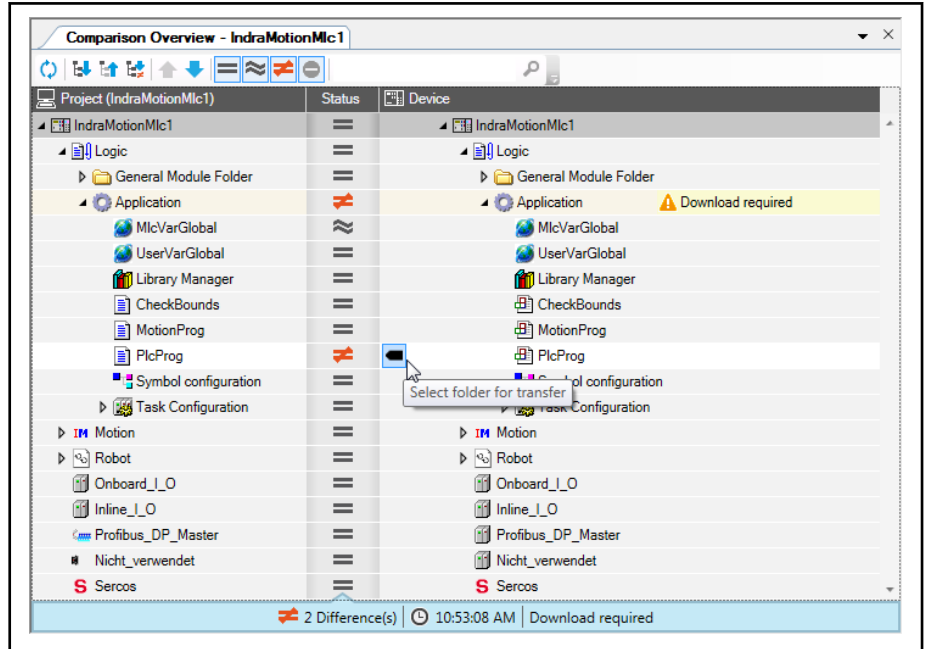


Fig. 3-101: Selecting the folder for data transfer

Individual nodes as well as nodes including subnodes or the entire tree can be adjusted.



- If a parent node is selected as folder for which subnodes exist on the PC, that do not exist on the device, they are deleted
- To transfer data, select the top node as folder
- Elements that cannot be adjusted cannot be selected for transfer

To transfer data, use "Transfer" in the header.

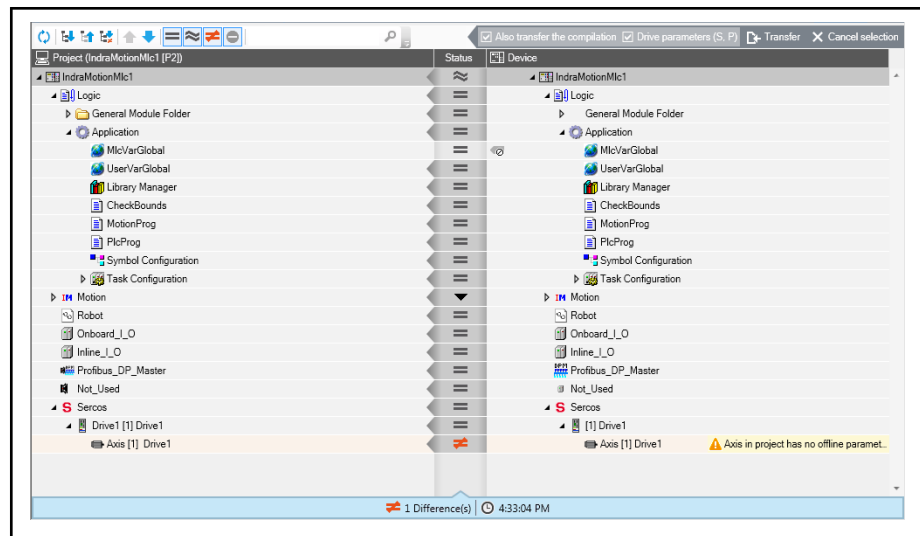


Fig. 3-102: Starting the transfer



Data can only be transferred in offline mode.



The option "**Transfer compilation**" is displayed if the PLC components (including the I/O field buses) are selected. The compilation is transferred by ticking the box. Following a success PLC compilation adjustment, login to the device without online change or re-compilation is possible.



The option "**Drive parameters S/P**" is only displayed if the offline parameterization for drives is enabled in the property dialog of the control **Properties** ► **Advanced settings** and if at least one drive has been selected below the Sercos node for the adjustment. Furthermore, an offline parameter block has to be available in the project, see offline mode/parameter adjustment



To be able to adjust the PLC compilation, the control and its subnodes have to be identical to the configuration on the device. This state is reached by using the identical project for synchronization with the device, the control was configured with or by creating the control via the command **Add XLC/MLC control on IP basis**.



From version 14V20, axes and drive are synchronized by the synchronization command at drives below the Sercos node. Synchronization via the real axes below the Motion node is not possible anymore!

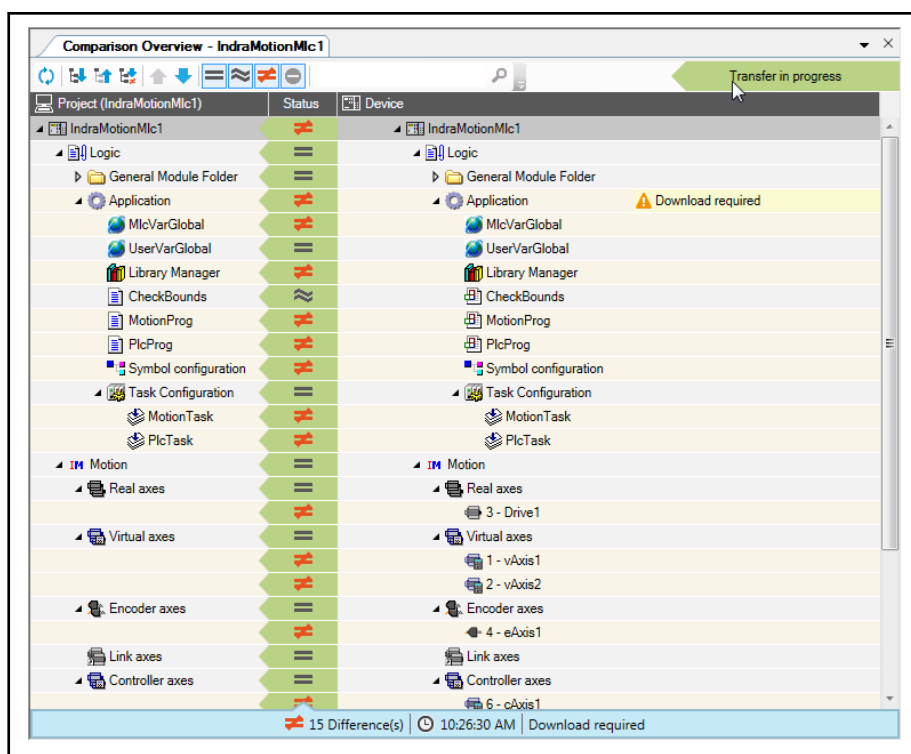


Fig. 3-103: Transferring all selected device data

If not all elements of a folder are selected for data transfer, the collapsed upper node indicates this by an unfilled arrow.

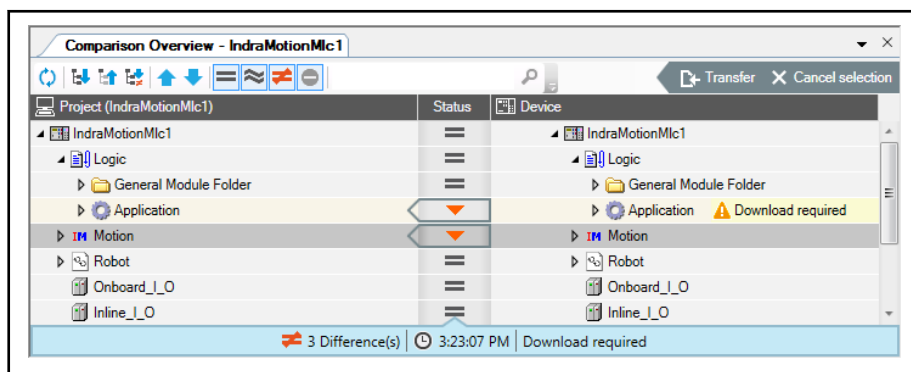


Fig. 3-104: Display if only part of the folder content is selected for data transfer

No synchronization possible



Synchronization is not possible in the following cases:

- If controls are of different variants.
To still be able to apply project data of the control, the control can be converted via the property dialog
- If function modules or extension modules are of a different type
- If single and double axis drives are in the same line
- If Robot Control V1 and Robot Control V2 objects are contained in the same line
- If real axes are used. Synchronization takes place via the physical drives

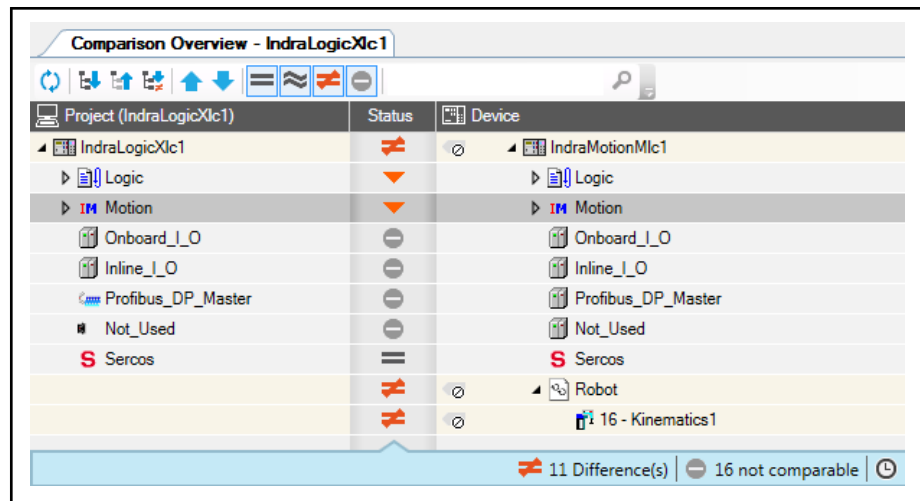


Fig. 3-105: An adjustment is not always possible

Logging in to the PLC without online change and recompilation

By using the option "Transfer compilation", the user can directly log in to the PLC after a completed synchronization without having to recompile or without having to use an online change. This option is available if at least one PLC object was selected for transfer on the control.

The PLC compilation is transferred without any additional messages if the following conditions are fulfilled:

- The control configuration in the project has to correspond to the configuration of the real control.
- All unsynchronized PLC objects starting with the Logic node and all unsynchronized field bus modules parallel to the Logic node have to be selected (including Sercos I/O).
- The control type has to be identical or selected for synchronization.

If at least one of the above-mentioned conditions is not fulfilled, a yellow note line is displayed, informing the user about more steps when selecting the option "Transfer compilation" or when clicking on "Transfer".

Behavior of the multi-device function during project synchronization

For the multi-device only data of the active configuration is compared, i.e. only data of the active line in the multi device dialog.

1. Multi device is used on the control
 - If multi device has never been used in the project, multi device is enabled in the project
 - If multi device is disabled in the project, but has previously been used, the multi device functionality is enabled again in the project.
 - The "Multi device control name" is applied to the project
 - The user-specific PLC data file ("UserPlcData.txt") is written/overwritten or deleted during the project adjustment
 - If the "UserDefs.cfg" file is available on the control, copy it to the project (write/overwrite). If no "UserDefs.cfg" is available on the control, the file in the project is deleted
 - If the option to manage the "UserDefs.cfg" is disabled by IndraWorks, a possibly available "UserDefs.cfg" file in the project is neither overwritten nor deleted.
 - The user files are considered when adjusting the control data, i.e. the files are written/overwritten or deleted.

2. No multi device is used on the control
 - The functionality in the project is disabled during the adjustment.
 - The multi device table and its data are not modified.

Transferring project data via the context menu

All control data can be uploaded at once to the PC via the context menu **Synchronize ► Upload control configuration to the PC**.

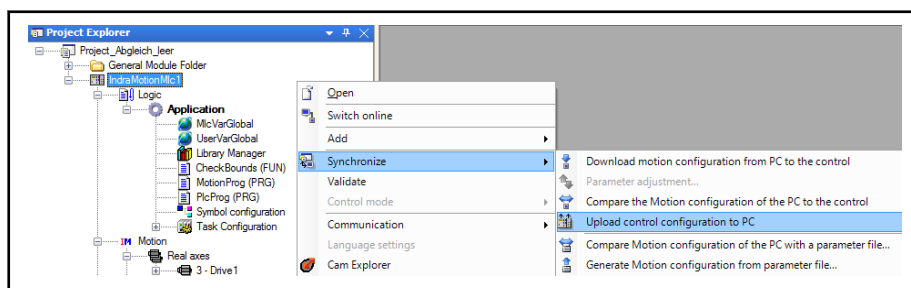


Fig. 3-106: Load all project data to the control

Transferring PLC sources together with the boot application

For the **Online comparison**, refer to the setting in the property dialog of the context menu to transfer the PLC program sources to the control.

Control ► Properties ► PLC

Transferring PLC sources together with the boot application	This option has to be enabled in order to compare the program sources

3.11.5 Creating a new device based on an IP address

An XLC/MLC device can be automatically be created in the IndraWorks project by specifying an IP address.

After creating or opening a project, go to **Project ► Add XLC/MLC control based on the IP address** to select an XLC/MLC control.

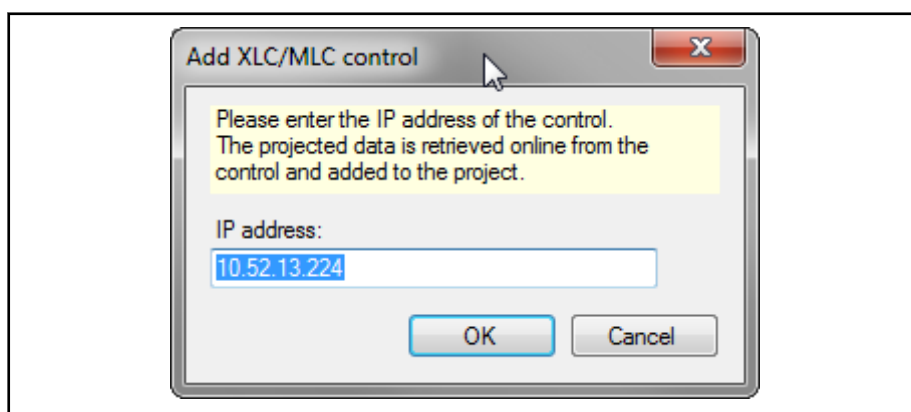


Fig. 3-107: Adding an XLC/MLC control based on the IP address

Press **OK** and the device is created in the project and all device data (configuration, applications, parameters, PLC source files and compiler information) is loaded from the control to the PC.



The drive S-/P-project parameters are only applied to the project if the offline parameterization is selected under **Properties ► Advanced settings**. This option already has to be selected on the project. Its data is applied to the control.



The existence of PLC source files is controlled analogously via **Properties ► Advanced settings**. If this option is deselected, an empty PLC project is created when creating a new control, i.e. the Safety components, which are also on the control, are missing in the IndraWorks project.

3.12 Validating project data

3.12.1 General information

For engineering procedures such as import or merging, IndraWorks temporarily allows comfortable working with discrepancies. This refers to bus addresses and names for example.

IndraWorks provides the possibility to check project data for discrepancies. This functionality is known as validation. Discrepancies are displayed as messages in the message window.

Validation messages can be of type error, warning or information.



- The validation detects existing and obvious configuration errors and discrepancies and reports the errors. Full accuracy of the configuration data cannot be guaranteed!
- The "Validate" function is only available for selected project elements. "Validation" takes place for these elements/components only!

For more detailed component-specific information on the "validation", refer to:

- **IndraLogic XLC/IndraMotion MLC: Validation**
- **IndraLogic HMI: Validation**

3.12.2 Starting the validation

Start validating via the context menu item "Validate" at the following project elements:

- Project node
- IndraMotion MLC
- IndraLogic XLC
- Visualization device Vxx

When a validation is started, already existing validation messages are deleted in the message window.



Starting at the **project node** is a comfort feature. Note that the "Validate" function is only available for the selected project elements. "Validation" takes place for these elements/components only!

Executing validation

The validation is visualized via a dialog with progress display if required.

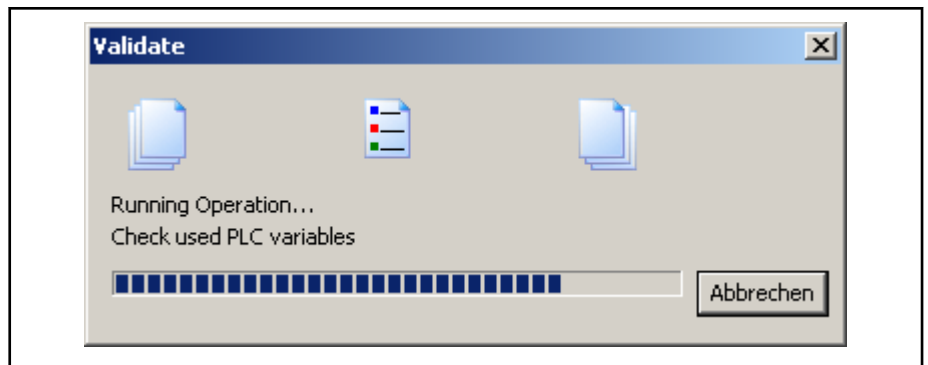


Fig. 3-108: Progress display at a running validation

As long as the progress display is visible, IndraWorks Engineering cannot be operated.

After the validation has been completed, the result is temporarily displayed in the status bar:



Fig. 3-109: Status bar after completed validation

If validation messages are present, these are listed in the message window under the category "Validation". Therefore, the message window is set in the foreground.

Canceling validation

The "Cancel" button of the progress display allows aborting a running validation.

The validation abort is displayed as follows in the status bar:

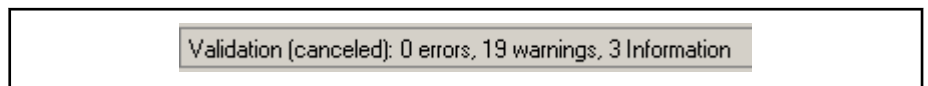


Fig. 3-110: Status bar after canceled validation

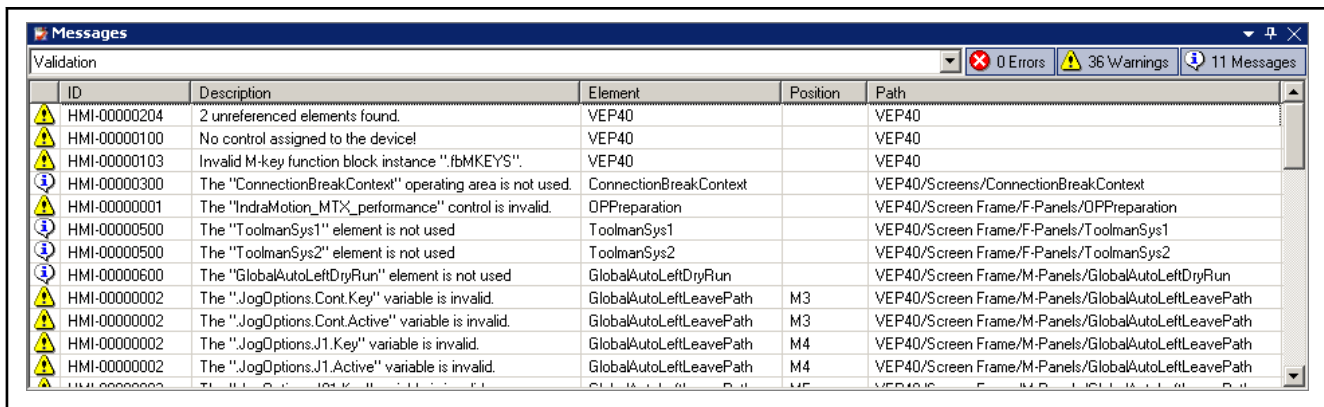
The messages found up to then are displayed in the message window under the category "Validation (canceled)".



Project data can still contain further discrepancies, since not all checks have been performed!

3.12.3 Using validation messages

The message window lists all messages generated during a validation under the category "Validation" or "Validation (canceled)":



ID	Description	Element	Position	Path
HMI-00000204	2 unreferenced elements found.	VEP40		VEP40
HMI-00000100	No control assigned to the device!	VEP40		VEP40
HMI-00000103	Invalid M-key function block instance "fbMKEYS".	VEP40		VEP40
HMI-00000300	The "ConnectionBreakContext" operating area is not used.	ConnectionBreakContext		VEP40/Screens/ConnectionBreakContext
HMI-00000001	The "IndraMotion_MTX_performance" control is invalid.	OPPPreparation		VEP40/Screen Frame/F-Panels/OPPPreparation
HMI-00000500	The "ToolmanSys1" element is not used	ToolmanSys1		VEP40/Screen Frame/F-Panels/ToolmanSys1
HMI-00000500	The "ToolmanSys2" element is not used	ToolmanSys2		VEP40/Screen Frame/F-Panels/ToolmanSys2
HMI-00000600	The "GlobalAutoLeftDryRun" element is not used	GlobalAutoLeftDryRun		VEP40/Screen Frame/M-Panels/GlobalAutoLeftDryRun
HMI-00000002	The "JogOptions.Cont.Key" variable is invalid.	GlobalAutoLeftLeavePath	M3	VEP40/Screen Frame/M-Panels/GlobalAutoLeftLeavePath
HMI-00000002	The "JogOptions.Cont.Active" variable is invalid.	GlobalAutoLeftLeavePath	M3	VEP40/Screen Frame/M-Panels/GlobalAutoLeftLeavePath
HMI-00000002	The "JogOptions.J1.Key" variable is invalid.	GlobalAutoLeftLeavePath	M4	VEP40/Screen Frame/M-Panels/GlobalAutoLeftLeavePath
HMI-00000002	The "JogOptions.J1.Active" variable is invalid.	GlobalAutoLeftLeavePath	M4	VEP40/Screen Frame/M-Panels/GlobalAutoLeftLeavePath

Fig. 3-111: Validation messages in the message window dialog

The buttons "Errors", "Warnings" and "Information" are used to show or hide the messages of the respective type.

To recover a reported error, the respective dialog or the document window opens when double-clicking on the message.

For more operating options of the message window, see [chapter 3.31.1 "Message windows" on page 262](#)

3.13 Multilingual projects

3.13.1 General information

Creating and editing multilingual projects

The language and text management integrated in IndraWorks allow to create and edit multilingual projects. Multilingual relates to the language of the user texts (e.g. configured messages, texts in HMI screens, program comments). Do not mistake this multilingual function for the language of the user interface.

The following procedure is recommended:

- When creating a project, the master language of the project is determined
- Plan and configure the project. All texts are entered in the master language.
- Add new languages to the project
- Export user texts of the project to one translation file per additional language
- Translation of texts, i.e. edit the translation files
- Import translated texts to the project

3.13.2 Master Language of Project

The language used to create an IndraWorks project is called the master language. Any number of further languages can be added to the project later on in addition to the master language.

The master language is derived when creating a new project from the currently set language of the user interface. It cannot be changed later on.

3.13.3 Managing project languages

Adding new language to project

To add a new language to the project, select **Project ► Language ► Manage project languages**.

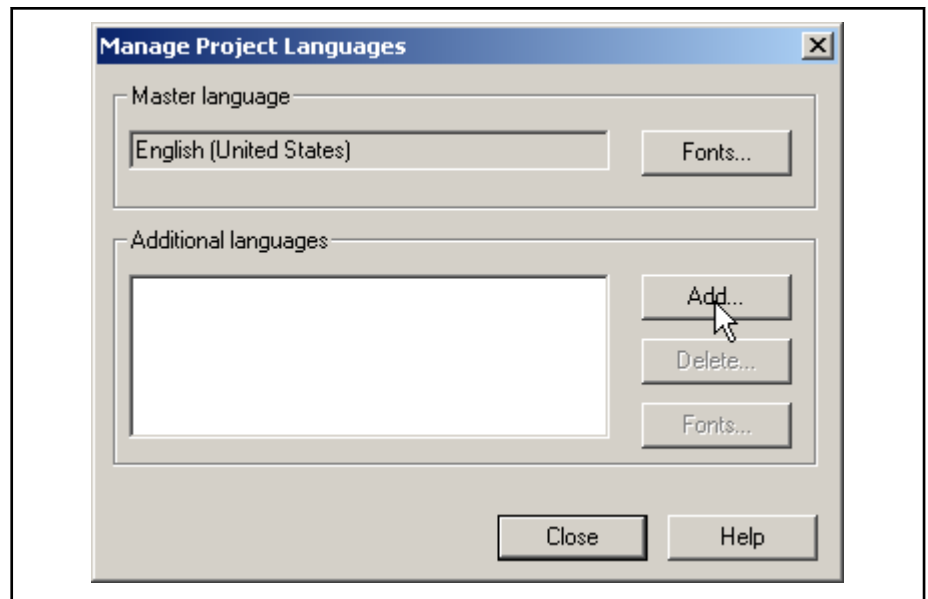


Fig. 3-112: "Manage project languages" dialog

To open the "Manage Project Languages" dialog, click on "Add" in the "Manage Project Languages" dialog.

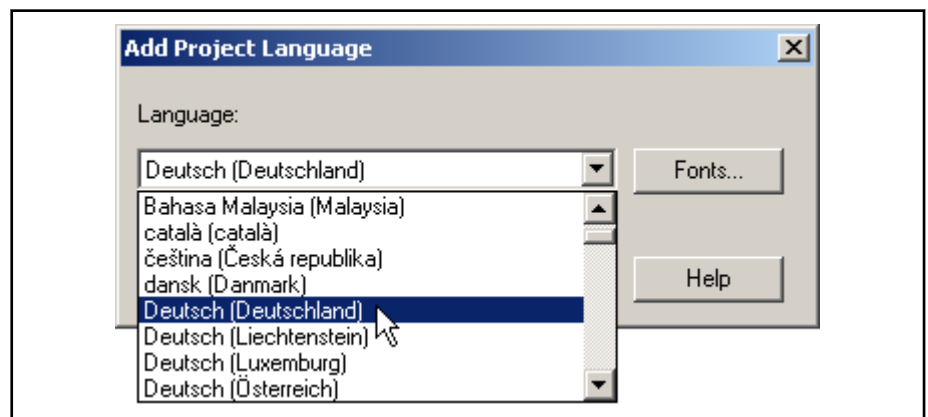


Fig. 3-113: "Add project language" dialog

Select the language to be added to the project.

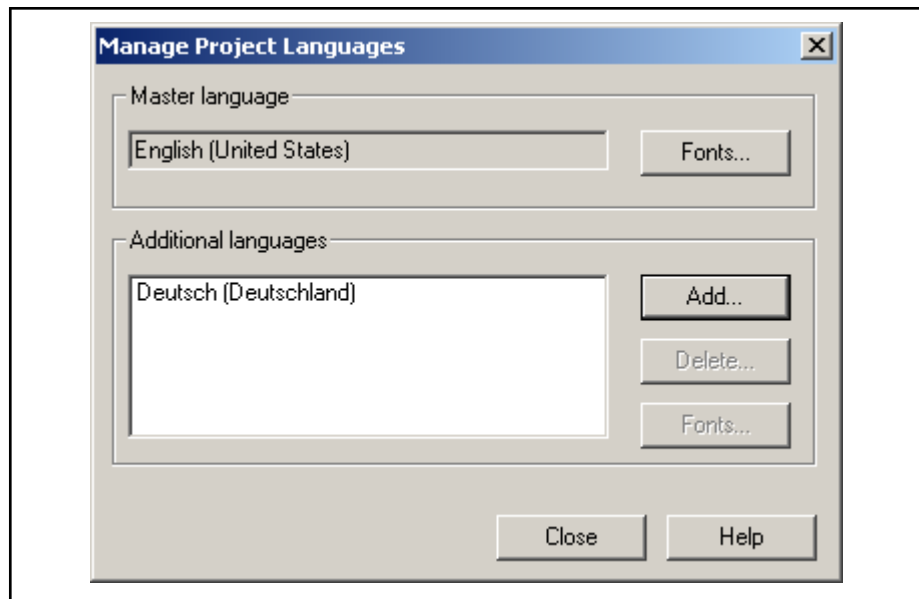


Fig. 3-114: "Manage project languages" dialog

Repeat this process until all necessary languages are added to the project.

To change the font of an additional language, select the language from the "Additional languages" list and click on "Fonts..."

Click on "Close" to return to the IndraWorks main window.



When a new language is added, the internal text memories are prepared to implement and manage texts in this language. It is not translated to this language.



Any added language can be selected as the active language. Thus, all language-specific user texts entered after this point in time are stored in the text memories of that language.

Editing in an additional language is only suitable when correcting a text or making minor changes to a project.

For the actual engineering, it is explicitly recommended using the master language only. Do not add other languages and do not translate user texts until the project has been completed technically.

If a project is to be expanded or revised, it is also recommended using the master language and translating the new user texts only afterwards.

Deleting additional language from project

To delete a language from the project, select **Project ► Language ► Manage project languages**. Select the language to be deleted from the "Additional languages" list and click on "Delete...". Confirm the safety prompt.

3.13.4 External project translation

General information

IndraWorks has an export/import interface for the texts of a project. This data interface allows texts to be exported to a translation file which can then be translated outside of IndraWorks.

To do this, a spreadsheet program is required which is able to read and write *.csv files and which supports UNICODE.

For example, Microsoft Excel 2003 or OpenOffice.org Calc are suitable for editing translation files. The operation of these two programs differs only in the setting of text export and text import filters to open and save the translation files.

After the translation has been completed, import the translation file. IndraWorks assigns the appropriate translations from the translation file to the original texts in the project.

The section below describes the translation of the texts of a translation file with the example of OpenOffice.org Calc.

The following steps are required:

1. Export the translation file from IndraWorks
2. Import the translation file to OpenOffice.org Calc
3. Translate texts The translated texts are inserted into the translation file
4. Export the translation file from OpenOffice.org Calc
5. Importing the translation file to IndraWorks

Exporting translation file from IndraWorks

Open the "Export translation file" dialog via **Project ► Language ► Export translation file....**

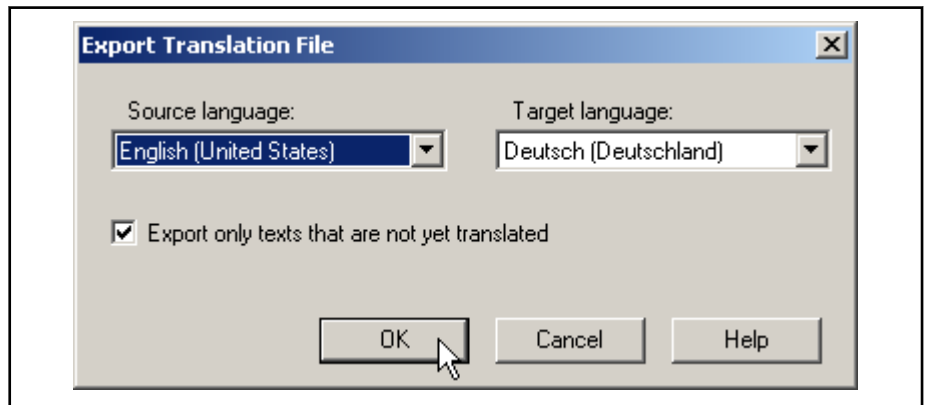


Fig. 3-115: "Export translation file" dialog

Source language

Select in this list box, which language version of the texts is written to the translation file as original text.

The master language is preset in this field after opening the dialog. However, any other project language can also be selected as source language.

Target language

Select in this list box, which language is the target language in the translation file. This entry is later evaluated during import to properly assign the imported texts to the correct text memories in the project.

Export only texts that are not yet translated

Use this checkbox to define whether all texts are exported to the translation file or only those that do not yet have a translation in the target language. Check this option if you have already revised a translated project and wish to export the new texts only. When they are imported, the texts of the translation file are merged with the translated texts in the project.

Click on "OK" to open a dialog to define the directory and the name of the translation file.

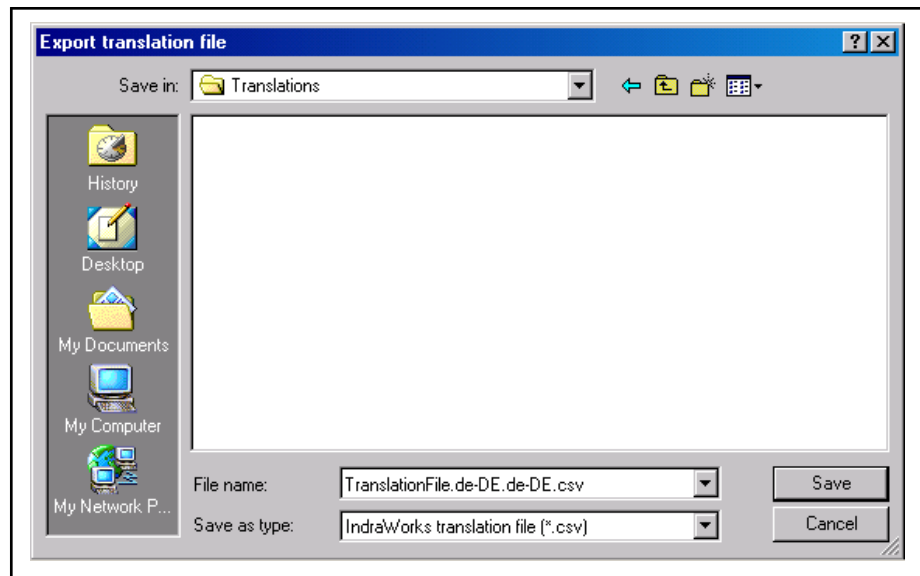


Fig. 3-116: "Export translation file" dialog, saving the file

The name suggested by IndraWorks has the following format:

TranslationFile.SourceLanguage.TargetLanguage.csv

for example, a translation file from German to US English:

TranslationFile.de-DE.en-US.csv

The name can be edited, but it is recommended not to change the name extension (e.g. .de-DE.en-US.csv).

Importing translation file to OpenOffice.org Calc

Download a translation file to OpenOffice.org via **File ► Open**. Select the file to be opened and click on "Open".

This opens the "Text import" dialog.

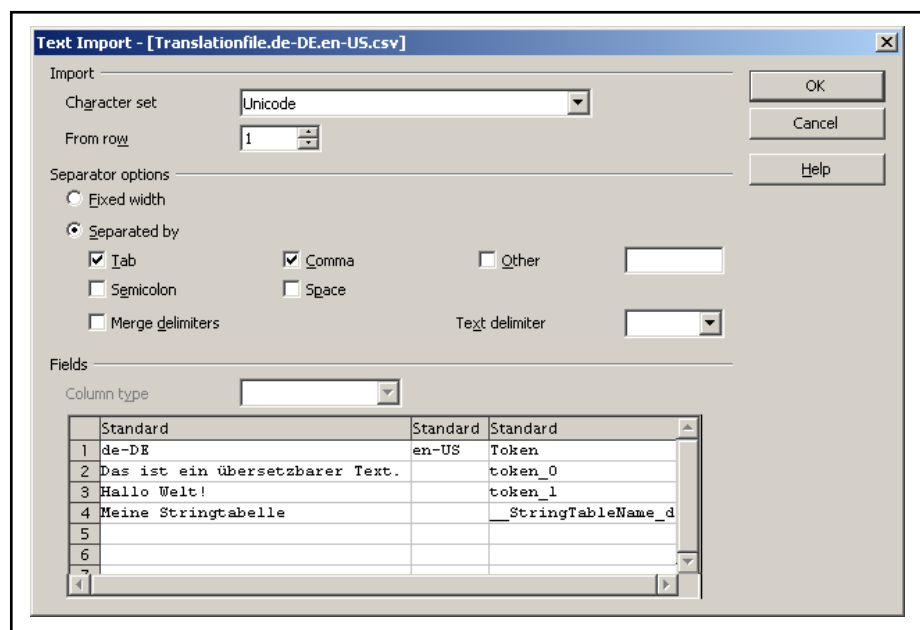


Fig. 3-117: OpenOffice.org Calc, "Text import" dialog

Character set "Unicode" has to be set in this list box. This should already be preset, since OpenOffice.org Calc automatically detects the character set used in the file.

Separator options Select the separator option "Separated by" and "Tab" as separator.

Text separator Text separators are not used in the translation file. Delete the suggested separator.

Click on "OK" to download the translation file to OpenOffice.org Calc.

Translate texts in OpenOffice.org Calc

After having downloaded the translation file to OpenOffice.org Calc, a spreadsheet is opened. It contains five columns and a number of lines depending on the number of texts.

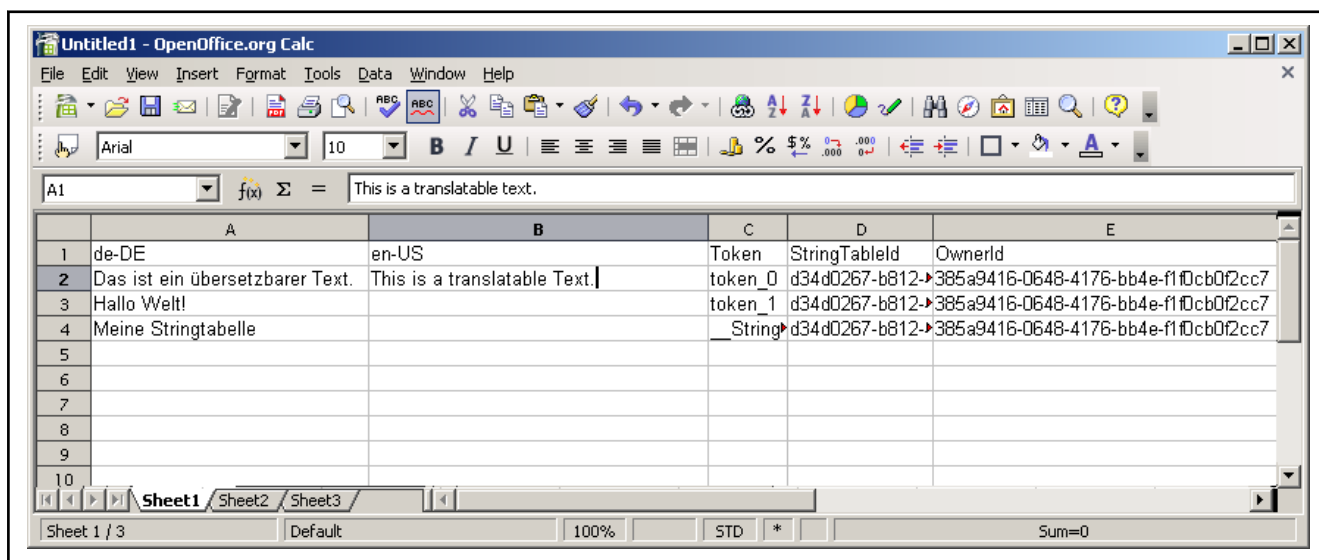


Fig. 3-118: OpenOffice.org Calc, "Translate texts"

The first line of the spreadsheet is a header and describes the column contents.

Column 1: Source language Column 1 contains the texts of the source language. The header contains the ISO code for this language.

Column 2: Target language Column 2 contains the texts of the target language. The header contains the ISO code for this language. Depending on the settings in the export dialog, the other lines of this column are empty or display existing translations.

Columns 3, 4, 5: Administration data Columns 3 to 5 contain administration data used to assign the translated texts properly when imported in IndraWorks.



Do not change the header or the administration data. Otherwise, the translation file cannot be imported.

During the translation, the translated texts are entered in column 2. During import, these texts are read in IndraWorks.



Note the following character strings during translation: "{%tab%}", "{%lf%}", "{%crif%}"

During export, these character strings are inserted in texts containing tabulator and end-of-line characters. Do not change these character strings in the translation.

Example:

Source text: Hallo{%tab%}Welt!!!

Translation: Hello{%tab%}World!!!

While the translation file is imported to IndraWorks, the character strings are reconverted into the original characters.

Exporting translation file from OpenOffice.org Calc

After the translation, save the translation file. It is recommended to save the edited file under a different name via **File ► Save as**.

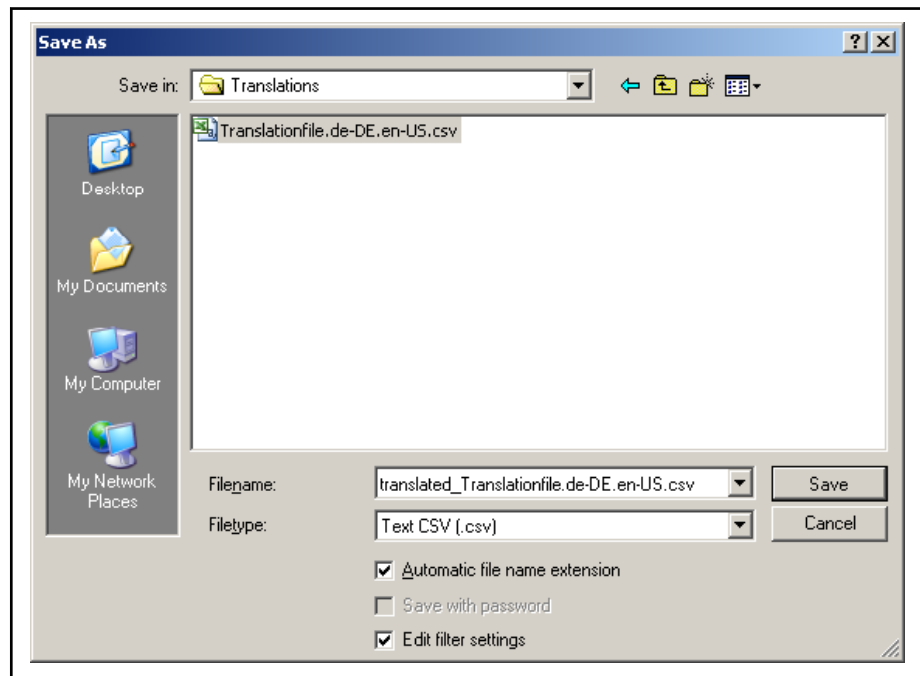


Fig. 3-119: OpenOffice.org Calc, "Save file as" dialog, "Export translation file"

File type

Select "Text CSV" from the "File type" field.

Editing filter settings

Use the "Edit filter settings" checkbox to select the filter settings before saving the file in the "Export of text files" dialog.

To open the "Export of text files" dialog, click on "Save".

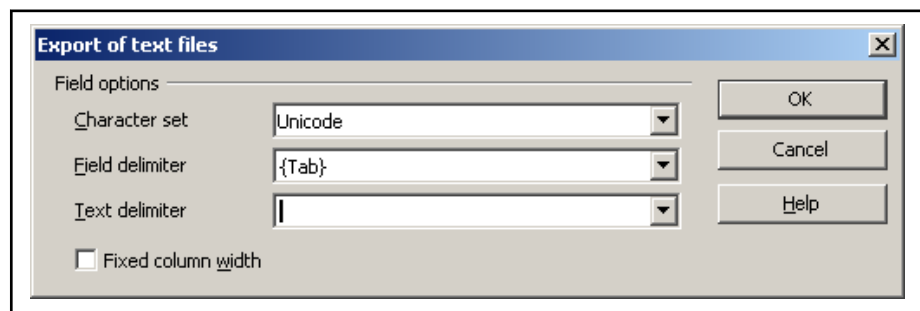


Fig. 3-120: OpenOffice.org Calc, "Text export" dialog

Character set Select "Unicode" from this list box.

Field separator Select "{Tab}" as "Field separator".

Text separator Delete the character in the "Text separator" field.

The export filter has to be set as described above, since otherwise, the translation file cannot be imported into IndraWorks.

Importing translation file in IndraWorks

To import the texts of a translation file to the current project, select **Project ► Language ► Import translation file**. From the file selection dialog, select the translation file to be imported.

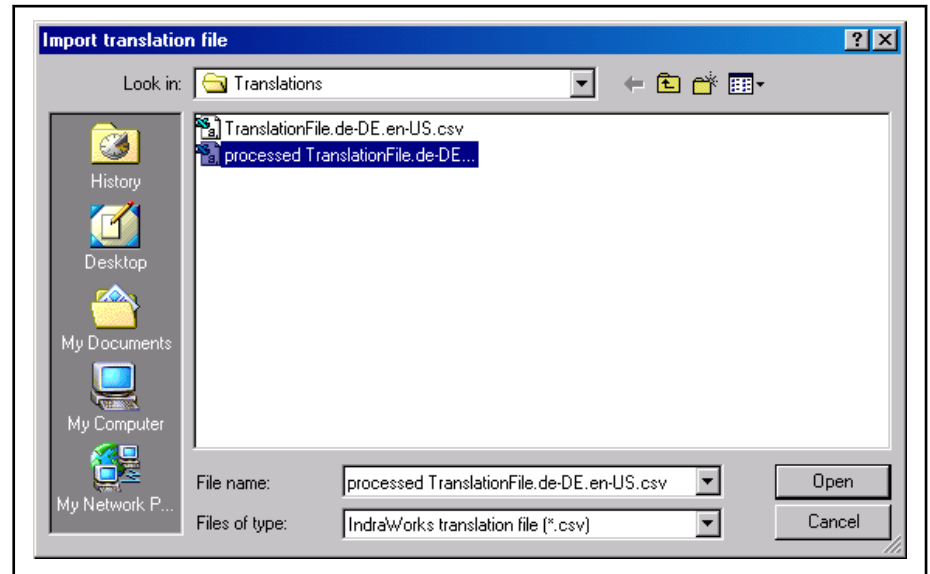


Fig. 3-121: "Import translation file" dialog; select file

The import options can now be set in the "Import translation file" dialog.

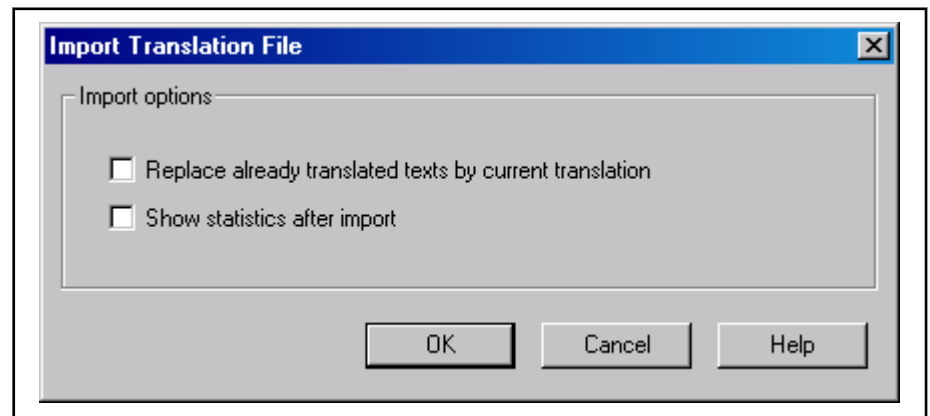


Fig. 3-122: "Import translation file" dialog

Replacing translated texts with current translation

Select this checkbox to replace existing translations with the current translations. This is for example reasonable if the translation file contains a complete set of texts which have been revised in their language and are now to be applied to the project.

If this option is not selected, already translated texts in the project are not changed. thus, the corresponding texts of the translation file are ignored.

Show statistics after import

Select this checkbox to view import statistics after the import.

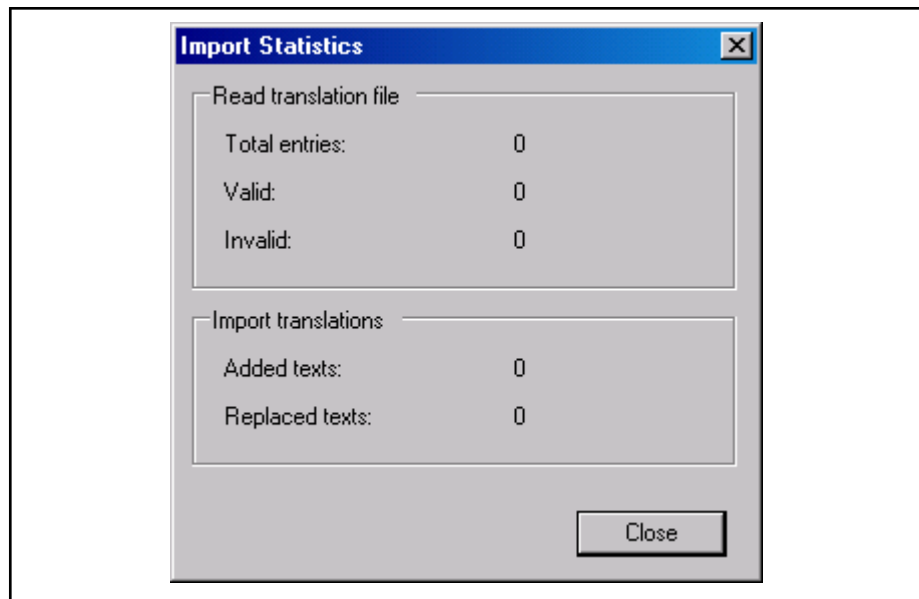


Fig. 3-123: "Import statistics" dialog

Total entries	Total number of lines read from the translation file.
Valid	Number of the lines in the translation files identified as valid.
Invalid	Number of the lines in the translation files identified as invalid. Such lines develop mainly if the export filter failed to be set properly while the translation file has been translated and saved in the external program.
Added texts	Number of new texts imported to the project.
Replaced texts	Number of the texts already translated in the project which have been overwritten by the imported more current text.

3.14 Version Control - Installing a Team Server

3.14.1 Introduction

Overview on topics

This chapter provides instructions on the installation and setup of team servers used with IndraWorks. A team server provides a central storage location for versioned IndraWorks projects and is thus the basic prerequisite to use the version control in IndraWorks.

First, a short overview is provided on the version control systems supported by IndraWorks. Subsequently, the possible installation variants with their specific advantages and disadvantages are shown. At the end, there is a detailed explanation on the execution of the different installation variants.

Supported Version Control systems

IndraWorks allows the following version control systems to be used on team servers:

- Microsoft® Visual SourceSafe 2005
- Apache Subversion® 1.6

3.14.2 Team Server with Microsoft® Visual SourceSafe

Installing Visual SourceSafe

Install Microsoft Visual SourceSafe 2005 on the team server

Note the documentation on Microsoft Visual SourceSafe 2005

Installing the ENI Server

Install the ENI server on the team server

Insert the IndraWorks installation CD and select the "Team server" setup option



When using a firewall, the port 1241 has to be enabled in the firewall.

Creating a Visual SourceSafe database

Visual SourceSafe Administrator

Creating database

First, create a database using the "Visual SourceSafe Administrator" tool.

1. Creating directory for the database

Create directory

2. Starting Visual SourceSafe administration

Start ► Programs ► Microsoft Visual SourceSafe ► Microsoft Visual SourceSafe administration

3. Starting database wizard

File ► New database...

4. Following the wizard

Select the directory created in step 1 as storage location.

Select the database model "Lock-Modify-Unlock".

5. Confirming safety prompt

When using the ENI server, it is not necessary to set up special access rights.

Creating user accounts

The following user accounts have to be defined in the newly created database:

- ENI user account

A separate account has to be created for the ENI server. This account is required to access the database. Create a user with the name "ENI" for example and any password. Remember user name and password. Both have to be entered later on into the "ENI Control" program when setting up the ENI server.

- User accounts for project editors

A separate user account has to be defined for each project editor to ensure that modifications in database objects can be uniquely assigned. Create one user account for each project editor.

Creating user account:

1. Starting Visual SourceSafe administration

Start ► Programs ► Microsoft Visual SourceSafe ► Microsoft Visual SourceSafe administration

2. Adding user

User ► Add user...

or press <Ctrl>+<A>.

3. Assigning user name and password

Select the **Read-only** checkbox only if the user should only have read access to IndraWorks projects. Subsequently, confirm with **OK**.



The user name as well as the password of the user account can only be changed by the administrator of the database.

Setting up the ENI Server

General Information

After the installation, the ENI server is started automatically and the tools described below are available in the task bar and the "Start" menu.

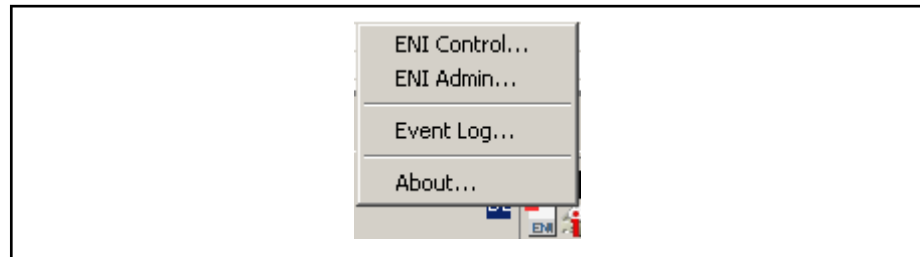


Fig. 3-124: Icon and context menu of the ENI server in the task bar

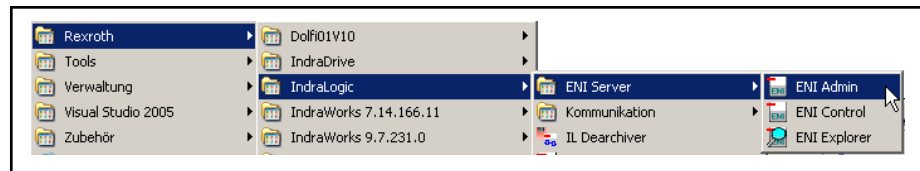


Fig. 3-125: ENI server in the "Start" menu

ENI Admin

This program does not require any settings to operate with IndraWorks.

ENI Control

Overview The "ENI Control" program allows stopping, configuring and restarting the ENI server.



"ENI Control" and "ENI Admin" cannot be active at the same time!

When "ENI Control" is started, a password dialog is displayed. This dialog can be used to specify a password to protect the ENI server against unauthorized configuration. If no password was or should be specified, exit the dialog with "Cancel". Subsequently, the "ENI Control" user interface opens:

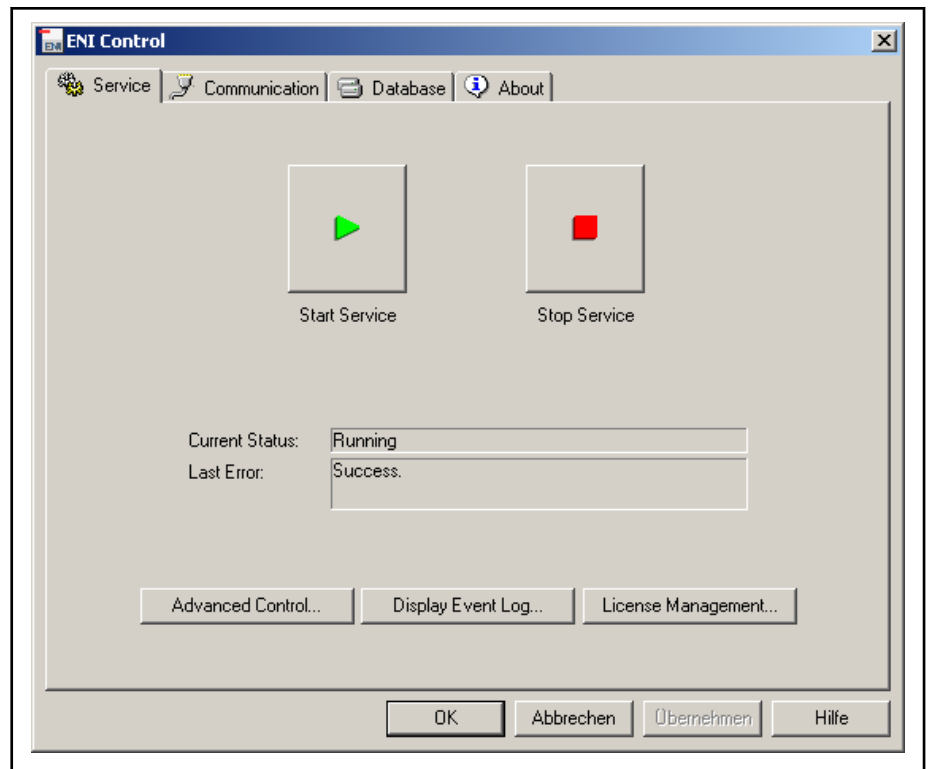


Fig. 3-126: Dialog ENI control (user interface)

"Service" tab: The "Service" tab displays the state of the "ENI Server" Windows system service. It can be started or stopped via the "Start Service" and "Stop Service" buttons.

"Communication" tab: *Make or check the following server settings:*

- Port: 1241 (IndraWorks default value)
- Communication timeout: 60 s (this setting is required to ensure that the transfer of bigger files is not canceled)
- Idle processing interval: 60 s (IndraWorks default value)

The client settings should not be modified.

"Database" tab: The ENI-VCS driver has to be selected and parameterized on the "Database" tab. Stop the service (see above) before changing the settings.

Select the "SourceSafe 6.0 and 2005" driver in the "Select Database Driver" field. If this driver is not available, add it. To do this, click on the "star" button to the right of the list box.

Select the `ENIDrvSourceSafe6.edd` driver file located in the installation directory of the ENI server: `ENI Server\Drivers`



If the ENI installation directory is unknown, use the ENI system service. Search for the "ENI Server" service under **Control Panel ► Administrative Tools ► Services**. For the storage location of the `ENI.exe` file, refer to the properties of this service. The `Drivers` directory is also stored there.

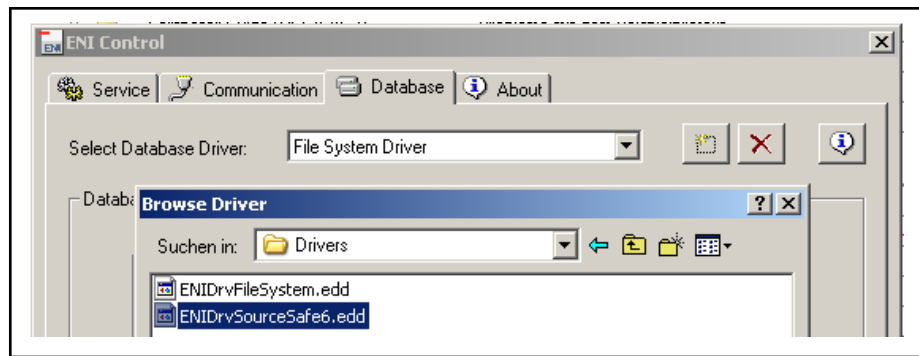


Fig. 3-127: Selecting the driver of the ENI server

Specify the following under "Database Configuration":

- Location of `srcsafe.ini`

Enter the path of the `srcsafe.ini` file of the created database. The following figure shows the default Windows Explorer which can be used to search for the directory.

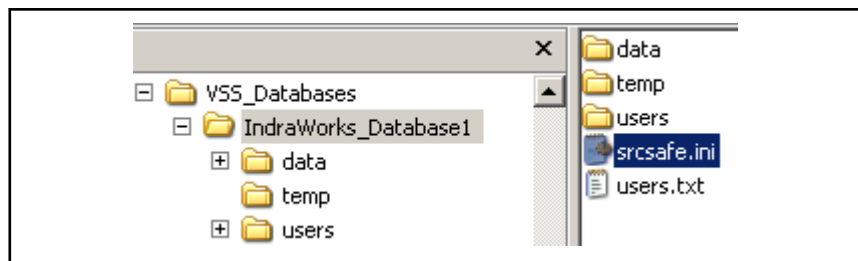


Fig. 3-128: "srcsafe.ini" storage location

- Root project

If the ENI server is not supposed to store its files and directories directly to the root directory of the database, specify an initial path (e.g. `$/IndraWorks`).

- Temporary folder

Directory in which the temporary database files are stored (e.g. `C:\Temp`).

- ENI user

Enter the ENI server user name created in the "Visual-SourceSafe Administrator" tool. See also chapter [Visual SourceSafe Administrator](#), page 131.

- ENI password

Enter the password of the ENI user account.

- "Structured saving of folders"

This setting is not important for IndraWorks.

Click on **Apply** to save the settings. Click on **Start Service** on the "Service" tab (see above) to start the server with the new settings. If all settings are correct, the "Current Status" field indicates the "Running" state.

3.14.3 Team Server with Apache™ Subversion®

Installation variants

The following three installation variants are common for a team server with Subversion. The installation variants differ for example in performance and data security of the team server and affect the team server access.

1. Subversion server

Subversion runs as service on the team server.

2. Apache server with Subversion module

The Apache server runs on the team server. Subversion runs as module in the Apache server.

3. Apache server with Subversion module and SSL

The Apache server runs on the team server. Subversion runs as module in the Apache server. The connection between engineering stations and the team server is secured using SSL.

The following table compares the installation variants in detail. Select the most suitable installation variant for your purposes.

Subversion installation variants

	Subversion server	Apache server + Subversion module	Apache server + Subversion module + SSL
Network protocol	svn://	http://	https://
Addressing	svn://<Computer-Name>/<Path to repository>	http://<Computer-Name>/svn/<Path to repository>	https://<Computer-Name>/svn/<Path to repository>
Installation	Quick and easy	More difficult than the Subversion server	More difficult than the Subversion server
Performance	Faster than http / https since state-oriented	Slower than svn since there is no state	Slower than svn since there is no state
Security	Passwords are stored as plain text on the server. That means that the server is to be secured accordingly. Repository content is transferred as plain text in the network.	Passwords are stored as hash value on the server. Network traffic is not coded.	Passwords are stored as hash value on the server. Network traffic is SSL-coded
Logging	No	Apache logging functions; very comprehensive	Apache logging functions; very comprehensive
Repository browsing with web browser	No	Yes	Yes
Server operation behind firewall	Required port sharing	Generally without problems since http protocol	Generally without problems since https protocol

Tab. 3-6: Subversion installation variants

Receiving the subversion binary package

Subversion is an open source version control system available as binary packages for the installation on different operating system platforms. The bi-

nary packages are not provided by the Apache Subversion project, but by several so-called "maintainers".

The following website provides an overview on the maintainers and available binary packages: <http://subversion.apache.org/>

Installing a Team Server with a subversion server

This installation instruction refers to the binary package of the "CollabNet" maintainer for the Microsoft® Windows operating system. Download this binary package from the following website: <http://www.collab.net/>.

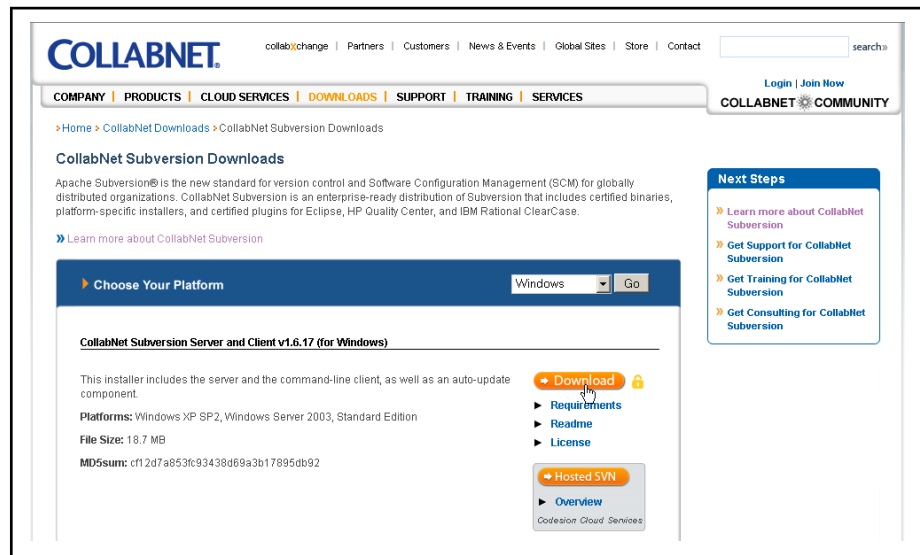


Fig. 3-129: Downloading the binary package Subversion 1.6 for Windows

Start the installation and the default settings can be applied. To modify the path of the default storage location `c:\svn_repository`, make changes in the installation under `Repository Path`.



Subversion is not yet active after installation. Subversion is automatically started at each system restart. The service can also be started manually via `net start CSVNsvnservice`.

When using a firewall, the port 3690 has to be enabled in the firewall.

For more information on Subversion such as the installation and administration, refer to the book under <http://svnbook.red-bean.com/> or to the "Readme" file of the installation described above.

Creating Subversion database

First, create a database using the `svnadmin` tool. It is assumed in the following examples that the storage location `<Repository_Path>` is `c:\svn_repository`.



`svnadmin` is part of a Subversion installation.

1. Call the Windows command line interpreter `cmd.exe`
2. Change to the storage directory of the database
`cd <Repository_Path>`
3. Creating database
`svnadmin create <Repository_Name>`

Below <Repository_Name>, different directories (conf, dav, db, hooks, locks) and files (format, README.txt) are created.

Example:

Creating database

```
cd c:\svn_repository
svnadmin create c:\svn_repository
```

Enabling the user management

The subversion user management is activated using the configuration file `svnserve.conf` contained in the storage location.

1. Change the directory in the subdirectory `conf`
2. Open the file `svnserve.conf` with an editor (notepad)
3. Remove the comment character '#' from the line `# password-db = passwd`
4. Remove the comment character '#' from the line `# anon-access = read` and change the `read` value to `none`
Only authenticated users can access.
5. Remove the comment character '#' from the line `# auth-access = write`
Authenticated users have read and write access.

6. Archive file and close the editor

User management

The actual user management is performed with entries in the `passwd` file. This file is located in the same directory as `svnserve.conf`.

1. Open the file `passwd` with an editor (notepad)
2. User and password are entered below `[users]` in the format `User = Password`.

Example:

User management

```
[users]
# harry = harryssecret
# sally = sallyssecret
user1 = xyz123
user2 = abc456
```

Installing a Team Server with Apache server and subversion module

This installation instruction refers to the binary package of the "CollabNet" maintainer for the Microsoft® Windows operating system. Download this binary package from the following website: <http://www.collab.net/>. The installation package from the preceding chapter can also be used, but configuration and user management have to be set "manually".

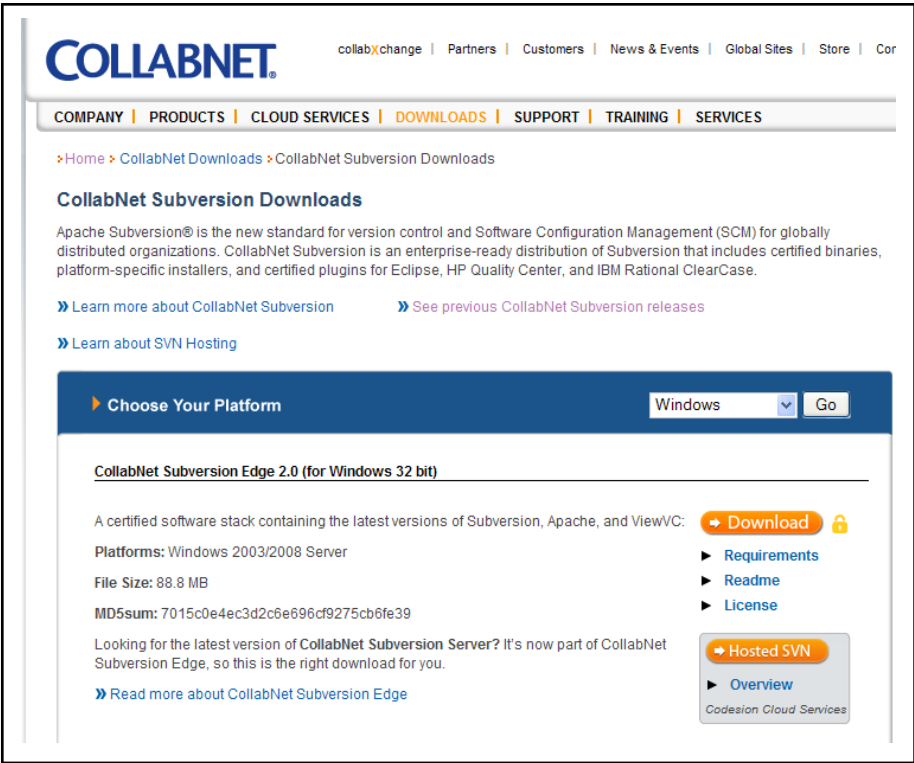


Fig. 3-130: Downloading binary package Edge for Windows



CollabNet Subversion Edge requires a Java Runtime installation.

Call the installation and specify its storage location. The actual administration is carried out via the address <http://localhost:3343/csvn/>. The administration tool of Edge is called.

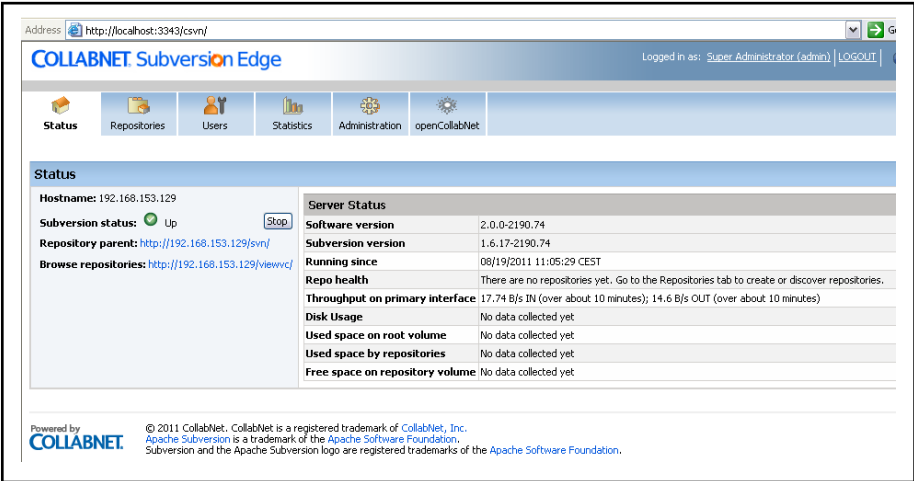


Fig. 3-131: Administration tool of Subversion Edge

Creating Subversion database

Select "Repositories" and create a storage location in the administration tool of Edge.

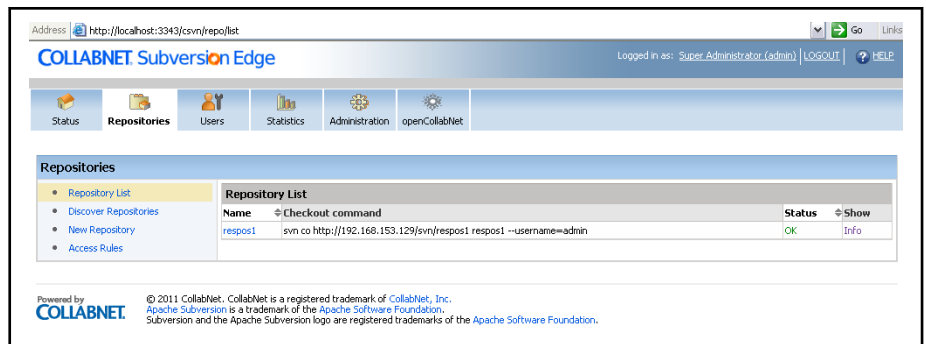


Fig. 3-132: Creating Subversion storage location

User management

The user management is carried out via "Users". New users are created or user rights are changed.

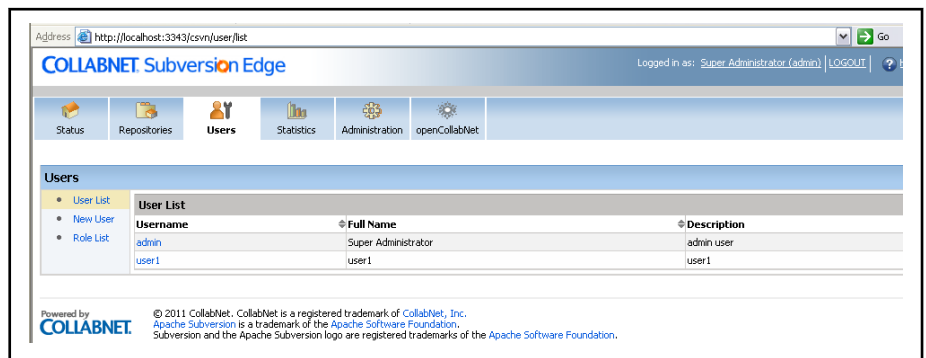


Fig. 3-133: User management

Installing a Team Server with Apache, subversion module and SSL

The communication can be secured via SSL for a secure data transmission. That means that the client call is carried out via "https" instead of "http". Go to "Administration" and enable "Subversion server should serve via https".

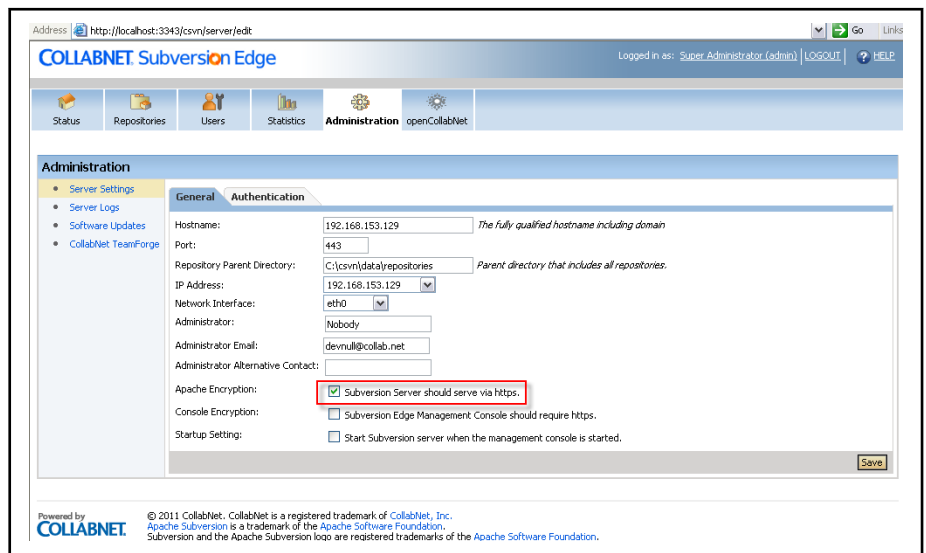


Fig. 3-134: Enabling https protocol

3.15 Version control

3.15.1 Introduction

IndraWorks Engineering allows working with version-controlled projects located on one team server. Multiple IndraWorks users can work simultaneously on such version-controlled projects.



The function "Version Control" is subject to license.

The function is supported by the following systems:

- **IndraLogic XLC/IndraMotion MLC**
- **IndraMotion MLD**

For more system-specific and component-specific information, refer to:

- **IndraLogic XLC/IndraMotion MLC: Version Control of XLC / MLC**
- **IndraMotion MTX: MTX Version Control**
- **FDT container: Version Control of the FDT Container**
- **HMI: Version Control for HMI**

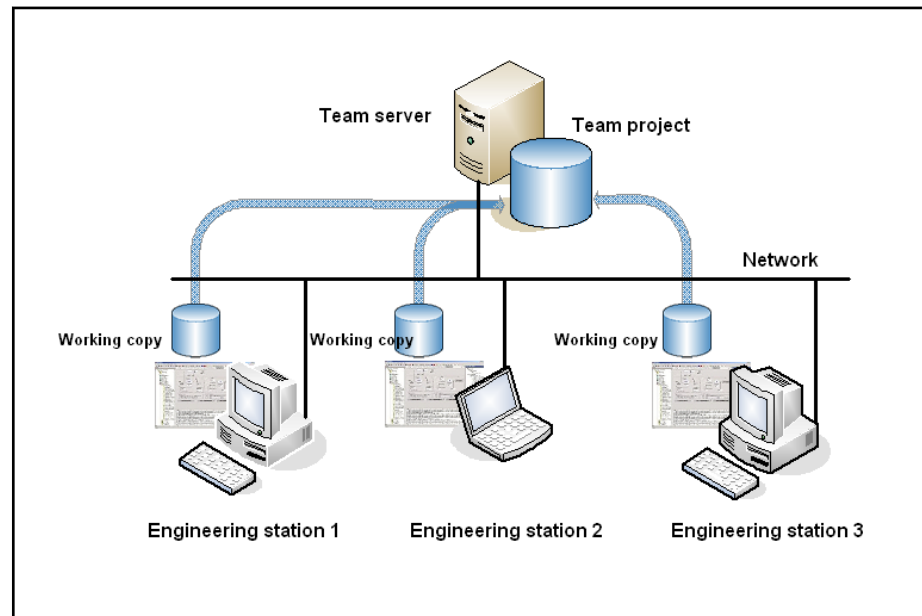


Fig. 3-135: IndraWorks users work parallelly at one team project on the team server

Among others, version control comprises the following functions:

- **Exclusive editing of project elements.** Only one user can edit an element. This requires that the user checks out the element and checks it in again after editing.
- **Recording the version history of each element.** The revision history of each versioned element is recorded and can therefore be followed.
- **Storing project parts in library projects.** This is an extended Version Control System. Library projects allow central storage of PLC project parts as versioned projects. Elements from library projects can be used in different team projects.

3.15.2 Definition of terms

Overview

The IndraWorks Version Control system uses specific terms indicated and defined below.

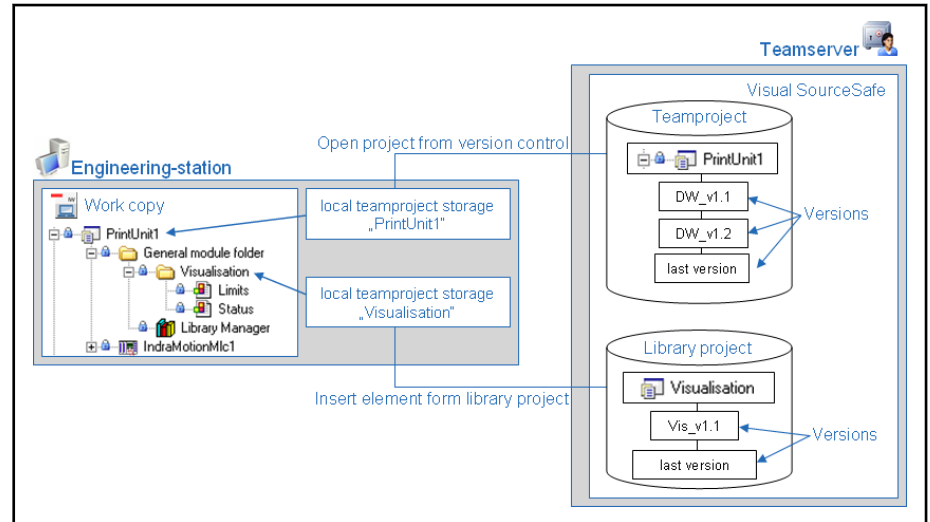


Fig. 3-136: Version Control overview

Definitions

Team server	The team server is the PC on which the version control system runs. The version control system consists of a version control database and a respective server service. On this team server, all versioned projects are saved, managed and provided to the users. Currently, IndraWorks supports the version control systems "Visual SourceSafe" and "Subversion".
Repository	Repository is a general term for a version control database especially used in the Subversion environment. A repository is a "storage location" for versioned data. It can be designed as "real" database or as directory structure.
Engineering station	An engineering station is a PC on which IndraWorks Engineering is used to work with versioned projects. This PC is seen as client from the team server view.
Versioned project	A versioned project is an IndraWorks project under version control. The database objects are stored on the team server. A project under version control can only be edited according to version control rules. Examples of versioned projects: Team project, library project.
Team project	A team project is an IndraWorks project under version control which is saved on the team server and on which multiple users can work at the same time. To edit a team project, users have to create working copies of it on their engineering stations.
Library project	A library project is a special IndraWorks project under version control which is virtually identical to a team project seen from a technical point of view. However, the special feature of such a library project is that it can be used to manage PLC elements which can be implemented in different team proj-

	ects. For more information, refer to the chapter 3.15.6 Library Projects, page 168.
Library element	A library element is an element of a library project. Library elements can be added to team projects.
Working copy	Every IndraWorks user working with a project under version control has to create a working copy of this versioned project on his/her engineering station. To create a working copy, execute the function Open project from Version Control, page 148. If a non-versioned project is added to version control, it automatically becomes a working copy afterwards. The version control synchronizes the editing of these working copies of multiple users with the team server.
Local team project folder	A local team project folder is a local data folder on an engineering station. Such a folder is automatically created for each working copy of a project under version control and each library project used in a team project. This local team project folder contains a subset of the database projects on the team server. This subset contains only those database projects required for the version currently edited on the engineering station. The local team project folder is intended for synchronization with the team server and allows the user to continue working with a working copy without connection to the team server. Team project folders are automatically created and managed. The user only has to specify a directory on the local hard disk where this data is stored. See also chapter 3.15.2 Definition of terms, 141 and chapter Options, page 143.
Version	A new version is assigned to each element of a project under version control as soon as one user transfers the changes made to the team server (check-in). Comments describing the modifications can be added to these versions. These modifications can also be displayed and compared in a history. The "latest version" is the latest version of an element or a project under version control. Modifications can only be made in this latest version. In addition, there are "labeled versions" which are defined for the complete project and store the complete version of a project at a certain time. Such a labeled version can be restored. A labeled version cannot be modified. For more detailed information on the version management, refer to the chapter 3.15.5 Managing versions, page 166.
Version Control	Synonyms are version management system, version control system or VCS. VCS stands for Version Control System. Version Control systems are used in software development to place source texts under version control and to coordinate access by multiple users. All modifications are recorded and all file versions are backed up with a time stamp and user identification in an archive. The Version Control system is a kind of version management. The comprehensive discipline is Software Configuration Management (SCM). It ensures that every user works with the current state or can access the archived states respectively. Thus, a Version Control system is not only interesting for engineering teams, but also for indi-

vidual engineers. It allows to create versions which can be restored at any time, e.g. if an older version needs to be accessed.

VSS VSS is the abbreviation for Microsoft Visual SourceSafe, the Microsoft version control system.



Under IndraWorks, Visual SourceSafe 2005 is approved as version control system.

SVN SVN is the abbreviation for subversion, a free version control system (open source).



IndraWorks supports Subversion Version 1.6.

3.15.3 Preparation

Accessing the team server

Users can only work with the team server if they have a user account. This user account is created by the administrator of the team server (for example the Visual SourceSafe database). IndraWorks requests the user name and password when the team server is accessed for the first time. This login remains until IndraWorks is closed.



To ensure that modifications to database objects can be uniquely allocated, a user account may not be used by multiple users.

To set up user accounts, refer to the chapter [Visual SourceSafe administrator](#), page 131.

Options

Version control can only be used after the following two settings have been made: Name or address of the team server in the network and directory of the local team project folder.

For the settings, go to **Tools ► Options ► General ► Version Control**.

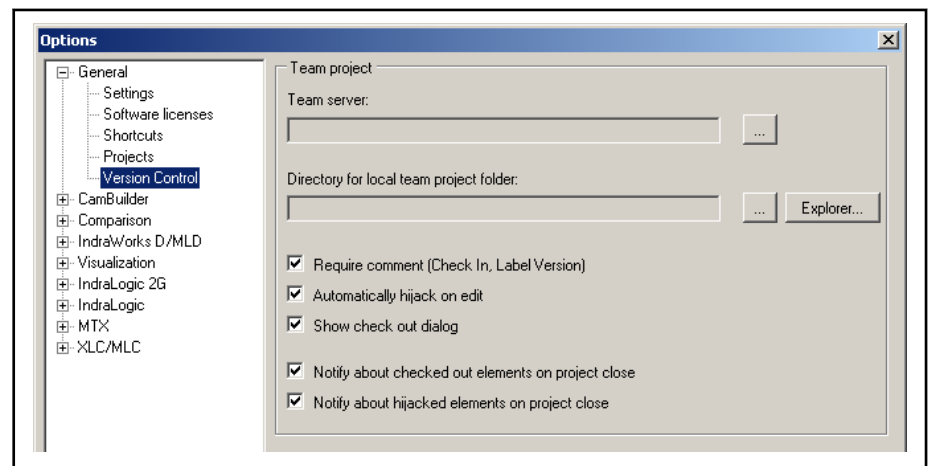


Fig. 3-137: Options (Version Control System in IndraWorks)

Team server	The team server used by default when versioning or calling projects is selected (name or address).
Directory for local team project folder	Specify the directory for the engineering station in which the local team project folders are stored and managed.

Require comment (check-in, label version)	If this checkbox is selected, a comment has to be specified upon each check-in and version labeling to execute the respective process.
Automatically hijack on edit	Select this checkbox if elements are to be hijacked automatically as soon as changes are made.
Show checkout dialog	When this checkbox is selected, the checkout dialog is displayed when checking out an element. This is reasonable if a comment should already be specified upon check-in.
Notify about checked out element on project close	If this option is selected, a message window is displayed when closing a versioned project notifying that the project contains checked-out elements. Closing can then be canceled and the changes are not applied to the version control.
Notify about hijacked elements on project close	This option is analog to the previous one; only that it is checked for hijacked elements.

Tab. 3-7: Explaining the options



For more detailed information on the local team project folders, refer to the chapter [3.15.2 Definition of terms, page 141](#).

Selecting and logging in to team server

Before creating new team projects on a team server or retrieving team projects from a team server, select a team sever and log in.

Enter a URL for the selected team server, as for a web browser, into the "Select team server" dialog. Another option is to select a URL from the selection list of the recently used URLs.

Click on the **Connection test...** button to check whether a connection can be established to the team server.

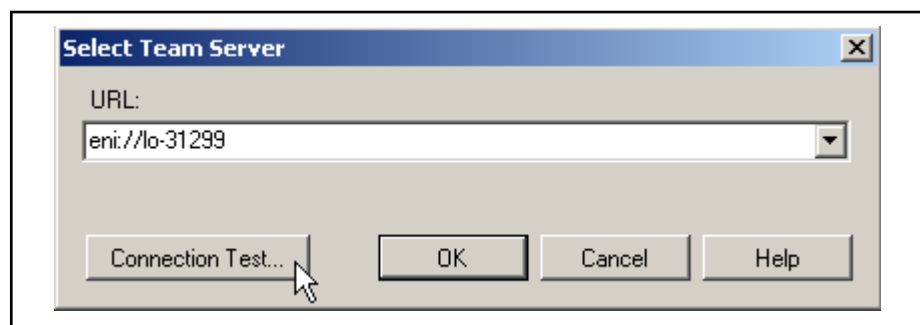


Fig. 3-138: Select team server

URL formats for the supported version control systems:

- **Team server with ENI and Microsoft SourceSafe**
eni://<Computername>
- **Team server with subversion and svn protocol**
svn://<Computername>[/<Repository path>]
- **Team server with Subversion and https protocol**
http://<Computername>/svn[/<Repository path>]
- **Team server with subversion and https protocol**
https://<Computername>/svn[/<Repository path>]



The structure of the URL depends on the installation and configuration of the team server.

In case of doubt, please contact the administrator of your team server.

Select the team server and a login dialog is displayed if you are not yet logged in to this team server.

Enter user name and password and confirm with **OK**.

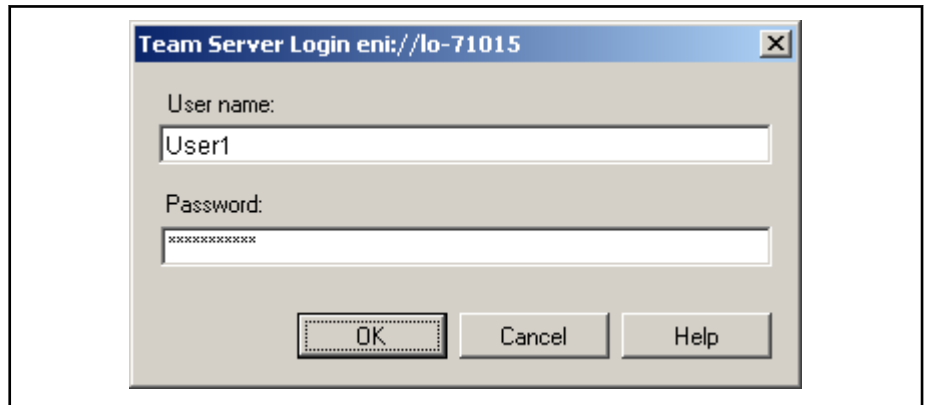


Fig. 3-139: Team server login

3.15.4 Functional scope

Properties of versioned projects

Element states

In addition to its normal icon, each element in an IndraWorks project under version control has a status icon for the version control. An exception are elements which are not under version control. The states and exceptions are described below:



Checked in: This element is under version control and the user has no write access on the team server. The element cannot be edited. To edit the element, check it out or hijack it.



This status icon symbolizes the states **"Disconnected"** and **"Checked out by"**:

Disconnected: The element is in a project under version control which has been disconnected from the version control system. Hijack the element to edit it in a disconnected state. This removes the project element from the version control and it can be edited locally.

Checked out by: The element has been checked out by another user on another engineering station.

Another possibility is that the project was opened multiple times from the version control. Thus, several local team project folders exist. The element was checked out in another local team project folder.



Checked out: The user obtained write access from the team server. The element can be edited and is protected against changes made by other users on other engineering stations.



Hijacked: The element is temporarily not version-controlled and may be edited locally on the engineering station. The el-

element can even be edited if the engineering station is not connected to the team server.

The "Hijacked" state can result from a failed working copy update: The element in the working copy does not correspond to the version-controlled state on the team server.

Note: "Hijacked" elements on the team server are not protected from changes by other users!



Added: The element has been recently added to the project but not yet added to the Version Control.

No icon: The element is not versioned. This is for example the case with elements whose data is automatically generated from other project elements.



The status icon of library elements is extended by a shortcut icon (see chapter [Visualizing library elements in the team project](#), page 173).



If another user checks an element out or in, its state in the project tree is not updated automatically. For more information, refer to chapter [Definition of terms](#), page 159.

State transitions

The figure below shows the possible states of the elements of a versioned IndraWorks project and the possible state transitions. The functions for the state transitions are described in the following chapters.

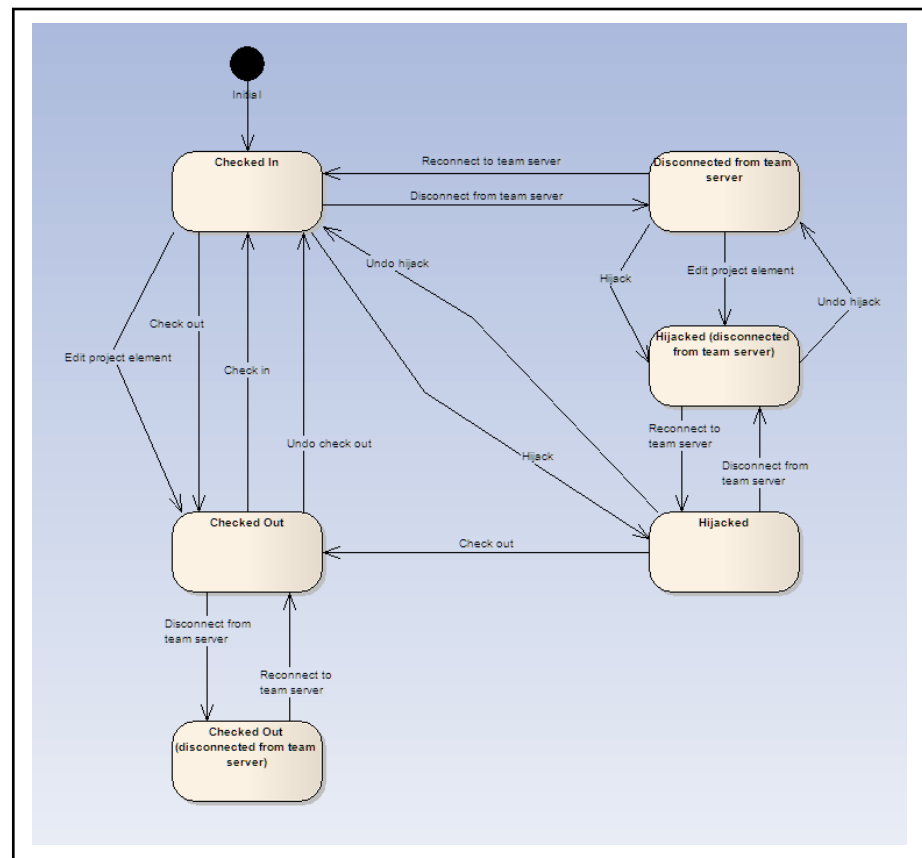


Fig. 3-140: Overview on states of a versioned project element

Project functions

Overview

Some of the version control functions refer to the entire IndraWorks project. Some of these functions can be opened in the IndraWorks file menu, others in the context menu of the project node. The context menu also contains the general functions of all project elements introduced in the next chapter.

Version control function in the "File" menu:

- **File ► Open ► Project from Version Control...**

Functions in the "Version Control" context menu of the project node:

- Create team project...
- Add project to Version Control...
- Label version...
- Change version...
- Manage library projects...
- Disconnect from team server...
- Remove team server connection...



The menu entries are provided according to the current Version Control status of the project.

Adding project to Version Control: "Create team project"

The "Create team project" function is only for projects not added to Version Control. To add a project to Version Control System, execute the following steps:

Precondition: The team server is set up. User accounts exist. Refer to [Chapter 3.14.3 Team server with Apache subversion, page 134](#) or [Chapter 3.14.2 Team server with Microsoft® Visual SourceSafe, page 130](#).

1. In the Project Explorer, click on the project node and select in the context menu **Version Control ► Create Team Project...**
2. Select the team server on which the project is to be versioned.
3. Log in to the team server. If you are already logged in to this team server since IndraWorks has been started, this step is omitted.
4. Select a storage location for the team project on the team server.

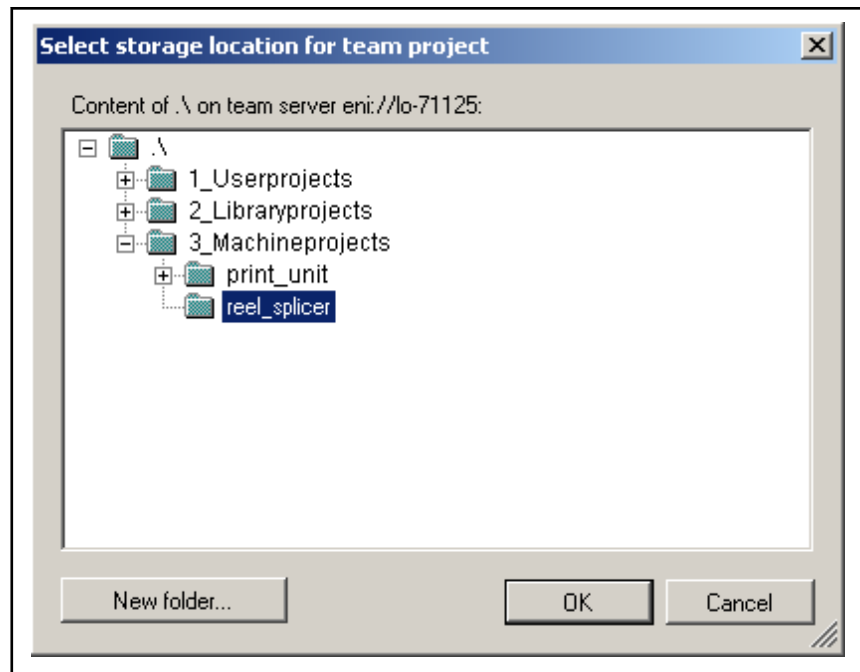


Fig. 3-141: Select storage location for team project (on the team server)

Create new folders and delete existing ones (delete via context menu). Continue with **OK**.



Use directories to structure the storage on the team server. This facilitates navigation and increases clarity. Do not create too many directories or team projects on one directory level.



After having been deleted via the context menu, the folders are no longer visible although they still exist in the database. The folders can only be permanently removed by a database administrator (see <http://msdn.microsoft.com/de-de/library/h2bd48cc%28VS.80%29.aspx>).

In addition, only the database administrator is authorized to rename folders.

After having been added to Version Control, the project can be edited considering the Version Control functions.

Open project from Version Control System

Any user opening a project from Version Control also creates an individual working copy at the same time.

Proceed as follows:

1. Start the **File ► Open ► Project from Version Control System...** function
2. Select the team server.
3. Log in to the team server
4. Select a team project on the team server

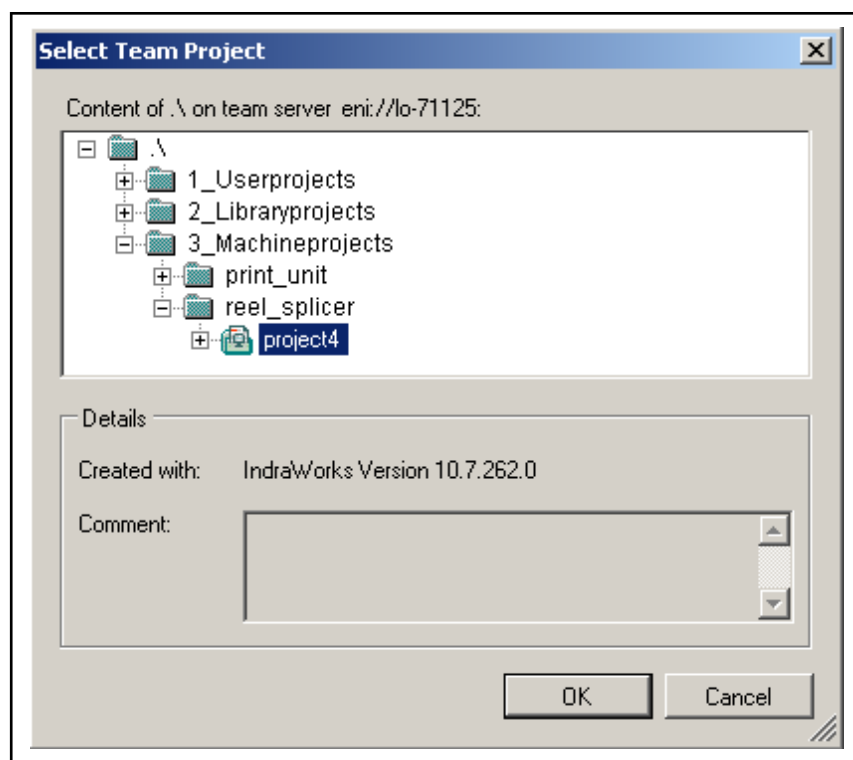


Fig. 3-142: Select team project (on the team server)

When navigating through the folder structure of the team server, there are two icons which allow distinguishing between IndraWorks projects and mere organizational folders. If an IndraWorks project is selected, the "Details" section displays more detailed information on the project.

After the selection has been confirmed with **OK**, the "Select Team Project Version" dialog is displayed:

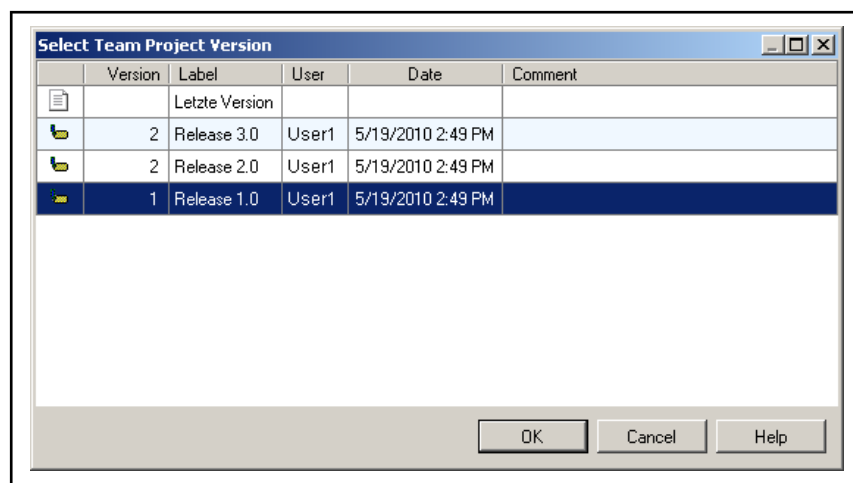


Fig. 3-143: Selecting the team project version

Select the project version to be retrieved here. The differences between two versions of the project can be displayed via the context menu.

After the version has been selected with **OK**, the corresponding team project folder is automatically created.

5. Then, enter a storage location in which the working copy of the team project is stored. Optionally, the suggested compatibility mode can be changed.

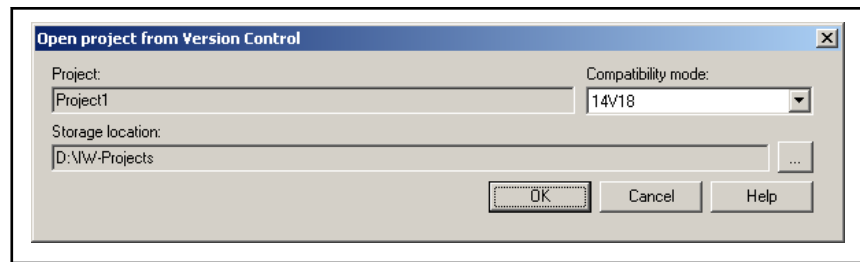


Fig. 3-144: Dialog to create the working copy of a team project

After the working copy has been created, the project can be edited considering the Version Control functions.



Only the user who created the working copy is allowed to make changes to the project by checking it in and out.

Adding project again under Version Control

This function can be used to create a new versioned project on the team server based on an existing versioned project. The new versioned project gets its own version history and can be further developed independently of the original versioned project.



After this function has been executed, you are still in the working copy belonging to the original team project. To work at the new team project, open it from Version Control first.

Labeling the version

Labeling a version identifies the latest checked-in state of all elements of the team project with a unique name. Label any version that might be accessed later on.

To label a version, click on the project node in the Project Explorer and select **Version Control ► Label version...** from the context menu. Enter a label and a comment on a version in the dialog and click on **OK**.

To avoid typing for frequently used comments, the dialog provides a comment history: Pressing the button above the comment field opens a context menu listing the respective first line of the latest comment used (latest entry on top). If the mouse pointer is moved over the entries, the complete comment is displayed as tooltip.

When an entry is selected, the comment is applied to the input field and can be modified there if required.

The comment is saved in the comment history if the dialog is exited with **OK**.

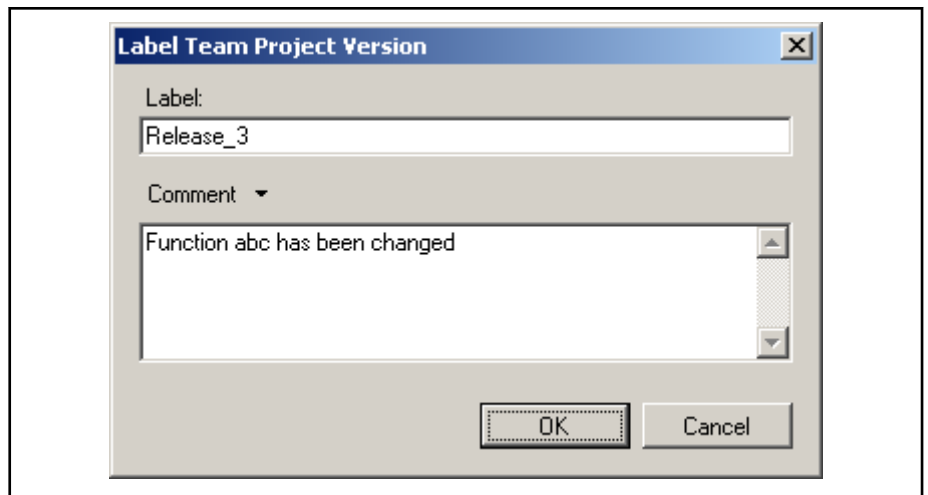


Fig. 3-145: Label team project version

For more detailed information on the version management, refer to the chapter [3.15.5 Managing versions](#), page 166.



Note that the label always relates to the latest, checked-in version of the team project. If you or another user has checked out or hijacked project elements, it is not the current working version that is labeled but the current version of these elements on the team server.

Furthermore, a version can only be labeled if used library projects are also implemented in a labeled version. For more detailed information, refer to the chapter [Adjusting Versions and Storage Locations of Library Projects](#), page 174.

Changing the version

Changing a version of the project updates the working copy up to a specific version of the team project. It can be selected between the latest version (newest) and the labeled (or older) versions.

Highlight two versions and click on "Compare selected versions" context menu to display the differences between two versions (see [chapter 3.10 "Comparing project data" on page 99](#)).

To change the version of a project, click on the project node in the Project Explorer and select **Version Control ► Change version...** from the context menu. Select the version to be retrieved and confirm with **OK**.

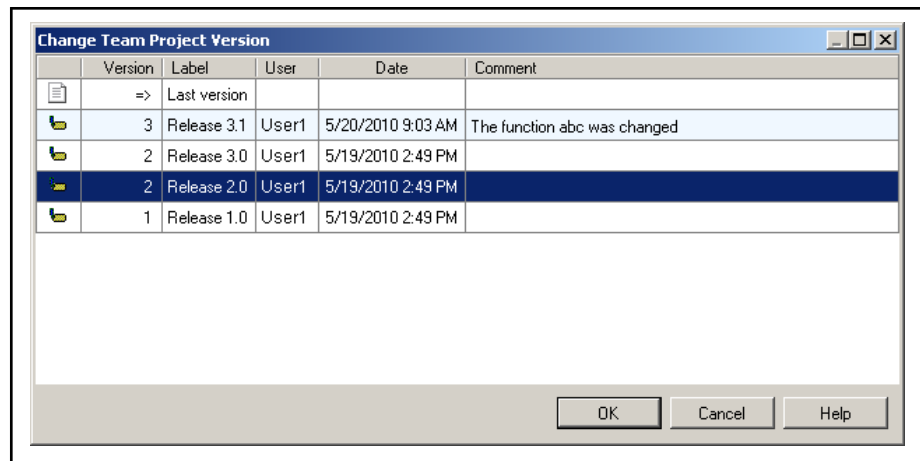


Fig. 3-146: Change team project version



Note that once a version of a project has been labeled, it cannot be edited any longer. To change a team project, retrieve the latest version.

For more detailed information, refer to the chapter [3.15.5 Managing Versions](#), page 166.

Managing library projects

This function allows to add library projects elements to be inserted into the current team project. It also allows to change the library project versions used. For more information, refer to the chapter [3.15.6 Library Projects](#), page 168.

Disconnecting from team server

If the team server is not available, the "disconnected" state is automatically assigned to the local working copy.

The connection can be manually disconnected via **Version Control ► Disconnect from Team Server...**

"Disconnected" state only allows local working. Elements checked out prior to the disconnection can be edited directly. Otherwise, the "hijacking" function can be used.



Use this function to work independently of the team server if there is no connection to the network or to log out the user.

Reconnecting to team server

To reconnect to the team server, click on the project node in the Project Explorer and select **Version Control ► Restore connection to team server...** in the context menu.

The "Select team server" dialog is displayed. The input field "URL" of the dialog is already pre-assigned with the URL of the team server by default.

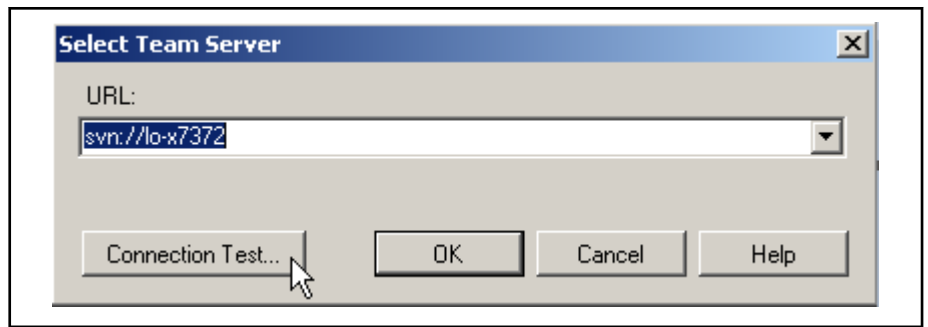


Fig. 3-147: Select team server

To restore the connection to the team server, do not change the URL and confirm with **OK**. The connection to the team server is restored. Log in again with user name and password.

If reconnection to the team server fails, an error message is displayed.



To change the user, use the "Disconnect from team server" and "Reconnect to team server" functions

Connecting to a different team server

It might be required to connect an existing working copy with a different team server. This is for example the case if the team server is exchanged and the Version Control database "moves" to a different team server. The complete Version Control database is usually transferred to the new team server. Thus, only the URL of the team server changes from the view of the Engineering PC.



When connecting a working copy to a different team server, an exact copy of the Version Control database of the original team server has to be available.

To connect a working copy to another team server, select the context menu items of the project node **Version Control ► Disconnect from team server** and then **Version Control ► Reconnect to team server**.

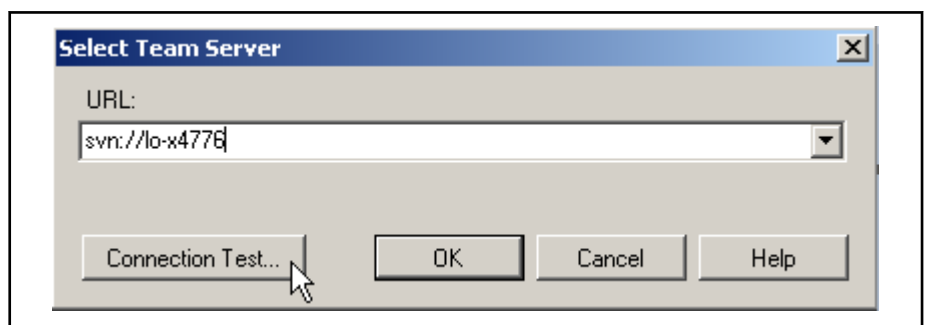


Fig. 3-148: Select team server

In the "Select team server" dialog, the "URL" input field is pre-assigned with the URL of the previous team server. Change the entry and enter the URL of the team server used to connect the new working copy to. Perform a connection test and confirm the dialog with **OK**.

The Version Control checks whether the team project and all library projects used by the team project are available on the specified team server. If this is not the case, an error message is output.

After a successful check, the Version Control connects the working copy to the newly specified team sever. New local team project storages and the library projects are created and synchronized with the team server version. The working copy is also updated. This process can take several minutes depending on the project size. The project elements checked out or hijacked in the working copy remain unchanged.



To move the Version Control database to a different team server, proceed as follows:

1. Ensure that no project elements in the working copies on the Engineering PCs are checked out or hijacked
2. Disconnect from the team server on all Engineering PCs
3. Transfer the version control database to the new team server
4. Reconnect to the team server on all Engineering PCs and enter the URL of the new team server

Deleting connection to team server

To convert a working copy to a completely local IndraWorks project which is disconnected from the team server, remove the connection via **Version Control ► Remove team server connection...**



Deleting the connection to the team server cannot be undone!

- Elements checked out prior to deletion continue to be disabled for other users. Only the Version Control database administrator is allowed to undo this state!
- If the connection is removed, information on the origin of implemented elements from library projects is lost!

Project element functions

Overview

A versioned project has a number of functions which allow working with individual project elements. Therefore, the context menu of the respective element has to be opened.

Version Control functions of project elements

- Show changes...
- Check out...
- Undo checkout
- Check in...
- Hijack
- Undo hijacking
- Scan for changed elements...
(only the context menu of the project node)
- Refreshing status display
- Display versioned elements...
- Refresh working copy...
- Show version history...
- Properties...

- Delete
- Insert element from library project...

Most of the Version Control functions are also available in the "Versioned elements" dialog.



The menu entries are provided according to the current Version Control state of the element.

Additionally, most of the Version Control functions are also available in the toolbar. The icons of the selected element are enabled or disabled in the Project Explorer according to the Version Control state.



Fig. 3-149: Toolbar of the Version Control System



To show or hide the toolbar of the Version Control, select **View ► Toolbars ► Version Control** in the menu.

Show changes

This function is available for checked-out and hijacked elements and opens the comparison display for the currently selected element. It can display all changes made since last element check-out or element hijacking.

Check out

To edit a project element exclusively, it has to be checked out. Checked-out elements are protected from changes by other users.

To check out project elements, proceed as follows:

- Context menu **Check out...** of the respective elements in the Project Explorer
- Context menu **Check out...** of the respective elements in the "Versioned Elements" dialog (see chapter [Displaying Versioned Elements](#), page 159).
- Activate automatic check-out to edit an element

When checking out via the context menu, the system first checks whether there are new versions of the elements to be checked out in the team project.

Unless new versions are found, the same "Check out" dialog is displayed. This dialog allows entering a comment to the planned changes. Click on **OK** to check out the project element.

If the option "Show checkout dialog" is not selected in the version control settings, the display of the dialog is not shown and a comment can only be entered upon check-in.

To avoid typing for frequently used comments, the dialog provides a comment history: Pressing the button above the comment field opens a context menu listing the respective first line of the latest comment used (latest entry on top) If the mouse pointer is moved over the entries, the complete comment is displayed as tooltip.

When an entry is selected, the comment is applied to the input field and can be modified there if required.

The comment is saved in the comment history if the dialog is exited with **OK**.

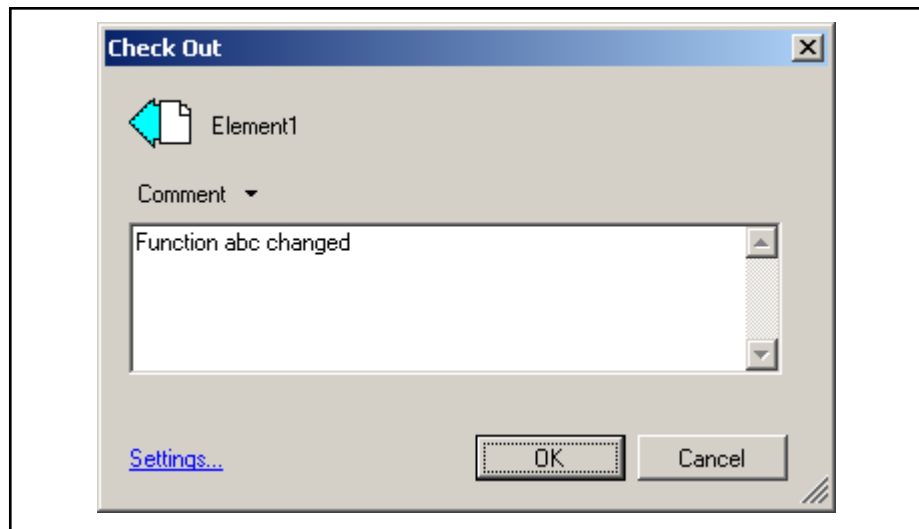


Fig. 3-150: Check out (project element)

If an element is edited without being checked out before, the element is checked out automatically.

If there are new releases in the team project for elements to be checked out, a dialog opens. This dialog lists these elements. The dialog allows to specifically exclude elements from the update by hijacking (for details see [Updating working copies, page 161](#)).

In addition, use the context menu to open the version history of the element. It can then be compared with other versions or the current project version as described in [chapter "Showing the version history" on page 163](#). Additionally, your local changes can also be merged with the changes made in the team project. For more details, refer to [chapter 3.10.4 "Merging" on page 108](#).



When checking out, updating elements is normally allowed. Thus, changes made in the meantime and checked in by other users can be seen. This ensures that you do not work with outdated versions and thus prevents unintentional overwriting of changes made by other users in the team project.



The "Check out" function can only be used if the versioned project is available in its "latest version", since labeled versions cannot be changed any longer (see also [chapter 3.15.5 Managing versions, page 166](#)). Additionally, the "read-only" attribute can impede library elements from being checked out (see [chapter 3.15.6 Library projects, page 168](#)).



Note that adding and deleting sub-elements of a project element also constitutes an editing process which requires that the project element on the level above has been checked out. Adding and deleting sub-elements is only visible on other engineering stations if the project element on the level above has been checked in again.

Undo checkout

You might have modified a checked out project element and would like to undo these changes. Therefore, select **Undo checkout...** in the context menu of one or several elements. In the following dialog, click **OK**.

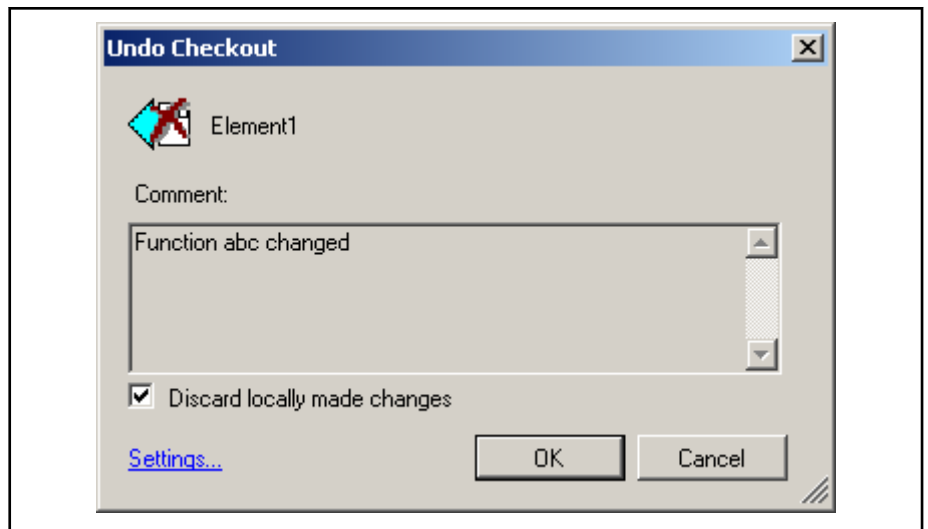


Fig. 3-151: Undo checkout

The element has now the version it had before it was checked out.



Deselect the checkbox **Discard locally made changes** to keep your changes. The element then goes into the "Hijacked" state.

Check in

This function is displayed for an element added newly to the working copy as well as for a checked-out element. An element added or imported is **not** automatically checked in. This can only be done with the **Check in** function.

The changes from the working copy can only be applied to the team project if the changed elements are checked in. Check-in comments can be made. Therefore, in the context menu select **Check in...** of one or several elements. In the following dialog, click **OK**.

To avoid typing effort, a comment history is available in this dialog (also refer to [chapter "Check out" on page 155](#)).

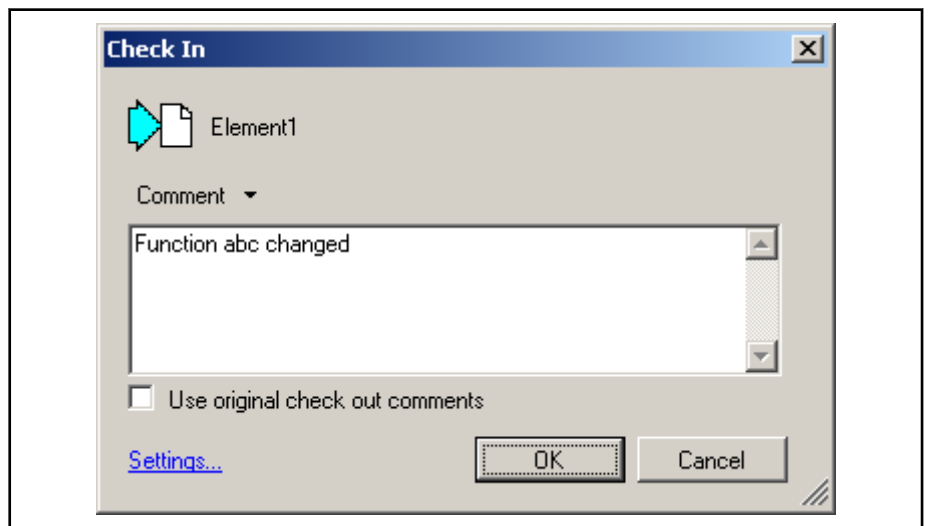


Fig. 3-152: Check in (project element)



When checking in multiple elements at the same time, the original check-out comments are applied as check-in comments by default (checkbox selected). To enter a check-in comment which applies to all elements to be checked in, deselect the checkbox. If the option "Require comment (check-in, label version)" is selected in the settings of the version control, no selection box is displayed and a common comment has to be specified for all elements to be checked in.

When an element is checked in, the current local editing version of that element is applied to the Version Control system. A new version of the project element is generated and can be retrieved by other users.



When elements are checked in, all non-versioned sub-elements are automatically added to the team project.

Compatibility

During the further development of IndraWorks, it might become necessary to change internal data structures of project elements or to add new properties. The consequence is that these project elements can no longer be retrieved and edited from the Version Control with older IndraWorks versions as soon as they have been edited or checked in with a later IndraWorks version. Thus, compatibility to older IndraWorks versions is thus limited for these project elements.

To ensure that the compatibility of elements of a team project to older IndraWorks versions is not limited without intention, IndraWorks checks before each check in whether the current version of the element to be checked in is compatible with the version the element had when it was checked out.

As soon as IndraWorks identifies a potential limitation of compatibility, a corresponding message is output. Then decide whether the check in is to be continued with compatibility limitation or canceled.

To avoid multiple asking at further check-ins, select the checkbox in the message window.

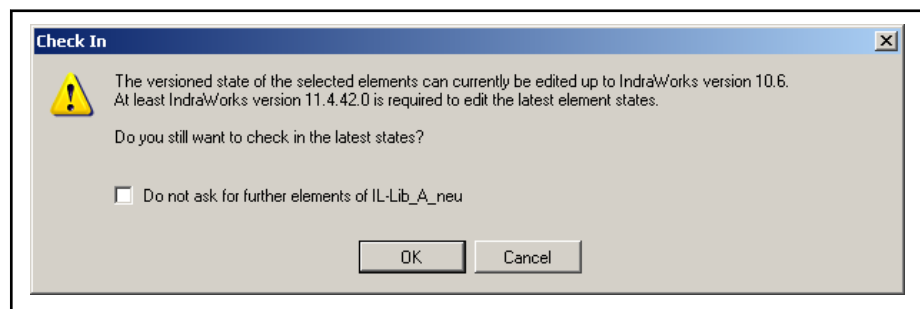


Fig. 3-153: Warning message if the compatibility with older IndraWorks versions is limited at check-in

Hijacking

IndraWorks Engineering provides the possibility of temporary exclusion of project elements from Version Control. The project elements remain checked-in in the team project but can nevertheless be locally edited on the engineering station. This also works if there is no connection to the team server, for example when working on the project on site at a machine or if the team server is not reachable in the network. This functionality is called "hijacking" and can be accessed via the **Hijack** context menu.

Practical applications for hijacking:

- Working on a project on site with a customer but there is no connection to the team server. Using hijacking, the can be edited project locally. Afterwards, when back in office, apply the modifications made to the team project.
- Trying changes in the project without having to check out the respective project elements. Make changes and tests in the project using hijacking. Afterwards, either undo the changes and return to the initial version or apply the modified version to the team project.
- Making changes while another user is working on an element and it is thus disabled it (checked out).



If in "hijacked" state, a project element is not protected from changes by other users. That means that, while working locally on a project element, other users can modify or even delete this project element in the team project.

Undo hijacking

To discard local changes in a project element, select the function **Undo hijacking** in the context menu of one or several elements. The changes are undone and the version prior to hijacking is restored.

Applying the hijacked version

To apply a local version to the team project (by hijacking), perform the following two steps:

1. Check out changed element (context menu **Check out**) to obtain write access from the team server (see [Checking Out, page 155](#))
2. Check in checked-out element (context menu **Check in**) to send the version to the team server (see [Check in, page 157](#))

Scan for changed elements

This function is only available at the project node and opens a dialog listing all currently checked-out, hijacked and newly added project elements. The changes can then be displayed, versioned or undone via context menu.

Refreshing the status display

When working on project elements (check out, check in), their status display in the Project Explorer is automatically updated. However, if another user checks out an element, their states in your working copy are not automatically refreshed. A change in state becomes only obvious after e.g. trying to check out this element and it is not possible.

To force refreshing of the status display for all project elements, click on any node in the Project Explorer and select from the context menu **Version Control ► Refresh status display**. This refreshes the status of the element and all its sub-elements.

Displaying versioned elements

To find out which elements have been checked out, hijacked, added or disabled by other users while working with a versioned version or thereafter, use the "Versioned elements" dialog (context menu **Version Control ► Display versioned elements...**).

Dialog function description:

Name	The name of the respective element. Click on the column header to sort the list.

Status	Current element status. Click on the column header to sort the list.
Project	Name of the team or library project to which the element belongs. Click on the column header to sort the list.
Label	Information on the labeled version (or "latest version") in which the element is available. All elements of a project are available in the same version. Click on the column header to sort the list.
Last change	Date and time for the last element change in the team project.
Users	User name of the user who last changed the element in the team project.
Storage location on server	Precise path on the team server where the element is filed. Click on the column header to sort the list.
Update 1	The list is created again using the Project Explorer. Changes in status caused by actions made directly in the Project Explorer are not automatically updated in this dialog.
Update 2	The current status of all elements in the list is retrieved from the team server.
Filters	The filter is applied by activating the "Filter" checkbox. Click on the Filter... button to open the dialog to configure the filter. Elements can be hidden in this dialog.

Reduce the list of versioned elements by deactivating specific criteria. For example, all checked-in elements can be hidden and to see only the edited ones. All elements of a specific library project can also be hidden.

Filter Criteria

Status	Facilitates filtering of elements according to status, e.g. show only checked out elements.
Project	Facilitates filtering of elements according to project or library project affiliation.
Last change	Facilitates filtering of elements regarding the last change in the team project (last change before/after a certain date).
Users	Facilitates filtering of elements regarding the user who last made changes in the team project.
Storage location on server	Facilitates filtering of elements regarding the storage location on the team server.

Use the dialog "Versioned elements" to simultaneously edit multiple elements via the context menu if required. Select the corresponding elements and select the function in the context menu.

To select multiple elements, perform one of the following actions:

- Select all elements: <Ctrl>+<A>.
- Selecting the range: Highlight the first element with the mouse, press and hold the <Shift> key and highlight the last element.
- Selecting individual elements: Press and hold the <Ctrl> key and highlight the elements to be selected one after the other.

The context menu also provides the function **Select in project**. Thus, it can be found out to which element in the Project Explorer the list element corresponds.

Updating the working copy

By updating the working copy, a project element, including its sub-elements, is updated to the latest version available in the team project. Thus, apply changes to your working copy made to the team project by other users.

In the Project Explorer, click on the project element and select in the context menu **Version Control ► Update working copy**.

This function checks whether the team project contains new versions for the selected project element and all its sub-elements.

Unless new versions are found, a message is displayed informing that your working copy is up-to-date.

Otherwise, a dialog shows the elements for which there are new versions in the team project.

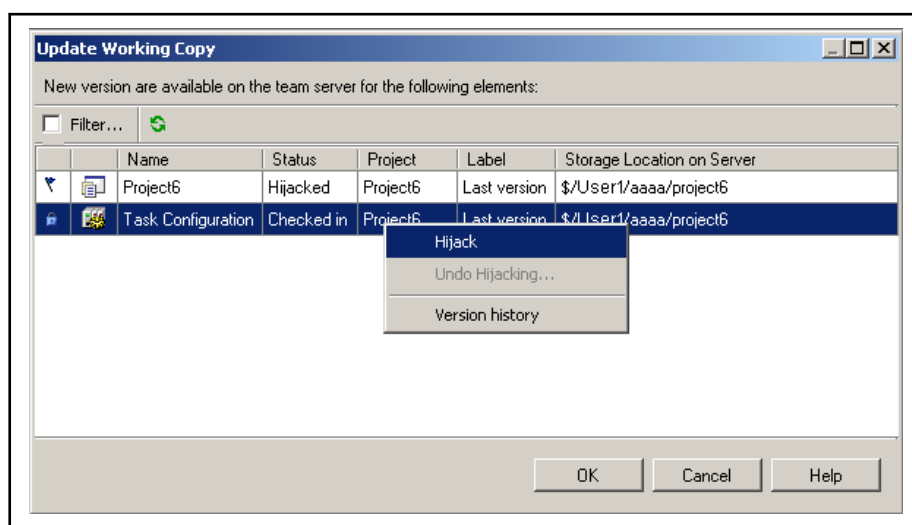


Fig. 3-154: Refreshing the working copy

This dialog has the same filter and sorting options as described in the chapter [Displaying versioned elements](#), page 159.

To exclude elements from updating, hijack them. The context menu provides the "Hijack" and "Undo hijacking" functions.

In addition, use the context menu to open the version history of the element. It can then be compared with other versions or the current project version as described in chapter [chapter "Showing the version history" on page 163](#). Additionally, your local changes can also be merged with the changes made in the team project. For more details, refer to [chapter 3.10.4 "Merging" on page 108](#).

Start the update operation with **OK**.

If the list of elements to be updated contains checked-out or hijacked elements, a warning is displayed that these elements are not updated.

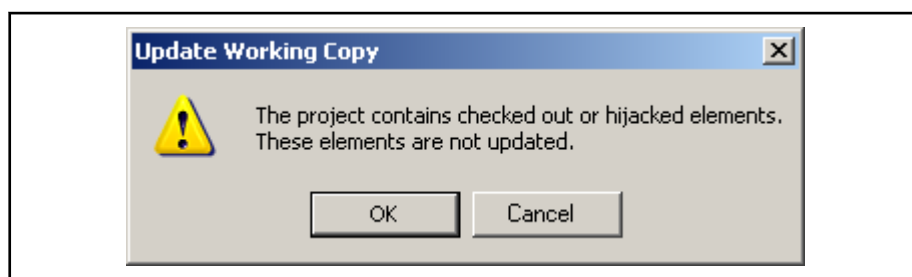


Fig. 3-155: Warning for checked-out or hijacked elements

Confirm the warning with **OK** to apply the latest versions of all checked-in elements from the team server to your working copy.



Checked-out or hijacked elements are **not** updated. This prevents local changes from being overwritten.



If an element cannot be updated to the current version, it is hijacked automatically. This is also applicable if sub-elements cannot be inserted or deleted. In both of these cases, the version in the working copy is different from the current version in the team project.

Thus, eliminate the error cause and initiate an update of the element with "Undo hijacking". The element can only be updated if your computer is connected to the team server.

Apply also your current working copy to the team project via the check out and check in functions.



The "Update working copy" function does not apply to the working copy of a labeled version, since labeled versions cannot be changed.

Forcing complete working copy update

The working copy is usually updated with regard to the scope of project elements to be updated. Before updating, determine for which project elements of the working copy are later versions available on the team server. These project elements are then updated in the working copy with the team server data.

New versions on the team server might not correctly be identified when updating the working copy. This is especially the case if the working copy was not closed properly.

- The Engineering PC is switched off while the working copy is still open in IndraWorks
- IndraWorks is closed by the Windows Task Manager while the working copy is still open

These cases can be resolved with a complete working copy update. The data of all project elements is retrieved from the team server and applied to the working copy. Only checked out and hijacked project elements remain unchanged.

While opening a working copy, the Version Control checks whether the working copy was properly closed in the last session. If this is not the case, a warning is displayed requesting to update the working copy.

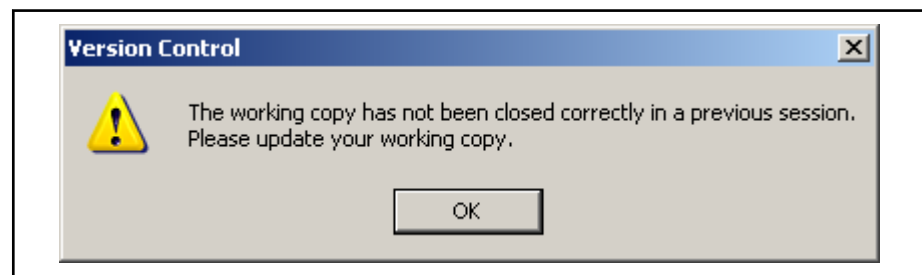


Fig. 3-156: Warning is displayed if the working copy was not properly closed.

Click on the project node in the Project Explorer and select the context menu item **Update working copy** or click on the corresponding button in the toolbar. The working copy is now completely updated.

The working copy can be updated completely at any time if **Update working copy** is selected for the project node. In contrast to other project elements, a dialog is displayed at the project node while updating. In this dialog, a complete update can be selected.

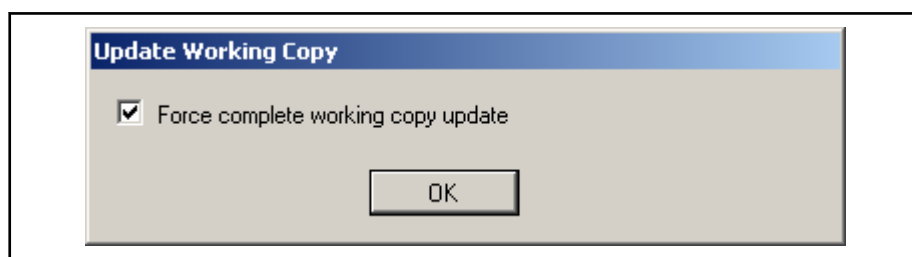


Fig. 3-157: Option when updating the project node

Select "Force complete working copy update" and click on **OK** for a complete working copy update.



The update preview is not displayed if a complete working copy update is being executed.

Showing the version history

To show the version history of a project element, click on the project element in the Project Explorer and select **Version Control ► Show history...** in the context menu. The following dialog shows a list of the versions and labeled releases of the project element.

Version History of Project4					
	Version	Label	User	Date	Comment
	3	Release 3.1	User1	5/20/2010 9:03 AM	The function abc was changed
	3		User1	5/20/2010 9:03 AM	
	2	Release 3.0	User1	5/19/2010 2:49 PM	
	2	Release 2.0	User1	5/19/2010 2:49 PM	
	2		User1	5/19/2010 2:49 PM	
	1	Release 1.0	User1	5/19/2010 2:49 PM	
	1		User1	5/19/2010 2:48 PM	

Fig. 3-158: Version history of projects

The first version of the element is created while it is generated. Additional versions of the element are created while checking in.

The "Version history" dialog displays versions and labels. Labels are created while a labeled project version is generated. Refer to the function [Labeling version](#), page 150.

Compare two element versions

In the version history, two element versions can be compared. Select the version to be compared and click on **Compare selected versions...** in the context menu.

Compare element version to project version

To compare a certain version to the current version in the working copy of the project, select the desired version and select **Compare to project version...** in the context menu.

Compare all sub-elements

In case of labeled versions, it is possible to include subelements in the comparison. Changes to object structures made in between two versions can be displayed. Select **Compare all sub-elements** in the "Compare" dialog.



For more details about the compare functions, please refer to [chapter 3.10 "Comparing project data" on page 99](#).

Exporting the version of an element

Any version of the element can be exported in a file. Select the version to be exported and select **Export...** Subsequently, select a directory in which to save the export file. Select an export file name. Please note that only the content of the element is exported during this operation. Subelements are not exported.

In case of labeled versions, the element including all subelements can be exported. Select **Export with subelements...** in the context menu after the labeled version has been selected. Please note that an export with subelements is only possible for team project elements. For elements with embedded library projects, this function is not available.



A file exported from the version history can be imported to the same element in the working copy. That way, an older element version can be used.

Properties

The "Properties" dialog under **Version Control ► Properties** provides information on the versioned element.

The dialog can be divided into the following sections:

- "General" tab
- "Storages" tab
- "Version history" function

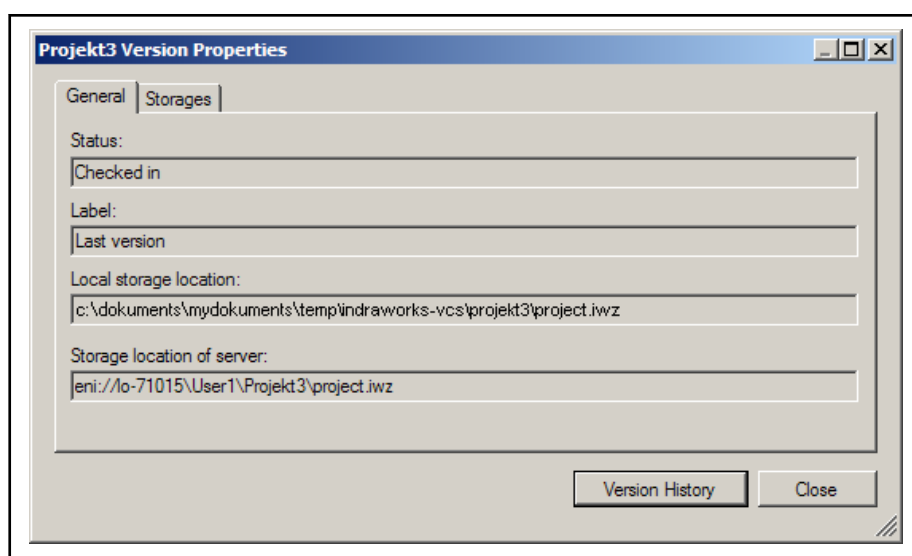


Fig. 3-159: Version properties

"General" tab	Status	Status of the element (also indicated at the icon in the Project Explorer).
	Designation	"Last version" or name of the labeled version currently called
	Local storage location	Specification where the element is stored in the local team project folder (and not in the project directory).
	Storage location of server	Path to the storage location on the server.
"Storages" tab	The local storages used by a project are displayed in this section. This display includes the team project storage location of the project as well as a list of library project locations used.	

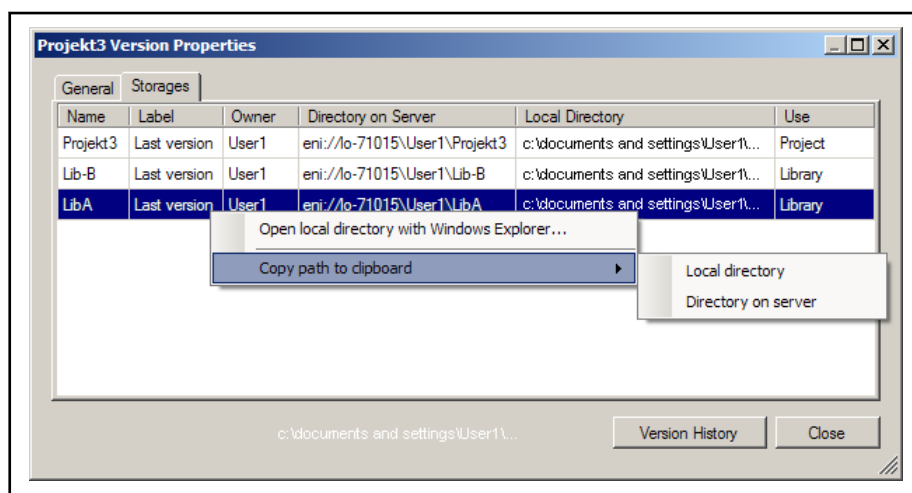


Fig. 3-160: Version properties

Right-clicking on the element in the list displays the associated context menu. By selecting the context menu item **Open local directory with Windows Explorer...**, an instance of the Windows Explorer is started and the respective directory of a local storage location is displayed.

Additionally, the path of the local or server-based storage location can be copied to the clipboard via the context menu item **Copy path to clipboard**.

"Version history" function Click on **Version history** to display the version history of the element.

Deleting

Deleting an element is a general function in IndraWorks projects. However, observe the following for versioned projects:



A versioned element can only be deleted if it is not checked out.



Restoring a deleted element. There are various variants:

- **Variant 1: The superordinate element has not been checked in yet.**

While the element was deleted, the superordinate element was checked out or hijacked. If this action is "undone", the element is displayed again.

- **Variant 2: The superordinate element was checked in.**

Check out the superordinate element. Compare the current version of the superordinate element with a version where the subordinate element still existed. Subsequently, select the desired element from the list of "Direct subelements" and apply it to the current version using the "Merge" function.

- **Variant 3: Before deleting, a version of the project was labeled.**

A labeled project version can be restored (function **Change version...**).

Inserting an element from a library project

If library projects are configured to be used in the current team project, elements from these library projects can be inserted into the project at certain locations. For more information, refer to the chapter [3.15.6 Library Projects, page 168](#).

3.15.5 Managing versions

A team or library project can comprise multiple labeled versions. Such labeled versions can be restored but not edited any longer.

To continue working based on a labeled version, a "version branch" of the project has to be created (project has to be branched). The project is again added to Version Control (see chapter [Add project to Version Control, page 150](#)).

In order to not lose track of the various versions and version branches of a versioned project, it is recommended to create a folder structure with information on the version or version branch. An example of a folder structure is shown in the following.

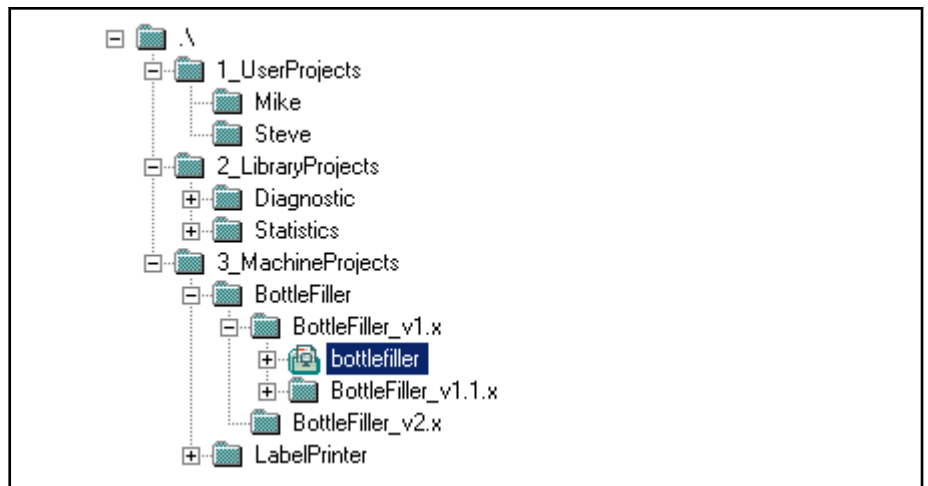


Fig. 3-161: Example of a folder structure of team and library projects

In the first step, the database is divided into three directories:

1. **UserProjects:** This directory contains a separate directory for each engineer where he/she can store own (test) projects.
2. **LibraryProjects:** This directory contains all library projects which provide general PLC program parts for use in team projects.
3. **MachineProjects:** This directory contains the team projects in which entire plants (or parts thereof) are configured and which include the process logic. These projects are downloaded to the respective control.

Each team or library project has its own directory at the next lower level. This directory is used to organize the various versions and branches of this project.

This is illustrated by the example of the "BottleFiller":

- One directory for each version branch. This directory includes the version label of the branch in its name (e.g. "BottleFiller_v1.x"). "x" is a placeholder for labeled versions within a branch.
- One IndraWorks project for each version branch. **The project name as such always remains the same in the various branches.** The labeled versions in a project extend the label of the branch (e.g. "v1.1").
- A separated branch is a subdirectory of the superordinate branch. This folder name corresponds to the labeled project version from which the branch was separated and it also provides "x" as a placeholder. For example, the branch "BottleFiller_v1.1.x" was separated from the labeled version "v1.1" of the superordinate branch.

This structure presents a comprehensible version history at branch level, beyond the labeled versions of an individual project. The separation of branches can be nested as deeply as desired.



This structure shows an example of possible version and branch organizations. When selecting a storage structure on the team server, ensure that the number of directories and projects stored a directory level does not become too large.

Use directories to structure the storage on the team server. This facilitates navigation and increases clarity.

3.15.6 Library projects

Definition and purpose of use

With "library projects", PLC elements as well as general files (e.g. *.doc, *.pdf) and folders can be centrally versioned and used in different team projects at the same time.

Library projects are specific team projects referenced in other team projects.

In team projects, library projects can be used in the current or in a labeled version. The versions of the library elements are used in the team project according to the version selection of the library project.



Do not confuse library projects with PLC libraries. PLC libraries are precompiled PLC program packages which can be used in an IndraWorks project. Library projects are versioned IndraWorks projects providing PLC program parts as source code or as general files and folders.

Creating library projects

Seen from a technical point of view, library projects are identical to normal team projects.

As with team projects, library projects are also created using the function [Add project to Version Control: Fore creating team projects, refer to 147](#). While creating library projects, consider the following:

- PLC program parts provided for team projects have to be stored in the library project under "General Module Folder". Therefore, a control supporting IndraLogic 2G (e.g. MLC) from the IndraWorks library has to be created in a library project. A control can be used to test the provided PLC program parts.

Apart from these prerequisites, consider the following criteria when organizing library projects:

- **Useful distribution of PLC program elements.** All PLC program elements summarized in a library project have commonly labeled versions assigned to them. Associated program elements developed as package independently of other part programs should be organized in separate library projects.
- **Unique naming/labeling for library projects.** PLC library projects included in a team project may not have the same name. Therefore, unique project names are to be assigned.
- **Structured storage of library projects.** Define the directory structure for library projects so that the engineers of team projects requiring library elements can easily orientate. Also observe the instructions on organizing versions in chapter [3.15.5 Managing versions, page 166](#).

Managing library projects

The library project management organizes the library projects in a team project.

Before inserting elements from a library project into a team project, add the respective library project to the list of used library projects of the team project.



Only library projects from the team server, on which the current team project is versioned, can be used.

To enter the library project management, select the function **Version Control ► Manage library projects...** in the context menu of the project node. Add, remove, modify or show the properties of library projects as well as label library project versions.

The library projects are displayed in a table. Each line represents a library project

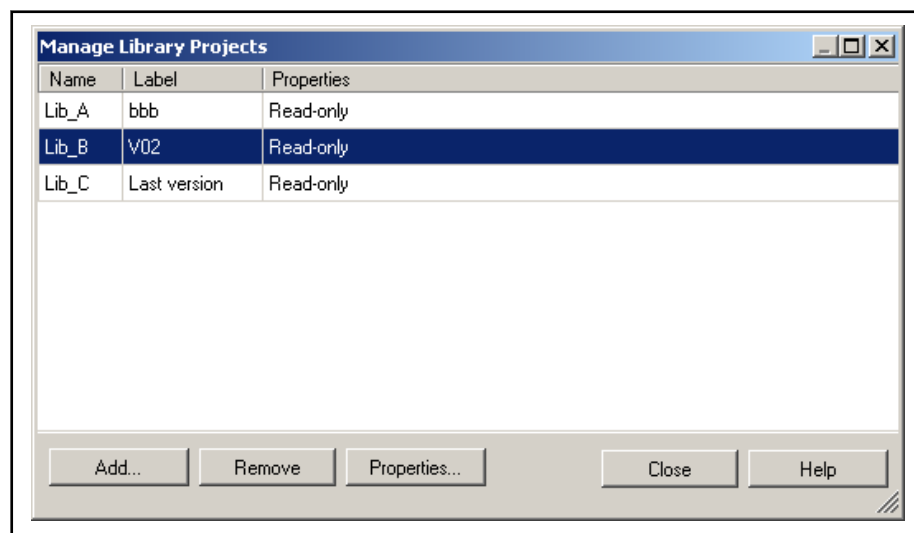


Fig. 3-162: Manage library projects

Name The name of the library project is displayed. This table field cannot be modified.

If newer labeled versions of the library project are available on the team server, this table field is displayed in bold. A tooltip is displayed, referring to newer versions, as soon as the mouse cursor hovers over the table field.

Used version The used version of the library project is displayed in the working copy. This table field cannot be modified.

If the mouse cursor hovers over this table field, a tooltip is displayed with a comment entered when labeling the library project version.

Target version A different library project version can be selected.

Write-protection The write protection status of the library project is displayed. The write protection can be changed for library projects used in the last version. Library projects of a labeled version are always write-protected.

Adding a library project

Click on **Add...** or select **Add...** in the context menu of the table of the library project management.

This opens a dialog to select versioned projects on the team server. Please select a versioned project and confirm with **OK** to access the version selection dialog. Select the desired library project version and confirm with **OK**.



When selecting the version, show the differences between two project versions via the context menu "Compare selected versions" (also see [chapter 3.10 "Comparing project data" on page 99](#)).



A library project can be easily exchanged with a variant of the library project previously created with "Add project to Version Control...". The library project variant has to be located in a different team server directory and has to have the name as the library project to be exchanged.

Add a new variant of the library project. The Version Control detects that a library project with the same name is already used and suggests to replace the existing library project with the selected one. All elements used in the project are replaced by the respective elements of the new library project.

Changing a library project version

To change a library project version, select **Target version** in the table column of the library project. The library project version currently used in the working copy cannot be selected as target version. Selecting an empty entry of the target version results in retaining the currently used version - thus, the version is not changed.

Please note that the target version can only be changed for a certain library project if no elements of this library project are checked out or hijacked in this working copy.

Please note that the write protection for a library project is enabled when switching from "Last version" to a "labeled version".

Changing the write protection of a library project

To check out and edit elements of a library project of the last version, first remove the write protection. Uncheck the option interface in the **Write-protected** column of the library project.

Please note that the write protection cannot be removed from library projects of a labeled version.

Removing the library project

To remove a library project from the team project, select the library project in the table and click on **Remove** or select **Remove** in the context menu.

Please note that a library project cannot be removed as long as the working copy still contains library project elements.

Applying or discarding changes in the working copy

All changes made to the library project management do not directly affect the working copy but are retained only in the RAM. By clicking on **Cancel** or by using <ESC> the library management can be exited and changes can be discarded. In this case, the working copy is not changed.

To apply changes of the library project management to the working copy, click on **OK**.

Show library project details

To display library project details, select the library project in the table and click on **Details...** or select **Details...** in the context menu. In the following dialog, the details of the selected library project are displayed.

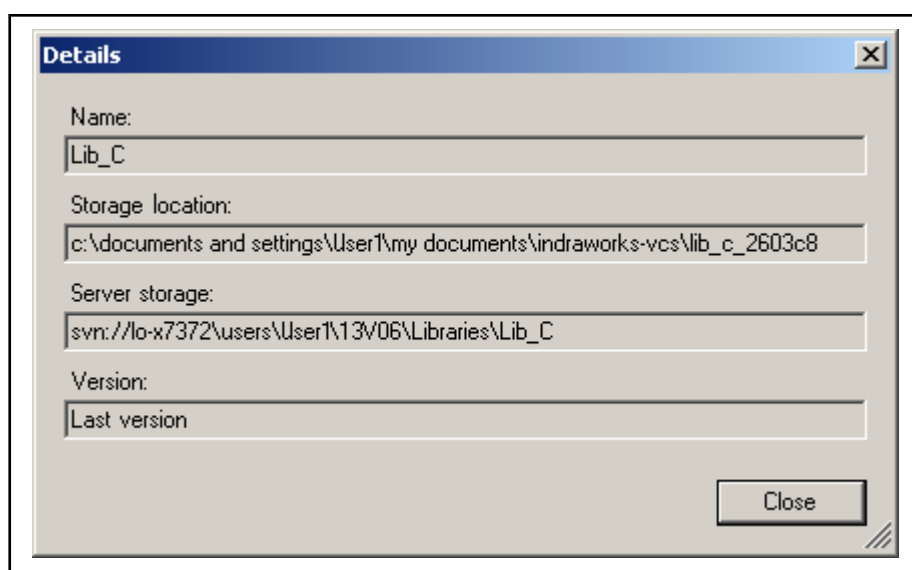


Fig. 3-163: Details of a library project

Name	Library project name
Local storage location	Storage location of the local storage of the library project
Storage location of server	Storage location of the library project on the team server
Designation	Currently used version of the library project

Labeling the library project

Labeling of a library project sets a label for the latest library project version available on the team server. By using the library project management, library projects can be labeled without having to open the respective library projects in IW-Engineering.

Prerequisite: The library projects to be labeled have to be used in the Last Version in the team project.

To label a library project, select the corresponding library project in the library project management and select **Label version....** The following sequence is identical to labeling a team project.

Please note that always the last project data version checked in to the team server is labeled. If library elements have been checked out or hijacked when labeling a version, the local project data version differs from the version on the team server. In this case, a warning message is displayed to prevent that a different version of the data is labeled.

Using elements from library projects

Inserting elements from a library project to the team project

General folders and files from a library project can be inserted at a corresponding location into the team project as it is the case with the PLC elements in the "General module folder".

Therefore, select **Version Control ► Insert element from library project...** in the context menu at the desired location in the IndraWorks project.

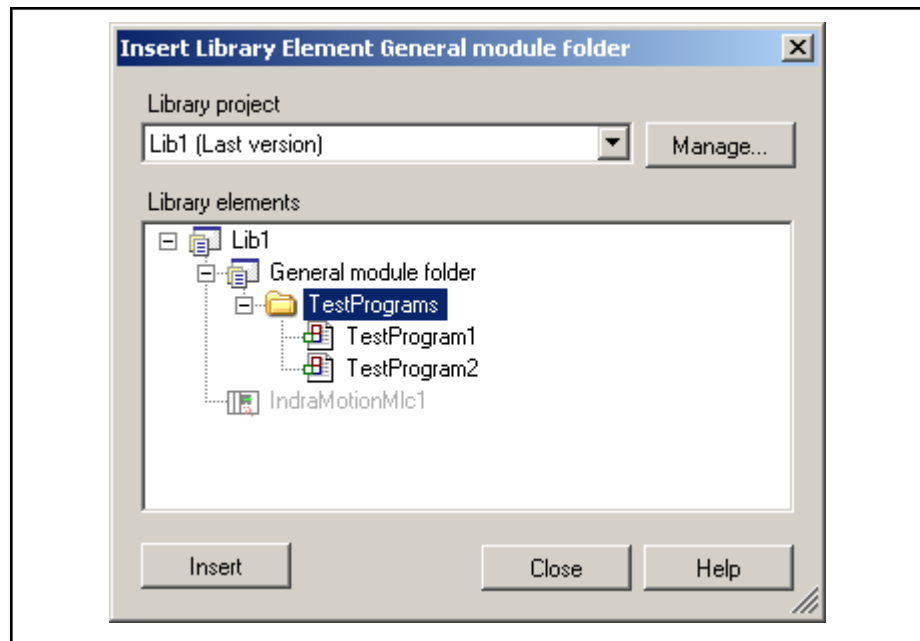


Fig. 3-164: Insert library element (example for "General Module Folder")

Functional description

- Library project** This drop-down list contains all library projects referenced by the team project. The content of the currently selected library project is displayed.
- Manage...** Add or remove references to library projects or edit their properties as described in the chapter [Managing library projects](#), page 168.
- Library elements** The relevant section of the selected library project is shown. Elements of the "General Module Folder" and general files and folders are provided for insertion. All other elements are disabled or hidden.
- Paste** The selected library including its existing sub-elements are inserted into the team project.



Elements can only be inserted if they are permitted at the location selected in the project. For example, name and type of the element or number of already existing elements are considered.



Elements inserted to a team project from a library project might require certain PLC libraries.

When an element from a library project is inserted into a team project, the required PLC library references are **not** added automatically. The required library reference has to be created manually in the library manager of the team project.



Inserted library elements can be edited in the team project if the library project is used in its "Last version" and the read-only checkbox is disabled.



If a folder containing elements of other library projects is inserted from a library project, the team project has to contain references to the corresponding library projects (see chapter [Managing library projects](#), page 168).

Visualizing library elements in team project

The library elements inserted to a team project are labeled in the Project Explorer. The icon showing the status of a versioned element is extended by a shortcut icon for library elements.

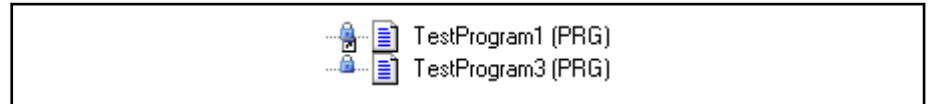


Fig. 3-165: Example: Upper icon - Library element (checked in); Lower icon: Versioned element in team project (checked in)

Removing library elements from team project

To remove library elements from the team project, delete them from the Project Explorer. It is important where the library element belongs to.

There are two possibilities:

1. The library element to be deleted was added to a team project folder or element. Thus, the superordinate element is part of the team project. In this case, the library element is removed while being deleted, but it remains part of the library project on the server.
2. The library element to be deleted was inserted along with a superordinate element (e.g. a folder). Thus, the superordinate element is also part of the library project. In this case, the deletion of the element also deletes it from the library project.



If library elements were inserted into the team project as group (e.g. in a folder), they are to be removed as group. Otherwise, an element might accidentally be deleted from the library project. To determine whether an element is a part of the library project, use the "Properties" or the "Versioned elements" dialog. For more detailed information, refer to [Project element functions](#), page 154.



Please note that deleting of library elements does not physically remove the elements from the team server but only marks them as deleted. Deleted library elements are thus not available anymore for inserting in a team project but are still available on the team server. Thus, deleted library elements might still be visible in working copies of other team projects in which they have been inserted before deleting them.

Thus, avoid to delete a library element and create a new library element under the same name at the same position in the library project. In team projects using one of the library elements with identical names, it is difficult to detect which of the two library elements is actually used.

Creating team project templates

Library projects can be used to provide PLC functionalities required in many projects at a central place. Multiple library projects and elements can be required in one team project. At the same time, some of the team projects differ

from each other only to a minor degree, for example, if they are different versions of the same machine type.

In this case, it can be recommended to create templates of such team projects in which the required library projects have already been configured and library elements have already been inserted. These templates can be stored on the team server. Create a working copy of these templates and, using the function "Add project to Version Control", create then a new variant of this team project including its library elements. Thus, a new team project does not have to be created.

Adjusting versions and storage locations of library projects

Changing version used in library project

If a working copy of the library project is created, versions can also be labeled for library projects. The library project version to be used can be set in a team project. Use the dialog **Project node ► Version Control ► Manage library projects....**

To change the library project version used, highlight the corresponding line and select **Properties....** Select a labeled version in the next dialog. Apply the new setting (**Close**) to set all inserted library elements to the selected version.



A version can only be labeled in a team project in which library projects are used if there is no library project used as "Last version". This is not possible, since the "Last version" of the library project can change.

Additionally, the library project version used can only be changed if the team project is not in a labeled version.

Membership of project elements

While a PLC program is developed, it might be necessary to change the membership of a program element. This means:

Transfer to a library project

Precondition: One or more elements of the team project are to be transferred to a library project and inserted as library element(s).

1. Export the particular element and delete it from the team project.
2. Open a working copy of the library project.
3. Import the element and check in all checked-out elements.
4. If necessary, label a version.
5. Open working copy of the team project and insert library element.

Transfer to the team project

Precondition: An element of a library project is to become part of the team project (for example to make project-specific changes).

1. Export element.
2. Delete element from project.
3. Re-import element and execute "Check in" in the context menu of the element.

3.15.7 Synchronizing working versions

This chapter describes the synchronization of different working versions. This refers to changes made without proper checkout and check in or if contents from other projects are to be applied to a team or library project.



The "Compare" and "Merge" functions are not described in detail as they are described in other sections of this document. The respective documentation can be found under [chapter 3.10 "Comparing project data"](#) on page 99.

Synchronizing local working version after reconnection to team server

Precondition: Changes were made while there was no connection to the team server. The project contains checked-out, hijacked and/or new elements. After reconnection to the team server, these changes are to be applied to the team or library project.

1. Restore connection to team server
2. Open the "Versioned elements" dialog via the project node
3. Deselect all checked-in elements in the "Filter" dialog and close with **OK**
4. Sort the elements in the list by status
5. Highlight and check in all checked-out elements
6. Apply the versions of all hijacked elements as described in the chapter [Applying hijacked version, page 159](#)



If the working copy is available in a labeled version of a versioned project, the related elements cannot be checked out. A labeled version can only be changed after a version branch has been created. For more detailed information, refer to the chapter [3.15.5 Managing Versions, page 166](#).

Applying exported IndraWorks project to team project

Precondition: There is an IndraWorks project whose contents are to be applied to a team or library project. Changed and new elements are also to be applied.

1. Open project to be applied and export it (via the project node)
2. Open working copy of team or library project to which the exported contents are to be applied
3. Use the **Compare...** function of the project node and compare it with the exported contents
4. Execute the **Compare all sub-elements** function in the comparison dialog. A comparison table is displayed. The right-hand column displays the contents of the export file, the left-hand column the open project
5. Check out different elements (marked in red), compare them with each other (context menu) and merge them if necessary



If the working copy is available in a labeled version (or a used library project), the related elements cannot be checked out. A labeled version can only be changed after a version branch has been created. For more detailed information, refer to the chapter [3.15.5 Managing Versions, page 166](#).

6. If new elements are included in the export file, these elements can be applied to the project during comparison as follows:
 - Right-click on the new element and execute "Select parent element". If the parent element is also a new element, repeat this step until an element present in both columns is selected.
 - Check out this element in the project. using the function "Show left element in project" via the context menu.

- Compare the two elements in the comparison table via the context menu. The new element is shown on the right side in the "Sub-elements" table of the "Compare" dialog. Highlight this element and execute "Preselect for merge".
 - "Start merge". The new element has now been inserted into the team project.
7. Close the "Comparison results" window and check in all checked-out elements. using the "Versioned elements" dialog of the project node.

Applying exported IndraWorks project to team project without server connection

Precondition: There is an IndraWorks project whose contents are to be applied to a team project while the team server is not available. Changed and new elements are also to be applied.

1. Proceed as described above: "Apply a version of an exported IndraWorks project to a team project"
2. Hijack elements instead of checking them out
3. To apply the changes to the team server, follow the steps described under "Synchronizing local working version after reconnection to team server"

Applying contents of archived IndraWorks project to a team project

There is an archive of a project whose contents are to be applied to a team project

1. Open and export archive
2. Open working copy of team project and apply exported project version to project. Proceed as described in the steps above

3.15.8 Error recovery

Errors are recorded in the Windows event display on the engineering station. Open the Windows event display via the Windows Control Panel or the user interface of the "ENI Control" (under **Service ► Display event log...** or the **task bar icon ► Event log...**).

The following sections describe examples of various errors with potential causes and solutions.

Example:

Team server not accessible or login to team server fails.

- Team server is not accessible in the network.
- ENI server is stopped. See "Team server cannot be started".
- User account is not created in the database.
- ENI user account is not created in the database.

Example:

The team server cannot be started.

The settings under **ENI Control ► Database** can be incorrect:

- Database driver has not been selected or is no longer available.
- After the team server has been installed for the first time, the ENI user name and the password have to be entered again.
- ENI user account has not been created.

- Storage location of the SourceSafe database entered is incorrect or has changed.

Example:

While retrieving a working copy, error messages on missing PLC libraries, device description files or non-installed DTMs (DeviceTypeManager) are displayed.

These missing elements were available on the engineering station on which team or library project were created. These elements also have to be installed on other clients.

- PLC libraries are installed via the repository (**Tools ► Library repository...**).
- Device description files are installed via the device database (**Tools ► Device database**).
- DTMs are installed in the Windows System (manufacturer's installation program).

Example:

Element cannot be checked out.

- Element is checked out (disabled) by another user.
- Element was inserted from a library project and the library project is available in a labeled version or it is read-only.
- Element belongs to the team project and the team project is available in a labeled version.
- Working copy was created with another team server user account. Working copy can only be edited with the user account used for its creation.

Example:

Elements checked out by a user whose working copy is no longer available (e.g. working copy deleted or defective hard drive).

- Solution 1: The user creates a new working copy to undo the checkout.
- Solution 2: The database administrator undoes the checkout by the user.
- Possible changes made by the user get lost in either case, since these changes were only made in the working copy.

Example:

Elements of working copy are grayed out (inactive) or cannot be edited.

- The appropriate editing license (for example CamBuilder) might not be available on the engineering station.
-

3.15.9 Project data validation

General information

In exceptional cases, e.g. if IndraWorks is closed using the Task Manager, invalid versions of the internal Version Control information in the working copy can be generated. When validating project data, invalid data is detected and displayed in the message window. The project can be validated at any time by selecting **Validate** at the context menu of the project node.

Possible Errors and Troubleshooting

VCS-001 - The assignment of a library element to a library project is incorrect

Troubleshooting:

1. Click on the entry in the message window. The concerned element is selected in the Project Explorer.
2. Hijack the parent element of the concerned element (context menu **Hijack**)
3. Delete the element (context menu **Delete**)
4. Undo hijacking of the parent element (context menu **Undo hijacking...**). Thus, the previously deleted element is inserted into the working copy again and the library project assignment is corrected.

VCS-002 - The assignment of the element to a storage location on the server is ambiguous.

This message is displayed if several identical elements of the working copy link to the same storage location on the server.

Solve this situation by deleting duplicates from the working copy:

1. Click on the entries in the message window showing the same element in the "Element" column.
2. Retain one of the elements in the working copy and delete all duplicates. If required, check the parent elements of the elements to be deleted out.
3. Check in all previously checked out elements.

3.16 Compatibility mode

3.16.1 Definition of terms

When IndraWorks projects are created, an ID is given starting from 13VRS. This indicates which IndraWorks installation is the minimum required to handle the project.

If a project is opened that has an older version identifier, there is no longer any automatic conversion, but rather IndraWorks Engineering is operated in the so-called compatibility mode. This means that this project can also be edited for the older IndraWorks version in case of changes made to the project.

For the user, however, this means that new functions that could cause an incompatible change of the project, are not available. If one of these functions is selected, IndraWorks Engineering displays the corresponding information.

The user can change or switch off the compatibility mode. The project compatibility to the original version is lost.

3.16.2 Applications in IndraWorks Engineering

Compatibility mode display in IndraWorks Engineering

For the user, editing a project in compatibility mode will first cause a reduction of the available IndraWorks functionality.

If a project is open in compatibility mode, this is shown at various places in the user interface:

1. In the IndraWorks Engineering window bar.

2. In the project node tooltip.
3. In the Properties dialog box for the project.

The compatibility mode is also specified for each of the recently opened projects.

Creating a new project

The compatibility mode is set when creating a new project. This is turned off by default, i.e. the project is created for the latest current version of IndraWorks. The full functionality of project processing is available to the user when compatibility mode is turned off. However, the project cannot be opened by earlier versions of IndraWorks.

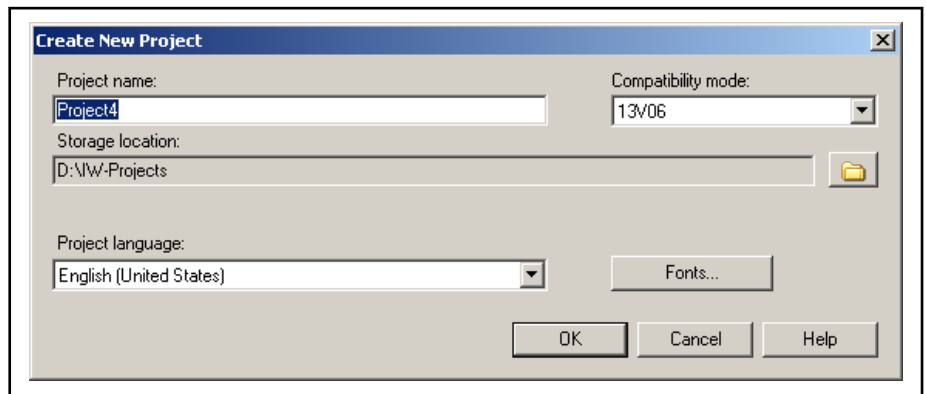


Fig. 3-166: Create a new project, compatibility mode

If the new project is intentionally created for a specific, older version of IndraWorks, the corresponding version label has to be selected in the "Compatibility mode" selection box.

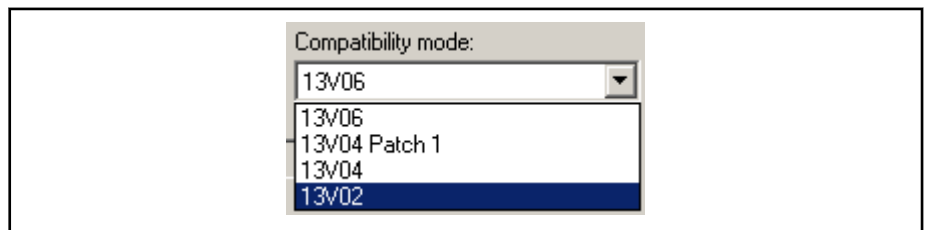


Fig. 3-167: Selecting the compatibility mode: 13V02

Displaying the compatibility mode of a closed project

In Windows Explorer, moving the cursor over the project folder of a directory-based IndraWorks project displays in ToolTip the minimum IndraWorks version required to edit the project.

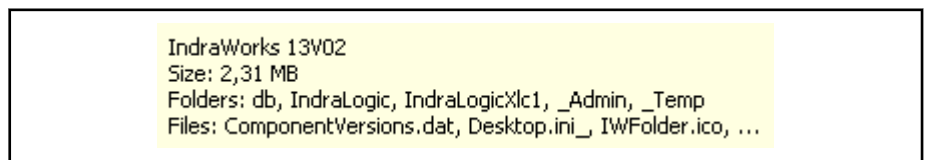


Fig. 3-168: Tooltip for a project

If a project with a higher version of IndraWorks is opened, the Windows Explorer ToolTip display corresponds to the compatibility mode.

The tooltip is not displayed for single-file projects (.xiwp).

Opening a project

The desired project is selected with the dialog "Open project". The version of the selected project folder can be seen from the ToolTip feature, and is ana-

log to the display in Windows Explorer. Prior to the project being opened, IndraWorks checks whether it can support the compatibility mode required for project editing.

The following possibilities exist:

1. The project has no version identifier.

This affects projects that were created with IndraWorks < Version 13.2. There is an automatic conversion to the current format. Subsequently, the project is opened.

2. The project version is not supported.

2.1 The project was created with a later version of IndraWorks. Under certain circumstances, editing would make the project unworkable for this version. Opening is thus canceled and corresponding information displayed.

2.2 The project was created with a lower IndraWorks version but at the time of creation, this version was not known in the higher IndraWorks version. This can be the case if, for example, due to bugfixes, a patch version has been created using a lower IndraWorks version after the higher IndraWorks version had been completed. This project can be opened but is converted to the current version as it cannot be operated in compatibility mode.

3. Open project with unknown project version

Project versions with a lower version number that have been created after the current IndraWorks version cannot be operated in compatibility mode. Reason: Devices and other project settings (e.g. the compiler version) are not known in the current version. However, it is possible to convert these projects to the current version. Requirement: The project has to be saved as "xiwp" file (zipped file). By default, this format is used for saving from version **13V06**. If you have opened or converted a project of an older version, the old, directory-based format is retained. To be able to convert old projects, load this project using the old IndraWorks installation and save it with "Save as" as "xiwp" file. When opening such a file in the current IndraWorks version, a query is displayed asking whether you want to convert this project to the current version. After the query has been confirmed and a new project name has been entered, a copy is generated and opened automatically.

Please note that a recompilation of the PLC program is required after this operation. Login is not possible without change or via "Online change". Furthermore, it can be required that grayed out devices have to be converted to a supported device version. This can be done via the property dialog of the affected device. The dialog can be opened using the "Properties" context menu.

As it is unknown which changes are contained in the subsequent release of older versions, compatibility problems can sporadically occur. Thus, it is recommended to check your project thoroughly after the conversion is completed.

4. The version of the project corresponds to the IndraWorks version installed.

The project is opened. Compatibility mode is turned off, the user has available the full scope of operation of the IndraWorks installation

5. The version of the project corresponds to an older IndraWorks version.

The project is opened and edited in compatibility mode.

Editing the project in compatibility mode, changing the compatibility mode

If the user edits a project in compatibility mode, they can select new, compatibility-infringing functions via the user interface where applicable. However, IndraWorks does not perform the changes to the project but issues information instead.

If the user wishes to use these functions, he must explicitly change the compatibility mode of the project. The **Change compatibility mode...** from the context menu of the project node is started via the menu item of the same name.

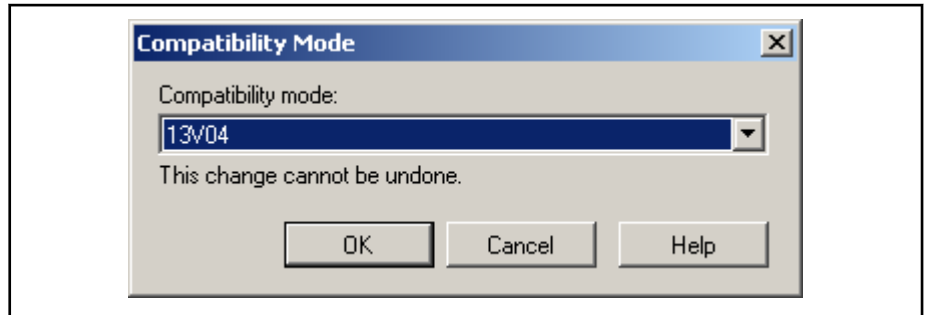


Fig. 3-169: Change compatibility mode

The version identifier can be selected using the "Compatibility mode" selection box. Compatibility mode is switched off if the highest version is selected. Clicking **OK** defines the new version identifier in the project, the project is saved compatible with this IndraWorks version.



As a rule, compatibility with the original IndraWorks version is irrevocably lost.

Exporting/importing a project

The compatibility mode for the project is also saved in the export file when a project including its root node is exported. When creating a new project from the contents of this export file, this saved compatibility mode is proposed as the compatibility mode for the new project.

If a different compatibility mode is selected, the data is converted during the transfer to the new project. Problems are reported if they occur.

Compatibility mode for versioned projects

Creating a team project, creating a working copy

When creating a team project, the compatibility mode of the original project is saved in the version control system and when a working copy of this team project is created (Operation "Open project from version control") this is proposed as the compatibility mode of the new project.

Once again a different compatibility mode can be selected. In this case, it can cause problems that lead to a hijack state when inserting or updating project elements.

Changing the compatibility mode of a working copy

The compatibility mode of a working copy can be changed as in any commonplace project. This does **not** automatically change the compatibility mode of other working copies and the team project. If, unless an agreement is made with anyone working on the team project, data that was changed after the new capability mode was applied is checked in, compatibility problems would occur when updating the project data with other working copies.



The compatibility mode of versioned projects should only be changed in agreement with all employees working on the team project. The compatibility mode of all working copies and the default value in the team project must be the same.

Changing the default value for the compatibility mode in a team project

The compatibility mode that is proposed when creating a working copy is a property value of the project node and can be changed on any working copy. To do this, call up the menu item **Change the compatibility mode of a team project...** via the context menu of the project node. The dialog of the same name appears (see above "Select compatibility mode of the working copy"). When a different compatibility mode is selected and the dialog exited with **OK**, the default value is first saved locally. If this is not yet done, the project node for this is checked out. When the project node is checked in, the new value is adopted by the team project and used as the default value for the compatibility mode when additional working copies are created.

Compatibility mode depending on the storage format

From IndraWorks 13V06, projects can be saved in the extended project format as a single file with the extension .xiwp. As the compatibility mode of a project specifies the minimum IndraWorks version that is required to edit the project, a compatibility mode lower than 13V06 cannot be set for a project in .xiwp format.

In the same way, directory-based projects with a compatibility mode less than 13V06 cannot be saved in .xiwp format using Save as.

3.17 Printing

3.17.1 General information

IndraWorks provides the functionalities "Print", "Print preview" and "Print settings" to document your data.

Choose between printing of:

- Data of a device
- Data of a project including all devices

The scope of data can be detailed via a dialog.



The print menu items depend on your current working context and can only be selected if a printable element is selected.

3.17.2 Print settings

Overview

Configure the print in IndraWorks via the "Print settings" dialog.

Go to the dialog in IndraWorks Engineering and in IndraWorks Operation via the menu items **File ► Print settings...**

The context menu of the project node also provides the **Print settings...** option.

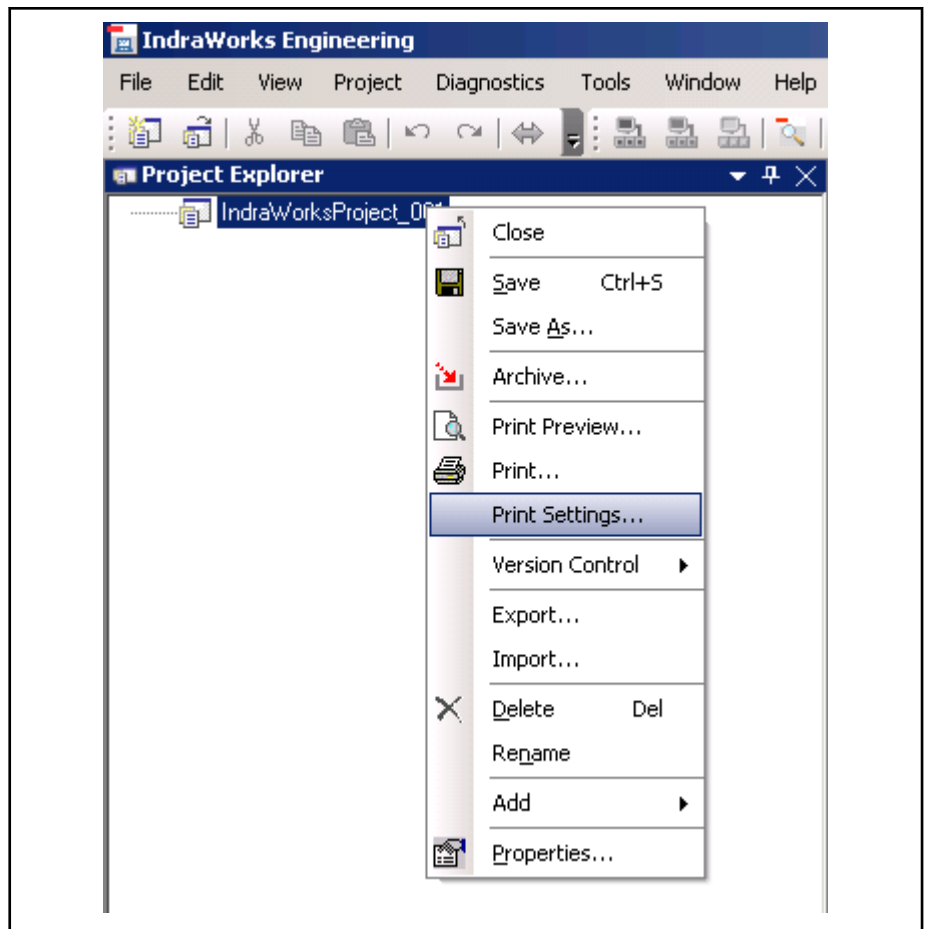


Fig. 3-170: Context menu of the project node

The following tabs are displayed in the "Print settings" dialog:

- Layout
- Cover page
- Paper size
- General information

Main buttons

The "Print settings" dialog has the following buttons:

- **OK**
OK saves all changes and closes the dialog.
- **Cancel**
Cancel discards all changes and closes the dialog. This also applies to changes made with the "Import" function.
- **Default**
Default resets all print settings to default.
- **Export...**
Export... opens the "Print settings" dialog. Select between two options:
1. Select **"Export as user-defined print settings"** to save the print settings of the current project as user-defined template. These user-defined print settings are used for new projects.

Use **"Export to different location"** to export the print settings of the current project and import them to apply them to another project. Use the **"Browse..."** button to open the "Export print settings" dialog box. The name and the target directory of the export file can be specified here.

- **Import...**

"Import..." allows you to import the previously exported print settings into the current project. Click on "Import..." and select a previously created export file in the "Import Print Settings" dialog box. Confirm with "OK". The import is carried out and the imported print settings are displayed.

- **Help**

"Help" starts the IndraWorks online help.

Tab "Layout"

Page layout

The page layout consists of header, footer and the printable area. Headers and footers as well as the printable area are displayed on the tab in proportion to the selected page settings.

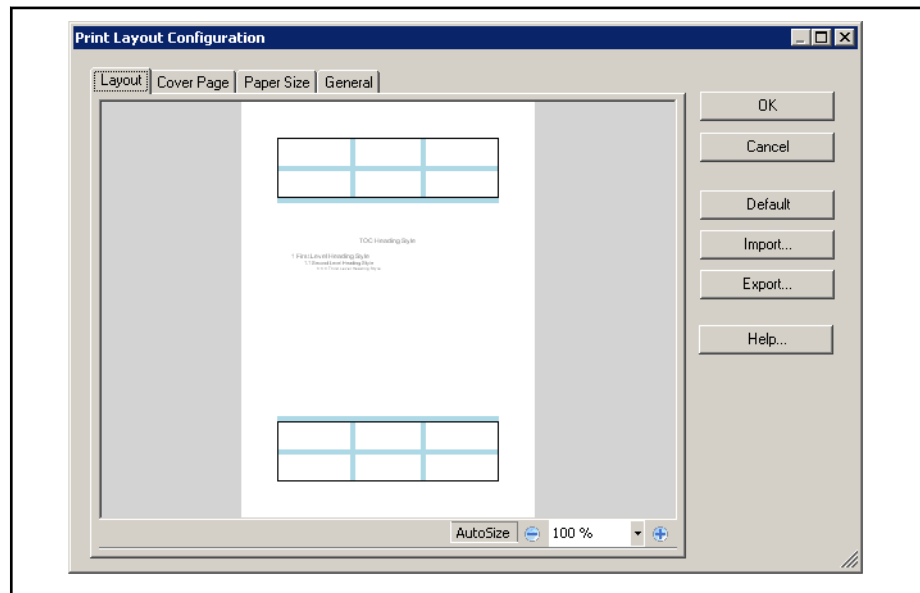


Fig. 3-171: Print settings, "Layout" tab (portrait)

The printable area is the area that remains once the header, footer and borders have been removed. This area can be filled with data to be printed.

The data displayed is sample data and intended to show the settings for the table of contents.

The page layout corresponds to the page format selected (portrait/landscape) on the "Paper size" tab.

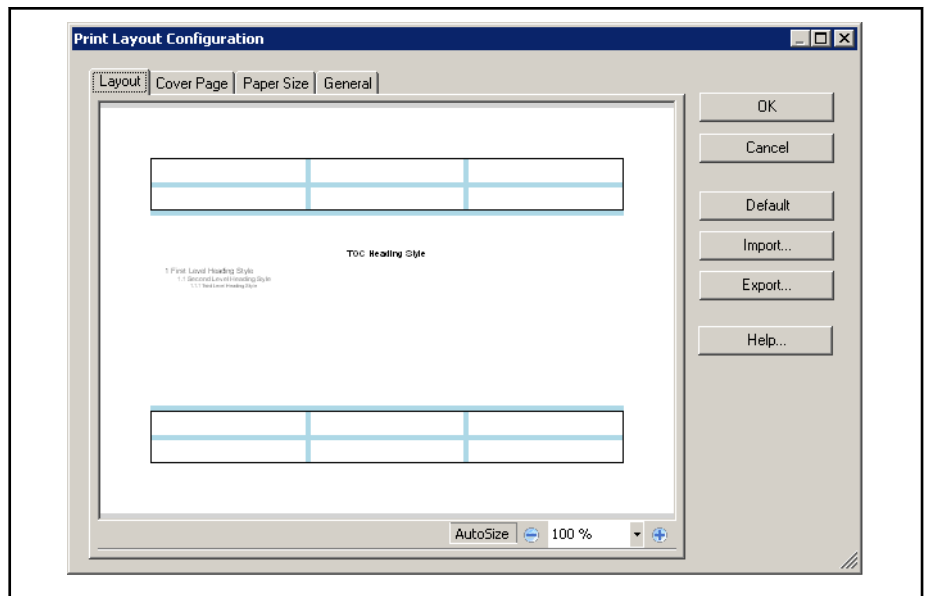


Fig. 3-172: Print settings, "Layout" tab (landscape)

If the "Auto size" checkbox is selected, the page displayed is automatically adjusted to the available display area.

The page view can be zoomed in and out using the "+", "-" buttons. The "Auto size checkbox" is disabled.

Table of contents

Change font settings for heading, first level heading, second level heading and third level heading and their indentation via the "Layout" tab and on the "General" tab.

Right-click on the printable area of the "Layout" tab to display the relevant context menu.

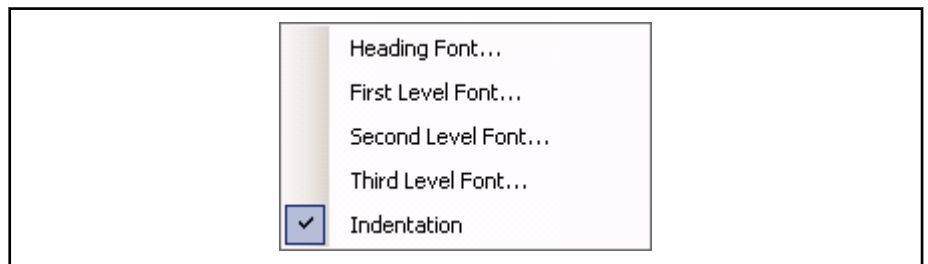


Fig. 3-173: Context menu (table of contents)

"Heading font..."	Select Heading font... to display the "Font" dialog. The font, font size and font color for the heading of the table of contents can be selected.
"First level font..."	Select First level font... to display the "Font" dialog. Font, font size and font color for the first level headings of the table of contents can be selected.
"Second level font..."	Select Second level font... to display the "Font" dialog. Font, font size and font color for the second level headings of the table of contents can be selected.
"Third level font..."	Select Third level font... to display the "Font" dialog. Font, font size and font color for the third level headings of the table of contents can be selected.
"Indentation"	The indentation of the heading levels of the table of contents can be activated.

Header and footer

The header and footer area is divided into six fields each. They are separated from each other by row separators.

Text and images can be inserted into the fields. The row separators can be made visible on the printout using borders.

Change the size of header or footer by dragging the row separators with the mouse. This allows the size of every field to be enlarged or reduced.

Right-click on the header or footer to display the context menu.



Fig. 3-174: Context menu (header and footer)

"Text"

The menu item **Text** has submenu items to configure the texts of the selected field of header and footer.



Fig. 3-175: Context menu (text)

"Edit"

Select **Text** ► **Edit** to edit the selected field. An editor with the content of the selected field is displayed in the header/footer.

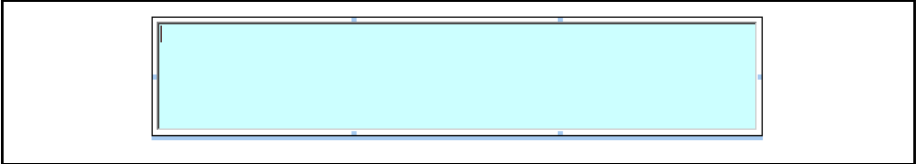


Fig. 3-176: Editor

When editing a text in the editor, right click to select the **Insert variable...** context menu item.

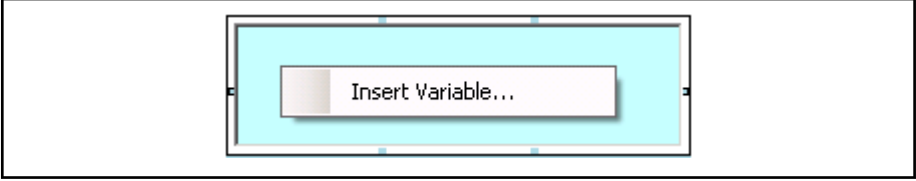


Fig. 3-177: Context menu in the editor

The "Select Variable" dialog is displayed:

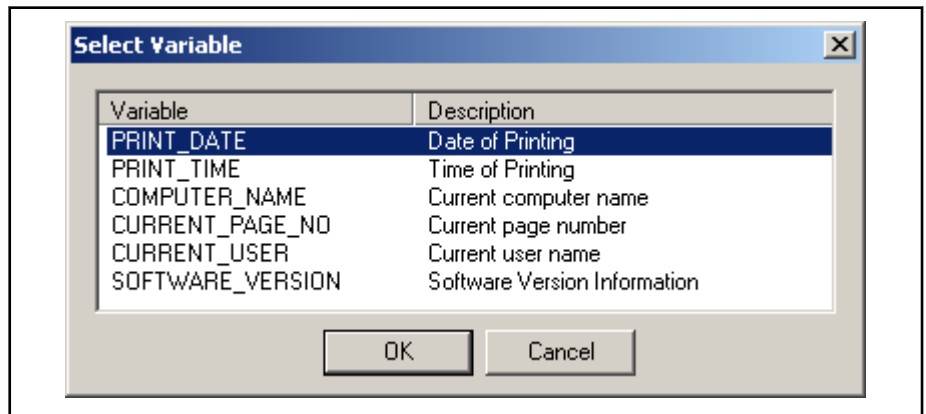


Fig. 3-178: Select variable

The selected variable is inserted at the cursor's position in the editor.

Variables cannot be edited but only added or deleted in the editor.

"Fonts"

Select **Text ► Font** to display the "Font" dialog. The settings are applied to the text in the selected field.

"Alignment"

The selected alignment is applied to the text in the selected field.

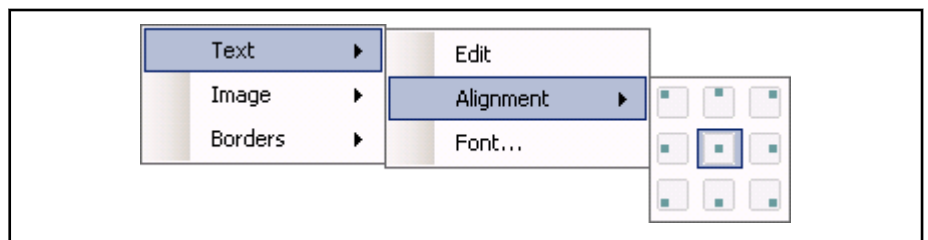


Fig. 3-179: Context menu (alignment)

Image

Select **Image ► Insert...** to insert an image into the selected field. Select the image file via dialog. The image is adjusted to fit the available area in the field.

Select **Image ► Remove** to remove the selected image from the selected field.

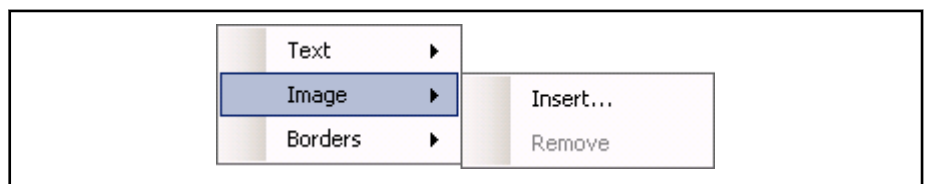


Fig. 3-180: Context menu (image)

Borders

Select **Border** to apply the settings for the border to the selected header or footer.

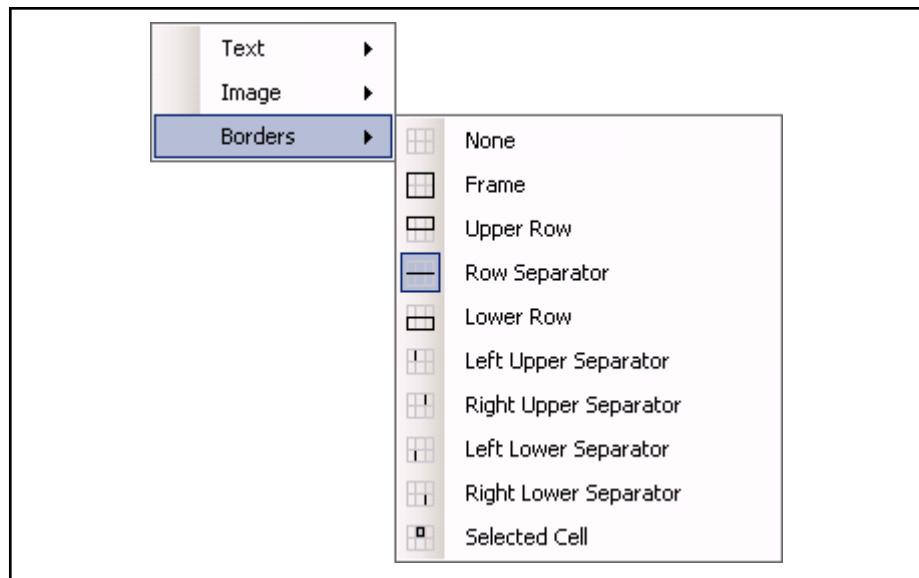


Fig. 3-181: Context menu (borders)

Scaling

There are scaling measures in the upper and lower section of the "Layout" tab to facilitate the alignment of the vertical separation lines/borders in header and footer.

"Layout" tab: Right-click outside the displayed page to display the **Scaling** context menu.

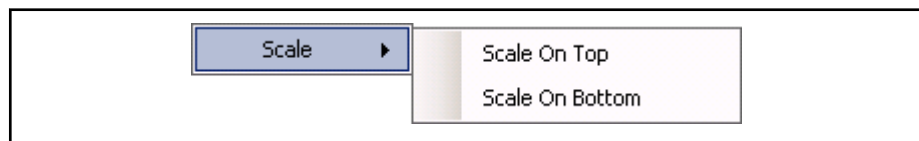


Fig. 3-182: Context menu (scaling)

- Select **Scale on bottom** to show the scaling measure at the bottom of the "Layout" tab.
- Select **Scale on top** to show the scaling measure at the top of the "Layout" tab.

Margins

"Layout" tab: Right-click on the border section of the displayed page to display the **Margins** context menu.

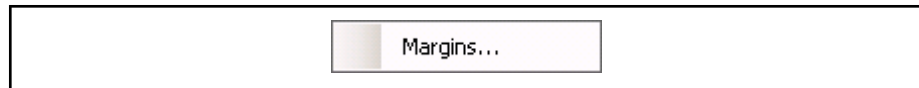


Fig. 3-183: Context menu (margins)

Open the "Page layout margins" dialog:

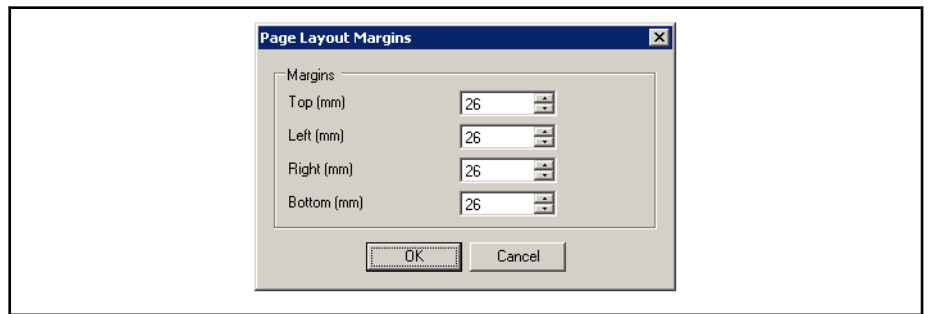


Fig. 3-184: Page layout margins

Tab "Cover page"

Configure the cover page using the "Cover page" tab.



Only if the "General" tab, contains the "Cover page" checkbox to include the cover page in the print preview and in the printout.

Cover page information

The data to be printed on the cover page is configured in **Cover page information**. The individual data/cover page information is presented in the list view as a combination of "Key" and "Value".



All "keys" and "values" are chronologically displayed on the cover page.

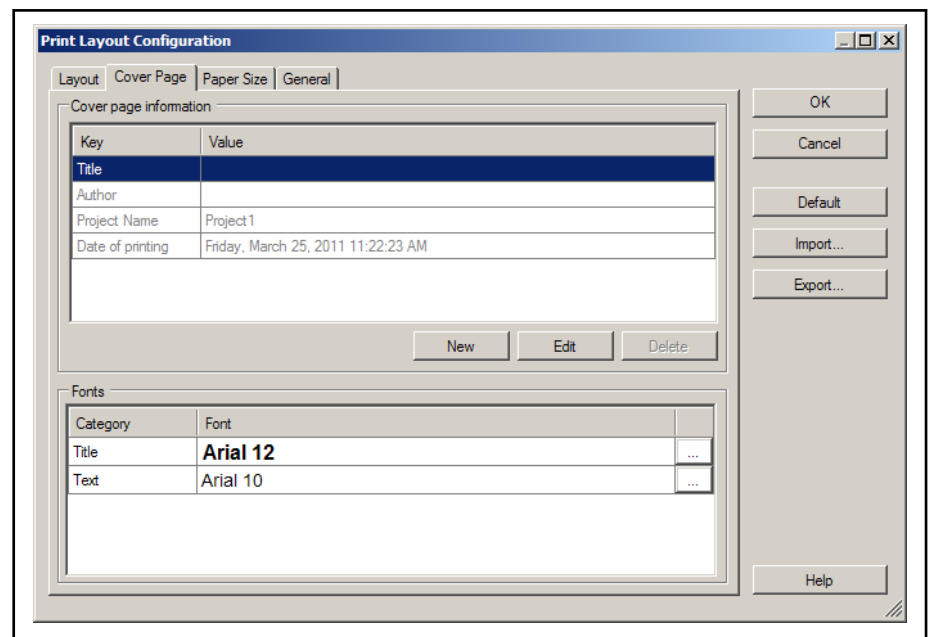


Fig. 3-185: Print settings ("Cover Page" tab)

- Button "New"

This opens the "Create cover page item" dialog:

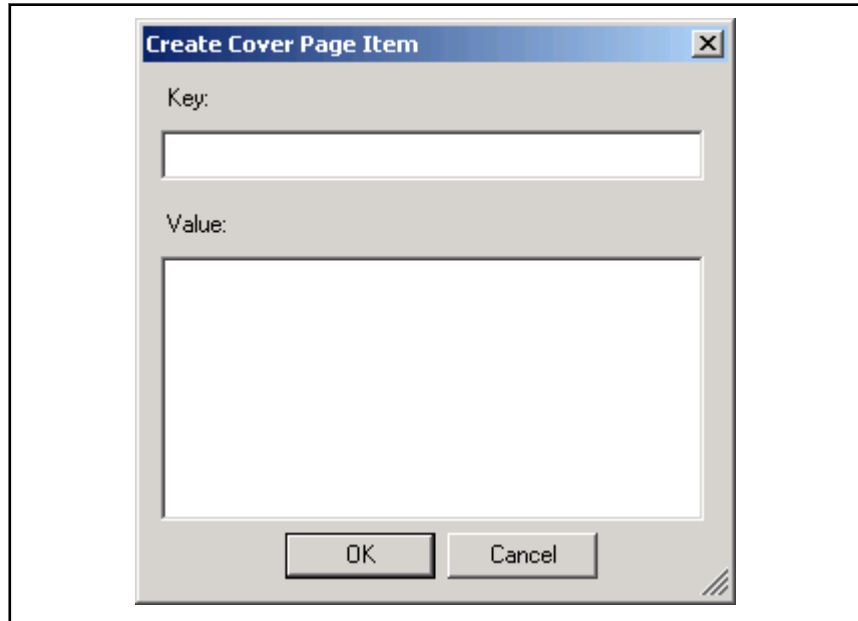


Fig. 3-186: Create cover page item

OK adds the key and the value to the "Cover page item" list view on the "Cover page" tab.

- **Button "Edit"**

Select an existing key in the "Cover page item" list. Use the "Edit" interface to open the dialog "Edit cover page information". Edit data in this dialog.

- **Button "Delete"**

Select an existing key in the "Cover page item" list. **Delete** deletes the cover page information (key and value).



Default keys are available in the "cover sheet information" dialog. These keys cannot be deleted. The values of "Title" and "Author" can be changed. All other values such as "Project name" and "Printing date" are determined from the project node and the current date/time.

Fonts

In the **Fonts** section, the font for heading and printable text can be configured.



- "..." opens the "Font" dialog.
- The fonts are also used for the separator sheet.

Tab "Paper size"

The "Paper size" tab displays the settings supported by the current printer. If no printer is installed, the default paper formats are displayed in the "Format" field.

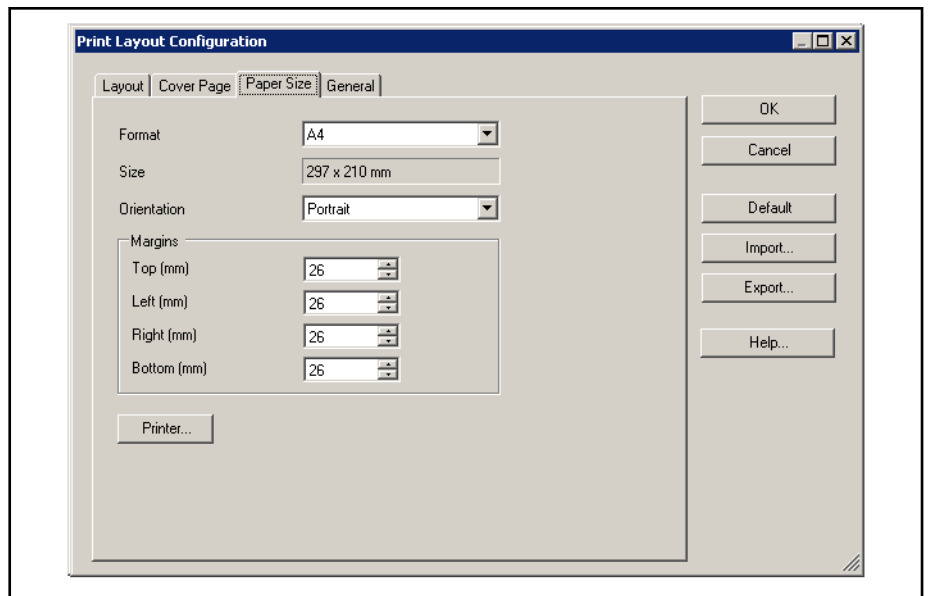


Fig. 3-187: Print settings ("Paper Size" tab)



The selected orientation determines the presentation of the layout on the "Layout" tab.

Click on "Printer..." to open a dialog, in which, for example, the printer can be selected and the printer properties viewed.

"General" tab

The **General** tab allows to make general print settings listed in the following sections:

- "Options"
- "Fonts"

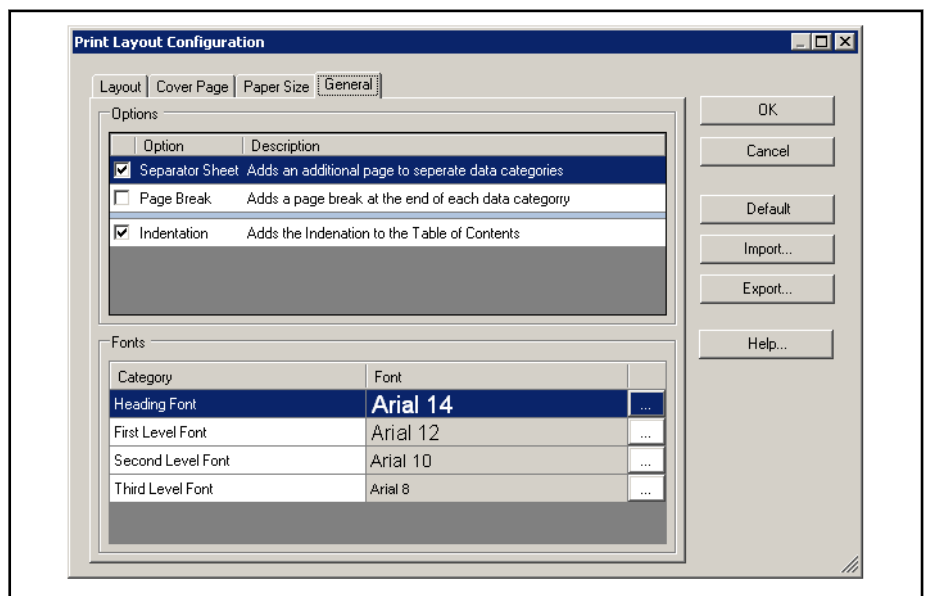


Fig. 3-188: Print settings ("General" tab)

"Option"

The "Options" section uses checkboxes:

- "Separator sheet"

Select this checkbox to add a separator sheet between chapters.

- "Page break"

Select this checkbox to apply a page break at the end of each chapter.

The "Separator sheet" and "Page break" options exclude each other. However, both options can be deselected.

- "Indentation"

Select the "Indentation" checkbox to indent all heading levels in the table of contents.

- "Cover page"

Select the "Cover page" checkbox to include the cover page in the print preview and in the printout.

Fonts In the "Fonts" section, the font for heading and headings in the table of contents can be selected.



- "..." opens the "Font" dialog.
- The example of the table of contents on the "Layout" tab is used as preview of the selected fonts and the indentation.

3.17.3 Printing project and device data

Print components

The print comprises several pages shown in the following section as example.

Cover page Design your cover page if desired.

Use the "Cover page" tab of the print settings, see [chapter "Tab Cover page" on page 189](#).

Author:
User1

Project Name:
Project1

Date of printing:
Friday, March 25, 2011 11:47:59 AM

Description:
-

Fig. 3-189: Print/print preview - Example "Cover page"



Only if "General" select the "Cover page" checkbox to include the cover page in the print preview and in the printout.

Table of contents

The table of contents generally includes the following information:

- 1. The first heading level displays the device name.
- 1.1 The second heading level displays the data categories of the device.
- 1.1.1 The third heading level displays the file name of the printed data category.

Configure the table of contents in the "Print settings" on the "General" tab can be configured, see [chapter "General tab" on page 191](#).



A table of contents is not created if only one element is to be printed.



All IndraLogic objects are output in the table of contents. Thus, objects that cannot be printed are also displayed in the table of contents. For these objects, the following text is inserted below the title in the expression:

"The object does not support the print functionality."

IndraLogic	Version 1.0
Plc Programm for CPS2	Date 06.02.2006

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1.3. Global variables	13
1.4. Task Configuration	15
1.5. Target System Configuration	17
1.6. PLC Configuration	19
1.7. Libraries	21
	23

Company name	Page 2

Fig. 3-190: Print/print preview - Example "Table of contents"

Separator sheet - Device

This page contains the name and the description (optional) of the selected device.



Separator sheet and cover page have the same font.

Configure the separator sheet in the "Print settings" on the "General" tab can be configured, see [chapter "General tab" on page 191](#).

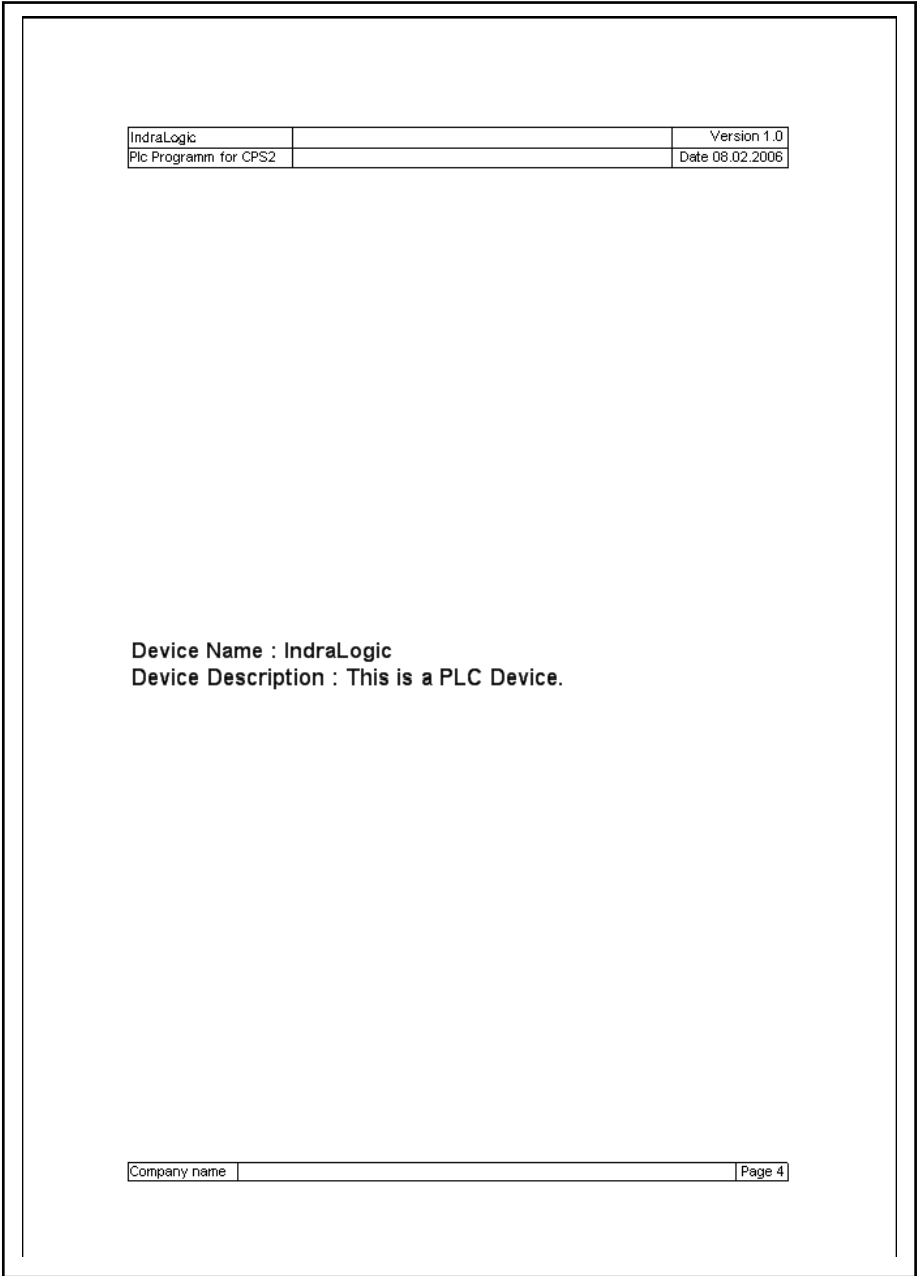


Fig. 3-191: Print/print preview - Separator sheet "Device"

Separator sheet - Device data

This page contains the name of the device data.



Separator sheet and cover page have the same font.

The separator sheet in the "Print settings" on the "General" tab can be configured, see [chapter "General tab" on page 191](#).

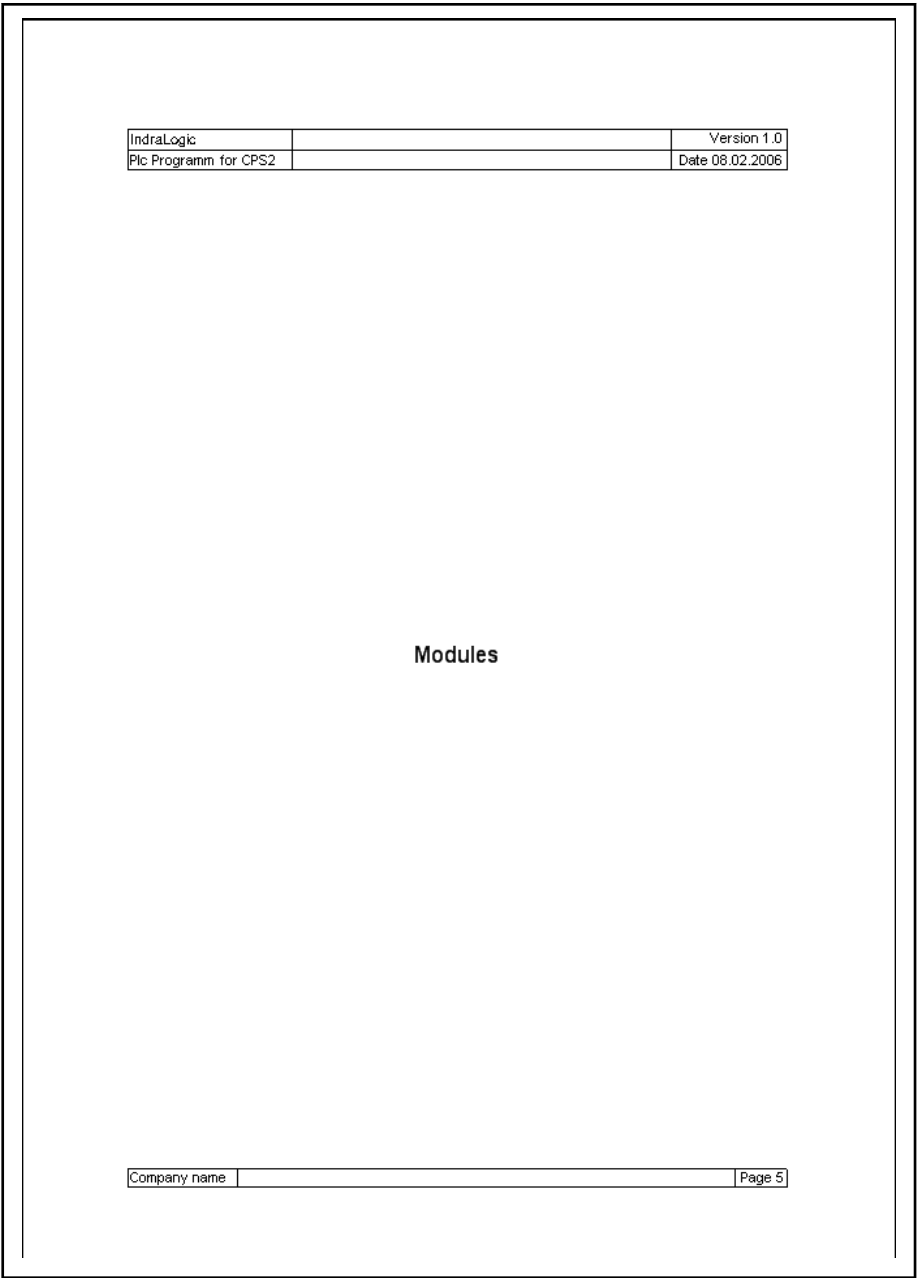


Fig. 3-192: Print/print preview - Separator sheet "Device data"

Device data This page contains device data and device-specific information.

Fig. 3-193: Print/print preview - Device data

Print and print preview

Choose between the print preview or printing of:

- Data of a device
- IndraWorks project data including all devices



The scope of the data can be detailed in both cases via a dialog.

Proceed as follows:

1. Open IW project:
Open IW project with printable devices.
2. Select function:

Select element to be printed:

- To print data of an IndraWorks project with its devices or to display it in the print preview, select the project node in the Project Explorer.
- To print the data of individual devices/nodes or to display these in the print preview, select the device/node in the Project Explorer.

Enable the function **Print...** or **Print preview...** in the context menu of the selected node. Alternatively, use the functions in the main menu **File**.

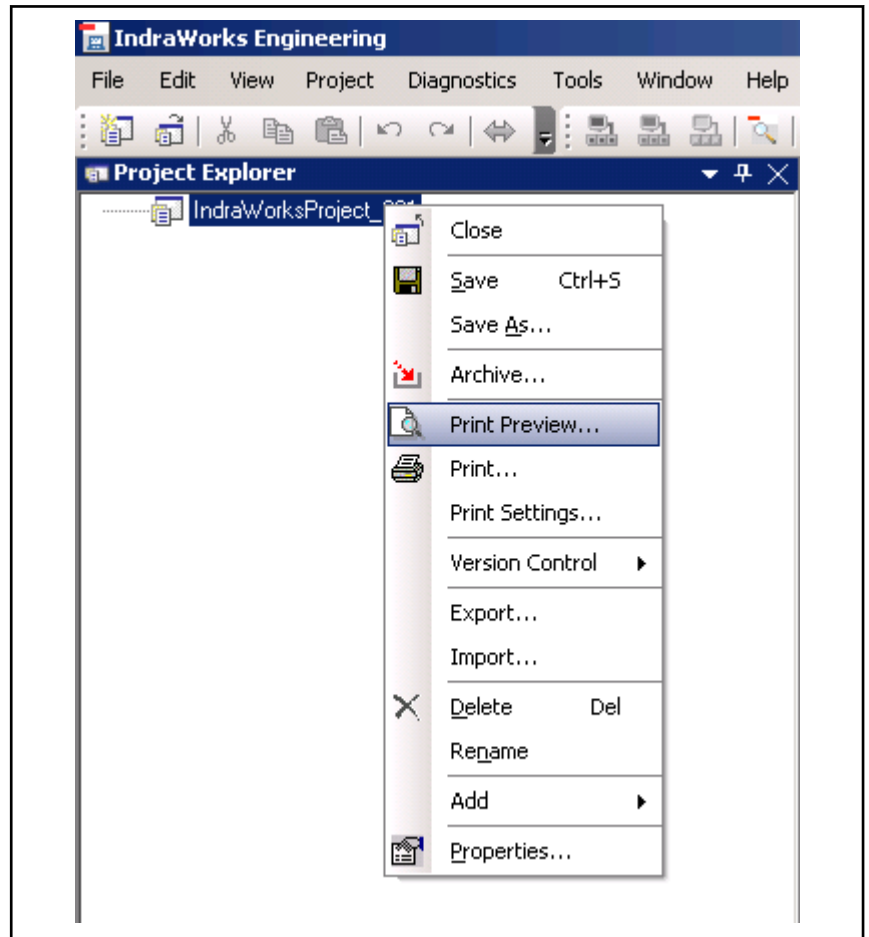


Fig. 3-194: Print/print preview - Select function

3. Selecting data to be printed:

The following dialog displays all the printable devices and nodes of the project on the left side.

Highlight a device or printable node in this tree structure and the relevant data categories of this node are displayed on the right side of the dialog. The data categories display an overview on the printable data of the selected node.

Select the devices and nodes to be printed and their data categories to be printed and select them with the mouse.

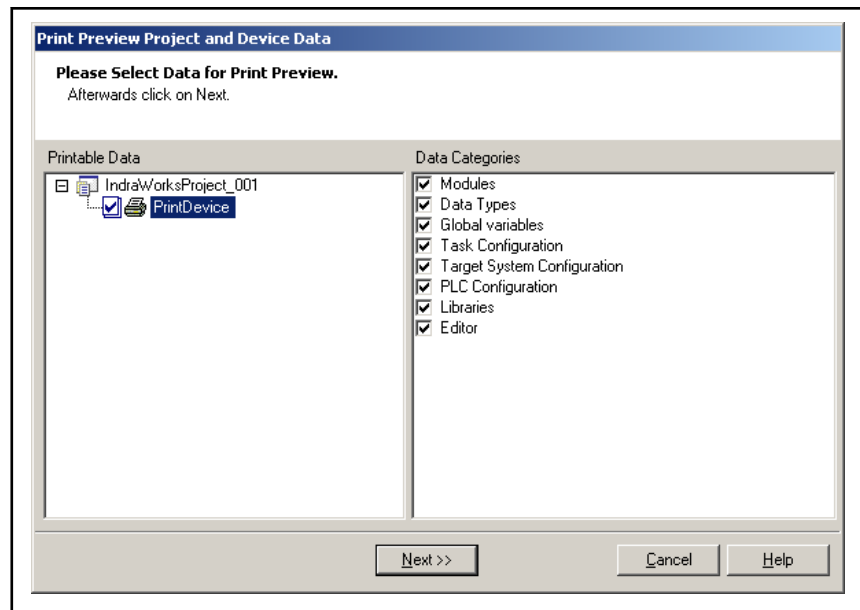


Fig. 3-195: Print/print preview - Select data and data categories



- Focus on a node in the tree structure, to use its context menu to select or deselect all printable data of this node and of its subordinate nodes.
- The selection for data and data categories remains after completion of the "Print" and "Print Preview" functions.

Confirm with "Next >>".

4. Check:

Check your settings in the next dialog.

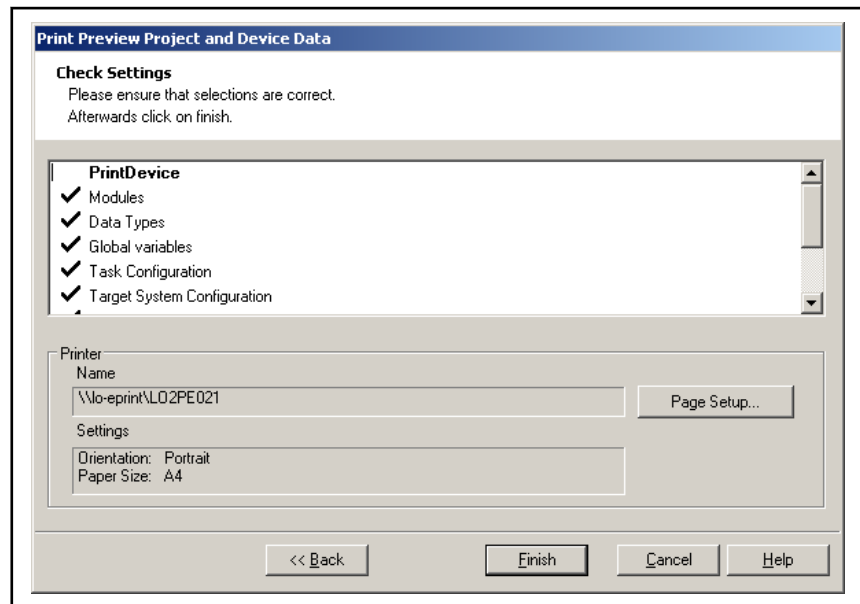


Fig. 3-196: Print/print preview - Check settings

- The dialog indicates the selected devices and nodes and their data categories with a checkmark.
- The selected printer and basic settings are shown in the "Printer" area.

- Use the "Page setup..." button to change the printer and the settings for margins, page orientation and paper size.
- "Finish" starts "Printing" or the "Print preview".

5. Progress bar

A progress bar is displayed until all pages are prepared for printing or print preview.

Stop this process with "Cancel". However, the pages already prepared are printed or displayed.

3.18 IndraWorks user management

3.18.1 General information

Working method for user management

User management ensures that control stations (IndraWorks Operation) only allows authorized persons to access protected functionality. Before users can access protected functionality, they must log in to the control station specifying a user name and a password. The authorization system checks the rights of the logged-in user each time before a protected function is called up and, if necessary, denies their execution if the user does not have the necessary rights.

The establishment of user administration (configuration of users, groups and rights, as well as settings) is performed in IndraWorks Engineering. The resulting user management data are stored within the IndraWorks project.

User management data is then transferred from the Engineering PC to the control stations via the "Transfer and enable visualization data" function.



User management and versioning cannot be used simultaneously in one project. User management cannot be enabled in a versioned project.

User management in the IndraWorks project

User management data are stored within IndraWorks projects. In practice, this means that different IndraWorks projects each have an individual user database.

When creating a new IndraWorks project, or when opening a project created with a previous version of IndraWorks, an initial user database is created that contains exactly one user. This is the administrator (user name "Admin"). The administrator always has all rights and therefore has unrestricted access to all protected features. The administrator's user account should only be used for administrative tasks.

Users, groups, rights

A user is a person intended to work on a control station and who therefore requires certain authorizations. Users are identified by a unique user name. The unique user name has other properties in addition to the first and last name, description, settings, etc. Users in IndraWorks have no directly associated rights, but rather they have the rights of the groups in which they are members.

Groups enable the definition of rights profiles and their assignment to one or more users. Rights are thereby given to groups and assumed by the users included in the group. A user has then the sum of the rights of all groups in which he is a member.

A right allows access to a particular protected functionality at a control station.

Initial password

When a new user is created, they are issued with a blank initial password. The entry of the user name in the log-in dialog is sufficient when a new user

	logs on for the first time. User management recognizes that the user is logging in for the first time and prompts him to set a password.
The administrator	In IndraWorks, the administrator (user name "Admin") has the role of super user. The administrator is available in an initialized user database immediately after a new IndraWorks project is created. He always has, by definition, all rights, without restrictions. The user data of the administrator, with the exception of some settings, cannot be changed. The administrator cannot be deleted. In production, an administrator's function should not be performed at a control station. For production, it is recommended that the administrator's initial password is changed and the administrator's account is locked.
Standard groups	To simplify the configuration or authorization, user management provides predefined default groups that have typical rights profiles of common user groups. Include users in standard groups to provide them with typical rights profiles. This method reduces configuration effort. Standard groups are predefined and cannot be changed nor deleted. However, it is possible to copy default groups and to modify the copy to meet the requirements. The copy of a standard group is a "normal" group, i.e. it can be changed and deleted.

3.18.2 Configuring the user management (IndraWorks Engineering)

Enabling the user management

When a new IndraWorks project is created, user management is initially inactive. In this state, after transferring the visualization data to a control device, all protected features of the control unit are enabled.

To enable user management, in IndraWorks Engineering, select the menu option **Project ► HMI-design ► Enable user management**.

As soon as this menu option is selected, user management is configurable in IndraWorks Engineering. User management data are transferred to a control device together with the visualization data (function "Transfer and enable visualization data"). Once completed, the scrutiny of authorization is enabled on the control device to the given design.



After transfer to a control device, user management data can be changed directly from the control device. This is necessary, for example, if a user changes their password from the control device. Repeating the transfer of visualization data to the control device would overwrite any locally modified user data with the older data in the project.

Before changing user management data in IndraWorks Engineering with the "Retrieve changes from the control station" function, it is therefore important to upload the current user management data for the control device to the project.

User and group lists

To show the list of users and groups for an IndraWorks project, open the project and then select **Project ► HMI-design ► Configure user management...**. The "Configure user management" dialog opens. This dialog contains two tabs that display the list of users and list of groups. Clicking the "User" or "Groups" tab brings the respective list to the foreground.

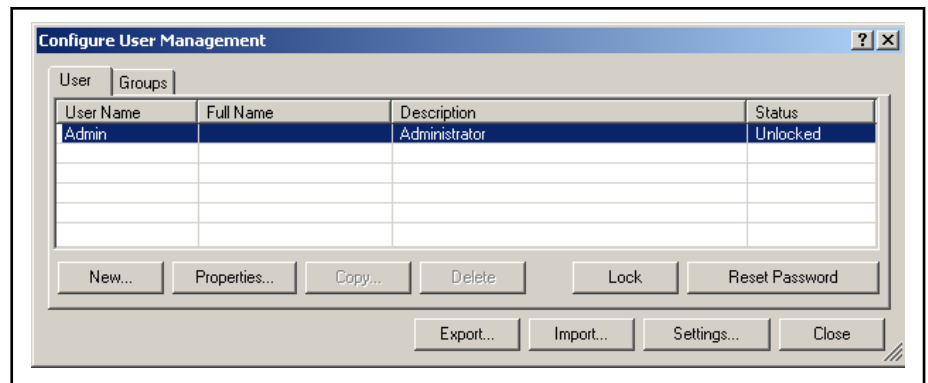


Fig. 3-197: Configure user management dialog - List of users

User name The user name is the name that must be entered along with the password in the log-in dialog.

Full name The full name of the user in the format <Last name>, <First name> is displayed here.

Description This column contains a short description of the user.

Status The user's status is displayed here. The status "Unlocked" means that the user can log in to IndraWorks. If the status is set to "Locked", IndraWorks denies this user's login.

Below the user list is "New...", "Properties...", "Copy...", "Delete", "Lock" and "Reset password". Clicking on these buttons runs the respective functions. A detailed description of these functions can be found later in this chapter.

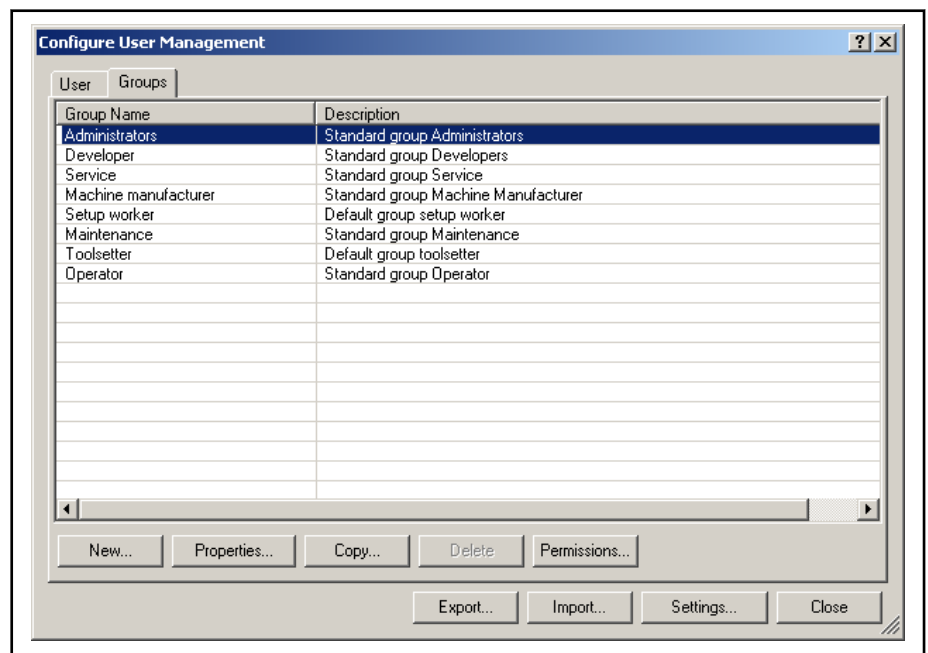


Fig. 3-198: Configure user management dialog - List of groups

The group list consists of the columns "Group name" and "Description", which show the name of the group and give a brief description of the group.

Below the group list is "New...", "Properties...", "Copy...", "Delete", and "Permissions....". Clicking on these buttons runs the respective functions. A detailed description of these functions can be found later in this chapter.

Creating a new user

1. Open the "Configure user management" dialog and in the "User" tab click on "New.." to open the user dialog.

Fig. 3-199: Step 1: Enter the new user's data

User name This is the name with which the user logs in to IndraWorks. The user name cannot contain spaces and must be unique within IndraWorks project.

First name User's first name (optional)

Last name User's surname (optional)

Description Brief description of the user (optional)

Code If an external registration process is being used, the EKS key associated with the user must be entered in this field. The codes entered have to be unique in the project. This field can be left empty.

Enter a user name in the "General" tab. Ensure that the user name in the IndraWorks project is unique. An error message is received if the user name is already assigned to another user. The other input fields in this tab are optional and can be left blank.

2. Click on the "Settings" tab and carry out the settings for the new user using this tab.

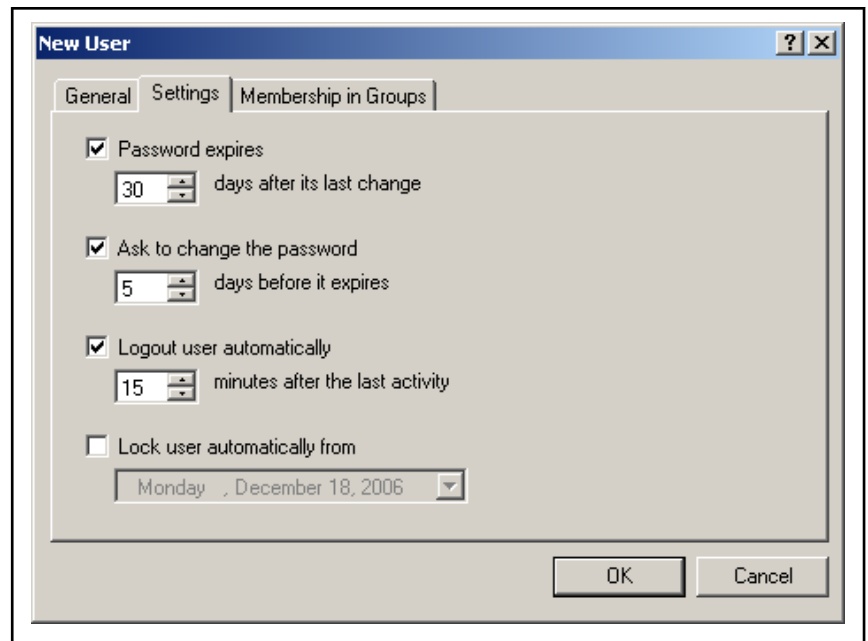


Fig. 3-200: Step 2: Carry out settings for the new user

- Password expires** Select this option if you want that the user's password becomes invalid after a certain expiry period and force the user to enter a new password. The expiration period can be set in days.
- Ask to change the password** This option is relevant if the "Password expiry" option is selected. If the option "Ask to change the password" is ticked, the user is prompted to change the password after an adjustable period of time has expired.
- Log out user automatically** Tick this option to automatically log out the user from IndraWorks after a specified time without any operations (keyboard, mouse). The period between the last operation and the user being logged off can be set in minutes.
- Lock user automatically from** Tick this option to lock the user from a specific date. Once the user is locked they can no longer log in to IndraWorks.

3. Click on the "Membership in groups" tab and assign the new user to one or more groups.

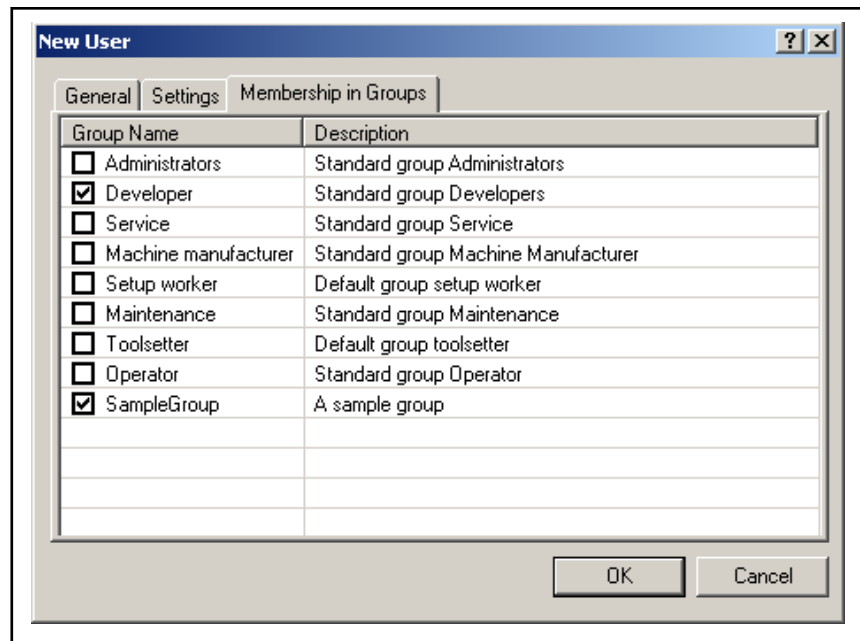


Fig. 3-201: Step 3: Assign new users to a group

- Click on **OK** to confirm the settings and close the user dialog. The newly created user appears in the user list.

Editing users

- Open the "Configure user management" dialog and select the user to be edited from the user list.
- Click on **Properties...** or press <Return> to open the user dialog. Alternatively, in the user list double click on the user to be edited. The user dialog input fields are prefilled with the user's current data.
- Now make the desired changes to the user's data and then press **OK** to apply the changes.

Copying the user

- Open the "Configure user management" dialog and select the user to be copied from the user list.
- Click on **Copy...** to open the user dialog. The user dialog input fields are prefilled with the original user's data. Exceptions are the user name and code because this data have to be unique for each user within an IndraWorks project.
- Now enter a new user name and, if necessary, make changes to the prefilled data. Press **OK** to apply the entries. The copied user now appears in the user list.

Deleting the user

- Open the "Configure user management" dialog and select the user to be deleted from the user list.
- Click **Delete** or press <Del>.
- Authorizing the following confirmation prompt with **Yes** deletes the user and removes the corresponding entry from the user list.

Lock or unlock user

The user can be locked to temporarily disable a user account. User management denies a log in attempt by locked users. The user can be unlocked at

any time to re-enable the user's account. The "Status" column in the user list displays the Locked or Unlocked status of the user.

Proceed as follows to lock or unlock a user:

1. Open the "Configure user management" dialog and select the user to be locked or unlocked from the user list. The text below the user list matches the **Locked** or **Unlocked** status of the selected user.
2. Click on **Lock** or **Unlock** to change the status of the user. Alternatively press the SPACEBAR. The changed user status is immediately displayed in the user list.

Resetting the user password

The Reset password function restores a user's password to the initial state, so that the user is prompted to set a new password the next time they log in. This function is useful if a user forgets their password and is unable to log in.

1. To reset a user's password, open the "Configure user management" dialog and select the appropriate user from the user list.
2. Click on **Reset password**, the user is prompted to enter a new password at the next log in.

Creating a new group

1. Open the "Configure user management" dialog and in the "Groups" tab click on **New..** to open the group dialog.

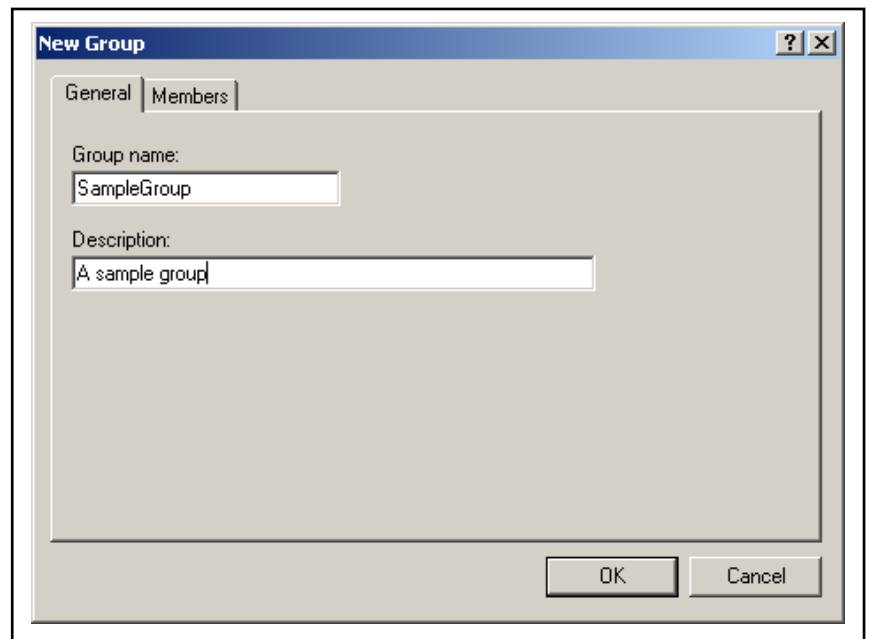


Fig. 3-202: New group (enter data of the new group)

Group name Name of the group

Description Brief description of the group (optional)

Enter a group name in the "Group data" tab. The input field "Description" in this tab is optional and can remain blank.

2. Click on the "Members" tab and add the users to the new group by ticking the appropriate checkboxes.

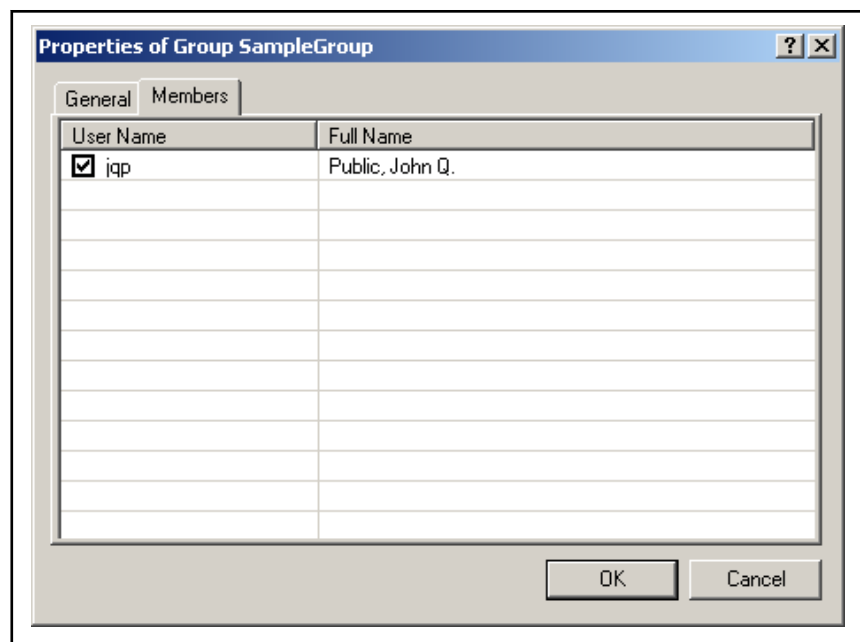


Fig. 3-203: New group (select members of the new group)

3. Close the group dialog with **OK** to confirm the settings. The newly created group appears in the group list.

Editing the group

1. Open the "Configure user management" dialog and select the group to be edited from the group list.
2. Click on **Properties...** to open the user dialog. The group dialog input fields are prefilled with the group's current data.
3. Now make the desired changes to the group's data and then press **OK** to apply the changes.

Copying a group

1. Open the "Configure user management" dialog and select the group to be copied from the group list.
2. Click on **Copy...** to open the group dialog. The group dialog input fields are prefilled with the original group's data, with the exception of the group name. It is empty and needs to be re-entered.
3. Now enter a new group name and, if necessary, make changes to the prefilled data. Apply the input with **OK**. The copied group now appears in the group list.

Deleting a group

1. Open the "Configure user management" dialog and select the group to be deleted from the group list.
2. Click **Delete** or press <Del>.
3. Authorizing the following confirmation prompt with **Yes** deletes the group and removes the corresponding entry from the group list.

Editing group rights

1. Open the "Configure user management" dialog and select the group whose rights are to be edited from the group list

2. Click on **Permissions...** or press <Return> to open the permissions dialog.
3. Change the permissions of the group by checking or unchecking the corresponding checkbox on the various tabs.
4. Confirm the entry and close the Permissions dialog with **OK**.

Settings

To change the user management settings, open the "Configure user management" dialog and click on **Settings**. Settings can now be made for log in, network-wide passwords and user lockout, external registration process and logging in the various dialog fields.

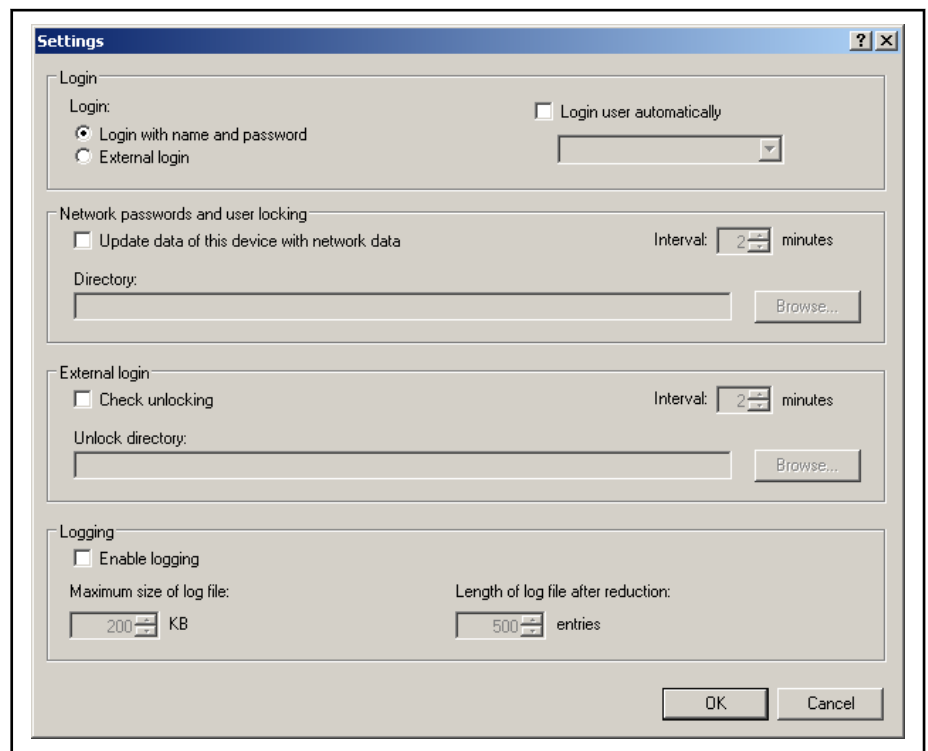


Fig. 3-204: Settings

Log in

The "Login" field is used to make settings relating to the procedure for logging in and the automatic user log in.

Select the log in procedure "Login with name and password" if users are to log in by entering their user name and password. The log in window opens automatically if users can call protected functionality without having to log in, or if the existing rights are not sufficient.

If an external procedure should be applied, select "External login". External procedure is defined as all user log in procedures requiring a key switch or a Euchner EKS key instead of entering a user name and a password. This facilitates log in on control stations without a keyboard by inserting a key or using an ECS key.

The option "Login user automatically" implements the functionality of a standard user. If the option is switched on and a user selected, user management ensures that the selected user is logged in immediately after IndraWorks is started, and always logged in if no other user is logged in.

Network passwords and user locking

Enable this option if the IndraWorks project includes several control stations and password changes or user locking made on one control station should affect all of the other control stations.

As a directory, select a directory that is released for network access. This directory is then used for matching the passwords or the list of locked users between the control stations.

As the interval, set a period according to which each data matching is carried out. The shorter this period of time is selected, the faster a password change on one control station affects the other control stations. An interval that is too short may load the overall system unnecessarily. Therefore, a minimum interval of 2 minutes is provided which cannot be undercut. Select the interval to be as long as possible and as short as necessary.

External login

This field is only relevant when working with an external procedure and Euchner EKS keys in conjunction with Euchner EKM software. The EKM software generates activation files from the serial numbers of the EKS keys, from which user management can detect whether an EKS key is unlocked for a user to log in.

Select here whether the activation of the ECS keys should be monitored and in which directory the activation files are located. This directory must be accessible from a network. Also specify a time interval after the expiry of which the activation files are reread. The same applies to this time interval: as long as possible and as short as necessary.

Logging

User management features a selectable log function that writes all log in and log out operations, as well as all rights queries in a log file. Tick the checkbox "Enable logging" to turn on the log function.

The log file is located in a specific user management installation directory (normally C:\ProgramData\Rexroth \IndraWorks\2\Cache\Userman\) and is called IndraWorks.Userman.Log.csv. It is a Unicode CSV text file that can be opened and evaluated with MS-Excel or OpenOffice Calc. The column delimiter is a semicolon.

To prevent the log file from growing in an uncontrolled manner, the file size is monitored and the file is shortened to a minimum number of rows if the file exceeds a maximum size. This process cuts off the beginning of the log file so that the current log entries remain.

Using "Maximum size of log file", set the size at which the log file should be reduced and use "Length of log file after reduction" to specify how many lines of the log file are to be reduced.

Export and import**Exporting the user data base**

If the IndraWorks project user database should be used in one or more other IndraWorks projects, export the project user database to a zip file. Then download this or the other IndraWorks projects and import the zip file with the exported user data.

1. To export the user database, open the "Configure user management" dialog and click on **Export....**
2. Now select the directory into which the user database is to be exported from the file selection dialog and specify the name of the zip file.
3. Start the export with **OK**.

Importing the user data base

1. To import an exported user database into an IndraWorks project, open the "Configure user management" dialog and click on **Import.....**

- Now select the zip file to import in the file selection dialog and start the import with **OK**.



When importing, the current user database data are replaced by the data being imported. This operation cannot be undone. Take this into account to prevent loss of data.

Importing ACC001.DAT

User databases that were created with earlier versions of IndraWorks (file ACC001.DAT) can be loaded using the import function.

- To import an ACC001.DAT file into an IndraWorks project, open the "Configure user management" dialog and click on **Import.....**
- Set "Acc001.DAT" as the file type and select the file.
- Start the import with **OK**.



When importing, the users are loaded from the ACC001.DAT file. The data in the current user database data are replaced by the data being imported. This operation cannot be undone. Take this into account to prevent loss of data.

3.18.3 Working on control stations with user management

Setting the password upon first log in

At the first log in at a control station, a prompt to set a new password is given.

Proceed as follows:

- Select the menu item **File ► Login user...**
- Enter the user name in the log in dialog (do not enter the password) and confirm with **OK**.



Fig. 3-205: Login user (user's first log in)

- User management now recognizes that this is the first time the user is logging in or that the user's password has been reset - and a prompt to set a password is given. Confirm the following message with **OK**.

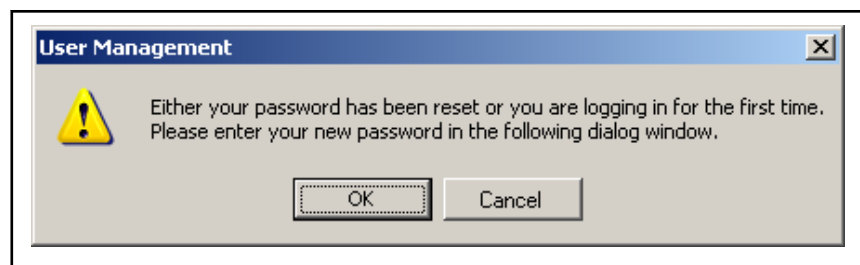


Fig. 3-206: User management detects that it is the first login

4. Now enter a new password and the password confirmation, and close the entry with **OK**. From this point on, always enter the user name and user defined password when logging in.

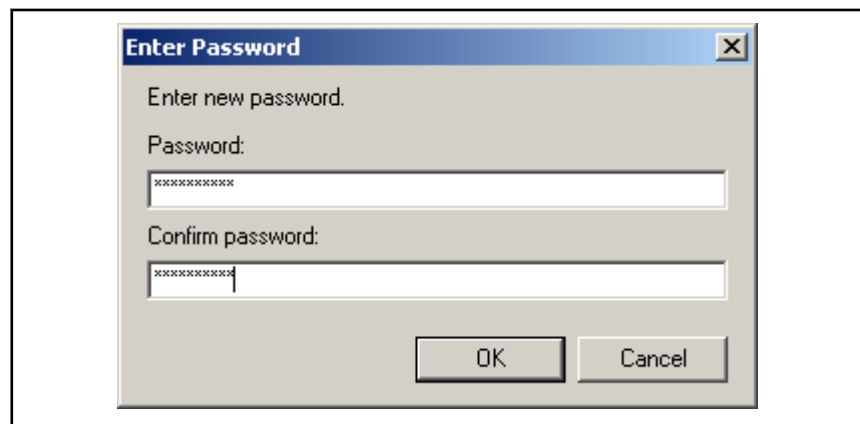


Fig. 3-207: Entering a new password and password confirmation

The log in is now complete and the user can work on the control station in accordance with their authorizations.

User log in

1. To log in to IndraWorks, select **File ► Login user...**
2. In the Login dialog, enter your user name and password and complete the entry with **OK**.

The log in is successful provided that the user name and password entered were correct. If this is not the case, an appropriate message is displayed.

User log out

1. To log out of a control station, select **File ► Logout user...** from the main menu
2. Then a message appears that confirms successful log out.

Changing the password

1. To change a password, first log in to a control station.
2. Then select **File ► User management ► Change password....**
3. In the "Change password" dialog, enter the old password, the new password, and the password confirmation. Close entry with **OK**.



Fig. 3-208: Changing the password

Log in with reference code and key code

Logging in with a reference code and key code permits logging in to a control station with administrator rights. It is intended for emergencies where normal log in is not possible. Proceed as follows to log in using a reference code and key code:

1. Select **File** ► **User management** ► **Log in with reference code and key code**.
2. A log in window opens displaying an eight-digit reference code in the "RefCode" field. Send the reference code to Bosch Rexroth Service. In doing so, leave the log in dialog open.

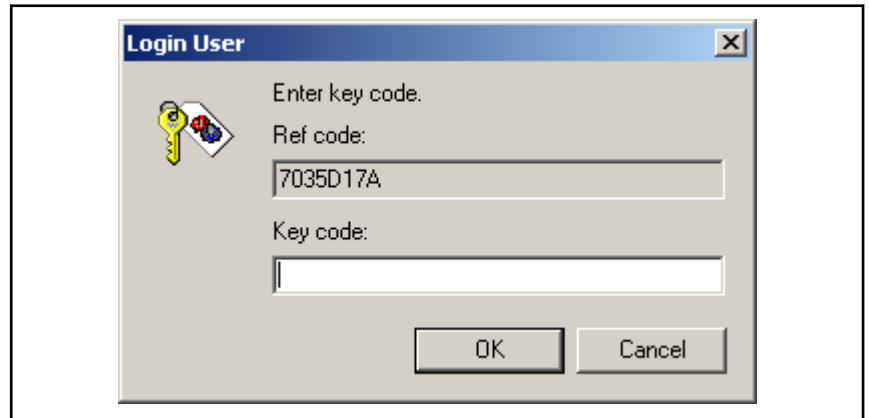


Fig. 3-209: Log in with reference code and key code

3. Bosch Rexroth Service provides a key code that matches the reference code. Enter this code in the "KeyCode" input field and press **OK**. Log in with Administrator rights is now complete.

A key code only works with the matching reference code. A new reference code is issued for each log in. Old key codes cannot be reused.



After logging in with a reference and key code, all functions are unlocked (administration rights enabled). Please work with particular care and log out from the control station when the task is completed.

3.19 User login with EKS keys

3.19.1 General information

The following sections describe the use of the EKS keys of Euchner for user login.

The EKS system consists of transponders (keys) and readers, facilitating contactless reading out the keys. Worldwide, each transponder has a unique 64 bit serial number as well as 116 freely programmable data bytes.

The readers can be connected to the PC or the operating device via the following interfaces:

- Serial
- USB
- Ethernet



To program the EKS keys, Euchner provides corresponding software.

Operating principle:

By evaluating the data bytes of an inserted EKS keys, a code is determined.

If the determined code matched the code of a user in the IndraWorks user management, the user is logged in.

To determine the EKS code, there are two variants. However, only one variant can be used:

- EKS login using a definable key data format, refer to [chapter 3.19.2 "EKS login using a definable key data format" on page 212](#)
This format allows for a free definition of the key data format and uses the login via PLC interface, see [chapter 3.20 "PLC interface of the user management" on page 227](#)
- EKS login using a fixed key data format, refer to [chapter 3.19.3 "EKS login using a fixed key data format" on page 215](#)

3.19.2 EKS login using a definable key data format

This chapter describes how to set up the EKS login by using a definable key data format.

In this variant, all data programmed on an EKS key are written to the PLC when inserting the key. When removing the key, all data is deleted from the PLC.

The PLC program can evaluate the information and can log a user in or off by writing a function block variable.

After IndraWorks has been installed, the required program parts are available on your PC or operating device and can be activated as follows:

To activate the EKS login using a definable key data format, proceed with the following steps:

1. Browse for the `_DDP.OPDLoadingSequenceForPlcLoginWithEks.xml` file in the `Config` subdirectory of the IndraWorks installation directory and delete the underscore in front of the file name.



It is also possible to save the `DDP.OPDLoadingSequenceForPlcLoginWithEks.xml` file in the IndraWorks project.

This causes a restricted availability. The EKS system is only available on the control panel if the respective project was activated for IndraWorks Operation.

If required, copy the `_DDP.OPDLoadingSequenceForPlcLoginWithEks.xml` file located in the Windows Explorer to the subdirectory `Config` of the HMI device, part of the operating station in the IndraWorks project and delete the underscore.

2. If you work with the USB variant of the EKS terminals, install the EKS USB driver as described in [chapter 3.19.4 "Installing EKS USB Driver" on page 221](#).

No further installation is required for the EKS terminals with either a serial or an Ethernet interface.



Several EKS terminals can be operated at the same time (also either serial connection, via USB or Ethernet).

3. If you work with the Ethernet variant of the EKS terminals, provide the IP address(es) of the terminal(s) to the IndraWorks Operation. This is carried out by editing the `DDP.OPDLoadingSequenceForPlcLoginWithEks.xml` file. Therefore, enter one or several IP addresses as value into the entry `Terminals EthernetAddresses`. The IP addresses are separated by a semicolon or a comma.
4. Enter the instance path of the function block in the PLC used for data exchange with IndraWorks via the entry `Plc FunctionBlockInstance` in the application `EksToPlc` and in application `PlcLogin`.

Example extract of the configuration file:

```
...
<Settings>
  <Plc FunctionBlockInstance="Applikation.Globale_Daten.fbUSERMAN" />
  <Terminals EthernetAddresses="192.168.1.10;192.168.1.11" />
</Settings>
...
```

5. Start IndraWorks Engineering and open the user management setting for the respective project via **Project ► HMI configuration ► Configure user management....** Select "External login".

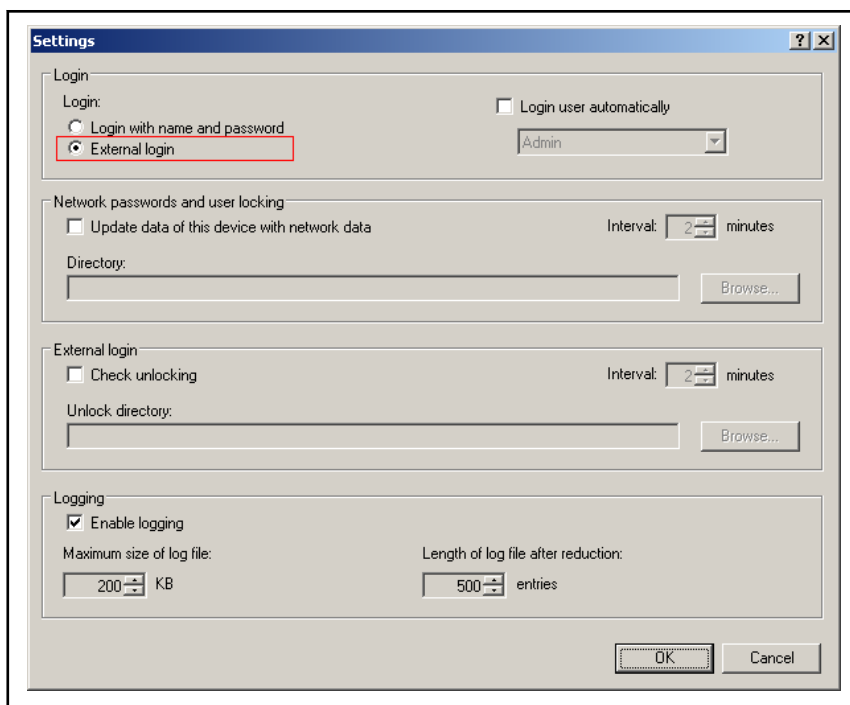


Fig. 3-210: Dialog Settings (select "External login")



After selecting "External login", a login is still possible with name and password via **File ► User management ► Login user....** Additionally, user management allows you now to login by inserting an EKS keys into a connected EKS terminal. Removing the EKS key from the EKS terminal logs out the user automatically.

6. Create a function block with the following variable declaration in the PLC program:

Program:

```
FUNCTION_BLOCK IL_Userman

VAR_INPUT
  (*read by HMI*)
  byLoginCmd      : BYTE; (* Command, 00hex = logout, FFhex = login *)
  strLoginCode    : STRING; (* Code of user to be logged in *)
  dwMediaId       : DWORD; (* release code, can be set to 0 *)
END_VAR

VAR_OUTPUT
  (*written by HMI*)
  byUsermanEnabled : BYTE; (* indicates, whether the user management is enabled *)
  byUserLoggedIn   : BYTE; (* indicates, whether a user is logged in *)
  strCurrentUserName : STRING; (* login name of the user *)
  uiAuthorizations : UINT; (* 16 Authorization bits of the logged in user *)
  diPcTickCount    : DINT; (* tick count of PC, updated every 15 seconds by HMI *)
  ulEksSerialNumber : ULINT; (* serial number of plugged in EKS key or 0 *)
  aEksKeyData      : ARRAY[0..115] OF BYTE; (* 116 bytes key data of plugged in EKS key *)
END_VAR

VAR
  ...
END_VAR
```

7. Define a variable of the function block type in a global variable list and release the variable in the symbol configuration. The instance path of this variable has to be entered in the DDP.OPDLoadingSequence-ForPlcLoginWithEks.xml file as described under step 4.

8. The function block can now be implemented to evaluate the data in `ulEksSerialNumber` and `aEksKeyData` and to trigger log in and log out of a user by setting the `byLoginCmd`, `strLoginCode`, `dwMediaId` variable, see [chapter 3.20 "PLC interface of the user management"](#) on page 227.

By a corresponding extension of the logic, a key switch can additionally be evaluated or checked if the user management in the project is enabled.

By checking for regular change in the `diPcTickCount` variable, a watchdog can be realized via a connection interruption between IndraWorks and the control.

To implement the function block, call the function block instance cyclically in the PLC program.

9. Compile the PLC program, transmit it to the control and start the program.
10. After the configuration of the user management has been completed, the visualization data has to be transferred to the operating station and has to be activated.

A subsequent restart of the IndraWorks Operation on the operating station is required.

3.19.3 EKS login using a fixed key data format

After IndraWorks has been installed, the required program parts are available on your PC or operating device and can be activated as follows:

To activate the EKS system using a fixed key data format, proceed as follows:

1. Search for the `_DDP.OPDLoadingSequenceForEksLoginDC.xml` file in the `Config` subdirectory of the IndraWorks installation directory and delete the underscore in front of the file name.



It is also possible to save the file `DDP.OPDLoadingSequenceForEksLoginDC.xml` in the IndraWorks project.

This causes a restricted availability. The EKS system is only available on the control panel if the respective project was activated for IndraWorks Operation.

If required, copy the file `_DDP.OPDLoadingSequenceForEksLoginDC.xml` located in the Windows Explorer to the subdirectory `Config` of the HMI device, part of the operating station in the IndraWorks project and delete the underscore.

2. If you work with the USB variant of the EKS terminals, install the EKS USB driver as described in [chapter 3.19.4 "Installing EKS USB Driver"](#) on page 221.

No further installation is required for the EKS terminals with either a serial or an Ethernet interface.



Several EKS terminals can be operated at the same time (also either serial connection, via USB or Ethernet).

3. If you work with the Ethernet variant of the EKS terminals, provide the IP address(es) of the terminal(s) to the IndraWorks Operation. This is car-

ried out by editing the file `DDP.OPDLoadingSequenceForEksLoginDC.xml`. Therefore, enter one or several IP addresses as value into the entry `Terminals EthernetAddresses`. The IP addresses are separated by a semicolon or a comma.

4. If you want to check the expiry date on the EKS key as well as one or several bits of the special bytes of the key in addition to the login data, edit the `DDP.OPDLoadingSequenceForEksLoginDC.xml` file.

Enable and configure the `AdditionalChecks` entry. The expiry date is checked for each when specifying `ExpiryDate="true"` for each connected key. Only if the date is correct and greater than the current date, login with this key is possible. If `ExpiryDate` is set to `"false"`, the check is not executed. Additionally, specify individual bits of the special bytes of the key that have to be set on the key to be accepted via the `SetBits` entry. More bits can be separated by a semicolon or a comma. Data has to be specified as `SO[1..9].[0..7]`. The part in front of dot is the special byte, the rear part specifies bit (0...7). If no bits are to be checked, set `SetBits=""`.

In the following example of the configuration file, the expiry date check of bit 7 of special byte 3 and the bit 2 of special byte 4 is configured:

```
...
<Settings>
  <Plc FunctionBlockInstance="" />
  <Terminals EthernetAddresses="192.168.1.10;192.168.1.11" />
  <AdditionalChecks ExpiryDate="true" SetBits="SO3.7,SO4.2" />
</Settings>
...
```

5. Start IndraWorks Engineering and open the user management setting for the respective project via **Project ► HMI configuration ► Configure user management....** Select "External login".

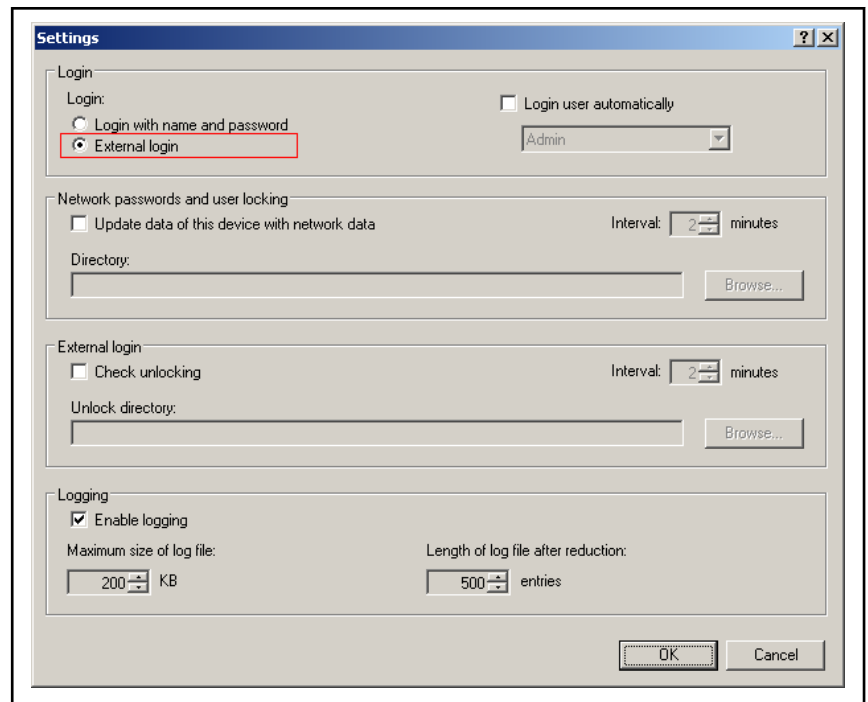


Fig. 3-211: Dialog Settings (select "External login")



After selecting "External login", a login is still possible with name and password via **File ► User management ► Login user....** Additionally, user management allows you now to login by inserting an EKS keys into a connected EKS terminal. Removing the EKS key from the EKS terminal logs out the user automatically.

- After the configuration of the user management has been completed (see [chapter "Setting up Users and Groups" on page 219](#)), the visualization data has to be transferred to the operating station and has to be activated.

A subsequent restart of the IndraWorks Operation on the operating station is required.

Querying EKS Key Data in the PLC Program

Using the "IL_Eks" function block

Starting from IndraWorks version 10V04, an "IL_Eks" function block is available in the "RIL_UserMan.lib" library. This can be used to easily query the EKS key data. Thus, the function block has to be defined as global variable in the PLC program and the instance has to be called cyclically. Additionally, the variable name has to be introduced to the EKS system by entering the name as value into the file `DDP.OPDLoadingSequenceForEksLoginDC.xml` in the `Plc FunctionBlockInstance` entry.

Example:

```
...<Plc FunctionBlockInstance="EKS_DATA01" />...
```

Using the function block has several advantages:

- Only the instance of the function block has to be defined.
- Any number of function block instances can be defined per PLC. This allows to operate several operating stations using a PLC without EKS data of the individual operating stations affecting each other. Thus, for each operating station, the name of the corresponding function block

has to be entered into the respective file `DDP.OPDLoadingSequence-ForEksLoginDC.xml`.

3. The function block contains a watchdog mechanism and thus ensures that - in case of a communication interference between PC and PLC - the EKS data in the function block is automatically reset after 30 seconds max.
4. The function block provides information whether a current communication interference between a PC and a PLC or a PC and an EKS terminal exists.

If an EKS key is inserted into an EKS terminal or if a key has already been inserted when starting the user interface, the login of the respective user as well as the EKS key data are written into the PLC assigned to the active HMI device. They are available as outputs for a further processing at the function block specified. When removing the EKS keys from the EKS terminal or when exiting the user interface, the data in the function block is reset.

Using global variables

Instead of using the function block, the following global PLC variables can still be defined to analyze EKS key data or information on the current protection level in a PLC program. Existing PLC programs do thus not have to be modified for the use of the function block.

Program:

```
VAR_GLOBAL
  EKS_SerialNo:STRING(16);      (*key serial number*)
  EKS_ProtectionLevel:INT;      (*protection level*)
  EKS_WorkerIdent:STRING(7);    (*worker ident*)
  EKS_SafetyOperationMode:BYTE; (*safety mode*)
  EKS_So1:BYTE;                (*special functions*)
  EKS_So2:BYTE;                (*special functions*)
  EKS_So3:BYTE;                (*special functions*)
  EKS_So4:BYTE;                (*special functions*)
  EKS_So5:BYTE;                (*special functions*)
  EKS_So6:BYTE;                (*special functions*)
  EKS_So7:BYTE;                (*special functions*)
  EKS_So8:BYTE;                (*special functions*)
  EKS_So9:BYTE;                (*special functions*)
  EKS_KeyIn:BYTE;              (*FFhex if key inserted, 00hex if no key*)
END_VAR
```

As soon as an EKS key was inserted into an EKS terminal and the respective user was logged in, IndraWorks writes the following data into the PLC assigned to the active HMI device if the variables mentioned above were declared.

EKS_SerialNo	Serial number of the EKS key as string. If the EKS key is removed, this variable contains an empty string.
EKS_ProtectionLevel	Protection level stored on the EKS key. Possible protection classes: 00 - 99. If the EKS key is removed, this variable is set to -1.
EKS_WorkerIdent	Workerident (e. g. employee number) as string. Use this data array to personalize EKS keys. If the EKS key is removed, this variable contains an empty string.
EKS_SafetyOperationMode	Safety mode. If the EKS key is removed, this variable is 0.
EKS_So1 to EKS_So9	Special functions If the EKS key is removed, these variables are set to 0.
EKS_KeyIn	Flag "Key inserted". As long as an EKS key is inserted and a corresponding user is logged in, the value of this variable is FFhex; otherwise 00hex.

Setting up Users and Groups

The IndraWorks user management analyzes the protection level stored in the EKS key, the special function "Rework" and the cost center data saved on the key if necessary and logs in a user depending on this data. The user to be logged in is defined via a code given by the administrator.

Fig. 3-212: Dialog Properties of user (the field "Code" defines the user to be logged in when inserting a certain EKS key)

The user management creates the code from the EKS key data according to the following scheme:

Pattern: eks_level_<protection level>[_r][_o][_<Cost center>]

The protection level is a three-digit decimal number. The user management supports protection levels from 000 to 099. The suffix "_ro" will be added if the special function "Rework" or "OperatingSystem" is set on the EKS key.

Optionally, a four-digit cost center name (consisting of the characters A-Z and 0-9) can be attached with an underscore. If the cost center is specified, it has to match the cost center data given on the EKS key to log in the user with this code. Otherwise, the cost center information on the EKS key is ignored, it is searched for a user and he is logged in if no cost center was defined for him.

Some examples of codes created from EKS key data are shown below:

- eks_level_001 : EKS key with protection level 1, no special function, no cost center
- eks_level_002 : EKS key with protection level 2, no special function, no cost center
- eks_level_001_r : EKS key with protection level 1, special function "Rework", no cost center
- eks_level_001_o : EKS key with protection level 1, special function "OperatingSystem", no cost center
- eks_level_001_ro : EKS key with protection level 1, special function "Rework" and "OperatingSystem", no cost center
- eks_level_003_ro_0815 : EKS key with protection level 3, special functions "Rework" and "OperatingSystem" as well as the cost center "0815"

The following user configuration and group configuration is recommended when using the EKS system in IndraWorks:

1. Create a user for each protection level and for each protection level with special functions. Assign a code to the users according to the protection level and special functions.

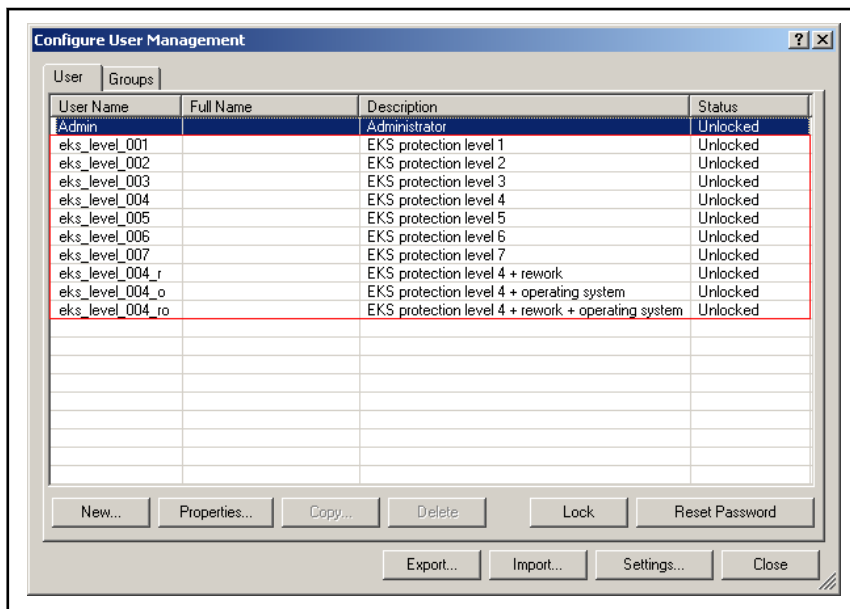


Fig. 3-213: Dialog Configure user management (user scheme based on EKS protection levels)

2. Create a group for every protection level and for every special function. Assign the necessary permissions to these groups. If the permission profiles of the groups are based on each other, assign only the permissions not given to the "lower" groups.

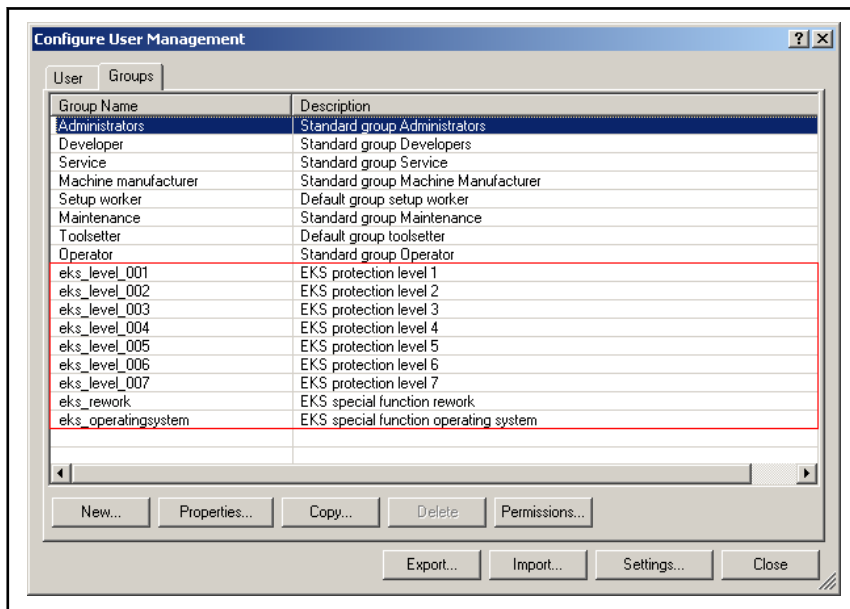


Fig. 3-214: Dialog Configure user management (group scheme based on EKS protection levels and special functions)

3. Assign every new user to the required groups.

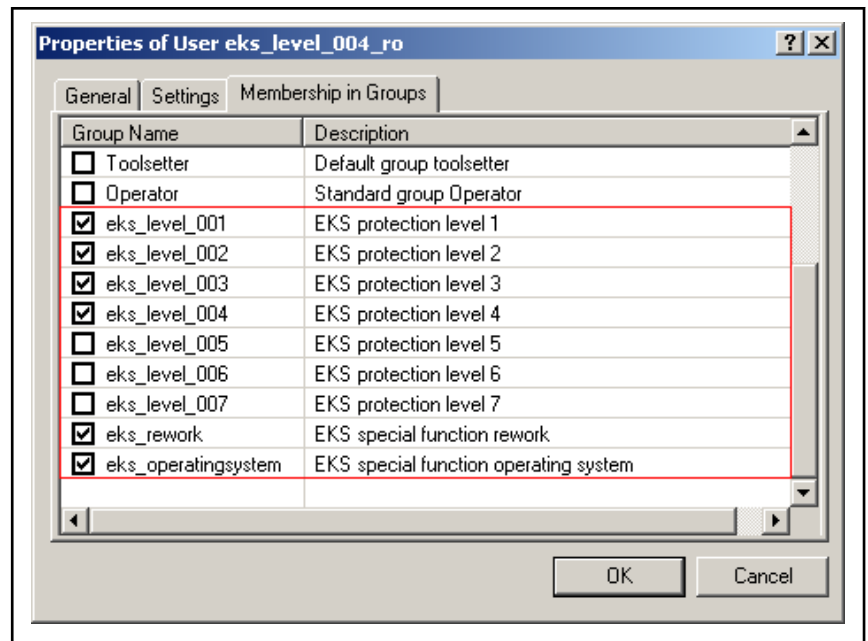


Fig. 3-215: Each user of an EKS protection level is member of the respective groups. The EKS protection level 4 with the special functions "Rework" and "OperatingSystem" is shown in the example.

3.19.4 Installing EKS USB Driver

The files for the EKS USB driver are located on the installation DVD of your IndraWorks installation.

To install an Euchner USB driver, proceed as follows:

1. Connect the EKS terminal to a free USB port

After the insertion of the EKS terminal in the USB port, the following message is displayed:

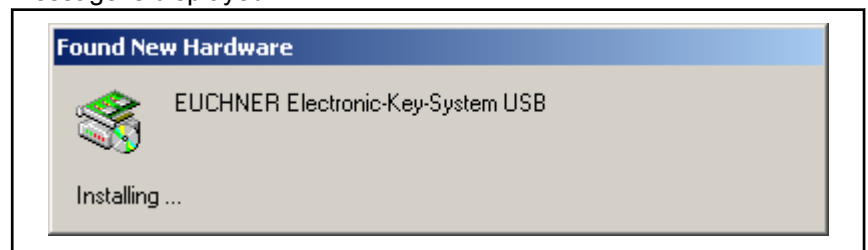


Fig. 3-216: Windows detected the newly connected EKS terminal. The Windows Hardware Wizard is started immediately afterwards.

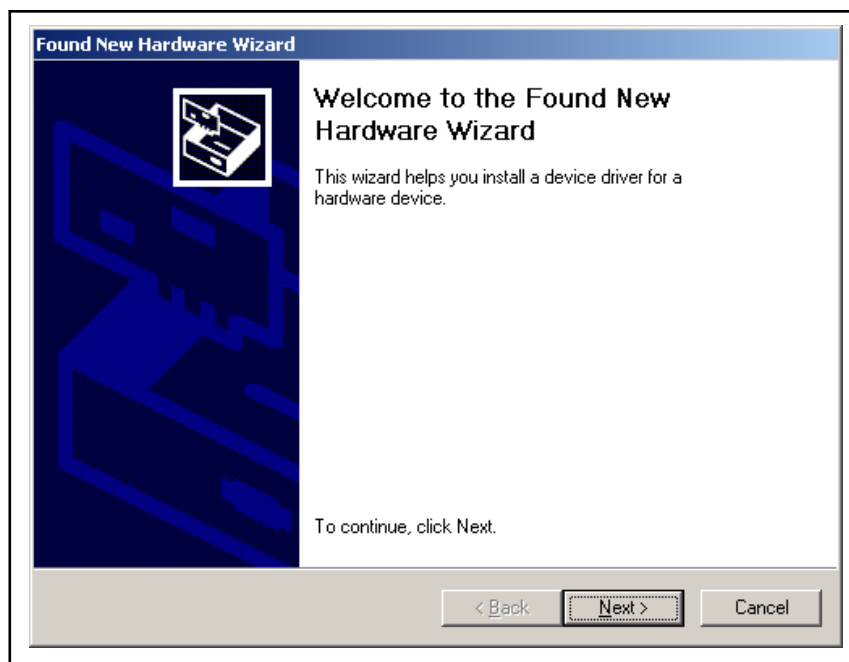


Fig. 3-217: Dialog Find new hardware wizard

2. Click on "Next".

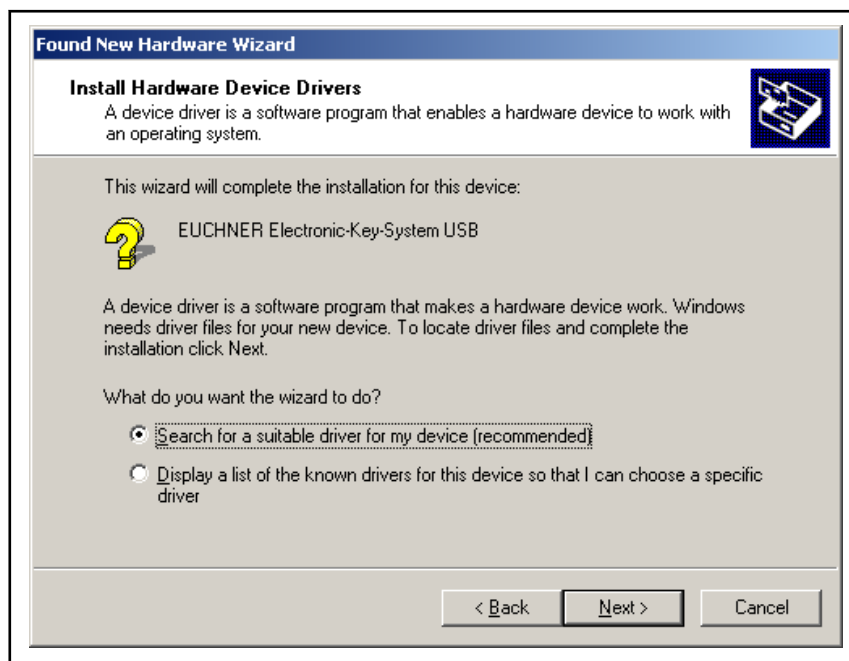


Fig. 3-218: Dialog Find new hardware wizard (installing hardware driver)

3. Click on "Next".

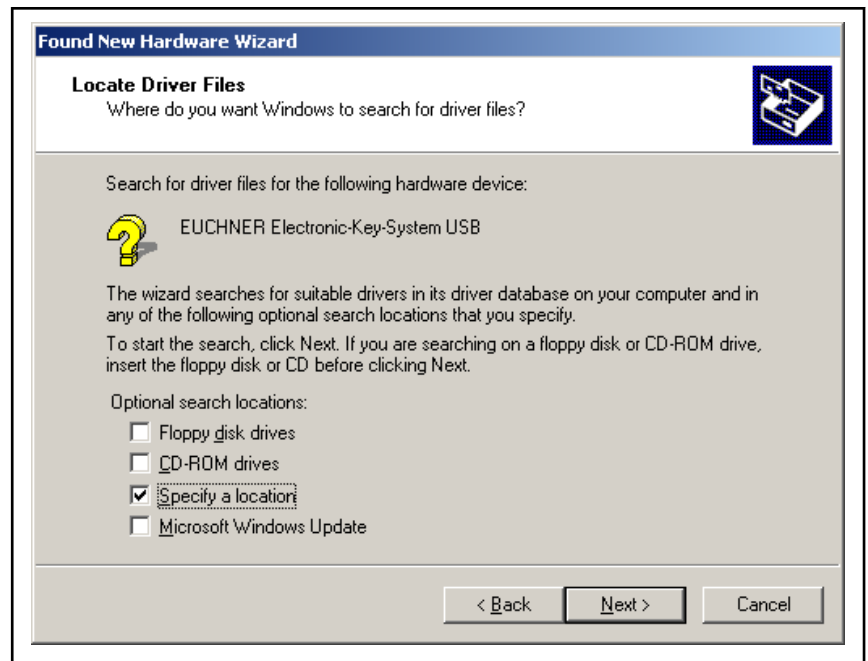


Fig. 3-219: Dialog Find new hardware wizard (finding driver files)

4. Click on "Next".

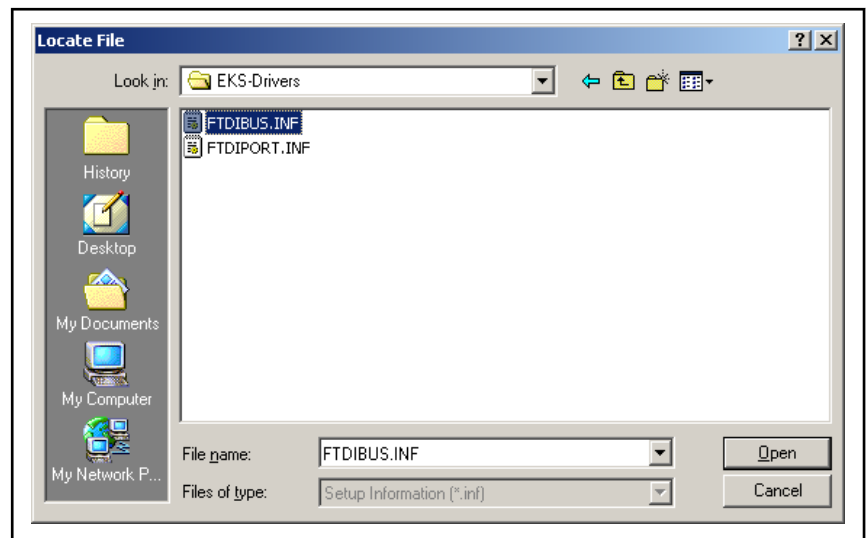


Fig. 3-220: Search file dialog (select driver)

Select the file `FTDIBUS.INF` in the respective directory on the installation DVD and click on "Open".

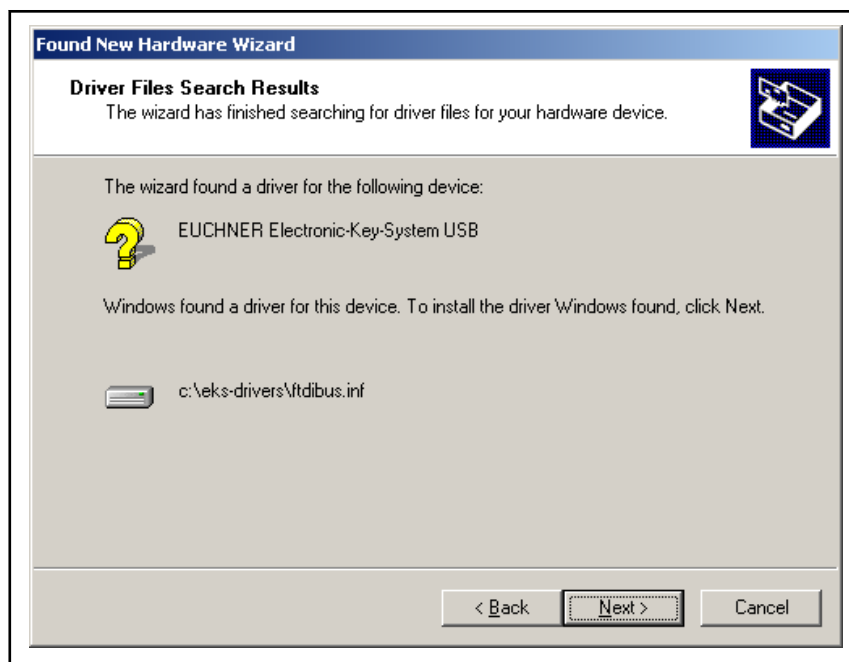


Fig. 3-221: Dialog Find new hardware wizard (confirming driver selection)

5. Click on "Next".

The EKS USB driver is now installed

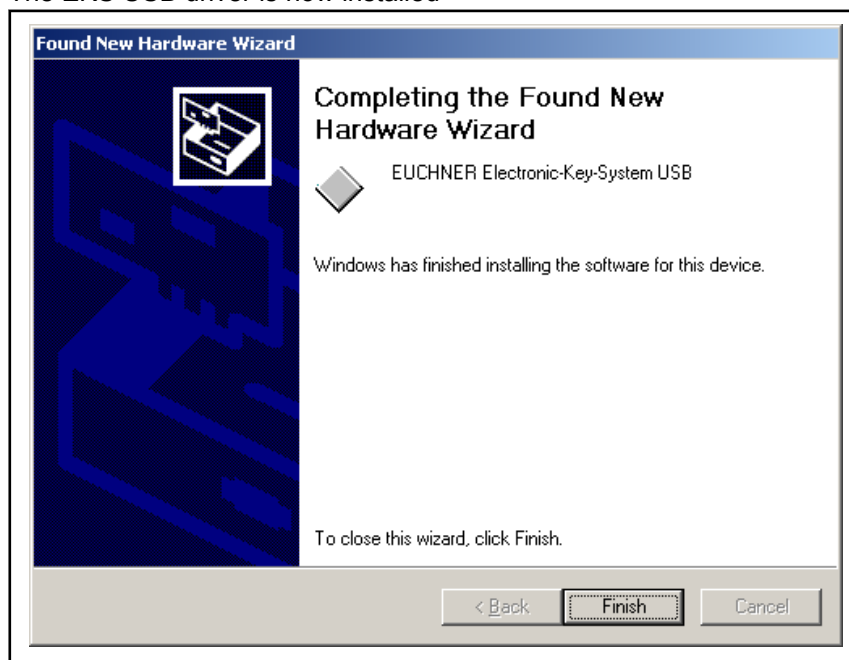


Fig. 3-222: Dialog Find new hardware wizard (completing installation)

6. Click on "Finish" to complete the installation of the EKS USB driver. Immediately after the installation of the EKS USB driver, a virtual serial port is installed for the newly connected EKS terminal.



Fig. 3-223: Windows detects a new virtual serial port
After the new virtual serial port has been detected by Windows, the Windows Hardware Wizard is started again.



Fig. 3-224: Dialog Find new hardware wizard

7. Click on "Next".

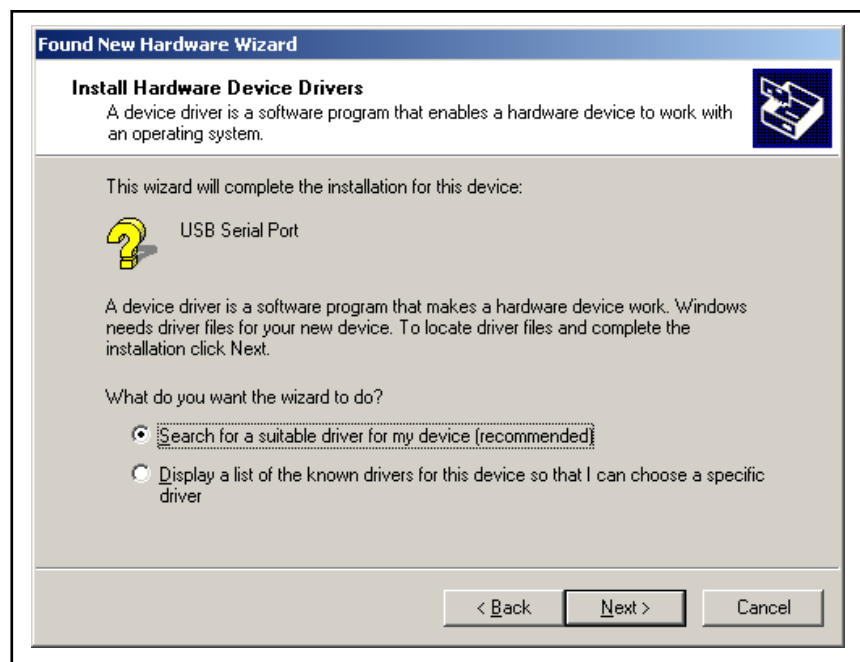


Fig. 3-225: Dialog Find new hardware wizard (installing hardware driver)

8. Click on "Next".

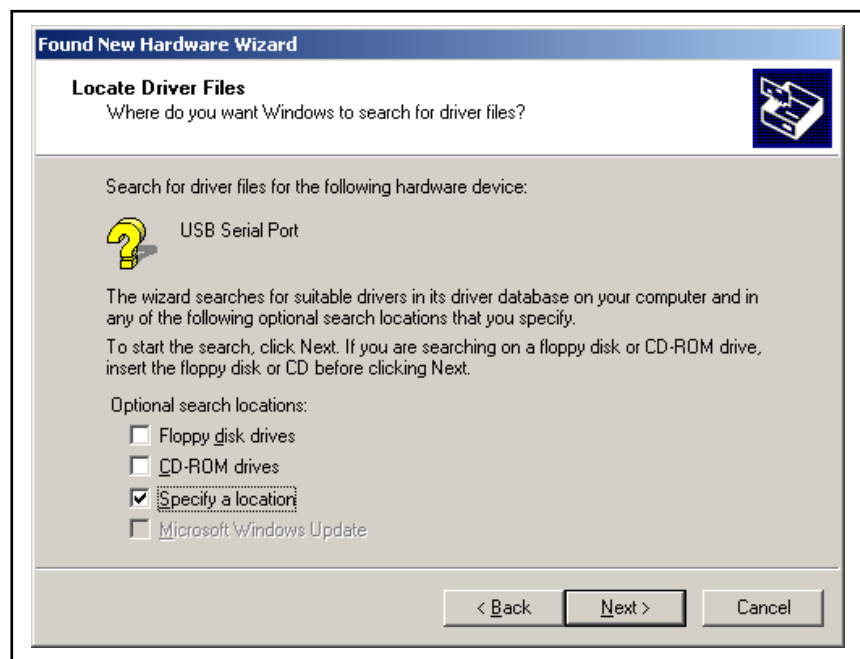


Fig. 3-226: Dialog Find new hardware wizard (finding driver files)

9. Click on "Next".

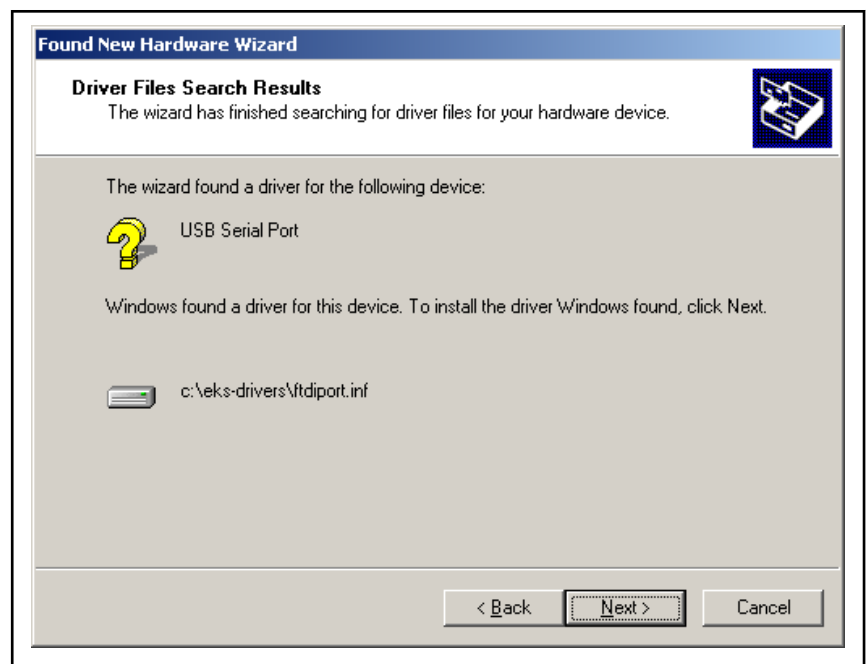


Fig. 3-227: Dialog Find new hardware wizard (confirming driver selection)

10. Click on "Next".



Fig. 3-228: Dialog Find new hardware wizard (completing the installation of virtual serial port)

11. Click on "Finish" to complete the driver installation. The EKS terminal is ready for use.

3.20 PLC interface of the user management

3.20.1 General information

The following sections describe the interface between user management and PLC. This interface allows the PLC-controlled user login and logout. It also

permits querying the currently logged in user as well as certain authorizations in the PLC program.

3.20.2 Enabling the PLC interface

Once IndraWorks is installed, all files necessary to operate the PLC interface are available on your PC or control panel, but they are not activated.

To activate the PLC interface in IndraWorks Operation, proceed as follows:

1. Exit IndraWorks Operation
2. Search for the `_DDP.OPDLoadingSequenceForPlcLogin.xml` file in the `Config` subdirectory of the IndraWorks installation directory and delete the underscore in front of the file name.



It is also possible to copy the file `_DDP.OPDLoadingSequenceForPlcLogin.xml` to the subdirectory `Config` of an HMI device of the IndraWorks project and to remove the underscore. The consequence is that this file is only loaded if the respective project and the HMI device for the IndraWorks Operation were activated.

3. Select "External login" in the IndraWorks user management to log in and log out users via the PLC.

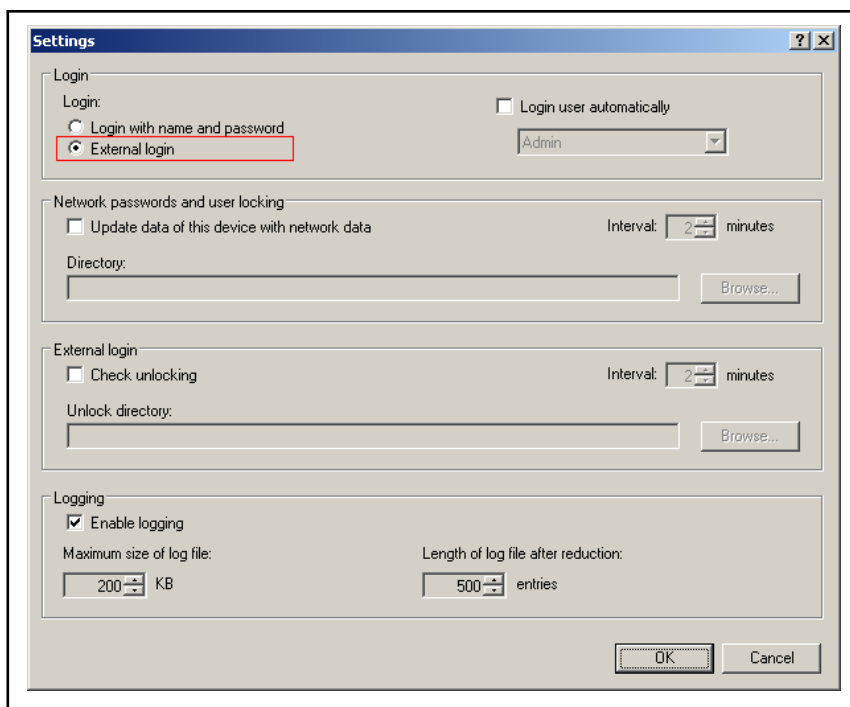


Fig. 3-229: Settings dialog (Select "External login")



After selecting "External login", a login is still possible with name and password via **Project ► User Management ► Login User...**. Additionally, the user management in IndraWorks Operation allows to log in and log out users by programming certain PLC variables.

4. After the configuration of the user management has been completed, the visualization data has to be transferred to the operating station and has to be activated.

A subsequent restart of the IndraWorks Operation on the operating station is required.

3.20.3 Users logged in and out by PLC program

The user login and user logout is controlled by three PLC variables. Define the following global PLC variables.

Program:

```
VAR_GLOBAL
  UM_LoginCmd:BYTE;    (* command, 00hex = logout, FFhex = login *)
  UM_LoginCode:STRING; (* code of the user to be logged in *)
  UM_MediaId:DWORD;    (* release code, can be set to 0 *)
END_VAR
```



In IndraLogic 2G, variables have to be declared without name-space. Insert the following line above "VAR_GLOBAL": {attribute 'namespace' := ''}

Furthermore, the variables have to be contained in the symbol configuration.

To log in a user, the PLC program has to perform the following steps in the given order:

1. Set PLC variable UM_MediaId to 0
2. Write the code of the user to be logged in into the PLC variable UM_LoginCode
3. Set PLC variable UM_LoginCmd to FFhex

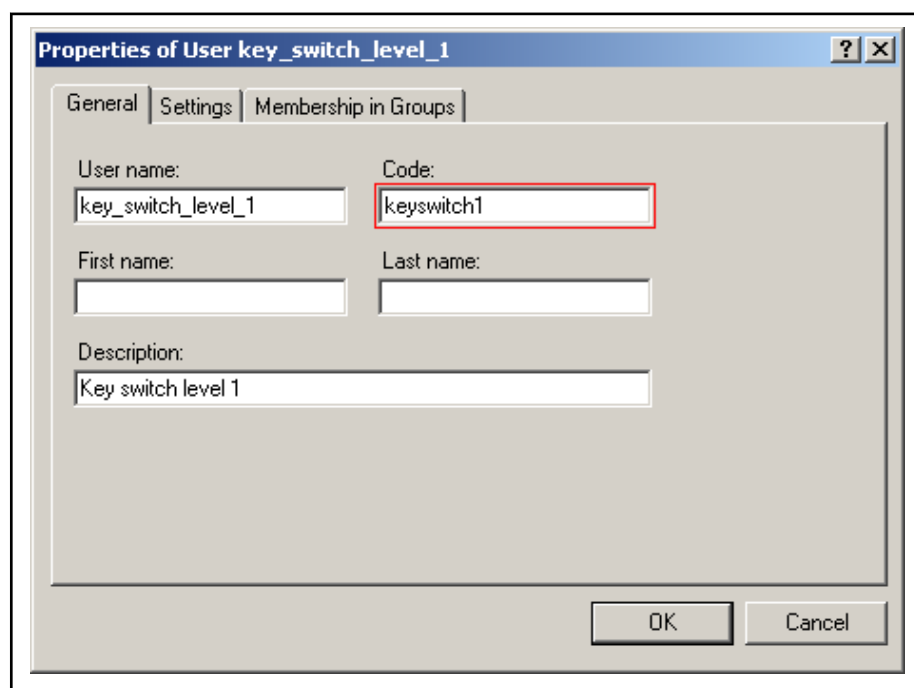


Fig. 3-230: Properties of user [the code defined in the user properties (see selection) has to be written into the PLC variable UM_LoginCode to log in the user]

To log out a user, the PLC program has to set the PLC variable UM_LoginCmd to 0. This logs out of the current user irrespective of the current value of the other two PLC variables.

3.20.4 Querying the current user in PLC program

The user management status is represented by three PLC variables. Define the following global PLC variables (see note in previous section).

Program:

```

VAR_GLOBAL
  UM_UsermanEnabled:BYTE;      (*indicates, whether the user management is enabled*)
  UM_UserLoggedIn:BYTE;        (*indicates, whether a user is logged in*)
  UM_CurrentUserName:STRING;   (*login name of the user *)
END_VAR

```



The values of these PLC variables are written by the user management. Only Read-only access to the PLC variables is allowed in the PLC program.

The PLC variable UM_UsermanEnabled indicates whether the user management is enabled (FFhex) or disabled (00hex).



If the user management is disabled, no permissions are checked in the user interface and all functions are enabled.

The PLC variable UM_UserLoggedIn indicates whether a user is logged in (FFhex if users are logged in or 00hex if not logged in).

The PLC variable UM_CurrentUserName contains the user name of the logged in user or an empty string if no user is logged in.

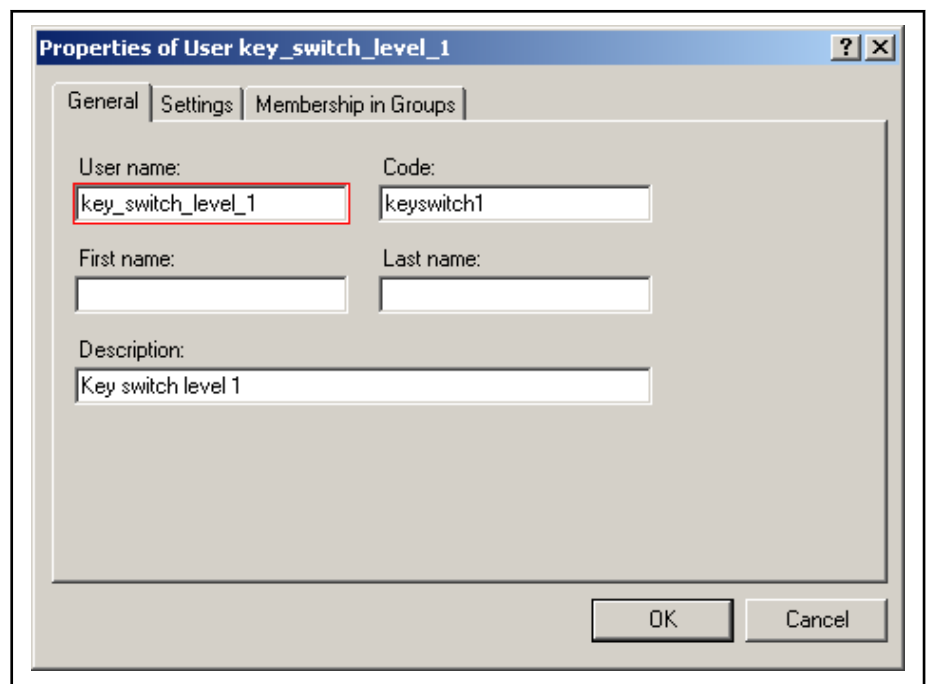


Fig. 3-231: Properties of user [After a successful login, the user management writes the user name (see selection) into the PLC variable UM_CurrentUserName]

3.20.5 PLC permissions

Assigning PLC permissions to groups

In the permission dialog box of the user management, 16 authorization bits can be set or deleted on the "PLC" tab. As the other permissions in the user management, the PLC authorization bits are assigned to a specified group. When logging in a user into IndraWorks, a bit mask is created according to his/her group via the authorization bits (OR operation) and written into the global PLC variable UM_Authorizations. In the PLC program, these bits can be evaluated depending on the enabled functions.

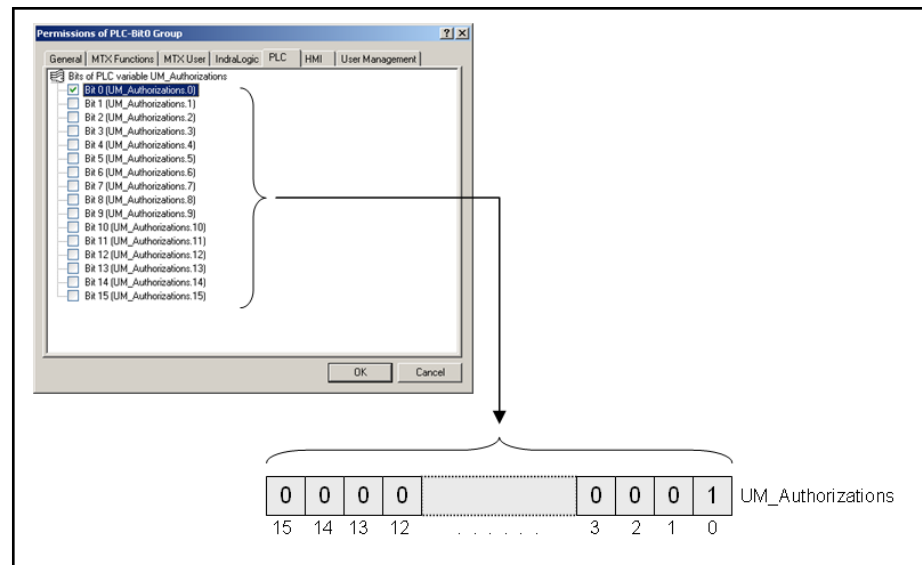


Fig. 3-232: Permissions of group (PLC authorization bits)

Querying PLC permissions

The UM_Authorizations PLC variable contains 16 authorization bits. These bits are set when logging in an user into IndraWorks Operation according to the current permissions of the user. These are deleted when logging out. The meaning of the individual bits can be assigned specifically for each IndraWorks project.

Define the following PLC variable:

```
VAR GLOBAL
{PLC authorization bits}
  UM_Authorizations:UINT;
END_VAR
```

To block actions in the PLC that are to be controlled by an authorization bit, only the respective bit is to be tested before executing the action:

```
PROGRAM PLC_PRG
VAR
END_VAR

IF UM_Authorizations.0 = TRUE { Test if bit 0 is set }
THEN

{ Execute actions that have been enabled by bit 0 }

END_IF

RETURN;
```



The value of these PLC variables is written by the user management. Only read-only access to the PLC variable is permitted in the PLC program.

3.20.6 Application example: Switching permission levels via key switch

Task

A key switch connected to the control panel is used to switch between several permission levels. The key switch has four positions:

Position 1: Permission level "User". In this position, the key can be removed; i.e. this permission level is active even without a key.

Position 2: Permission level "Maintainer".

Position 3: Permission level "Programmer".

Position 4: Permission level "Machine vendor".

Configuring the user management

In the user management, one user is defined for each of these four permission levels that are to be switched via key switch. The users are assigned to one or more groups according to the necessary permission profile.

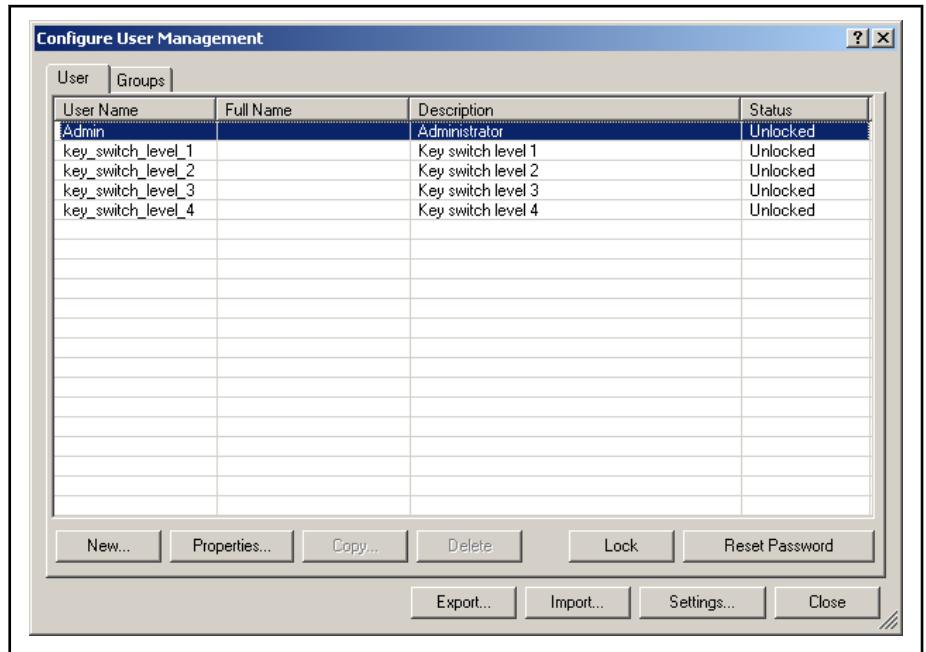


Fig. 3-233: Configure user management dialog (configuration example: one user per permission level)

"External login" is selected in the settings of the user management. Additionally, it is defined to log in the user "key_switch_level_1" automatically. This ensures the availability of at least this permission level.

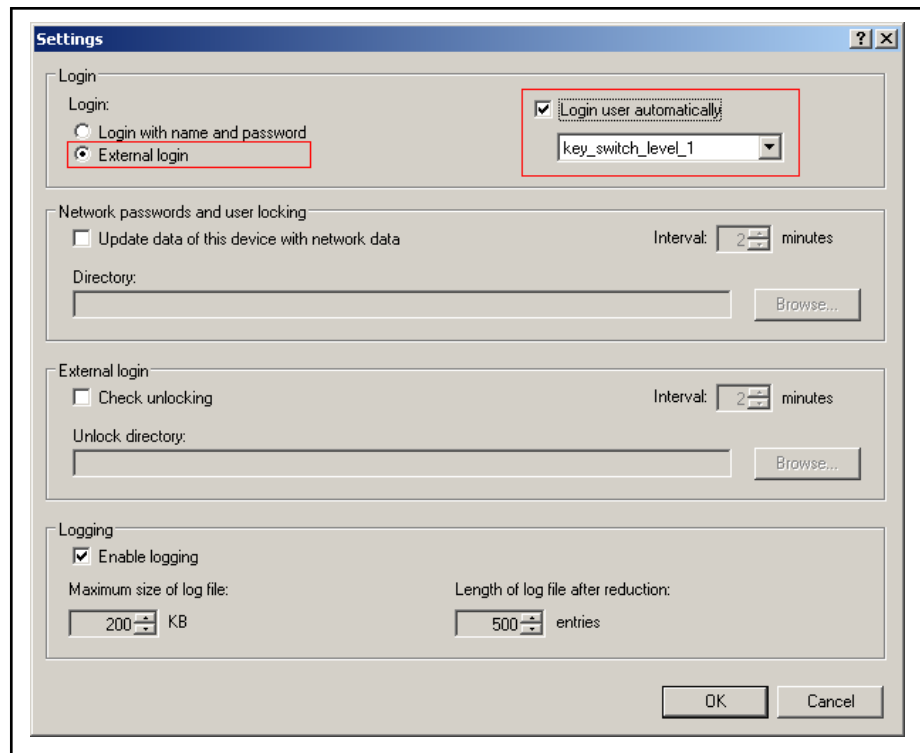


Fig. 3-234: Dialog: Settings (User Management)

PLC program

The key switch position is assigned to a user via a PLC program. This program checks the key switch position and logs in the respective user.

Program:

```
VAR_GLOBAL
  UM_UsermanEnabled:BYTE;
  UM_UserLoggedIn:BYTE;
  UM_CurrentUserName:STRING;

  UM_LoginCmd:BYTE;
  UM_LoginCode:STRING;
  UM_MediaId:DWORD;
END_VAR
```

3.21 Firmware management



A firmware download changes the properties of a device. It is only to be considered if specific functionalities, which are included in a later release of the firmware for the device, are required.

It is not reasonable to perform a firmware download without precise knowledge of the improvement and of the versions involved.

Contact our Service Department in connection with this.



Loss of user data!

It is possible that some devices lose user data. Therefore, it is recommended to archive the user data **before** downloading the firmware.

For more information on data archiving, refer to chapter [3.6 Archiving and Restoring Projects](#), page 75.



During the firmware download, the power supply of the device may not be switched off and the network connection may not be interrupted. If one of the above mentioned occurs, the device does not start and the firmware download has to be restarted.

Firmware management in IndraWorks provides the following functions:

- Downloading firmware to a device
- Displaying current firmware in a device
- Displaying available firmware versions available for a download

Starting firmware management

To start the firmware management, use the context menu of a device or the device-specific items in the main menu. Select **Firmware Management**.

Describing dialog elements

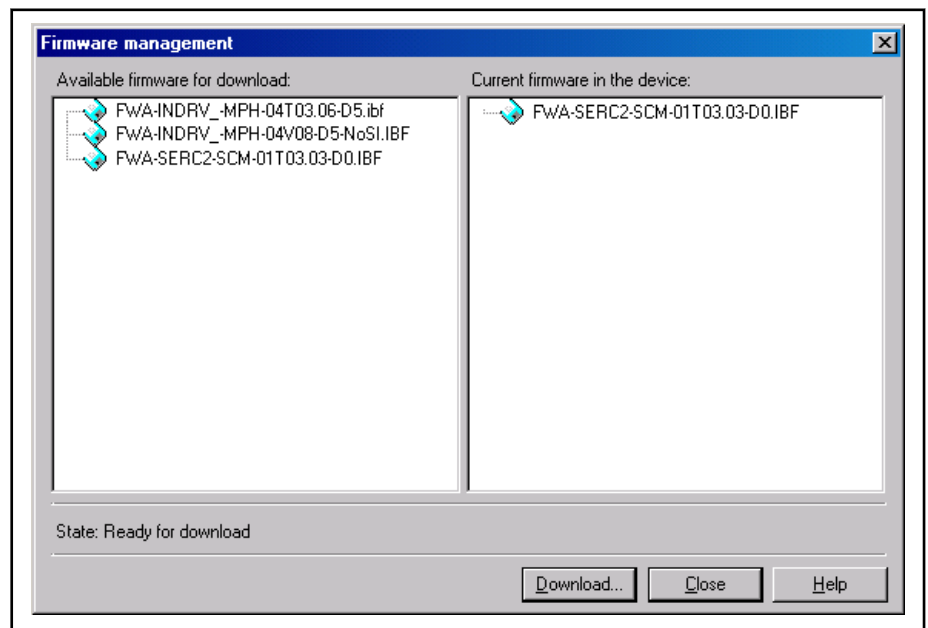


Fig. 3-235: "Firmware Management" dialog

The left window of the dialog displays the firmware versions available for download. Depending on the device used, it is possible to select a directory containing firmware files above this display.

The right window of the dialog displays the current firmware in the device.

Below these windows, the current status of the firmware versions available is displayed, e.g. "Ready for download".

Operation



Before downloading the firmware, the device has to be in a "download-capable" state, i.e., all subroutines and the PLC have to be stopped and the drives have to be in the parameterization level (phase 2).

Check before downloading whether the firmware download is required. Compare the current firmware in the device with the version to be loaded. If it is necessary to download new firmware, proceed as follows:

1. Highlight the firmware file to be loaded
2. Consider further device-dependent options such as "Restart after download"
3. Start the execution via "Download"

During download, the progress display indicates the current status.

3.22 License management

3.22.1 Licensing IndraWorks components

General information

The licenses of IndraWorks software components are managed via the "Options" dialog box. Open the Options dialog box in the IndraWorks Engineering desktop via **Tools ► Options** and then select the page "Software Licenses" under "General".

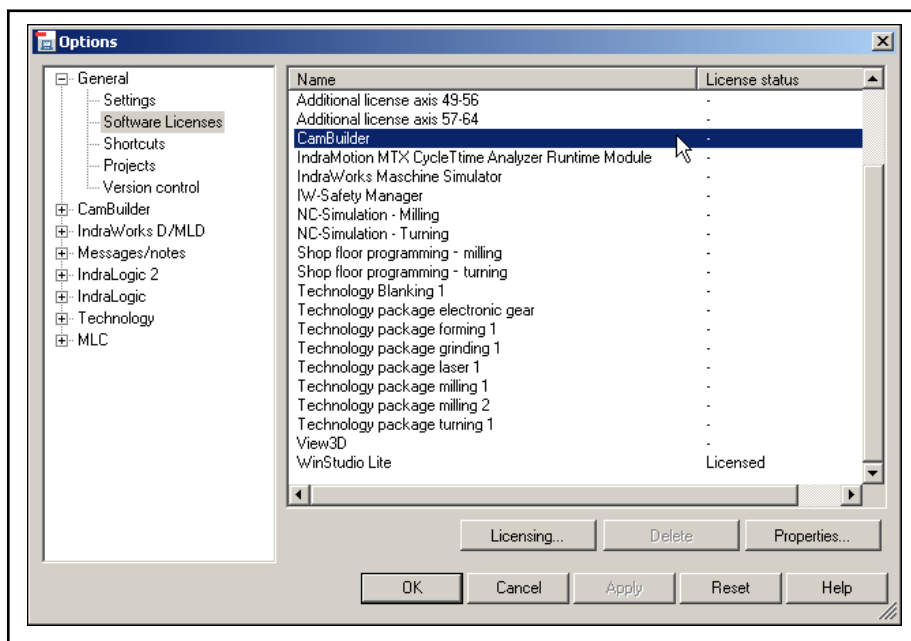


Fig. 3-236: Options dialog (licensing)

The screen displays all available software components requiring a license and their license state. The entry scope depends on the system installed.

License state	Description
-	No license was installed on this PC. The component cannot be used.
Licensed	A full license was installed on this PC. The component can be used without any restrictions.
Demo license for 30 days	A limited demo license was installed on this PC. The component can still be used for the evaluation for the period specified (30 days max.).

Tab. 3-8: License state

To view a license description, place the mouse pointer on the license entry.

Installing a license

1. To license a software component, select it from the list and click on "Licensing...".



If a full license is already installed, the "Licensing..." button is deactivated.

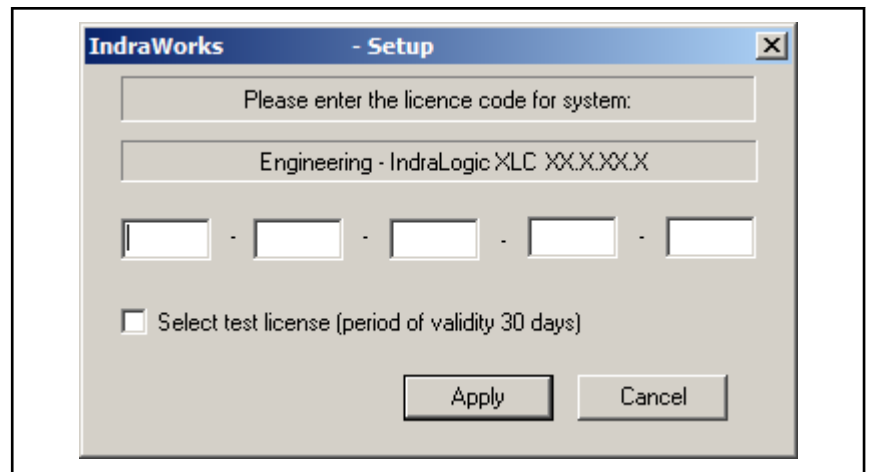


Fig. 3-237: IndraWorks setup dialog (select license type)

2. To activate a full license, go to step 4.
3. With a test license, the selected software components can be tested for 30 days.



If the "test license" is deactivated, a test license has either already been installed or the component selected does not support a test license.

Select **Apply** and go to step 5.

4. Enter the activation key to install a full license. You have obtained the necessary data together with the license.
Instead of installing the license locally on the PC, install the license on a dongle by selecting the "Save to Dongle" option.



The "Save to Dongle" option is only available if the license supports this option and if there is a dongle on the PC.

Select **Apply**.

5. Read the license conditions.

To confirm the license conditions, select

- I accept the license conditions
and confirm with **Complete**.

If you do not accept the license conditions, select

- **Cancel**

The license is not activated.

Removing a license

To remove a license, select it from the list and click on "Delete".

To confirm the safety prompt, click on "Yes".

Displaying license properties

To display the properties of a software component requiring a license, select them from the list and click on "Properties...".

The properties dialog shows a short description of the software component as well as the parts number and the serial number of the license bought.

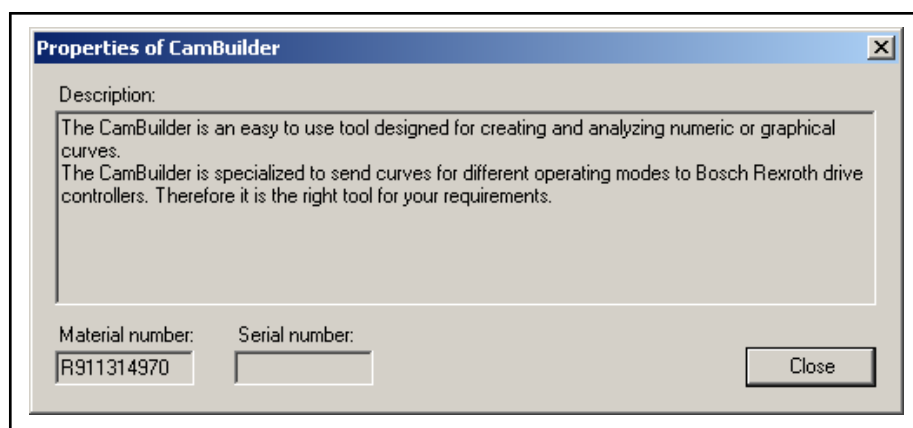


Fig. 3-238: Properties of CamBuilder dialog

3.22.2 WinStudio licensing

Introduction

The graded license model permits an optimized adjustment to the required number of variables and the required functional scope. The larger license package covers the functional scope of the smaller package. An upgrade to the next higher license class is possible.

The WinStudio licensing procedure changed with the introduction of WinStudio 7.x (from IndraWorks 09VRS). In the following, please find a description of the new license management.

Overview on WinStudio licenses

The following licenses are available:

- **WinStudio Lite**

This license is part of the IndraWorks installation. The user can create and execute WinStudio projects with a maximum of 500 variables (tags). Moreover, all CE devices are equipped with a Lite license to execute Lite runtime projects. With this license, alarms, recipes, reports, trends as well as TCP/IP and DDE driver sheets are not executed and cannot be created or edited

- **WinStudio Runtime 1K5 / 4K / 16K / 64K / 512K (RUN licenses)**

For WinStudio runtime projects, licenses with up to 1,500, 4,000, 16,000, 64,000 and 512,000 WinStudio variables (tags) are available

- **WinStudio Engineering and Runtime 1K5 / 4K / 16K / 64K / 512K (RUD licenses)**

With this license, WinStudio projects with up to 1,500, 4,000, 16,000, 64,000 or 512,000 WinStudio variables (tags) can be created and executed

- **WinStudio demo license**

With this license, the WinStudio functional scope can be tested within 30 days. After the test period, the last valid license (e.g. Lite license) is active

The demo license can only be activated once.



Only 1K5 and 4K runtime licenses are available for the activation on an IndraControl VEx device.

Activating a WinStudio license

The individual "WinStudio Runtime" and "WinStudio Engineering and Runtime" licenses are subject to additional costs and have to be activated by entering a license key. The license sheet contains your personal license key.

To activate the license, open the licensing dialog via **Tools ▶ Options ▶ General ▶ Software Licenses** and select "WinStudio". Open the activation dialog via **Licensing...** and enter the activation key.

After license activation, WinStudio Engineering or IndraWorks Operation might have to be restarted.

Saving license on dongle

The activation key is only valid for one PC. To use a license on several PCs, save it on a dongle. The license is valid as long as the dongle is plugged into a USB interface of the computer. Windows CE licenses (VEx) cannot be transferred to a dongle.

License activation on VEx devices

To enable a WinStudio license on a VEx device with a Windows CE operating system, open the licensing dialog on the VEx device in the Windows start menu via **Programs ▶ Rexroth ▶ WinStudio ▶ License management** and enter the activation key. The licensing software is already installed on new VEx devices. If you have a VEx device without pre-installed licensing software, install the IndraWorks visualization software on the VEx device and enable the WinStudio license.

To save the license setting, start IndraWorks Operation on a VEx device and subsequently back up the Windows registry.



The license activation via the WinStudio remote agent is not possible anymore with the new licensing procedure. Use the IndraWorks licensing dialog to activate the license (as described above).



The license key cannot be transmitted anymore via the integrated WinStudio function due to the new licensing procedure. The license key has to be directly entered at the VEx device.



The IndraWorks license component for Windows CE is already installed on new devices. To update an already existing VEx device with the new software, install the runtime components on the VEx device via the context menu of the VEx device in IndraWorks Engineering using the function **Install software**. The link might not be given. In this case, start the licensing dialog via `\StorageCard\Rexroth\WinStudio\bin\IndraWorks.LicenseImport.CE.exe`. The licensing component requires .Net Compact-Framework 2.0 so that only the firmware has to be updated.

Consequences of a missing or a lower-class license

When opening a project with the WinStudio that was editor created on another computer with a higher class WinStudio license, the elements subject to license in WinStudio Engineering are not activated. Thus, these elements can neither be created nor edited.

When starting IndraWorks Operation, a message displays that the available WinStudio license is insufficient for the current project. No WinStudio screens are displayed in case of an insufficient or missing license.



If you still want to use the current project, activate the demo license. Use the IndraWorks licensing dialog to activate the license (as described above).

3.22.3 Licensing runtime functions in the control

For runtime functions in the control that are subject to license, an activation is not required. However, a valid license sheet is required in order to use them. To find out which functions that are subject to license are used in a control, highlight the control in the Project Explorer and select the menu item **Runtime Licenses....** The menu item is only enabled at an online connection with the selected control.

Notes on how to interpret the license display

In the license display of the control, a version-dependent license (e.g. 13VRS) is displayed as **"type code"**. Such a "type code" is printed on the license sheet for each license. If both type codes match, the license is valid.

A license printed on the license sheet is also valid if it does not bound to the version displayed, but can be used version-comprehensively (type ID: **NNVRS**) or if this license is an upgrade license (type ID: **URS**).

Note that a full license is additionally required in case of an upgrade license.

F W S - I M * P R * - T E C - 1 2 V R S - N N - R E G I * A D V									
Firmware version									
Version-dependent				= 12					
Version-independent				= NN					
License type									
Full license				= V					
Upgrade license				= U					
(for an upgrade license, an additional full license is additionally required)									
Product ID									

Fig. 3-239: Notes on the presented license information in the "Licenses" dialog window



If the note "Display of licenses not available for this device" is displayed after opening the license dialog, runtime licenses of the control on the HMI can be checked (menu: **Tools ▶ Options ▶ Software licenses**).

3.23 Network cluster

3.23.1 General information

To operate several machines in a network cluster with access to data and diagnostics of neighboring machines, the following steps are required:

- A network configuration listing all visualization devices and controls in the machines of the network cluster has to be created.
- The network configuration has to be added to the machine projects.

Data access to a network control is always established via the visualization device to which the control is assigned to. Thus, the network configuration has to contain the visualization devices as well as the controls.

3.23.2 Creating network configuration

General information

Create a new network configuration via **File ► New ► File....** Select the template "Network Configuration" in the dialog "New file" and confirm it with "Open". IndraWorks opens an editor used to edit and save this empty network configuration.

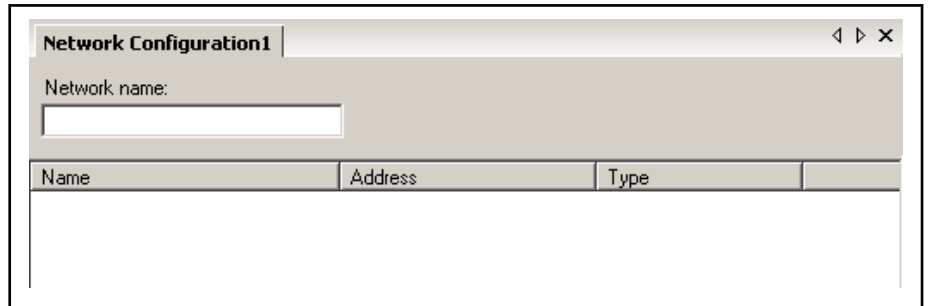


Fig. 3-240: Network configuration editor

Specify a name for the network cluster and define the individual devices in the network in the network configuration editor.

Adding devices to the network configuration

The following devices can be added to a network configuration:

Family	Device types
Visualization devices	VPx/VSx/VEP (XPe)
IndraLogic	IndraLogic XLC
MLC	IndraMotion MLC
MTX	IndraMotion MTX compact/standard/performance/advanced

Tab. 3-9: Available device types

To add a device to the network configuration, right-click on the device list in the editor and select the desired device type with **Add** in the context menu.

When adding a device to the network configuration, a dialog to edit the device properties opens. The device is only added to the list after the "Properties" dialog has been closed with "OK".



When a control is added, the corresponding visualization device has to be specified. Therefore, it is recommended that the visualization device is defined before adding a control (IndraLogic, MLC or MTX).

Editing devices properties

General Information

The "Properties" dialog is opened automatically when a device is added. To change the properties of a device already in the list, open the dialog by

- Double-clicking on the device or
- Selecting the device and pressing "Enter" or
- Highlighting the device and selecting it under **View ► Properties...** or
- Right-clicking on the device and selecting **Properties...** in the context menu.

Visualization devices (VPx/VSx/VEP)

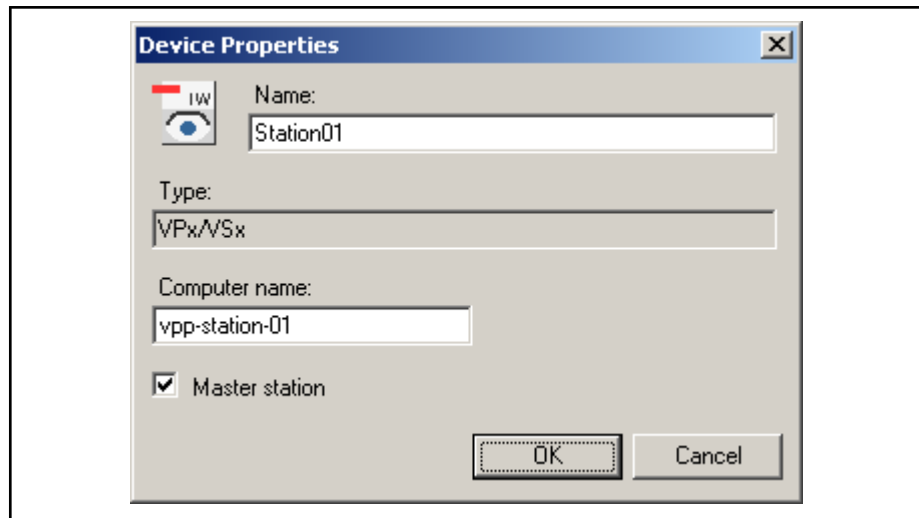


Fig. 3-241: Property dialog for VPx/VSx/VEP devices

Name Input box for the device name. The name has to be unique in the network cluster. The editor ensures the unambiguousness.

Type Device type (only display)

Computer name Input box for the name used to reach the device in the network

Master station Defines whether the visualization device is the master station. The editor ensures that only one visualization device becomes the master station.

Controls (IndraLogic, MLC, MTX)

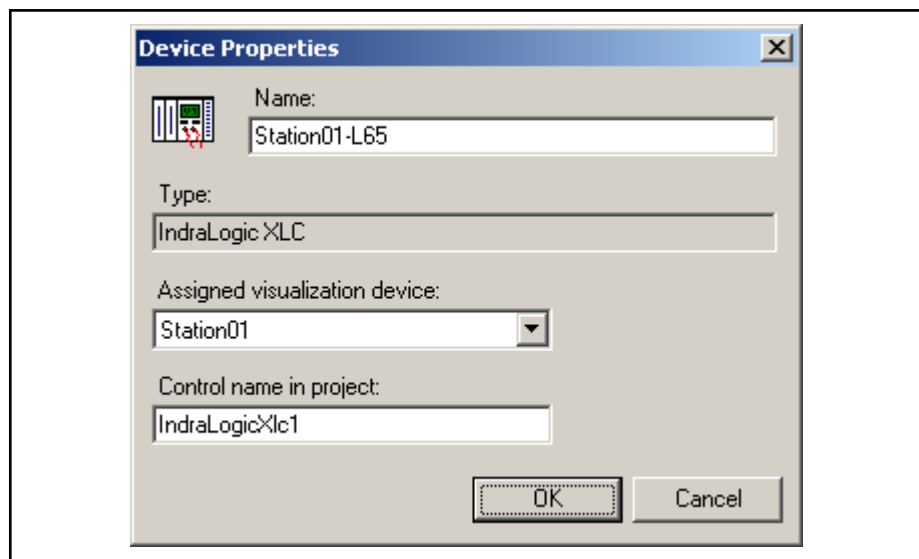


Fig. 3-242: Properties dialog for IndraLogic, MLC and MTX devices

Name Input box for the device name. The name has to be unique in the network cluster. The editor ensures the unambiguousness.

Type Device type (only display)

Assigned visualization device Defines the visualization device the control is assigned to. The drop-down list lists all visualization devices defined in the network configuration.

Control name in the project Enter the name of the control exactly as defined in the original project.

Changing sequence

Change the order of the devices in the network configuration by

- Right-clicking on a device and selecting **Up** or **Down** in the context menu or
- Dragging a device to a different position

Removing device

Delete a device from the network configuration by

- Right-clicking on the device and selecting **Remove** in the context menu or
- Highlighting the device and pressing <Del> or
- Highlighting the device and **Edit ► Remove** in the main menu

If you are sure you want to remove the device, confirm the following dialog with "Yes".

Saving network configuration

Save a network configuration via **File ► Save <Link configuration file>**.

If it is a new network configuration, a dialog to define the file name opens.

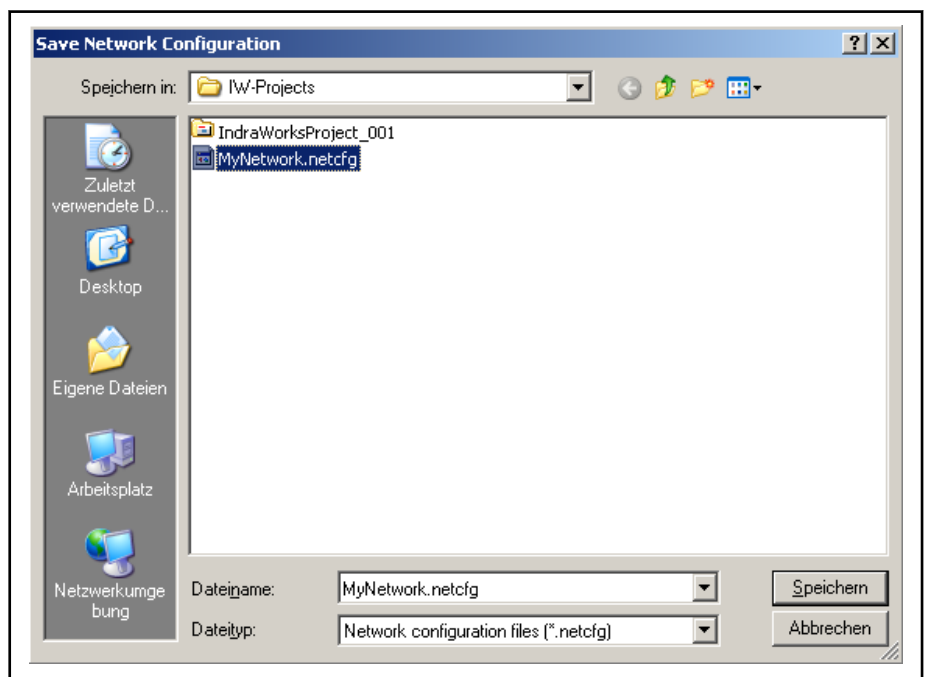


Fig. 3-243: Saving a Network Configuration

If the network configuration has already been saved or an existing network configuration has been opened, the existing file is overwritten.

Via the menu item **File ► Save All** or the shortcut <Ctrl>+<S>, the Save function can be triggered for all opened and changed link configurations. Additionally, a loaded IndraWorks project as well as the project-independent data of all other opened editors are saved.

If you want to save the network configuration under a different name, select **File ► Save <Link configuration file> As....**



Verify that the input focus is in the link configuration editor when saving, otherwise, the commands "Save <Link configuration file>" or "Save <Link configuration file> As..." are not available.

Closing editor

To close the network configuration editor, click on the "x" in the upper right of the document window or press <Ctrl> + <F4>.

If there are unsaved changes in the network configuration, you are asked how to proceed.

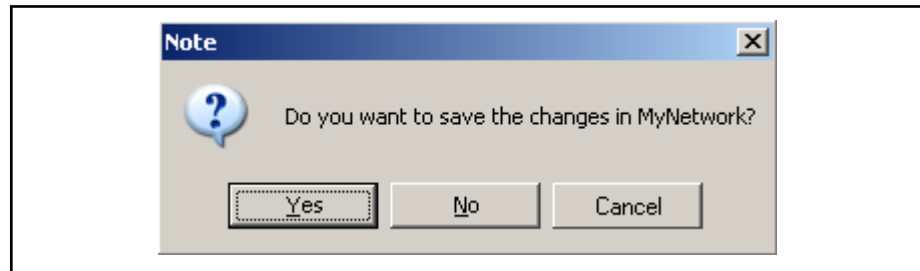


Fig. 3-244: Note when closing the editor

- Yes** Saves the network configuration and closes the editor. If the network configuration was not saved before, the dialog to select a file name opens.
- No** Discards the changes and closes the editor.
- Cancel** The editor is not closed.

3.23.3 Opening existing network configuration

To open an existing network configuration, click on **File ► Open ► File...** in the main menu. IndraWorks opens a dialog to select the file.

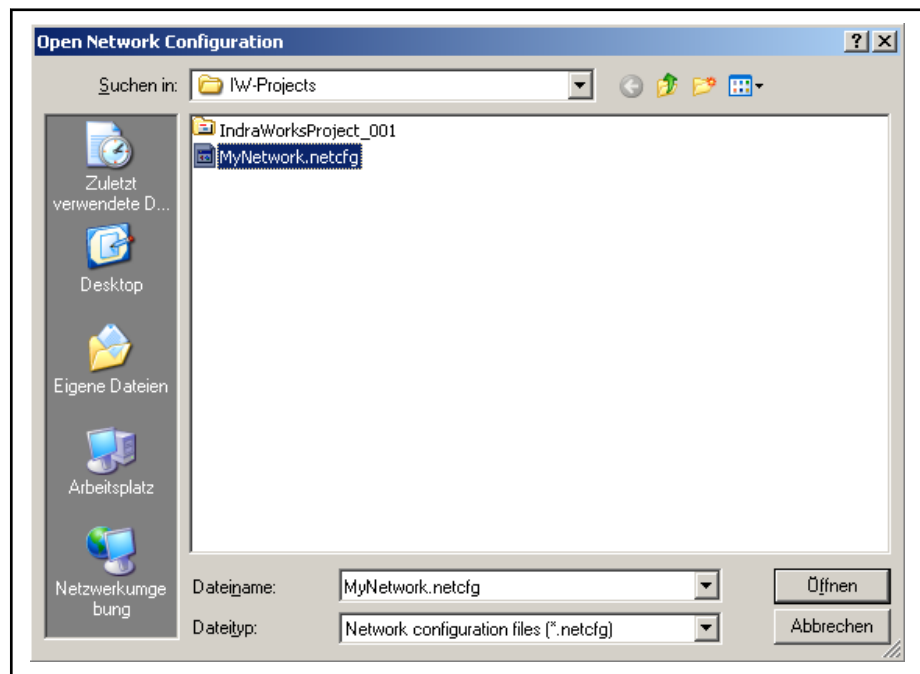


Fig. 3-245: Opening the link configuration

Confirm the dialog with "Open". The network configuration editor is opened and displays the projected data.

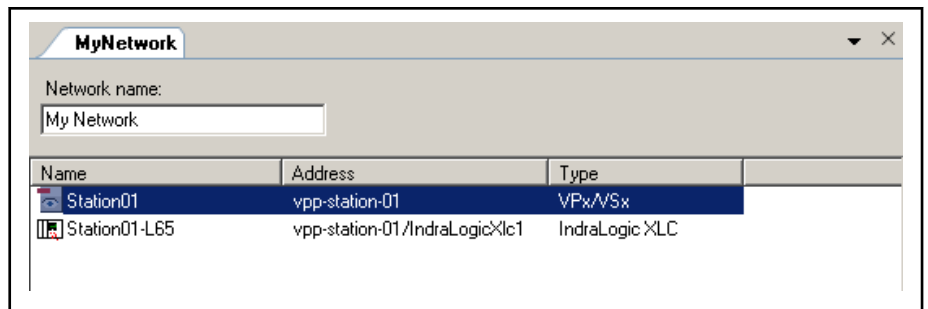


Fig. 3-246: Network configuration editor

Edit a network configuration as described in "Creating Network Configuration".

3.23.4 Adding network configuration to a project

To display data of non-local controls in a visualization device in operating mode, a relevant network configuration has to be added to the project.

Select **Project ► Add Network Configuration** in the main menu of the open project. IndraWorks opens a dialog to select the configuration file.

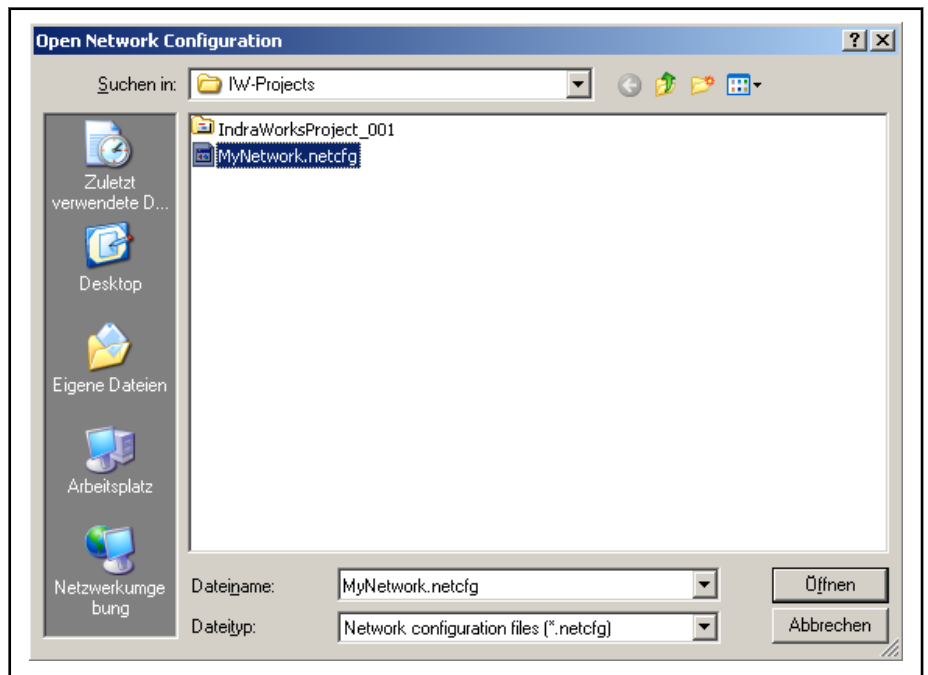


Fig. 3-247: Opening the link configuration

Select a file and press "Open". The network configuration is added to the project and displayed in the Project Explorer.



Fig. 3-248: Project with network configuration

When adding a network configuration to a project that already contains one, the following message is displayed.

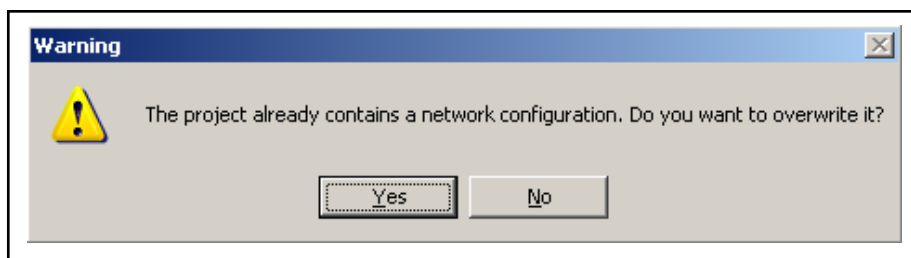


Fig. 3-249: Warning when adding a network configuration to a project

3.24 Configuring data accesses

3.24.1 General information

Using the application

This application can be used to enable a computer for the reception of visualization data (FTP server operation). Thus, other computers using IndraWorks Engineering can transfer their visualization data to this computer. IndraWorks Operation uses the visualization data.

Additionally, this application can be used to operate a computer in a network of operating stations (DCOM server operation). If this option is enabled, this computer can also provide data for other computers via OPC.

Starting the application

Start the application via the following menu items:

Start ▶ Programs ▶ Rexroth ▶ IndraWorks ▶ Communication ▶ Data Access

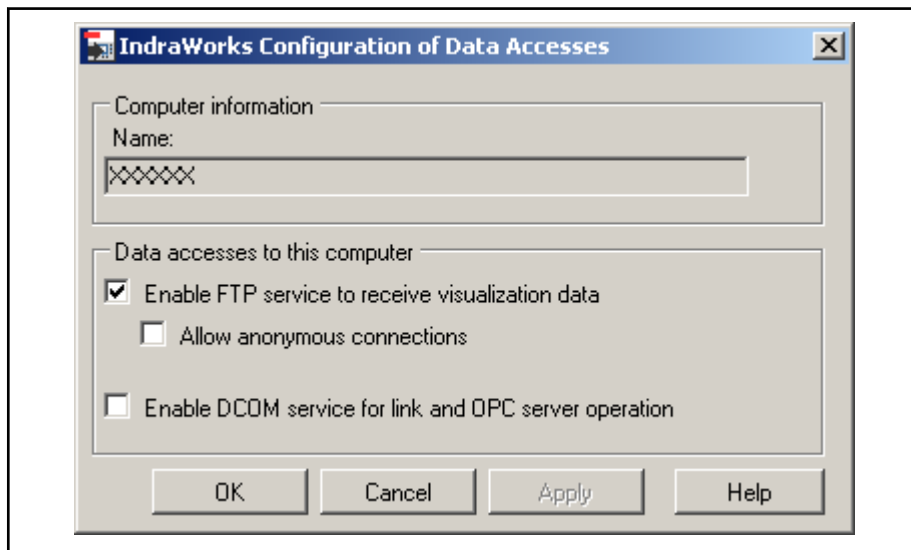


Fig. 3-250: IndraWorks Configuration of Data Accesses

Canceling the application

Exit the interface via the inputs known from Windows applications (<Alt> +<F4>, <ESC>, etc.) and with **Cancel**. If settings were made, these are discarded.

Calling the help function

Open the corresponding online help chapter via **Help** or <F1>.

Changing and applying settings

The user interface is divided into different sections. Settings can be seen and changed in these sections (the settings are described in the following).

If a change is made in the settings, the **Apply** button is enabled. Press this button or **OK** to apply the changes. This might take some time and may not be canceled. It is visualized by the Windows progress dialog.

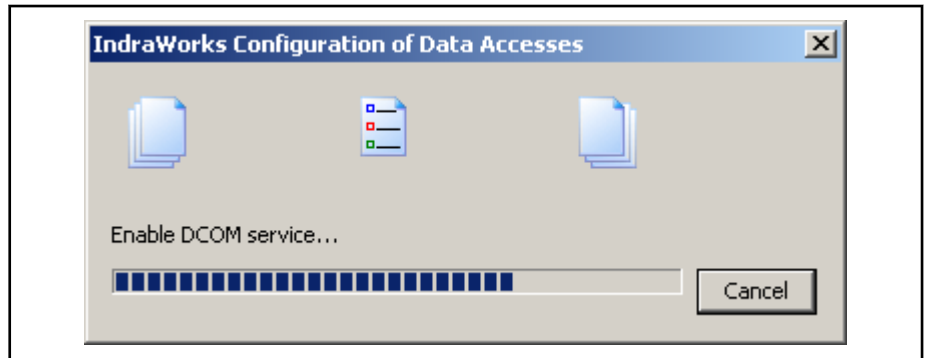


Fig. 3-251: IndraWorks Configuration of Data Accesses (progress bar)

If errors occur while applying the settings, these are displayed in the user interface.

If **Apply** was selected, exit the dialog with **OK**. Otherwise, the dialog is closed automatically after the application of these settings.

3.24.2 Areas of user interface

Computer information

No settings can be made in this area. Only the computer name is displayed.

This specification is required to transmit visualization data from another computer to this computer.

Data accesses on this computer

The control elements in this area display the current state of a service or an option and control this state. Therefore, click on the control element or use the <Tab> key to jump to the corresponding element and press the <space-bar>.

Enabling FTP service to receive visualization data

This control element enables the FTP service. If the computer is supposed to receive visualization data, this service has to run.

The subordinate control element "Allow anonymous connections" indicates whether FTP connections to your computer can be established without specifying a user account (anonymous).

The following settings are recommended:

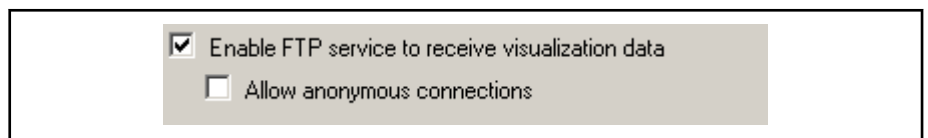


Fig. 3-252: FTP service enabled; user account has to be specified

1. The FTP service is enabled.

Thus, visualization data can be transmitted to your computer. It can also be used as FTP server to store project archives for example.

The FTP service is reachable via port 21.

2. Anonymous connections are not allowed.

A valid user account (user name and password) has to be specified to establish an FTP connection to your computer. A login dialog is usually displayed at the computer actively establishing the connection.



The IndraWorks installation program has already made the recommended settings if you selected the installation option "IndraWorks Operation".

Enabling DCOM service for network and OPC server operation

This control element enables the DCOM service required if your computer is integrated into an operating station network or if an OPC server is to be operated on your computer.

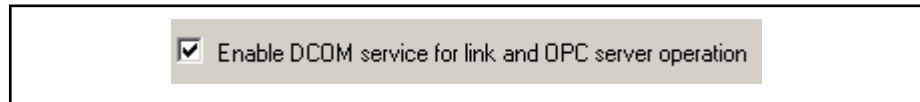


Fig. 3-253: DCOM service enabled

This setting is not made automatically. The DCOM service has to be explicitly enabled at each computer.

3.25 External applications

3.25.1 General information

IndraWorks allows to call any external applications and HTML pages. Once programs and HTML pages are configured correspondingly, these are displayed under **Tools** and can be started by selecting the entry.

To configure and manage external applications, go to **Tools ► External Applications...**



When using the **Automation Interface**, create an HTML page with embedded script code containing the access functionality to the Automation Interface. Add this functionality to the "Tools" menu as described in the following chapter.

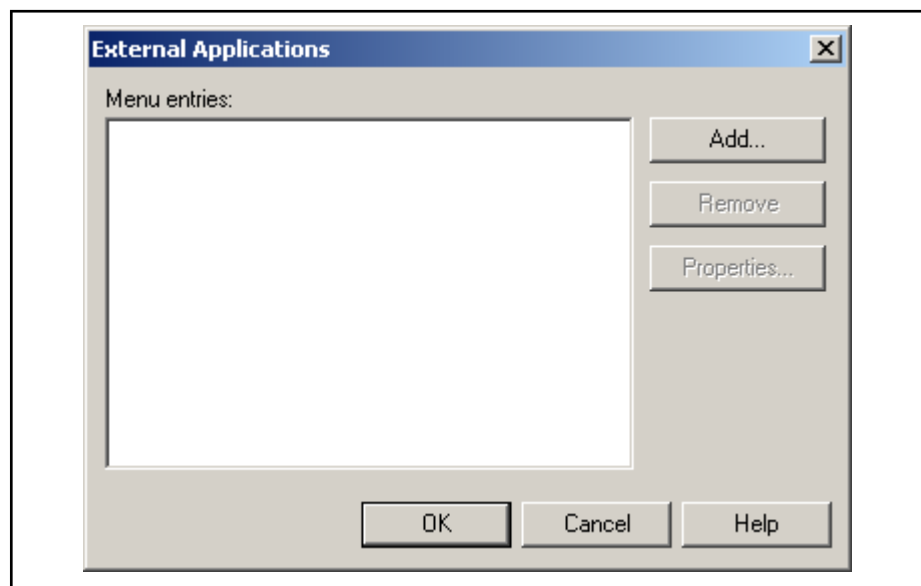


Fig. 3-254: "External Applications" dialog

3.25.2 Adding an application or an HTML page

Use "Add" to open a dialog and to select an application file or HTML page. To select HTML pages, change the setting in the field "Data type" to "All Files".

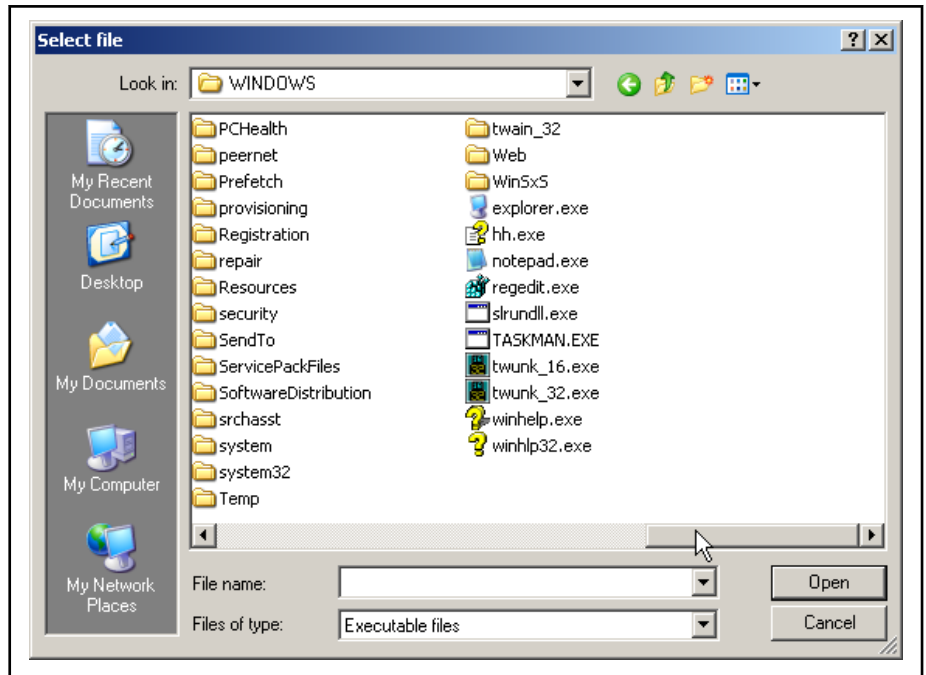


Fig. 3-255: "Select file" dialog

Confirm the file selection with "Open" and the application or HTML page is displayed in the "Properties" dialog. Set the properties here (see [chapter 3.25.3 "Changing properties of an application" on page 249](#)).

After having confirmed all dialogs, the application or HTML page is displayed and can be opened via **Tools ► External Applications....**

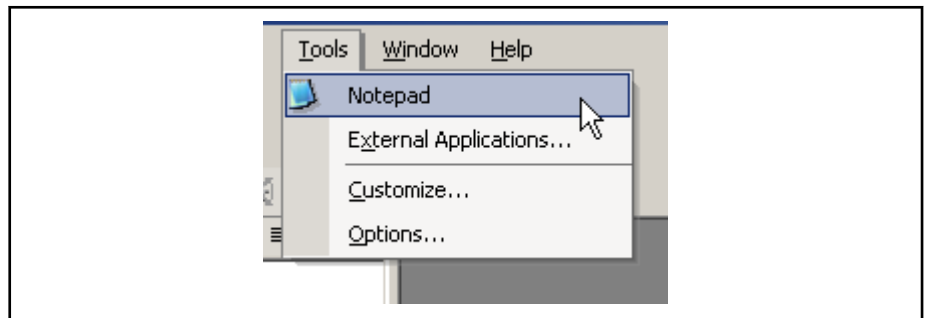


Fig. 3-256: "External Applications..." in the "Tools" menu

3.25.3 Changing properties of an application

To open the "Properties" dialog for an application, select the "External Applications" dialog and click on "Properties...".

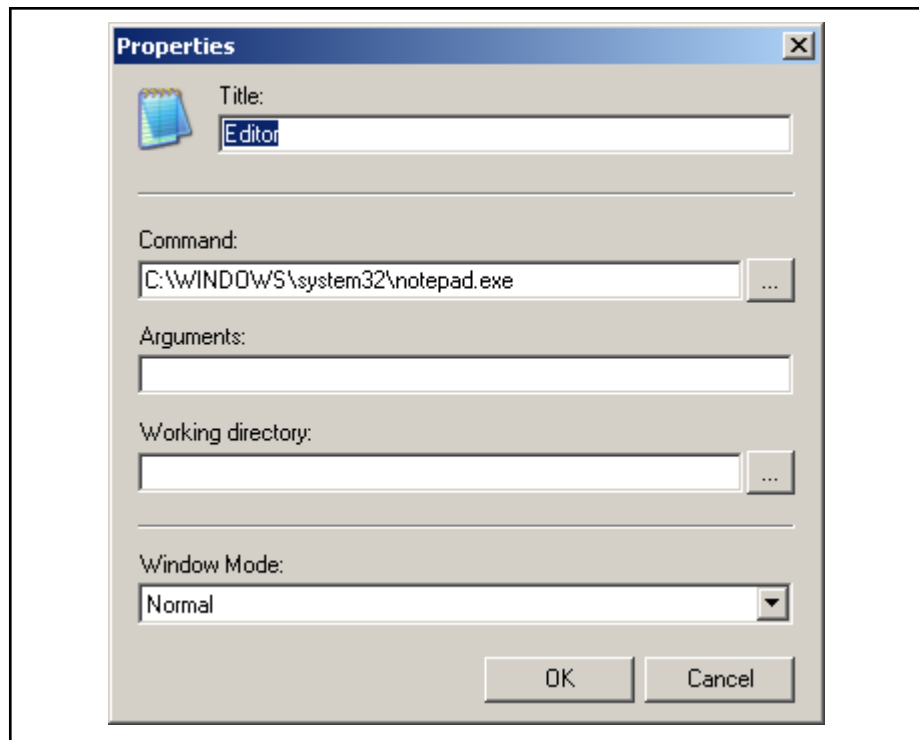


Fig. 3-257: "Properties" dialog, properties of external applications

- Title** This field automatically contains the description text of the application. The title is also used as display text in the menu.
- Command** Enter the application name or select it via "...".
- Arguments** Arguments to be transferred to the application at start can be optionally entered here.
- Working directory** Enter the working directory optionally here or select it via "...".
- Window mode** Select whether the application is started with normal window size or in full screen mode as far as the application uses this parameter.

3.25.4 Changing properties of an HTML page

To open the "Properties" dialog for an HTML page, select it in the "External Applications" dialog and click on "Properties...".

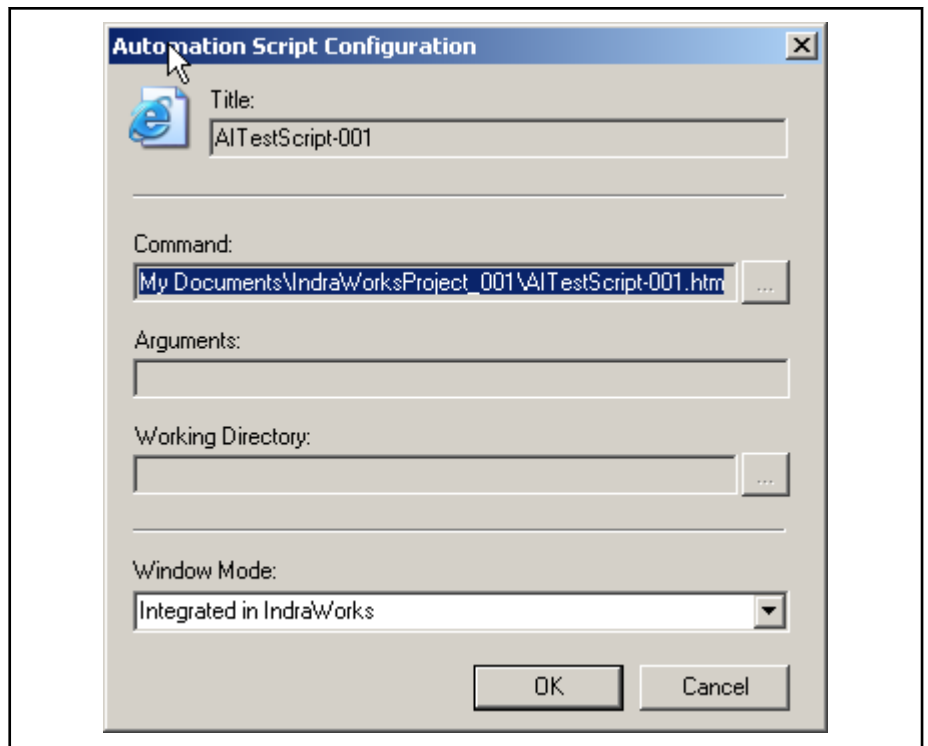


Fig. 3-258: "Properties" dialog, properties of external applications

Title	This field contains automatically the description text of the HTML page. The title is also used as display text in the menu.
Command	Enter the application name or select it via "...".
Arguments	This field is locked when adding HTML pages.
Working directory	This field is locked when adding HTML pages.
Window mode	Define whether the HTML page is to be started integrated in IndraWorks or externally. The current version runs HTML pages only integrated in IndraWorks.

3.25.5 Deleting an application or an HTML page

To remove an application or HTML page from IndraWorks, select the appropriate entry from the "External Applications" dialog and click on "Remove".

3.26 "Options" dialog

3.26.1 General information

The "Options" dialog provides comprehensive setting options to customize IndraWorks.

These setting options range from the appearances of the user interface to its responses up to the specific settings of various program parts.

The setting options are organized in "Options" screens. A single screen contains associated or related settings.

To go to the "Options" dialog, select **Tools ► Options....**

3.26.2 Functional areas

The "Options" dialog is divided into a navigation area and an area to display "Options".

Navigation area The navigation area contains the tree-like hierarchy of the "Options" screens. There are only folders on the highest level. Folders can contain "Options" screens and subfolders.

"Options" screens Select an element from the navigation area to display the corresponding "Options" screens. The corresponding settings can be viewed and edited.

Select a folder in the navigation area to open an overview of its "Options" screens in the folder and a brief description.

3.26.3 Operating

Changing settings Select an element from the navigation area of the "Options" dialog to display the corresponding "Options" screen.

Make the desired settings on the "Options" screen. Several "Options" screens can be edited consecutively. These changes remain as long as the "Options" dialog is open.

Applying changed settings Click on "Apply" or "OK" to apply the changes.



- IndraWorks options are not saved in the project. The options are included in the IndraWorks installation.
 - Changed options are only saved when IndraWorks is closed!
-

Memory response of the options if IndraWorks instances are opened parallelly

If IndraWorks instances are open parallelly, they work with their initial or changed option settings.

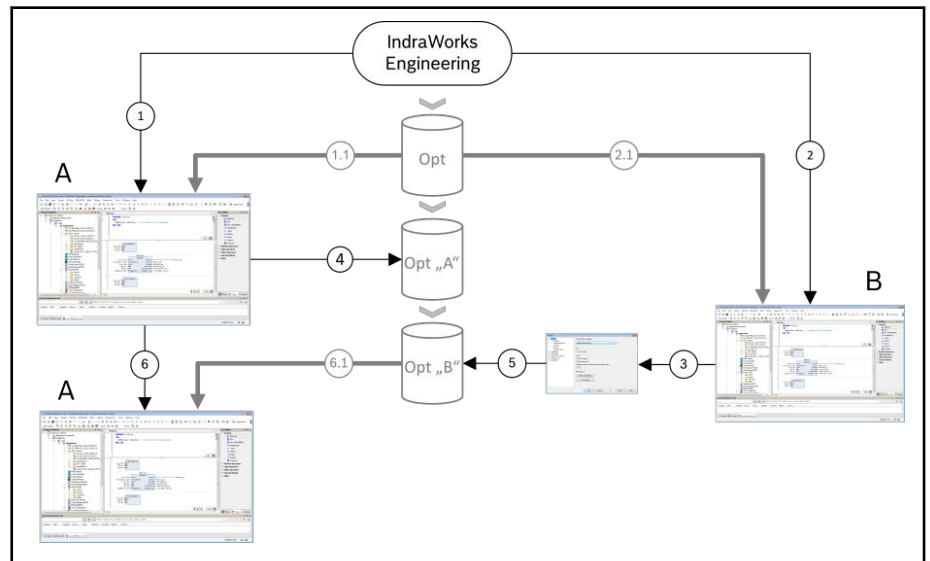
Changes in the IndraWorks options only apply to the currently open IndraWorks instance.



Only the options of the latest closed instance are still be applied when closing multiple IndraWorks instances.

Option settings made in previously closed instances are overwritten!

Saving options in parallely open IndraWorks instances



- ① The IndraWorks instance "A" is started. The last saved option settings are loaded (1.1)
- ② The IndraWorks instance "B" is started parallelly. The last saved options settings are loaded (2.1)
- ③ Options are changed in instance "B" and applied with "OK". The change has no impact on instance "A"
- ④ The options are changed in instance "A". IndraWorks is closed. The options of instance "A" are saved (opt "A")
- ⑤ Instance B is closed. The options are saved again (opt "B"). The previously saved settings in opt "A" are overwritten.
- ⑥ Instance "A" is opened again. The previously saved option settings of instance "B" are loaded.

Fig. 3-259:

Restoring settings to default values

To restore the default values on the current "Options" screen, click on "Reset". To apply the default settings, click on "Apply" or "OK".

Opening help

Click on "Help" to open the online help for the current "Options" screen.

Exiting "Options" dialog

Click on "OK" to exit the "Options" dialog. The changes are applied.

Click on "Cancel" to discard all changes and to close the "Options" dialog.

3.26.4 General options

Settings

User interface language

Select the user interface language in this section.

Click on "OK" or "Apply" to update the display of the user interface in the selected language.

Close

Select "Prompt when exiting" and a safety prompt is displayed when exiting the application.

Layout

Restore layout:

This option refers to the following properties: visibility, position and size of tool windows and toolbars. If this option is selected, changes in these properties are saved when exiting the application and restored at next start.

If this option is deselected, the application is always displayed in the layout upon delivery.

Show menu bar:

Use this option to hide and show the menu and title bar of the application. Note that the option is not available anymore after hiding the menu bar and closing the "Options" dialog.



Use the shortcut <Alt>+<M>. It shows and hides the menu bar and title bar.

Resetting layout

Menus and toolbars:
Press this button to undo all changes made in the menus and toolbars via "Customize". This resets these elements to their delivery state.

Tool window:
This button resets visibility, position and size of the tool window to the delivery state.



Changes in the "Reset layout" area are immediately applied and cannot be undone (not even by canceling the "Options" dialog)!

Software Licenses

Use this site to manage the licenses of software components (see [chapter 3.22 License management, page 236](#)).

Shortcuts

Shortcuts for commands can be defined in this "Options" screen.

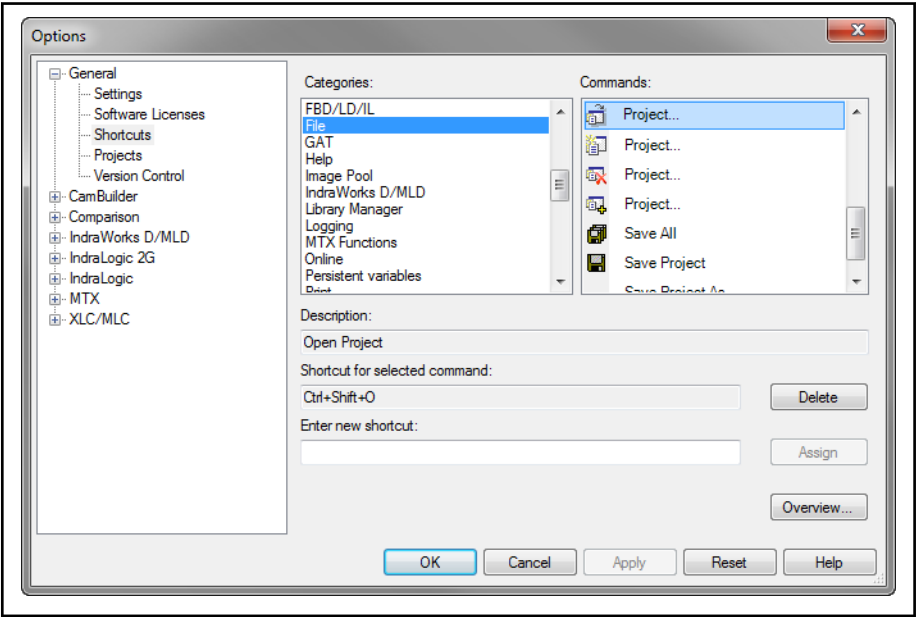


Fig. 3-260: Options dialog (Shortcuts)

Categories Select a category to list the commands of that category in the "Commands" column.

Description This field provides a brief description on the command selected.

Shortcut for selected command If a shortcut is assigned to a selected command, it is displayed in this field. Click on "Delete" to remove the shortcut. If no shortcut exists, this field displays "None".

Enter new shortcut Press a key or a shortcut to define a new shortcut for the selected command. If the shortcut is already assigned to a different command, this is displayed in the "Shortcut is already used by" field.



One shortcut can only be assigned to one command. If you assign a shortcut already in use to a new command, that shortcut cannot be used for the previous command any longer.

Projects

Change the settings for the projects here.

These changes are only applied after restart.

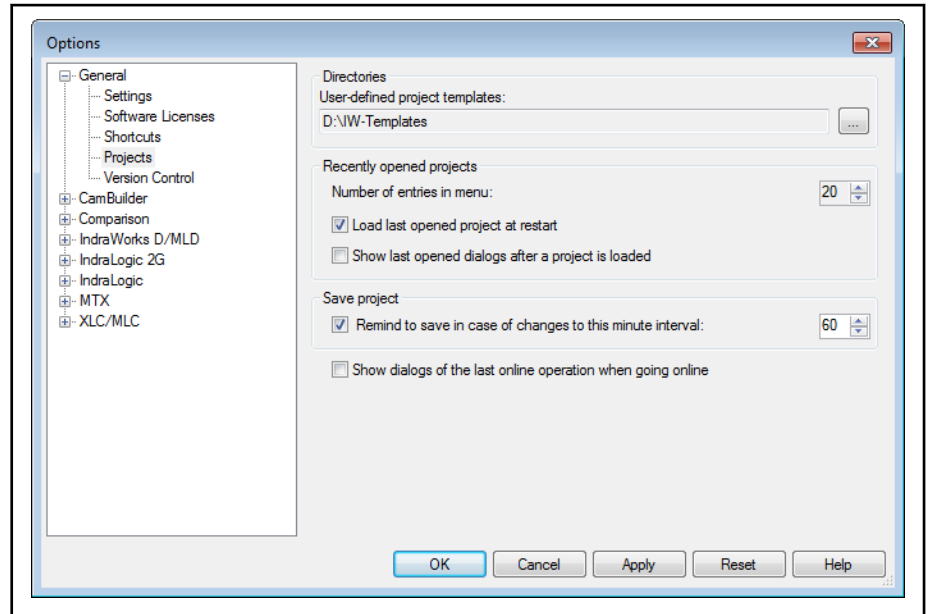


Fig. 3-261: Options dialog (projects)

3.27 Settings

3.27.1 General information

Environment settings can be saved and restored in IndraWorks. The settings are exported to a file. The file can be backed up or imported in another IndraWorks installation on any PC. Resetting to default is possible.

A wizard supports the process. The <<Back and Next>> buttons are used to switch between the individual pages in the wizard. Click on **Cancel** to close the wizard.

To open the wizard, select **Tools ► Settings...**

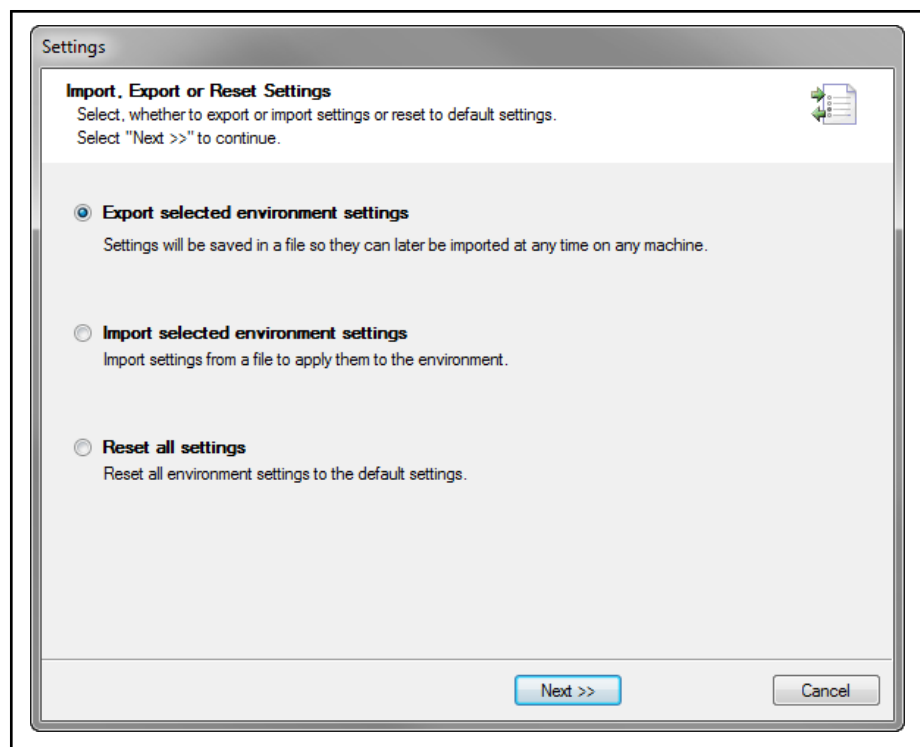


Fig. 3-262: Wizard to import, export and restore settings

3.27.2 Exporting the selected environment settings

The settings are saved in a file. They can be applied to another IndraWorks installation on any PC.

3.27.3 Importing the selected environment settings

The settings are restored from a file. The data of the control data archive is only applied after an NC restart.

3.27.4 Resetting all settings

All settings are reset to default. Restart IndraWorks.

3.27.5 Environment settings

Environment settings can be selected during the export/import. Resetting always refers to all settings.

- **Layout**
Status of toolbars and tool window including the anchored and unanchored positions
- **Shortcut**
List of shortcuts available in the environment
- **Other settings**
Other uncategorized settings of the Options dialog and the configuration settings of the software components

3.28 "Customize" dialog

Use the "Customize" dialog to edit the menu and the toolbars.

To open this dialog, select **Tools ► Customize**.

Adding a command to the menu or a toolbar	To add a command to a toolbar, display that toolbar. Afterwards, select Tools ► Customize and the "Commands" screen. Select the category for the command. Drag the command to be added from the "Commands" field to the appropriate position in the menu or toolbar.
Showing and hiding toolbars	Toolbars can be shown or hidden. To do this, select Tools ► Customize and the "Toolbars" screen. Make the appropriate settings in the "Toolbars" field.
Creating new toolbar	To create an own toolbar, click the "New" button on the "Toolbars" screen. This opens the "Create New Toolbar" dialog and a name for the new toolbar can be entered. Click "OK" to create the toolbar. It is floating. The toolbar name is entered in the toolbar list.
Renaming toolbar	Select the user-defined toolbar to be renamed from the "Toolbars" field on the "Toolbars" screen. Click on "Rename".
	 Only user-defined toolbars can be renamed.
Deleting toolbar	Select the user-defined toolbar to be deleted from the "Toolbars" field on the "Toolbars" screen. Click on "Delete" and confirm the "Delete Toolbars" message.
	 Only user-defined toolbars can be deleted.

3.29 SCP-OPC configurator

3.29.1 General information

The SCP-OPC configurator declares the devices provided by SCP via OPC. The SCP-OPC configurator can be used to create the configuration files and to label them as active configurations. At the start of the OPC server, the active configuration is evaluated and the relevant SCP devices are created. The selected devices are highlighted in blue. Modifications to an active configuration can only take effect when the OPC server next restarts.

In the main window of the application, the SCP-OPC configurator displays the list of devices stored in the SCP-OPC configuration file. The following device properties are displayed:

column	Description
Device	SCP device name, cannot be edited
Type	SCP device type, cannot be edited
OPC Alias	OPC alias name of the device; can be edited; optional

Tab. 3-10: Device properties displayed

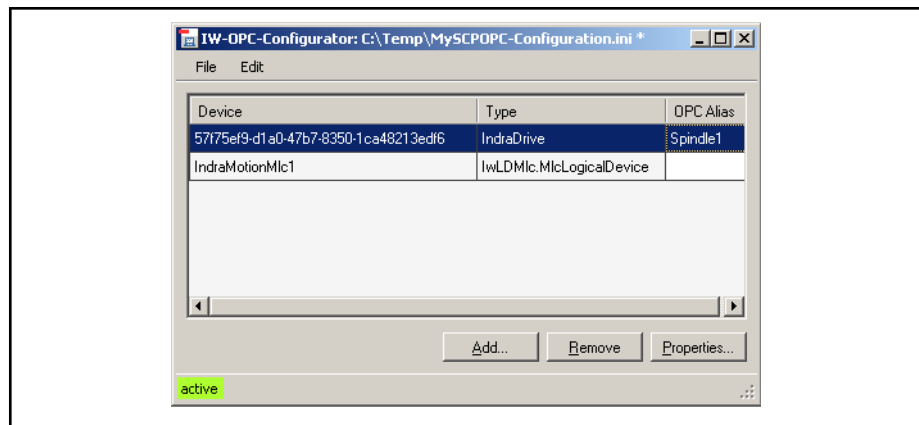


Fig. 3-263: Display of configuration file

3.29.2 Operation

Creating device configuration

Create a new SCP-OPC configuration file via the main menu **File ► New**. Enter the file name when saving the configuration. If there is any configuration data that has not yet been saved when closing, you are asked to save it.



The heading of the application displays the path and file name of the currently open file. If a file was opened or modified after the last change, the "*" symbol is shown in the dialog headline at the end of the file name.

Opening device configuration

Open a new SCP-OPC configuration file via the main menu **File ► Open**. Select the directory and the configuration file to be opened in a file selection dialog. Only the files with the extension ".ini" are displayed. The SCP-OPC configuration is displayed as a list of devices in the main window of the application. If the opened file is the currently active SCP-OPC configuration, the status bar of the application is a light green field with the label "active".



The heading of the application displays the path and file name of the currently open file. If a file was opened or modified after the last change, the "*" symbol is shown in the dialog headline at the end of the file name.

Adding devices

To display a selection dialog to select the devices to be added to your configuration, go to the main menu option **Edit ► Add**, the context menu option **Add** or the "Add" button and specify the data source. Devices already in the configuration are grayed out in the selection dialog. Data sources are IndraWorks projects, SCP-OPC configuration files or an active SCP-OPC configuration. A dialog to display the properties of a SCP device can be added for every device in the selection dialog as well as in the main window of the configurator via the "Properties" option.



The devices in a configuration have to be uniquely named. If devices - already in the configuration (grayed) - are selected in the dialog, these devices are not added.

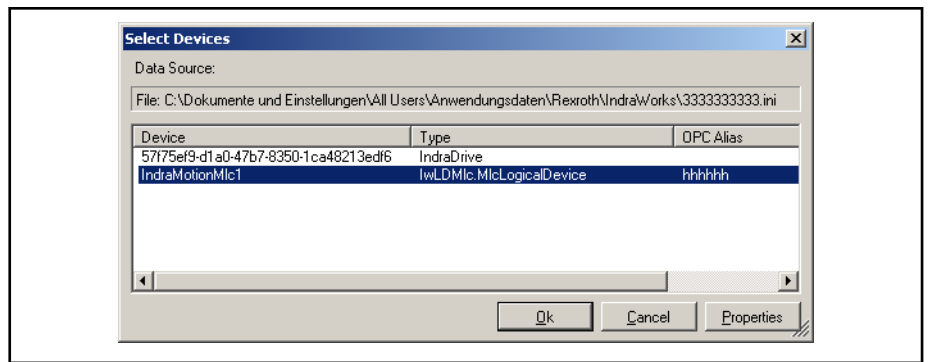


Fig. 3-264: Device selection

Displaying device properties

The properties dialog of the selected device of the device list can be displayed with all its properties using the main menu option **Edit ► Properties**, the context menu option **Properties** or the "Properties" button. The option is activated only if exactly one device on the list has been selected.



The "Device Properties" dialog can be started either from the main window or from the device selection dialog.

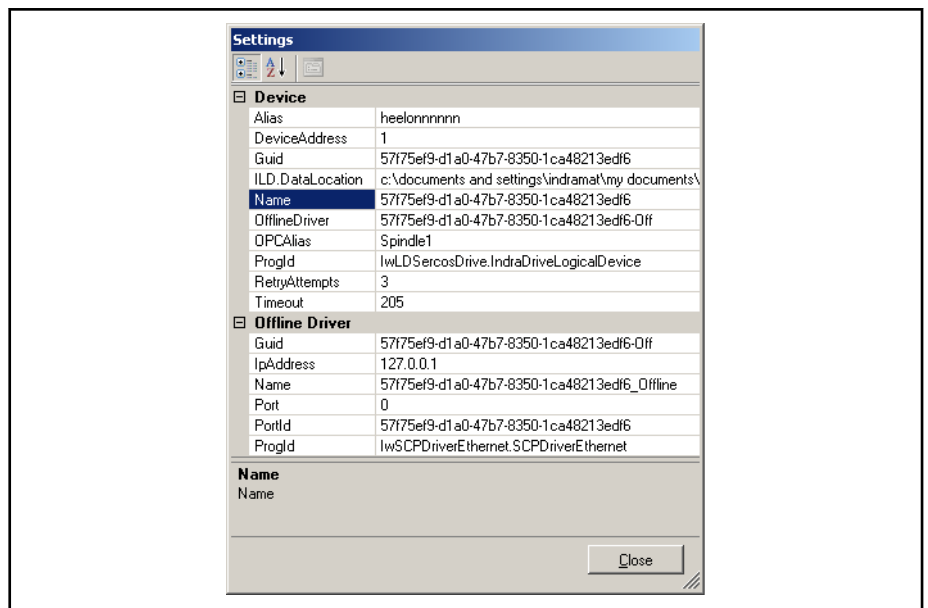


Fig. 3-265: Device properties

Changing devices OPC alias

Device name and device type cannot be changed by the user. These fields are displayed as non-editable fields with a grey background. However, the OPC alias name of a device can be changed by selecting the desired device and clicking on the OPC alias name field. The editing mode is closed with <Return> or by selecting another field.



The OPC alias name may only include the following characters: "a-z, A-Z, 0-9, _, -". If the name convention is infringed, a message is displayed, the background of the field will turn red and an error symbol will be displayed in the field. A description of the present error can also be found in the tooltip of the field labeled as incorrect.

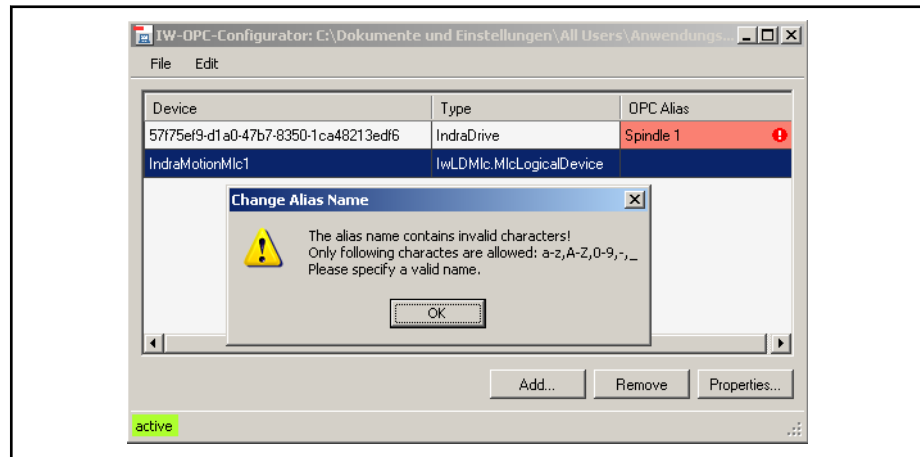


Fig. 3-266: Changing OPC alias name

Removing devices

After confirming a safety prompt, the selected devices are removed from the device list using either the main menu option **Edit ► Remove**, the context menu option **Remove** or the "Remove" button.



This option is only enabled if at least one device of the device list is selected.

Saving device configuration

Save the currently edited configuration under the directory and file name given in the heading of the application using the main menu option **File ► Save**.



This option is only available if any changes were made since the data was opened or last saved.

The "Save" option is not available for newly created configurations as long as no file name has been allocated.

Saving device configuration as

The currently edited configuration can be saved under a different file name using the main menu option **File ► Save As**. Select the desired directory in a file selection dialog and enter the file name under which the file is to be saved. If this file already exists in the target directory, overwriting has to be confirmed explicitly.



If configurations are newly created, the "Save" option is not available, since no file name has been specified yet. The "Save As" option is always available if a configuration file is open.

Activating device configuration

It can be specified to use the currently open file as active configuration via the main menu option **File ► Activate**. This means that this configuration will be used to generate the device list of the OPC server when the OPC server next restarts. Only those devices are available via the OPC server, which are defined in this configuration file.

If the opened file is the currently active SCP-OPC configuration, the status bar of the application is a light green field with the label "active".



A configuration can only be labeled as active if it was saved as file before.

Closing application

Close the application using either the main menu option **Close** or the system menu item **x**. If there are unsaved data you will be prompted to save the data.

3.30 Info

Use **Help ► Info...** to call the IndraWorks information dialog.

Click "Advanced >>" to view detailed information on the individual components.

The upper part of the dialog displays the exact version label and the build number of the basic installation.

The lower part of the dialog displays the license conditions.

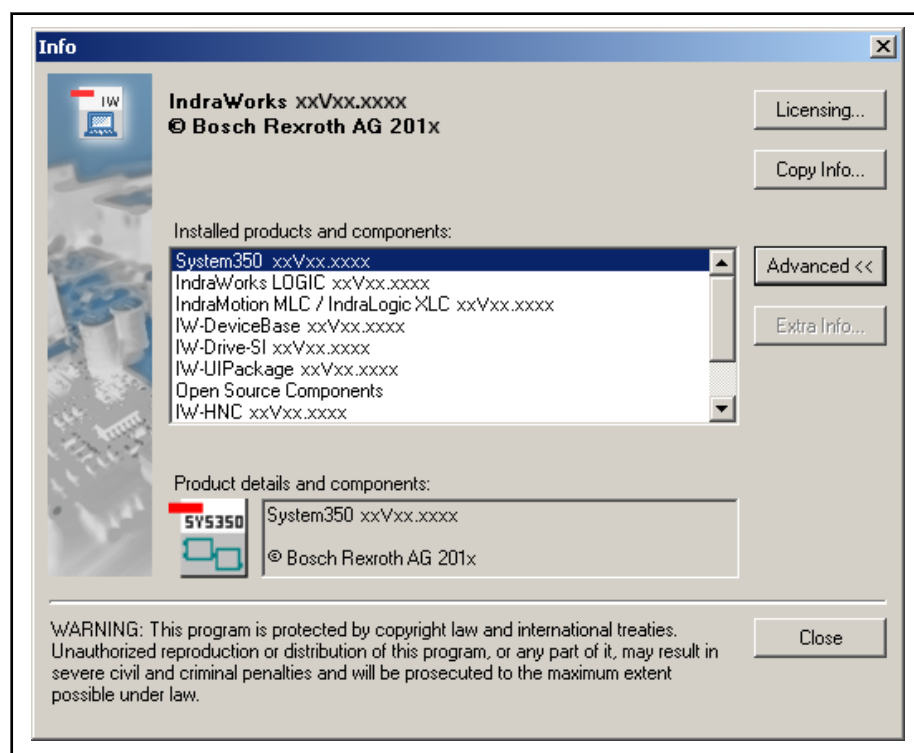


Fig. 3-267: Info dialog box

Installed products and components

This list displays the installed products.

Product details

Select a product from the list to view detailed information (type code and copyright) in the "Product details" field.

Advanced information	Click on "Advanced>>" to additionally show the basic components of the installed software packages in the "Installed products" list. To hide this information again, click on "Advanced<<".
Copy Info	Click on "Copy Info..." to copy the displayed information. Not only the build and version information on IndraWorks are copied, but also information on the files to be installed, such as file size, creation date and key information on the particular PC, processor and operating system. After copying is completed, an editor is started to process this information .
Calling extra info	To obtain extra information on the product selected, click on the "Extra Info" button.
Used open source components	The copyright information of the open source components used in IndraWorks can be displayed by showing "Advanced<<", highlighting the "Open Source Components" item and pressing "Extra Info...".

3.31 Other windows and troubleshooting

3.31.1 Message windows

General information

IndraWorks has different message windows to display errors, search results, diagnostics and messages. These windows can be shown or hidden individually as well as arranged in any order.

Output

The "Output" window can be shown and hidden via the menu **View ► Other Windows ► Output**. It is used to log events and processes occurring while working with IndraWorks.

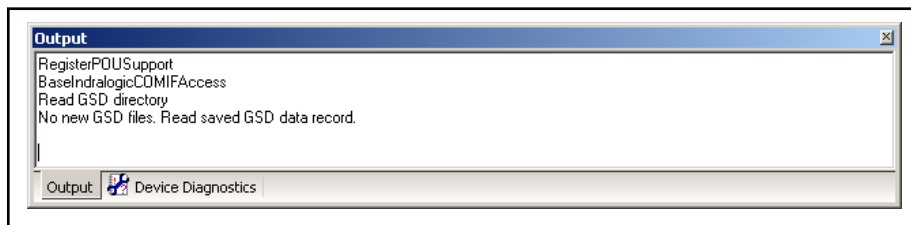


Fig. 3-268: Output window

Messages

The "Messages" window can be shown and hidden via the menu **View ► Other Windows ► Messages**.

This window displays messages generated during certain processes such as PLC program compilation or project data validation for example.

- Messages can be of type error, warning or information.
- Apart from the description as text, each message is also provided with a language-independent "ID".
- "Element" labels a project element to which the message is assigned.
- "Path" specifies the relative project path.
- Specifying "Position" is optional. It is for example used as line/column specification to display syntax errors in source texts.

ID	Description	Element	Position	Path
HMI:00000204	2 unreferenced elements found	VEPA0		VEPA0
HMI:00000100	No control assigned to the device	VEPA0		VEPA0
HMI:00000103	Invalid M-key function block instance "fBMKEYS"	VEPA0		VEPA0
HMI:00000300	The "ConnectionBreakContext" operating area is not used.	ConnectionBreakContext		VEPA0/Screens/ConnectionBreakContext
HMI:00000001	The "IndraMotion_MTX_performance" control is invalid.	OPPreparation		VEPA0/Screen Frame/F-Panels/OPPreparation
HMI:00000500	The "ToolmanSys1" element is not used	ToolmanSys1		VEPA0/Screen Frame/F-Panels/ToolmanSys1
HMI:00000500	The "ToolmanSys2" element is not used	ToolmanSys2		VEPA0/Screen Frame/F-Panels/ToolmanSys2
HMI:00000600	The "GlobalAutoLeftDyRun" element is not used	GlobalAutoLeftDyRun		VEPA0/Screen Frame/F-Panels/GlobalAutoLeftDyRun
HMI:00000002	The "JogOptions.Cont.Key" variable is invalid.	GlobalAutoLeftLeavePath	M3	VEPA0/Screen Frame/M-Panels/GlobalAutoLeftLeavePath
HMI:00000002	The "JogOptions.J1.Key" variable is invalid.	GlobalAutoLeftLeavePath	M4	VEPA0/Screen Frame/M-Panels/GlobalAutoLeftLeavePath
HMI:00000002	The "JogOptions.J1.Active" variable is invalid.	GlobalAutoLeftLeavePath	M4	VEPA0/Screen Frame/M-Panels/GlobalAutoLeftLeavePath

Fig. 3-269: Messages

The upper area of the window is used to filter the messages to be displayed:

- A selection list allows filtering processes. The process, whose messages are to be displayed, can be selected here. If "All" is selected, processes are not filtered.
- Further filtering is carried out via the message type. One field is available for each type. The number of messages of this type is displayed in the field. Click of one of these fields to show or hide messages of the respective type.

Enabled fields (message types) are labeled with a frame.

The displayed messages can be sorted according to the column contents. It is sorted by clicking into the respective column header or via the context menu that is available at each message. Restore the original order again via the context menu.



Many messages provide support when recovering the reported error cause:

- Double-click on a message to reach the position in a dialog or source text where the message was caused
- For a selected message, press <F1> to open the respective chapter in the help system.



Selected messages can be copied to the clipboard with <Ctrl> + <C> or via the context menu item **Copy**.



Save messages to a text file via the context menu of the message.

Device diagnostics

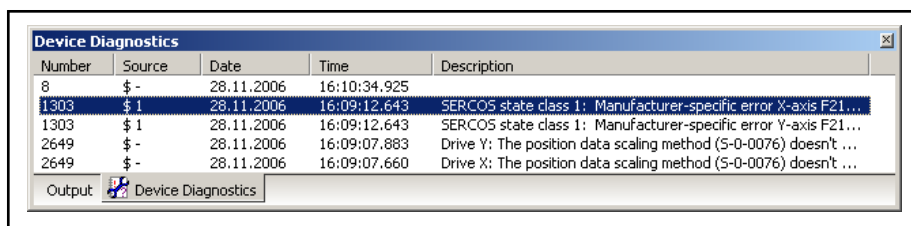
Show and hide device diagnostics via **Diagnostics ► Device Diagnostics**.

The device diagnostics shows a list of the currently pending diagnostics of a device if:

- The device or one of its subitems is selected in the Project Explorer
- The device supports diagnostic messages
- The device is in "online" state

Otherwise, an empty list is displayed.

Each diagnostic message outputs the diagnostic number, diagnostic source (module for ProVi messages, channel number with MTX), date and time of occurrence as well as a descriptive text.



Number	Source	Date	Time	Description
8	\$ -	28.11.2006	16:10:34.925	
1303	\$ 1	28.11.2006	16:09:12.643	SERCOS state class 1: Manufacturer-specific error X-axis F21...
1303	\$ 1	28.11.2006	16:09:12.643	SERCOS state class 1: Manufacturer-specific error Y-axis F21...
2649	\$ -	28.11.2006	16:09:07.883	Drive Y: The position data scaling method (S-0-0076) doesn't ...
2649	\$ -	28.11.2006	16:09:07.660	Drive X: The position data scaling method (S-0-0076) doesn't ...

Output Device Diagnostics

Fig. 3-270: Device Diagnostics

Search results

Show and hide the "Search Results" window via **View ► Other Windows ► Search Results**. This window lists the search results.

The display in the "Search Results" window consists of a navigation bar, a result text and the display of the search result.



Fig. 3-271: Search results

Navigation bar

The navigation bar provides several buttons which are active or inactive depending on the search result.

- Refresh**
 The previous search query was executed again with the same settings.
- Display search request**
 The previous search request is opened in the "Search" window to adjust the search settings and to perform the search again.
- Call current element**
 An action is carried out for the current element. Alternatively, also start this action via the <Enter> key or double-click.
- Call previous element**
 The previous element is selected and an action is carried out for this element. It is also possible to press the shortcut <Shift>+<F8>.
- Call next element**
 The next element is selected and an action is carried out for this element. It is also possible to use <F8>.
- Extended view**
 Click this button to display the elements found in an extended view.
- Delete all**
 The list of found elements is deleted.



If the search results were determined based on the "element search in the project", multiple elements can be selected in the "Search Results" window.

Subsequently, click on "Call selected element" to select these elements in the Project Explorer. Commands can now be applied to this multiple selection in the Project Explorer.

For more information about "Element search in the project", refer to [chapter 3.4.6 "Search element in the project" on page 37](#).

Connection status

Show and hide the "Connection status" window via **View ► Other Windows ► Connection status**. It displays an overview of the existing communication connections to the project devices.

For each connection, a line with the following properties is displayed:

- Device name
- Source: Motion or Logic
- Address
- Connection status: Connected, not connected, connection interrupted



By double-clicking on the connection status symbol in the status line or via its context menu, the connection status window can also be displayed. The filter "Unacknowledged interruptions" is automatically activated.



Apart from the display in the connection status window, a message is generated in the output window upon an interrupted connection. For 5 seconds, a message is displayed to the bottom right of the display.

Filter

When activating the filter "Unacknowledged interruptions" in the toolbar of the window, only interrupted, not yet acknowledged connections are displayed.

Acknowledging interruptions

Interrupted connections can be acknowledged via the toolbar of the window. The affected connections are not displayed anymore in the overview if the filter "Unacknowledged interruptions" is active.



The context menu of the connection status symbol can be used in the status bar to acknowledge interrupted connections.

3.31.2 Error handling

Software errors in IndraWorks are displayed via the following dialog:

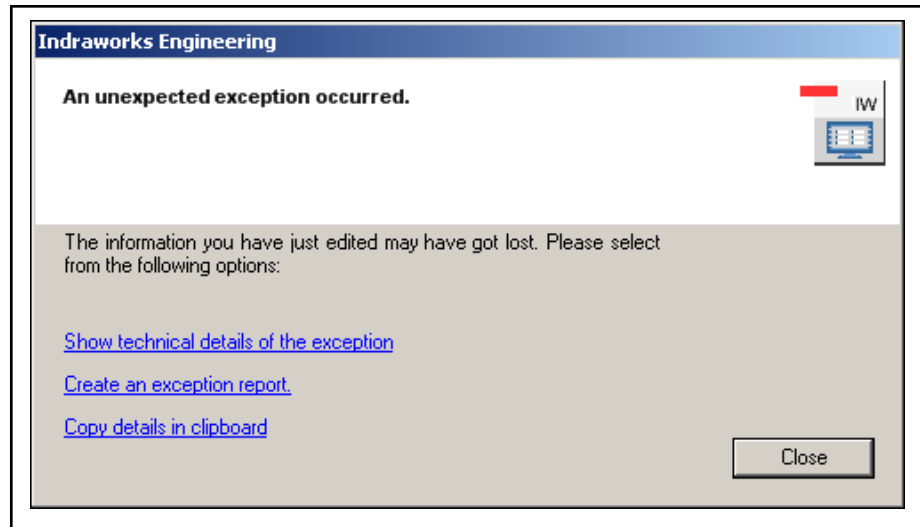


Fig. 3-272: Unexpected exception

The dialog provides three possibilities to look at and save information on the error:

- The first link opens a new dialog displaying detailed technical information on the error. This dialog also provides the possibility to save this data in a text file that is subsequently opened automatically in a Windows text editor.
- The second link creates a detailed error report allowing subsequent error analysis by Bosch Rexroth.
- The third link copies the error information to the clipboard and can subsequently be pasted into an editor and or an email.



If an error occurs, close IndraWorks and restart it in order not to damage project data or cause subsequent errors.

Creating error report

After selecting the link to create an error report, the following dialog opens to specify the scope of the error report.

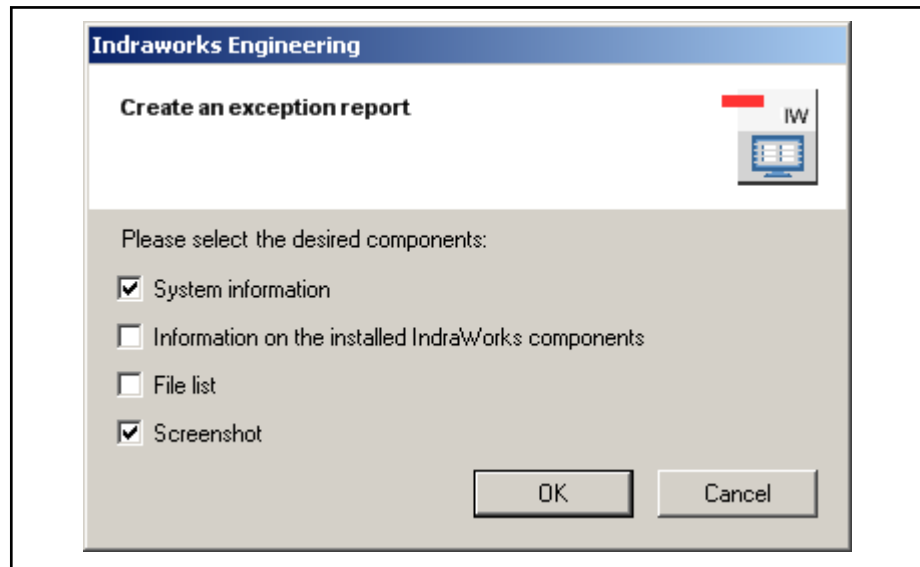


Fig. 3-273: Creating error report

Click on "OK" and IndraWorks creates an error report. All the information gathered is saved as files in a subdirectory. Its name consists of "ErrorReportFrom_" as well as the current date and time. The storage location of the error report as well as the current progress are displayed in the following dialog:

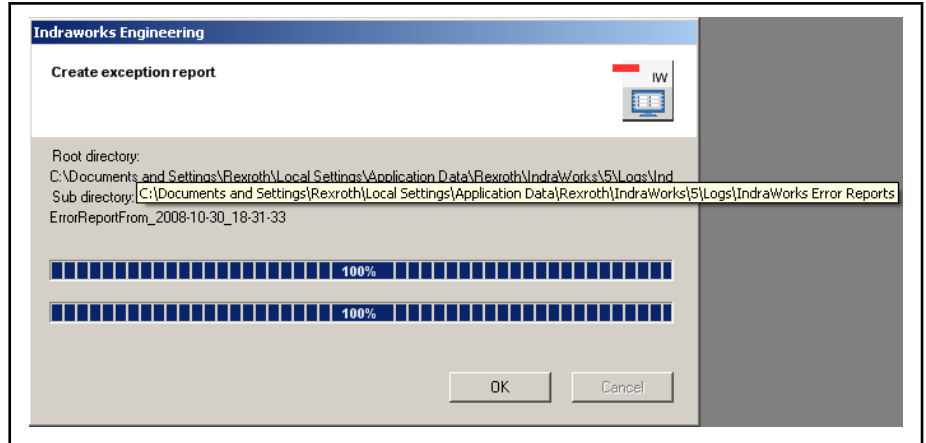


Fig. 3-274: Progress bar

In this dialog, the storage location path can be copied into the clipboard or displayed completely as tooltip after highlighting it with the mouse.

To find a saved error report at a later stage, proceed as follows:

1. Open the Windows Explorer
2. Navigate to the IndraWorks installation directory, normally to "C:\Programs\Rexroth\IndraWorks"
3. Search the "_LinkToLocalAppData" link file in the installation directory and double-click. The Windows Explorer changes automatically to the configuration data directory applicable for this installation.
4. Change to the "IndraWorks Error Reports" subdirectory in the "Logs" subdirectory. This directory provides a corresponding subdirectory for every error report created for this installation.

3.31.3 IndraWorks black box

Introduction

IndraWorks Black Box Control is a tool for recording data from different IndraWorks processes. It can be used to analyze problems.

The recorded data includes visual operating interactions, program data (file, registry accesses, etc.) and errors in the program sequence (exceptions). The recorded data is defined via profiles. The processes monitored and the program data to be recorded are determined in a profile.

IndraWorks Black Box provides a predefined selection of profiles:

Black box profiles

Profile name	Processes	Note
IndraWorks - Default	DDP.EngineeringDesk-top.exe DDP.OperationDesk-top.exe IWDS.exe OPCScp.exe SCP.Server.exe SCP.Runtime.Configuration.exe	This profile is the default profile.
IndraWorks - only DDP	DDP.EngineeringDesk-top.exe DDP.OperationDesk-top.exe IWDS.exe SCP.Runtime.Configuration.exe	Limited process selection compared to the default profile.
IndraWorks - only Communication	OPCScp.exe SCP.Server.exe	Limited process selection compared to the default profile.
IndraWorks- hang situation	DDP.EngineeringDesk-top.exe DDP.OperationDesk-top.exe IWDS.exe OPCScp.exe SCP.Server.exe	Hang situation records data from blocking processes. This profile is started after blocking.
IndraWorks - Installation	InstallManager.exe IW_InstUtil.exe setup.exe	Recording the installation process.
IndraWorks - only DDP (file operations)	DDP.EngineeringDesk-top.exe DDP.OperationDesk-top.exe IWDS.exe SCP.Runtime.Configuration.exe	Extension: File operations
SCP - Gateway	SCP.Server.exe Gateway.exe	Specific recording of IndraLogic 1.x data

Profile name	Processes	Note
IndraWorks - only DDP (Garbage collector)	DDP.EngineeringDesktop.exe DDP.OperationDesktop.exe IWDS.exe SCP.Runtime.Configuration.exe	Extension: Garbage collector
IndraWorks - only Communication (network)	OPCScp.exe SCPServer.exe	Extension: Network operations
IndraWorks - IndraLogic	IndraLogic.exe	IndraLogic 1.x
IndraWorks - Drive OfflineServer	DDP.EngineeringDesktop.exe DDP.OperationDesktop.exe IWDS.exe OPCScp.exe SCPServer.exe DriveServer_M*.exe	In addition to the default processes, data from the various DriveServer processes is also recorded.

Tab. 3-11: IndraWorks Black Box profile

Starting recording

Question: At what time do you start a black box recording?

Response: You can start a recording at any time. The runtime of the black box is linked to a process. As the black box recording affects the runtime behavior and performance of a process, recording is only to be started specifically.

Prepare for recording by calling the "IndraWorks.Blackbox.exe" program from the installation directory. Select a profile and start recording via **Start Recording**.



Fig. 3-275: Black box recording dialog (start recording)

Start Recording starts the "BlackBox.exe" process. This is integrated as icon into the Windows message field (Window SysTray).



If the icon is pulsing, recording is running.

No pulsing indicates that either an incorrect profile has been selected or the process to be analyzed has not yet been started.

Pay attention to this pulsing, since only then data is recorded.



Fig. 3-276: Windows message field: Black box has started



Fig. 3-277: Windows message field: Black box is recording

Stopping recording

Click on **Stop Recording** to stop the recording. Log data is now generated and stored in the "My Documents" directory with the file extension ".asl".

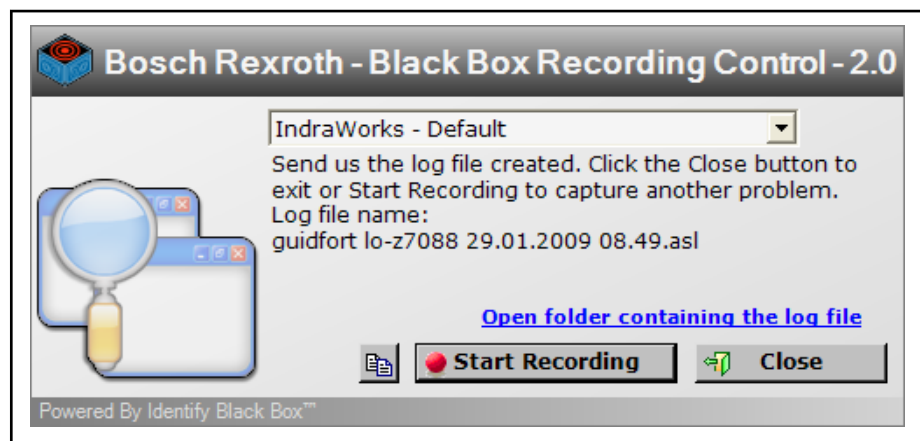


Fig. 3-278: Black box recording dialog (recording stopped)

The above diagram show the BlackBox Control following "Stop Recording". The file name is "guidfort lo-z7088 29.01.2009 08.49.asl". Go to **Open folder containing the log file** and start the Windows Explorer by selecting the ".asl file" directly.

Executing special profiles

The preconfigured profiles cover the majority of applications. However, uploading new profiles is possible to further analyze an error or a non-configured process. This analysis is not performed in the Black Box Control, but directly via the "Blackbox.exe" application in the Windows message field.



"Blackbox.exe" has to started via the IndraWorks Black Box Control before.

Select the black box icon and call the context menu.

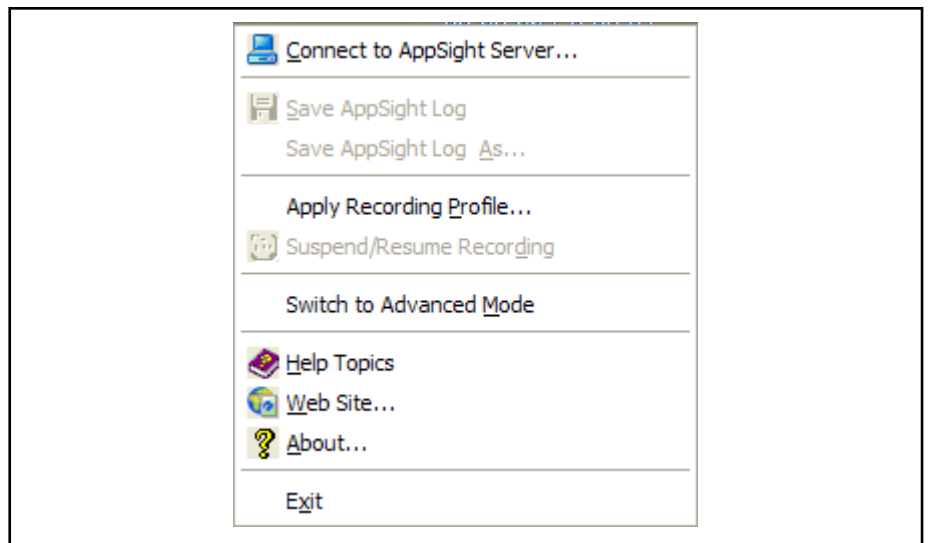


Fig. 3-279: Black box context menu

Switch to the following dialog via **Switch to Advanced Mode**.

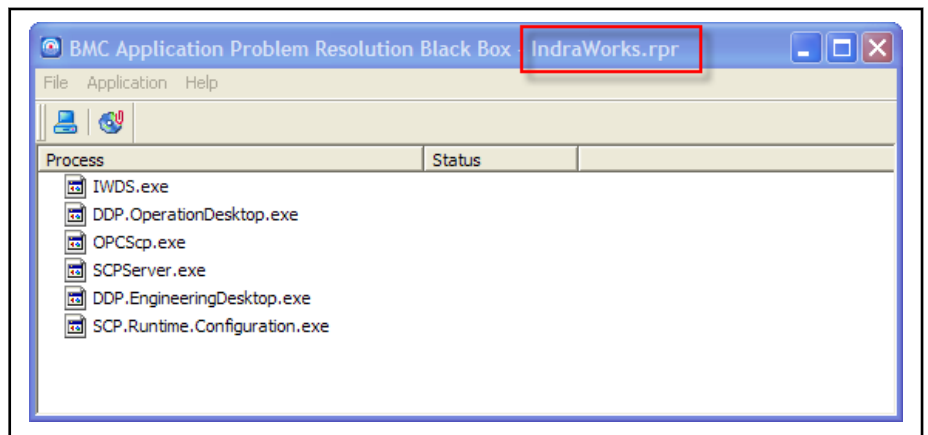


Fig. 3-280: Black box dialog (advanced mode)

All processes that can be analyzed are displayed in this window. The active profile is displayed as file name in the title bar. "IndraWorks.rpr" means in this case "IndraWorks - Default".

Change the profile via **File**

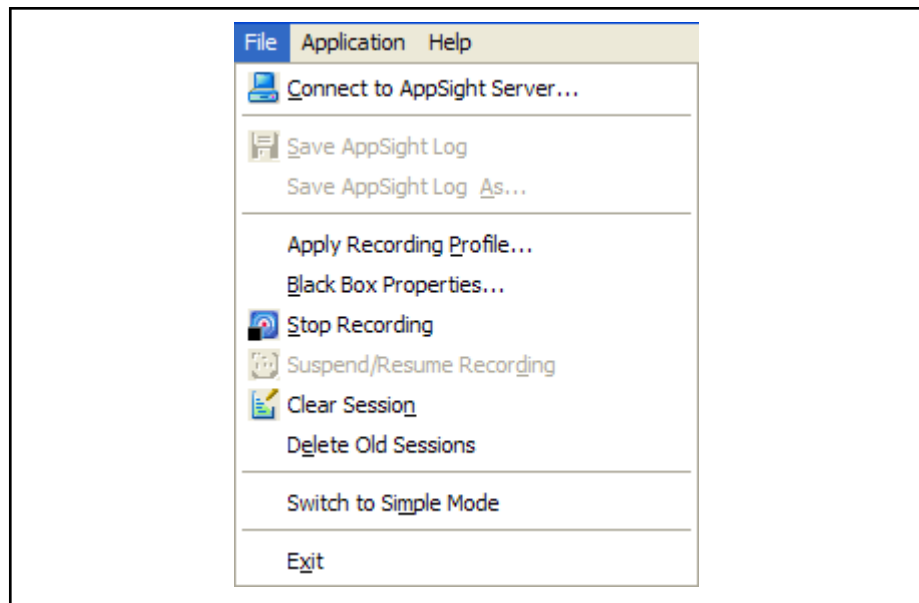


Fig. 3-281: Black box menu

and select **Apply Recording Profile...** from the menu.

Due to this selection, the new profile and the process list are loaded and the window title is adapted accordingly.

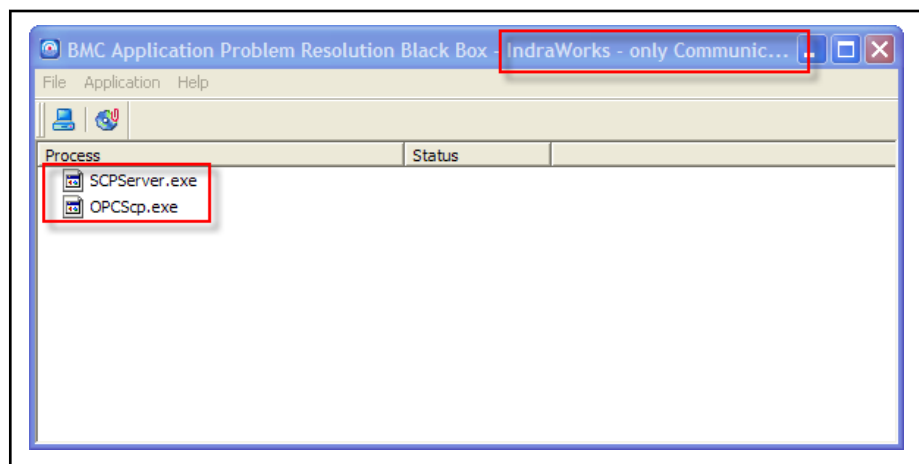


Fig. 3-282: Black box dialog (new active profile)

Notes

Operating multiple monitors

with modern operating systems, applications can run on multiple monitors. Note in this case that the black box only records **visual** data of the **primary monitor**. In Windows, the primary monitor can be identified at the Windows taskbar.

Resources

As data collection is performed within a process, the black box operation affects the performance and memory use of the respective process. With older computer systems with little CPU capacity and memory, the performance can significantly decrease during recording. It is thus recommended using a more powerful computer for recording, e.g. a dual-core system with 1-2 GB of main memory. The consumption of resources is then negligible.

Administrative rights

For data collection purposes, the black box uses Windows debug and hook techniques to link to a running process. It is therefore necessary that the black box is provided with administrative rights.

These can be given specifically in Windows via the **Execute As...** context menu.

Recording period

Log data is recorded in the black box in a ring buffer. Thus, stop recording if the situation to be analyzed occurred in order not to increase the volume of data unnecessarily.

Windows XP Embedded

Windows XP Embedded is not supported by the black box.

3.32 Help

3.32.1 IndraWorks online help

Help Start the online user documentation to learn the basics about IndraWorks via **Help ► First Steps**.

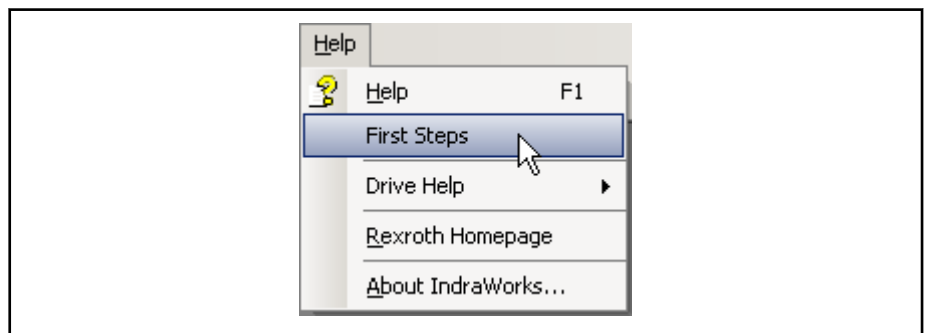


Fig. 3-283: Help menu, first steps

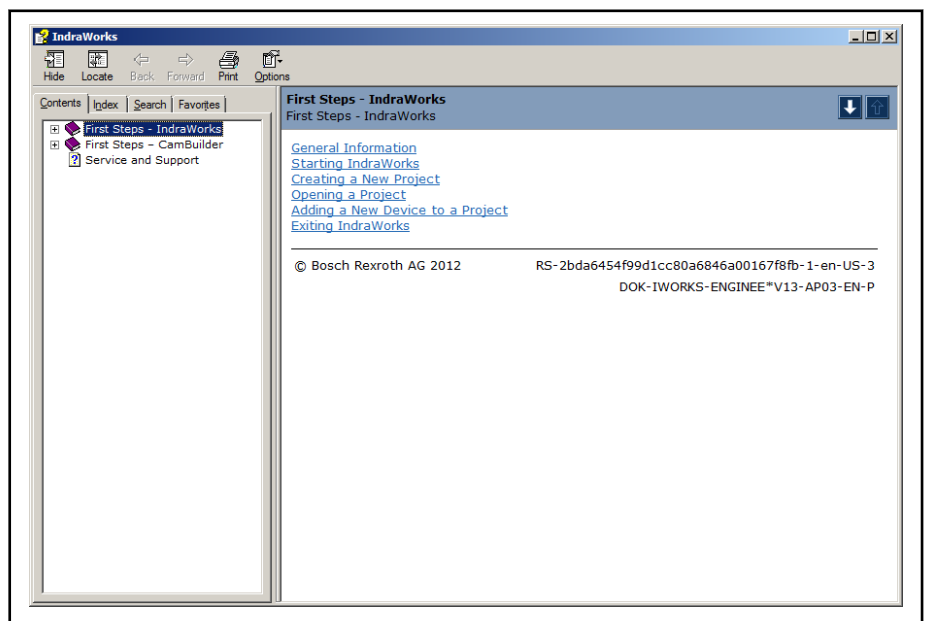


Fig. 3-284: Online information on first steps with IndraWorks



The folders displayed in the "Contents" depend on the installed components installed.

Select **Help ► Help** to start the IndraWorks online user documentation.

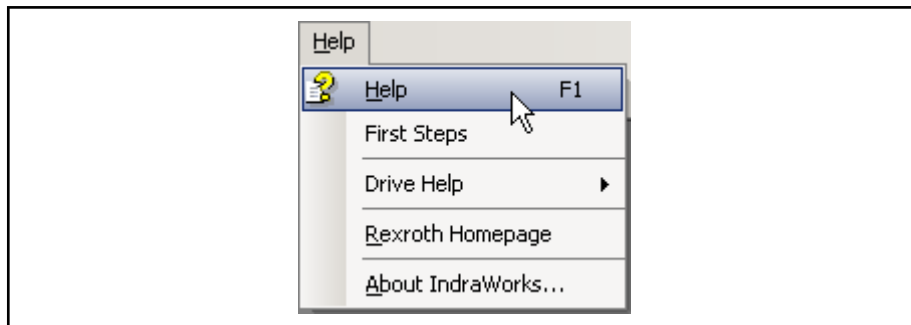


Fig. 3-285: Help menu (start online help)

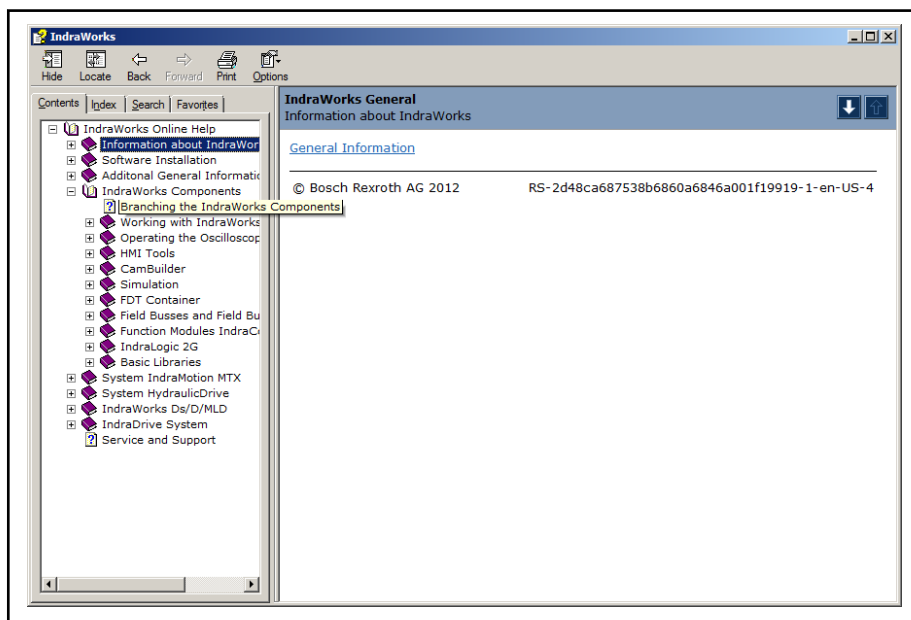


Fig. 3-286: Online information on IndraWorks

Contents See the entire IndraWorks Online Help via "Contents". It is sorted by topics.

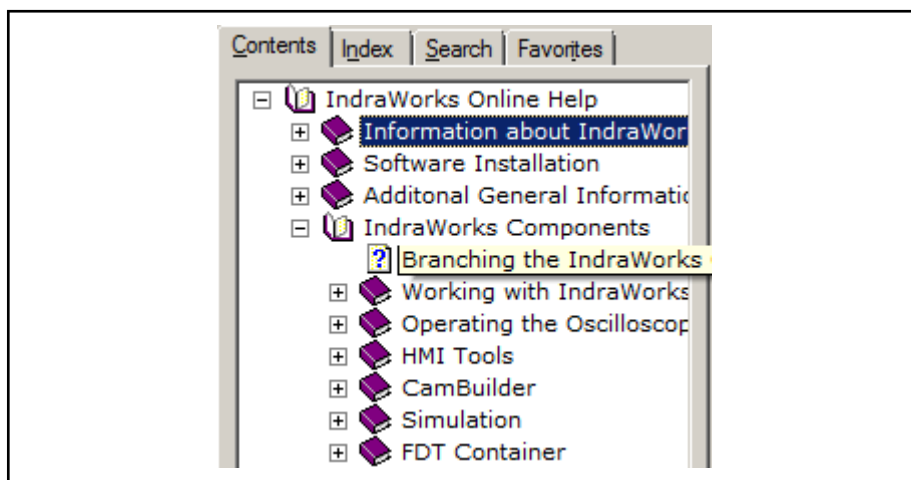


Fig. 3-287: Content of IndraWorks online help



The folders displayed in the "Contents" depend on the installed components installed.

Index The complete online IndraWorks help is provided in the "Index". It is sorted by keywords.

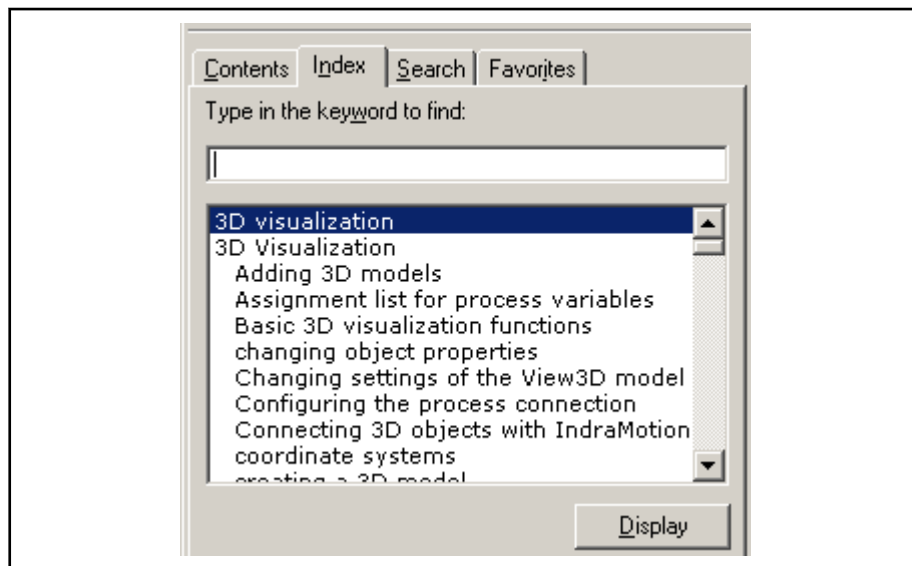


Fig. 3-288: Help, Index

Search Search for keywords in the complete online help via "Search". The search results are displayed in a list with all associated topics.

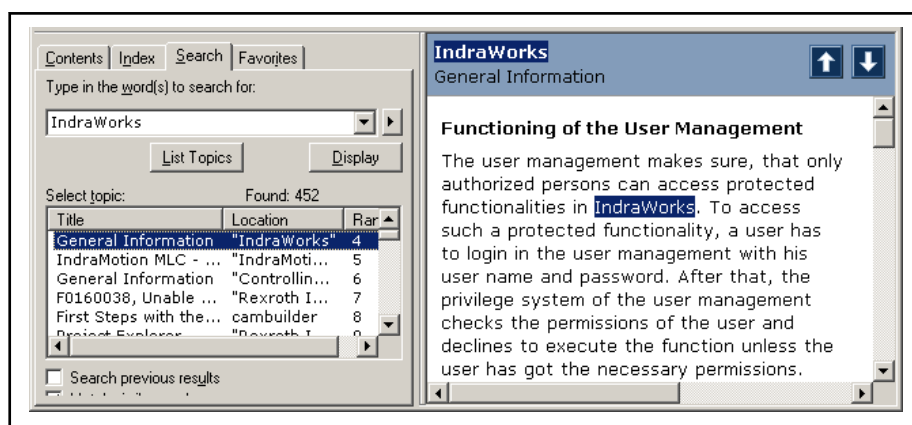


Fig. 3-289: Help, search for topics

Rexroth Homepage Select **Help ► Rexroth Homepage** to go to the Bosch Rexroth homepage if your computer is online.

4 Oscilloscope function

4.1 General information

The oscilloscope is a powerful software-based measuring tool for commissioning, servicing and testing drives and control systems. It is used to measure and evaluate the transient response of a drive, for example. It is thus possible to optimize the axes of a machine without additional measuring accessories.

In addition, the oscilloscope has a powerful measurement management process and an extensive range of diagram types for the most diverse evaluations. In addition to the diagram types ("Time diagram", "FFT" and "Frequency response") used in the drive technology, there are further diagram types ("Contour diagram", "Path deviation" and "Circle test") which are used predominantly in the area of machine tools.



The oscilloscope can be used to process signal data of a maximum data width of 32 bits!

4.2 Operating

4.2.1 Working with measurement files

General information

Use the oscilloscope, to create, open and edit measurement files (*.scope). All oscilloscope data (measurements and measurement-comprehensive calculations) can be saved in a measurement file.



In addition to the measurement-comprehensiveScope-file format (*.scope), the following file formats are supported by the oscilloscope:

- *.xml
- *.txt
- *.csv

In contrast to the Scope-file format, these file formats can only be used for individual measurement nodes.

In the signal legend, select the measurement node and press "Save as..." in the context menu. The dialog "Save as" opens. Select the file format from the drop-down box "File type".



The node "Measurement configuration" shows the measurement configuration of the connected device. This data is not part of a measurement file!

Oscilloscope function

When working with measurement files, use the oscilloscope file menu on the far left of the tool bar:

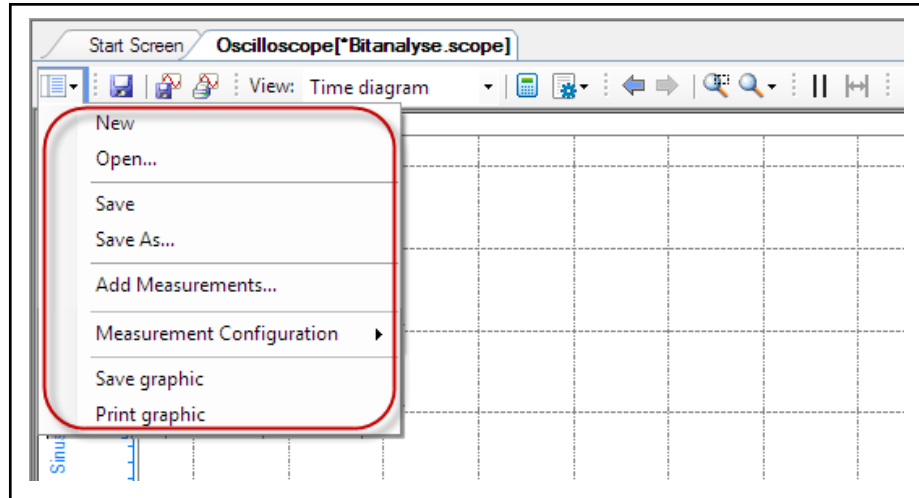


Fig. 4-1: Oscilloscope file menu of the tool bar

New

Data displayed in the oscilloscope can be reset via the **New** function. When resetting the data, all measurements and measurement-comprehensive calculations are deleted in the oscilloscope. Furthermore, the assignment to the opened measurement file (*.scope) is canceled. The display of the opened measurement file in the title bar or the tab changes to "Untitled".



The node "Measurement configuration" shows the measurement configuration of the connected device. The measurement configuration is not deleted when executing the function **New**!

Open

Open a measurement file (*.scope) using the **Open** function. The data of the measurement file (measurements and measurement-comprehensive calculations) is loaded to the oscilloscope and displayed in the signal legend. In the following, you are using the opened measurement file. Upon each saving action, the file is updated with the data displayed in the oscilloscope.

The measurement file currently opened is displayed in the title bar or the tab.



Upon opening of a measurement file, all data in the oscilloscope is deleted. If the data has not been saved yet, you can now save it before opening the new measurement file.

Saving

Via the **Save** function, the opened measurement file is updated with the data displayed in the oscilloscope (measurements and measurement-comprehensive calculations). If no measurement file has previously been opened, the dialog "Save as..." in which the name and the storage location for the measurement file can be entered is automatically displayed.



The change notice (asterisk) in front of the name of the opened measurement file shows that the data displayed in the oscilloscope differs from the measurement file data. During saving, the oscilloscope data is applied to the measurement file and the change notice is deleted from the display.

Save as

Via the function **Save as...**, data displayed in the oscilloscope (measurements and measurement-comprehensive calculations) is saved in a measurement file (*.scope) after specifying a storage location and a file name.



In addition to the measurement-comprehensiveScope-file format (*.scope), the following file formats are supported by the oscilloscope:

- *.xml
- *.txt
- *.csv

In contrast to the Scope-file format, these file formats can only be used for individual measurement nodes.

In the signal legend, select the measurement node and press "Save as..." in the context menu. The dialog "Save as" opens. Select the file format from the drop-down box "File type".

Adding measurements

Via this function, measurements can be selected in a measurement file and can be loaded to the oscilloscope in addition to the data of the opened measurement file. This operation does not affect the opened measurement file.



When saving data after measurements have been added, the added measurements are additionally stored in the opened measurement file.

Loading the measurement configuration

Select a measurement configuration and subsequently load it to a connected device using the function **Measurement configuration ► Load...**. Subsequently, the device configuration is completed according to the selected measurement configuration. If configuration adjustments are required, they can be made manually via the relevant dialogs.

It is now possible to select the measurement configuration via a template or a measurement file.



The function is only available if the oscilloscope is connected to a device.

Loading the measurement configuration from the template

To support typical measurement tasks, templates (measurement configurations) are provided with the oscilloscope. In the "Load measurement configuration from template" dialog, select a matching template. If the template supports the device type of the connected device, it can be loaded to the connected device by clicking on **OK**.

Loading the measurement configuration from the measurement

Apart from using the templates, the measurement configuration can be applied from a measurement file (*.scope) and can be loaded to the connected

Oscilloscope function

device. In the "Load measurement configuration from measurement" dialog, select a matching measurement file. After the file has been selected, the measurements contained in the measurement file are displayed. Select one of the measurements using the assigned checkbox and confirm with **OK**. Thus, the measurement configuration of the selected measurement is loaded to the connected device.



Loading of templates and configurations of the measurement files is only supported for the single device measurement! The selected configuration has to match the type of the connected device to be able to load the configuration to the device.

Save measurement configuration as

The measurement configuration of the connected device can be saved in a measurement file (*.scope) using the function **Measurement configuration ► Save as...**



The function is only available if the oscilloscope is connected to a device.

4.2.2 Control elements

The main window of the oscilloscope is split into different areas. The following figure provides an overview:

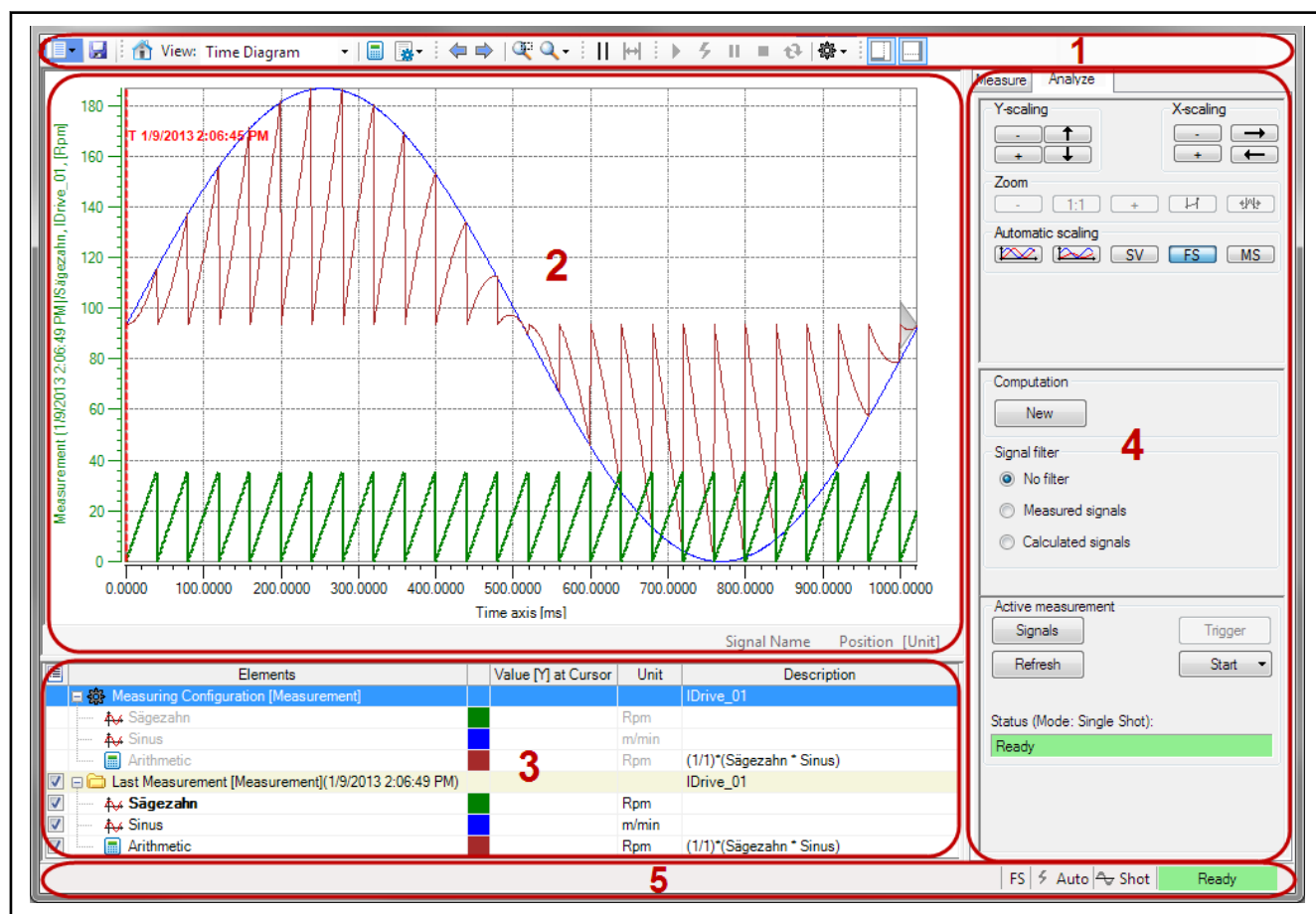


Fig. 4-2: Oscilloscope (1 - toolbar, 2 - Graph area, 3- Signal legend, 4 - operating area, 5 - status bar)

1 - Toolbar**File management**

In this toolbar area, important function for working with measurement files (*.scope), measurements and measurement configurations are provided. Additionally, the graphic area of the oscilloscope can be saved or printed.

Analyzing and layout (time diagrams)

Switch to the different diagram types of the oscilloscope, perform computations, view characteristics or change the layout of the interface.

Scaling

The functions of this area provide the opportunity to scale the signal curves displayed in the graph. Using the arrow keys "Scaling back" or "Next scaling", you can switch to old or new scaling settings.

Cursor

Show or hide two line cursors and zoom into the area marked with line cursors.

Configuring and controlling the measurement

In this area, configure the measurement and the measuring mode and control the measurement.

Layout control

The signal legend (window area below) and the operating area (window area to the right) can be activated or deactivated using the respective buttons. The layout settings are applied and are still valid upon an oscilloscope restart. Additionally, a setting can be selected for the oscilloscope using the interface to the far right to always display the oscilloscope in the foreground. This setting is only active if the oscilloscope is running in an individual window or in the IndraWorks Suite. The option is disabled upon restart or docking.

2 – graph area

In the graph area, measured and loaded signal curves and computations are displayed. Displace, scale or change the color of the measuring curves. The display in the graph area corresponds to the signal legend of the oscilloscope.

In addition to direct operation of the mouse, the graph area has operating functionalities in the context menu. It is differentiated between three graph areas. A special context menu is available for each of these graph areas. These three areas are the x-axis, y-axis and the diagram area, which is spanned by the axes.

3 – signal legend

The signal legend displays all of the measurements and signals of the oscilloscope session and corresponds to the display in the graph area. In the signal legend, switch the active signal, or show or hide signals and computations in the graph, for example.

Depending on the selected element, different context menus are available in the signal legend. In addition to connection management, functions for measurement configuration and measurement control are thus provided e.g. on the "Measurement configuration" node. Show or hide the signal legend via the layout functions of the toolbar.

4 – operating area

The operating area is positioned to the right of the oscilloscope window and provides the tab "Measure" and "Evaluate". The operator interface to configure and execute a measurement is contained on the "Measure" tab. The "Evaluate" tab provides the operator interface to evaluate (e.g. scale and position measurement curves, etc.) as well as to execute measurements.

Show or hide the operating area via the layout functions of the toolbar. Operate the oscilloscope when the operating area is hidden via context menus and the toolbar.

5 – status bar

Here, the most important states and settings of the oscilloscope are displayed:

- Fixed scaling
- Trigger mode
- Measuring mode

- Measurement status

A tooltip with a brief description is displayed for every field of the status bar.

4.2.3 Graph area

Active signal

A measuring curve with double line width is displayed in the graph area. This measuring curve represents the active signal in the oscilloscope. The y-axis in the graph area always displays the unit, scaling and color of the active signal. Switch the active signal in the graph area by selecting another measuring curve with the mouse.

Proceed as follows to switch the active signal in the graph area. Move the mouse near or on the desired measuring curve. The oscilloscope tries immediately to record the measuring point located nearest to the mouse cursor. In the graph, the recorded measuring point is displayed by a small circle on the measuring curve. Left-click to select the measuring curve, on which the measuring point is located, as an active signal. The selected curve is marked with double line width and the associated y-axis is represented in the same color.

Displacing measuring curves

Displace measuring curves in the diagram in the x- and y-direction. Depending on the selected diagram type, either all measuring curves or only the measuring curves belonging to the active evaluation are displaced in the x-direction. In the y-direction, the displacement affects the active measuring curve.

X-displacement

Move the mouse cursor in the diagram area or in the area below the x-axis. Left-click and move the mouse to the left or right with the button pressed. The measuring curve and x-axis scaling are displaced accordingly. Release the mouse button again once the target position is reached.

The x-displacement affects all of the measuring curves represented in the following diagram types: "Measurement", "Time diagram", "FFT", "Frequency response" and "Contour diagram". In the case of the "Path deviation" and "Circle test" diagram type, only the measuring curve belonging to the active evaluation is always offset in the x-direction.



If the measuring curve extends beyond the visible diagram area in the "Measurement", "Time diagram", "FFT" and "Frequency response" diagram type, an arrow symbol is shown on the right or left edge in the graph area. Click on the arrow symbol to scroll the graph to the left or right.

Y-displacement

Proceed as follows to displace the active measuring curve in the y-direction. Move the mouse cursor in the area to the left of the y-axis. The mouse cursor is changed to a "hand cursor". Left-click and move the mouse upward or downward with the button pressed. The active measuring curve is also moved with the mouse. The y-axis is automatically adapted accordingly. Release the mouse button again once the target position is reached.

To displace several curves in the y-direction, activate and displace the relevant curve. Perform this procedure for every curve to be displaced.



Functions for displacing measuring curves in the x- and y-directions are also available via the operating area of the oscilloscope in the "X-scaling" and "Y-scaling" areas. They are used like the mouse. A description of the corresponding buttons is provided via the assigned tooltip.

Scaling measuring curves

Scale the measuring curves in the diagram in the x- and y-direction using the mouse. Depending on the selected diagram type, either all measuring curves or only the measuring curves belonging to the active evaluation are scaled in the x-direction. In the y-direction, the scaling affects the active measuring curve.

X-scaling Move the mouse cursor in the area below the x-axis. The mouse cursor is changed to a "hand cursor". Press the <Ctrl> key; keep it pressed and then left-click. Move the mouse to the left or right with the button pressed. With the movement of the mouse, the measuring curves are also scaled, i.e. enlarged or shrunk in the x-direction. The x-axis is automatically represented in the correct scaling. Release the mouse button and <Ctrl> key again once the target scaling is reached.

The x-scaling affects all of the measuring curves represented in the following diagram types: "Measurement", "Time diagram", "FFT", "Frequency response" and "Contour diagram". In the case of "Path deviation" and "Circle test", only the measuring curve belonging to the active evaluation is always scaled in the x-direction.

Y-scaling Proceed as follows to scale the active measuring curve in the y-direction. Move the mouse cursor in the area to the left of the y-axis. The mouse cursor is changed to a "hand cursor". Press the <Ctrl> key; keep it pressed and then left-click. Move the mouse upward or downward with the button pressed. The active measuring curve is also scaled in the y-direction with the mouse, i.e. the measuring curve is enlarged or shrunk in the y-direction. The y-axis is automatically represented in the correct scaling. Release the mouse button and <Ctrl> key again once the target scaling is reached.

X- and y-scaling Change the x- and y-scaling "at the same time". Move the mouse cursor in the diagram area, which is spanned by the two axes. Press the <Ctrl> key; keep it pressed and then left-click. Move the mouse to the left or right, or upward and downward, with the button pressed. Depending on the mouse movement, the curve is either scaled in x- or y-direction. All axes are automatically represented in the suitable scaling.

Automatic scaling In the oscilloscope, there are different functions for automatically scaling measuring curves. These functions are provided via the toolbar or the "Graph Area" context menu below the **Scaling** menu item.

Partly, these functions are also available via the operating area, in the "Automatic scaling" section.

Fixing scaling It is possible to fix the set scaling in the oscilloscope. If the scaling is fixed, the set scaling is also retained for a new measurement. When the "Fix scaling" switch is deactivated, measuring curves are automatically scaled again every time a new measurement is performed.

Via "FS" (Fixed scaling) being displayed in the status bar, the black font color shows that "Fix scaling" is switched on. With the gray font color, "Fix scaling" is switched off.

**Scaling backwards/
Scaling forwards** All changes to scaling are saved by the oscilloscope and can be restored. Use the arrows "Scaling backwards" and "Scaling forwards" in the toolbar. By using these functions, go back to old scaling settings or go forward to new scaling settings.

This functionality is also available in the operating area of the oscilloscope.



Functions for scaling measuring curves in the x- and y-directions are also available via the operating area of the oscilloscope in the "X-scaling" and "Y-scaling" areas. They are used like the mouse. A description of the corresponding buttons is provided via the assigned tooltip.

Line cursors

Show two line cursors in the diagram and use them for scaling or measurement tasks. The line cursors are represented as black, vertical dotted lines. One of the cursors is the active cursor; this is marked with double line width. The cursors are labeled with the cursor names "C1" or "C2" and the x-position. Displace the labeling fields of each cursor with the mouse. Move the mouse cursor on the corresponding labeling field and move this upward or downward to the desired position with the left button pressed.

Select line cursors with the mouse and drag them to the desired position or displace them using the arrow keys. The line cursor stops on the relevant position and remains, even when the measuring curves are displaced in the x-direction.

Showing cursors Show or hide the two line cursors via the **Show both cursors** button in the toolbar, or via the corresponding button in the operating area in the "Zoom" section.

Setting cursors Set both cursors separately on the measured value of a curve. Proceed as follows: Move the mouse cursor to the corresponding position of a measuring curve. The closest measuring point is automatically recorded by the oscilloscope and is displayed on the measuring curve with a small circle. Open the **Cursor** context menu and select the **Set Cursor 1** or **Set Cursor 2** menu item. The selected cursor is set precisely to the position of the recorded measuring point. The cursor is automatically shown, if it was not already displayed.

Cursor distance The distance between cursor 1 and cursor 2 is shown via a labeling field between the two cursors. The labeling field is connected to the cursors via a line. Displace this labeling field in the y-direction with the mouse.

To displace the two cursors to the right or left at the same time while retaining the set distance, click on the labeling field and displace the mouse in the x-direction with the left button pressed.

Value at the cursor In the signal legend, the y-value of the intersection point is displayed with the active cursor in the "Value [Y] at the Cursor" column for each measuring curve. Switch the active cursor and the value display is adapted.

Via the **Display options ► Show cursor positions** context menu item in the diagram area, show or hide a table displaying the y-values on the intersection point of the relevant measuring curve with cursor 1 and cursor 2. Press **Tools ► Show cursor positions** to show or hide the table.

Zooming

Zooming into the area *To zoom into an area in the diagram, select*

- the **Range selection frame** menu item in the toolbar or
- the **Range selection frame** menu item in the Diagram context menu

Select the graph and move the mouse to draw the zoom area. A zoom rectangle appears. Its size is changed with the movement of the mouse. Release the mouse button. The area to be zoomed into is defined and automatically sized to the entire graph area.

Disable the function by selecting the interface again or by pressing <ESC> (in case of a selected diagram area).

Area between the cursors

To zoom into the area between the two cursors, select

- the **Maximize area between cursors** menu item in the toolbar or
- the **Scaling ► Maximize area between cursors** menu item in the Diagram context menu.



This functionality is also available via the **Zoom between the two cursors** button of the toolbar in the "Zoom" section.

Displaying trigger point in time

After performing a "single shot" measurement, the point in time at which the trigger was initiated is displayed in the diagram. The trigger point in time is displayed by a vertical, red dashed line. The line is labeled with a "T" and the trigger point in time (date and time). Select the label and displace vertically with the mouse.

Show several Y-axes

In the view "time diagrams", Y-axes of the displayed signals can be shown or hidden.

A short description of the showing or hiding of Y-axes:

Show all Y-axes

Using this function, the Y-axes of all displayed signals are shown.

To activate this function, select the **Tools ► Show Y-axes** menu item in the toolbar or select the **Display options ► Show Y-axes** menu item in the "Diagram area" context menu.

Show all Y-axes

Using this function, all displayed Y-axes can be hidden. Following the call, only the Y-axis of the active signal is displayed.

To activate this function, select the **Tools ► Show one Y-axis** menu item in the toolbar or select the **Display options ► Show one Y-axis** menu item in the "Diagram area" context menu.

Showing/hiding of a Y-axis

Using this function, all displayed y-axes, apart from the y-axis of the active signal, can be hidden.

Proceed as follows to show a Y-axis. Move the mouse pointer to the signal in the diagram. As soon as the signal has been recorded automatically, a small circle is displayed at the recorded measuring point. Select the menu item **Show Y-axis** in the context menu.

Proceed as follows to hide a Y-axis. Move the mouse pointer to the signal in the diagram until the signal is recorded. Deselect the menu item **Show Y-axis** in the context menu. The function can also be called via the context menu of the Y-axis. Deselect the menu item **Show Y-axis** in the context menu of the Y-axis.

Showing the characteristic value table

The oscilloscope supports the computation of characteristic values for defined time ranges of the measuring curves.

The following characteristics values are supported:

- Minimum (min.)
- Maximum (max.)
- Arithmetic average value (mean)
- Quadratic average value (RMS)

To activate this function, select the **Tools ► Show characteristic values** menu item in the toolbar or select the **Display options ► Show characteristic values** menu item in the "Diagram area" context menu.

Oscilloscope function

After selecting this function, an area selection tool (gray area) is enabled in the diagram and the characteristic table displaying the characteristics for the selected area (for every measuring curve) is shown to the right of the diagram.

Adjusting the area Select the characteristic computation area and left-click. Two red "flags" are shown on the left and right of the characteristic area. Move the mouse cursor precisely on one of these flags to change the mouse cursor into a horizontal left-right arrow. Press and hold the left mouse button and move the mouse to the left or right. Thus, the area is enlarged or shrunk to the left or right. Consequently, the left and right area margin can be moved to the desired position.

Move the mouse in the characteristic computation area and press and hold the left button to displace the entire area to the left or right.

Area size The area size, which is connected to the area boundaries by a line, is displayed via a labeling field between the two area boundaries. Displace this labeling field in the y-direction with the mouse.

More display options

Set various display options, such as signal filter, curve display or display format of x- and y-axis, in the oscilloscope. Select the associated functions via the operating area, in the graph area via the "Axes" context menus or via the **Display options** "Diagram area" context menu.

Signal filter Via the signal filter, control the display in the "Time diagram" diagram.

It is possible to set the following filters:

- No filter (display all signals)
- Measured signals (only display measured signals)
- Computed signals (only display computed signals)

Curve display Set how the curve is to be represented.

The following representations are possible:

- Interpolated (the individual measuring points are connected by lines)
- Discrete (y-value is extended in parallel to the x-axis until a new measured value is reached)
- Interpolated with measuring points (interpolated representation with marked measuring points)

Show signal table A signal table with all displayed signals can be shown in the right diagram area.

4.2.4 Signal legend

General information

The signal legend provides an overview of the measurement configuration, measurements, signals and computations of the oscilloscope. Access the functions of the individual elements via the context menu.

In the signal legend, a distinction is made between the following node types:

- Measurement configuration
- Last measurement
- Measurement
- Signal
- Local computation
- Global calculations

The following figure shows, by way of example, a signal legend with two measurements:

Elements	Y-axis min	Y-axis max	Value at cursor	Unit	Description
Measuring configuration [Bremsentest]					IDrive_01, Kommentar zu Messung Bremsentest...
Sägezahn(en-US)				Rpm	
Sinus(en-US)				m/min	
Bremsentest (5/23/2012 11:11:22 AM)					Achse[1], Kommentar zu Messung Bremsentest...
Sägezahn	-21.060	249.210		Rpm	
Sinus	-660.000	1650.000		m/min	
Gleichlauf (6/12/2013 10:09:23 AM)					IDrive_01, Kommentar zur Messung Gleichlauf...
Sinus5Hz	-6.600	8.800		U/min	
PRBS	-8.800	6.600		U/min	
Arithmetik	-11.000	4.400		U/min	(1/1)*(Sinus5Hz * PRBS)
Global computations					
Arithmetik	-440.644	73.441		Rpm	(1/1)*(Sägezahn * (1/1)*(Sinus5Hz * PRBS))

Fig. 4-3: Signal legend with measurement configuration and two measurements



The "Measurement configuration", "Last measurement" and "Global calculations" nodes are nodes specified by the oscilloscope, which have special properties and cannot be renamed or displaced as regards their position.



The respective y-scaling is displayed in the diagram for each signal value via the "Y-axis min" and "Y-axis max" columns. By entered different values, the y-scaling is changed. First select the line to be changed by double-clicking on the line, then enter the desired value.

The following section provides a description of all the node types of the signal legend:

Measurement configuration

The node Measurement configuration shows the measurement configuration of the connected device. Via the context menu, functions for configuring and controlling the measurement are available. Below the node, all of the signals selected for the measurement are displayed. Via the "Node" context menu, add computations, in which the signals selected are to be used as operands in the measurement configuration.

The measurement configuration can be edited as follows:

- Connection management (connect to device, disconnect the connection)
- Copy measurement
- Load measurement configuration to device (from file or template)
- Save measurement configuration
- Control of the measurement (Start, Stop, Trigger...)
- Add or delete the signals/calculations
- Signals/computations - change colors
- Configuring measurement
- Add calculation
- Show/edit properties (measurement: Name, description,...)
- Rename assigned measurements in the signal legend (start editing with double-click)

To create a measurement configuration, establish a connection to the device. Then, select the signals on the device and configure the trigger and resolution. These settings are forwarded to the connected device and there, they define the configuration for the next measurement.

Signals and computations, which are displayed below the measurement configuration, are displayed in gray. This means that no measured values are present for these entries. The Properties dialog of the measurement configuration provides an overview of the set values. Provide the measurement configuration with a name and a comment. In the signal legend, the name after "Measurement configuration" is displayed in square brackets. The comment is displayed in the "Description" column after the device name of the connected device. The name and comment are passed on when a measurement is performed, i.e. the new measurement is given the name and comment of the measurement configuration.



Assign a meaningful name and comment to each measurement configuration. When working with several measurements, this provides a better overview during the following steps to render the operations more user-friendly.



Use the templates provided with the oscilloscope (measurement configuration -> Load -> Template) to quickly configure your measurement. Adjust the measurement configuration after a template has been loaded, if required.

Last measurement

This node is located below the "Measurement configuration" node in the signal legend and displays the measurement that was performed last. On the node, the measurement name and a time stamp are displayed in square brackets. The time stamp specifies the point in time at which the measuring result was delivered from the device to the oscilloscope. The comment on the measurement and the device name is output in the "Description" column.

Below the "Last measurement" node, all of the signals and computations set beforehand in the measurement configuration are displayed. Unlike with the measurement configuration, the entries here are displayed in black. This means that measured values are present for these entries. Show or hide the signal in the diagram via the checkbox to the left of the first column of the signal legend. Show or hide all of the signals and computations of the measurement via the checkbox on the measurement node.



Every new measurement is performed with the configuration of "measurement configuration". After a measurement is completed, the measuring results are again stored in the "Last measurement" node, overwriting the old values.

There is always one active signal in the oscilloscope. This signal is displayed in bold in the diagram and in the signal legend. Switch the active signal in the signal legend by double-clicking or by pressing <Return>. The representation of the active signal in the diagram follows this switch in the signal legend and vice versa.



Any changes made to the configuration in "Last measurement" by e.g. changing signal colors or adding a new computation are overwritten with the configuration from "Measurement configuration" when a new measurement is performed.

To prevent this, a red exclamation mark is shown in the icon on the "Last measurement" node as soon as the configuration has been changed. To prevent accidental overwriting when a new measurement is performed, it is queried at the start of the a measurement (when the exclamation mark is set) whether the measurement configuration from "Last measurement" is to be applied as the active measurement configuration.

Perform this step manually via the **Apply measurement configuration...** context menu.

Measurement nodes

A measurement node displays a measurement performed at an earlier point in time and contains the measurement configuration and measuring results. Rename the node name and thus the name of the measurement. The time stamp displayed is fixed and cannot be deleted or renamed.

Edit measurements and their subordinate signals or computations as follows:

- Delete measurement/signals/computations, change colors, show or hide in the graph
- Change y-scaling of the signal in the diagram (column: Y-axis min/y-axis max, start editing with double-click)
- Signals/computations - change colors
- Show or hide signals/computations in the graph
- Rename measurement (possible in the properties dialog or directly in the signal legend)
- Copy measurement
- Apply measurement configuration as active measurement configuration
- Moving measurement in x-direction



Use the function "Move measurement in x-direction" to assign a temporal offset to the measurement. Thus, it is possible to temporally displace different measurements against each other. The offset set is saved and can be reset at a later point in time.

Signals

Signals are displayed below a measurement node in the signal legend. The presence of a signal below a measurement node indicates that it is configured in the measurement. The font color of the signal indicates whether measuring results are present for the signal. Signals cannot be renamed.

Local computation

A local computation is always assigned to a measurement and only uses operands from this measurement. Operands from other measurements are not available for a local computation.

Create a local computation via the **New computation...** context menu at the "Measurement configuration" node or on any measurement node.

Save a measurement to save the local computations, too.

You can rename the computation in the signal legend (start editing with double-click).

Global calculations

A global calculation is not assigned to any measurement and can use operands from different measurements. It is displayed below the "Global calcula-

tions" node in the signal legend. This node is located right at the bottom of the signal legend.

Create a global calculation via the **New computation...** context menu of the "Global calculations" node of the graph area, or using the **New** button of the operating area.

You can rename the computation in the signal legend (start editing with double-click).

Switching the representation

Switch the representation of the signal legend between "Structured representation" and "List representation".

In the structured representation, the complete data, including all of the structural elements, are displayed. In this view, configure the measurement. All of the functions for managing measurements are available.

In the list representation, only measured and computed signals, which can be displayed in the diagram type currently selected, are displayed. The elements are represented in a flat list.

To switch the representation, press the **Switching to list representation** or **Switching to structured representation** buttons, which are located in the top left-hand corner of the signal legend.

Managing measurements

The signal legend of the oscilloscope enables working with several measurements within one oscilloscope session.

The following functions are available for managing these measurements:

- Configure, perform and repeat measurements
- Copy measurements and measurement configurations
- Apply measurement configurations as the active measurement configuration
- Save and delete individual measurements
- Rename and comment on measurements
- Rename computations

The following chapters provide a description of the most important functions.

Copying measurements

Copy measurements in the signal legend. When copying a measurement, the measurement node, including all of the subordinate signals and calculations, is copied.

Especially for the "Last measurement" node, this is reasonable, as this data is overwritten every time a new measurement is performed. Copying preserves the data, even when a further measurement is performed.

To copy a measurement, select the **Copy measurement** menu item on the context menu of the measurement to be copied. The copy of the measurement is located at the end of the signal legend (before the "Global calculations" node) and is provided with an index as a name extension.



It is also possible to copy the "Measurement configuration" node. A measurement node, which contains the copied configuration without measuring results, is provided as a result. The gray font color indicates that there are still no measuring results present for the corresponding signals and computations.

Create and copy measurement configurations to create and save a set of different measurement configurations within one session. For example, create a set of measurement configurations for a drive optimization, save it in a measurement file and forward it to the commissioner of the drive. The commissioner can perform and save the measurements and return them for further analysis.

Applying a measurement configuration

It is possible to perform every measurement again when working with several measurements within one oscilloscope session. Apply the measurement configuration of the corresponding measurement as the active measurement configuration. Perform the measurement with this configuration.

Proceed as follows to apply a measurement configuration. On the context menu of the selected measurement, select the **Apply measurement configuration** menu item. Upon selection of this function, the measurement configuration of the selected measurement is applied in the "Measurement configuration" node (topmost node) of the signal legend and the device-specific configuration parts are transferred to the connected device. The "Measurement configuration" node is assigned the name of the measurement, from which the measurement configuration was applied, in square brackets as a name extension. In the Description column, the associated measurement comment is displayed.

Every new measurement is performed with this measurement configuration. After the measurement has been completed, the measuring results are saved in the "Last measurement" node with the current time stamp.

The measurement configuration thus applied is valid until this is changed, the connection to the device is disconnected or the measurement configuration of another measurement is applied as the active measurement configuration via the **Apply measurement configuration** context menu.



Only apply a measurement configuration if there is a connection to a device.



When connected to a multi-device configuration in the oscilloscope, select on which device the measurement configuration is to be applied to. In this case, another menu level is available in the context menu of the measuring node below the menu item **Apply measurement configuration**. In this menu level, select on which target device the measurement configuration is to be applied to.

Saving a measurement

In the signal legend, select the measurement node of the measurement to be saved and press "Save as..." in the context menu.

The dialog "Save as" opens. Enter the name, the storage location and the file type.

The following formats are supported:

- *.scope

- *.xml
- *.txt
- *.csv

Subsequently, select **Save** to save the selected measurement as well as the contained measurement configuration and all subordinate signals and calculations.

4.3 Starting the oscilloscope

4.3.1 General information

Start the oscilloscope via the **Diagnostics ► Oscilloscope** function in the IndraWorks main menu.



By default, the oscilloscope is displayed as a window within IndraWorks. But it is also possible to "ungroup" this window from IndraWorks and place it on a second screen, for example. Use the mouse to drag and drop the tab of the "Oscilloscope" tab in the desired screen area. The oscilloscope can thus be kept open while the main IndraWorks workspace is available for other tasks. If the previously "ungrouped" oscilloscope is to be displayed again as grouped in IndraWorks, drag the window to the main workspace in IndraWorks and drop it.

Offline mode The oscilloscope starts in offline mode if not yet connected to a device when started in IndraWorks. In this mode, it is not possible to perform measurements, but it is possible to read in, view and further edit measurement data saved as a file.



It is also possible switch to online mode later on.

Online mode The oscilloscope starts in online mode if connected to a device.

4.3.2 Oscilloscope start page

Upon starting the oscilloscope, a start page is displayed via which important functions for working with the oscilloscope are provided. In the area "Execute measurement", an auto setup wizard provides support regarding establishing a connection, the measurement configuration as well as the execution of a measurement. Furthermore, the last edited measurement file (*.scope) can be opened or a new measurement file can be selected for editing in the "Open measurement file" area.

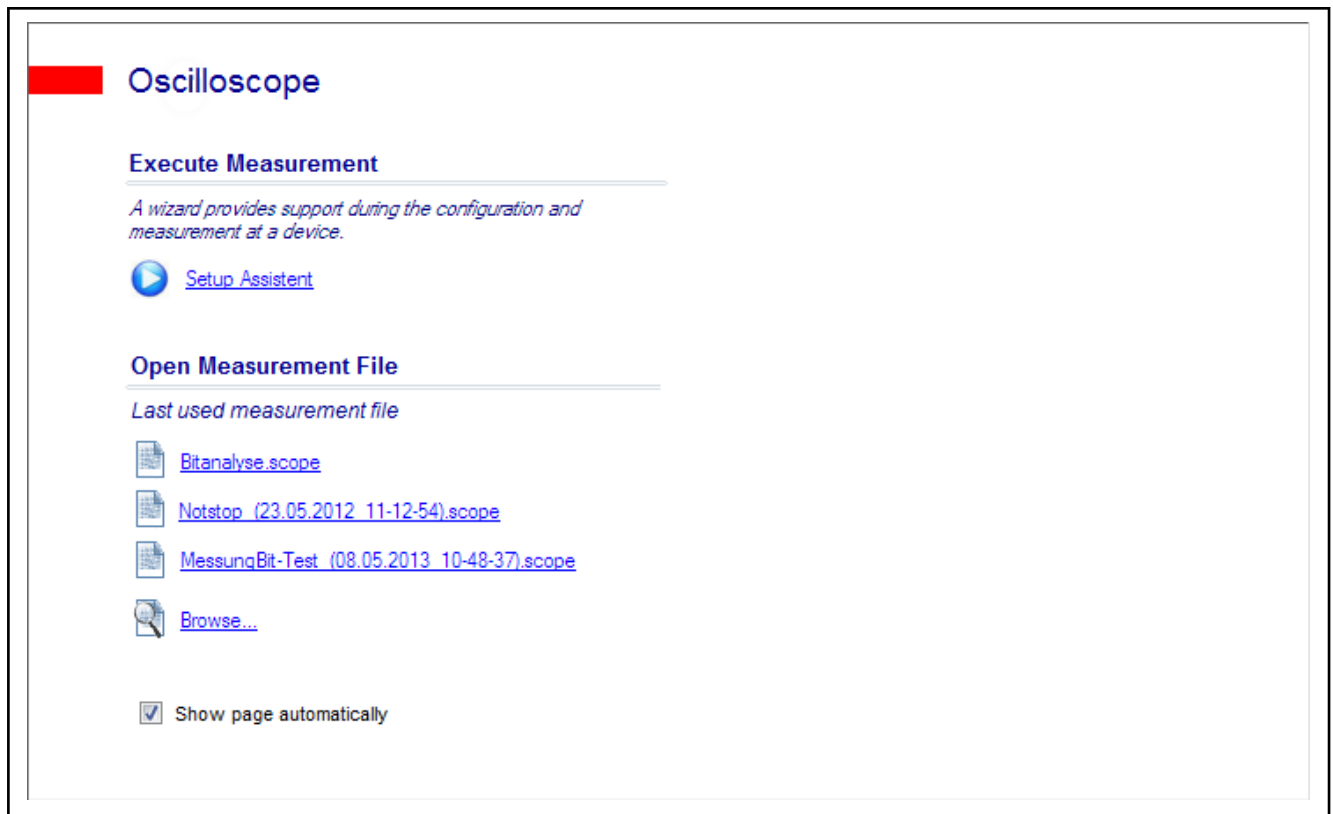


Fig. 4-4: Start page of the oscilloscope (display in graphic area)

After IndraWorks has been installed, the start page is set to be automatically displayed after certain functions have been executed.

The start page is automatically displayed:

- Upon the start of the oscilloscope
- When actuating the function **New** in the file menu of the toolbar.

This behavior can be changed using the checkbox "Automatically display page".

Manually change to the start page by clicking on "Start page" (house symbol) in the left area of the toolbar or by changing to the "Start" view.

Start page - Setup wizard

Establish a connection to the device using a wizard. Execute the measurement configuration by means of a template or a measurement file or on the basis of the measurement configuration available on the device. After successfully completing the measurement configuration, close the wizard and automatically start the measurement.



The setup wizard is only available on the start page if devices are available to which the oscilloscope can establish a connection. If no devices are available, only the functions in the "Open measurement file" are available.

Setup wizard - Select device

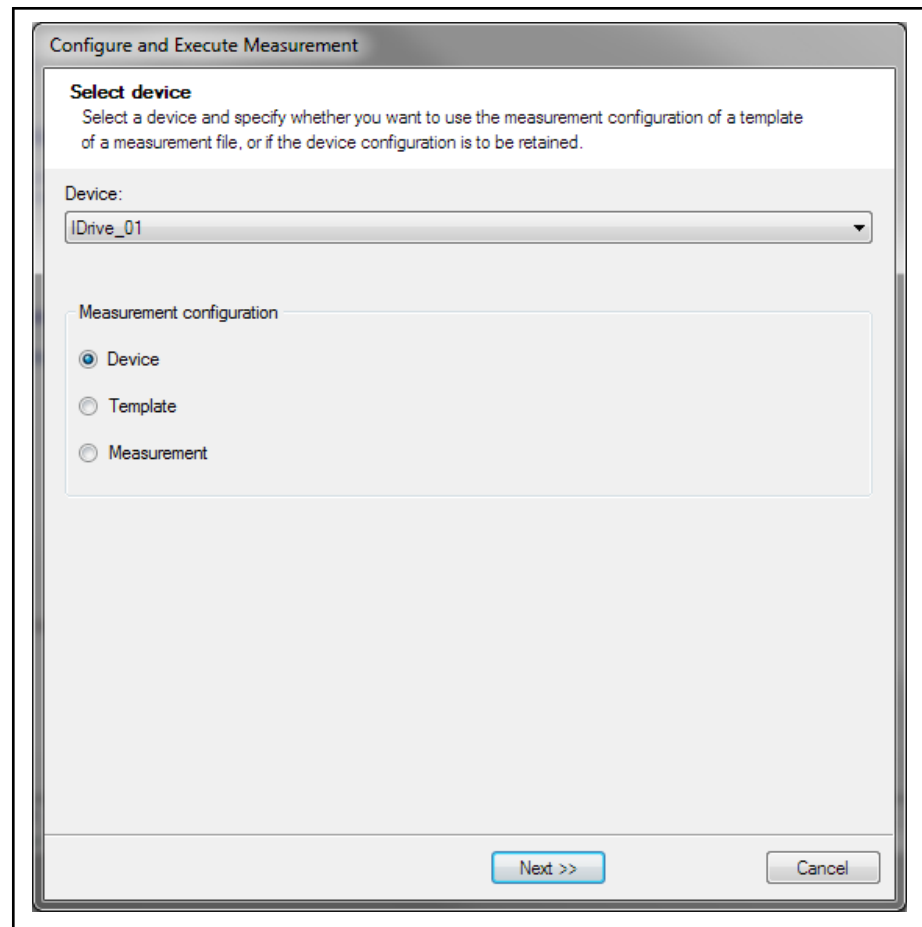


Fig. 4-5: Setup wizard (first page): Select device

On this page, select the device, the oscilloscope should connect to. If a connection is established to a device, this device is already preselected.

In the "measurement configuration" area, specify whether to use the measurement configuration of the device, of a template or of a measurement file.

- **Device:** Use the measurement configuration on the device. Press "Next" and a connection is established to the selected device. The available measurement configuration is displayed on the next page ("Configure measurement") of the wizard and can be changed or extended.
- **Template:** Configure the measurement on the basis of a template (measurement configuration). Press "Next" and the connection is established to the selected device. Subsequently, the page "Select template" of the wizard is displayed. On this page, templates (oscilloscope measurement configuration) are available that can be loaded to the connected device. By clicking on "Next", the selected template is loaded to the device. The available measurement configuration is displayed on the next page ("Configure measurement") of the wizard and can be changed or extended.
- **Measurement:** The measurement is configured on the basis of a measurement that is defined in a measurement file (*.scope). Press "Next" and the connection is established to the selected device. Subsequently, the page "Select measurement" of the wizard is displayed. On this page, first the measurement file (*.scope) and subsequently the measurement whose configuration is to be loaded to the connected device is selected. By clicking on "Next", the selected measurement configuration is loaded

to the device. The available measurement configuration is displayed on the next page ("Configure measurement") of the wizard and can be changed or extended.



The selected template or the measurement is always (!) loaded to the device by clicking on "Next". If the configuration of the template or the measurement has previously been adjusted on the last page and the wizard has been run through with "<< Back" and "Next >>", the changes can sporadically be overwritten.

New overwriting can be avoided by changing to page 1 and by setting that the measurement configuration of the device is to be used in the "Measurement configuration" area.

Setup wizard - Configure the measurement

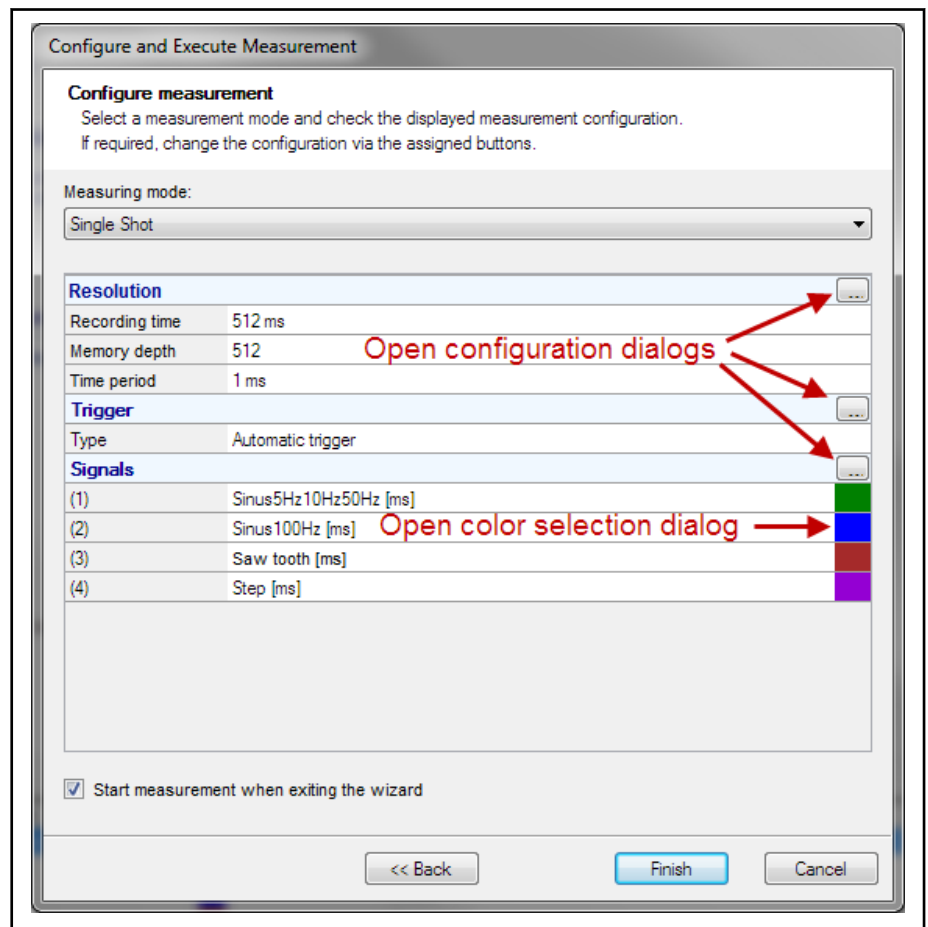


Fig. 4-6: Setup wizard (last page): Configuring measurement

On the top of the page, the measurement mode (single shot, trending, ...) of the oscilloscope can be set with which the measurement is to be executed.

In the table below, the measurement configuration of the device is displayed. If you want to change the configuration, open the configuration dialogs for each section via the assigned "..." interfaces (see figure) and make the desired changes.

Via the button "Finish", the wizard is exited. Via the checkbox "Start measurement when exiting the wizard", it is set whether the measurement is started automatically.



In case of a running measurement, the message status is displayed on the start page as note. Upon completion of the measurement, the oscilloscope automatically changes to the "Time diagram" view.

Start page - Open measurement file

In the area "Open measurement file", the last edited measurement files are listed. At the bottom of the list, a measurement file can be selected for opening via the "Browse" function. Upon opening of a measurement file, the oscilloscope automatically changes to the "Time diagram" view.

4.3.3 Starting in offline mode

Start the oscilloscope in offline mode if previously saved measurements are to be read in and edited.

Status In the "Active measurement" operating area and in the status bar, the "Not connected" status shows the oscilloscope is not connected to a device. This state does not allow any measurements.

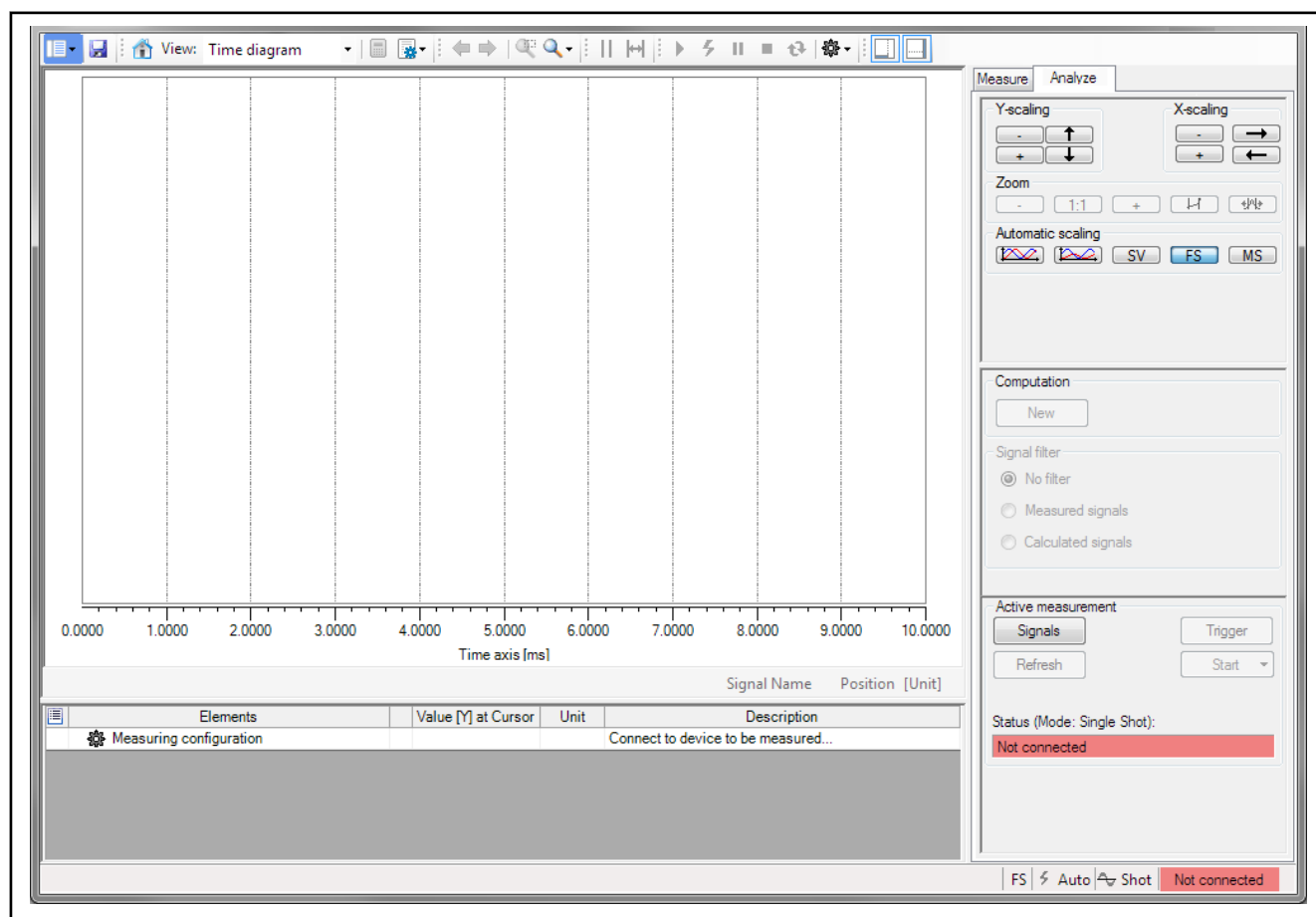


Fig. 4-7: Oscilloscope, started in offline mode



In the offline mode, a measurement file of the previously saved measurements can be opened, displayed and analyzed via the tool bar using **File menu ► Open....**

Select the signals for a measurement after connecting to a device. Configure the trigger and measurement. Perform a measurement.

4.3.4 Starting in online mode/Switching to online mode

Measurement configuration After switching to online mode, the oscilloscope reads the configuration of the connected device and displays this on the "Measurement configuration" node in the signal legend. View or change the measurement configuration via this context menu. Each configured signal is displayed below the "Measurement configuration" node.

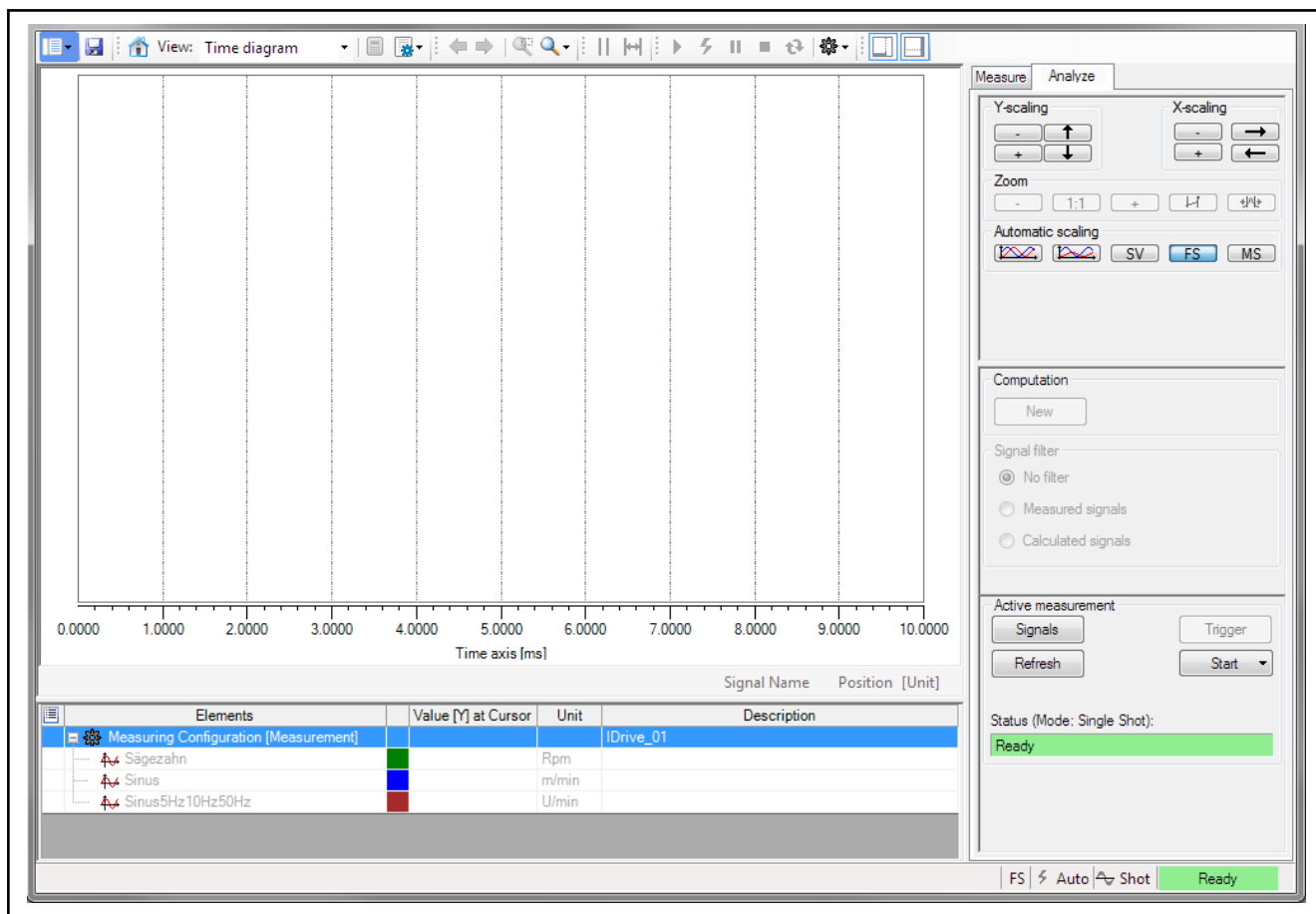


Fig. 4-8: Displaying the measurement configuration in the signal legend

If measurement data is already on the device, read it out from the device and display it in the graph using **Refresh**.



The measurement performed or the measurement read using **Refresh** is displayed in the signal legend below the "Last measurement" node and is given the current time stamp as a name extension. The recorded values are displayed in the graph.

A measurement contains measured data and configuration data.

Status The status of the measurement is displayed in the "Active measurement" operating area and in the status bar. If the status is "Ready", a measurement can be performed.

Further status messages are "disconnected", "not configured", "not triggered", "triggered" and "storing".

In addition, a progress display is provided in the status bar. This progress display indicates the measurement data reading status after the measurement.

Updating (reading a measurement from the device)

If the device contains not only the configuration but also signal data, e.g. following a long-term measurement, view it via **Refresh**.

Oscilloscope function

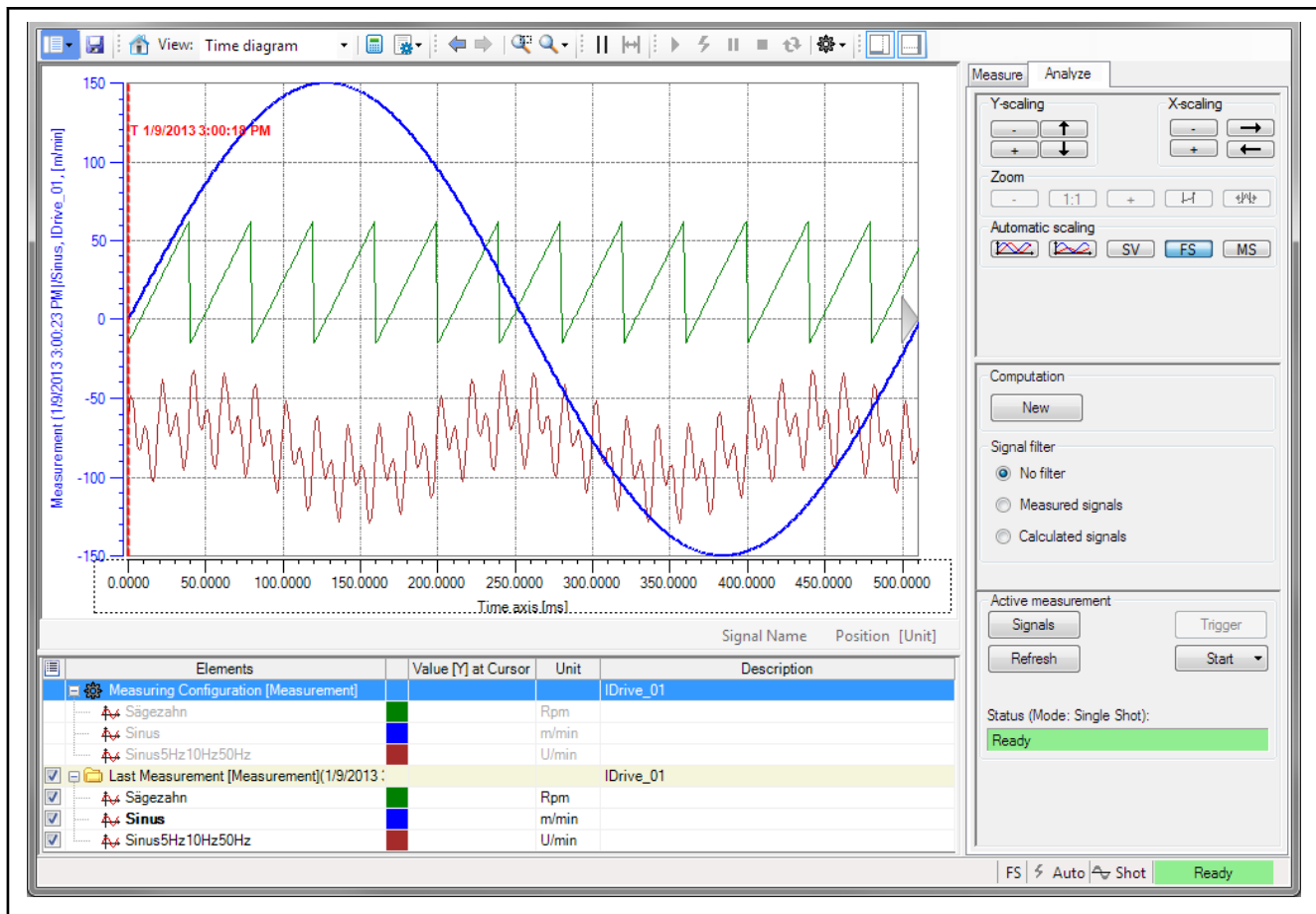


Fig. 4-9: Displaying measured data

To show or hide individual signals, select or deselect the relevant checkmark to the left of the signal name.

The active signal

The representation is always scaled according to the active signal. Active signals are represented in bold in the signal overview and marked in double line thickness in the graph. Activate a signal by clicking in the graph, by double-clicking or by pressing <Return> on the signal in the signal overview.

4.4 Configuring a measurement

4.4.1 General information

To execute a measurement with the oscilloscope, connect to the device and configure the measurement. Specify in the measurement configuration which signals are to be recorded by the device and at which sample rate. Moreover, specify the trigger configuration. Specify how to configure the trigger controlling the signal recording.

Using the oscilloscope, the measurement configuration can be executed manually, i.e. step-by-step via the corresponding dialogs or an already completed measurement configuration can be loaded to the connected device. Completed measurement configurations are provided as templates with the oscilloscope installation. Furthermore, the measurement configuration can be saved in a file (*.scope) and can subsequently be loaded to a device of the same type.

Proceed as follows to execute a manual measurement configuration:

Connect the oscilloscope to the desired device.

The devices available are displayed in the "Configure devices" dialog.

If using devices that support a multi-device measurement (e.g. via SERCANS1), synchronized measurements can be performed on several devices.

Single device measurement

Select the device and the signals, configure the measurement and the trigger and start the measurement.

Multi-device measurement

1. First, select the device for the multi-device measurement that coordinates the multi-device measurement.

This device is generally a control that is connected to other devices of the measurement as field bus master.

2. Then select the device that triggers the measurements of all the devices involved (trigger device).

3. Select the devices to be involved in the measurement.

Configure the signals to be measured for each of the devices involved.

4. Configure the measurement and the trigger for the trigger device and start the measurement.

The measurement and trigger configurations are sent to all the devices involved to enable synchronous measurements.

5. Start the measurement.

4.4.2 Single device measurement (connecting to a device and selecting signals)

Device selection

Connect to the device on which an oscilloscope measurement is to be performed. Open the "Configure devices" dialog.

Open the dialog as follows:

- Toolbar: **Configure measurement ► Connect...**
- "Graph area" context menu: **Measurement ► Connect...**
- "Signal legend" context menu, "Measurement configuration" node: **Connect...**
- Operating area: **Signals** button and then **Devices**.

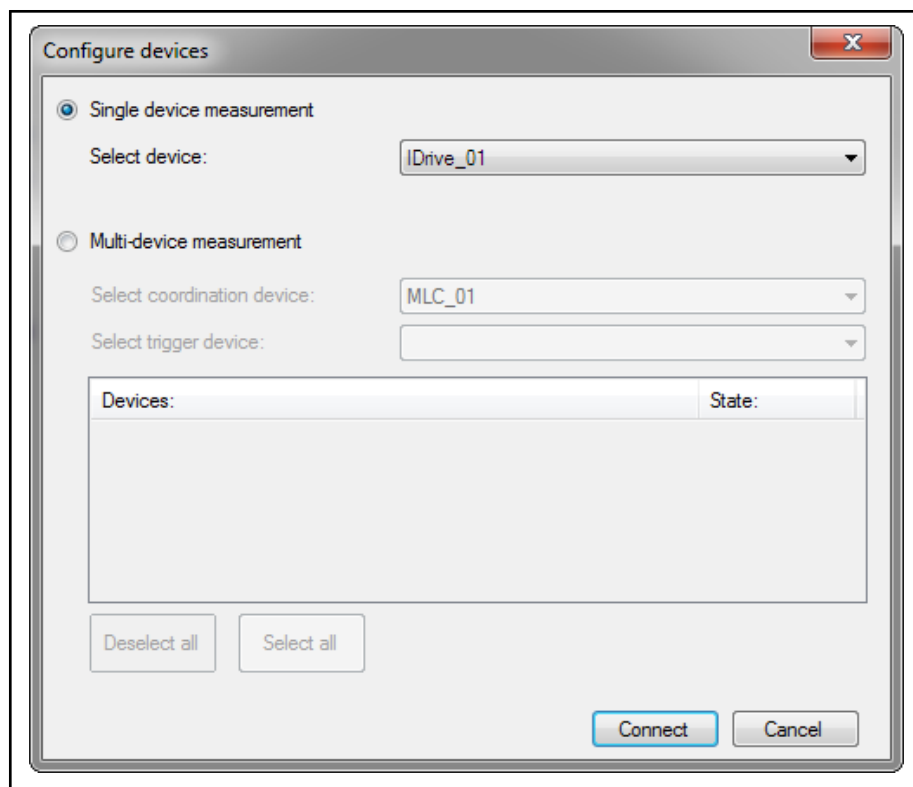


Fig. 4-10: Configure devices (single device measurement)

Select the single device measurement and the desired device from the list.

Establish a connection between the oscilloscope and the selected device using the "Connect" button.

Configure the signal to be recorded.

Signal selection

Define which signals of the connected device are to be recorded by the oscilloscope during the measurement. Open the "Configure signals" dialog.

Open the dialog as follows:

- Toolbar: **Configure measurement** ► **Signals...**
- "Graph area" context menu: **Measurement** ► **Configure** ► **Signals...**
- "Signal legend" context menu, "Measurement configuration" node: **Configure** ► **Signals...**
- Operating area: **Signals** button.

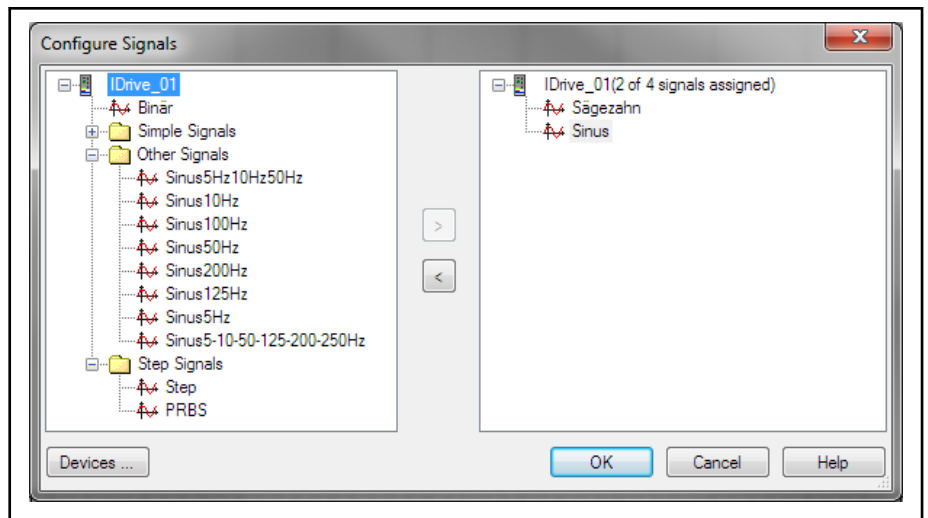


Fig. 4-11: *Configure signals*

If there is already a connection to a device, the left-hand area of the dialog displays the signals supported by the device.

In the area to the right, the signals selected for measurement are displayed. The device node in the right-hand area also provides information on the number of signals selected or the number of signals that can still be selected.



Only the number of signals supported by the connected device are allowed for the measurement.

Add signals to the configuration

Select the signals, the measured values of which are to be recorded, in the left-hand window.

Highlight and add a signal

- via the ">" button
- by double-clicking on the highlighted signal
- via the <Ins> key
- via <spacebar>



When adding a signal to the measurement, it is applied from the left-hand to the right-hand area. The signal is no longer available in the left-hand area.

Remove signals from the configuration

Highlight a configured signal to remove it from the configuration

- via the "<" button
- by double-clicking on the highlighted signal
- via the <Del> key
- via <spacebar>

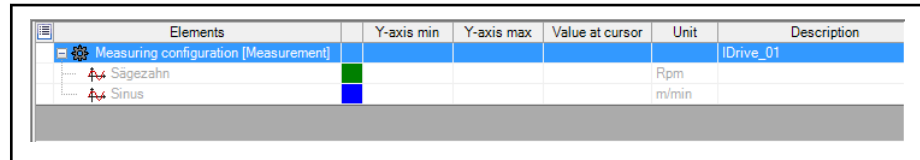


When deleting a signal from the measurement configuration, it is deleted in the right-hand screen area and is then available again in the left-hand screen area to be added to the measurement again.

Measurement configuration in the signal legend

After selecting the signals to be measured, these are displayed in the signal legend below the "Measurement configuration" node.

The signals are "grayed out". This means that no measured values are present for these signals.

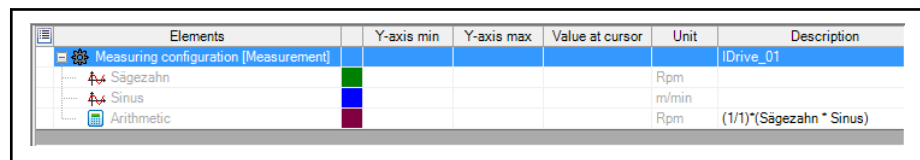


Elements	Y-axis min	Y-axis max	Value at cursor	Unit	Description
Measuring configuration [Measurement]					IDrive_01
Sägezahn				Rpm	
Sinus				m/min	

Fig. 4-12: "Signal legend": "Measurement configuration" node

Access all of the measurement configuration settings via the context menu of the "Measurement configuration" node.

Use the configured signals in a computation, for example, via the **New computation...** context menu. The computation forms part of the configuration and is also displayed below the "Measurement configuration" node.



Elements	Y-axis min	Y-axis max	Value at cursor	Unit	Description
Measuring configuration [Measurement]					IDrive_01
Sägezahn				Rpm	
Sinus				m/min	
Arithmetic				Rpm	(1/1)*(Sägezahn * Sinus)

Fig. 4-13: "Signal legend": "Measurement configuration" node with computation (arithmetic)

4.4.3 Multi-device measurement (connecting to devices and selecting signals)

Device selection Connect to the devices used to perform an oscilloscope measurement. Open the "Configure devices" dialog.

Open the dialog as follows:

- Toolbar: **Configure measurement** ► **Connect...**
- "Graph area" context menu: **Measurement** ► **Connect...**
- "Signal legend" context menu, "Measurement configuration" node: **Connect...**
- Operating area: **Signals** button and then **Devices**.

Press the "Multi-device measurement" radio button

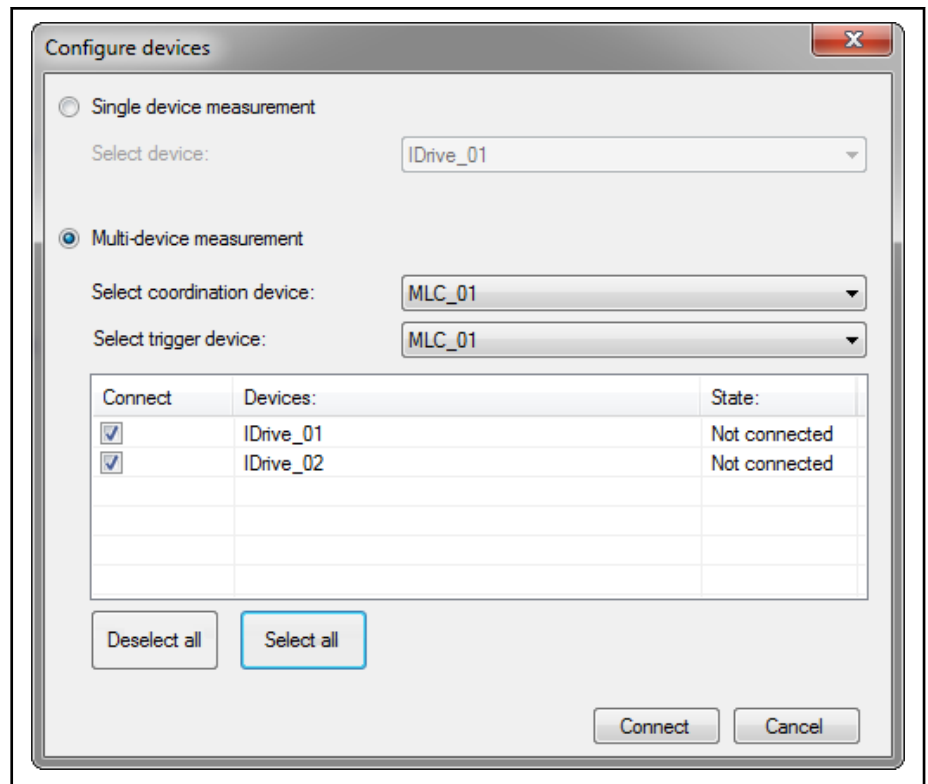


Fig. 4-14: Selecting coordination device, trigger device and further devices

Select the coordination device, trigger device or the other device(s) to connect to and press "Connect".

The progress display is shown while the connection is established.

Initially, all devices are connected to the oscilloscope. Then, the configuration of the single devices is adjusted for the multi-device measurement. The memory depth, pretrigger and sampling time of all the devices are adjusted to that of the trigger device.

After the device selection, configure the signals to be recorded in the device.

Signal selection

Define which signals of the connected devices are to be recorded by the oscilloscope during the measurement. Open the "Configure signals" dialog.

Open the dialog as follows:

- Toolbar: **Configure measurement** ► **Signals...**
- "Graph area" context menu: **Measurement** ► **Configure** ► **Signals...**
- "Signal legend" context menu, "Measurement configuration" node: **Configure** ► **Signals...**
- Operating area: **Signals** button.

In the "Configure signals" dialog, the signals supported and selected by all of the connected devices are displayed.

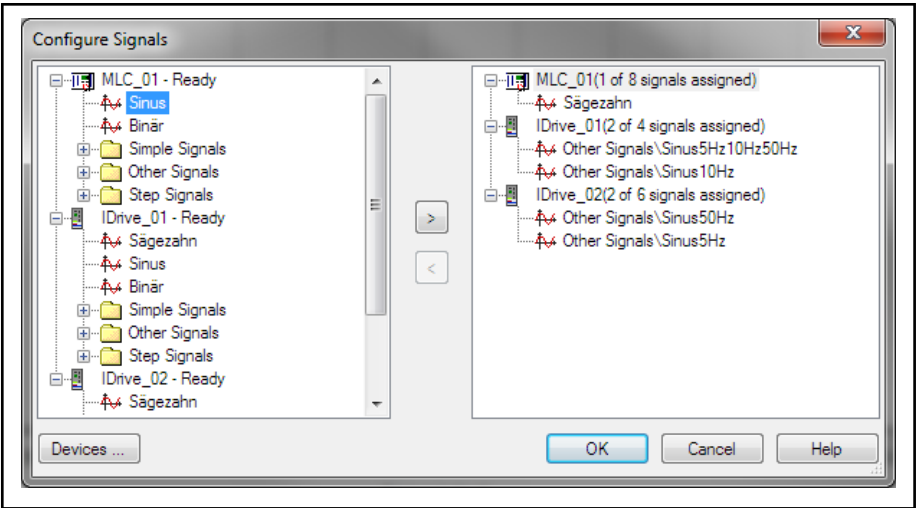


Fig. 4-15: Configure signals (selecting the signals to be measured)

 The signal selection procedure is identical to the procedure for the single device measurement (refer to [chapter 4.4.2 "Single device measurement \(connecting to a device and selecting signals\)" on page 299](#)).

Measurement configuration in the signal legend

After selecting the signals to be measured for every device, the measurement configuration is displayed in the signal legend. The "Measurement configuration" node at the topmost level corresponds to the measurement configuration of the trigger device (master), while the subordinate "Measurement configuration" nodes contain the measurement configuration of the subordinate devices (slave devices). In the "Description" column, the device name of the device is displayed for each measurement configuration.

The signals are "grayed out". This means that no measured values are present for the signals.

Elements	Y-axis min	Y-axis max	Value at cursor	Unit	Description
Measuring configuration [Measurement]					MLC_01
Sägezahn				Rpm	
Measurement (1)					IDrive_01
Sinus5Hz10Hz50Hz				U/min	
Sinus10Hz				U/min	
Measurement (2)					IDrive_02
Sinus50Hz				U/min	
Sinus5Hz				U/min	

Fig. 4-16: "Signal legend": "Measurement configuration" node

Access all of the measurement configuration settings via the context menu of the "Measurement configuration" node.

Use the configured signals in a computation, for example, via the **New computation...** context menu. The computation forms part of the configuration and is also displayed below the "Measurement configuration" node.

Elements	Y-axis min	Y-axis max	Value at cursor	Unit	Description
Measuring configuration [Measurement]					MLC_01
Sägezahn				Rpm	
Arithmetic				Rpm	$(1/1) * (\text{Sägezahn} * \text{Sägezahn})$
Measurement (1)					IDrive_01
Sinus5Hz10Hz50Hz				U/min	
Sinus10Hz				U/min	
Arithmetic				U/min	$(1/1) * (\text{Sinus5Hz10Hz50Hz} * \text{Si})$
Measurement (2)					IDrive_02
Sinus50Hz				U/min	
Sinus5Hz				U/min	

Fig. 4-17: "Signal legend": "Measurement configuration" node with computations (arithmetic)

4.4.4 Configuring the resolution

Configure the number of measuring points to be recorded in a specified time period during a measurement. Open the "Configure resolution" dialog.

Open the dialog as follows:

- Toolbar: **Configure measurement** ► **Resolution...**
- "Graph area" context menu: **Measurement** ► **Configure** ► **Resolution...**
- "Signal legend" context menu, "Measurement configuration" node: **Configure** ► **Resolution...**
- Operating area: **Configure measurement** button

The "Configure resolution" dialog containing the default values for the selected device is opened and displays the values used last.

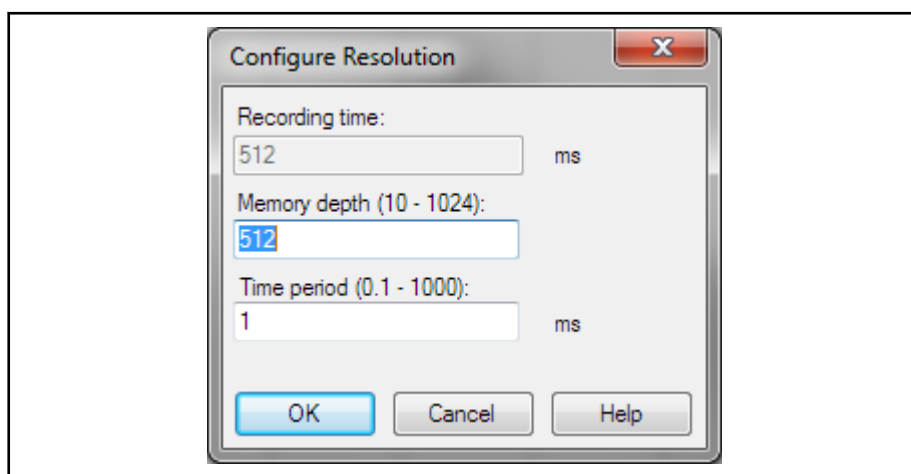


Fig. 4-18: Configure resolution



For multi-device measurement, only configure the measurement for the trigger device.

Configuration changes are transferred to the device, if necessary.

Recording time This field displays the product from memory depth and time period. No entries can be made here.

Memory depth In this field, enter the number of measured values to be recorded as part of a measurement. The values for the minimum and maximum memory depths are provided by the device. If the entry exceeds or falls below these limit values, it is corrected.

Time period Set the time period used to sample the measured values during a measurement. The time period describes the temporal distance between the individual measuring points. The supported time period values are provided by the de-

vice. If the entry differs from these time period values, they are automatically corrected to the nearest value.

Save the changes with **OK**. Before saving, the limits are checked and the values entered are corrected, if necessary. The new measurement is now completely configured.

Discard the changes with **Cancel**.

4.4.5 Configuring a trigger

General information

A trigger is a procedure initiated when a particular event occurs. The oscilloscope trigger controls the start of value recording (during a continuous measurement). First, determine a particular event. If this event occurs during a continuous measurement, the trigger is initiated, i.e. the measurement records the configured number of measured values with the initiation of the trigger and is exited. It is thus possible to record only the area of interest that starts when the trigger event is initiated as part of a measurement.

To configure the trigger, open the "Configure trigger" dialog.

Open the dialog as follows:

- Toolbar: **Configure measurement** ► **Trigger...**
- "Graph area" context menu: **Measurement** ► **Configure** ► **Trigger...**
- "Signal legend" context menu, "Measurement configuration" node: **Configure** ► **Trigger...**
- Operating area: **Configure** button in the trigger section.

Trigger methods

In the "Configure trigger" dialog, select a trigger method. The trigger methods supported by the connected device are displayed in the associated selection box.

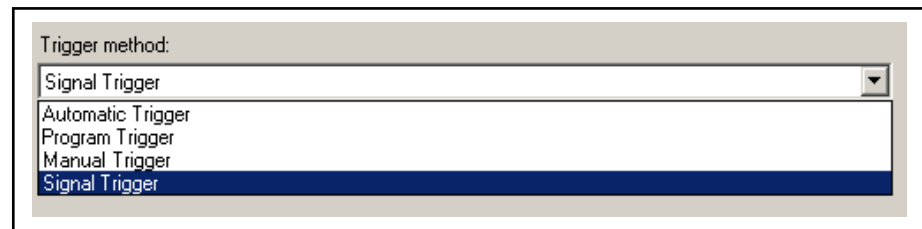


Fig. 4-19: Selecting the trigger method

Possible trigger methods are:

Automatic trigger

Select this trigger method to start the measurement directly with "Start". The automatic trigger is immediately initiated in the device after the measurement start. A pretrigger cannot be set.

Devices supporting this trigger method:

- IndraDrive
- MTX
- MLC
- MLD

Manual trigger

Select this trigger method to initiate the trigger manually using the keyboard or mouse after the "Start". Set a pretrigger to also record the measured value area before the initiation of the manual trigger.

Devices supporting this trigger method:

- IndraDrive
- MLC
- MTX
- MLD

Signal trigger

Select this trigger method to trigger a particular signal and a particular value. Both binary (e.g. input signals that provide information about switch positions) and numerical (e.g. speed, current, etc.) signals are supported .

Devices supporting this trigger method:

- IndraDrive
- MLC
- MLD

Program trigger

With this trigger method, e.g. initiate the trigger with a particular program line in an NC program.

Devices supporting this trigger method:

- MTX

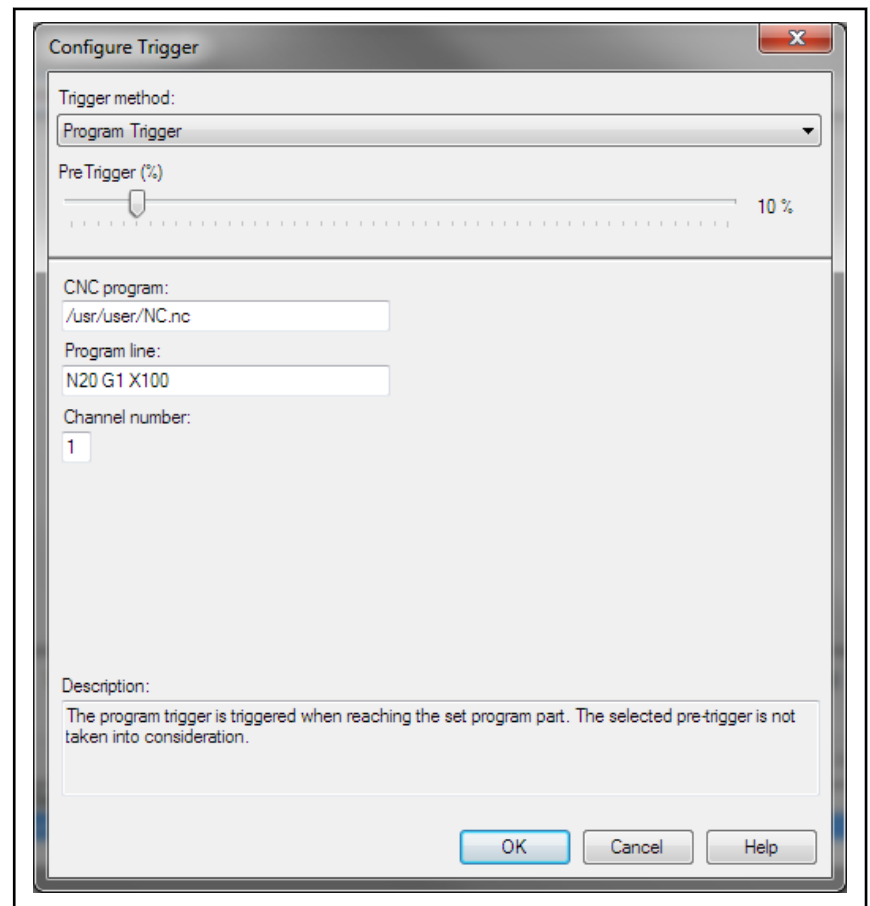


Fig. 4-20: Configure trigger (example: MTX: Program trigger)

Example: IndraDrive: Manual trigger

IndraDrive supports the **Manual trigger**, **Signal trigger** and **Automatic trigger**. Select the "Manual trigger" option in the "Trigger method" area and confirm with **OK**.

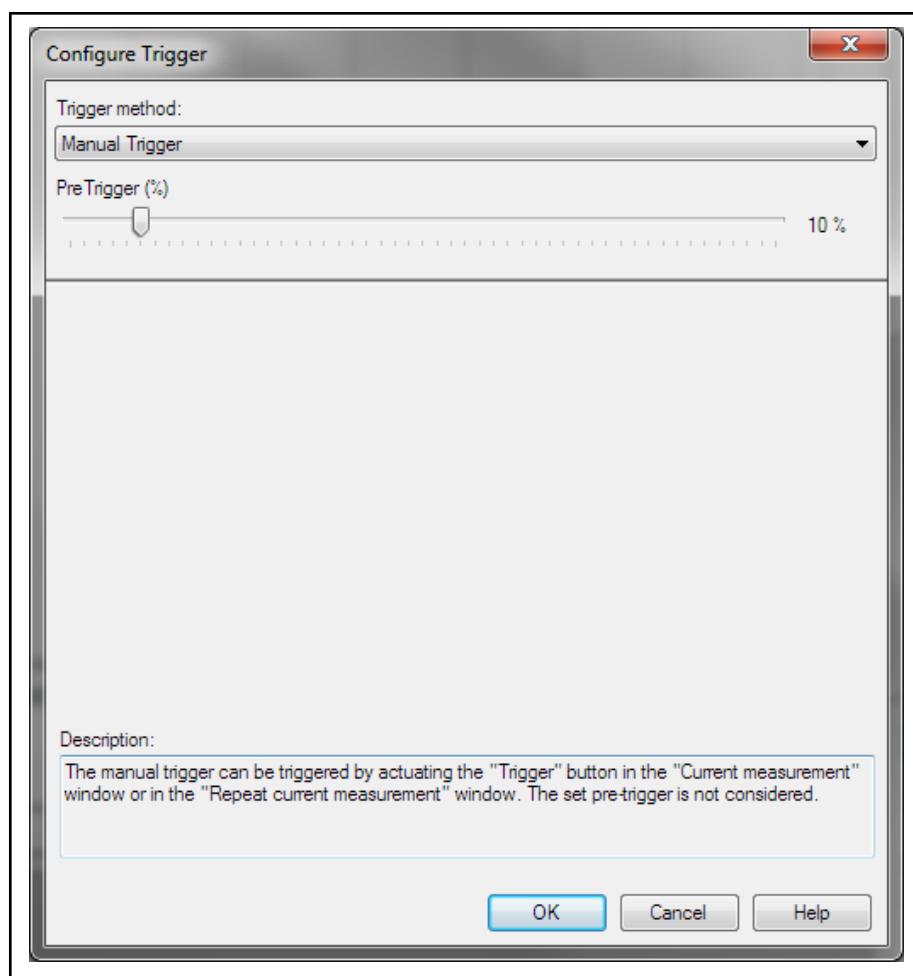


Fig. 4-21: Configure trigger (example: IndraDrive: manual trigger)

To initiate the manual trigger after starting the measurement, proceed with one of the following actions:

- Toolbar: **Trigger measurement**
- "Graph area" context menu: **Measurement ► Trigger**
- "Signal legend" context menu, "Measurement configuration" node: **Trigger**
- Operating area: **Trigger** button.



IndraDrive does not provide the manual trigger if the P-0-0036 parameter is configured cyclically.

Setting a pretrigger

A pretrigger defines the percentage of the measurement to be recorded before the actual trigger event. Select the pretrigger value between 0 % and 100 %.

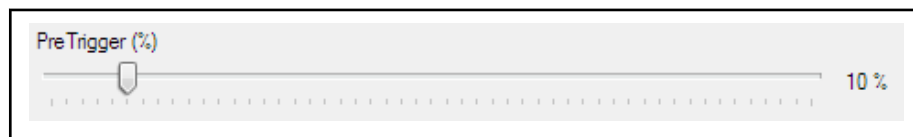


Fig. 4-22: Selecting a pretrigger



If the trigger is initiated before the time span defined for the pre-trigger has elapsed, only a part of the desired pretrigger is displayed.

Example: pretrigger

Select a pretrigger of 50%.

Define a memory depth (number of measured values) of 4000.

According to these settings, 2000 values are measured after the trigger event.

Result 1:

If the trigger event was initiated after more than 2000 values have already been measured, 4000 values are provided and displayed in total (2000 values before the trigger event + 2000 values after the trigger event).

Result 2:

If the trigger event was initiated after 1000 measured values, only 3000 values are provided and displayed in total (1000 values before the trigger event + 2000 values after the trigger event).

Signal trigger (example of IndraDrive)**"Signal trigger" trigger method**

If a measurement recording is to start depending on a signal value, select the "Signal trigger" method. If the signal configured as trigger has exceeded or fallen below the set value, the trigger is initiated. The measuring period is computed from the memory depth and the time period. The data is displayed taking the pretrigger into consideration.

Select "Signal trigger" and press "Browse" in the "Configure trigger" dialog to select the trigger signal.

Oscilloscope function

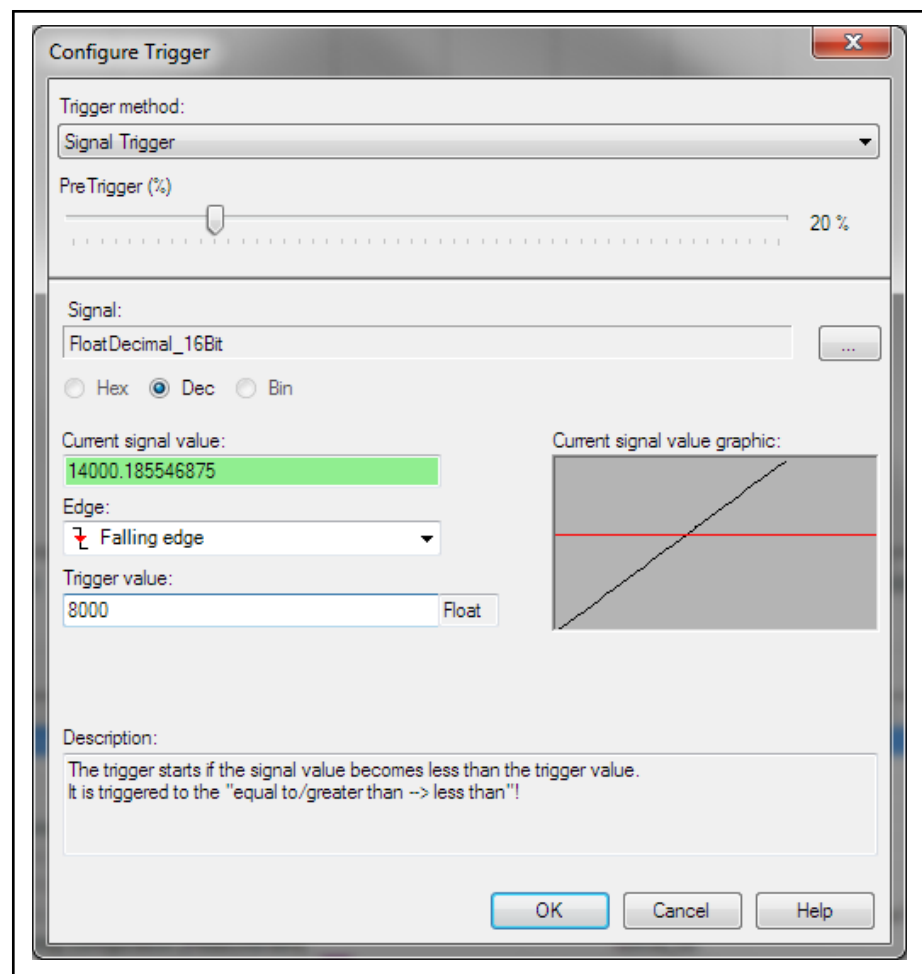


Fig. 4-23: Configure trigger (float signal as signal trigger)

Selecting the signal

Open the "Select signal trigger" dialog via the "..." button next to the signal input. This dialog provides the trigger signals of the connected device. Select a signal to be used for the trigger.

Hex/dec/bin (format switching)

Use these radio buttons to switch between the hexadecimal, decimal and binary representation types. Depending on the data type of the selected trigger signal (here: float), the radio buttons are enabled or disabled.

Current signal value

This field displays the current value of the trigger signal. Enter a suitable trigger threshold.

Edge

The trigger edges supported by the device are provided here. Depending on the set edge, define when a trigger is to be initiated once the signal value is reached (rising, falling, equal to, not equal to).

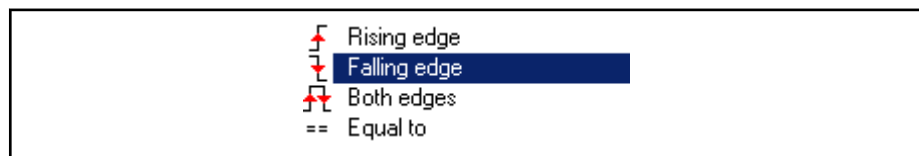


Fig. 4-24: Selecting possible trigger edges

Trigger value

Enter the trigger value that the trigger signal has to reach, exceed or fall below to initiate the trigger event. The representation format is displayed depending on the selected representation type. In the "Binary" representation type, the additional information on the input cursor bit position is provided when editing the value.



If the trigger is not initiated during the measurement, adapt the trigger value after measurement start. Use the operating area of the "Measurement" diagram type under "Signal trigger" in the "Trigger value" field in order to enable a more suitable trigger value to be entered.

Triggering with binary signals

A binary signal can also be selected as trigger signal in the trigger dialog. In this case, trigger the status change of a particular bit. The trigger and trigger mask are logically linked with AND. The trigger condition is satisfied if the evaluation logically results in "1".

Example: IndraDrive

The "S-0-0013, State class 3" signal consists of 16 bits. For a complete definition of all bits, refer to the further reference given at the end of this description.

In this example, bit 0 (actual velocity = command velocity) and bit 1 (actual velocity < standstill window) are used to initiate the trigger.

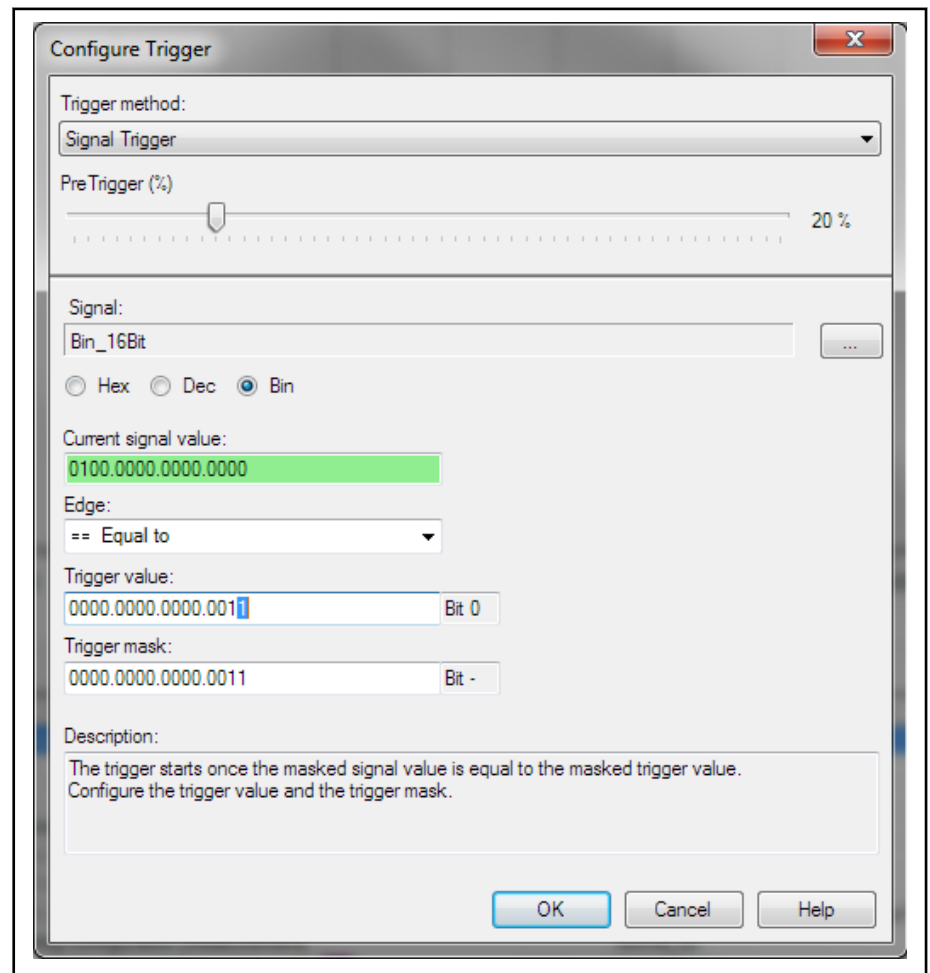


Fig. 4-25: Configure trigger (bit signal as signal trigger)

Define the trigger value and mask in the "Bin" representation type bit by bit through directly entering the relevant position. The bit position of the selected bit is displayed at the end of the field.

If another representation type is preferred while entering, switch between different representation types using the "Hex", "Dec" and "Bin" radio buttons.



When a trigger value is entered, the bits of the trigger mask are automatically set to identical values.

Enter the trigger mask without affecting the trigger value.

4.4.6 Loading the measurement configuration

To support typical measurement tasks, templates (measurement configurations) are provided with the oscilloscope. If the template supports the device type of the connected device, it can be loaded to the connected device by clicking on OK. Subsequently, the device configuration is completed according to the selected template. If configuration adjustments are required, they can be made manually via the relevant dialogs.

Apart from using the templates, the measurement configuration can be applied from a measurement file (*.scope) and can be loaded to the connected device.

Loading the measurement configuration from the template

Load the measurement configuration from the template to the connected device. Open the dialog "Load measurement configuration off".

Open the dialog as follows:

- Toolbar (button to the far left): **Measurement configuration ► Load...**
- "Signal legend" context menu, "Measurement configuration" node: **Load...**

In the dialog "Load measurement configuration off", the tab "Template" is pre-selected. The dialog displays the templates (measurement configurations) provided with the oscilloscope. A description text is displayed when selecting a template. Select a template matching the device type and measurement task and confirm with **OK**. Thus, the template (measurement configuration) is loaded to the connected device.

In the signal legend, the loaded configuration can be viewed at the measurement configuration node. The device configuration is completed. If required, adjust the configuration and subsequently restart the measurement.

Loading the measurement configuration from the measurement file

Load the measurement configuration from the measurement file (*.scope) to the connected device. Open the dialog "Load measurement configuration off".

Open the dialog as follows:

- Toolbar (button to the far left): **Measurement configuration ► Load...**
- "Signal legend" context menu, "Measurement configuration" node: **Load...**

In the dialog "Load measurement configuration off", the tab "Template" is pre-selected. Go to the "Measurement" tab. Via the browser interface or the history function of the drop-down list, select a measurement file (*.scope). After the file has been selected, the measurements contained in the measurement file are displayed. Select one of the measurements using the assigned checkbox and confirm with **OK**. Thus, the measurement configuration of the selected measurement is loaded to the connected device.

In the signal legend, the loaded configuration can be viewed at the measurement configuration node. The device configuration is completed. If required, adjust the configuration and subsequently restart the measurement.



Loading of templates and configurations of the measurement files is only supported for the single device measurement! The selected configuration has to match the type of device connected to be able to be loaded to the device.

4.5 Performing a measurement

4.5.1 Measurement mode

The oscilloscope supports various measurement modes, in which a measurement can be performed. Essentially, a distinction is made between the "single shot" modes and the "trending" mode.

In the single shot mode, the measurement is first performed on the device. After the measurement has been completed, the measured values are transferred from the device to the oscilloscope. In the "trending" mode, the measured values are continuously displayed during the measurement, i.e. the currently recorded measured values are continuously transferred from the device to the oscilloscope and displayed there. This results in a "continuous" diagram in trending mode.

The set measurement mode is displayed both in the operating area and in the status bar. Only switch the measurement mode before or after a measurement, but not during a continuous measurement. To set the measurement mode, connect to a device.

Single shot

The measurement is performed once the trigger condition occurs on the device. Following the measurement, the recorded measured values are transferred from the device to the oscilloscope and displayed there in the diagram and in the signal legend on the "Last measurement" node.

Single shot (reading manually)

The measurement is performed once the trigger condition occurs on the device. The recorded measured values are not automatically transferred to the oscilloscope, however. They remain on the device. Should the measuring results be required, they have to be read out from the device in a separate step.

To read out the measuring results from the device, proceed with one of the following actions:

- Toolbar: **Read measurement results from device**
- "Signal legend" context menu, "Measurement configuration" node: **Refresh**
- Operating area: **Refresh** button

The measuring results read out from the device are displayed in the diagram and in the signal legend on the "Last measurement" node.

Single shot (repeating automatically)

The measurement is performed once the trigger condition occurs on the device. The recorded measured values are then transferred from the device to the oscilloscope and displayed there in the diagram and in the signal legend on the "Last measurement" node.

In this mode, after the measurement data has been read, the next measurement is performed automatically. Stop the measurement to exit the automatic repetition of the measurement.

To stop the measurement, proceed with one of the following actions:

- Toolbar: **Stop measurement**
- "Graph area" context menu: **Measurement ► Stop**
- "Signal legend" context menu, "Measurement configuration" node: **Stop**
- Operating area: **Stop** button

The measuring results read out from the device are displayed in the diagram and in the signal legend on the "Last measurement" node.

Trending (continuous measuring)

The "Trending" measurement mode is the classic oscilloscope operation mode. In this mode, the measured values recorded by the device are continu-

ously transferred to the oscilloscope and displayed there. This results in a "continuous" display on the oscilloscope.

Edit the signal curves with limited functionality during "continuous" display. Position and scale the measuring curves via mouse-click.

To obtain the complete functionality for editing the measuring curves, switch the display in the oscilloscope to "Pause". In pause mode, the data is still recorded in the background, but the display is no longer updated. In the diagram area, "Pause" is shown in a large font.

Stop "Pause" mode to update the display again. Stopping the display via "Pause" such that no measured values are lost.

To switch the display to "Pause", proceed with one of the following actions:

- Toolbar: **Stop continuous display of measurement (trending)**
- "Graph area" context menu: **Measurement ► Pause**
- "Signal legend" context menu, "Measurement configuration" node: **Pause**
- Operating area: **Pause** button



The "Trending" measurement mode is only available if it is supported by the device.



In "Trending" mode, a recording buffer for a maximum of 10,000 measured values is provided per signal. This buffer is implemented as a ring buffer, i.e. if the number of measured values exceeds the maximum number, the newly recorded measured values overwrite the old values.

It is possible to "run" a measurement for an unlimited time in "Trending" mode. After exiting the measurement, only the last 10,000 measured values are available per signal, however.

4.5.2 Single device measurement

Start the measurement in the configuration set beforehand. The status display in the oscilloscope displays the current measurement status during the measurement.

To start the measurement, proceed with one of the following actions:

- Toolbar: **Start measurement**
- "Graph area" context menu: **Measurement ► Start**
- "Signal legend" context menu ("Measurement configuration" node): **Start**
- Operating area: **Start**

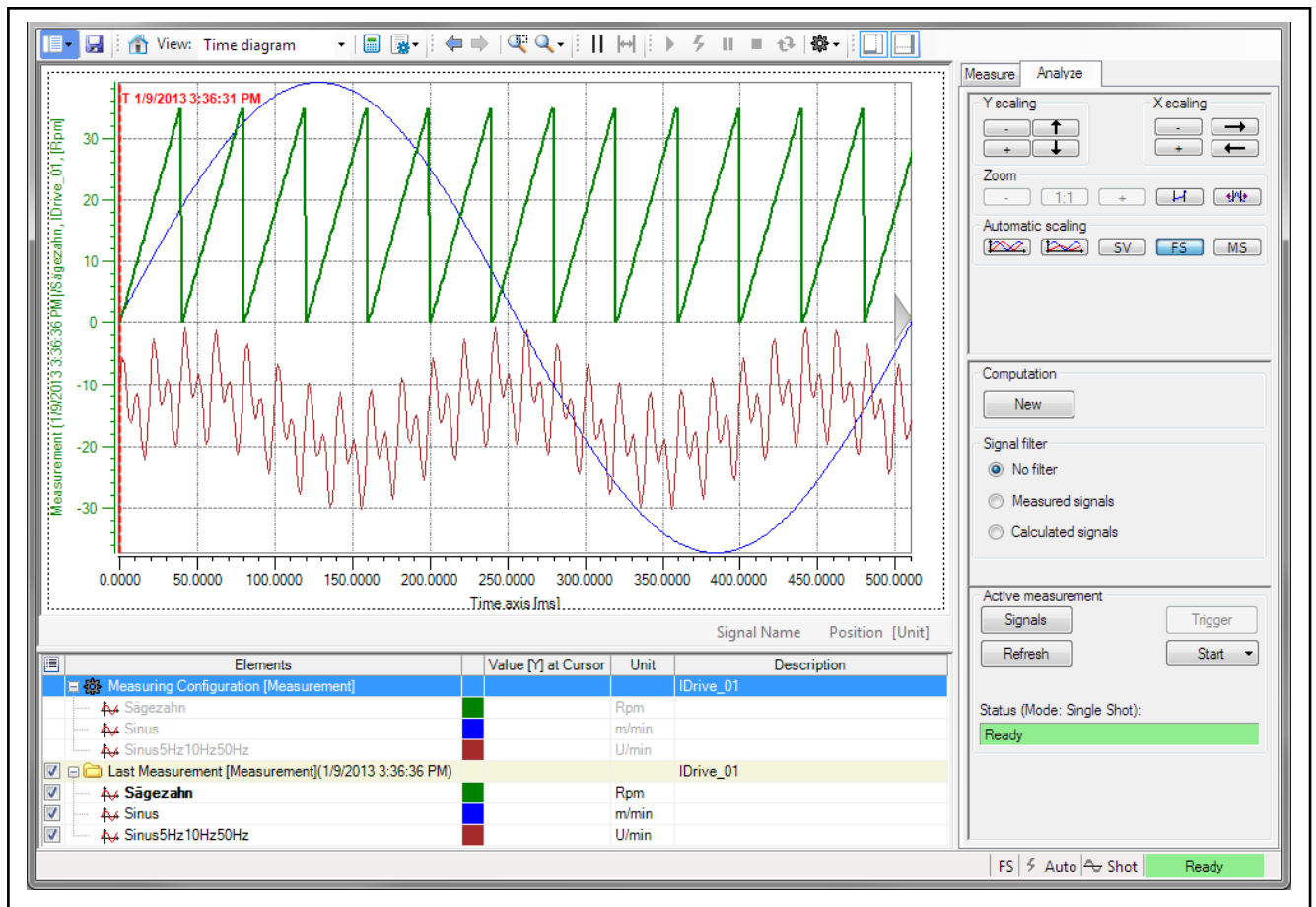


Fig. 4-26: Single device measurement successfully completed



Restarting the measurement overwrites the previous measuring results on the "Last measurement" node.

4.5.3 Multi-device measurement

Start the measurement in the configuration set beforehand. The current measurement status is displayed in the status display of the oscilloscope.

To start the measurement, proceed with one of the following actions:

- Toolbar: **Start measurement**
- "Graph area" context menu: **Measurement ► Start**
- "Signal legend" context menu ("Measurement configuration" node): **Start**
- Operating area: **Start**

Oscilloscope function

If the master device identifies the trigger event, it starts the measurement synchronously on the slave devices. Once a measurement has been successfully performed, the status is set to "Ready" again. View the measured values in both the graphic display and in the signal legend below the "Last measurement" node:

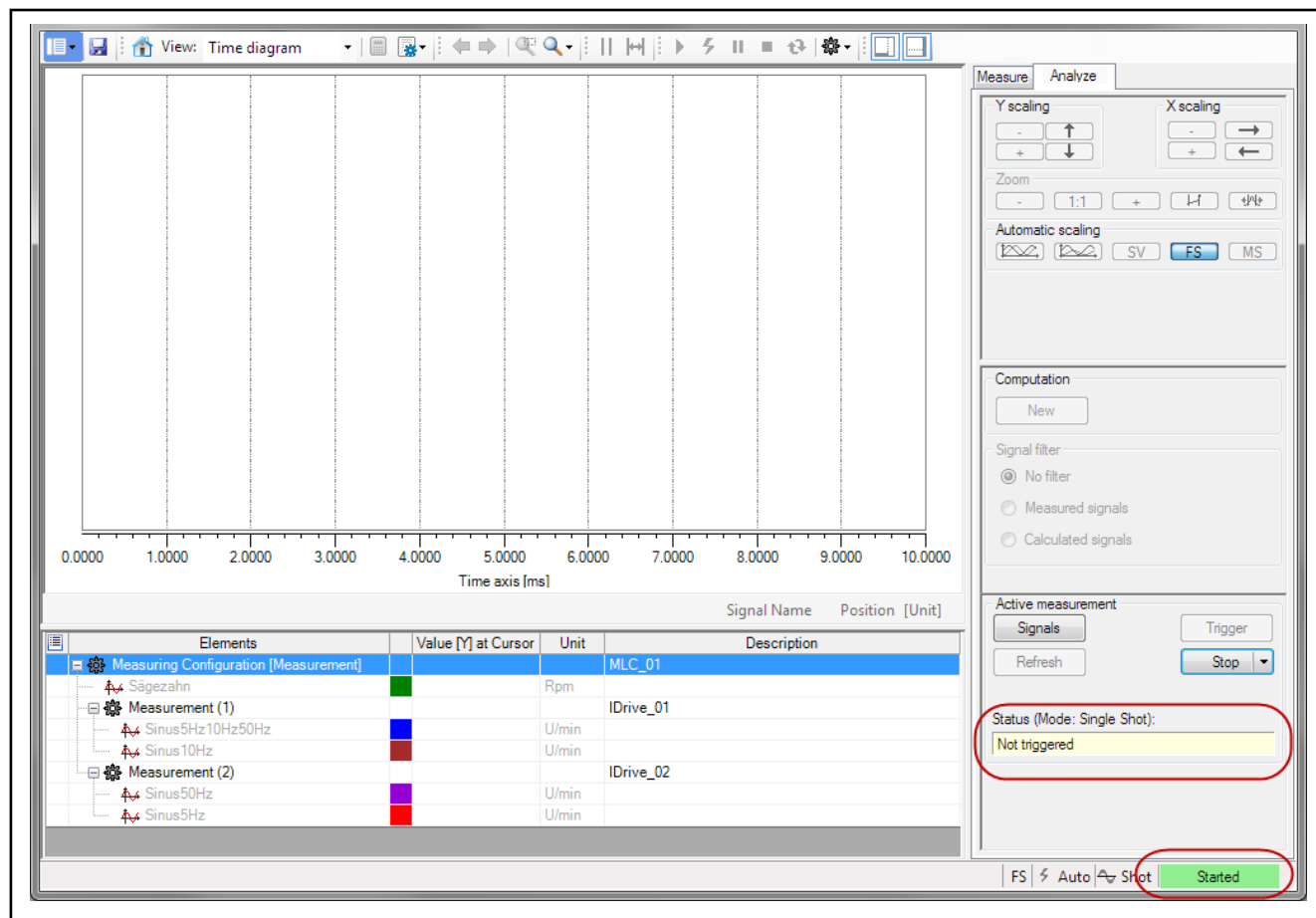


Fig. 4-27: Multi-device measurement running, no trigger has yet been initiated.

Once a measurement has been successfully performed, the status is set to "Ready" again and the measured values are indicated in the graphic display (here with signal legend enlarged by horizontal split bar):

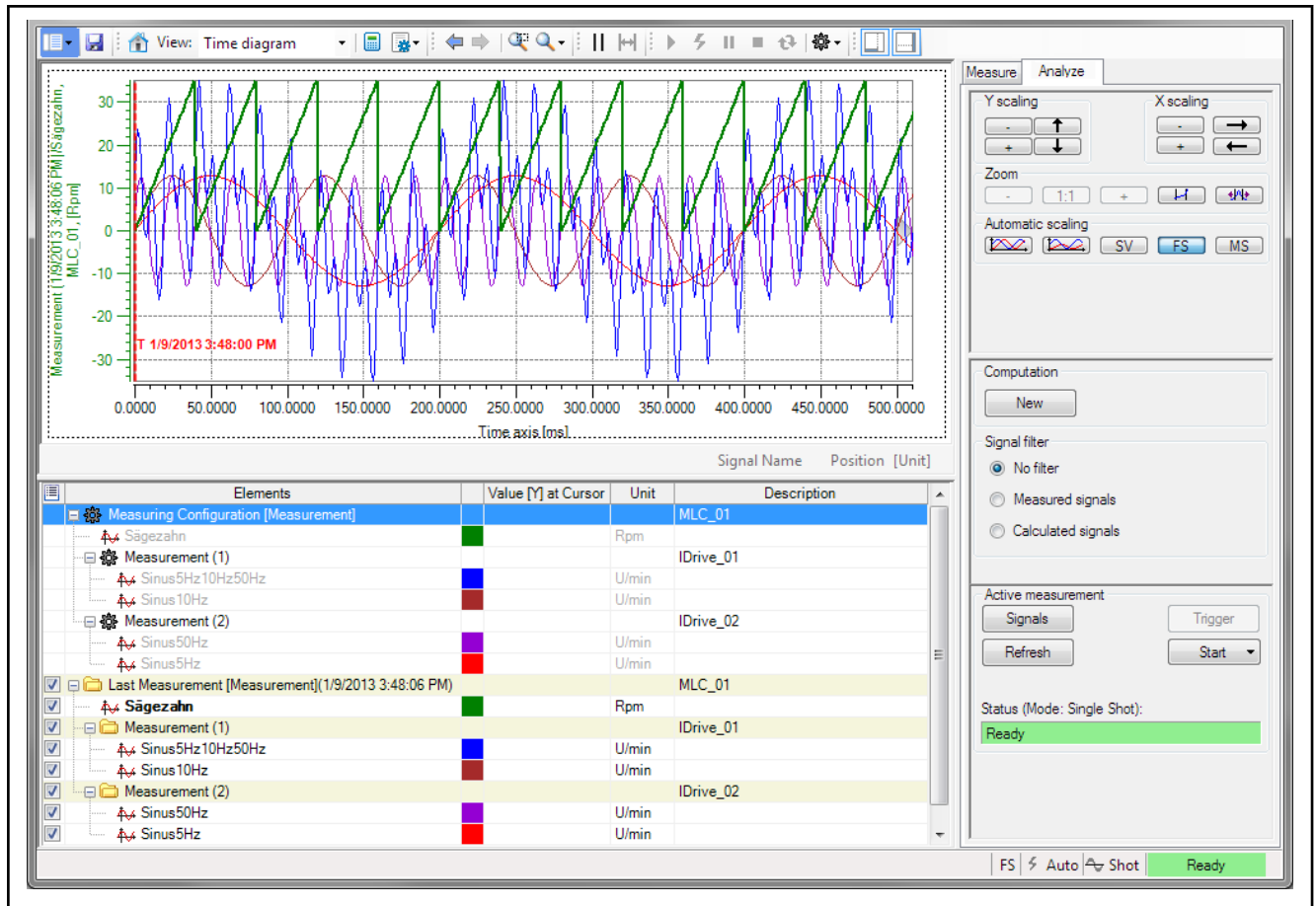


Fig. 4-28:

Multi-device measurement successfully completed, results are located below the "Last measurement" node

4.6 Evaluation

4.6.1 General information

Use the oscilloscope to display different diagram types, to obtain the best possible support for various measurement tasks.

The following diagram types are available:

- Time diagram
- FFT
- Frequency response
- Contour diagram
- Path deviation
- Circle test

Switch between the individual diagrams using the toolbar selection box. A layout adapted for editing is used for every diagram type.

The oscilloscope is opened with the "Time diagram" diagram type.



The "Measurement" entry can be found in a selection box of the toolbar. In this evaluation area, the layout is specially coordinated to the configuration of a measurement. The configured resolution and trigger are displayed in the operating area.

4.6.2 Time diagram

In the "Time diagram" diagram type, the oscilloscope represents measured and computed signal curves in the temporal procedure within a two-dimensional coordinate system.

Use measured signals and results of other computations as operands of a computation.

To add a new computation, proceed with one of the following actions:

- Toolbar: **New computation...** button
- "Graph area": **New computation...** context menu
- "Signal legend": **New computation...** context menu on various elements

The oscilloscope supports the following computation types in the "Time diagram" diagram type:

- Arithmetic (basic arithmetic)
- Universal computation (differential and integral calculus)
- Bit analysis
- Moving average

4.6.3 Bit analysis

The bit analysis enables individual bits from binary signals to be represented in the temporal process. It is a special form of the "time diagram", in which selected bits are represented one on top of the other in a separate diagram area.

Configuration

Proceed as follows to perform a bit analysis:

1. Select the "Time diagram" diagram type in the toolbar and create a new computation of the "Bit analysis" type.

To create a new computation, proceed with one of the following actions:

- Toolbar: **New computation...** button
- "Graph area": **New computation...** context menu
- "Signal legend": **New computation...** context menu on various elements

2. In the "Define computation" dialog, select the "Bit analysis" computation. Then select the signal, the bits of which are to be displayed. In the "Signal" selection box, all of the measured or computed signals that support an integer representation format are provided.

The bits are displayed in a table for the selected signal in the lower part of the dialog. Unless the relevant bit descriptions are provided by the connected device, they are displayed in the table next to the respective bit. If no bit descriptions are provided by the device, the signal name is displayed following by the bit number in brackets.



Bit names can also be assigned by the user. Double-click on the name space or change the bit name via the context menu function **Rename** in the signal legend.

- For every bit to be displayed, activate the associated checkbox: Bits can be selected in the tabular bit mask as well as in the bit mask to the right.

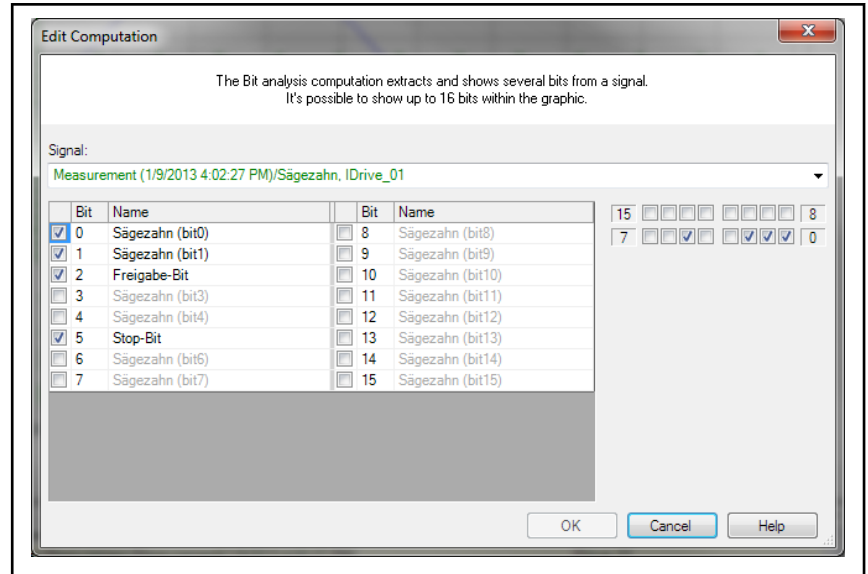


Fig. 4-29: Define computation: Bit analysis

- Confirm the selection with **OK**.

Representation

Oscilloscope function

The following figure shows the "Time diagram" diagram type with activated bit analysis:

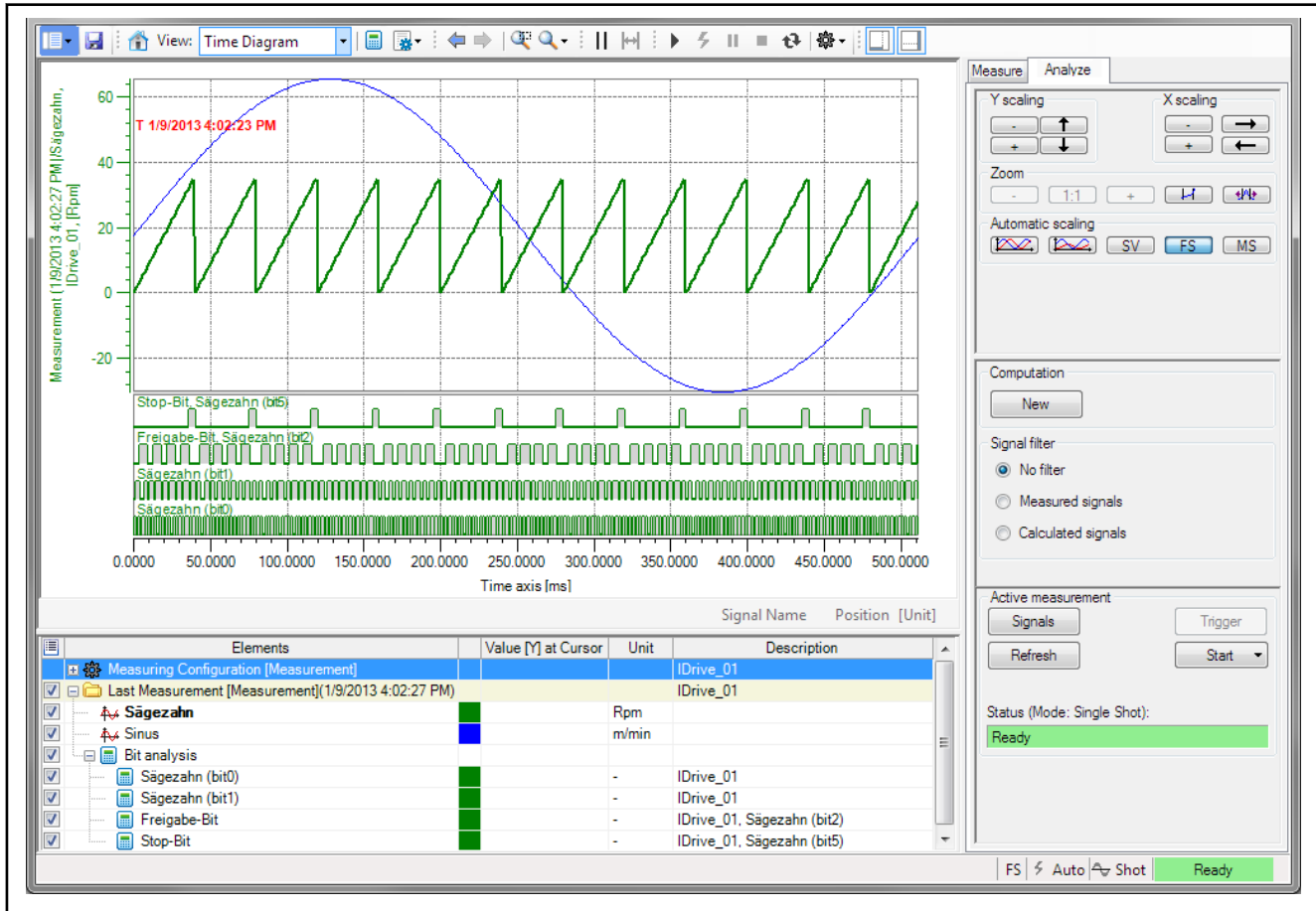


Fig. 4-30: "Time diagram" diagram type with activated bit analysis

By default, the bit analysis is shown in the bottom diagram area of the "Time diagram", separated from the measuring curves by a horizontal split bar. In the bit display, all the displacement and scaling options of the time axis are available. Via the signal legend, show or hide the individual bits or change their color. To apply further signals in the display, add a computation of the bit analysis type. To change a configured bit analysis, reopen the dialog "Define computation" via the context menu **Open** of the "Bit analysis" node.

Change the division of the diagram size between the measuring curves and bit analysis using the horizontal split bar directly above the bit analysis. Enlarge or shrink the symbol area of the bit analysis in this way. A designation of the individual bits is automatically shown if there is sufficient space provided in the diagram area of the bit analysis.

4.6.4 FFT

The Fourier transformation is a mathematical procedure used in signal processing. It is used to convert signals from the (time, sampling value) representation to the (frequency proportion, amplitude) representation. For many operations and evaluations, a representation in the frequency area is more suitable, e.g. for filter configurations or vibration analyses.

The oscilloscope provides a Fast Fourier Transformation (FFT) via this diagram type.

Configuration **Proceed as follows to perform a FFT:**

1. Select the "FFT" diagram type in the toolbar and then create a new computation.

To create a new computation, proceed with one of the following actions:

- Toolbar: **New computation...** button
- "Graph area": **New computation...** context menu
- "Signal legend": **New computation...** context menu on various elements

2. In the "Edit computation" dialog, select a signal for the FFT.

Activate the "Amplitude in dB" checkbox, if the amplification/damping (display in decibels [dB], logarithmic dimension) is to be displayed instead of the amplitude:

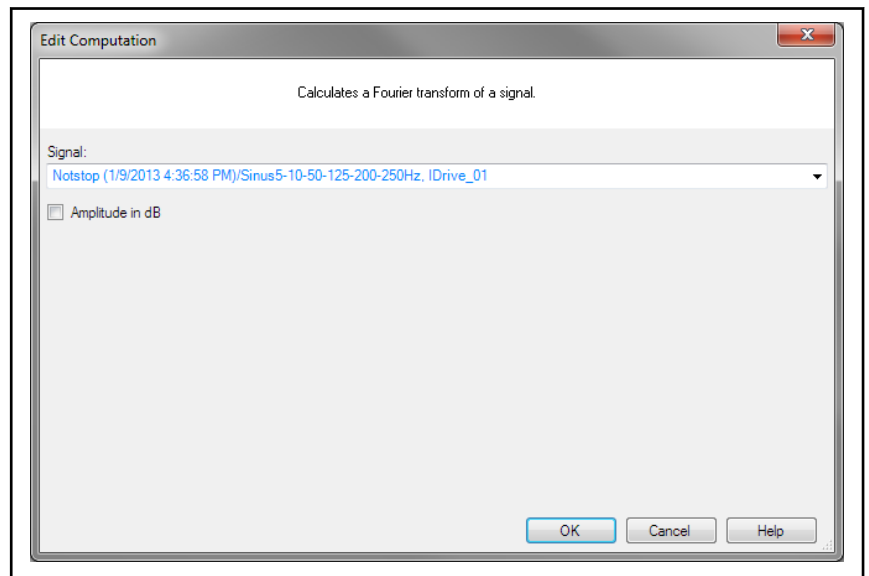


Fig. 4-31: *Edit computation: FFT*

3. Confirm the selection with **OK**.

Representation

Oscilloscope function

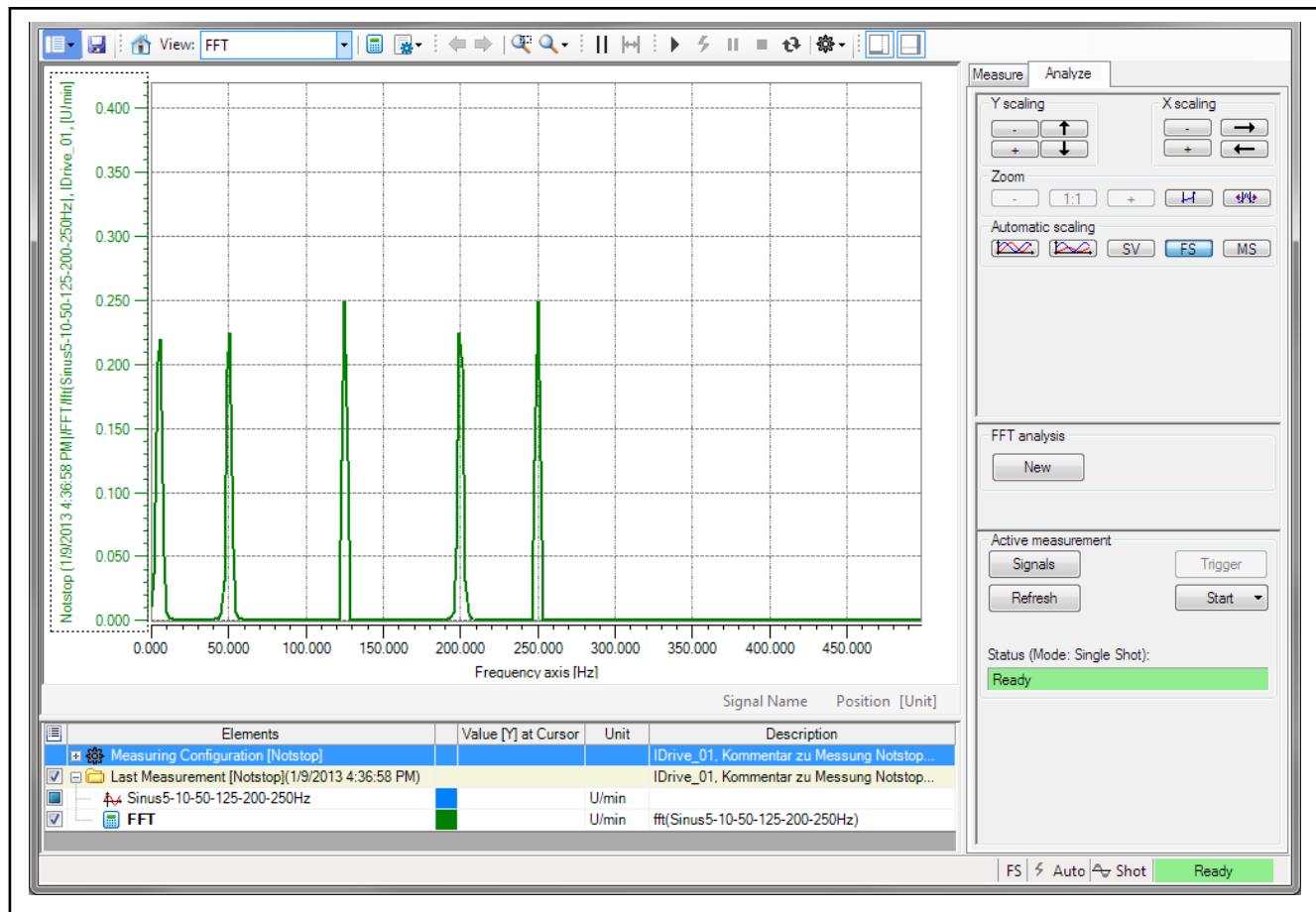


Fig. 4-32: "FFT" diagram type

For further evaluation, use the functions and tools of the oscilloscope. They are provided via context menus, the toolbar and the operating area.

4.6.5 Frequency response

A very powerful way to evaluate a control loop is the frequency response. It describes the response of the control loop in different frequency ranges. It is suitable for the representation of command value and disturbance response.

To identify the frequency response, load the control loop with a suitable input variable (command value or disturbance variable). Then, observe the progress of the output variable (actual value). The result is represented in the Bode diagram. The Bode diagram contains an amplitude response and a phase response.

- Depending on the frequency of the input variables, the amplitude response describes the response of the input and output variable amplitudes. It is conventional to represent this response in the decadic logarithm or in decibels (decadic logarithm multiplied by 20).
- The phase response describes the angular misalignment (phase displacement) between input and output variables.

Amplitude and phase responses are represented using the frequency of the input variable. The frequency is also saved in the Bode diagram in the decadic logarithm.

With the frequency response, determine the cut-off frequency and the phase reserve of a control loop.

Configuration **Proceed as follows to perform a frequency response computation:**

1. Select the "Frequency response" diagram type in the toolbar and create a new computation.

To create a new computation, proceed with one of the following actions:

- Toolbar: **New computation...** button
 - "Graph area": **New computation...** context menu
 - "Signal legend": **New computation...** context menu on various elements
2. In the "Edit computation" dialog, select the input signal and the output signal for the frequency response computation:

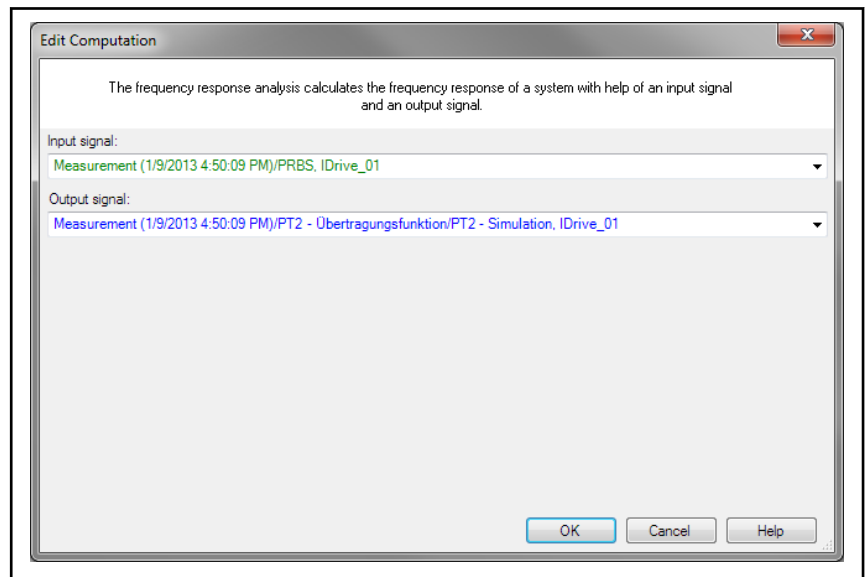


Fig. 4-33: Edit computation: Frequency response

3. Confirm the selection with **OK**.

Representation

Oscilloscope function

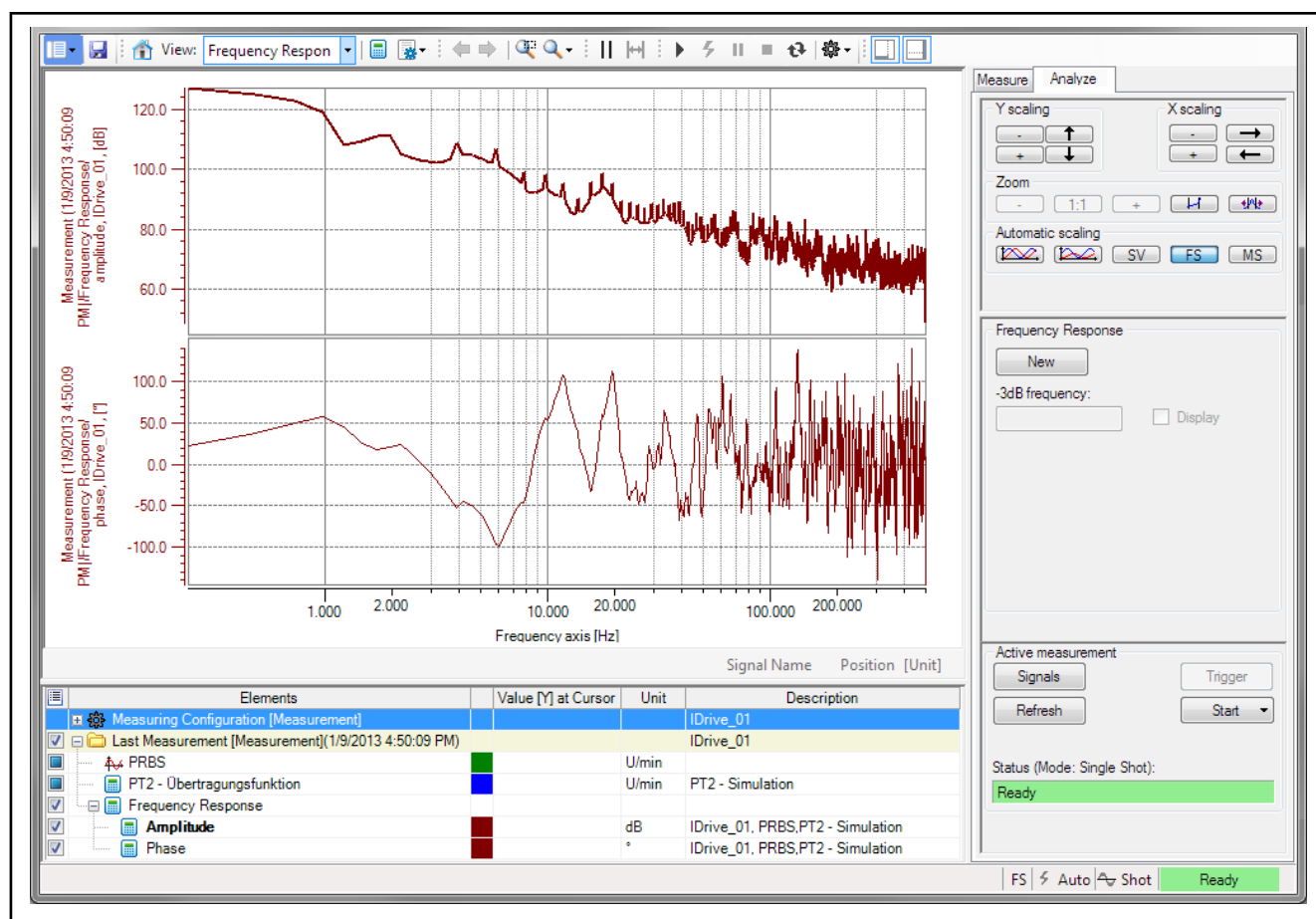


Fig. 4-34: "Frequency response" diagram type

In the operating area (right window area), the -3dB frequency is displayed in the "Frequency response" area. Via the checkbox "Display", the -3dB frequency in the diagram can be shown or hidden.

For further evaluation, use the functions and tools of the oscilloscope. They are provided via context menus, the toolbar and the operating area.

4.6.6 Contour diagram

Use the contour diagram to graphically represent the command contour (path) of a x-y-movement set in the NC command set on a machine tool. Enable a command-actual comparison through the additional representation of the actual contour.

Display the x- and y-value for every measuring point of the two curves using the auxiliary cursors of the contour diagram.

Configuration

Proceed as follows to start the contour diagram:

1. Select the "Contour diagram" diagram type in the toolbar and create a new computation.

To create a new computation, proceed with one of the following actions:

- Toolbar: **New computation...** button
- "Graph area": **New computation...** context menu
- "Signal legend": **New computation...** context menu on various elements

- In the "Define computation" dialog, select the x- and y-signals for the command and actual contours:

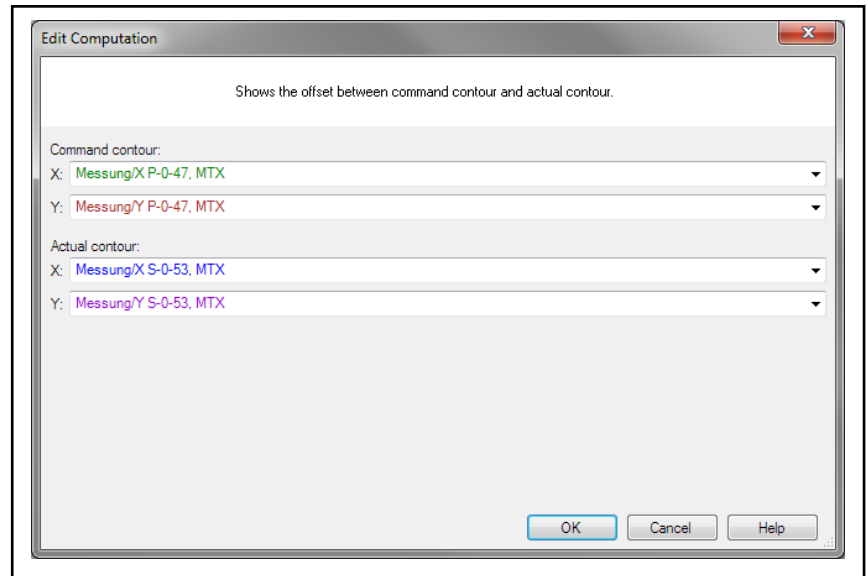


Fig. 4-35: Define computation: Contour diagram

- Confirm the selection with OK.

Representation

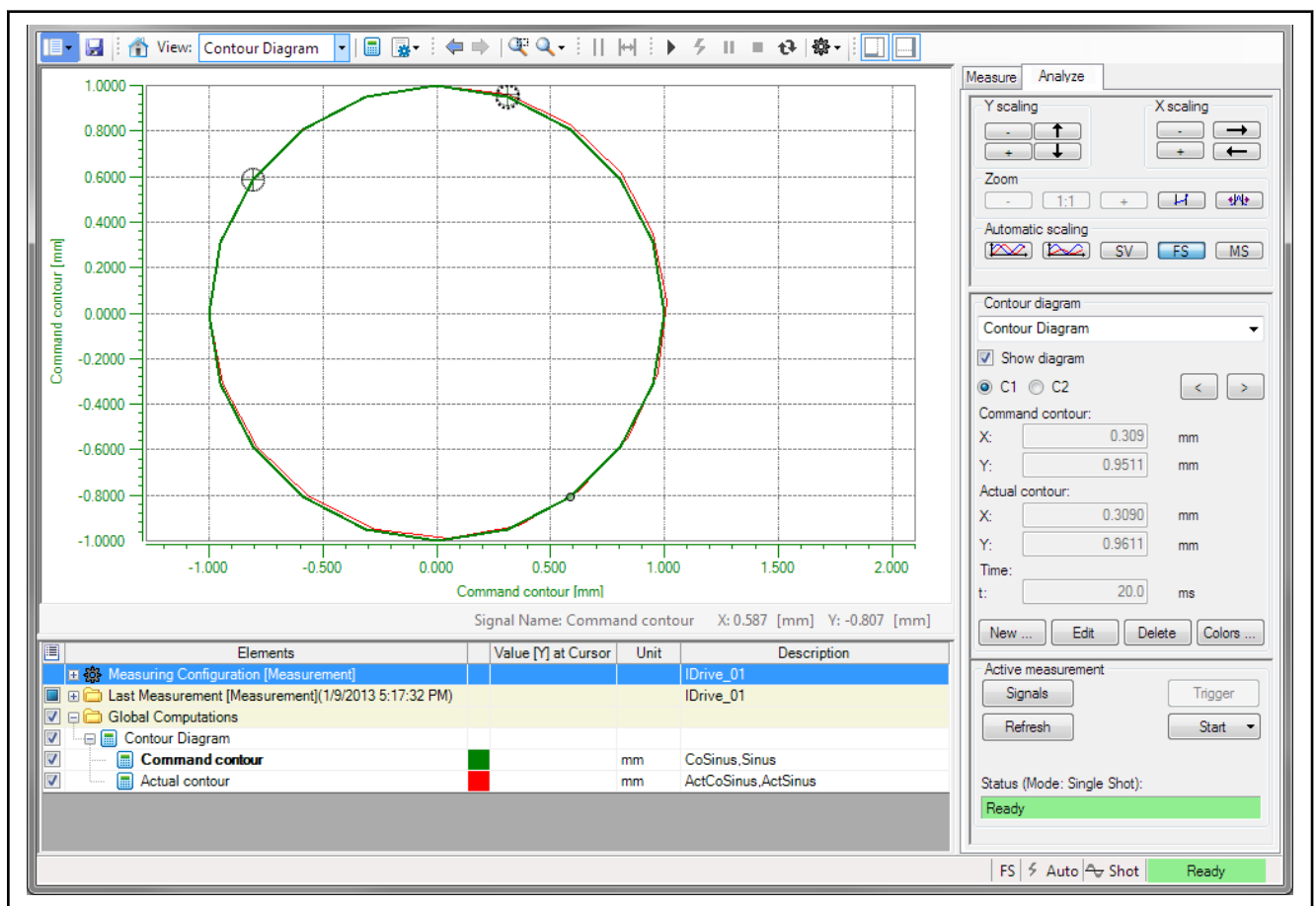


Fig. 4-36: "Contour diagram" diagram type



In the contour diagram, the "path error", i.e. the deviations between the command and actual contours, are displayed in the same scaling as the entire contour, i.e. not intensified. The representation of the deviation and entire contour thus corresponds to the real proportion. Deviations can thus often only be represented in the graph after significant "zooming in".

The following figure shows an enlarged section, thus making the deviation more obvious:

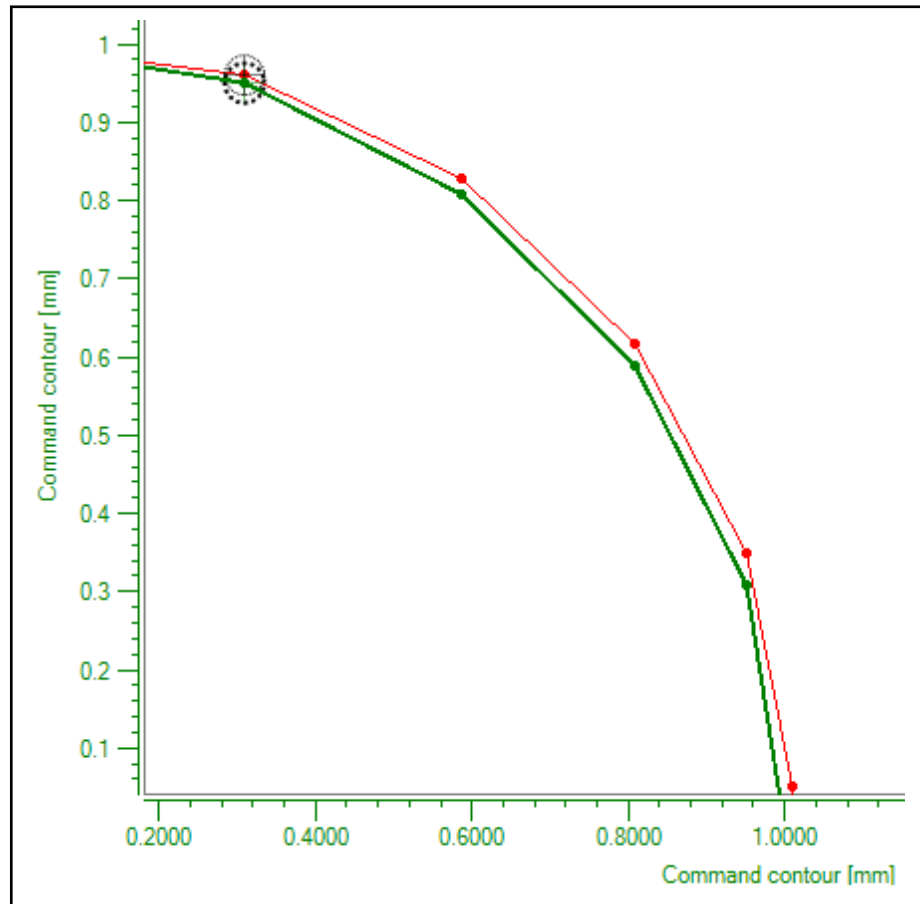


Fig. 4-37: Enlarged area in the contour diagram

In addition, the two cursors, one on the command contour and one on the actual contour, can be seen.



The cursor on the command contour is directly coupled to the cursor on the actual contour. In the operating area, x- and y-values and a time value are displayed for the measuring points selected by the cursor.

The following figure shows the control elements for the contour diagram in the operating area of the oscilloscope:

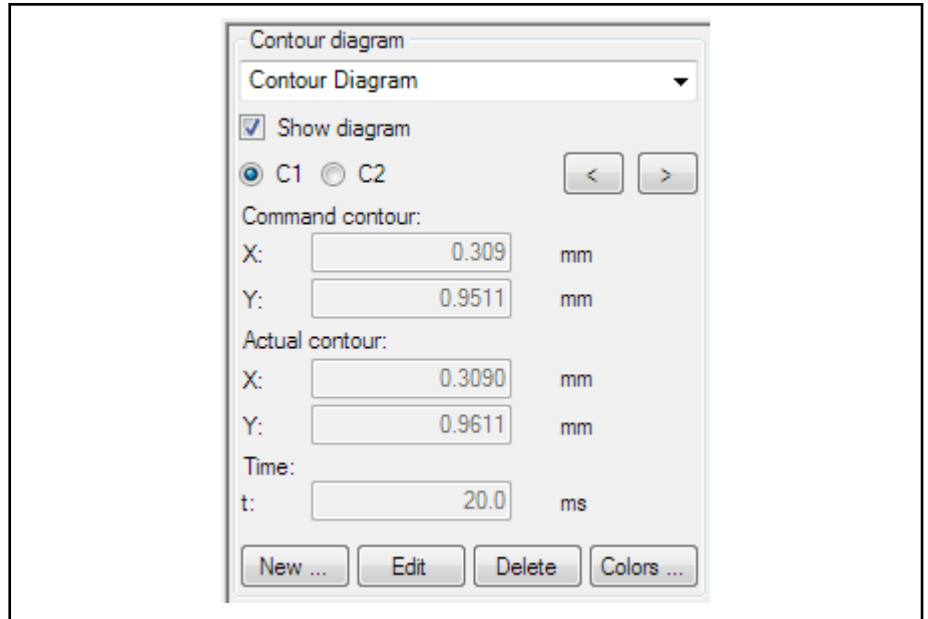


Fig. 4-38: Control elements for the contour diagram in the operating area of the oscilloscope

Having defined several diagrams, select these using the selection box right at the top. The selection box has one entry per contour diagram. These entries correspond to the entries of the signal legend.

"Show diagram": Serves to show or hide the selected diagram.

"C1/C2": Select cursor 1 or cursor 2 using the C1/C2 radio button. Press the direction keys or the < or > buttons to move the selected cursor in the graph.

"Command contour": The x- and y-value is displayed for the measuring point selected using the cursor.

"Actual contour": The x- and y-value is displayed for the measuring point selected using the cursor.

"Time": The time value of the measuring point selected by the cursor is displayed.

Use the other buttons to create, edit and delete new contour diagrams or to change the color of command and actual contours.

For further evaluation, use the functions and tools of the oscilloscope. They are provided via context menus, the toolbar and the operating area.

4.6.7 Path deviation

The editing result of a tool machine or the positioning accuracy of a robotics application is greatly influenced by the dynamic and static accuracy of the machine motion. It is thus important to record, evaluate and, if necessary, compensate for motion deviations.

Dynamic measurements provide information about the path response. Conclusions on the state of the machine and the adjustment parameters of the control loops are drawn from this information.

Static measurements only allow for conclusions on the geometric accuracy of a machine.

Machine manufacturers use the results to introduce (in a targeted manner) constructive measures for improvement in order to enhance accuracy.

Machine operators can use the measurement of the path deviation for acceptance and regular accuracy checks, as well as preventative maintenance of their machines.

Configuration **Proceed as follows to measure the path deviation:**

1. Select the "Path deviation" diagram type in the toolbar and then create a new computation.

To create a new computation, proceed with one of the following actions:

- Toolbar: **New computation...** button
- "Graph area": **New computation...** context menu
- "Signal legend": **New computation...** context menu on various elements

2. In the "Define computation" dialog, select the x- and y-signals for the command and actual contours:

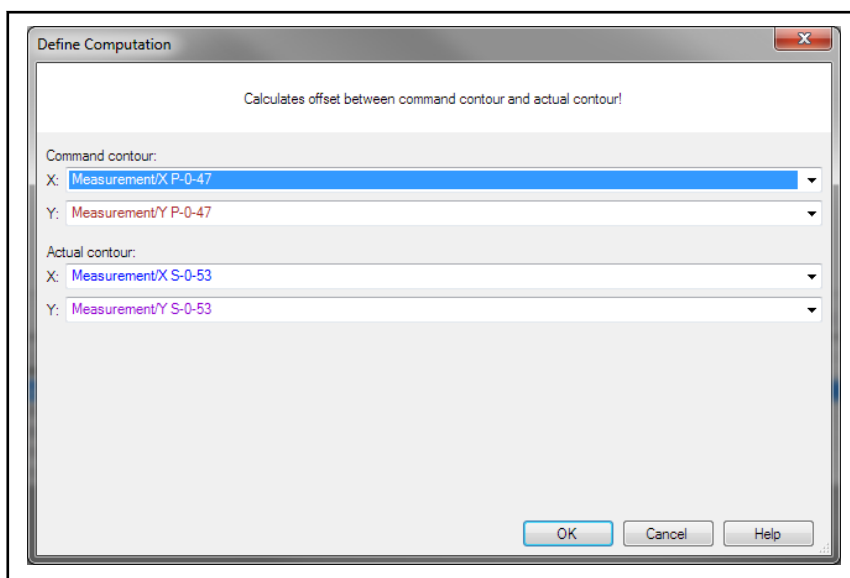


Fig. 4-39: Define computation: Path deviation

3. Confirm the selection with **OK**.

Representation

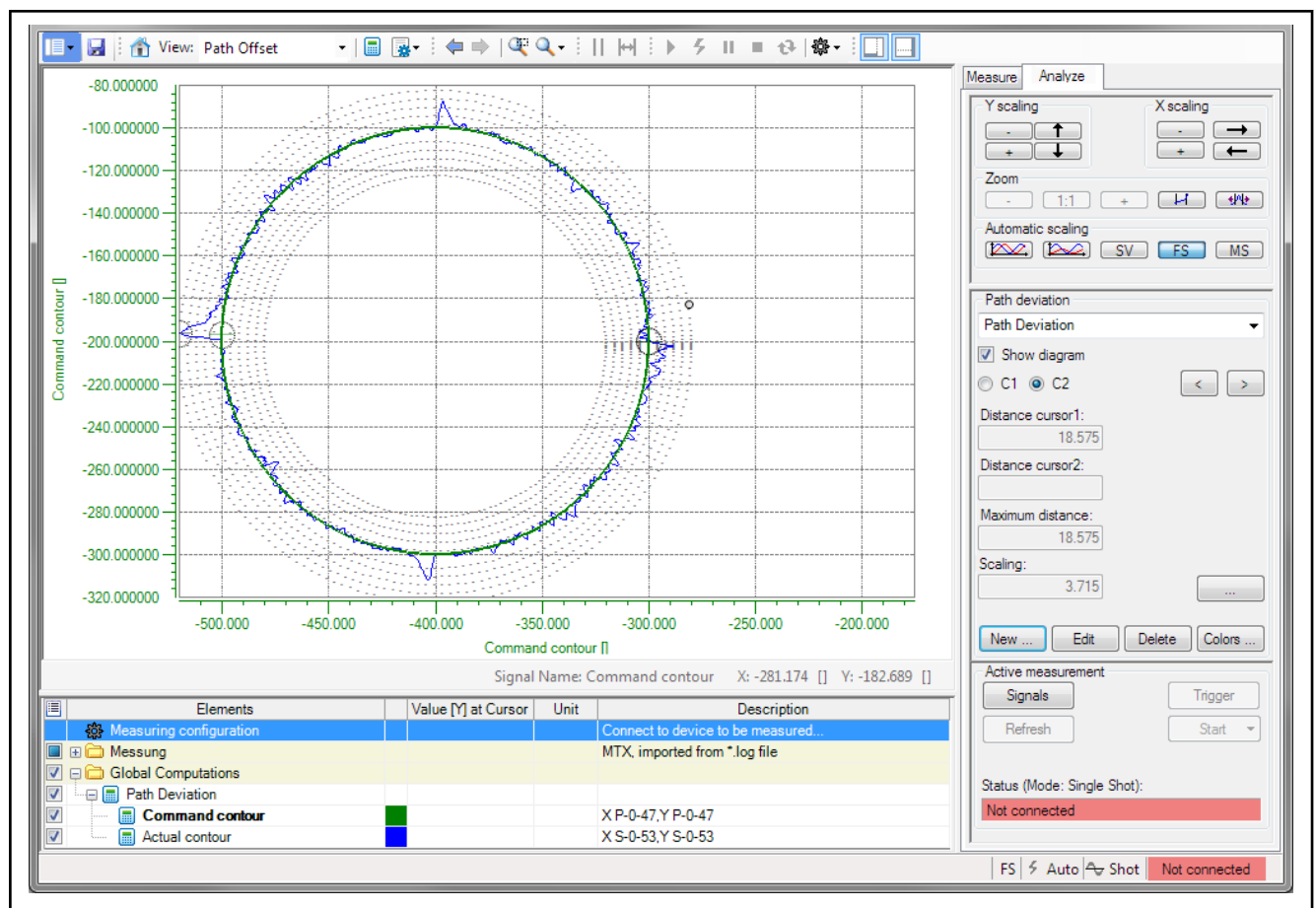


Fig. 4-40: "Path deviation" diagram type



In the diagram, the path errors, i.e. the path deviation between the command and actual contours, are displayed with a high level of sensitivity, i.e. intensified. The deviations in the diagram are thus easy to identify.

The example shows a typical use case. The deviation when traveling a circle is displayed. Typical errors at the quadrant crossings caused by frictional resistance can be seen. The effect of the friction can be reduced with IndraDrive using the respective parameters. Check the optimization using this display.

The following figure shows an enlarged section, thus making the deviation more obvious:

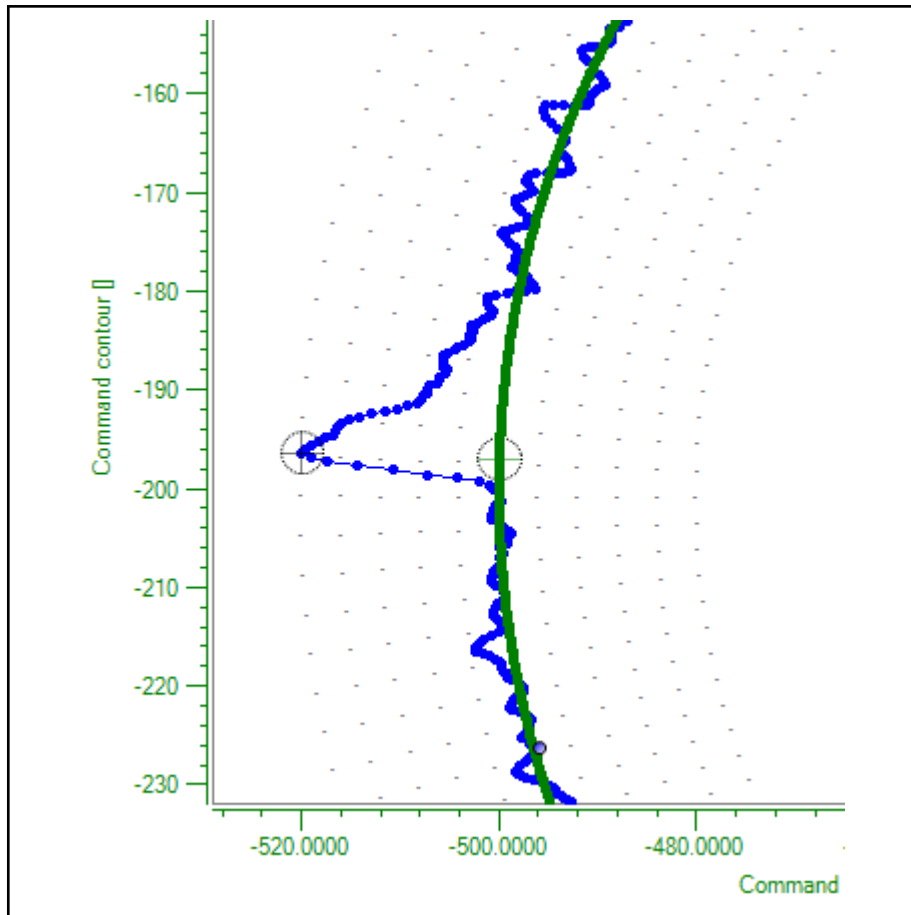


Fig. 4-41: Enlarged area in the path deviation diagram

In addition, the two cursors, one on the command contour and one on the actual contour, can be seen.



The cursor on the command contour is directly coupled to the cursor on the actual contour. For a better understanding, the path error has been computed.

The path error is displayed in the operating area, in the "Distance Cursor1" or "Distance Cursor2" field.

The following figure shows the control elements for the path deviation in the operating area of the oscilloscope:

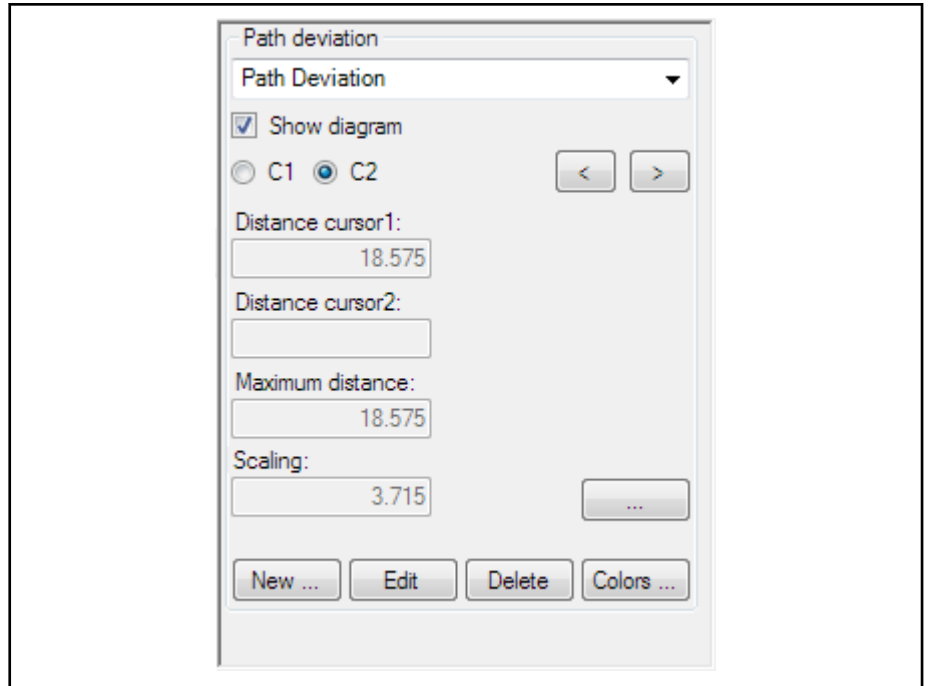


Fig. 4-42: Control elements for the path deviation in the operating area of the oscilloscope

Having defined several diagrams, select these using the selection box right at the top. The selection box has one entry per diagram (path deviation). These entries correspond to the entries of the signal legend.

"Show diagram": Serves to show or hide the selected diagram.

"C1/C2": Select cursor 1 or cursor 2 using the C1/C2 radio button. Press the direction keys or the < or > buttons to move the selected cursor in the graph.

"Distance cursor1": This field displays the distance between the command contour and actual contour at cursor1 in μm .

"Distance cursor2": This field displays the deviation between the command contour and actual contour at cursor2 in μm .

"Maximum distance": This field displays the maximum distance between the command contour and actual contour in μm .

"Scaling": This field displays the current factor used to compute the amplification. It corresponds to the distance of two auxiliary lines.

Button "...": Set the factor used to compute the amplification. The current value is displayed in the "Scaling" field.

Use the other buttons to create, edit and delete new diagrams or to change the color of command and actual contours.

For further evaluation, use the functions and tools of the oscilloscope. They are provided via context menus, the toolbar and the operating area.

4.6.8 Circle test

The circle test is a method for checking the positioning accuracy and to assess the controller settings of a CNC machine tool. Based on the results of a position measurement of the tool zero point during the circle contour procedure, the accuracy of the machine can be evaluated. The different deviations

of the actual contour from the command contour provide information about the errors and misadjustments of the machine.

A simple method of the circle test is the direct recording of the path curve with the machine's own measuring systems.

Configuration **Proceed as follows to perform a circle test:**

1. Select the "Circle test" diagram type in the toolbar and then create a new computation.

To create a new computation, proceed with one of the following actions:

- Toolbar: **New computation...** button
- "Graph area": **New computation...** context menu
- "Signal legend": **New computation...** context menu on various elements

2. In the "Define computation" dialog, select the X- and Y values for the command and actual contours:

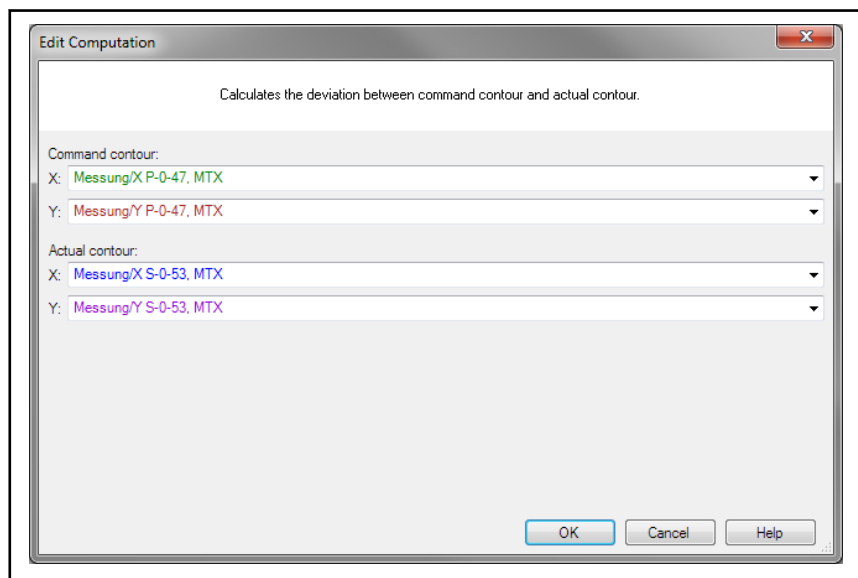


Fig. 4-43: Define computation: Circle test

3. Confirm the selection with **OK**.

Representation

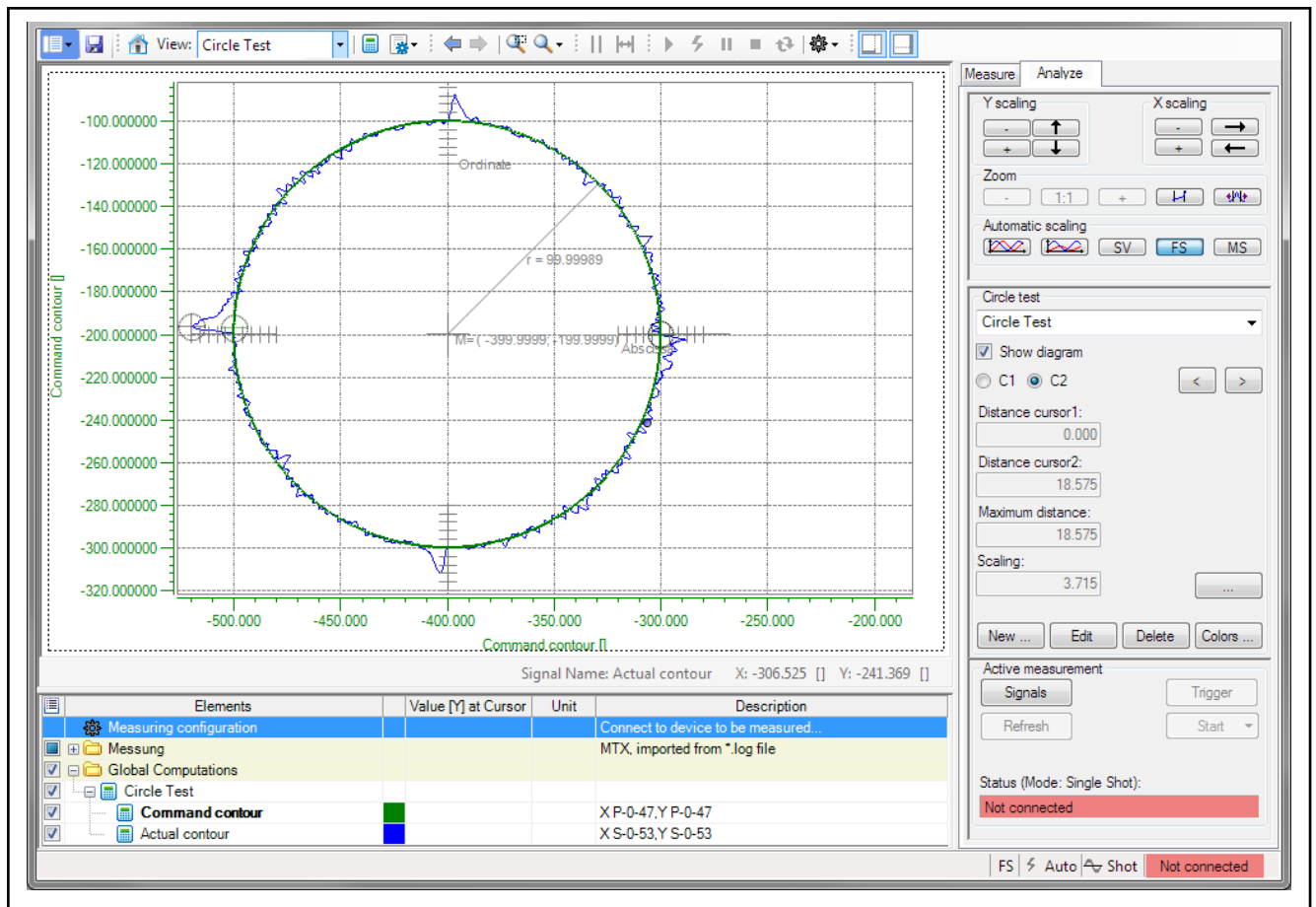


Fig. 4-44: "Circle test" diagram type



In the diagram, the path errors, i.e. the path deviation between the command and actual contours, are displayed with a high level of sensitivity, i.e. intensified. The deviations in the diagram are thus easy to identify.



The circle test assumes that a circle was measured as a contour and uses the formulas of the path deviation to compute the actual contour deviations.

The operating options in the circle test are identical to the path deviation.

For further evaluation, use the functions and tools of the oscilloscope. They are provided via context menus, the toolbar and the operating area.

5 Service and support

Our worldwide service network provides an optimized and efficient support. Our experts offer you advice and assistance should you have any queries. You can contact us **24/7**.

Service Germany Our technology-oriented Competence Center in Lohr, Germany, is responsible for all your service-related queries for electric drive and controls.

Contact the **Service Hotline** and **Service Helpdesk** under:

Phone:	+49 9352 40 5060
Fax:	+49 9352 18 4941
E-mail:	service.svc@boschrexroth.de
Internet:	http://www.boschrexroth.com

Additional information on service, repair (e.g. delivery addresses) and training can be found on our internet sites.

Service worldwide Outside Germany, please contact your local service office first. For hotline numbers, refer to the sales office addresses on the internet.

Preparing information To be able to help you more quickly and efficiently, please have the following information ready:

- Detailed description of malfunction and circumstances
- Type plate specifications of the affected products, in particular type codes and serial numbers
- Your contact data (phone and fax number as well as your e-mail address)

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Notes

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