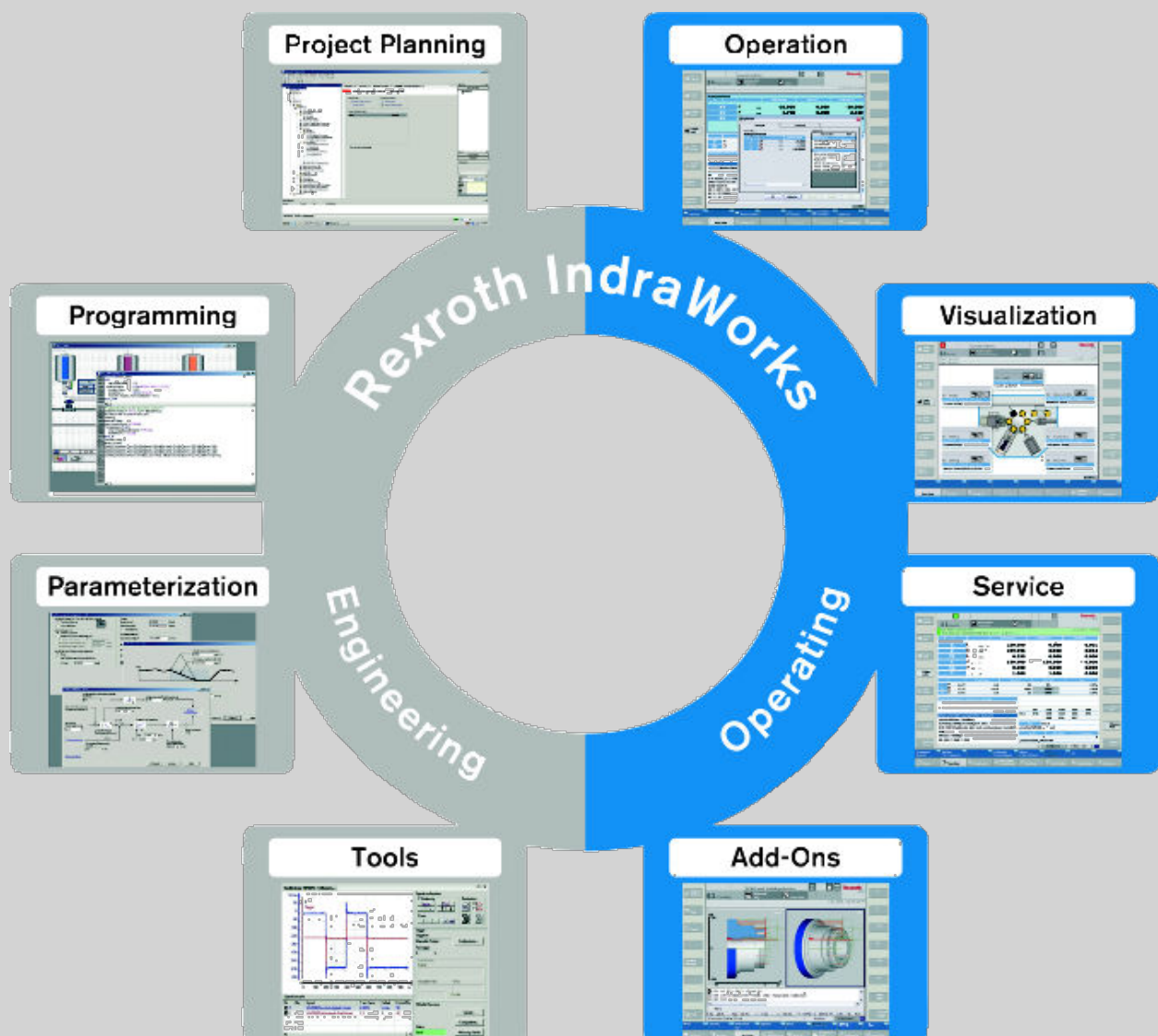


IndraWorks 14VRS

Simulation

Application Description
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Edition 01



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 Simulation

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Editorial Department Engineering Automation Systems Basic Components for Engineering and Visualization , AnGu (SyKe/PiaSt)

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1 About this documentation

1.1 Validity of the documentation

Overview on target groups and product phases

In the following illustration, the framed activities, product phases and target groups refer to this documentation.

In the product phase "Engineering", the target group "programmer" can execute the activities "parameterizing, programming, configuring and simulating".

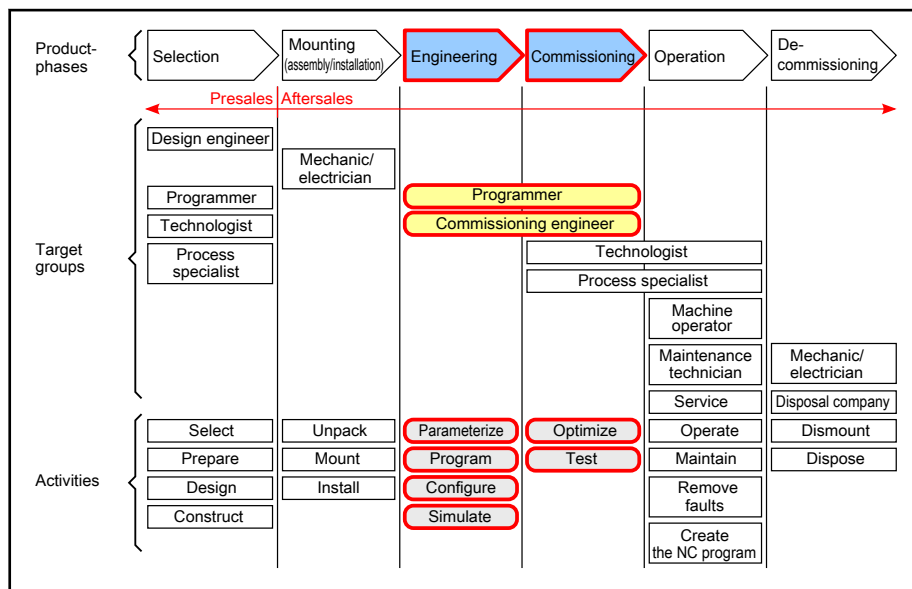


Fig. 1-1: Assigning this documentation to the target groups, product phases and target group activities

1.2 Required and supplementing documentation IndraWorks

1.2.1 Engineering

Documentation titles with type codes and part numbers

<p>IndraWorks 14VRS Software Installation DOK-IWORKS-SOFTINS*V14-CORS-EN-P, R911344286 This documentation describes the IndraWorks installation.</p>
<p>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.</p>
<p>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.</p>
<p>IndraWorks 14VRS Basic Libraries IndraLogic 2G DOK-IL*2G*-BASLIB**V14-LIRS-EN-P, R911343920 This documentation describes the system-comprehensive PLC libraries.</p>

About this documentation

<p>IndraWorks 14VRS WinStudio 7.4</p> <p>DOK-IWORKS-WINSTUD*V14-APRS-EN-P, R911341585</p> <p>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.</p>
<p>Rexroth IndraWorks 13VRS CamBuilder</p> <p>DOK-IWORKS-CAMBUIL*V13-APRS-EN-P, R911336291</p> <p>This documentation describes the basic principles and operation of the CamBuilder, the cam editing tool.</p>
<p>IndraWorks 14VRS Field Buses</p> <p>DOK-IWORKS-FB*****V14-APRS-EN-P, R911341485</p> <p>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.</p>
<p>WebAssistant</p> <p>DOK-GENERL-WEB*ASSIST*-APRS-EN-P, R911381469</p> <p>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.</p> <p>The following control variants are supported:</p> <ul style="list-style-type: none">• IndraMotion MLC L25/L45/L65/L75/XM2• IndraLogic XLC L25/L45/L65/L75/VEP
<p>IndraWorks IndraMotion Service Tool</p> <p>DOK-IWORKS-IMST*****-APRS-EN-P, R911341383</p> <p>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.</p> <p>The following control variants are supported:</p> <ul style="list-style-type: none">• IndraMotion MLC L25/L45/L65/L75/XM12/XM2/VPx• IndraLogic XLC L25/L45/L65/L75
<p>Rexroth IndraDrive Service Tools IMST/IDST</p> <p>DOK-IM*MLD-IMSTIDSTV13-RERS-EN-P, R911342652</p> <p>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.</p>
<p>IndraWorks SafeLogic 14VRS First Steps</p> <p>DOK-IWORKS-SL*STEP*V14-CORS-EN-P, R911341520</p> <p>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.</p>
<p>Rexroth IndraWorks 12VRS FDT Container</p> <p>DOK-IWORKS-FDT*CON*V12-APRS-EN-P, R911334398</p> <p>This documentation describes the IndraWorks FDT Container functionality. It includes the activation of the functionality in the project and working with DTMs.</p>

About this documentation

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. 1-1: 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. 1-2: 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. 1-3: IndraWorks documentation overview - Visualization

1.3 Information representation

1.3.1 Safety instructions

If there are safety instructions in the documentation, they contain certain signal words (Danger, Warning, Caution, Notice) and sometimes 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.

About this documentation

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.

1.3.2 Symbols used

Note Notes are represented as follows:



This is a note for the user.

Tip Tips are represented as follows:



This is a tip for the user.

1.3.3 Names and abbreviations

Term	Explanation
IWE	IndraWorks Engineering
IWO	IndraWorks Operation
NC	Numerical Control
OEM	Original Equipment Manufacturer
VCS	Version Control System

Tab. 1-4: Names and abbreviations used

1.4 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 due to an incorrect use of products.



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 dealing with our products 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 commission them.
- 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

Using IndraWorks Engineering in other applications than those specified or described in the documentation and technical data is considered as "unintended".

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

3 Introduction

3.1 Why Simulation

Due to the increasing stress of competition amongst machine manufacturers, new possibilities for minimizing the costs of a machine project are sought continuously. In doing so, all phases of the life cycle of a machine (design, commissioning, production) are taken into account. Thanks to the more and more powerful computer systems the concept of simulation is getting more and more important at this point. The visions even go as far as a virtual factory, making it possible to emulate all procedures of a production facility in a virtual manner. One part of this virtual factory is the virtual machine that can be used to support the individual phases of the life cycle of a machine, using suitable simulation tools.

3.2 What is being simulated

There are simulation techniques for all phases of the life cycle of a machine. These simulation techniques are clearly delineated, but have common points, such as the data acceptance of the design data of the machine from the CAD system into the 3D visualization.

During the design phase of the machine, the FEM (**F**inite **E**lements **M**ethod) analysis or the MBS (**M**ultiple **B**ody **S**imulation) analysis are used for example, while the commissioning phase exclusively concentrates on the behavioral simulation. However, the production phase mostly focuses on the process optimization (e.g. cycle time optimization).

Considering the simulation techniques during the commissioning phase, another division of the techniques can be made at this point. On the one hand, there is the so-called hardware-in-the-loop-simulation, and on the other hand, there is the software-in-the-loop-simulation.

Hardware-in-the-loop

Regarding this simulation technique, a real control is part of the simulation set-up. All other components are simulated on one computer or several computers. The communication connection of the real control to the simulation components for example is done via Profibus slave cards.

Software-in-the-loop

With this simulation technique, all components are simulated on one computer or several computers.

3.3 Objectives of Simulation in IndraWorks

The focus of using simulation techniques of the company Bosch Rexroth in the field of system development for motion control is on optimizing the commissioning procedure of controls of Bosch Rexroth. This description primarily describes the functions using the example of the machine tool control IndraMotion MTX. Basically, the functions can also be used for all Bosch Rexroth controls. Here, the main focus is on the behavioral simulation, e.g. on testing the PLC program or the NC program.

In order to meet this objective, components such as a virtual control (NC, MC, and PLC), a virtual control panel and virtual drives are required. An efficient behavioral simulation is only allowed for by the interaction of all the aforementioned components.

Using the following functions the commissioning time can be shortened

Introduction

- Testing the complete program sequences in an early phase of development
- Testing optimized programs before transfer to the machine
- Mixed operation between real and simulated Profibus devices possible
- Can also be used for external controls
- Consistent project states at any time due to IndraWorks project archiving

However, along with the reduction of the commissioning times there are further fields of application for the simulation providing the user with cost and time savings.

- Demonstrator for distribution with the customer
- Testing the program sequences (both of the CNC and the PLC)
- Parameterization of the control and the drives
- Use for training purposes
- Emulation of failures (troubleshooting)
- Validation of troubleshooting measures

3.4 Components in IndraWorks

IndraWorks comprises the following simulation components:

IndraMotion MTX Simulator

The IndraMotion MTX Simulator (see also [chapter 5.4 "Virtual control" on page 18](#)) is a virtual control that can be run on a Windows PC. IndraWorks Engineering, IndraWorks Operation and the VAM simulator provide a complete development station for the mechanical engineer.

VAM Simulator

The virtual control panels (see also [chapter 5.2 "Virtual control panels" on page 14](#)) replace the real VAM 40, VAM 41 and an additional control panel, when working with the MTX Simulator. The optical characteristics and the function simulate the functions of the real VAM 40 and VAM 41.

4 Quick start

Different demonstration projects are part of the IndraMotion MTX installation in the installation directory "..\Rexroth\IndraWorks\Projects". The following handling instruction describes the configuration steps for these IndraMotion MTX projects to operate the different simulation components of IndraWorks.

The instructions are not intended for users without any prior knowledge of the simulation components. Inexperienced users have to read the whole documentation first, in order to familiarize with the topic.

To execute an IndraMotion MTX project on a PC, simulate the following steps:

1. Start IndraWorks via the desktop shortcut
2. Load the IndraMotion MTX project (e.g. demonstration project) in IndraWorks
3. Start the IndraMotion MTX emulation (see also [chapter 6.2.5 "Starting and stopping the MTX emulation" on page 42](#))
4. Select "local host" for communication of IndraMotion MTX and PLC.
5. The PLC has to be stopped
6. The NC kernel data have to be restored (see also [chapter 6.2.3 "Configuring the NC Kernel" on page 37](#))
7. The PLC program has to be loaded and started (see also [chapter 6.2.4 "Configuring the PLC" on page 40](#))
8. Activate the IndraWorks project for IndraWorks Operation (see also [chapter 6.2.2 "Configuring the HMI" on page 35](#))
9. Create and configure a virtual control panel (e.g. VAM 40) in IndraWorks engineering (see also [chapter 6.1.1 "Configuration in IndraWorks" on page 19](#))
10. Start windows program "IndraWorks virtual control panel" (see also [chapter 6.1.3 "Start and operation" on page 31](#))



Detailed information regarding the IndraMotion MTX emulation can be found in chapter "Virtual commissioning of the MTX" in the documentation "IndraMotion MTX commissioning".

5 Simulation components

5.1 Project Explorer

The simulation components can be found in the IndraWorks Project Explorer below the **Simulation and 3D visualization** node.

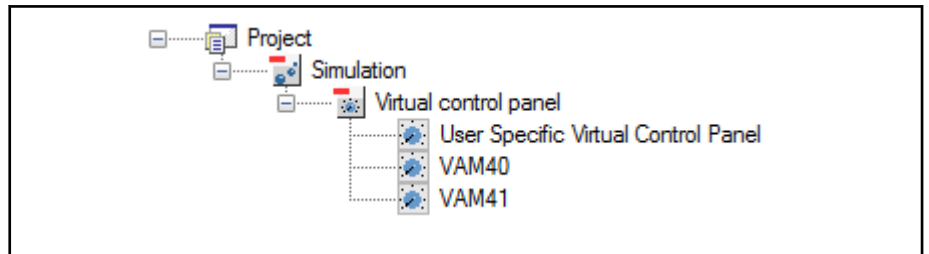


Fig. 5-1: Project Explorer

Project node Simulation The project node simulation can contain the following simulation components:

Virtual control panels

Several virtual control panels (e.g. VAM 40, VAM 41 or freely configurable control panels) can be managed and configured.

To add a virtual control panel to the IndraWorks project, proceed as follows:

1. Drop a virtual control panel from the category **Simulation** in the IndraWorks library on one of the following nodes in the Project Explorer via Drag-and-drop:
 - Project node
 - **Simulation** node
 - **Virtual control panel** node
2. The dialog box **Add new element** is opened via the context menu **Add... ► Add new element** of one of the nodes mentioned above.
 The virtual control panel can be selected in the category **Simulation ► Virtual control panels**.

The following menu items are located in the context menu on the node of a control panel (e.g. VAM40):

- Open
Opens the selected control panel
- Export...
Exports the current configuration of the selected control panel
- Import...
Imports a configuration of the control panel
- Rename
Renames the selected control panel
- Delete
Irrevocably deletes the selected control panel from the IndraWorks project
- Assign control
Changes the control the control panel has to communicate with.

Simulation components



If the node **Simulation** does not yet exist in the IndraWorks project, it is created automatically when a new virtual control panel is added to the project.

5.2 Virtual control panels

5.2.1 General description

The virtual control panels replace the real VAM 40, VAM 41, and an additional control panel, when working with the MTX simulator. The optical characteristics and the function simulate the functions of the real VAM 40 and VAM 41. The current version contains the texts for the languages English and German.

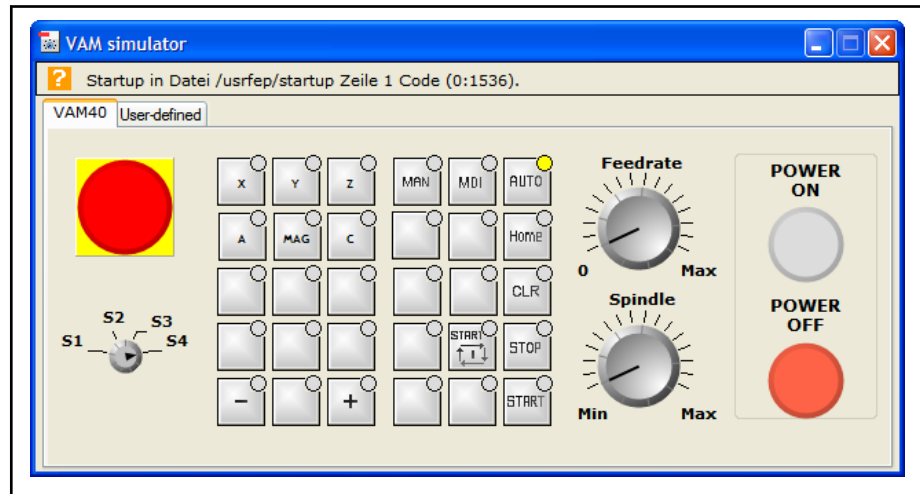


Fig. 5-2: VAM simulator VAM 40

5.2.2 Configurator

General information

The virtual control panels are configured in IndraWorks Engineering.

Simulation components

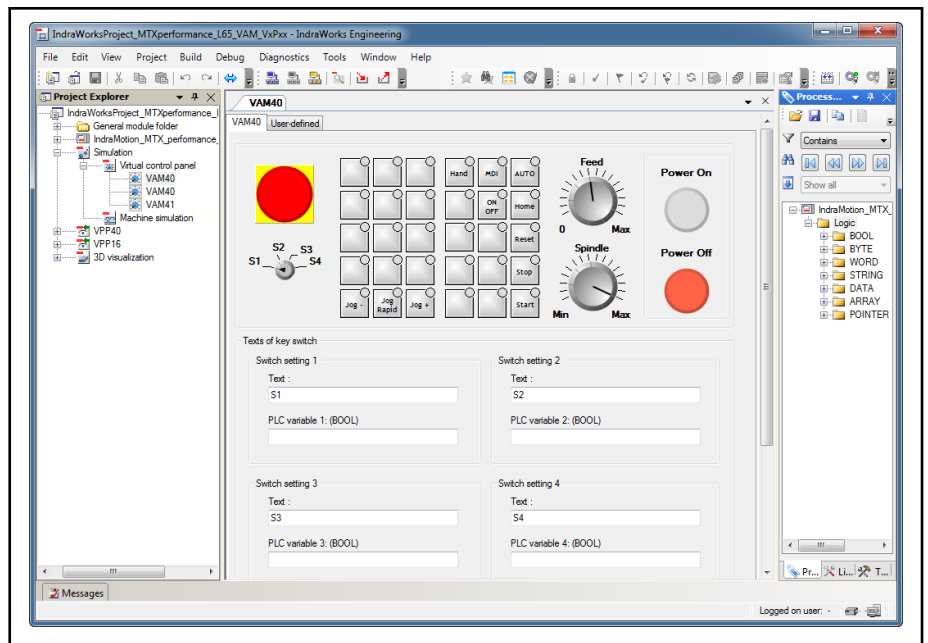


Fig. 5-3: Configuration in IndraWorks

Virtual control panels in IndraWorks project

In the IndraWorks project tree, virtual control panels can be found below the **Simulation / Virtual control panels** node.

Double-click on the node or use **Open** in the context menu to open the editor to configure a virtual control panel.

An up-to-date representation of the configured control panel can be found in the upper part of the editor. By selecting a control element, an input mask to configure the element is opened in the lower editor area.



Upon initial opening of a user-specific control panel, a control panel without control elements (blank screen) is displayed. The control elements can be moved from the control panel library to the control panel using Drag-and-drop.

Configuration pages of the VAM 40 and VAM 41

- The configuration page of the emergency stop On the emergency stop page, only the PLC variable for later communication can be created.
- The configuration page of the key-operated switch On the configuration page of the key-operated switch, the individual switching positions are labeled and the PLC variables are assigned.
- The configuration page of the overrides The configuration page of the overrides is for labeling and assigning the PLC variables.
- The configuration page of the keypad This page assigns the PLC variables and labels the keypads with texts or pre-configured images. Each individual key can be allocated by entering a text or by dragging and dropping an image from the symbol list.

The configuration page of the quick stop module



Depending on the selected type (VAM 40 or VAM 41) the following different functions are available.

Using the configuration page of the quick stop module, select different settings for both keys:

- Key labeling
- Function

Simulation components

Since the keys on the real VAM 40 are hardware-wired and the switches are equipped with normally closed and normally open contacts, these settings can also be selected.

The configuration page for user-specific elements

- Assigning the PLC variables

The following elements can be selected from the configuration page for the eight user-specific elements:

- LED
- Key with LED
- Key without LED
- Switch with 2 positions
- Switch with 3 positions

Middle position does not have any function

These elements can be labeled and assigned to PLC variables.



Since the keys on the real VAM 41 are hardware-wired and the switches are equipped with normally closed and normally open contacts, these settings can also be selected.

The configuration pages of the user-specific control panel

As the freely configurable control panel provides the same elements as VAM 40 or VAM 41, the configuration pages are partially identical regarding function and haptics. The elements can be taken from the control panel library and can be positioned on the sheet.

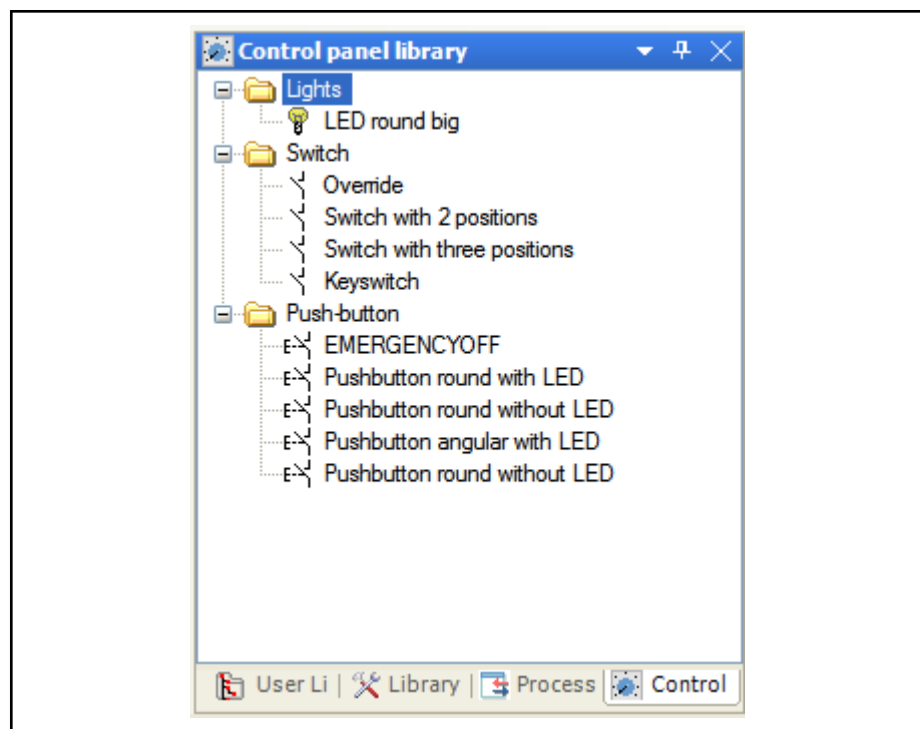


Fig. 5-4: View of the control panel library



After the elements have been placed on the sheet, they can be moved using the mouse or the arrow keys.

5.2.3 The application

The application is a separate application and controls the PLC program in the IndraMotion MTX emulation. The application can be started independently of

IndraWorks Engineering or IndraWorks Operation. Upon the virtual control panel start, a project has to be selected in which the control panel to be used is contained.



The control panels communicate directly with the emulation. It is not necessary to start IndraWorks Operation or IndraWorks Engineering.

5.3 Library

5.3.1 Simulation components

Find all components of the simulation in the IndraWorks library in the category **Simulation**.

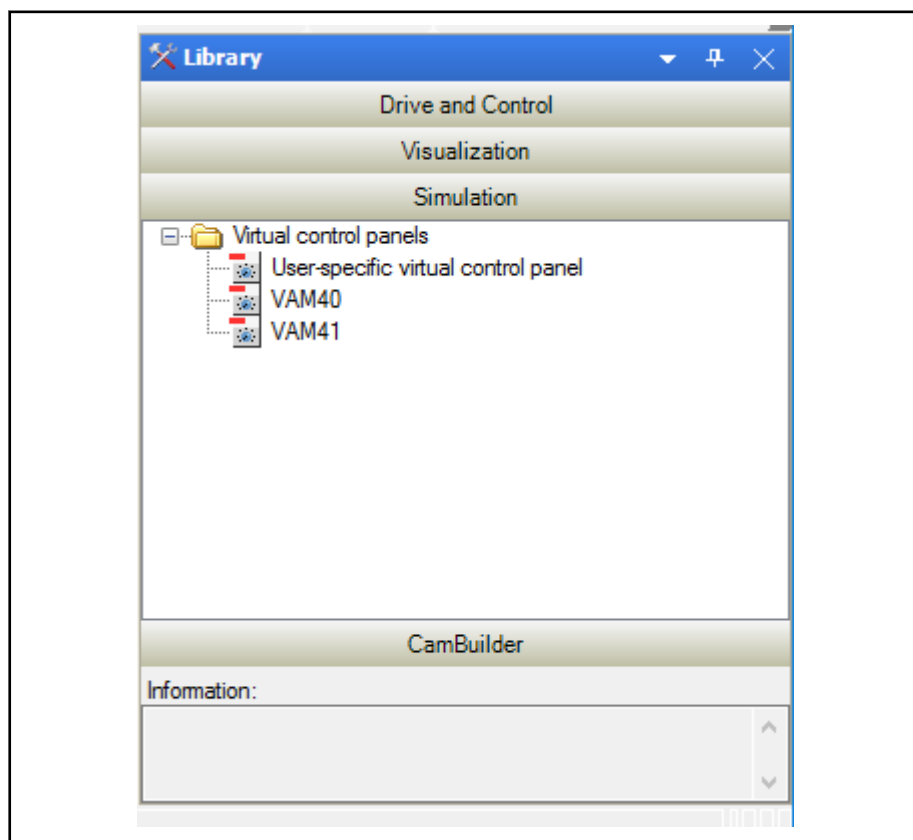


Fig. 5-5: IndraWorks library

Use Drag-and-drop to add simulation components to the IndraWorks project.

The library comprises the following categories:

- Virtual control panels

5.3.2 Virtual control panels

The Virtual Control Panels can be found under the **Virtual Control Panel** category. Virtual Control Panel entries:

- VAM 40
Virtual control panel based on the real VAM 40
- VAM 41
Virtual control panel based on the real VAM 41
- User-specific Virtual Control Panel

Simulation components

A user-specific control panel that can be selected from the control elements of the VAM 40 and VAM 41 control panels according to the requirements.

5.4 Virtual control

5.4.1 General description

A virtual control is the most important component of the simulation as it controls the whole process - as does the real control. It contains the same functionality as the real control and is parameterized, programmed, and operated the same way. Thus, the mode of operation for the user does not change when changing over between virtual and real control. Only the communication parameters of the Engineering interface have to be adjusted. However, as the virtual control runs on Windows, the only limitation is that it is not real-time-compatible.

Using the emulation of the machine tool control IndraMotion MTX, Bosch Rexroth has such a virtual control.

For further information about the IndraMotion MTX emulation, see [chapter 6.2 "Using the virtual control" on page 34](#).

6 Operation in IndraWorks

6.1 Using the virtual control panel

6.1.1 Configuration in IndraWorks

Configuring the virtual control panel

Creating a virtual control panel

In order to be able to configure a virtual control panel, a project has to be created in IndraWorks.

A virtual control panel is created in an existing project in IndraWorks via **Project node** ► **right mouse button** ► **Add new element** ► **Virtual control panel** or selected using the library via the tab **Simulation** ► **Virtual control panels** to drag it to the project node and drop it there.

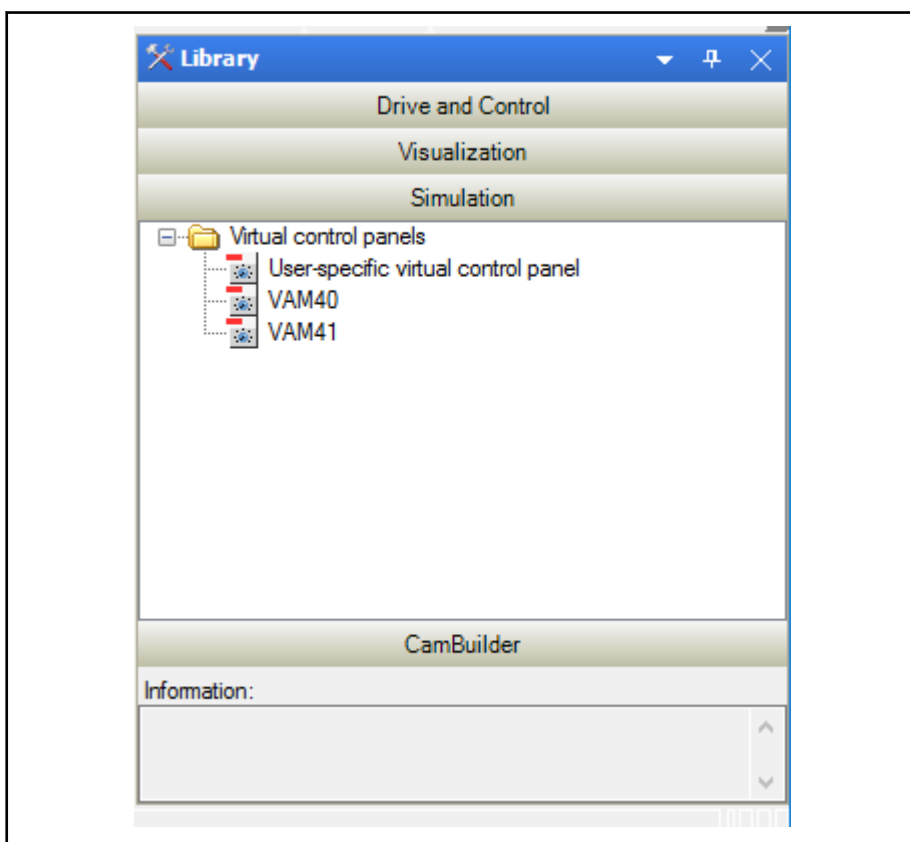


Fig. 6-1: Simulation library

Subsequently, the dialogs "Create VAM4x" or "Create virtual control panel" are displayed. The following settings can be selected:

Operation in IndraWorks

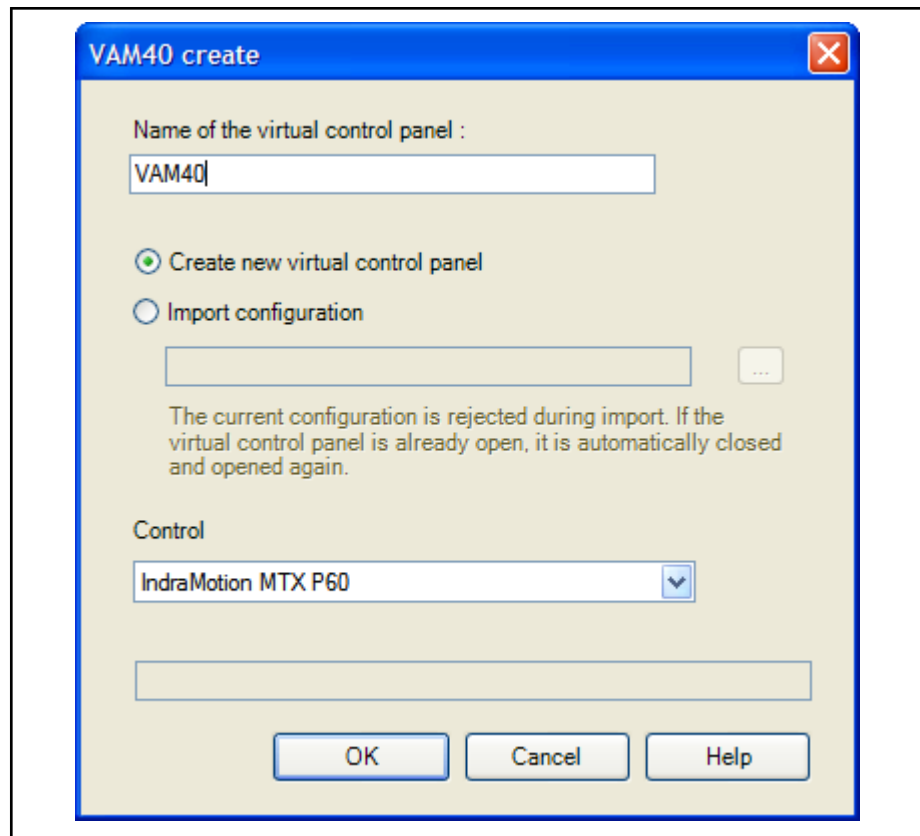


Fig. 6-2: Dialog Create new control panel

- Select the control for communication with the selected control panel.
- Create a new virtual control panel.
A new virtual control panel is created by selecting **Create new virtual control panel** ► **OK**.
- Create an already configured virtual control panel.
Select the function "Import configuration" and use the button <...> to select a configured configuration file in the browser. Afterwards, confirm your selection and acknowledge the dialog "Create new VAM4x" and "Create virtual control panel" by pressing <OK>.

Subsequently, the selected "VAM" is displayed under Simulation/Virtual control panels.

By <double-clicking> or **right mouse click** ► **Open** on the node of the control panel, the configuration pages open.

Project conversion

If a project of a previous version is opened in IndraWorks, it is automatically updated in the background.

If the project is from a version < 9 in which a control panel was configured, a node "Virtual control panels" is created under the "Simulation" node. The previously configured control panel is located below.

Assigning process variables

Select a process variable in the **Process variable** window and drag it to the control panel by holding the left mouse button down and drop it on the selected entry.



If the **Process variables** is hidden, it can be shown in the main menu using the menu item **View**.

Compiling a freely configurable control panel

If a freely configurable control panel is opened, an empty page having a separation line is shown and the control panel library opens simultaneously parallel to the process variable browser.

In order to design the control panel, the following steps have to be executed:

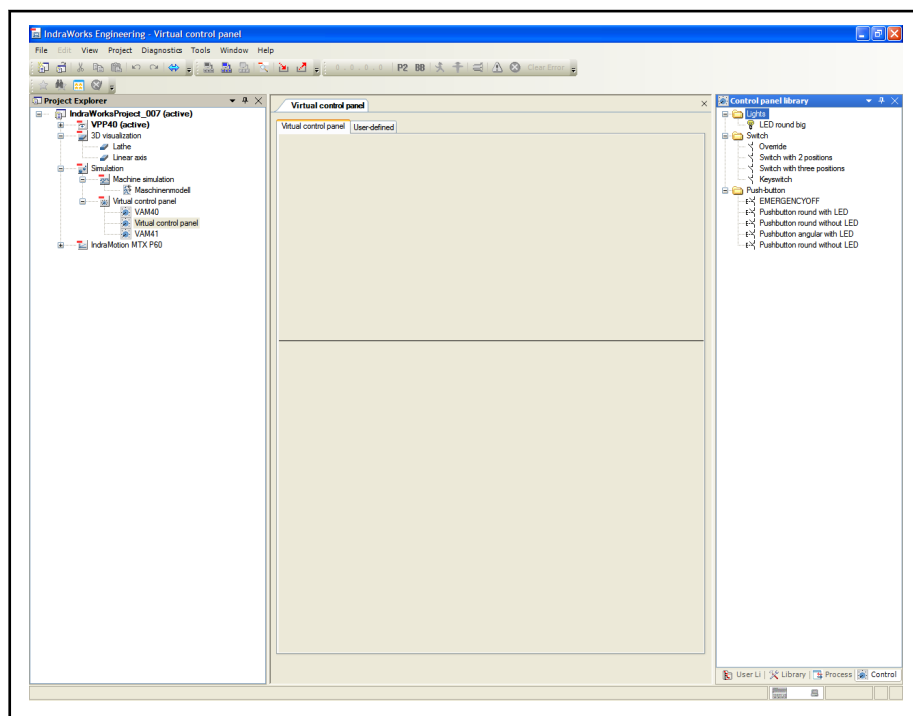


Fig. 6-3: Configuration of the freely configurable control panel

Retrieve the folders of the control panel library and select an element to be placed on the control panel. Subsequently, drag this element to the top part of the blank page using Drag&Drop. The configuration page of the element is opened to assign the element.

Functions during configuration of the freely configurable control panel

- Move element
 If an element has been positioned incorrectly, the element can be moved using the arrow keys or the mouse.
- Delete element
 Using the "Del" key or via **Element ▶ Right mouse button ▶ Delete** elements can be removed.
- Delete bitmap
 The bitmap on the key can be deleted via **Element ▶ Right-click ▶ Delete bitmaps**.



The function "Delete bitmap" is not available for all elements!

Configuring the emergency stop

There are two options to assign a PLC variable to the emergency stop.

1. Select a BOOL variable in the process variable window and drag & drop it to the image of the emergency stop switch in the control panel. After

Operation in IndraWorks

dropping the variable, the configuration page of the emergency stop opens automatically - if it is not already open - and shows the PLC variables entered in the text field.

2. Select the PLC variable in the process variable browser and drag and drop it on the configuration page to the edit field.



The "keyswitch" only accepts variables of type "BOOL".

Configuring the key-operated switch

Labeling the key-operated switch

By selecting the key-operated switch in the image of the virtual control panel, the configuration page is opened. The switch positions are labeled in the individual text fields. The number of characters of the texts is unlimited and the new label is displayed immediately in the image of the control panel.

Assigning PLC variables

There are two options to assign PLC variables

1. Select the PLC variable from the process variable tree and Drag&drop it to the image of the key-operated switch. Subsequently, a context menu is opened where selections determine which switch position has to communicate with the variable. The positions 1 - 4 are assigned from left to right.
2. Select a PLC variable in the process variable browser and drag and drop it on the configuration page to the edit field of the PLC variable.

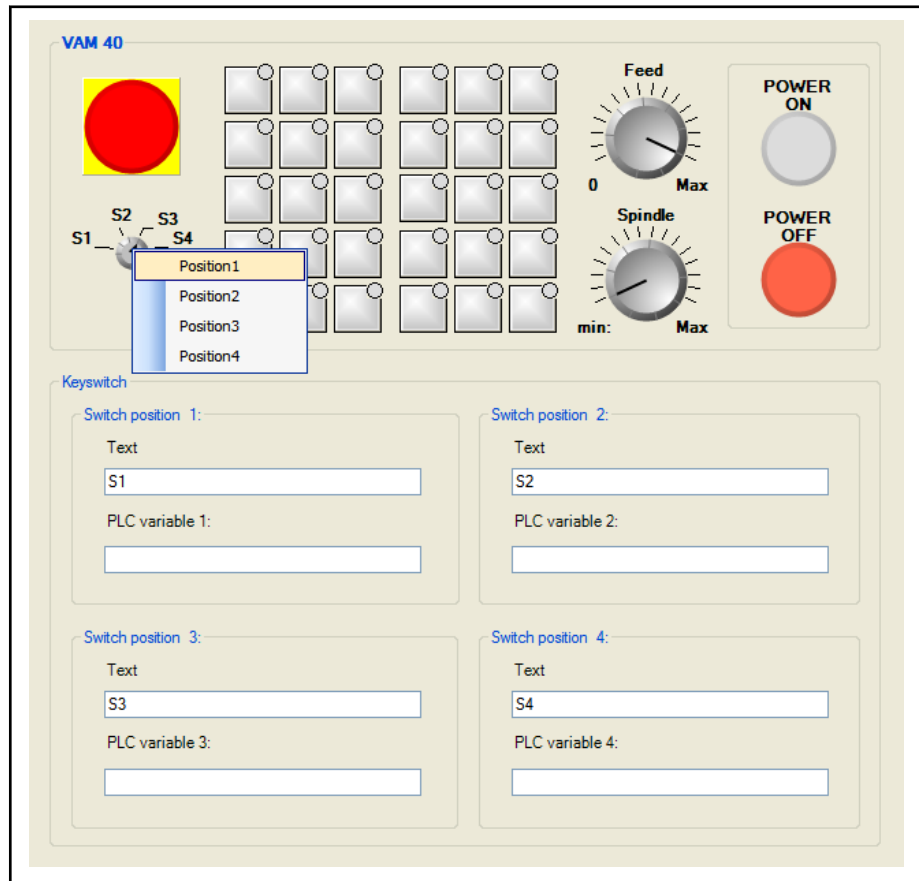


Fig. 6-4: Configuration page of the key-operated switch



The "keyswitch" only accepts variables of type "BOOL".

Configuring the overrides

Labeling the overrides

By selecting one of the overrides in the image of a virtual control panel, the configuration page is opened. The overrides are labeled in the individual text fields. The number of characters of the texts is unlimited and the new label is displayed immediately in the image of the control panel.

Assigning the PLC variables

The PLC variables are assigned in two ways as for all other elements:

1. Select the PLC variable from the process variable tree and Drag&drop it to the image of the override that must assign the variable. The name of the variable can be seen on the configuration page in the corresponding text field.
2. Select a BYTE variable in the process variable browser and Drag&drop it on the configuration page to the edit field of the PLC variable.



The "keyswitch" only accepts variables of type "BOOL".

Configuring the keypads

The configuration page of the keypads is actuated by selecting a key in the keypad.



In case of the freely configurable control panel, this function has the elements "Key angular with and without LED".

Assigning text to the keys

When labeling the individual key, the desired key has to be selected in the keypad first. Subsequently, the cursor moves into the text field "Labeling the key" and can be used for entering a text.

Assigning images to the keys

Previously generated images of the default page can be used or user-defined images can be imported using the user-defined page. They are available for every new virtual control panel.

The user-defined images are imported by pressing the <Import> key. A dialog is opened where the image with the extension "*.bmp" can be browsed for. An image is displayed on the tab and can be assigned to the keys of the virtual control panels.

The keys can be assigned in two different ways: via Drag&drop or via the context menu if the key is located in an invisible area of the Windows Desktop.

- Using Drag&drop

First, select one of the images in the "Symbols" category. Subsequently, the key is assigned by left mouse click and dragging the cursor to the key.

- Using the context menu

First, the key on which the image should be visible is to be selected in the image of the control panel. Subsequently, select the image in the category "Symbols" and right-click. A context menu with the text "Assign bitmap to key X3Y3" is opened or in case of a freely configurable control panel "Assign bitmap". After executing the context menu item, the image on the desired key appears in the image of the virtual control panel.

Operation in IndraWorks

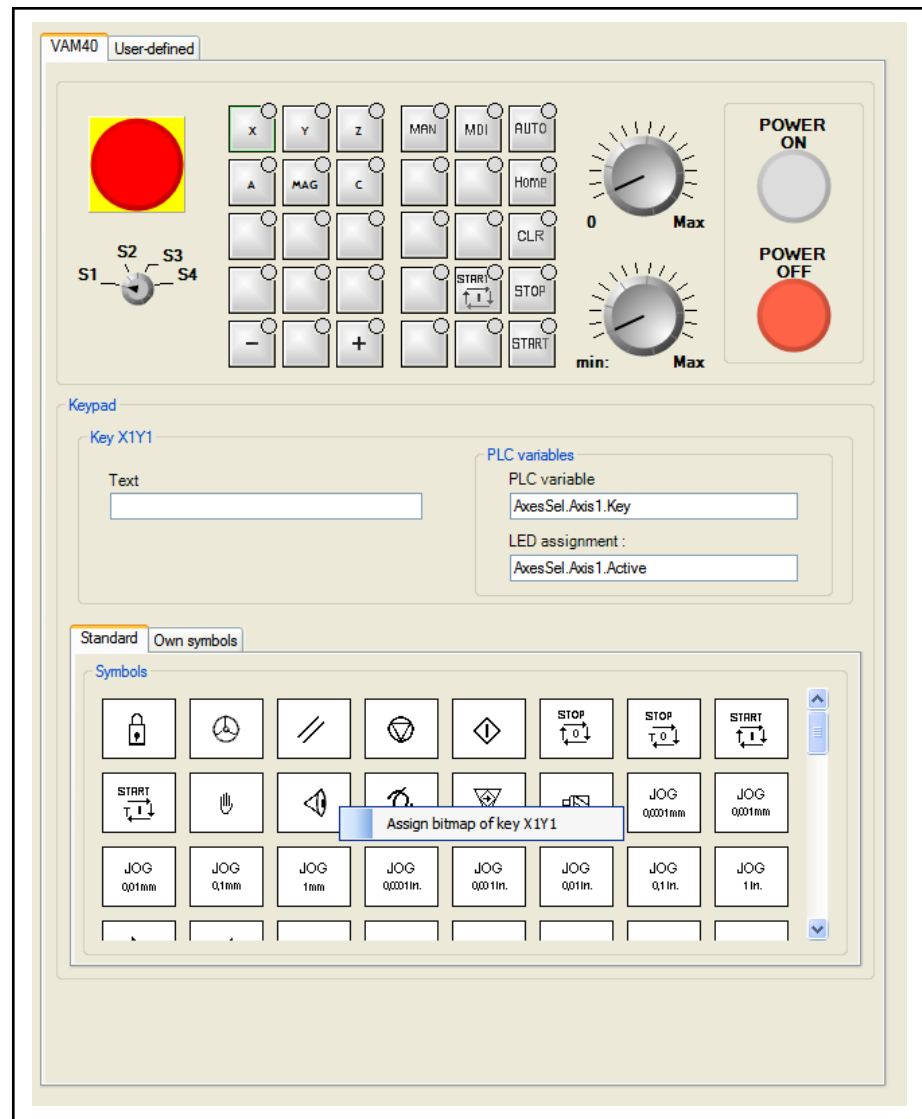


Fig. 6-5: Assigning images using the context menu

Assigning PLC variables to the keys

PLC variables can be added in two different ways, as it is the case with the emergency stop and the key-operated switch.

1. Select a PLC variable in the process variable window and drag it to the desired key using Drag&Drop. After dropping the variable, it has to be determined what the variable is to act on. Therefore, the key and the corresponding LED can be selected. The name of the variable can be seen on the configuration page in the corresponding text field.
2. Select a PLC variable from the process variable browser and drag and drop it on the configuration page to the edit field of the PLC variable for button or LED.

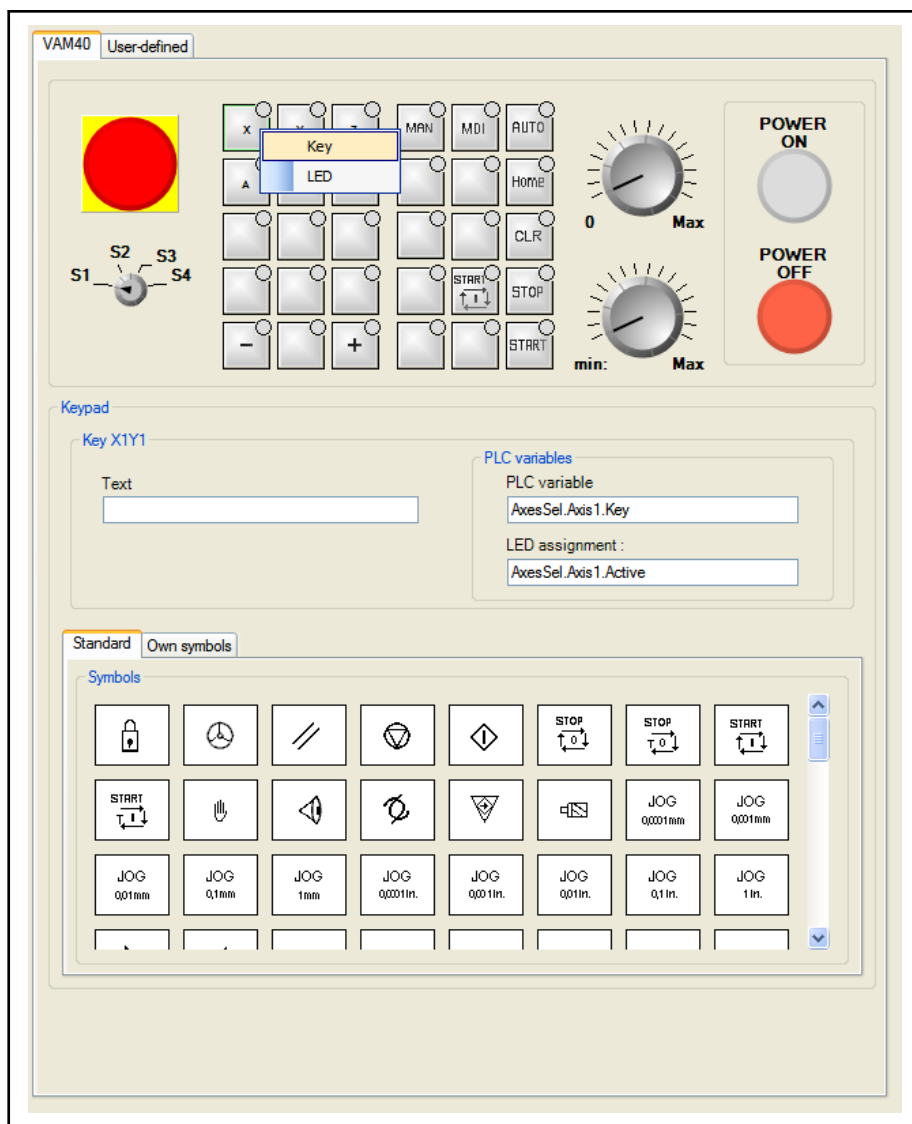


Fig. 6-6: Configuration page of the keypads



The "button with LED" only accepts variables of type "BOOL".

VAM 40-specific configuration pages

Configuring the quick-stop module

The configuration page of the quick-stop module is opened by selecting the quick-stop module in the image of the virtual VAM 40.

Labeling the keys

In the text field "(Upper) key" und "(Lower) key", a new label can be entered individually. It is not checked for Line breaks and line lengths. The label is displayed immediately in the image of the VAM 40.

Function of the keys

Since the keys on the real VAM 40 are hardware-wired and the switches are equipped with normally closed and normally open contacts, these settings have to be selected. This is implemented by setting the functions "Break-contact" or "Make-contact".

Assigning the PLC variables

There are also two different options to assign the PLC variables to the keys and to the LED in the quick-stop module.

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1. Select a PLC variable in the process variable window and drag it to the desired key using Drag&Drop. If the upper button is selected, a context menu opens, for which the affiliation of the PLC variable is to be determined. The key and the associated LED can be used for determining the variable affiliation. There is no dialog box for the lower button because only the button can be assigned. The name of the variable can be seen on the configuration page in the corresponding text field.
2. Select a BOOL variable from the process variable browser and drag and drop it on the configuration page to the edit field of the PLC variable for button or LED.

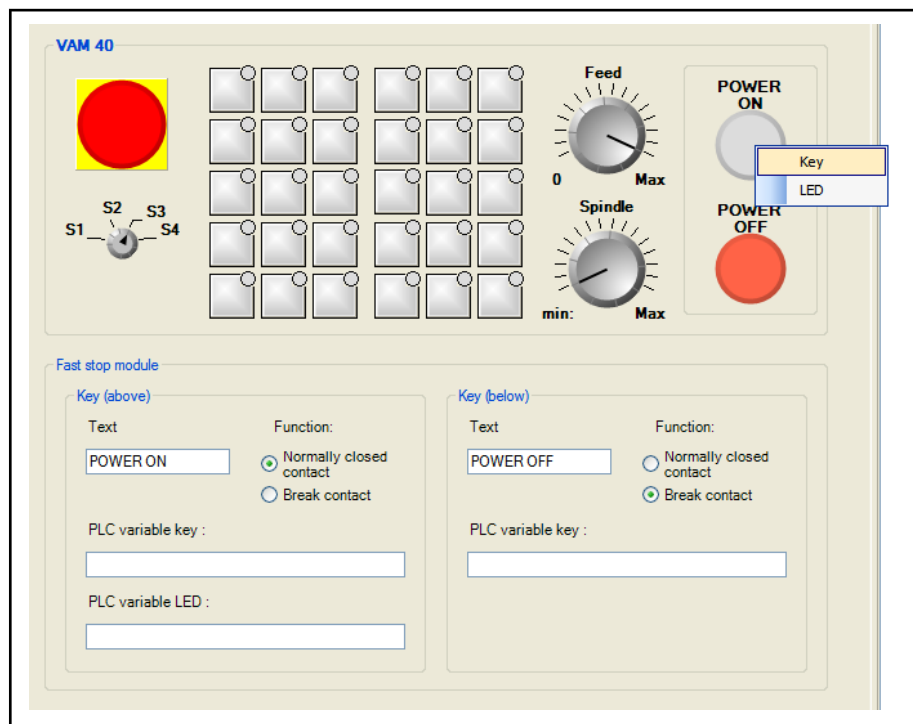


Fig. 6-7: Configuration page of the quick-stop module



The "button with LED" only accepts variables of type "BOOL".

VAM 41 Specific configuration pages

Configuring the eight freely configurable elements

The configuration page of the eight freely configurable elements is displayed by selecting the rectangular checkbox or the already selected elements in the image of VAM 41.

Under "Function of the element", several elements can be selected.

- LED
- Key with LED
- Key without LED
- Switch with 2 positions
- Switch with 3 positions

No PLC variable can be assigned to the mid-position.

These elements can be labeled and assigned to PLC variables.



Since the keys on the real VAM 41 are hardware-wired and the switches are equipped with normally closed and normally open contacts, these settings can also be selected.

- Labeling the elements** The single elements are labeled using the "Text" field on the configuration page. Line break and character length are again not taken into account, the labeling is displayed immediately in the image of the VAM 41.
- Function of the keys with and without LED** Since the keys on the real VAM 41 are hardware-wired and the switches are equipped with normally closed and normally open contacts, these settings also have to be selected. This is implemented by setting the functions "Break-contact" or "Make-contact".
- Function of the switches** The PLC variable is set to logic 1 for the switch with 2 switching positions; always depending on the switching position. The PLC variable which was assigned to the other position is set to logic 0.

 The function of the switch with three positions is identical to the switch with two positions. The only difference is that both PLC variables are set to logic zero in the mid-position.
- Assigning the PLC variables** As for the other configuration pages, there are to options to assign the PLC variables.
 1. Select a PLC variable in the process variable window and drag it to the desired element via Drag&drop. If the element is a key with LED or a switch, the context menu opens, for which the affiliation of the PLC variables has to be determined. For the "Key with LED", select between an LED and a key and for the "Switches" between the right and the left side.
 2. Select a BOOL variable from the process variable browser and drag and drop it on the configuration page to the edit field of the PLC variable.

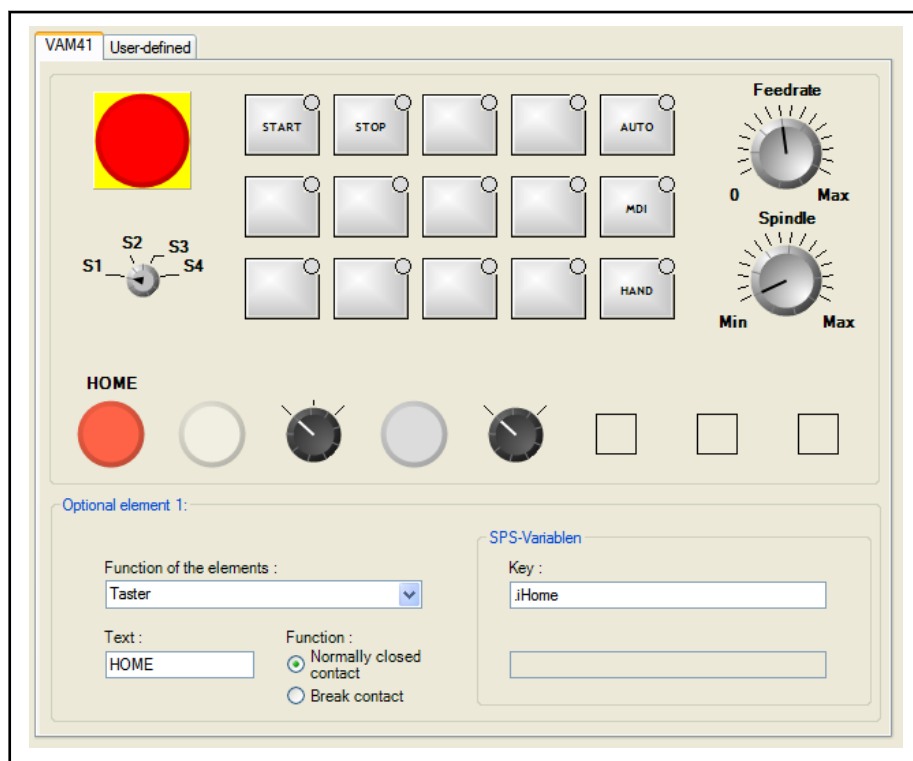


Fig. 6-8: Freely configurable elements of VAM 41

Operation in IndraWorks



The "button", "switch" and "LED" only accept variables of type "BOOL".

Specific configuration pages of the freely configurable control panel

The freely configurable control panel has the same specific elements as the VAM41. However, they are only partially identical regarding haptics and name. The function and operation is identical.

The following elements are affected:

- LED round
- Key round with and without LED
- Switches with 2 and 3 positions

Configuration of the tab

On the tab parallel to the VAM 40 or VAM 41, PLC variables can be assigned without any restrictions due to insufficient space or if they are not of type "BOOL" and "BYTE". If a variable has been assigned successfully to an array, the data type-dependent value field is displayed.



The current value of the variable becomes only visible in the application and thus can only be modified in the application!

The PLC variable is assigned as follows:

Select a PLC variable in the process variable window and drag it to the desired field via Drag&drop. The name of the variable is displayed in the text field and the corresponding value field becomes visible.

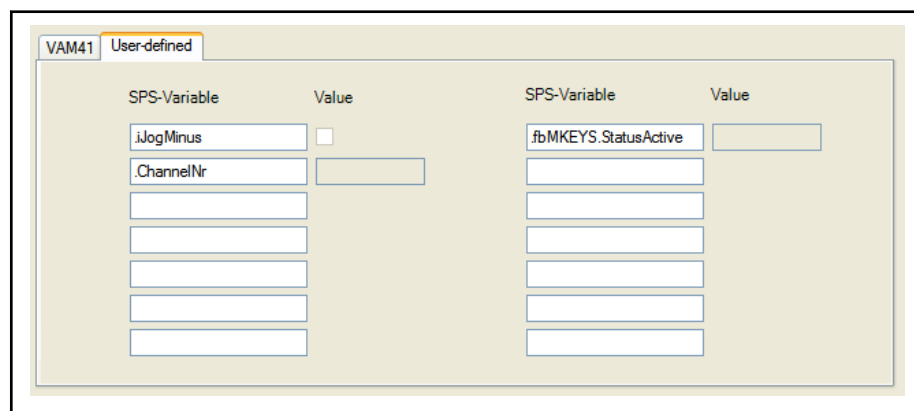


Fig. 6-9: Configuring the tab in IndraWorks


Context menu display in the virtual control panel in the Project Explorer

The context menu is opened via **Project Explorer** ► **Simulation** ► **Virtual control panels** ► **Control panels, e.g. VAM41** ► **Right mouse button**.

The following functions can additionally be executed:

- Open** The virtual control panels are opened using this function.
- Import...** During the import the same dialog is opened as when creating a new control panel, but the function "Create new virtual control panel" is grayed out. The control the communication should take place with can be changed if necessary.

Subsequently, select and acknowledge the imported configuration in the browser using the <...> key.

 The name of the configuration file has to be provided with the extension `*.vcp` or has to be `"VirtualControlPanel_VAM40.xml"` (from version IW-Simulation-01VRS)!

Subsequently, confirm your selection and acknowledge the dialog "Create VAM4x" or "Create virtual control panel " by pressing `<OK>`. If the control panel is open at that moment, it is closed automatically; the previous configuration is canceled and the panel is reopened with the imported configuration.

It is checked if the configuration to be imported corresponds to the type of the new virtual control panel. If this is not the case, the import is canceled.

Export... If the item "Export" is selected, the dialog "Export" opens. In this dialog, the directory and the name of the file can be determined. Following the confirmation, a copy of the configured control panel is located in the destination directory and has the extension `*.vcp`.

Assigning control... The context menu "Assign control..." is used for assigning or changing a control. After a selection has been made, the dialog is confirmed by pressing `<OK>` and the virtual control panel closes in case it has been open. Subsequently, it is reopened automatically.

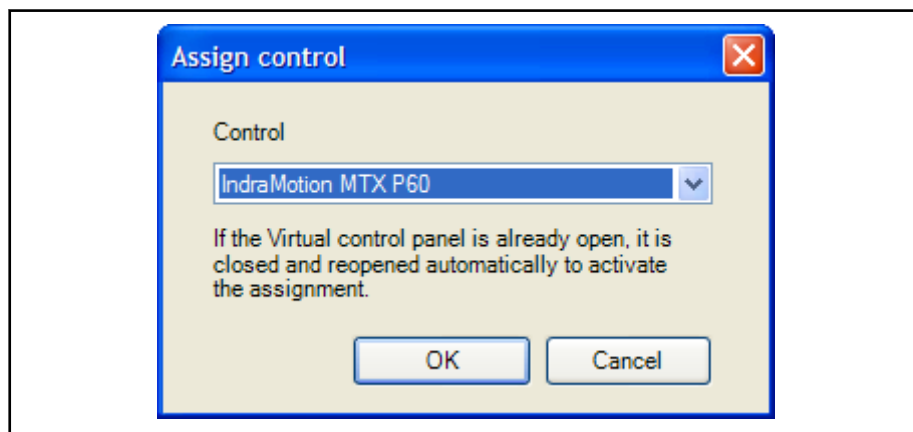



Fig. 6-10: Assigning the control


Delete When the function "Delete" is selected, the virtual control panel is removed from the project. However, the simulation node is retained.

Rename In order to rename a virtual control panel, the context menu item "Rename" has to be selected. Afterwards, the name may be changed in the project explorer.

 It is not checked if this name already has been used for a control panel in the project tree. The user has to be user that the name is unique.

Printing the configuration of the virtual control panel

Printing is executed via the General Print Component in IndraWorks Engineering by using **Main menu ▶ File ▶ Print**. Furthermore, the print-out can be previewed via **Main menu ▶ File ▶ Print preview** .

 Printing is only possible if a virtual control panel is opened in the foreground and is focused!

Printing the VAM40 labeling The insertion strips are printed for:

Operation in IndraWorks

- Key switch
- Keypad
- Quick-stop-module

Printing the VAM41 labeling

The following insertion strips are printed:

- Key switch
- Keypad
- The eight freely configurable elements

Printing the labeling of the freely configurable control panel

The labeling of the various elements is printed out successively for the freely configurable control panel. If more than one element of one sort exists, all elements of this type are summarized and printed out.

The labeling is printed for the following elements:

- Key switch
- Switches with 2 and 3 positions
- LED round large
- Key with and without LED round large
- Key with and without LED square small

6.1.2 Connection to the virtual control

Before the VAM Simulator can be started successfully, the following has to be carried out to establish a connection to the virtual control:

Preparations in IndraLogic

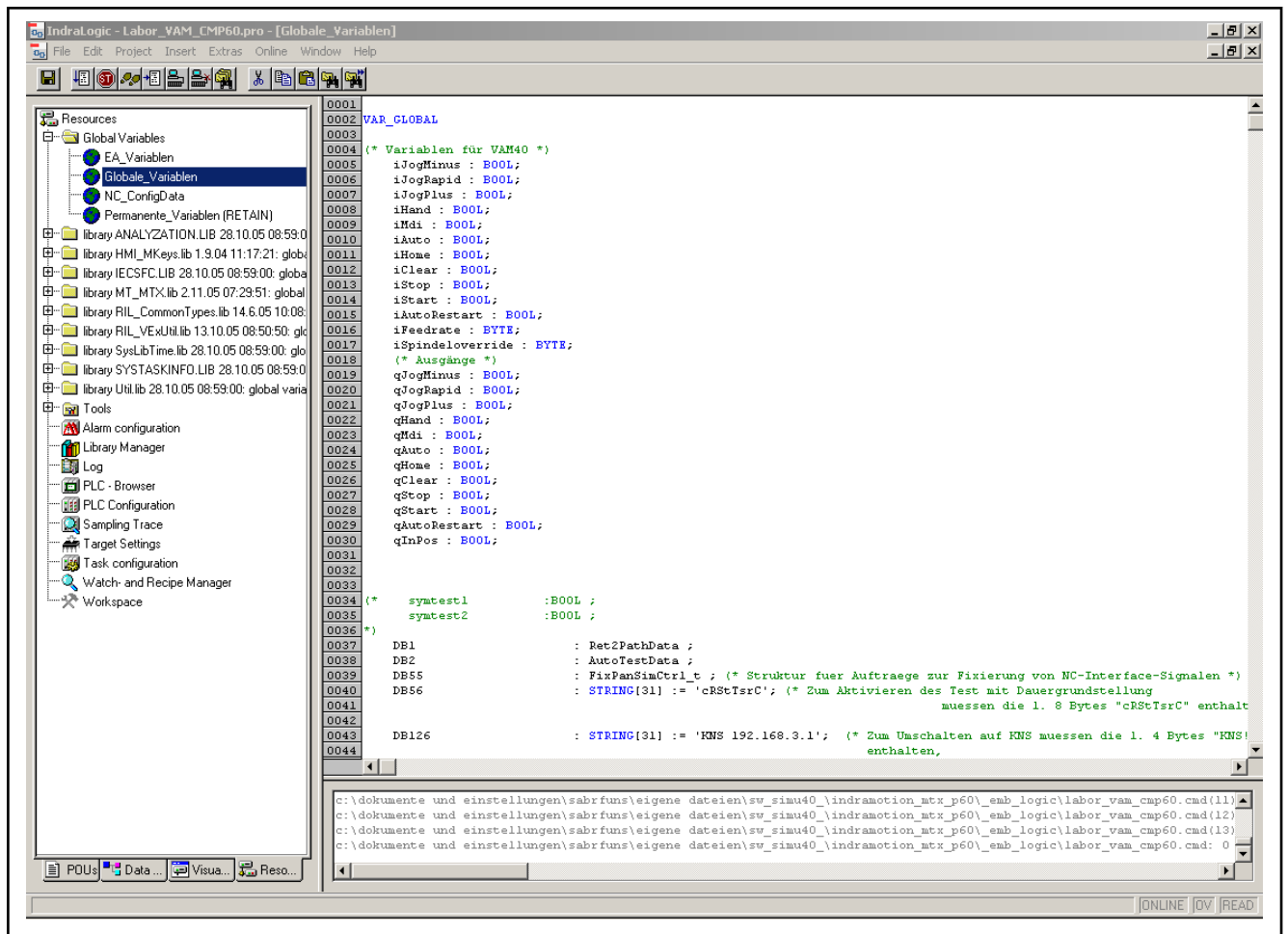


Fig. 6-11: Preparations in IndraLogic

- Create all variables to be connected to the VAM Simulator in "Global variables" in the PLC program. These variables are used to actuate the individual switching positions, keys, lamps and overrides.
 They are created as follows: Variable name: BOOL, e.g. **iStart: BOOL;**



Addresses must not be assigned! If necessary, remove the address assignments!

- Compile, log in and start the PLC program.

6.1.3 Start and operation

Start The virtual control panels are started via **Start ▶ Program files ▶ IndraWorks ▶ Virtual control panel** or by using the icon on the desktop "IndraWorks virtual control panel".

After the start, a project selection dialog is displayed in which the Engineering project containing the virtual control panel has to be selected. However, this project selection dialog can be disabled via the context menu "Show project selection upon start". If a virtual control panel not contained in the project is required at a later point, the virtual control panel has to be called and enabled again via the context menu "Show project selection upon start".

Operation in IndraWorks



In order to keep track which IndraWorks project and control panel is used, the title is structured as follows in the virtual control panel:

1. Icon
2. [IndraWorks project name]
3. Control panel name
4. The application, in this case "Virtual control panel"

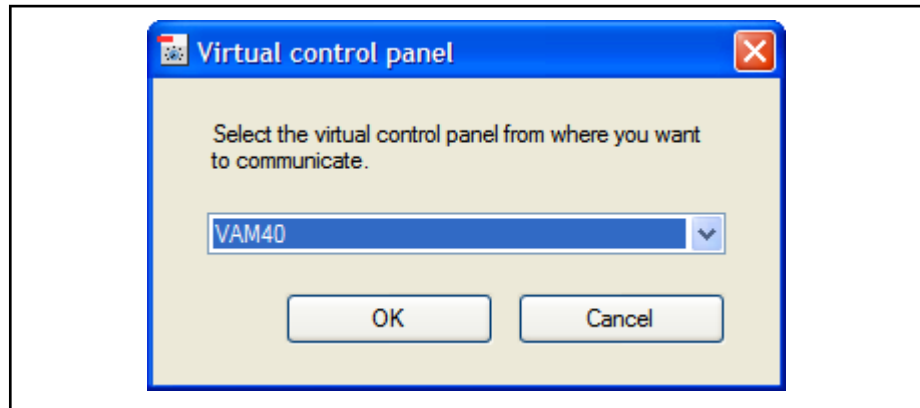


Fig. 6-12: Selection dialog of configurable control panels in Engineering for use in the .exe

After the project has been selected, another dropdown box is displayed containing the names of the configured control fields in the Engineering project. The control panel is opened after selecting a control panel and confirming with <OK>.



All control panels configured in the Engineering project can run in parallel. Call the .exe again and select the control panel.

Operating the user-defined tab

All PLC variables added to the configuration are write-protected and only their value can be modified. Variables added during runtime are deleted after closing the VAM simulator and have to be re-entered during restart.

In order not to enter the variables upon each start or to edit them in the configuration, it is possible to remove and add the variables from/to the configuration via the context menu.

1. Add variables to the configuration

In the context menu via **right mouse button ► Add to configuration**. Subsequently, the variable is added to the configuration and displayed (read-only) in the application. Subsequently, only the value can be modified.

2. Delete variables from the configuration

In the context menu via **right mouse button ► Delete from configuration**. Subsequently, the variable is deleted from the configuration and the application and the text field is not write-protected anymore.



It is not queried, whether the variable should really be deleted!

The variable is irrevocably deleted from the configuration and the application.

As for the configuration, there are two options to add PLC variables.

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1. Press the key <...> next to the PLC variable field. Subsequently, the process variable browser is opened in which the PLC variable can be selected. By pressing <OK>, the PLC variable is entered in the field and the data-dependent value field shows the current value of the PLC.
2. Select one of the PLC variable fields that has not been assigned yet and enter the PLC variables into the field.

When the field is exited, it is to be checked if the entered PLC variable exists in the PLC. If not, it is colored in red.

The variable value is changed so that the desired value is entered in the value field. Using the key <Enter> or by exiting the value field, the value is sent to the PLC.



If the value range is exceeded while modifying the PLC variable value and this is send to the PLC, an error message is displayed and a new input has to be made!

6.1.4 Context menu in the virtual control panel

If a control panel has been started, three functions can be activated or deactivated by using the **right mouse click**. In order not to reset the functions during each restart, the functions are saved.

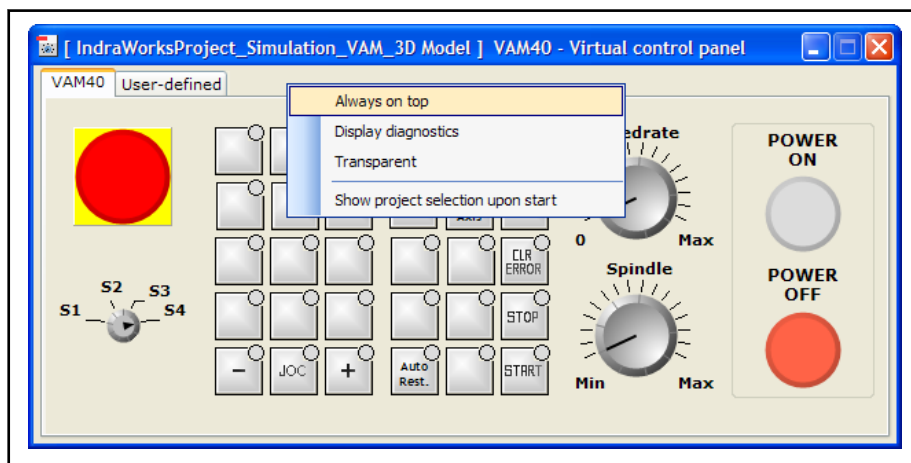


Fig. 6-13: Context menu display in the virtual control panel

Function "Always in the foreground"

The function "Always in the foreground" is used to ensure that the virtual control panel remains in the foreground and is not hidden while using the Operation Desktop. The function can be activated or deactivated any time using the **right mouse button** ► **Always in the foreground**.

Function "Display diagnostics"

The diagnostic display is used to show error, warning and info texts even if IndraWorks Operation is closed. The function can be activated or deactivated any time using the **right mouse button** ► **Display diagnostics**. The location for the display is always adapted automatically.



Only the message currently pending in the control is displayed.

Function "Transparent"

Using this function, the control panels can be switched to transparent to see the application located in the background. The function can be activated or deactivated any time using the **right mouse button** ► **Transparent**.

"Show project selection upon start" function

Use the function to select whether the project selection dialog is displayed upon the start of the virtual control panel. The selection/deselection of this function is controlled via **right click** ► **Show project selection upon start**.

Operation in IndraWorks

6.1.5 Error messages and remedy

Error box "No virtual control panel configured!"	Remedy: Open IndraWorks Engineering and open the project in which the virtual user panel was configured. Select a virtual control panel using Project node ▶ Right-click ▶ Add new element ▶ Simulation ▶ Virtual control panels ▶ VAM40, VAM41 or create new virtual control panel or use Library ▶ Simulation ▶ Virtual control panels to select a Virtual control panel, e.g. ▶ VAM4x and drag it to the project node using Drag&Drop. Proceed according to chapter "VAM 40-specific configuration pages" on page 25 .
Error box "Communication could not be established!"	Remedy: Start emulation via Start ▶ Program files ▶ Rexroth ▶ IndraWorks ▶ MTX Emulation .
Error box "Error when writing PLC variables"	This error message can have various reasons and thus different remedies are available: <ol style="list-style-type: none"> 1. Check if PLC variables have been saved in "Global variables" and if they are of type BOOL. Exception: Override actuation using BYTE variables. 2. Check communication to PLC and restore the connection if necessary.
Error box "No control assigned!" and "Incorrect control assigned!"	Remedy: Open IndraWorks Engineering and the project the virtual control panel has been configured in. Subsequently execute: E.g. VAM40 ▶ Right-click ▶ Assign control and select the control to communicate with. Restart the virtual control panel.
Error box "Conversion required!"	Remedy: Open IndraWorks Engineering and the project the virtual control panel has been configured in. Subsequently, restart the virtual control panel.
Error box "Error when writing PLC variables!"	Remedy: Open IndraWorks Engineering and the project the virtual control panel has been configured in and the control panel. Subsequently, check spelling of variables in the configuration and modify it if required. Subsequently close the control panel in IndraWorks Engineering again and restart the .exe.

6.2 Using the virtual control

6.2.1 Configuring the emulation

Restoring an existing project

General information

Short description Using IndraWorks Engineering, existing projects created at an earlier point in time or on another computer for real systems or for the MTX emulation can be restored.

Description This section describes how to transfer (= restore) an IndraWorks project from a real control into the emulation. The IndraWorks project memory contains, amongst others, the control parameters, the Profibus configuration, the PLC program, the definition files for the M- and F-keys and the log books, as well as the user images.

The project is restored using the function "Restore" in the menu "Project".

Handling instructions: Restoring an existing project for the MTX emulation:

This section describes how to transfer (= restore) an IndraWorks project from a real control into the emulation.

IW-Engineering / Motion: Restore control data

Figure	Flowchart	Example	Instruction	Documentation
Anweisung:			Restore data	
Documentation:	IndraWorks start-up manual		Data backup	

Tab. 6-1: Reference

6.2.2 Configuring the HMI

General information

Description

Short description The configured HMI data can only be used in the user interface, if they are loaded to the runtime folder of the user interface by downloading them.

Basic conditions The runtime folder only has to be set if the installation directory of the target control (emulation) differs from the installation direction of the source control the project has been created on.

Handling instructions: Configuring the HMI for MTX Emulation:

These handling instructions contain notes for the settings specific for using the MTX emulation for the HMI.

IW-Engineering / HMI BTV 40: Open and settings in the properties dialog

- Right click on the node of the HMI device in the project navigator.

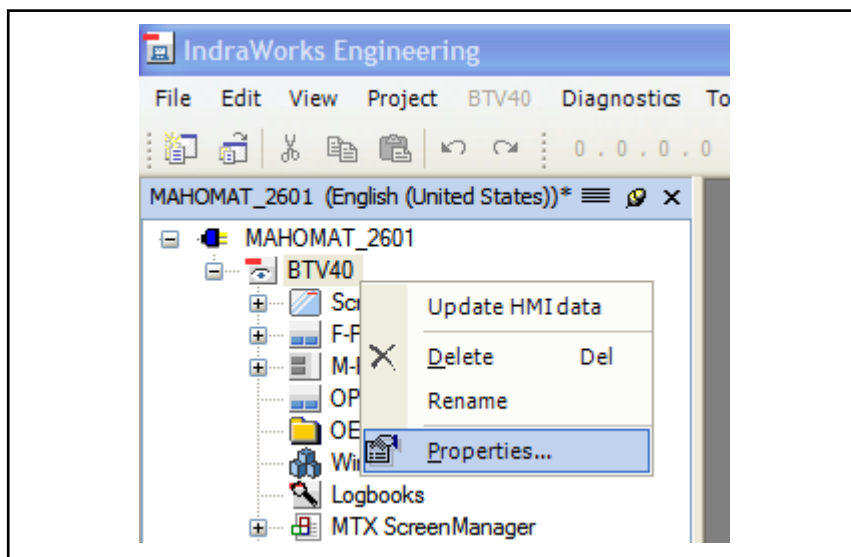


Fig. 6-14: IndraWorks project - properties

- Select the properties dialog by pressing the left mouse button on the entry "Properties". This opens the dialog for setting the properties for the HMI project.

Operation in IndraWorks

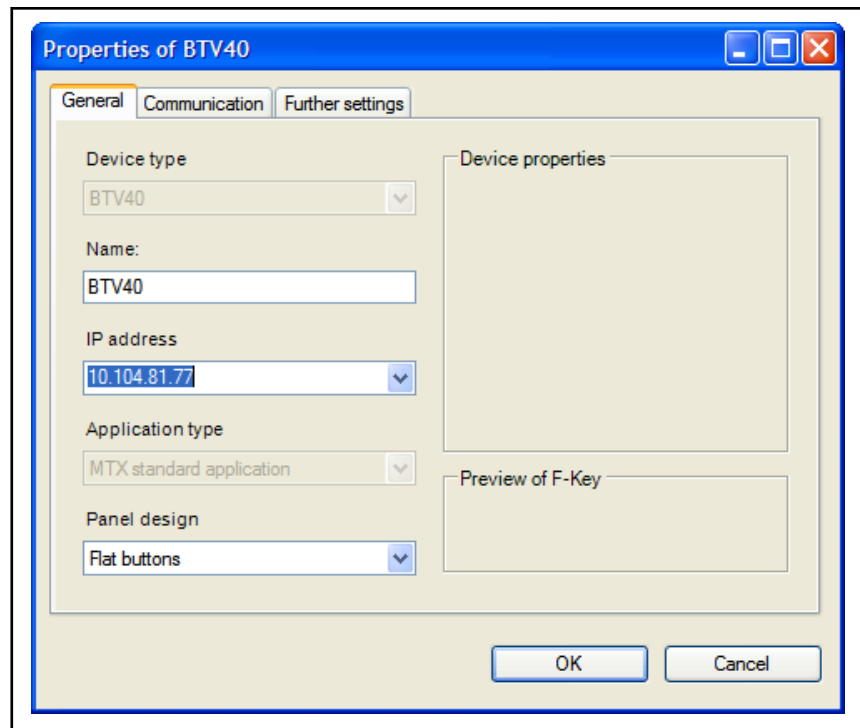


Fig. 6-15: IndraWorks project - dialog "properties"

- Enter the directory for runtime installation of the MTX (normally identical with the installation directory of the MTX).
- Exit the properties dialog using "OK".

IW-Engineering / Project: Activate IndraWorks project

- The IndraWorks project is activated in the main menu at "Project / Activate for operation".

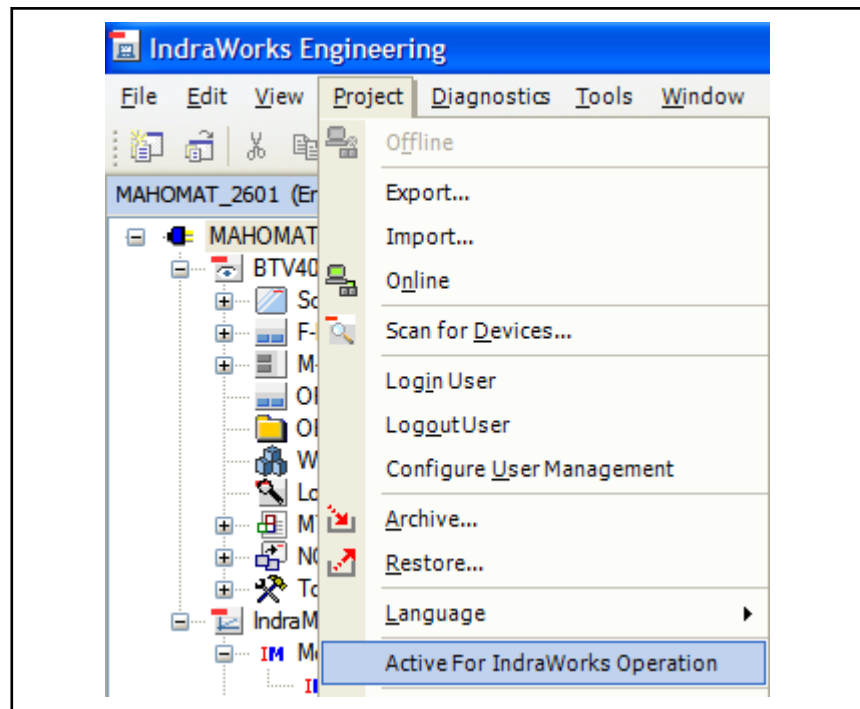


Fig. 6-16: Activate IndraWorks project

- Download the HMI project to the runtime folder by pressing the activate command.
- The IndraWorks project will be shown after the next start of the MTX user interface.

6.2.3 Configuring the NC Kernel

General information

Description

Brief description Restoring the IndraMotion MTX (NC kernel data) control data by using the MTX emulation is described.

The control data can be subdivided as follows:

- Machine parameters
- System data
- Tool tables
- User FEPROM
- RAM file system
- Permanent CPL variables
- Remanent PLC data



The device communication setting have to be adjusted before restoring the control data of a project that has been created on a real control is possible.

Handling instructions: Restoring control data by using the MTX emulation

The handling instructions describes the steps to restore the IndraMotion MTX control data by using the MTX emulation.

An IndraWorks project with a real IndraMotion MTX or an MTX emulation can be the basis.



The only difference between an IndraWorks project with an MTX emulation and a project with a real IndraMotion MTX are the communication settings.

As soon as "localhost" is set as IP address under the communication settings of the **IndraMotion MTX** device, the MTX emulation is used for communication purposes instead of the real IndraMotion MTX.

IW-Engineering / IndraMotion MTX: Adjust the communication settings of the device "IndraMotion MTX".

- Use the right mouse button to click on the device node "IndraMotion MTX". The Property dialog box of the "IndraMotion MTX" device is opened.

Operation in IndraWorks

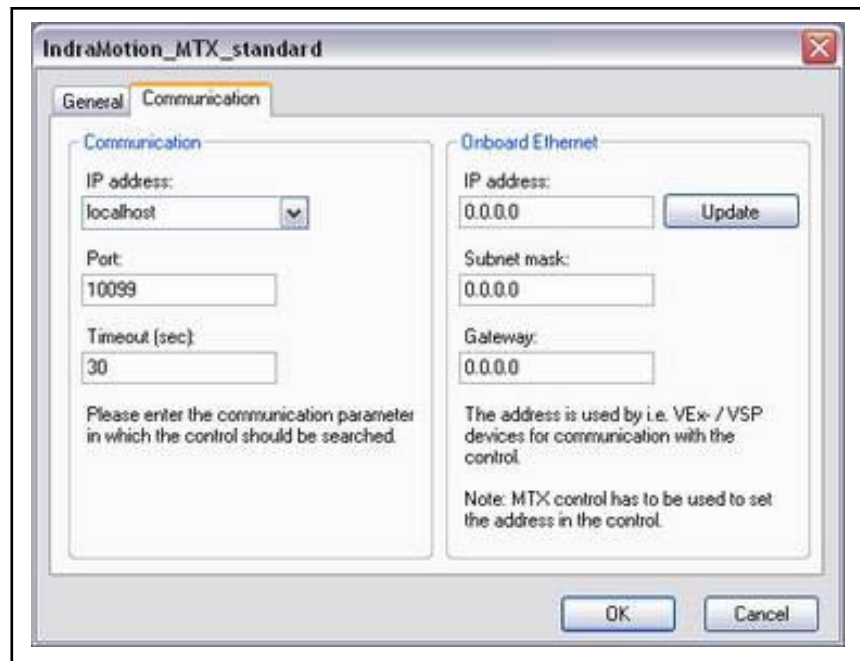


Fig. 6-17: IndraMotion MTX - "Properties" dialog

- Use the left mouse button to select the tab "Communication".
- In the entry field "IP address" select the entry "localhost" and exit the dialog with <OK>.

IW-Engineering / IndraMotion MTX: Restore control data

- Start the IndraMotion MTX emulation via the menu item **Programs** ► **Rexroth** ► **IndraWorks** ► **MTX Emulation** in the Windows start menu (also [chapter 6.2.5 "Starting and stopping the MTX emulation" on page 42](#)).
- Establish connection to the "IndraMotion MTX" device via the **Online switching** context menu.
- Stop the PLC via the menu item **Stop PLC** in the context menu of the **Logic** node below the MTX device node (optionally, the PLC can also be stopped in the "IndraLogic" program).
- Call the menu item **Restore...** in the context menu of the MTX device node.
- Select the desired archive in the "Restore control data archive" dialog and initially only load the data of the "User FEPROM".
- Afterwards, finish IndraWorks Engineering and the emulation.
- Entering "14" in the DOS window finishes the emulation.

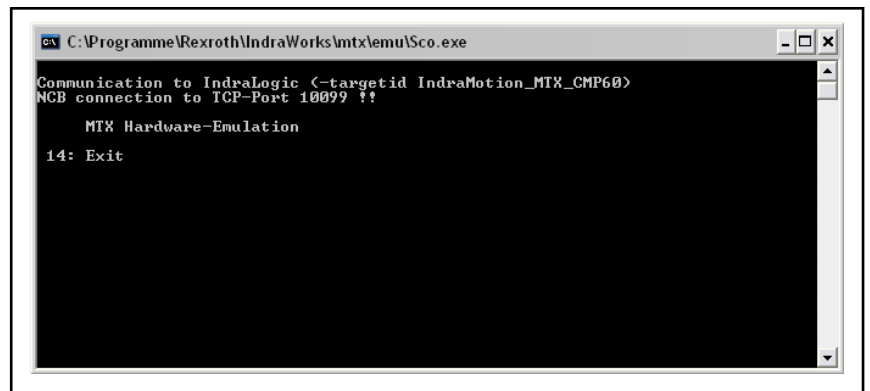


Fig. 6-18: MTX emulation

- Restart the emulation and IndraWorks Engineering (see: [chapter 6.2.5 "Starting and stopping the MTX emulation" on page 42](#)).
- Stop the PLC via the menu item **Stop PLC** in the context menu of the **Logic** node below the MTX device node (optionally, the PLC can also be stopped in the "IndraLogic" program).
- Now, select and reload all NC kernel data, except the data of the user FEPROM already loaded.
- Complete and restart the MTX emulation and IndraWorks Engineering again. Now, the MTX emulation uses the loaded NC kernel data.



Changed data (e.g. configuration parameters, tool data) only become effective when completing the emulation by entering "14" in the DOS window.

Particularities when working with the MTX Emulation

In an MTX emulation, it is not possible to execute an NC restart with a preselected startup mode via IndraWorks. The following section describes how these functions can be executed during the MTX emulation.

Accessing the file system of the MTX emulation

The NC file system of the MTX emulation is accessed, as for a real IndraMotion MTX, via the node "NC file system" below the MTX device node in IndraWorks Engineering.

When closing the MTX emulation by entering "14" in the DOS window, the file system of the MTX emulation is saved in several files on the PC. The RAM file system is saved in the "typ3ram.pxf" file and the user FEPROM in the "t3usrfep.pxf" file.



The file system of the MTX emulation is stored depending on the version in the user directory of the registered Windows user. The directory can be accessed via the link "_LinkToLocalAppData", via the IndraWorks installation directory "e.g. C:\Programs\Rexroth\IndraWorks".

The files are located in the subdirectory "MTX\Emu\".

System restart of the emulation (startup mode 0)

A system restart of the MTX emulation is necessary to apply the changes to, for example, the machine parameters (MACODA).

1. Exit IndraWorks.
2. Complete the MTX emulation by entering "14" in the DOS window. The changed parameters are written to the "typ3ram.pxf" and "t3usrfep.pxf" files on the PC and the changes will become effective upon the next MTX emulation start.

Operation in IndraWorks

Initial program loading (startup mode 6)

3. Restart MTX emulation.
4. Restart IndraWorks.

Executing the procedure of initial program loading, comparable to executing the startup of the real MTX, with startup mode 6 re-creates the RAM file system of the control.



The procedure of initial program loading creates a new root file system. In doing so, all data of the old file system are deleted. If there is an intact user FEPRM file system, the PLC boot project and the configuration data are loaded from this system.

The procedure of initial program loading is necessary to accept changes to the size of the tool database or the structure of the tool data sets for example.

1. If changes have been made to the tool data block, the changes have to be copied to the "usrfep" directory of the NC file system.
2. Exit IndraWorks.
3. Complete the MTX emulation by entering "14" in the DOS window.
4. Delete the RAM file system, i.e. delete the file "typ3ram.pxf" (also see: ["Accessing the file system of the MTX emulation" on page 39](#)).
5. Restart MTX emulation.
6. Restart IndraWorks.

Re-create the user FEPRM file system (startup mode 7)

Re-creating the user FEPRM file system, comparable to executing startup mode 7 of the real MTX, is necessary, if all project-specific data on a control are to be deleted or if the user FEPRM file system is damaged.



Re-creating the user FEPRM file system results in re-creating the user FEPRM. In doing so, all data of the old file system are deleted. The root file system is retained. The permanent CPL variables are deleted.

1. Exit IndraWorks.
2. Complete the MTX emulation by entering "14" in the DOS window.
3. Delete the user FEPRM file system, i.e. delete the file "t3usrfep.pxf". ["Accessing the file system of the MTX emulation" on page 39](#)).
4. Restart MTX emulation.
5. Restart IndraWorks.

6.2.4 Configuring the PLC

General information

Description

Short description

At first you have to change the communication settings of the PLC project, if the IndraWorks PLC project is from the real control or if IndraWorks previously has been installed in a directory deviating from the active version. Afterwards, the PLC project can be activated.

Handling instructions: Restoring the PLC project

These handling instructions describe the steps for starting up the PLC project that already ran on a real control.

IW-Engineering / Logic: Restore PLC project

Operation in IndraWorks

- Select the node "IndraMotion MTX P90\Logic" and start the "Properties" dialog using the right mouse button.
- In the "Properties" dialog select the tab "Communication settings".

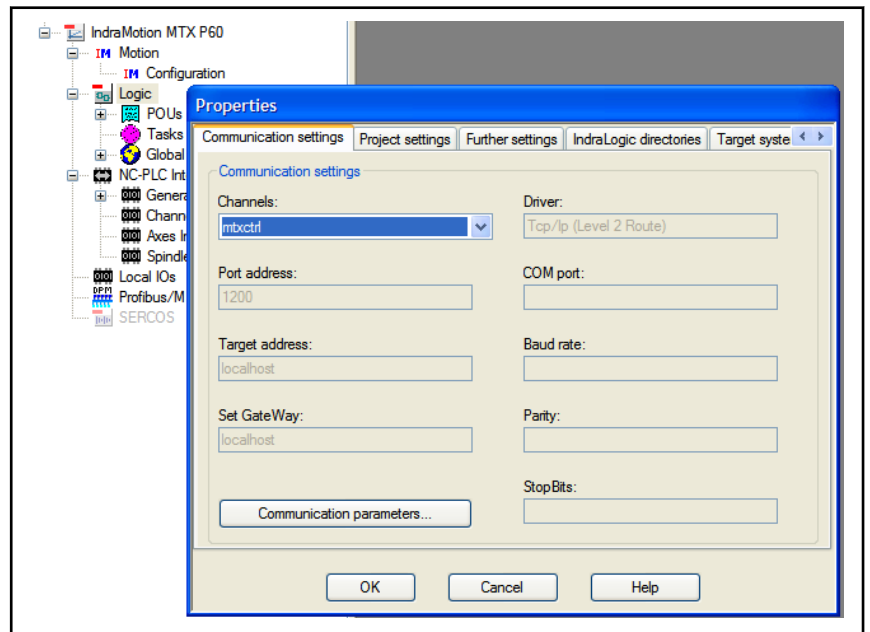


Fig. 6-19: Communication parameters of the PLC

- Press the button "Communication parameters". This opens the dialog "Communication parameters".
- Conduct the settings shown in the following figure in the dialog "Communication parameters" and confirm by pressing "OK". If required, the existing old settings have to be deleted.

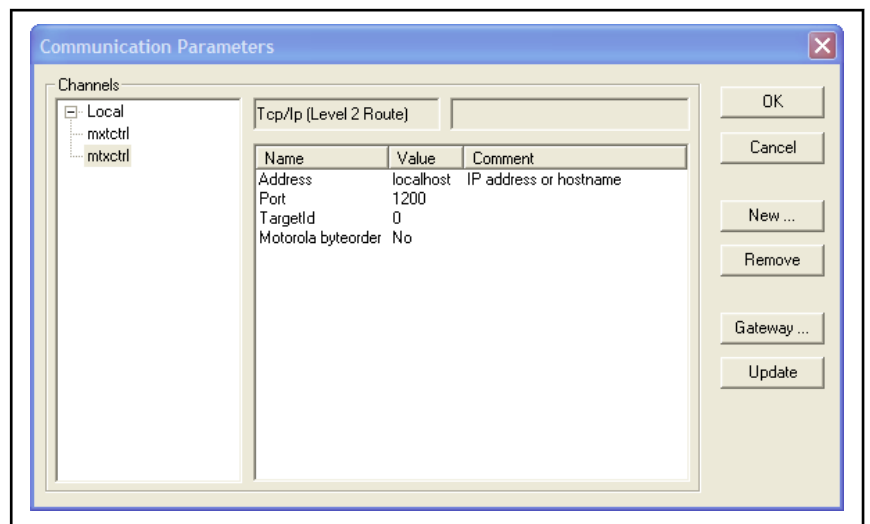


Fig. 6-20: Settings in the dialog "Communication parameters"

- In the dialog "Properties" (see above) open the tab "IndraLogic directories" and adapt the directory information to the installation directories of the emulation, if necessary. Only one directory information may be stored.

Operation in IndraWorks

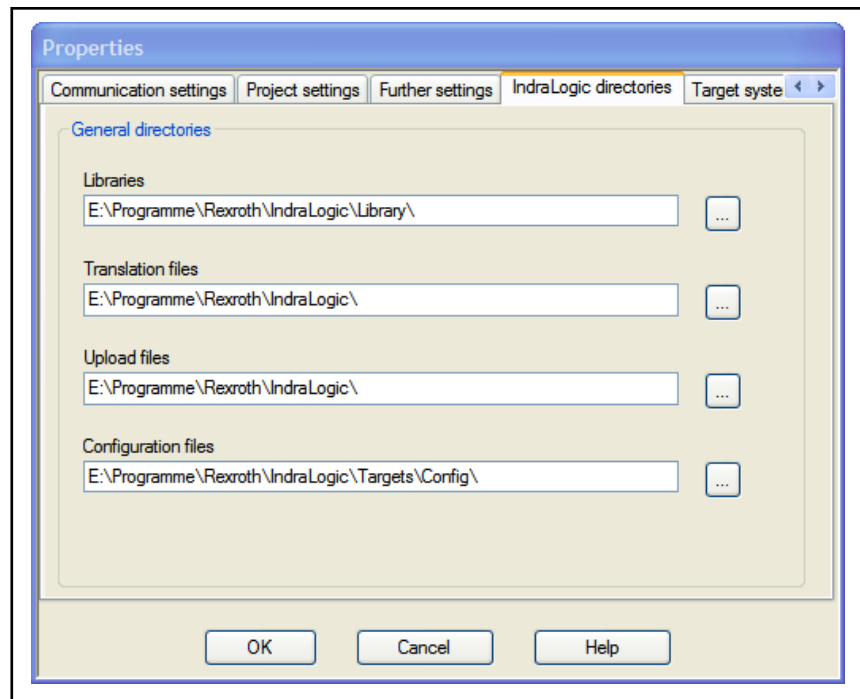


Fig. 6-21: Settings in the dialog "Properties/directories"

- Exit the properties dialog by pressing "OK".
- In IndraWorks use the right mouse button to click on the node "Logic" and execute the command "Update". Now, the IndraLogic project is set to the "Emulation" and may be restarted.
- Start IndraLogic by double clicking on the node "Logic" and translate and download the PLC project.

Figure	Flowchart	Example	Instruction	Documentation
Documentation:	IndraLogic system description		Working with projects	

Tab. 6-2: Reference

6.2.5 Starting and stopping the MTX emulation

General information

Description	
Brief description	The MTX emulation comprises both the NC kernel and the PLC that are started and stopped together. For this purpose, a Windows application is available. The Windows functionality during runtime can be checked via a DOS window. A system restart of the MTX emulation is required to, e.g. apply the changes made to the tool data or the configuration data (also see chapter "Particularities when working with the MTX Emulation" on page 39).
Basic conditions	The MTX emulation always has to be started before starting to work with IndraWorks Engineering (configuration interface) and IndraMotion MTX user interface.
Handling instructions: Start the MTX emulation	
These handling instructions describe how to start the MTX emulation (CNC and PLC).	
Windows: Start the MTX emulation	

Operation in IndraWorks

- Start the MTX emulation via the menu item **Programs ▶ Rexroth ▶ IndraWorks ▶ MTX Emulation** in the Windows start menu.
- Proper startup of the MTX emulation may be identified when looking at the feedback according to the following figure.

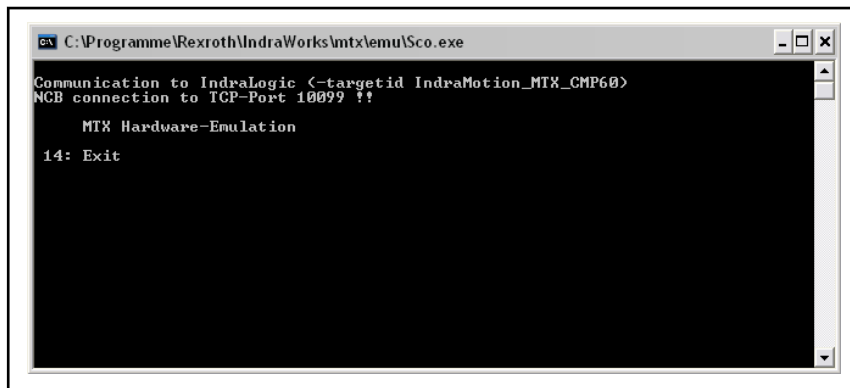


Fig. 6-22: Start MTX emulation



The MTX emulation always has to be started before starting to work with IndraWorks Engineering and IndraMotion MTX.

Handling instructions: Stopping the MTX emulation

These handling instructions describe how to stop the MTX emulation (CNC and PLC).

Windows: Start the MTX emulation

- Entering MTX emulation is completed by entering "14" in the DOS window.

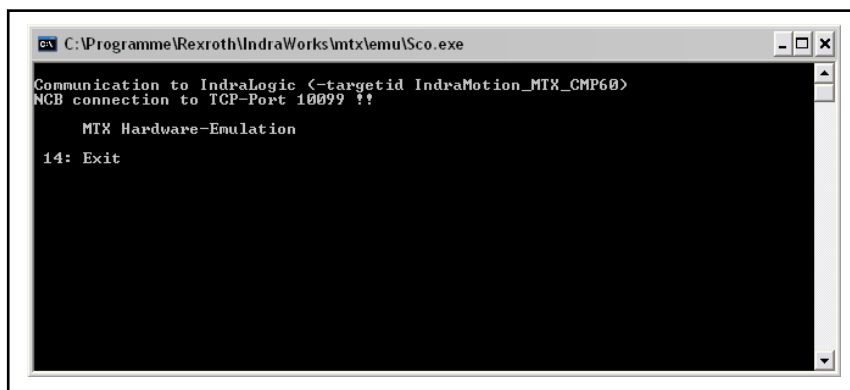


Fig. 6-23: Stop the MTX emulation



Changed data (e.g. machine parameters or tool data) are saved only when finishing the emulation by entering "14" in the DOS window.

Handling instructions: System restart of the MTX emulation

The content of the handling instructions constitute in the description of the MTX emulation restart (CNC and PLC). A system restart of the MTX emulation is required to e.g. apply changed machine data.example.

Windows: Restart the MTX emulation

- Close IndraWorks Engineering and/or IndraWorks Operation.

Operation in IndraWorks

- Complete the MTX emulation by entering "14" in the DOS window. Writing the files of the RAM file system "typ3ram.pxf" and the user FEPROM "t3usrfep.pxf" saves the changed parameters to the PC and the changes will become effective when starting the MTX emulation the next time.
- Restart MTX emulation.
- Restart IndraWorks Engineering and/or IndraWorks Operation.



Changed data (e.g. MACODA, tool data) only become effective when finishing the MTX emulation by entering "14" in the DOS window!

6.2.6 Starting the Operation desktop

Short description The MTX user interface is started as for a real application. A link is created on the desktop when installing the MTX emulation ("IndraWorks HMI").

7 Communication - SCP

The SCP (**S**calable **C**ommunication **P**latform) is the standardized IndraWorks communication platform. Any communication between Bosch Rexroth products, e.g. between the virtual control panel and the PLC, is executed via SCP.

Between the virtual control panel and the PLC the data are exchanged via SCP items consisting of the names of the PLC variables and starting with PLC.Pvl, **PLC variable name**.

More detailed Information can be found in the SCP documentation.

8 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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