

Rexroth IndraMotion MLC 12VRS Commissioning

R911333858

Edition 01

Commissioning Manual



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1 About this Documentation

1.1 Validity of the Documentation

	It describes tasks frequently performed while commissioning a machine. Hardware exchange and diagnostics are also described in detail.
Target group	This documentation is addressed to those who commission systems. It describes the steps required for commissioning and performing service on the IndraMotion MLC system. It includes checklists for tasks to be frequently performed and a detailed description of the steps.
	 It is not designed for project planning or development.
Application phases	This documentation supports the user in the following phases: • commissioning • operating and programming • maintenance • troubleshooting

1.2 Structure of the Documentation

The first part contains important safety instructions and instructions on use ([chapter 2 "Important Instructions on Use" on page 15](#) and [chapter 3 "Safety Instructions for Electric Drives and Controls" on page 17](#)).

The second part "[Checklists](#)", [starting on page 29](#) contains a list of the work frequently performed during commissioning and service.

The checklists are categorized as follows:

- commissioning
- Hardware exchange and
- Diagnostics

Each of these checklists is described based on the prerequisites and a list of steps. For purposes of clarity, the lists of steps have been kept short. For most of the steps there are references to the second section of the document. The exact procedure is described there.

The third part of the document, "[Step Description](#)", [starting on page 43](#), contains a precise description of the individual steps in the procedure and additional information and boundary conditions. This section can also be used as a general informational reference for commissioning.

The fourth part presents diagnostic possibilities using IndraWorks, "[Diagnostics](#)", [starting on page 175](#), hardware diagnostics (e.g. using the control display or LEDs,...) and the web-based diagnostic tool IMST "[Diagnostics in the IMST](#)", [starting on page 209](#). This section of the documentation describes the various possibilities for localizing and diagnosing errors that occur for those involved in commissioning.

Chapter "[Service and Support](#)", [page 223](#) provides information on the customer service helpdesk.

About this Documentation

1.3 Required and Supplementing Documentations

Documentation titles with type designation codes and parts numbers

IndraWorks		MLC	XLC
/36/	Rexroth IndraWorks 12VRS Software Installation DOK-IWORKS-SOFTINS*V12-COxx-EN-P, R911334396 This documentation describes the IndraWorks installation.	X	X
/5/	Rexroth IndraWorks 12VRS Engineering DOK-IWORKS-ENGINEE*V12-APxx-EN-P, R911334388 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.	X	X
/20/	Rexroth IndraMotion MLC 12VRS Functional Description DOK-MLC***-FUNC****V12-APxx-EN-P, R911333848 This documentation describes wizards, context menus, dialogs, control commissioning, device configuration and functionalities of the IndraMotion MLC.	X	
/20/	Rexroth IndraLogic XLC 12VRS Functional Description DOK-XLC***-FUNC****V12-APxx-EN-P, R911333878 This documentation describes wizards, context menus, dialogs, control commissioning, device configuration and functionalities of the IndraLogic XLC.		X
/7/	Rexroth IndraWorks 12VRS CamBuilder DOK-IWORKS-CAMBUIL*V12-APxx-EN-P, R911333842 This documentation describes the basic principles and operation of the CamBuilder, the cam editing tool.	X	X
/37/	Rexroth IndraLogic XLC IndraMotion MLC 12VRS Automation Interface DOK-XLCMLC-AUT*INT*V12-APxx-EN-P, R911334178 This documentation describes the script-based access to IndraWorks project data via the interface of the Automation Interface.	X	X
/38/	Rexroth IndraWorks 12VRS FDT Container DOK-IWORKS-FDT*CON*V12-APxx-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.	X	X
/29/	Rexroth IndraLogic XLC IndraMotion MLC 12VRS Project Conversion DOK-XLCMLC-PROCONV*V12-APxx-EN-P, R911334187 This documentation described the project conversion of IndraLogic 04VRS and IndraMotion MLC04VRS on IndraWorks Version 12 with IndraLogic 2G. It especially focuses on changes in the field of Motion and PLC.	X	X
/28/	Rexroth IndraMotion MLC 12VRS Commissioning DOK-MLC***-STARTUP*V12-COxx-EN-P, R911333858 This documentation describes the steps required for commissioning and performing service on the IndraMotion MLC system. It includes checklists for tasks to be frequently performed and a detailed description of the steps.	X	

About this Documentation

Motion		MLC	XLC
/23/	Rexroth IndraLogic XLC IndraMotion MLC 12VRS PLCopen Libraries DOK-XLCMLC-FUNLIB**V12-LIxx-EN-P, R911334182 This documentation describes the function blocks, functions and data types of the RIL_CommonTypes, ML_Base and ML_PLCopen libraries for the IndraLogic XLC/IndraMotion MLC. It also includes the error reactions of function blocks.	X	X
/27/	Rexroth IndraLogic XLC IndraMotion MLC 12VRS Generic Application Template DOK-XLCMLC-TF*GAT**V12-APxx-EN-P, R911334191 This documentation provides a structured template to the IndraLogic PLC programmer. This template can be used to add and edit the PLC programming code. It includes the template, the template wizard and example applications.	X	X
/31/	Rexroth IndraMotion MLC 12VRS RCL Programming Instruction DOK-MLC***-RCL*PRO*V12-APxx-EN-P, R911333852 This documentation provides information on the RobotControl. It is given most importance to the programming language RCL (RobotControl Language). The program structure, variables, functions, motion statements and the required system parameters are described.	X	
/21/	Rexroth IndraLogic XLC IndraMotion MLC 12VRS Parameters DOK-XLCMLC-PARAM***V12-RExx-EN-P, R911334176 This documentation describes the parameters of the XLC/MLC systems as well as the interaction between parameterization and programming. It includes the axis parameters, control parameters, kinematic parameters, touch probe parameters and programmable limit switch parameters.	X	X
/10/	Rexroth IndraDrive; Firmware for Drive Controllers MPH, MPB, MPD, MPC-07 DOK-INDRV*-MP*-07VRS**-FKxx-EN-P, R911328670		
/11/	Rexroth IndraDrive MPx-16 Functions DOK-INDRV*-MP*-16VRS**-APxx-EN-P, R911326767		

Field buses		MLC	XLC
/39/	Rexroth IndraMotion MLC 11VRS PLCopen Field Bus DOK-IM*ML*-PLCFBUS*V11-APxx-EN-P, R911333896 This documentation describes the creation of field bus drives in an IndraWorks project, function blocks, functions and data types of the libraries RIL_CommonTypes.library (excerpt for field bus drives), RMB_PLCopenFieldBus.library, RIL_Uilities.library (excerpt for field bus drives). It also includes the error reactions of function blocks.	X	X
/4/	Rexroth IndraLogic XLC IndraMotion MLC 12VRS Field Buses DOK-XLCMLC-FB*****V12-APxx-EN-P, R911334394 This documentation describes the supported field buses and their diagnostic function blocks.	X	X

HMI		MLC	XLC
/8/	Rexroth IndraWorks 12VRS HMI DOK-IWORKS-HMI*****V12-APxx-EN-P, R911334392 This documentation describes the functions, configuration and operation of the user interfaces IndraWorks HMI Engineering and IndraWorks HMI Operation.	X	X

About this Documentation

/6/	Rexroth IndraWorks 12VRS WinStudio DOK-IWORKS-WINSTUD*V12-APxx-EN-P, R911333844 This documentation describes the installation of the software, working with WinStudio and the creation and operation of applications.	X	X
/50/	Rexroth IndraLogic XLC IndraMotion MLC 12VRS HMI Connection DOK-XLCMLC-HMI*****V12-APxx-EN-P, R911334184 This documentation describes the visualization systems supported by the IndraLogic XLC and IndraMotion MLC and their connection.	X	X

PLC		MLC	XLC
/3/	Rexroth IndraWorks 12VRS IndraLogic 2G Programming Instruction DOK-IWORKS-IL2GPRO*V12-APxx-EN-P, R911334390 This documentation describes the PLC programming tool IndraLogic 2G and its usage. It includes the basic usage, first steps, visualization, menu items and editors.	X	X
/33/	Rexroth IndraWorks 12VRS, Basic Libraries, IndraLogic 2G DOK-IL*2G*-BASLIB**V12-LIxx-EN-P, R911333835 This documentation describes the system-comprehensive PLC libraries.	X	X

Technology			
/30/	Rexroth IndraMotion MLC 12VRS Technology Libraries DOK-MLC***-TF*LIB**V12-LIxx-EN-P, R911333868 This documentation describes the function blocks, functions and data types of the libraries "ML_TechInterface.library", "ML_TechMotion.library", "RMB_TechCam.library" and "ML_TechBase.library". It also includes libraries for the winder functionality, register controller functionality and CrossCutter functionality.	X	
/60/	Rexroth IndraMotion MLC 12VRS RegisterControl (Library) DOK-MLC***-REGI*CO*V12-LIxx-EN-P, R911333856 This documentation describes the inputs and outputs of the individual function blocks and provides notes on their usage.	X	
/62/	Rexroth IndraMotion MLC 12VRS RegisterControl (Application Manual) DOK-MLC***-REGI*CO*V12-APxx-EN-P, R911333854 This documentation describes the application of the integrated register control for a rotogravure printing machine. The components of the mark stream sensor, the HMI application and the error recovery options are described. This instruction provides information on how to operate the register control, react on errors and query diagnostics. This documentation is written for machine setters and machine operators.	X	
/49/	Rexroth IndraMotion MLC 12VRS Application of Winder Functions DOK-MLC***-TF*WIND*V12-APxx-EN-P, R911333870 This application-related system documentation describes the usage of the winder technology functions.	X	

Hardware		MLC	XLC
/1/	Rexroth IndraControl L45/L65 DOK-CONTRL-IC*L45*L65*-PRxx-EN-P, R911324661	X	X
/2/	Rexroth IndraControl L25 DOK-CONTRL-IC*L25*****-PRxx-EN-P, R911328474	X	X

About this Documentation

/24/	Rexroth IndraControl Lxx 12VRS Function Modules DOK-CTRL-FM*LXX**V12-APxx-EN-P, R911333830 This documentation describes all function modules of the Lxx controls including engineering and diagnostics.	X	X
/12/	Rexroth IndraDrive Drive Controllers MPx-02 to MPx-07 DOK-INDRV*-GEN-**VRS**-PAxx-EN-P, R911297317		
/13/	Rexroth IndraDrive MPx-02 to MPx-07 and HMV DOK-INDRV*-GEN-**VRS**-WAxx-EN-P, R911297319		
/35/	Rexroth IndraDrive Drive Controller Control Sections CSB01, CSH01, CDB01 DOK-INDRV*-CSH*****-PR08-EN-P, R911295012		

Diagnostics and Service		MLC	XLC
/26/	Rexroth IndraMotion MLC/XLC 11VRS Service Tool DOK-IM*ML*-IMST***V11-RExx-EN-P, R911331940	X	X
/22/	Rexroth IndraLogic XLC IndraMotion MLC 12VRS Diagnostics DOK-XLCMLC-DIAG***V12-RExx-EN-P, R911334180 This documentation includes all control parameters implemented in the control systems IndraLogic XLC and IndraMotion MLC.	X	X

System Overview		MLC	XLC
/48/	Rexroth IndraMotion for Printing 12VRS System Overview DOK-IM*PR*-SYSTEM**V11-PRxx-EN-P, R911333840 This documentation describes the product IndraMotion for Packaging. It introduces the control systems, drive systems and I/O systems as well as the commissioning and programming.	X	
/48/	Rexroth IndraMotion for Packaging 12VRS System Overview DOK-IM*PA*-SYSTEM**V12-PRxx-EN-P, R911333838 This documentation describes the product IndraMotion for Packaging. It introduces the control systems, drive systems and I/O systems as well as the commissioning and programming.	X	
/9/	Rexroth IndraMotion MLC 12VRS System Overview DOK-MLC***-SYSTEM**V12-PRxx-EN-P, R911333860 This documentation provides an overview on the possible hardware/software components of the automation system IndraMotion MLC of the named version. It helps assembling a system.	X	
/9/	Rexroth IndraLogic XLC 12VRS System Overview DOK-XLC***-SYSTEM**V12-PRxx-EN-P, R911333880 This documentation provides an overview on the possible hardware/software components of the automation system IndraLogic XLC of the named version. It helps assembling a system.		X

About this Documentation

First Steps		MLC	XLC
/25/	Rexroth IndraMotion MLC 12VRS First Steps DOK-MLC***-F*STEP**V12-COxx-EN-P, R911333846 This documentation describes the first steps of the IndraMotion MLC and the RobotControl. It includes the hardware and software prerequisites as well as the creation of a project.	X	
/25/	Rexroth IndraLogic XLC 12VRS First Steps DOK-XLC***-F*STEP**V12-COxx-EN-P, R911333876 This documentation describes the first steps of the IndraLogic XLC. It includes the hardware and software prerequisites as well as the creation of a project.		X

xx Respective edition
Fig. 1-1: XCL/MLC documentation overview

1.4 Information Representation

1.4.1 Safety Instructions

The safety instructions available in the user documentations contain certain signal words ("Danger", "Warning", "Caution", "Notice") and a signal alert symbols if necessary (acc. to ANSI Z535.6-2006).

The signal word should focus the attention on the safety instructions and designates the severity of the hazard.

The signal alert symbol (warning triangle with exclamation mark) located in front of the signal words "Danger", "Warning" and "Caution" indicates hazards for individuals.

The safety notes are represented as follows:

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 **could** occur.

CAUTION

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

NOTICE

In case of non-compliance with this safety instruction, property damages can occur.

1.4.2 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.

1.4.3 Names and Abbreviations

Term	Explanation
IEC	International Electrotechnical Commission
SERCOS	(SErial Realtime COmmunication System) interface is a worldwide standardized digital interface to communicate between controls and drives (IEC 61491 and EN 61491)
FDT	Field Device Tool It is a manufacturer-comprehensive concept in automation technology allowing parameterization of field devices of different manufacturers with only one program
DTM	Device Type Manager It is a manufacturer-comprehensive concept in automation technology allowing parameterization of field devices of different manufacturers with only one program
HTML	The Hypertext Markup Language (HTML), also often called hypertext, is a text-based markup language to structure contents such as texts, images, hyperlinks in documents
XML	Extensible Markup Language (XML). It is a markup language to represent hierarchical structured data as text data
Internet Browser	Web browsers - or only browsers - are special computer programs developed to represent websites in the World Wide Web or - more generally - documents and data

Fig. 1-2: Names and abbreviations used

2 Important Instructions on Use

2.1 Appropriate Use

2.1.1 Introduction

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

The products may only be used in the appropriate way. If they are not used in the appropriate way, situations resulting in property damage and personal injury can occur.



Bosch Rexroth as manufacturer is not liable for any damages resulting from inappropriate use. In such cases, the guarantee and the right to payment of damages resulting from inappropriate use are forfeited. The user alone carries all responsibility of the risks.

Before using Rexroth products, make sure that all the pre-requisites for an appropriate use of the products are satisfied:

- Personnel that in any way, shape or form uses our products must first read and understand the relevant safety instructions and be familiar with appropriate use.
- If the products take the form of hardware, then they must remain in their original state, in other words, no structural changes are permitted. It is not permitted to decompile software products or alter source codes.
- Do not mount damaged or faulty products or use them in operation.
- Ensure that the products have been installed in the manner described in the relevant documentation.

2.1.2 Areas of Use and Application

Rexroth IndraMotion MLC

IndraMotion MLC and its function modules are intended for Motion/Logic applications.



The IndraMotion MLC and its function modules may only be used with the accessories and mounting parts listed in this documentation. Components that are not expressly mentioned must neither be attached nor connected. The same is valid for cables and lines.

The operation must only be carried out with the hardware component configurations and combinations that were expressly mentioned and with the software and firmware indicated and specified in the respective documentations and functional descriptions.

IndraMotion MLC and its function modules have been developed for use in single and multi-axis drive and control tasks.

For the application-specific use of the machine operating and visualization terminals, device models featuring different equipments and different interfaces are available.

Typical scopes of use where IndraMotion MLC and its function modules can be applied are:

- [Handling and mounting systems]
- [Packaging and food machines]
- [Printing and paper-processing machines]

Important Instructions on Use

Rexroth IndraMotion MLC and the function modules must only be operated under the mounting and installation conditions, the position, and the ambient conditions (temperature, type of protection, moisture, EMC, etc.) specified in the related documentations.

2.2 Inappropriate Use

The use of Rexroth IndraMotion MLC and its function modules in applications other than those specified or described in the documentation and the technical data is considered as "improper".

The Rexroth IndraMotion MLC and its function modules may not be used if it is

- exposed to operating conditions which do not correspond to the specified ambient conditions. Operation under water, extreme temperature fluctuations or extreme maximum temperatures etc. is prohibited.
- Furthermore, the IndraMotion MLC and its function modules must not be used in any applications not expressly approved by Bosch Rexroth. Therefore, read the statements given in the general safety instructions!

3 Safety Instructions for Electric Drives and Controls

3.1 Definitions of Terms

Application Documentation	Application documentation comprises the entire documentation used to inform the user of the product about the use and safety-relevant features for configuring, integrating, installing, mounting, commissioning, operating, maintaining, repairing and decommissioning the product. The following terms are also used for this kind of documentation: User Guide, Operation Manual, Commissioning Manual, Instruction Manual, Project Planning Manual, Application Manual, etc.
Component	A component is a combination of elements with a specified function, which are part of a piece of equipment, device or system. Components of the electric drive and control system are, for example, supply units, drive controllers, mains choke, mains filter, motors, cables, etc.
Control System	A control system comprises several interconnected control components placed on the market as a single functional unit.
Device	A device is a finished product with a defined function, intended for users and placed on the market as an individual piece of merchandise.
Electrical Equipment	Electrical equipment encompasses all devices used to generate, convert, transmit, distribute or apply electrical energy, such as electric motors, transformers, switching devices, cables, lines, power-consuming devices, circuit board assemblies, plug-in units, control cabinets, etc.
Electric Drive System	An electric drive system comprises all components from mains supply to motor shaft; this includes, for example, electric motor(s), motor encoder(s), supply units and drive controllers, as well as auxiliary and additional components, such as mains filter, mains choke and the corresponding lines and cables.
Installation	An installation consists of several devices or systems interconnected for a defined purpose and on a defined site which, however, are not intended to be placed on the market as a single functional unit.
Machine	A machine is the entirety of interconnected parts or units at least one of which is movable. Thus, a machine consists of the appropriate machine drive elements, as well as control and power circuits, which have been assembled for a specific application. A machine is, for example, intended for processing, treatment, movement or packaging of a material. The term "machine" also covers a combination of machines which are arranged and controlled in such a way that they function as a unified whole.
Manufacturer	The manufacturer is an individual or legal entity bearing responsibility for the design and manufacture of a product which is placed on the market in the individual's or legal entity's name. The manufacturer can use finished products, finished parts or finished elements, or contract out work to subcontractors. However, the manufacturer must always have overall control and possess the required authority to take responsibility for the product.
Product	Examples of a product: Device, component, part, system, software, firmware, among other things.
Project Planning Manual	A project planning manual is part of the application documentation used to support the sizing and planning of systems, machines or installations.
Qualified Persons	In terms of this application documentation, qualified persons are those persons who are familiar with the installation, mounting, commissioning and operation of the components of the electric drive and control system, as well as with the hazards this implies, and who possess the qualifications their work requires. To comply with these qualifications, it is necessary, among other things,

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- 1) to be trained, instructed or authorized to switch electric circuits and devices safely on and off, to ground them and to mark them
- 2) to be trained or instructed to maintain and use adequate safety equipment
- 3) to attend a course of instruction in first aid

User A user is a person installing, commissioning or using a product which has been placed on the market.

3.2 General Information

3.2.1 Using the Safety Instructions and Passing Them on to Others

Do not attempt to install and operate the components of the electric drive and control system without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation prior to working with these components. If you do not have the user documentation for the components, contact your responsible Bosch Rexroth sales partner. Ask for these documents to be sent immediately to the person or persons responsible for the safe operation of the components.

If the component is resold, rented and/or passed on to others in any other form, these safety instructions must be delivered with the component in the official language of the user's country.

Improper use of these components, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, could result in property damage, injury, electric shock or even death.

3.2.2 Requirements for Safe Use

Read the following instructions before initial commissioning of the components of the electric drive and control system in order to eliminate the risk of injury and/or property damage. You must follow these safety instructions.

- Bosch Rexroth is not liable for damages resulting from failure to observe the safety instructions.
- Read the operating, maintenance and safety instructions in your language before commissioning. If you find that you cannot completely understand the application documentation in the available language, please ask your supplier to clarify.
- Proper and correct transport, storage, mounting and installation, as well as care in operation and maintenance, are prerequisites for optimal and safe operation of the component.
- Only qualified persons may work with components of the electric drive and control system or within its proximity.
- Only use accessories and spare parts approved by Bosch Rexroth.
- Follow the safety regulations and requirements of the country in which the components of the electric drive and control system are operated.
- Only use the components of the electric drive and control system in the manner that is defined as appropriate. See chapter "Appropriate Use".
- The ambient and operating conditions given in the available application documentation must be observed.
- Applications for functional safety are only allowed if clearly and explicitly specified in the application documentation "Integrated Safety Technology". If this is not the case, they are excluded. Functional safety is a safety

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concept in which measures of risk reduction for personal safety depend on electrical, electronic or programmable control systems.

- The information given in the application documentation with regard to the use of the delivered components contains only examples of applications and suggestions.

The machine and installation manufacturers must

- make sure that the delivered components are suited for their individual application and check the information given in this application documentation with regard to the use of the components,
- make sure that their individual application complies with the applicable safety regulations and standards and carry out the required measures, modifications and complements.
- Commissioning of the delivered components is only allowed once it is sure that the machine or installation in which the components are installed complies with the national regulations, safety specifications and standards of the application.
- Operation is only allowed if the national EMC regulations for the application are met.
- The instructions for installation in accordance with EMC requirements can be found in the section on EMC in the respective application documentation.

The machine or installation manufacturer is responsible for compliance with the limit values as prescribed in the national regulations.

- The technical data, connection and installation conditions of the components are specified in the respective application documentations and must be followed at all times.

National regulations which the user must take into account

- European countries: In accordance with European EN standards
- United States of America (USA):
 - National Electrical Code (NEC)
 - National Electrical Manufacturers Association (NEMA), as well as local engineering regulations
 - Regulations of the National Fire Protection Association (NFPA)
- Canada: Canadian Standards Association (CSA)
- Other countries:
 - International Organization for Standardization (ISO)
 - International Electrotechnical Commission (IEC)

3.2.3 Hazards by Improper Use

- High electrical voltage and high working current! Danger to life or serious injury by electric shock!
- High electrical voltage by incorrect connection! Danger to life or injury by electric shock!
- Dangerous movements! Danger to life, serious injury or property damage by unintended motor movements!
- Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electric drive systems!
- Risk of burns by hot housing surfaces!

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- Risk of injury by improper handling! Injury by crushing, shearing, cutting, hitting!
- Risk of injury by improper handling of batteries!
- Risk of injury by improper handling of pressurized lines!

3.3 Instructions with Regard to Specific Dangers

3.3.1 Protection Against Contact With Electrical Parts and Housings



This section concerns components of the electric drive and control system with voltages of **more than 50 volts**.

Contact with parts conducting voltages above 50 volts can cause personal danger and electric shock. When operating components of the electric drive and control system, it is unavoidable that some parts of these components conduct dangerous voltage.

High electrical voltage! Danger to life, risk of injury by electric shock or serious injury!

- Only qualified persons are allowed to operate, maintain and/or repair the components of the electric drive and control system.
- Follow the general installation and safety regulations when working on power installations.
- Before switching on, the equipment grounding conductor must have been permanently connected to all electric components in accordance with the connection diagram.
- Even for brief measurements or tests, operation is only allowed if the equipment grounding conductor has been permanently connected to the points of the components provided for this purpose.
- Before accessing electrical parts with voltage potentials higher than 50 V, you must disconnect electric components from the mains or from the power supply unit. Secure the electric component from reconnection.
- With electric components, observe the following aspects:
Always wait **30 minutes** after switching off power to allow live capacitors to discharge before accessing an electric component. Measure the electrical voltage of live parts before beginning to work to make sure that the equipment is safe to touch.
- Install the covers and guards provided for this purpose before switching on.
- Never touch electrical connection points of the components while power is turned on.
- Do not remove or plug in connectors when the component has been powered.
- Under specific conditions, electric drive systems can be operated at mains protected by residual-current-operated circuit-breakers sensitive to universal current (RCDs/RCMs).
- Secure built-in devices from penetrating foreign objects and water, as well as from direct contact, by providing an external housing, for example a control cabinet.

High housing voltage and high leakage current! Danger to life, risk of injury by electric shock!

- Before switching on and before commissioning, ground or connect the components of the electric drive and control system to the equipment grounding conductor at the grounding points.

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- Connect the equipment grounding conductor of the components of the electric drive and control system permanently to the main power supply at all times. The leakage current is greater than 3.5 mA.
- Establish an equipment grounding connection with a minimum cross section according to the table below. With an outer conductor cross section smaller than 10 mm² (8 AWG), the alternative connection of two equipment grounding conductors is allowed, each having the same cross section as the outer conductors.

Cross section outer conductor	Minimum cross section equipment grounding conductor Leakage current ≥ 3.5 mA	
	1 equipment grounding conductor	2 equipment grounding conductors
1.5 mm ² (16 AWG)	10 mm ² (8 AWG)	2 × 1.5 mm ² (16 AWG)
2.5 mm ² (14 AWG)		2 × 2.5 mm ² (14 AWG)
4 mm ² (12 AWG)		2 × 4 mm ² (12 AWG)
6 mm ² (10 AWG)		2 × 6 mm ² (10 AWG)
10 mm ² (8 AWG)		-
16 mm ² (6 AWG)	16 mm ² (6 AWG)	-
25 mm ² (4 AWG)		-
35 mm ² (2 AWG)		-
50 mm ² (1/0 AWG)	25 mm ² (4 AWG)	-
70 mm ² (2/0 AWG)	35 mm ² (2 AWG)	-
...	...	...

Fig. 3-1: Minimum Cross Section of the Equipment Grounding Connection

3.3.2 Protective Extra-Low Voltage as Protection Against Electric Shock

Protective extra-low voltage is used to allow connecting devices with basic insulation to extra-low voltage circuits.

On components of an electric drive and control system provided by Bosch Rexroth, all connections and terminals with voltages between 5 and 50 volts are PELV ("Protective Extra-Low Voltage") systems. It is allowed to connect devices equipped with basic insulation (such as programming devices, PCs, notebooks, display units) to these connections.

Danger to life, risk of injury by electric shock! High electrical voltage by incorrect connection!

If extra-low voltage circuits of devices containing voltages and circuits of more than 50 volts (e.g., the mains connection) are connected to Bosch Rexroth products, the connected extra-low voltage circuits must comply with the requirements for PELV ("Protective Extra-Low Voltage").

3.3.3 Protection Against Dangerous Movements

Dangerous movements can be caused by faulty control of connected motors. Some common examples are:

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- Improper or wrong wiring or cable connection
- Operator errors
- Wrong input of parameters before commissioning
- Malfunction of sensors and encoders
- Defective components
- Software or firmware errors

These errors can occur immediately after equipment is switched on or even after an unspecified time of trouble-free operation.

The monitoring functions in the components of the electric drive and control system will normally be sufficient to avoid malfunction in the connected drives. Regarding personal safety, especially the danger of injury and/or property damage, this alone cannot be relied upon to ensure complete safety. Until the integrated monitoring functions become effective, it must be assumed in any case that faulty drive movements will occur. The extent of faulty drive movements depends upon the type of control and the state of operation.

Dangerous movements! Danger to life, risk of injury, serious injury or property damage!

A **risk assessment** must be prepared for the installation or machine, with its specific conditions, in which the components of the electric drive and control system are installed.

As a result of the risk assessment, the user must provide for monitoring functions and higher-level measures on the installation side for personal safety. The safety regulations applicable to the installation or machine must be taken into consideration. Unintended machine movements or other malfunctions are possible if safety devices are disabled, bypassed or not activated.

To avoid accidents, injury and/or property damage:

- Keep free and clear of the machine's range of motion and moving machine parts. Prevent personnel from accidentally entering the machine's range of motion by using, for example:
 - Safety fences
 - Safety guards
 - Protective coverings
 - Light barriers
- Make sure the safety fences and protective coverings are strong enough to resist maximum possible kinetic energy.
- Mount emergency stopping switches in the immediate reach of the operator. Before commissioning, verify that the emergency stopping equipment works. Do not operate the machine if the emergency stopping switch is not working.
- Prevent unintended start-up. Isolate the drive power connection by means of OFF switches/OFF buttons or use a safe starting lockout.
- Make sure that the drives are brought to safe standstill before accessing or entering the danger zone.
- Additionally secure vertical axes against falling or dropping after switching off the motor power by, for example,
 - mechanically securing the vertical axes,
 - adding an external braking/arrester/clamping mechanism or
 - ensuring sufficient counterbalancing of the vertical axes.

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- The standard equipment **motor holding brake** or an external holding brake controlled by the drive controller is **not sufficient to guarantee personal safety!**
- Disconnect electrical power to the components of the electric drive and control system using the master switch and secure them from reconnection ("lock out") for:
 - Maintenance and repair work
 - Cleaning of equipment
 - Long periods of discontinued equipment use
- Prevent the operation of high-frequency, remote control and radio equipment near components of the electric drive and control system and their supply leads. If the use of these devices cannot be avoided, check the machine or installation, at initial commissioning of the electric drive and control system, for possible malfunctions when operating such high-frequency, remote control and radio equipment in its possible positions of normal use. It might possibly be necessary to perform a special electromagnetic compatibility (EMC) test.

3.3.4 Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting

Magnetic and electromagnetic fields generated by current-carrying conductors or permanent magnets of electric motors represent a serious danger to persons with heart pacemakers, metal implants and hearing aids.

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electric components!

- Persons with heart pacemakers and metal implants are not allowed to enter the following areas:
 - Areas in which components of the electric drive and control systems are mounted, commissioned and operated.
 - Areas in which parts of motors with permanent magnets are stored, repaired or mounted.
- If it is necessary for somebody with a heart pacemaker to enter such an area, a doctor must be consulted prior to doing so. The noise immunity of implanted heart pacemakers differs so greatly that no general rules can be given.
- Those with metal implants or metal pieces, as well as with hearing aids, must consult a doctor before they enter the areas described above.

3.3.5 Protection Against Contact With Hot Parts

Hot surfaces of components of the electric drive and control system. Risk of burns!

- Do not touch hot surfaces of, for example, braking resistors, heat sinks, supply units and drive controllers, motors, windings and laminated cores!
- According to the operating conditions, temperatures of the surfaces can be **higher than 60 °C (140 °F)** during or after operation.
- Before touching motors after having switched them off, let them cool down for a sufficient period of time. Cooling down can require **up to 140 minutes!** The time required for cooling down is approximately five times the thermal time constant specified in the technical data.

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- After switching chokes, supply units and drive controllers off, wait **15 minutes** to allow them to cool down before touching them.
- Wear safety gloves or do not work at hot surfaces.
- For certain applications, and in accordance with the respective safety regulations, the manufacturer of the machine or installation must take measures to avoid injuries caused by burns in the final application. These measures can be, for example: Warnings at the machine or installation, guards (shieldings or barriers) or safety instructions in the application documentation.

3.3.6 Protection During Handling and Mounting

Risk of injury by improper handling! Injury by crushing, shearing, cutting, hitting!

- Observe the relevant statutory regulations of accident prevention.
- Use suitable equipment for mounting and transport.
- Avoid jamming and crushing by appropriate measures.
- Always use suitable tools. Use special tools if specified.
- Use lifting equipment and tools in the correct manner.
- Use suitable protective equipment (hard hat, safety goggles, safety shoes, safety gloves, for example).
- Do not stand under hanging loads.
- Immediately clean up any spilled liquids from the floor due to the risk of falling!

3.3.7 Battery Safety

Batteries consist of active chemicals in a solid housing. Therefore, improper handling can cause injury or property damage.

Risk of injury by improper handling!

- Do not attempt to reactivate low batteries by heating or other methods (risk of explosion and cauterization).
- Do not attempt to recharge the batteries as this may cause leakage or explosion.
- Do not throw batteries into open flames.
- Do not dismantle batteries.
- When replacing the battery/batteries, do not damage the electrical parts installed in the devices.
- Only use the battery types specified for the product.



Environmental protection and disposal! The batteries contained in the product are considered dangerous goods during land, air, and sea transport (risk of explosion) in the sense of the legal regulations. Dispose of used batteries separately from other waste. Observe the national regulations of your country.

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3.3.8 Protection Against Pressurized Systems

According to the information given in the Project Planning Manuals, motors and components cooled with liquids and compressed air can be partially supplied with externally fed, pressurized media, such as compressed air, hydraulics oil, cooling liquids and cooling lubricants. Improper handling of the connected supply systems, supply lines or connections can cause injuries or property damage.

Risk of injury by improper handling of pressurized lines!

- Do not attempt to disconnect, open or cut pressurized lines (risk of explosion).
- Observe the respective manufacturer's operating instructions.
- Before dismantling lines, relieve pressure and empty medium.
- Use suitable protective equipment (safety goggles, safety shoes, safety gloves, for example).
- Immediately clean up any spilled liquids from the floor due to the risk of falling!



Environmental protection and disposal! The agents (e.g., fluids) used to operate the product might not be environmentally friendly. Dispose of agents harmful to the environment separately from other waste. Observe the national regulations of your country.

3.4 Explanation of Signal Words and the Safety Alert Symbol

The Safety Instructions in the available application documentation contain specific signal words (DANGER, WARNING, CAUTION or NOTICE) and, where required, a safety alert symbol (in accordance with ANSI Z535.6-2006).

The signal word is meant to draw the reader's attention to the safety instruction and identifies the hazard severity.

The safety alert symbol (a triangle with an exclamation point), which precedes the signal words DANGER, WARNING and CAUTION, is used to alert the reader to personal injury hazards.

⚠ 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 **could** occur.

⚠ CAUTION

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

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NOTICE

In case of non-compliance with this safety instruction, property damage could occur.

4 Checklists

4.1 commissioning

4.1.1 IndraWorks Installation

This section describes installation and updating for IndraWorks.

Hardware requirements

- Computer with 2 GB available memory on the target drive
- Installation DVD
- IndraWorks license

Required files

- IndraWorks installation

Case 1:

IndraWorks new installation

see [5.1.3 Initial Installation of IndraWorks \(page 43\)](#)

Case 2:

IndraWorks update

see [5.1.5 Updating IndraWorks \(page 52\)](#)

4.1.2 Creating a Machine Project for Commissioning

This section describes the creation of all files required for commissioning at a machine. It is assumed that a complete IndraWorks project already exists and that the drive parameterization is known.

Prerequisites

- IndraWorks is installed

Required files

- IndraWorks project
- Original parameter file

Required information

- IP address of the control
- SERCOS addresses of the drives
- Parameterization of the drives

Steps

The following steps are required to prepare a project for commissioning:

1. Open project
2. Activate existing drives for the real machine. Deactivate drives that are not present
3. Start offline parameterization
4. Import the original parameter set for all drives
see [5.9 Importing Parameters \(page 81\)](#)
5. Parameterize drives
6. Export parameters
see [5.8 Exporting Parameters \(page 78\)](#)
7. Go offline
8. Archive project
see [5.2.2 Complete Backup Procedure \(page 56\)](#)
9. Send project archives and parameter file to the person responsible for commissioning

Checklists

4.1.3 Initial System Commissioning

This section describes the commissioning of a system. It is assumed that the control and the drives are in any kind of state, i.e. unknown firmware or unknown configuration on the control or drives. This is for instance the case if the system is brand new.

Hardware prerequisites	• The control is installed and equipped with a Compact Flash card • The drives are installed and equipped with a multimedia card (MMC) • The SERCOS bus is wired • Optional: The safety technology of the drive is wired • Optional: The cross link module is plugged to the MLC • Optional: Inline modules are wired • Optional: PROFIBUS is wired • Optional: SERCOS III bus couplers are wired • Optional: DTM device is wired
Required files	• IndraWorks project archive • Parameter export file
Required information	• IP address of the control • SERCOS addresses of the drives • Cross link address of the Control
Steps	The following steps are required for initial commissioning: 1. Update the drive firmware to the current version see 5.15 Firmware Exchange (page 129) 2. Set the SERCOS addresses of the drives see 5.13 Basic Master Communication Functions (page 93) 3. Set the IP address, subnet mask and gateway on the control see 5.3 IndraMotion MLC - Setting the IP Address (page 65) 4. Start IndraWorks 5. Import project archive see 5.2.3 Project Restoration Procedure (page 61) 6. Set the IP address of the control in IndraWorks and perform connection test 7. Update control firmware see 5.4 Exchanging MLC Firmware (page 69) 8. Continue at 4.1.4 System Commissioning (page 30)

4.1.4 System Commissioning

This section describes the commissioning of a system. It is assumed that the correct firmware is available on the control and the drives. This is for example the case if there was previous initial commissioning.

Prerequisites	• The control is installed and equipped with a Compact Flash card • The control firmware is correct
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Checklists

- The drives are installed and equipped with a multimedia card (MMC)
- The SERCOS addresses for the drives are set
- The drive firmware version is correct
- Optional: The safety technology of the drive is wired
- Optional: The cross link module is plugged to the MLC
- Optional: Inline modules are wired
- Optional: PROFIBUS is wired
- Optional: SERCOS III bus couplers are wired
- Optional: DTM device is wired
- The steps in [4.1.3 Initial System Commissioning \(page 30\)](#) have already been carried out

- Required files**
- IndraWorks project archive
 - Parameter export file

- Required information**
- IP address of the control
 - SERCOS addresses of the drives
 - Cross link address of the Control

- Steps** The following steps are required to commission a system:
1. If the project is already on the computer: Open project
File ► Open ► Project...
- or -
If a project archive exists: Import project archive
Project ► Restore...
see [5.2.3 Project Restoration Procedure \(page 61\)](#)
 2. Go online
see [5.6 Going online \(page 73\)](#)
Optional: Assign remote address to SERCOS III bus coupler
 3. Load basic parameters to all drives
see [5.16 Loading Basic Parameters to IndraDrive \(page 148\)](#)
 4. "Load defaults procedure for safety technology" to all drives with safety technology
see [5.17.4 Loading of the Defaults Procedure for Drive-integrated Safety Technology \(page 157\)](#)
 5. Import parameters
(Control parameters and drive parameters)
see [5.9 Importing Parameters \(page 81\)](#)
 6. Switch to BB
see [5.10 Switching IndraMotion MLC to BB \(page 84\)](#)
 7. Create and print out protocols for safety technology
 8. Go offline
(Backup drive parameters on the Compact Flash card of the MLC)

Checklists

9. Load the PLC program to the control and start it
see [5.7 Uploading and Starting the PLC Program \(page 77\)](#)
10. Set the reference value in the drives
11. Install DTM and write parameters to the device
see [DTM - Restoration \(page 173\)](#)

4.2 Exchanging Hardware

4.2.1 Firmware Update for MLC and Drives

This section deals with updating the firmware for drives and control. It is assumed that the system is running, i.e. [4.1.4 System Commissioning \(page 30\)](#) has already been carried out.

- Prerequisites**
- The system is running
 - The steps as described in [4.1.4 System Commissioning \(page 30\)](#) have already been carried out

- Required files**
- IndraWorks project or IndraWorks project archive
 - Parameter export file (optional)

- Steps** The following steps are required to update the firmware on the system:
1. If the project is already on the computer: Open project
File ► Open ► Project...
- or -
If there is an existing project archive: Import project archive
Project ► Restore...
see [5.2.3 Project Restoration Procedure \(page 61\)](#)
 2. Go online
see [5.6 Going online \(page 73\)](#)
 3. If there is no existing parameter file or if parameters were modified:
Save the control and drive parameters (to restore the required parameters)
see [5.8 Exporting Parameters \(page 78\)](#)
 4. If the drive firmware was not updated: Continue at 7
Execute firmware update on the drives
see [5.15 Firmware Exchange \(page 129\)](#)
 5. "Load basic parameters" on the drives
see [5.16 Loading Basic Parameters to IndraDrive \(page 148\)](#)
 6. "Load defaults procedure for safety technology" to all drives with safety technology
see [5.17.4 Loading of the Defaults Procedure for Drive-integrated Safety Technology \(page 157\)](#)
 7. If the control firmware was not updated: Continue at 9
Update control firmware
see [5.4 Exchanging MLC Firmware \(page 69\)](#)

8. Import the existing or previously saved parameter file
 - When updating drive firmware: S-, P-parameters
 - When updating control firmware: A-, C-parameterssee [5.9 Importing Parameters \(page 81\)](#)
9. Switch to BB
see [5.10 Switching IndraMotion MLC to BB \(page 84\)](#)
10. Create and print out protocols for safety technology
11. Go offline
(Backup drive parameters on the Compact Flash card of the MLC)
12. Upload and start PLC program
see [5.7 Uploading and Starting the PLC Program \(page 77\)](#)
13. Set the reference value in the drives

4.2.2 Exchanging the Drive Control Section Using the Multimedia Card (MMC)

This section describes the exchange of a drive control section with an existing multimedia card (MMC) and a functioning display. It is assumed that the system has already been commissioned.

- | | |
|-----------------------|--|
| Prerequisites | <ul style="list-style-type: none">• Defective control section (IndraDrive M or IndraDrive Cs)• Existing multimedia card (MMC) (IndraDrive M)• Functioning display (IndraDrive Cs)• The steps as described in 4.1.4 System Commissioning (page 30) have already been carried out |
| Required files | <ul style="list-style-type: none">• None |
| Steps | <p>The following steps are required to exchange a drive control section on a system:</p> <ol style="list-style-type: none">1. De-energize the drive and the control section2.<ul style="list-style-type: none">• For IndraDrive M:
Remove the multimedia card (MMC) from the control section• For IndraDrive Cs:
Remove drive display3. Exchange control section4.<ul style="list-style-type: none">• For IndraDrive M:
Plug the multimedia card (MMC) removed before into the new control section• For IndraDrive Cs:
Plug the display removed before into the new control section5. Switch on the system again |

4.2.3 Exchanging the Drive Control Section without a Multimedia Card (MMC)

This section describes the exchange of a drive control section if the multimedia card (MMC) or the display are defective. It is assumed that the system has already been commissioned.

- | | |
|----------------------|---|
| Prerequisites | <ul style="list-style-type: none">• Defective control section (IndraDrive M or IndraDrive Cs)• Parameter export file |
|----------------------|---|

Checklists

- The steps as described in [System Commissioning \(see page 30\)](#) have already been carried out
- Required files**
- None
- Steps** The following steps are required to exchange a drive control section on a system:
1. De-energize the drive and the control section
 2. Exchange control section
 3. Switch on the system again
 4. Firmware update of the exchanged drive
see [5.15 Firmware Exchange \(page 129\)](#)
 5. Set the SERCOS address of the exchanged drive
see [5.13 Basic Master Communication Functions \(page 93\)](#)
 6. If the project is already on the computer: Open project
File ► Open ► Project...
- or -
if a project archive exists: Import project archive
Project ► Restore...
see [5.2.3 Project Restoration Procedure \(page 61\)](#)
 7. Go online
see [5.6 Going online \(page 73\)](#)
 8. "Load basic parameters" on the exchanged drive
see [5.16 Loading Basic Parameters to IndraDrive \(page 148\)](#)
 9. "Load defaults procedure for safety technology" on the exchanged drive
see [5.17.4 Loading of the Defaults Procedure for Drive-integrated Safety Technology \(page 157\)](#)
 10. Import S- and P-parameters of the exchanged drive
see [5.9 Importing Parameters \(page 81\)](#)
 11. Switch to BB
see [5.10 Switching IndraMotion MLC to BB \(page 84\)](#)
 12. Create and print out protocols for safety technology
 13. Set the reference value in the exchanged drive (optional)
 14. Go offline
(Backup drive parameters on the Compact Flash card of the MLC)

4.2.4 Exchanging the MLC if Existing Compact Flash Card Available

This section describes the exchange of an MLC if a Compact Flash card is available. It is assumed that the system has already been commissioned.

- Prerequisites**
- Defective MLC
 - Existing Compact Flash card in the MLC
 - The steps as described in [4.1.4 System Commissioning \(page 30\)](#) have already been carried out
- Required files**
- None
- Steps** The following steps are required to exchange the MLC on a system:
1. De-energize MLC

2. Remove the Compact Flash card from the MLC
3. Exchange MLC
4. Plug the Compact Flash removed before into the MLC
5. Switch on the system again

4.2.5 Exchanging the MLC without Compact Flash Card

This section describes the exchange of an MLC without an existing Compact Flash card or with a defective Compact Flash card. It is assumed that the system has already been commissioned.

- Prerequisites**
- Defective MLC
 - Defective or missing Compact Flash card
 - The steps as described in [System Commissioning \(page 30\)](#) have already been carried out

- Required files**
- None

Steps The following steps are required to exchange the MLC on a system:

1. De-energize MLC
2. Replace the defective MLC with an MLC with Compact Flash card (has to contain the respective firmware)
3. Switch on the system again
4. Set the IP address, subnet mask and gateway on the control
see [5.3 IndraMotion MLC - Setting the IP Address \(page 65\)](#)
5. If the project is already on the computer: Open project
File ► Open ► Project...
- or -
if a project archive exists: Import project archive
Project ► Restore...
6. Update control firmware
see [5.4 Exchanging MLC Firmware \(page 69\)](#)
7. Go online
see [5.6 Going online \(page 73\)](#)
8. Import A- and C-parameters of the MLC
see [5.9 Importing Parameters \(page 81\)](#)
9. Switch to BB
see [5.10 Switching IndraMotion MLC to BB \(page 84\)](#)
10. Go offline
(Backup drive parameters on the Compact Flash card of the MLC)
11. Upload and start PLC program
see [5.7 Uploading and Starting the PLC Program \(page 77\)](#)

4.2.6 Exchanging an MLC Function Module

This section describes the exchange of an MLC function module. It is assumed that the system has already been commissioned.

- Prerequisites**
- Defective MLC function module
 - The steps as described in [4.1.4 System Commissioning \(page 30\)](#) have already been carried out

Checklists

- Required files**
- None
- Steps** The following steps are required to exchange an MLC function module on a system:
1. De-energize MLC
 2. Exchange function module
 3. Switch on the system again

4.2.7 Exchanging a PROFIBUS Participant

This section describes the exchange of a PROFIBUS participant. It is assumed that the system has already been commissioned.

- Prerequisites**
- Defective PROFIBUS participant
 - The steps as described in [4.1.4 System Commissioning \(page 30\)](#) have already been carried out
- Required files**
- None
- Steps** The following steps are required to exchange a PROFIBUS participant:
1. De-energize PROFIBUS participant
 2. Exchange PROFIBUS participant
 3. Set the address for the new PROFIBUS participant
 4. Switch on the system again
 5. For PROFIBUS participants with DTM, write the parameters to the device see [5.19.3 Procedure for DTM Device Exchange \(page 171\)](#)

4.2.8 Exchanging a SERCOS III Coupler

This section describes the exchange of a SERCOS III participant. It is assumed that the system has already been commissioned.

- Prerequisites**
- Defective SERCOS III bus coupler
 - The steps as described in [4.1.4 System Commissioning \(page 30\)](#) have already been carried out
- Required files**
- None
- Steps** When exchanging a SERCOS III I/O device, the SERCOS address cannot be directly set at the service as it is for example possible for an IndraDrive drive via the display of a drive. For SERCOS III IO devices, the address has to be set via the SERCOS III mechanism "Remote address specification". There are different possibilities:
- Variant 1:** With IndraWorks and the matching IndraWorks project to this machine:
1. SERCOS III bus couplers to be de-energized
 2. Exchange SERCOS III bus coupler
 3. Switch on the system again
- The MLC reports the error F0140001 "Drive command configuration incorrect" on the display
4. Stop PLC
 5. Go online with IndraWorks
- see [5.6 Going online \(page 73\)](#)
- The "Adjustment SERCOS configuration" dialog opens automatically

Checklists

6. The configuration found is compared with the configured devices via the "Adjustment SERCOS configuration" dialog and assigned
7. Click on the **Perform Remote Address Assignment** button
The SERCOS address of the device is set
8. "Clear errors"
9. Switch to BB
see [5.10 Switching IndraMotion MLC to BB \(page 84\)](#)
10. Restart PLC program

Variant 2: With IndraMotion Service Tool:

1. SERCOS III bus couplers to be de-energized
2. Exchange SERCOS III bus coupler
3. Switch on the system again
The MLC reports the error F0140001 "Drive command configuration incorrect" on the display
4. Open a web browser opens and log in on the control of the IndraMotion Service Tool (rights to change parameters are required)
5. Select "Diagnostic" -> "Control name" in the project tree and check control mode 2. The following steps have to be executed in the parameterization mode P2
6. Select Data -> Parameters -> C-Parameters in the project tree
Enter the parameter "C-0-0510, Address configuration)" in the IDN field and press <RETURN>
A list of the found SERCOS device are displayed according to the topology address. The topology addresses are output according to their wiring order starting from X7E1 of the MLC (also for ring wiring). For devices connected to X7E2 of the MLC, the last device of the line is entered first
7. In the parameter list, the address of the new device can be correct to the address defined in the project. The list is written with <RETURN> and the "remote address specification" is executed
8. "Clear errors"
9. Switch to BB

4.2.9 Exchanging an Inline Module

This section describes the exchange of an Inline module connected to an MLC or PROFIBUS coupler. It is assumed that the system has already been commissioned.

- | | |
|-----------------------|--|
| Prerequisites | <ul style="list-style-type: none">• Defective Inline module• The steps as described in 4.1.4 System Commissioning (page 30) have already been carried out |
| Required files | <ul style="list-style-type: none">• None |
| Steps | <p>The following steps are required to exchange an Inline module on an MLC or PROFIBUS coupler:</p> <ol style="list-style-type: none">1. De-energize MLC or PROFIBUS coupler2. Exchange Inline module3. Switch on the system again |

Checklists

4.2.10 Exchanging a DTM Device

This section describes the exchange of a DTM device.

It is assumed that the system has already been commissioned.

- | | |
|-----------------------|--|
| Prerequisites | <ul style="list-style-type: none"> • Defective DTM device • The steps for System Commissioning (page 30) have already been carried out |
| Required files | <ul style="list-style-type: none"> • None |
| Steps | <p>The following steps are required to exchange a DTM device (cf. chapter 5.19.3 "Procedure for DTM Device Exchange" on page 171):</p> <ol style="list-style-type: none"> 1. Load parameters from device 2. De-energize DTM device and MLC 3. Exchange DTM device 4. Switch on the system again 5. Write parameters to device |

4.3 Diagnostics

4.3.1 MLC Diagnostics

This section describes the diagnostic possibilities for the MLC. The diagnostics can be carried out using either the control display or the diagnostic memory in IndraWorks.

Diagnostics on the display The display shows the highest priority error message (see also [6.1 Diagnostic Numbers and Diagnostic Texts as Display for the IndraMotion MLC L25/L45/L65 Display, page 175](#)). Use <Esc> on the display to delete all pending errors. It is possible that new pending errors appear immediately. Other possibilities for MLC display operations are described in [5.12 Display of the IndraMotion MLC \(page 91\)](#).

MLC diagnostic memory The following steps are required to read out the MLC diagnostic memory:

1. Start IndraWorks
2. If the project is already on the computer: Open project
File ► Open ► Project...
- or -
if a project archive exists: Import project archive
Project ► Restore...
see [5.2.3 Project Restoration Procedure \(page 61\)](#)
3. Go online
see [5.6 Going online \(page 73\)](#)
4. Display diagnostic memory
Right click on the control, then
Diagnostics ► Error/diagnostic memory
see [6.2.4 Error/Diagnostic Memory \(page 178\)](#)

4.3.2 IndraDrive Diagnostics

This section describes the diagnostic possibilities for IndraDrive.

The diagnostics can be carried out using either the drive display or the diagnostic memory in IndraWorks.

Checklists

- Diagnostics on the display** The display shows the highest priority error message (see also [chapter 5.14 "Control Panel of the Standard Operating Unit" on page 114](#)). Use <Esc> on the display to delete all pending errors. It is possible that new pending errors appear immediately. Other possibilities for MLC display operations are described in [chapter 5.14 "Control Panel of the Standard Operating Unit" on page 114](#).
- Diagnostic memory** All drive error messages are also recorded in MLC diagnostic memory. The following steps are required to read out the MLC diagnostic memory:
1. Start IndraWorks
 2. If the project is already on the computer: Open project
File ► Open ► Project...
- or -
Project ► Restore...
see [chapter 5.2.3 "Project Restoration Procedure" on page 61](#)
 3. Go online
see [chapter 5.6 "Going online" on page 73](#)
 4. Display diagnostic memory
Right click on the control, then
Diagnostics ► Error/diagnostic memory
see [chapter 6.2.4 "Error/Diagnostic Memory" on page 178](#)

4.3.3 Cross Link Diagnostics

- This section describes the diagnostic possibilities for the MLC cross link. The diagnostics can be carried out using the LEDs on the cross link module, the MLC display or the dialog "Diagnostics for the MLC link" in IndraWorks.
- Diagnostics on the cross link module** The LEDs on the cross link module display the current hardware status of the link. The physical layer can be checked using both LEDs for the distortion display (see also ["Distortion displays" on page 183](#)).
- Diagnostics on the MLC display** Cross link module diagnostic messages are shown on the MLC display. For more detailed information on this topic, refer to ["MLC link dialog - Status - CrossComm" on page 184](#).
- Diagnostic dialog in IndraWorks** The state of the cross link can be read using the IndraWorks dialog "Diagnostics for the MLC link".
- The following steps are required to open this dialog:
1. Start IndraWorks
 2. If the project is already on the computer: Open project
File ► Open ► Project...
- or -
if a project archive exists: Import project archive
Project ► Restore...
see [chapter 5.2.3 "Project Restoration Procedure" on page 61](#)
 3. Go online
see [chapter 5.6 "Going online" on page 73](#)
 4. Display diagnostic dialog
Right click on the CrossComm entry below the control, then select **Diagnostics for MLC link...**

Checklists

see ["MLC link dialog - Status - CrossComm" on page 184](#)

4.3.4 Field Bus Diagnostics

Diagnostic dialog in IndraWorks The state of the field bus participant can be read using the tree view and the diagnostic window in IndraWorks.

The following steps are required to open both dialogs:

1. Start IndraWorks
2. If the project is already on the computer: Open project
File ► Open ► Project...
- or -
if a project archive exists: Import project archive
Project ► Restore...
see [chapter 5.2.3 "Project Restoration Procedure" on page 61](#)
3. Go online
see [chapter 5.6 "Going online" on page 73](#)
4. Display the diagnostic dialog using the tree view
Double click on the field bus participant below the control, then select the **Status** tab,
see ["Diagnostic overview in the tree view" on page 191](#)
5. Open diagnostic window
Highlight the field bus participant in the tree view, then select **Diagnostic ► Field bus diagnostics**
see ["Field bus diagnostics in the diagnostic window" on page 191](#)

4.3.5 Reading out the PLC Logbook

This section describes how to read from the PLC logbook on the MLC. Reading is performed in IndraWorks.

Reading out PLC logbook The following steps are required to read out the PLC logbook of the MLC:

1. Start IndraWorks
2. If the project is already on the computer: Open project
File ► Open ► Project...
- or -
if a project archive exists: Import project archive
Project ► Restore...
see [chapter 5.2.3 "Project Restoration Procedure" on page 61](#)
3. Double-click on the control
A dialog opens
4. Select the **Log** tab
5. Click the Refresh button ()

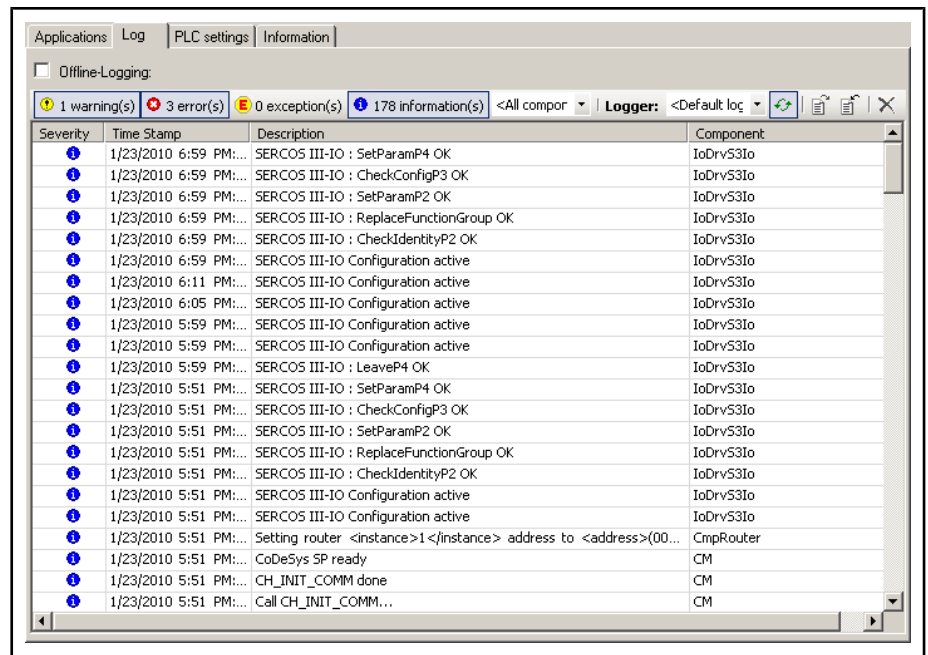


Fig. 4-1: PLC logbook in IndraWorks

4.3.6 Behavior during a Control SysErr

This section describes system the behavior after a "SysErr" on the control.

NOTICE

In case of a fatal system error, "SysErr" appears on the control display in alternation with the error number.

In this state, the control is no longer ready for operation and, in addition, it cannot communicate with IndraWorks.

If this occurs just once, disconnect the control from the power supply and then reconnect it. If "SysErr" occurs repeatedly, it has to be investigated.

Reading out error memory

The following steps are required if a "SysErr" appears on the control display:

1.
 - If "SysErr" occurs just once:
Restart the control by disconnecting it from the power supply, then reconnect it
Continue at step 3
 - If "SysErr" occurs repeatedly:
Continue at step 2
2. Press the <V>, <Λ> and <Enter> on control display at the same time.
"DEBUG" appears on the control display
3. Start IndraWorks
4. If the project is already on the computer: Open project
File ► Open ► Project...
- or -

Checklists

if a project archive exists: Import project archive

Project ► Restore...

see [chapter 5.2.3 "Project Restoration Procedure"](#) on page 61

5. Save Compact Flash card data

see [chapter 5.11.1 "Archiving Device Data"](#) on page 85

6. Transfer saved data to the DCC service

Background information, such as actions performed previously or recent changes to the system, is important.

If the error cannot be recovered, it might help to recommission the control.

Therefore, perform the actions starting with step 8 in the checklist as described in [chapter 4.2.1 "Firmware Update for MLC and Drives"](#) on page 32.

5 Description of the Steps

5.1 Installing Rexroth IndraWorks

5.1.1 Administrator Rights

General

The installation of the user interface requires a knowledge of PCs and the operating system. Administrator rights are required for the installation.



An experienced user with knowledge of the operating system and administrator rights should perform the installation.

Access Data

The preinstalled operating terminals supplied by the manufacturer include the following access data:

Windows XP:

- User name: Rexroth
- Password: Rexroth

Login as Administrator

Log in as administrator:

Windows XP:

- User name: Administrator
- Password: - (no password)

5.1.2 Licensing the Installation

To install successfully, purchase a software license (SWL) from Bosch Rexroth. With the purchase, you receive an activation code that has to be entered during the installation.

5.1.3 Initial Installation of IndraWorks

DVD

General

Starting with version 08VRS, the IndraWorks software is only delivered on DVD. Thus, a DVD drive or a network connection has to be available for the installation.

This can be

- a local, internal DVD drive (some Bosch Rexroth industrial PCs (e.g. control cabinet industrial PC) have a built-in DVD drive)
- a local, external DVD drive (for the installation, a portable DVD drive can be connected to the USB port of a Bosch Rexroth industrial PC)
- a shared DVD drive in the network



Before installing, inform yourself about the existing options.

Installing from the Hard drive

If the data carrier (DVD) has to be copied to the hard drive to install from there, proceed as follows:

Description of the Steps

1. Create a directory on the hard drive, e.g. with the name: "DVD"
2. Copy the contents of the IndraWorks DVD to the "DVD" directory.
3. Start SETUP.EXE from the hard drive from the "DVD" directory.

The installation runs automatically.

Installing IndraWorks

It is assumed that a DVD drive with the drive letter "E" is used for the installation.

1. Insert the DVD in the DVD drive



If "Autorun" is running on your system and it should be installed from a local DVD drive, the installation wizard starts automatically. Then, continue with step 5.

If "Autorun" is not running on your system, continue with step 2 or 4.

If you wish to perform the installation from a DVD drive shared in the network, use Windows Explorer to navigate to the DVD drive and double click "Setup.exe" to start it. Continue with step 5.

2. In the start menu, click **Run**
3. To install from a DVD, for example, type "E:\SETUP.EXE".

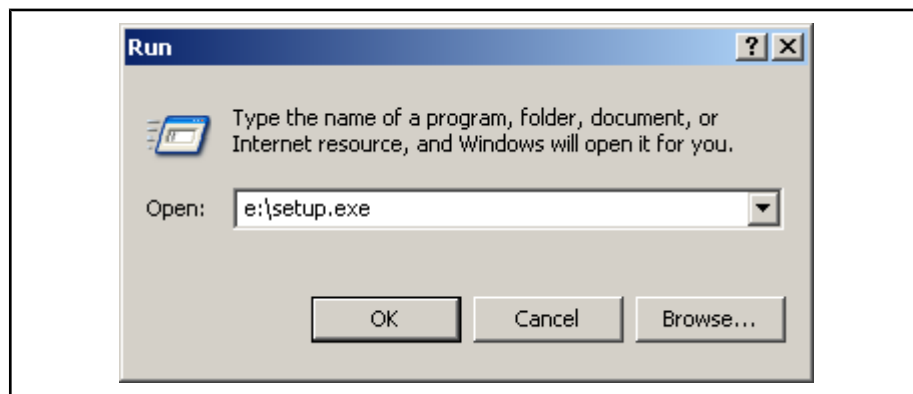


Fig.5-1: Dialog: Run (Start Setup.exe)

Click **OK** or confirm with <Enter>

Continue with step 5

4. Another option is to click on the DVD drive from Windows Explorer and double-click on the "setup.exe" file to run it:

Description of the Steps

Name	Size	Type	Date Modified
AddComponents		File Folder	10/16/2007 6:21 AM
IndraLogic		File Folder	10/16/2007 6:21 AM
Redist		File Folder	10/16/2007 6:21 AM
WinStudio		File Folder	10/16/2007 6:22 AM
Autorun.inf	1 KB	Setup Information	10/12/2007 8:41 AM
CompVersion.xml	13 KB	XML Document	10/12/2007 8:02 AM
Data1.cab	8,321 KB	Cabinet File	10/12/2007 8:57 AM
Data2.cab	7,503 KB	Cabinet File	10/12/2007 8:57 AM
Data3.cab	1,289 KB	Cabinet File	10/12/2007 8:57 AM
Data4.cab	11,549 KB	Cabinet File	10/12/2007 8:57 AM
Data5.cab	16,373 KB	Cabinet File	10/12/2007 8:57 AM
Data6.cab	11,654 KB	Cabinet File	10/12/2007 8:57 AM
Data7.cab	2,547 KB	Cabinet File	10/12/2007 8:57 AM
Data8.cab	4,632 KB	Cabinet File	10/12/2007 8:57 AM
Data9.cab	2,538 KB	Cabinet File	10/12/2007 8:57 AM
Data10.cab	577 KB	Cabinet File	10/12/2007 8:57 AM
Data11.cab	4 KB	Cabinet File	10/12/2007 8:57 AM
Data12.cab	5,105 KB	Cabinet File	10/12/2007 8:57 AM
Data13.cab	36,098 KB	Cabinet File	10/12/2007 8:57 AM
Data14.cab	6 KB	Cabinet File	10/12/2007 8:57 AM
Data15.cab	11,145 KB	Cabinet File	10/12/2007 8:57 AM
Data16.cab	69,663 KB	Cabinet File	10/12/2007 8:58 AM
IndraWorks.msi	9,692 KB	Windows Installer P...	10/12/2007 8:59 AM
LicenceCode.bin	1 KB	BIN File	9/30/2007 10:21 PM
Liesmich.rtf	1 KB	Rich Text Document	3/28/2007 3:37 AM
setup.bin	10 KB	BIN File	9/20/2007 12:56 AM
setup.exe	873 KB	Application	9/18/2007 4:29 AM
Setup.ini	11 KB	Configuration Settings	10/15/2007 4:33 AM

Fig.5-2: Listed DVD with setup.exe selected

Start the installation wizard with <Enter> or double-click.

5. Select the installation language for IndraWorks.

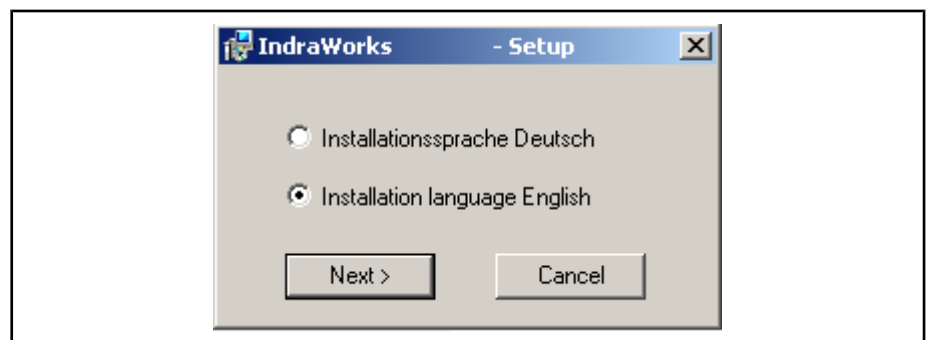


Fig.5-3: Dialog: IndraWorks Setup (language selection)

You are guided through the installation. Use **Next >** to move to the next dialog, **< Back** to return to the previous dialog.

6. Select the systems to be installed by enabling the box in the "System" column.

Description of the Steps

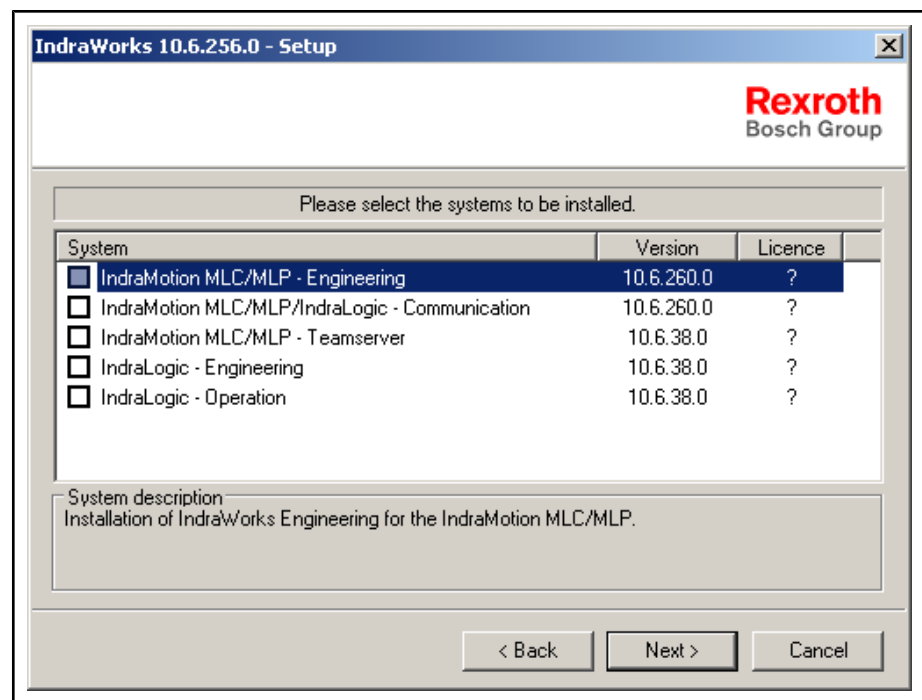


Fig.5-4: Dialog: IndraWorks Setup (selecting the systems to install)

If you have selected a system that requires a license (indicated by a question mark in the "License" column), the following dialog opens automatically and the activation code can be entered.

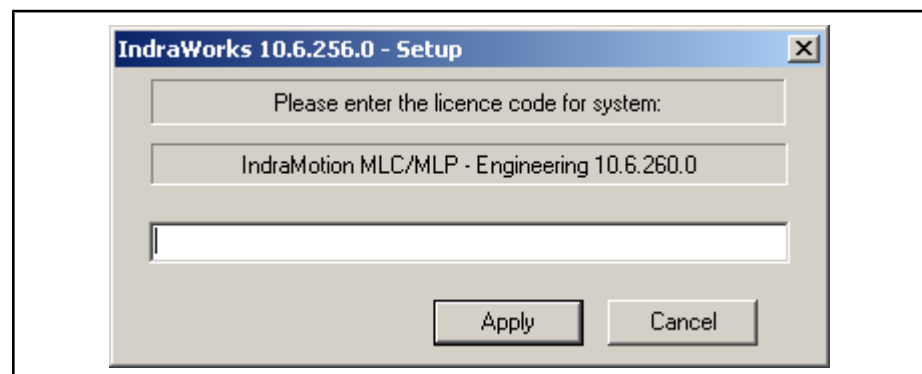


Fig.5-5: Dialog: IndraWorks Setup (entering an activation code for the selected system)

If the word **Valid** appears in place of the question mark when clicking on "Accept", the system activation code has been accepted. The checkmark is placed additionally at the beginning of the line.

Description of the Steps

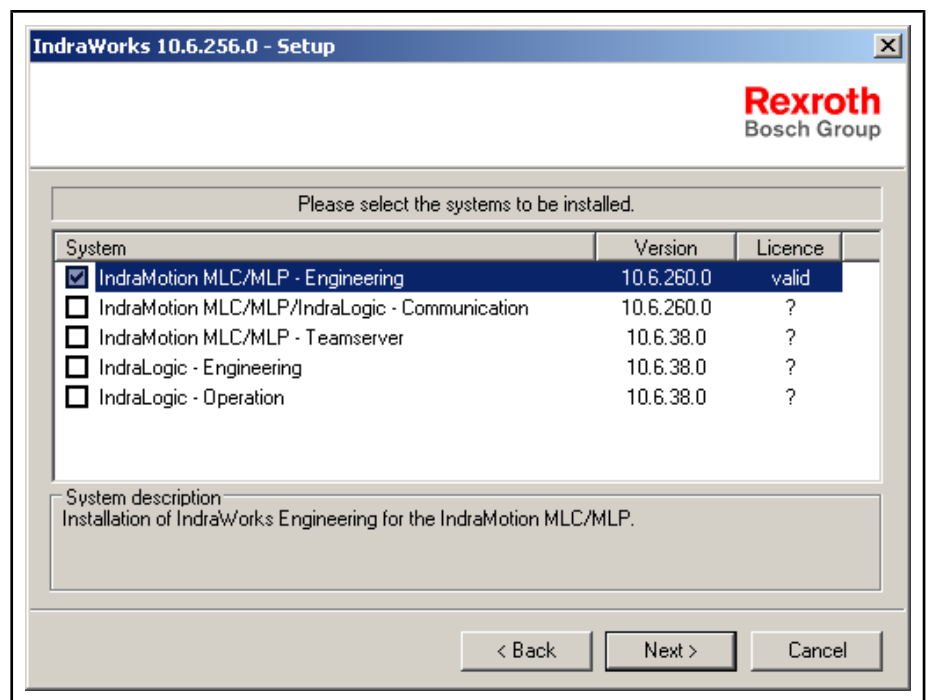


Fig.5-6: Dialog: IndraWorks Setup (valid activation code entered)
Click **Next >** and a list of tasks to be performed appears.

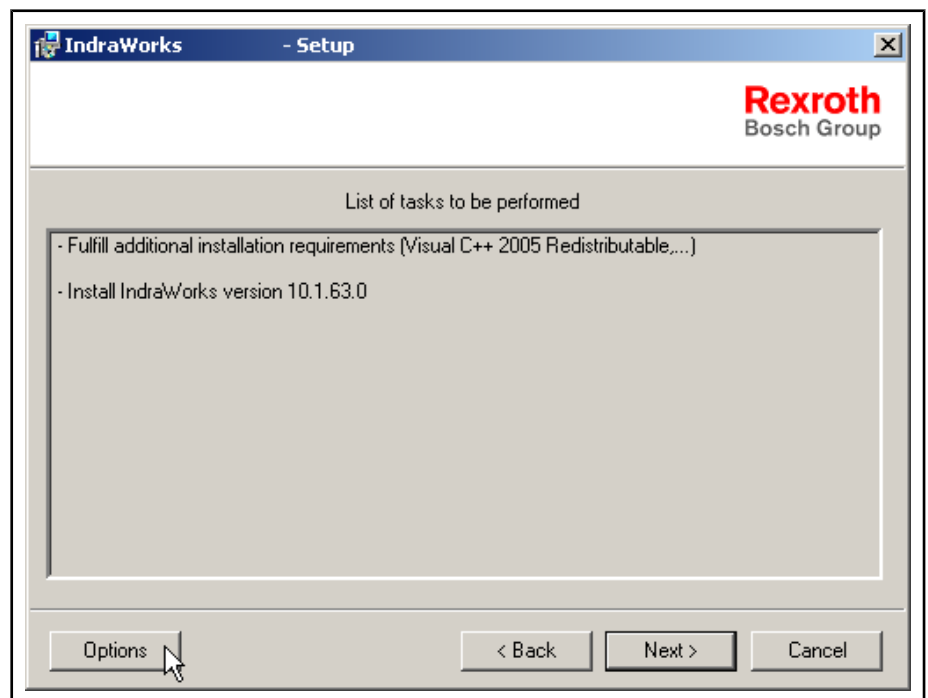


Fig.5-7: Dialog: IndraWorks Setup (list of tasks to be performed)

- Click **Next >** to skip the next "Options" dialog.
In this case, all online helps for your installation are installed.
- Click **Options** to move to the following dialog.
Only use this dialog if space problems might occur during the installation.

Description of the Steps

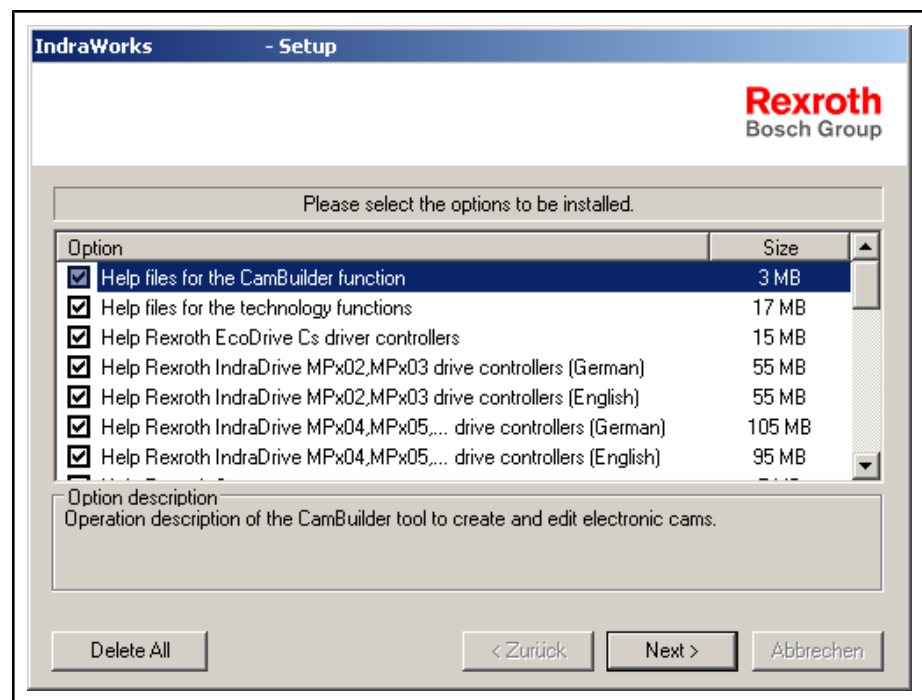


Fig.5-8: Dialog: IndraWorks Setup (selecting/deselecting options)

Here, online help files or online help systems can be deselected if the hard drive lacks of capacity. The required capacities are shown for information purposes

Desktop icons can also be deselected

7. A message appears if there are release notes for the current version. Select "Show Release Notes" to open the respective PDF document when confirming with **Next >**.

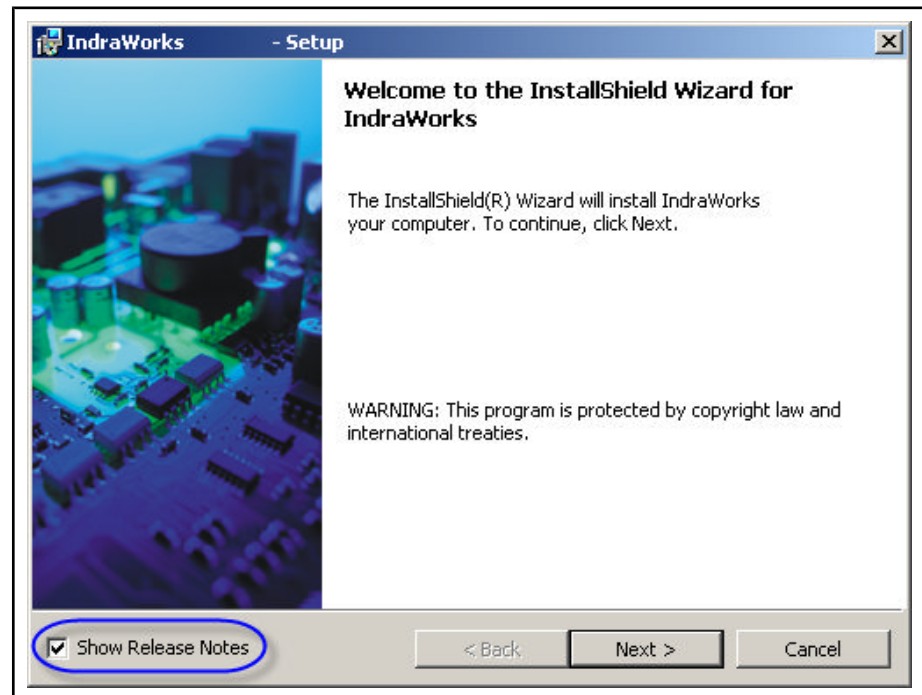


Fig.5-9: Dialog: IndraWorks Setup (message regarding release notes)

Description of the Steps

8. After reading the release notes, close Acrobat Reader and following the installation instructions.
9. Accept the terms of the license agreement.

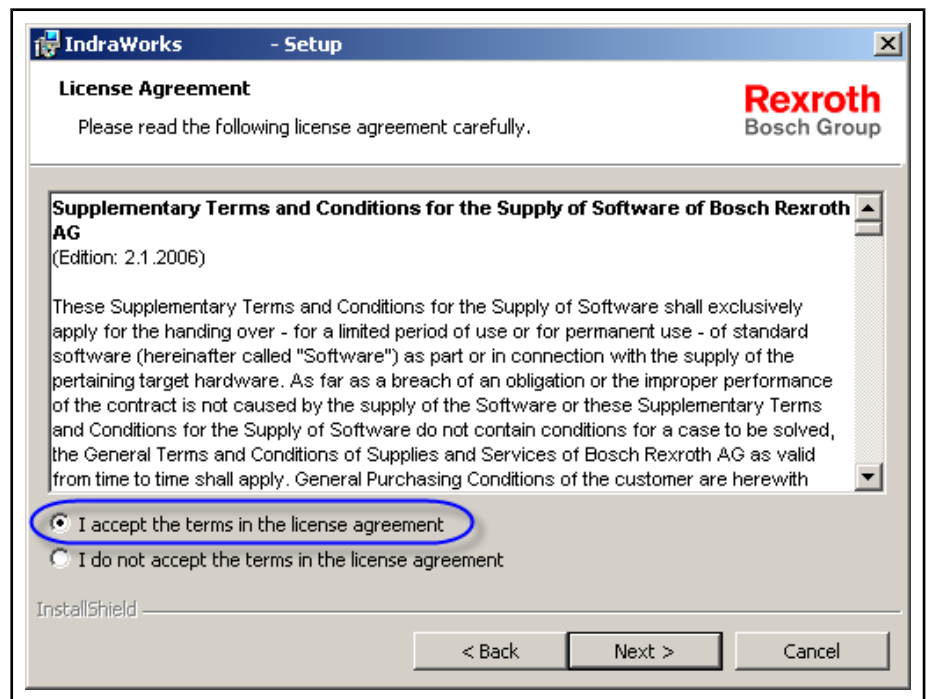


Fig.5-10: Dialog: IndraWorks Setup (license agreement)

10. Confirm with **Next >** to move to the "Customer Information" dialog.

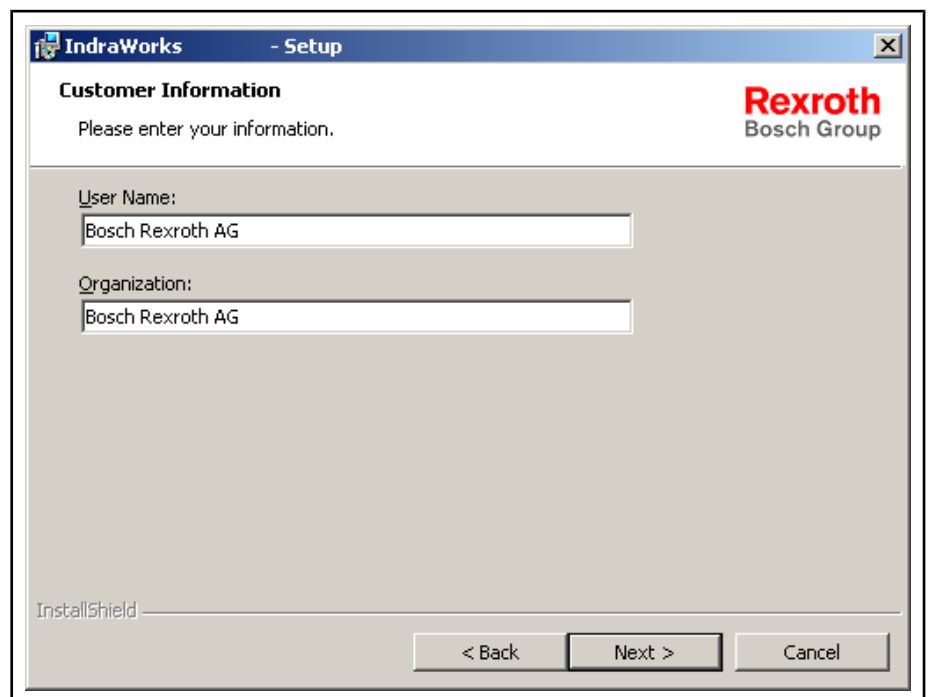


Fig.5-11: Dialog: IndraWorks Setup (customer information)

11. Enter name and company of the user and click on **Next >**. The selection of desired installation directory opens (target folder)
12. Select the drive and the target path where IndraWorks is to be installed.

Description of the Steps

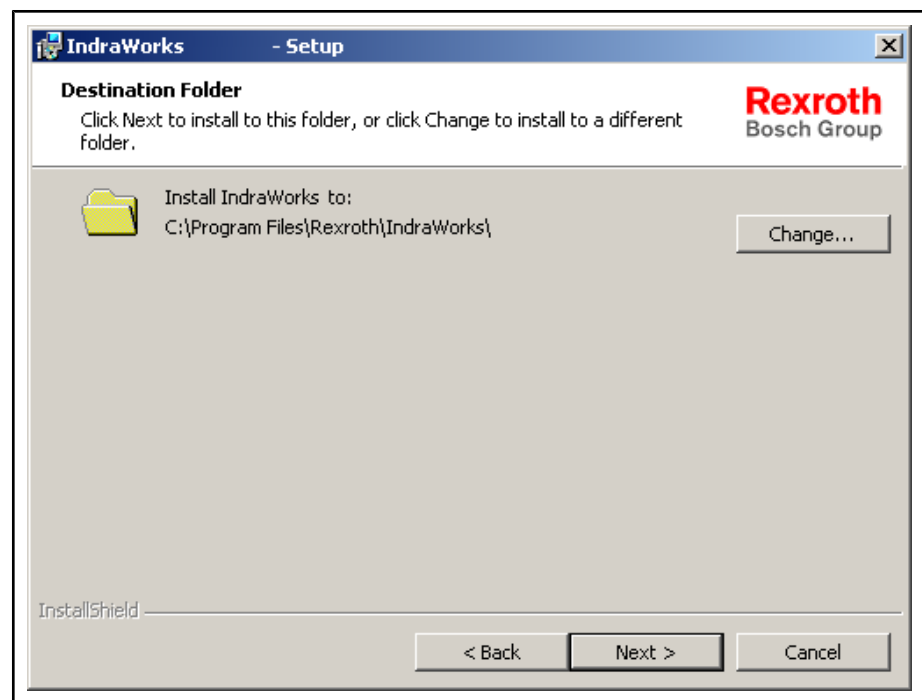


Fig.5-12: Dialog: IndraWorks Setup (selecting the target folder)
Click **Next >** to move to the start dialog for the actual installation

13. Start the installation with **Install**.

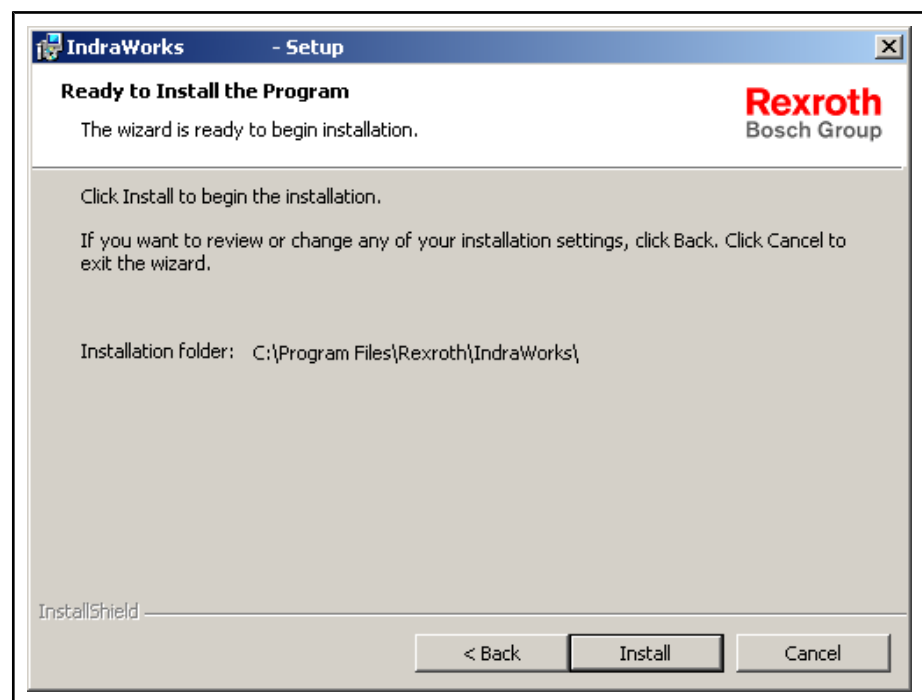


Fig.5-13: Dialog: IndraWorks Setup (starting the installation)
The installation starts. A progress bar shows the status of the installation

Description of the Steps

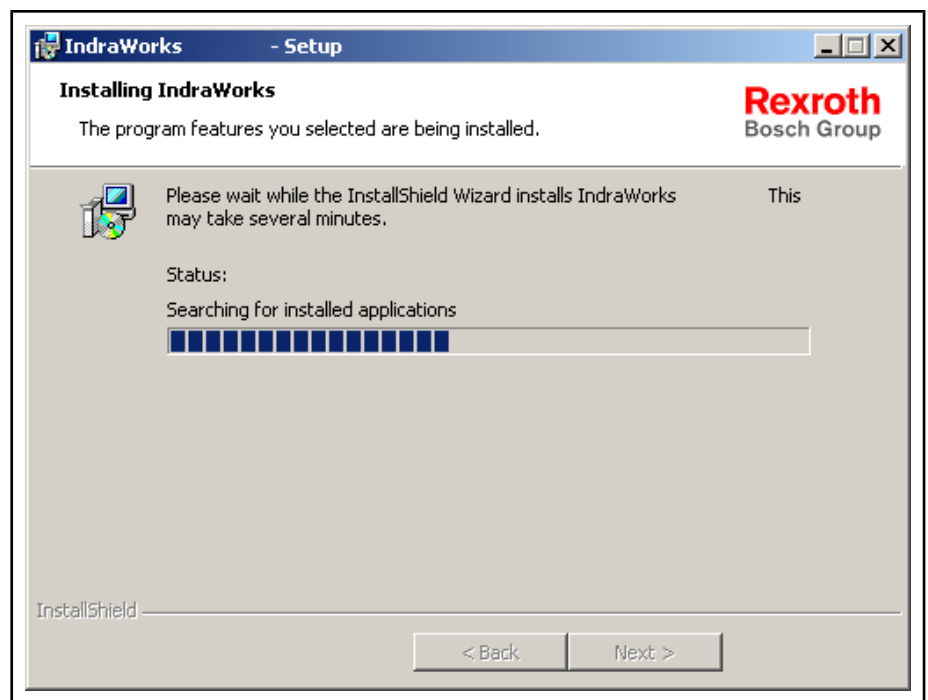


Fig.5-14: Dialog: IndraWorks Setup (progress of the installation)

14. After request, complete the installation with **Finish**.

After the installation, you are requested to restart Windows.

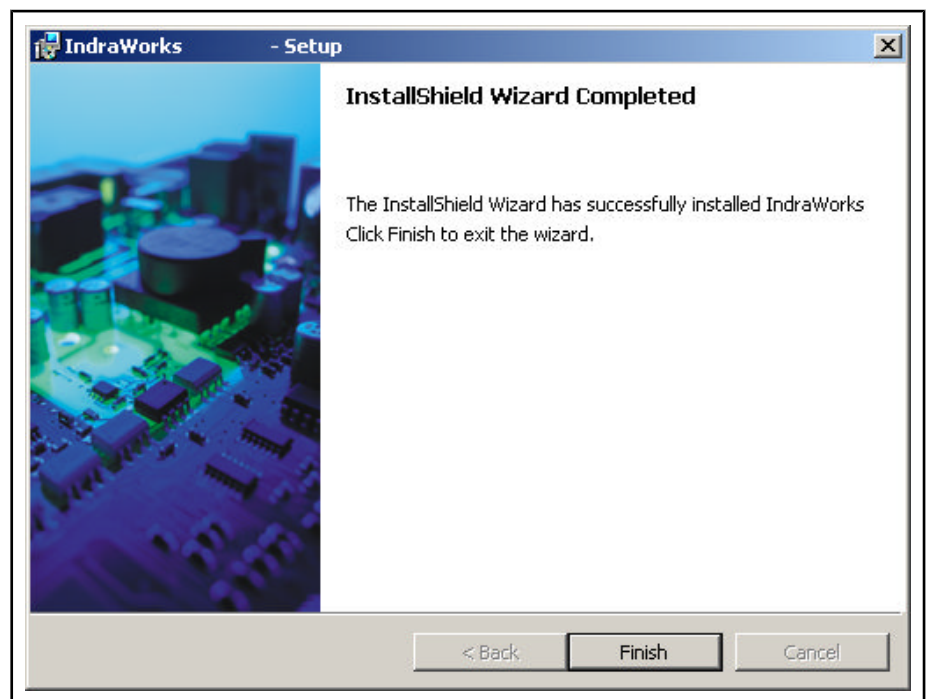


Fig.5-15: Dialog: IndraWorks Setup (end of the installation)



Before you can work with the program, restart Windows or the computer.

After the restart, system files are updated and the necessary registrations performed. The installation is now completed.

Description of the Steps

5.1.4 Parallel Installation

Several different versions of the IndraWorks software can be installed at once. If another version should be installed in addition to the existing version, proceed as follows:

1. Start the installation as described under [chapter "Installing IndraWorks" on page 44](#)

After the language selection, a selection dialog appears

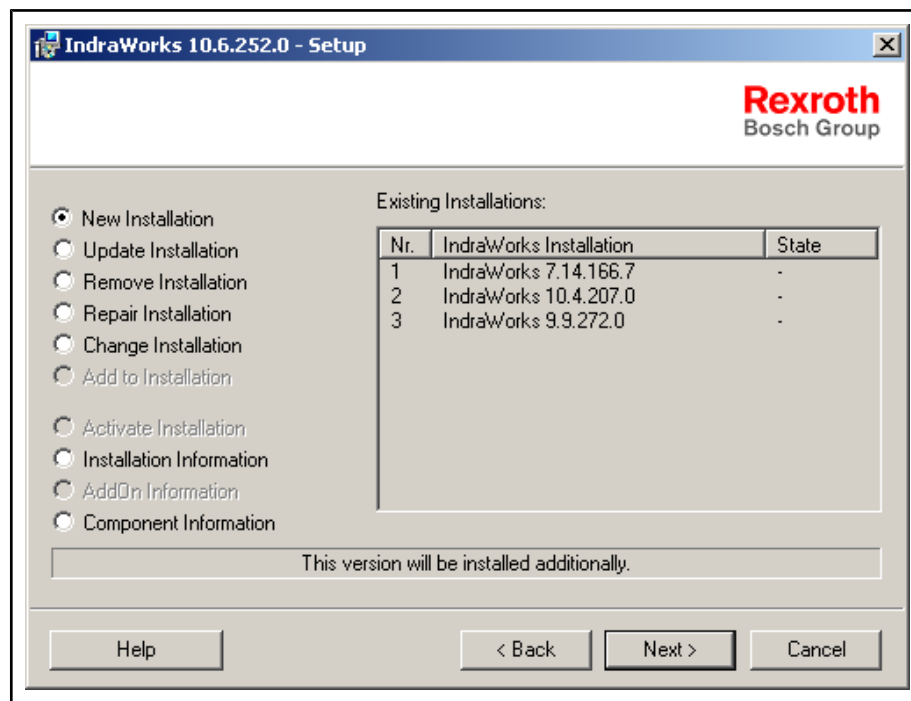


Fig.5-16: Dialog: IndraWorks Setup (selecting installation type)

2. Select "New Installation" and close the dialog with **Next >**

This starts the installation

The rest of the installation corresponds to the initial installation.

5.1.5 Updating IndraWorks



Loss of user data!

With some devices, user data might be lost. Therefore, it is recommended to archive the user data **before** updating the software.

Start the installation program as described under [chapter "Installing IndraWorks" on page 44](#)

1. Proceed up to the following selection dialog:

A list appears that includes the existing installations

Description of the Steps

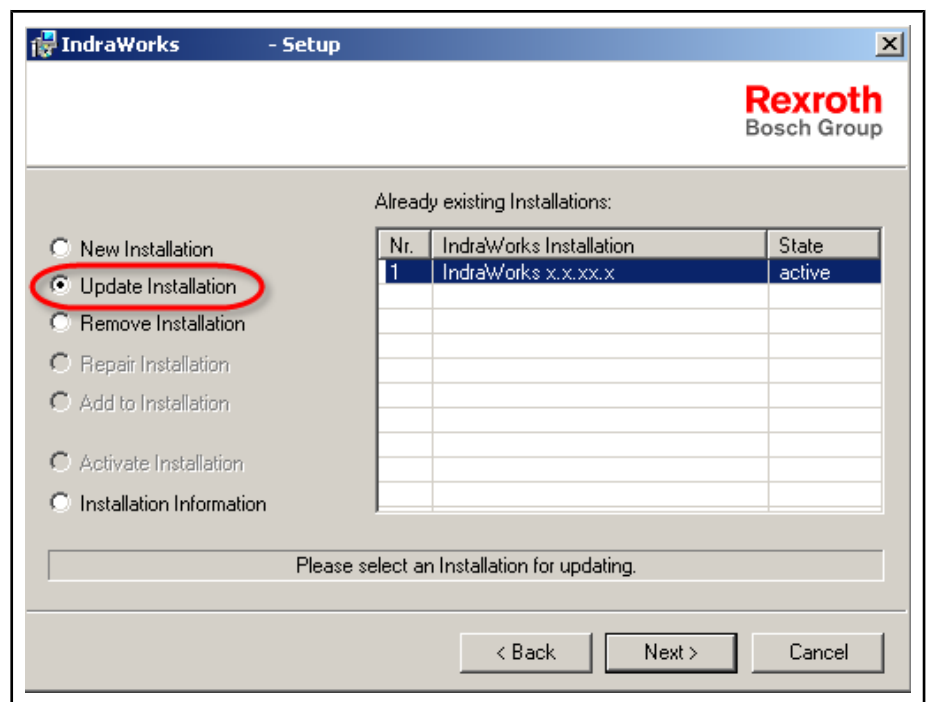


Fig. 5-17: Selection dialog

2. • From the list, select the version for which an update should be performed.
- Select "Update Installation"
- Close the dialog with **Next >**
3. If a previous version of IndraWorks has to be uninstalled before an update, the following note appears:

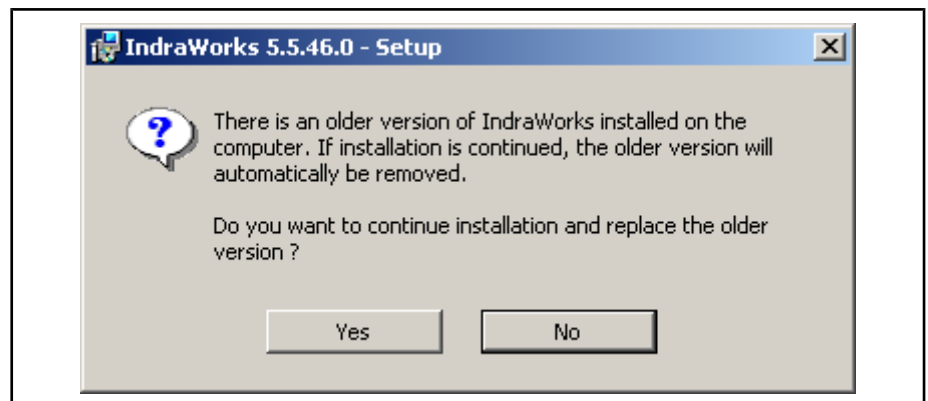


Fig. 5-18: Note on the IndraWorks update

Click **Yes** to move to the information screen to execute the update

4. The rest of the procedure corresponds to the initial installation. Follow the instructions on the screen

Description of the Steps

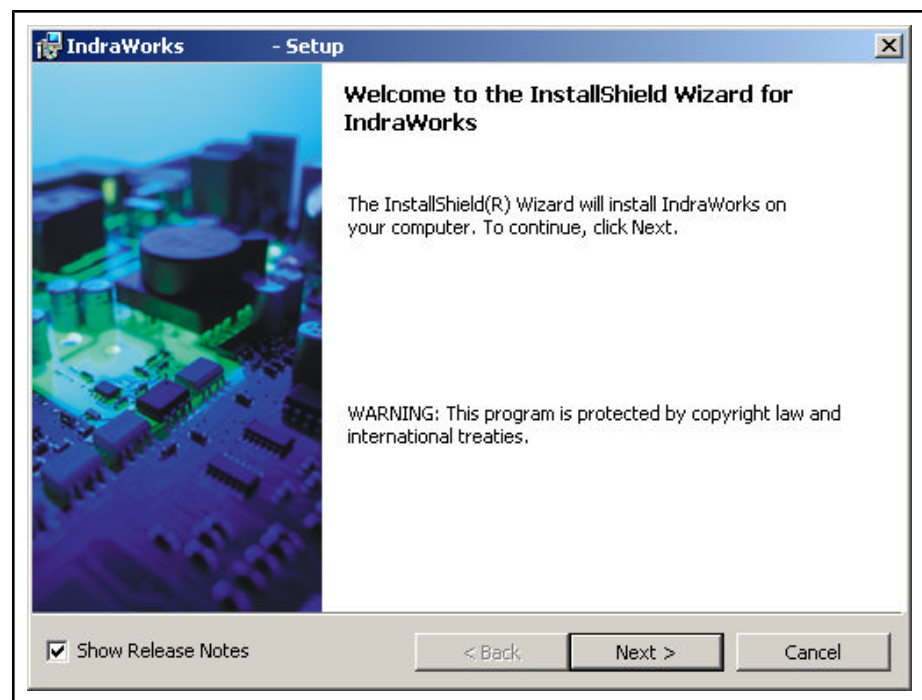


Fig.5-19: Information screen regarding the IndraWorks update

5. After request, complete the installation with **Finish**.

After the update, you are requested to restart Windows.

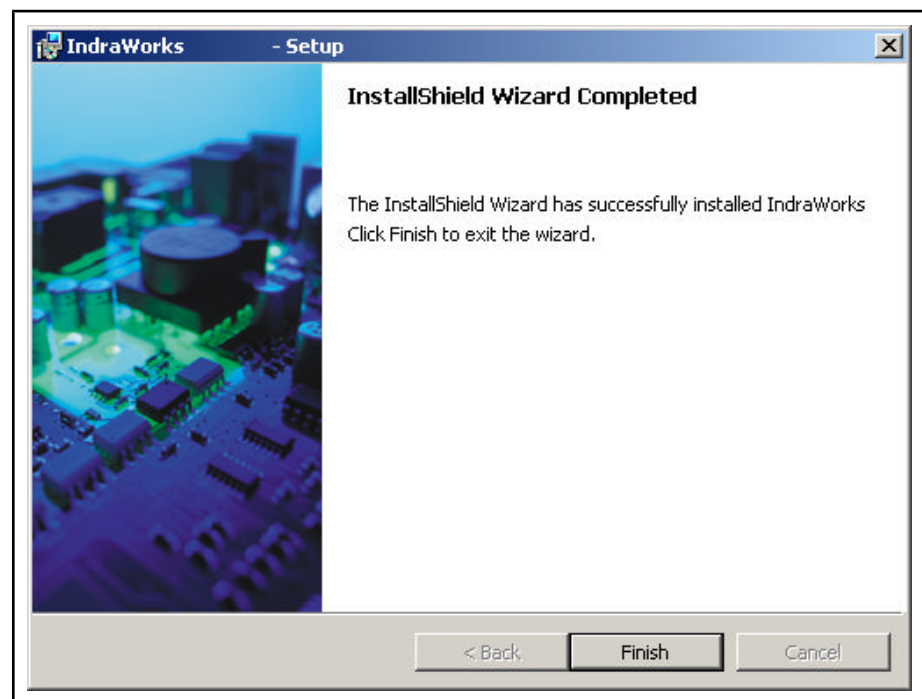


Fig.5-20: End of the update



Before you can work with the program, restart Windows or the computer.

After the restart, system files are updated and the necessary registrations performed. The installation is now completed.

5.1.6 Uninstalling IndraWorks

Uninstalling for parallel installations

If several versions of the software are installed, it can be uninstalled via the Setup. After starting the Setup (see [chapter "Installing IndraWorks" on page 44](#)), the selection dialog appears.

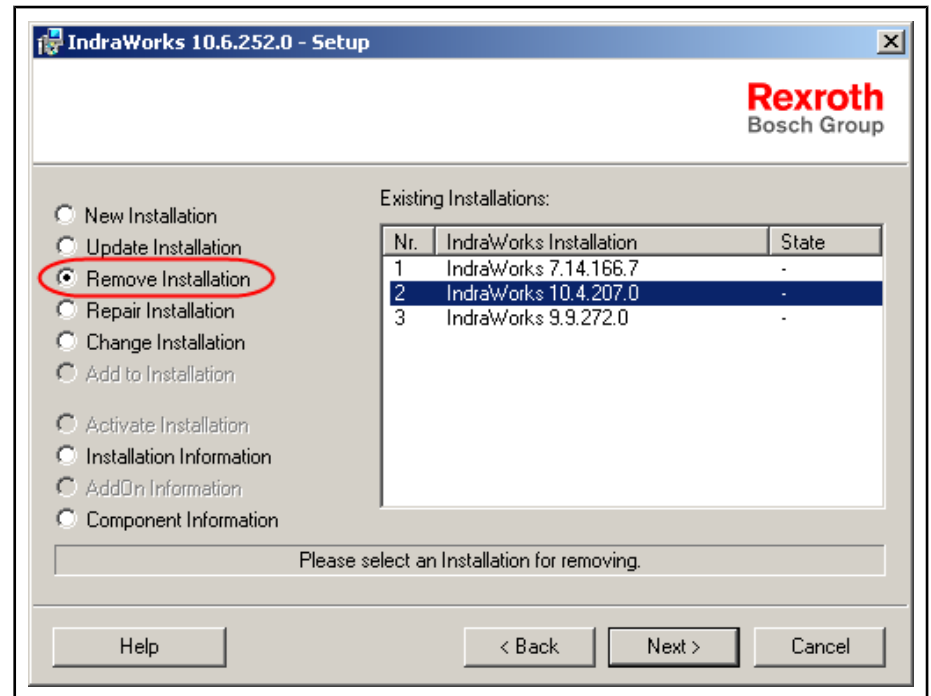


Fig. 5-21: Dialog: IndraWorks Setup (removing an installation)

1. Select the version to be removed from the list
2. Select "Remove Installation"
3. Click **Next >** to continue

Uninstalling using the operating system

IndraWorks is uninstalled using the operating system via **Start ► Control Panel ► Software**. Select "IndraWorks" as the program to be removed. The installation DVD for IndraWorks software is not needed. After the uninstallation, a prompt asks whether all data below the installation folder that has not been removed should be move to the Recycle Bin.



Loss of user data!

If user data should be accessed after uninstalling the software, save it.

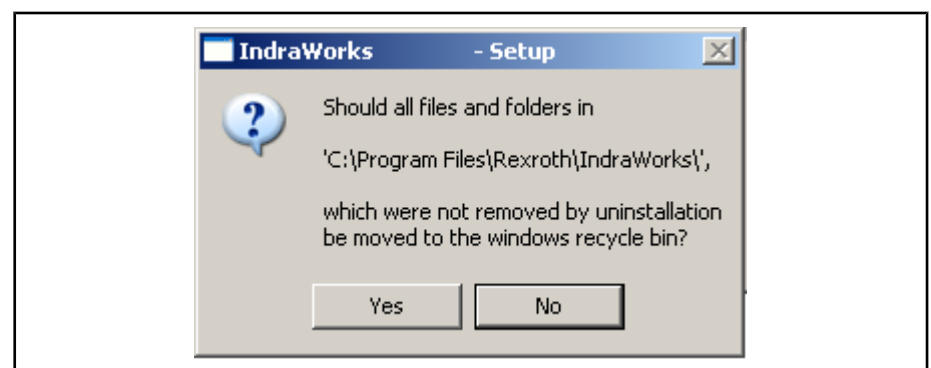


Fig. 5-22: Dialog: IndraWorks Setup (end of the uninstallation)

Description of the Steps

After the uninstallation, you are requested to restart Windows.



To update the system files, restart Windows or the computer.

After the restart, the system files are updated. The uninstallation is now completed.

5.2 Complete Data Backup

5.2.1 General

The complete MLC data backup is carried out via archiving. It is backed up in Online mode.



Depending on the size of the project and the number of the axes used, the data backup can take a few minutes.

The following data is archived:

- Configuration
- Control parameters
- Drive parameters
- Kinematic data
- Libraries, device descriptions
- Compact Flash card contents



If there are DTM devices, the DTM data has to be downloaded from the device before the archiving.

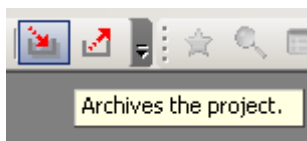
If there are DTM devices, the DTM software has to be installed before and after the restoration, the parameters have to be written to the device again.

5.2.2 Complete Backup Procedure

The complete backup procedure is as follows:

1. If one or more DTMs are present, the DTM parameters have to be downloaded from the device. Otherwise, continue with the step 2
see ["DTM - archiving" on page 173](#).

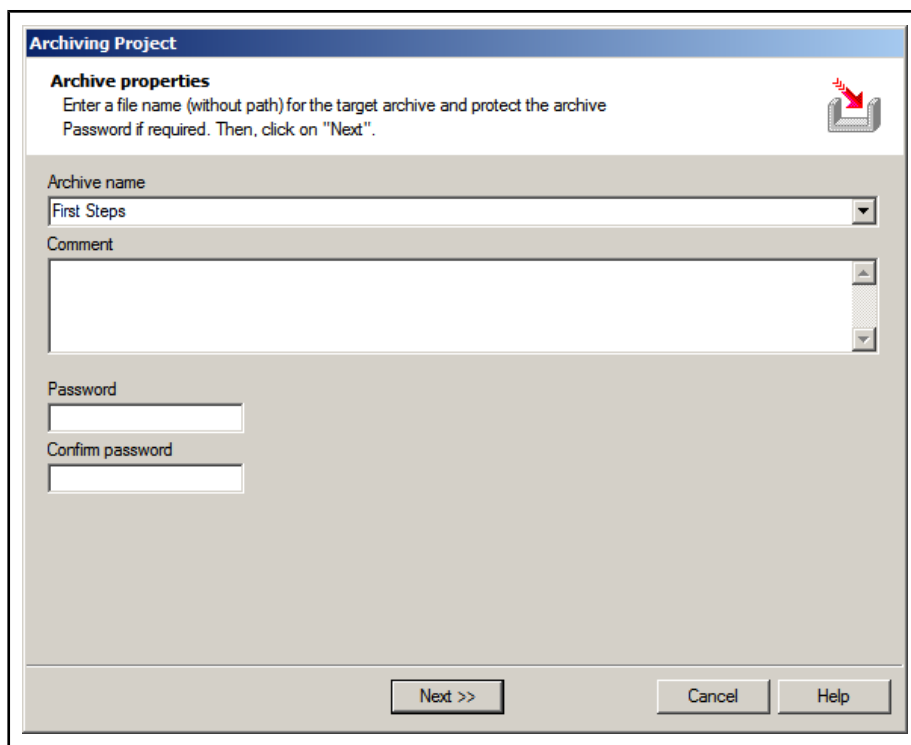
2.



Select the icon in the IndraWorks toolbar

3. Enter the name of the archive as well as the optional input of a comment and/or password

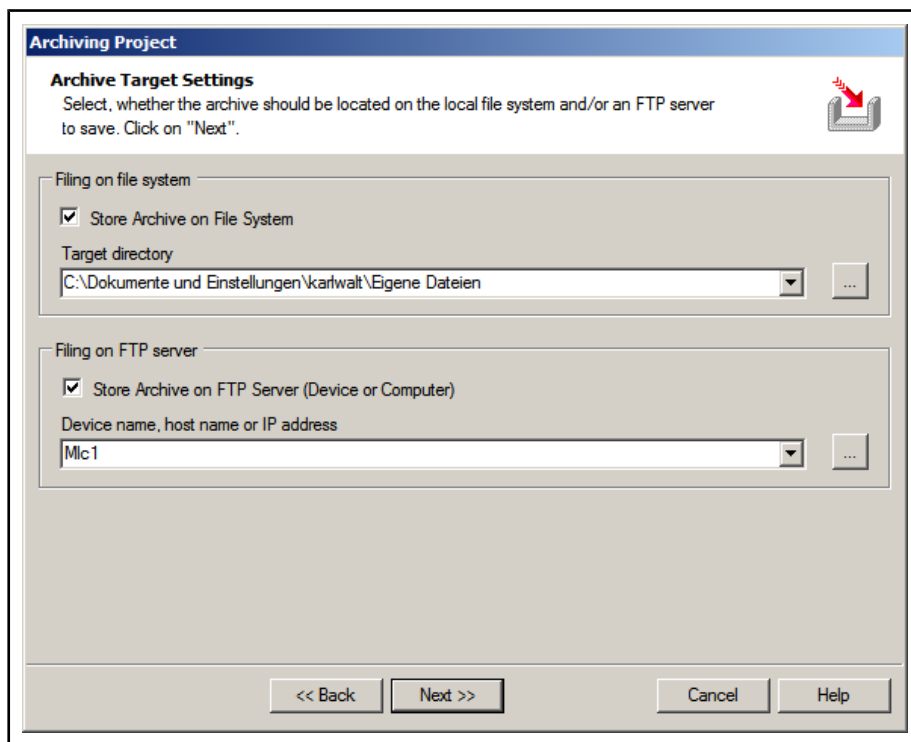
Description of the Steps



The dialog box is titled "Archiving Project" and has a blue header bar. Below the header, the "Archive properties" section contains instructions: "Enter a file name (without path) for the target archive and protect the archive Password if required. Then, click on 'Next'." To the right of the text is a red arrow icon pointing into a folder. The form includes an "Archive name" dropdown menu with "First Steps" selected, a "Comment" text area, a "Password" text field, and a "Confirm password" text field. At the bottom right are buttons for "Next >>", "Cancel", and "Help".

Fig.5-23: Enter the archive name

4. Select the storage location (file system and/or FTP server)



The dialog box is titled "Archiving Project" and has a blue header bar. Below the header, the "Archive Target Settings" section contains instructions: "Select, whether the archive should be located on the local file system and/or an FTP server to save. Click on 'Next'." To the right of the text is a red arrow icon pointing into a folder. The form is divided into two sections: "Filing on file system" and "Filing on FTP server". In the "Filing on file system" section, the "Store Archive on File System" checkbox is checked, and the "Target directory" dropdown menu shows "C:\Dokumente und Einstellungen\karl.walt\Eigene Dateien". In the "Filing on FTP server" section, the "Store Archive on FTP Server (Device or Computer)" checkbox is checked, and the "Device name, host name or IP address" dropdown menu shows "Mlc1". At the bottom are buttons for "<< Back", "Next >>", "Cancel", and "Help".

Fig.5-24: Select the storage location

5. Select the data to be archived. On the "General" tab, specify if the control data should be backed up and which partitions of the MLC/MLP should be backed up.

The three partitions contain the following data:

Description of the Steps

- User partition: Cam tables transferred to the control, MotionProfile as well as any personal documents
- OEM partition: Archives saved on the device; compiled PLC programs
- System partition: Firmware, PLC retain data

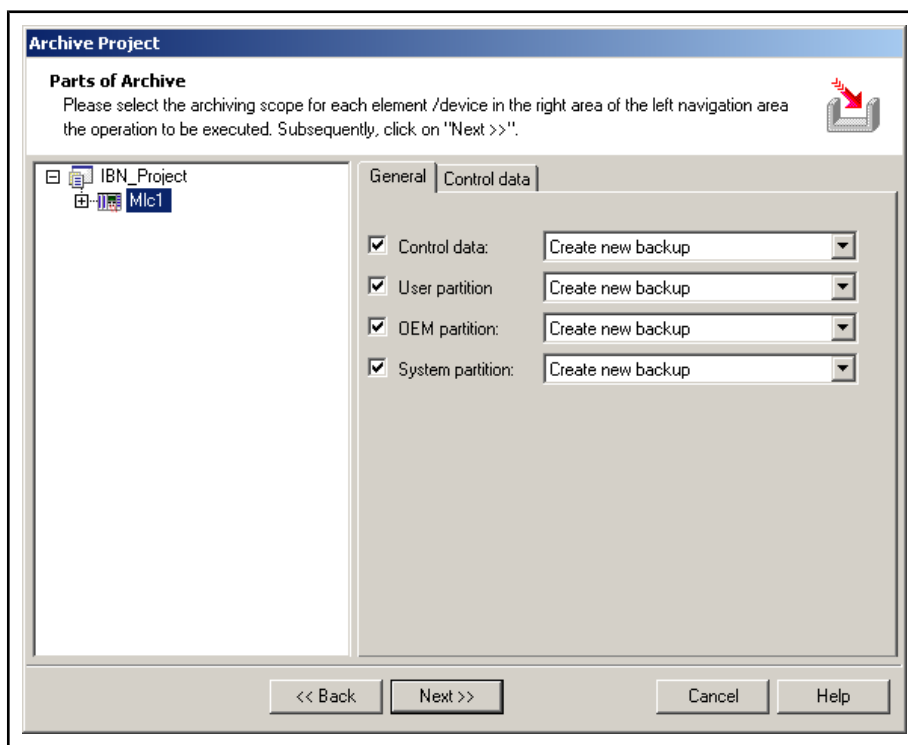


Fig.5-25: Selection of the components to be archived (1)

On the "Control data" tab, the parameters to be saved can be specified and whether kinematic data is to be saved.

It is only possible to make an entry on this page if "Create new backup" was selected on the "General" tab at "Control data". If not at least one kinematics is configured in the control, the "Other data" area is not displayed.

Description of the Steps

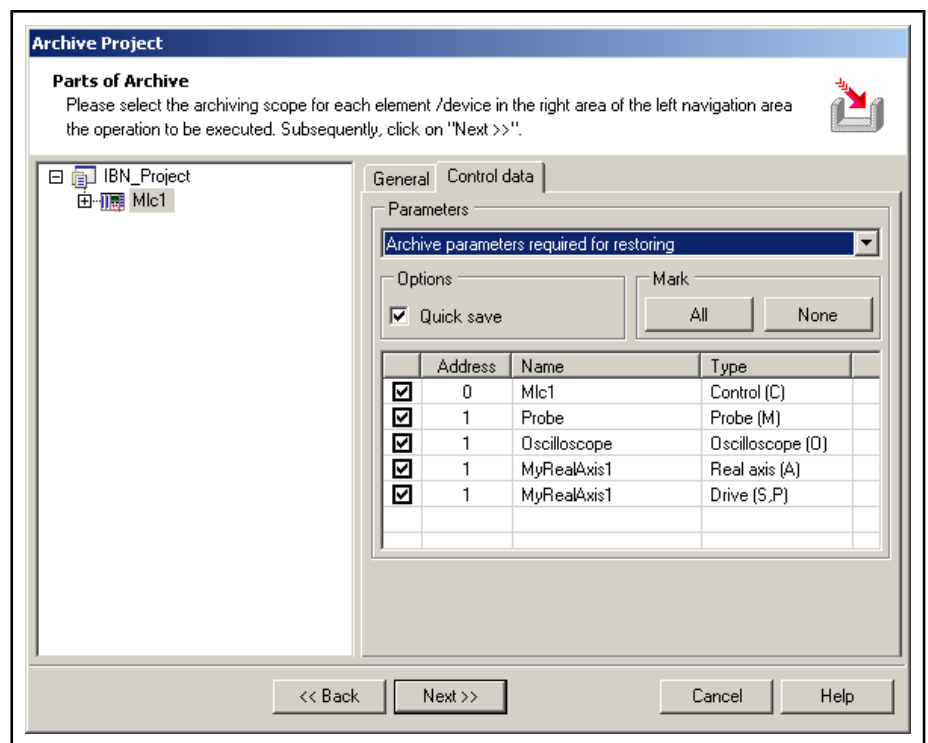


Fig.5-26: Selection of the components to be archived (2)

6. Check user inputs

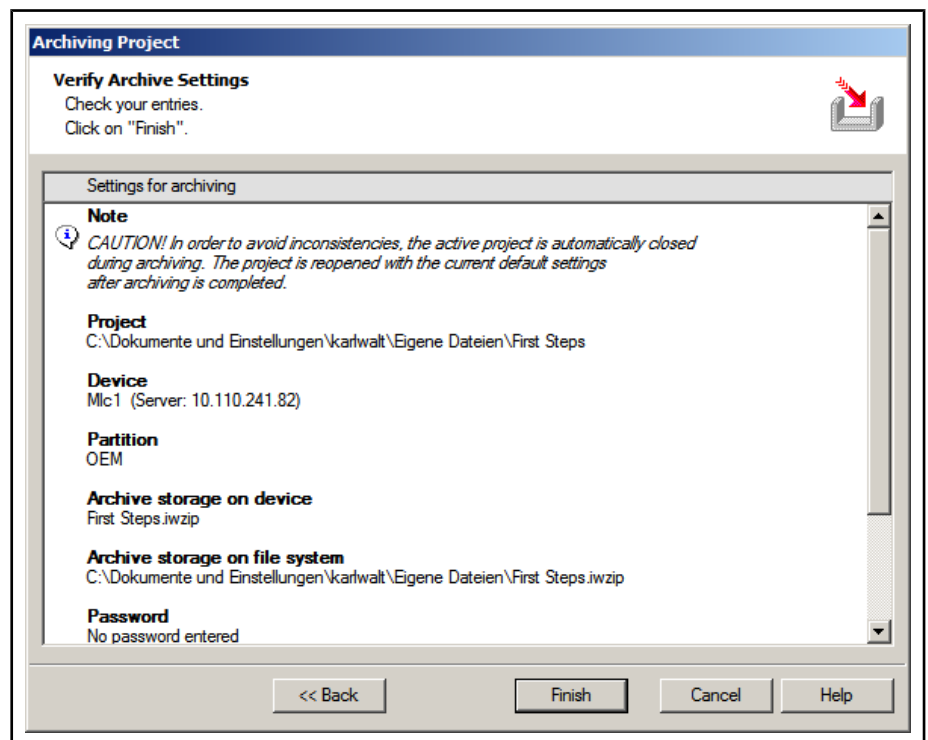


Fig.5-27: Check user inputs

7. Archive with progress bar

Description of the Steps

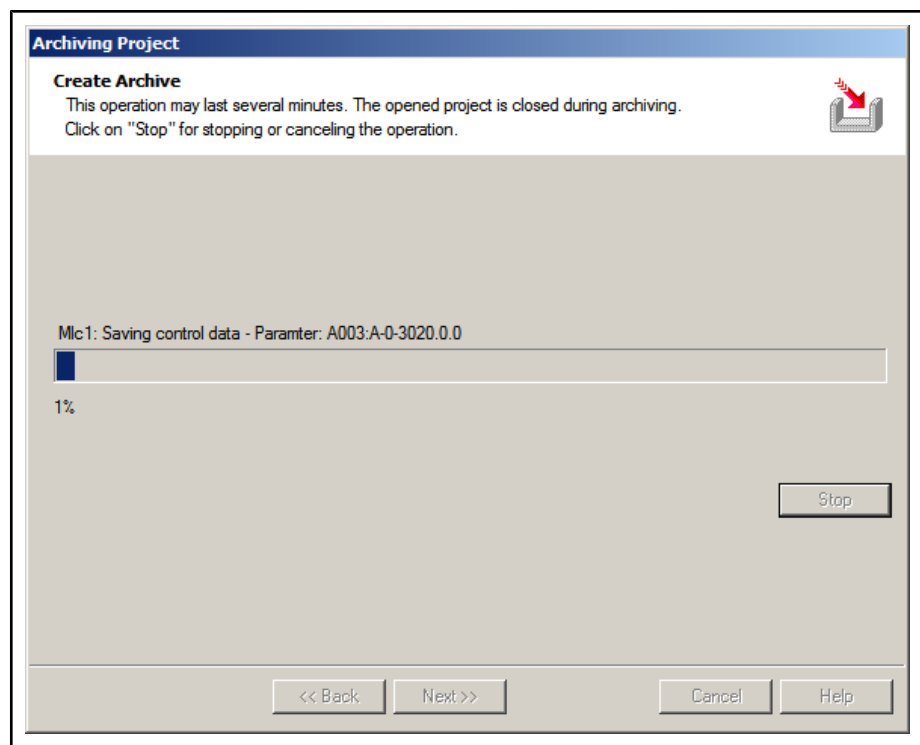


Fig.5-28: Archiving...

During the archive creation, this additional dialog appears for saving drive parameters in the non-volatile memory of the drive.

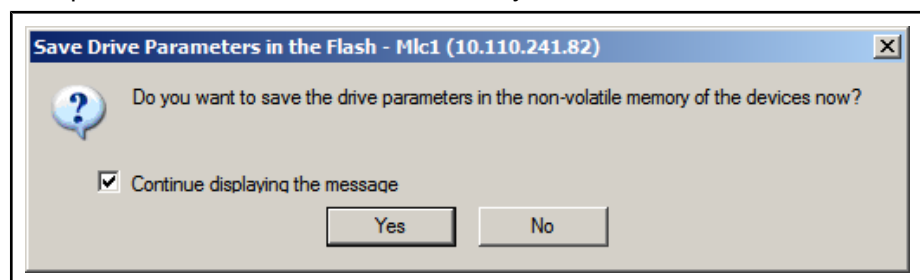


Fig.5-29: Dialog to archive drive parameters

8. Display of a summary

Description of the Steps

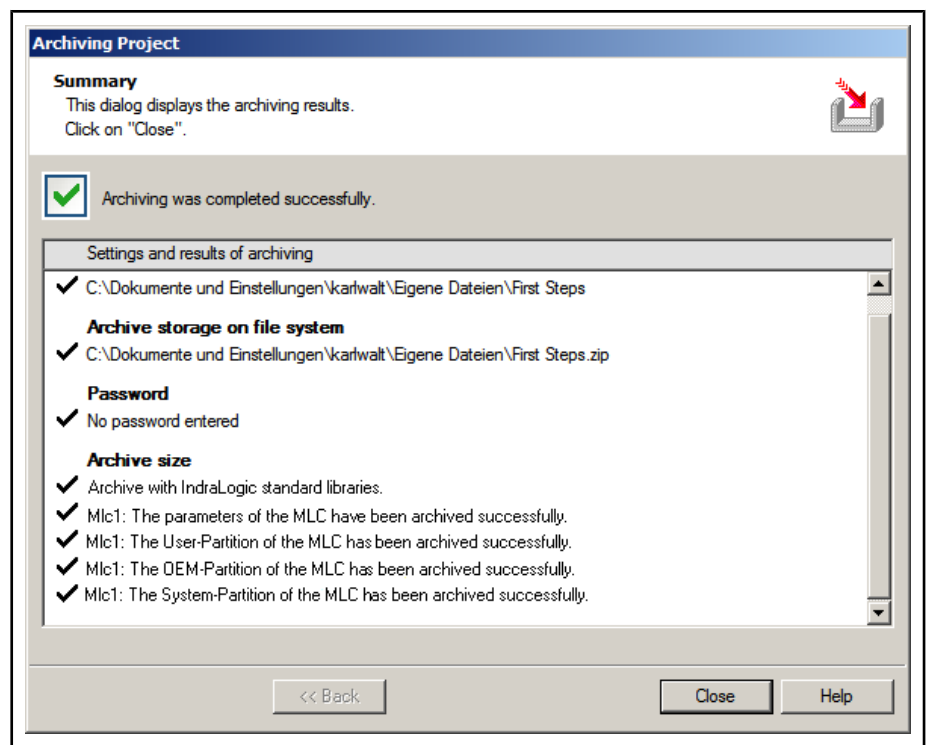
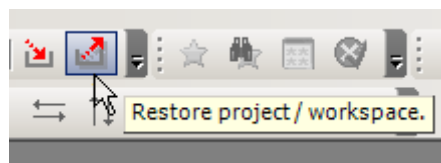


Fig.5-30: Summary of the project backup

5.2.3 Project Restoration Procedure

The project is restored as follows:

1. If there are DTMs, their softwares have to be on the computer or installed. Otherwise, continue with the step 2
see ["DTM - Restoration" on page 173.](#)
2. In the IndraWorks toolbar, select the icon



3. Specify the restoration type, i.e. the source of the project to be restored (file system or FTP server)

Description of the Steps

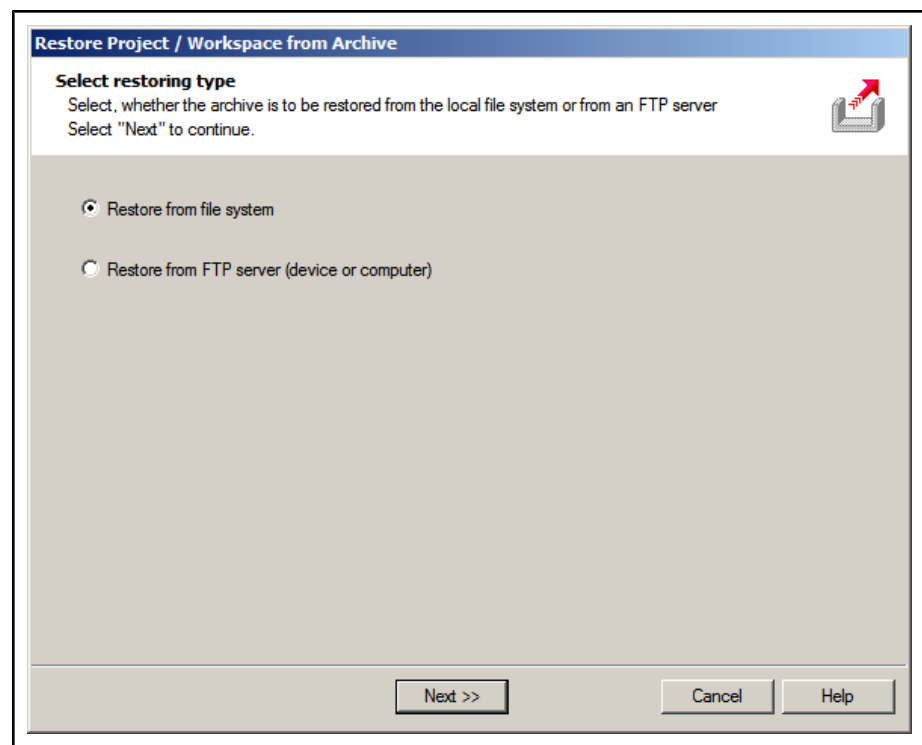


Fig.5-31: Specifying the restoration type

4. Select the archive to be restored

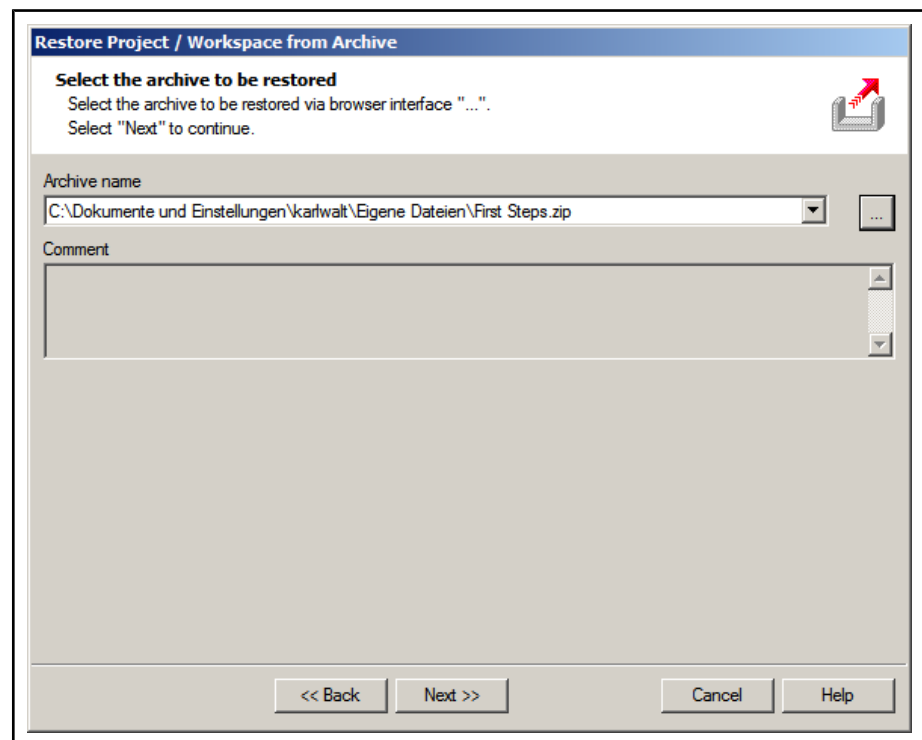


Fig.5-32: Select the archive to be restored

5. Select the directory in which the archive should be restored
A folder with the project name is automatically created

Description of the Steps

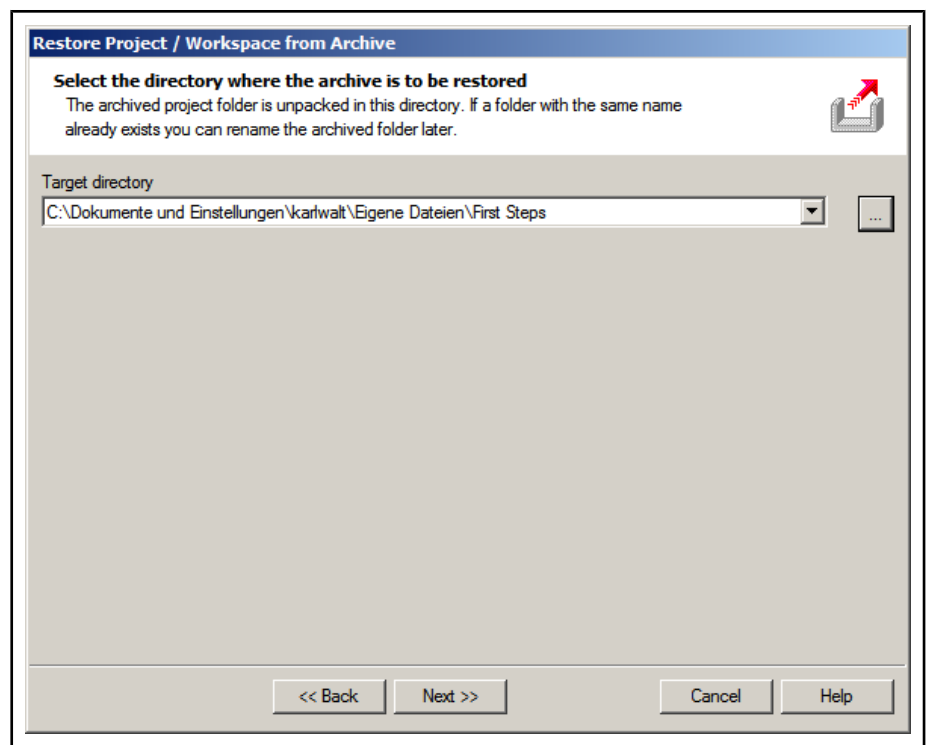


Fig.5-33: Selecting the directory...

6. Check the specifications made

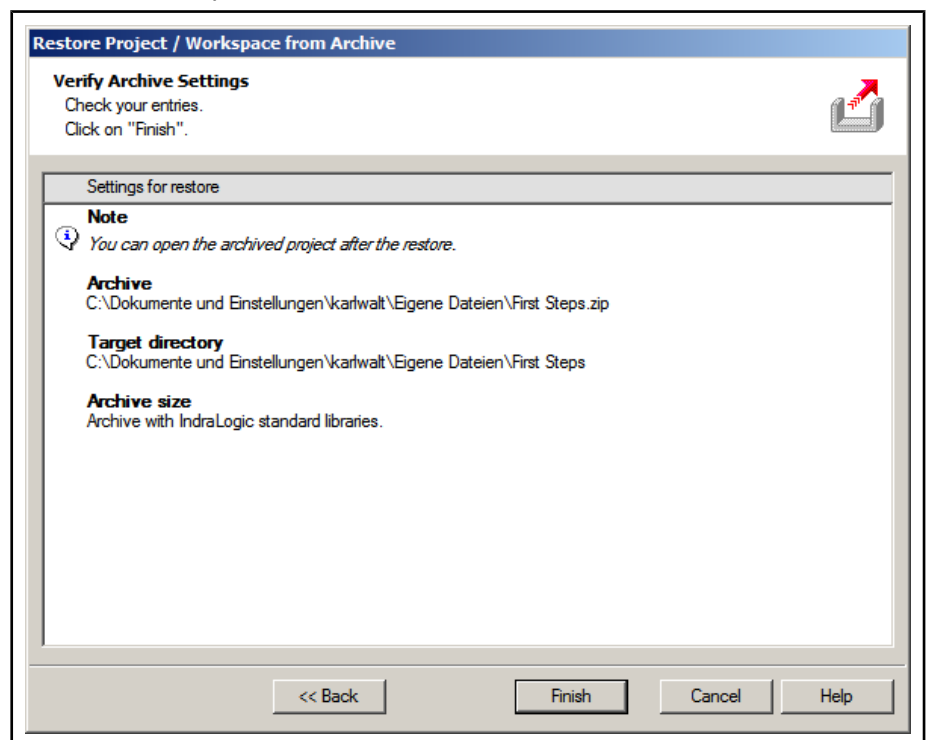


Fig.5-34: Check the specifications made

If a password was specified when the project was archived, a dialog to enter the password opens

Description of the Steps

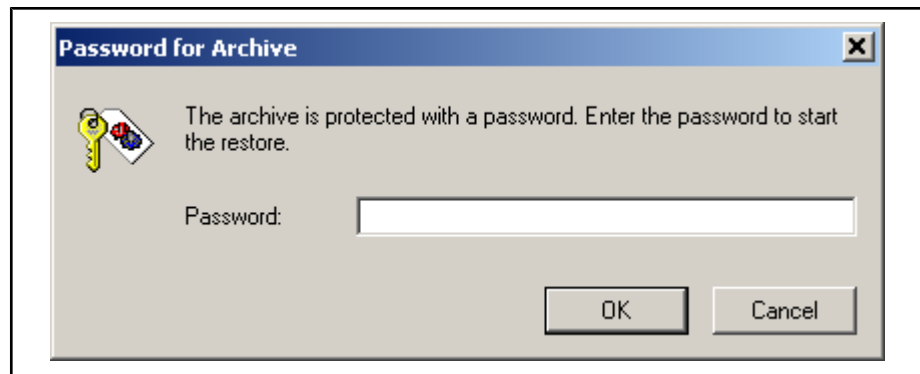


Fig.5-35: Input dialog for the password

7. A summary of the project restoration is displayed. The selected archive, the target directory, the project directory and the archive size are displayed.

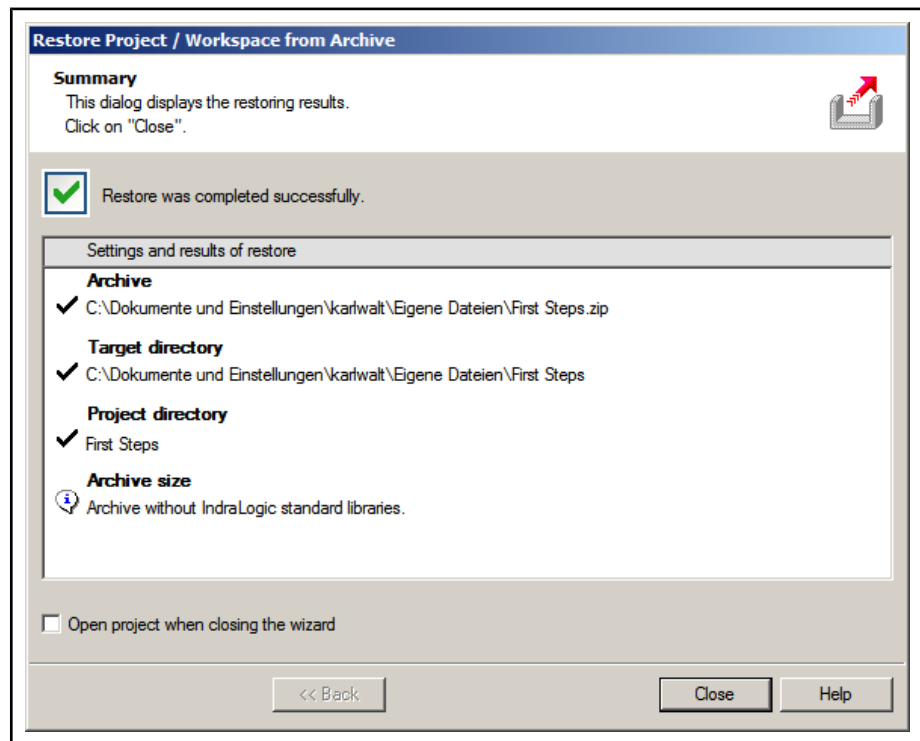


Fig.5-36: Display of a summary

8. The project was restored

If device data is present in the project, the following message appears when opening the project for the first time:

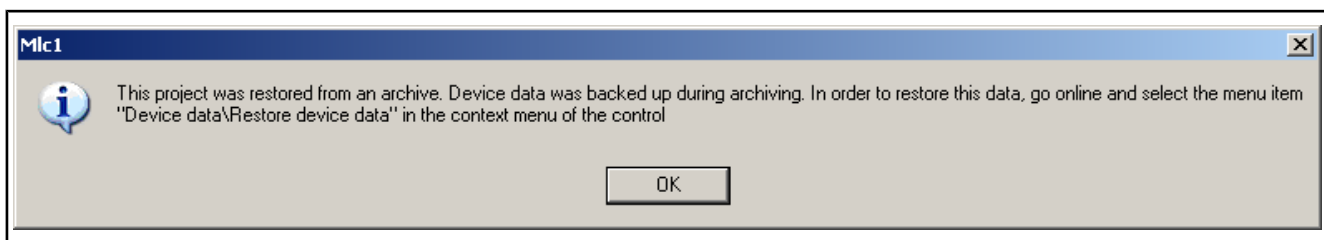


Fig.5-37: Restoring Device Data

see [chapter 5.11.2 "Restoring Device Data" on page 88](#)

9. If there are DTMs, the parameters have then to be written to the device

see ["DTM - Restoration" on page 173](#)

5.3 IndraMotion MLC - Setting the IP Address

IP address - Initial setting

Before the IndraMotion MLC can communicate with the programming device (e.g. notebook) via Ethernet, it has to be provided with an IP address valid for the network.

State of delivery

In the state of delivery, the following addresses are set on the control:

Address	Initial value
IP address	192.168.001.001
Subnet mask	255.255.255.0
Standard gateway	192.168.001.001

Fig. 5-38: Initial values

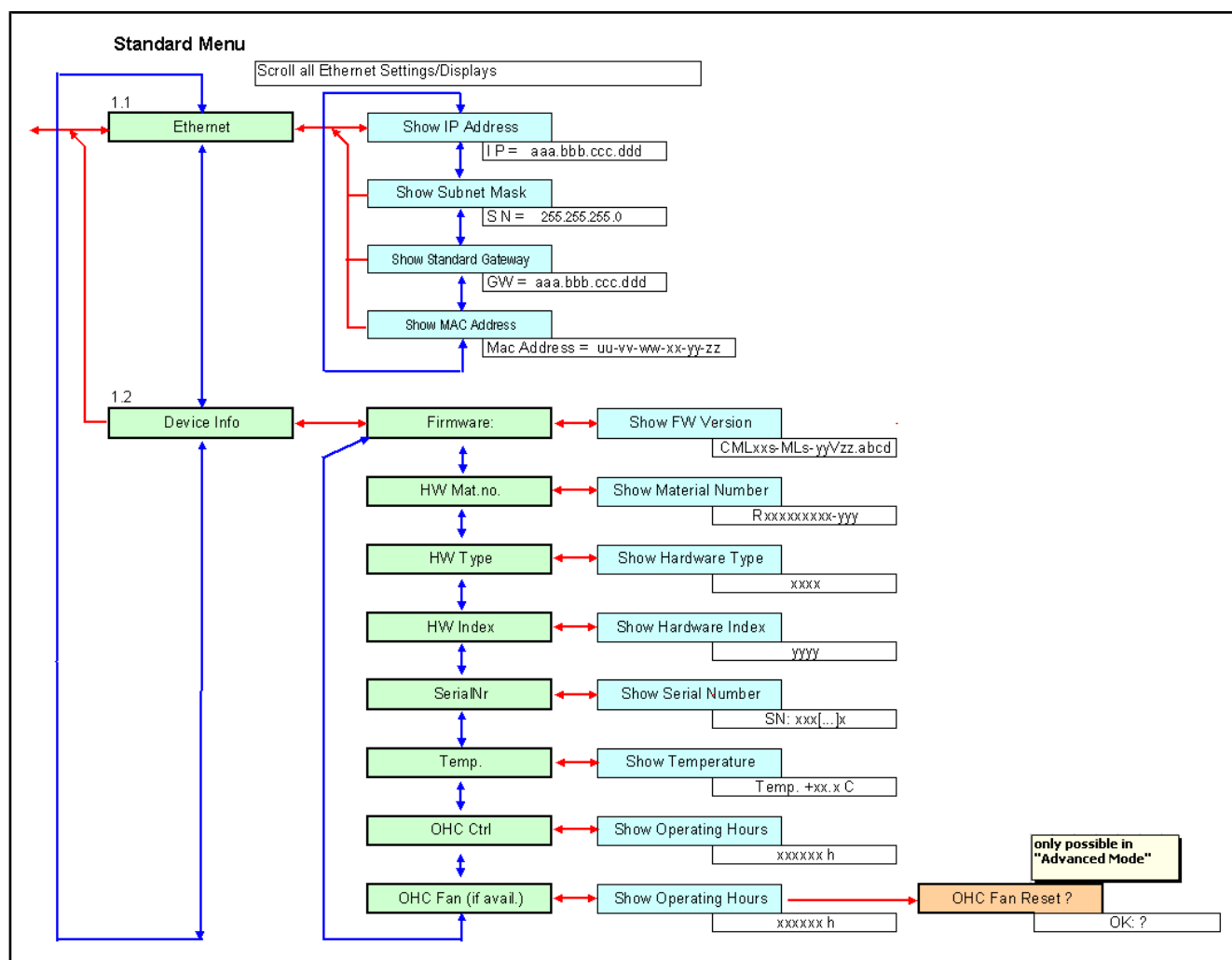
The IP and subnet mask of a control are set via the four keys of the control display (see [fig. 5-39 "IndraMotion MLC display with four operating keys" on page 66](#)).. Afterwards, the control can be connected to the PC via the company network or via cross-over cables. The cross-over connection requires no address change in the control. Only the programming device side has to be adjusted.



If the control is connected to the company network, the instructions of the network administrator have to be observed.

In the **"BB STOP"** state, the IP address and the subnet address can be read and set and the current firmware status can be determined.

Description of the Steps



Esc One level back; discard a change
v Navigating down in the menus or decrease the value
^ Navigating up in the menus or incrementing the value
Enter Open the next menu level or confirm the entry
Fig.5-39: IndraMotion MLC display with four operating keys

The following figure shows the operating menu of the display based on the standard display:

Fig.5-40: Standard display

Description of the Steps

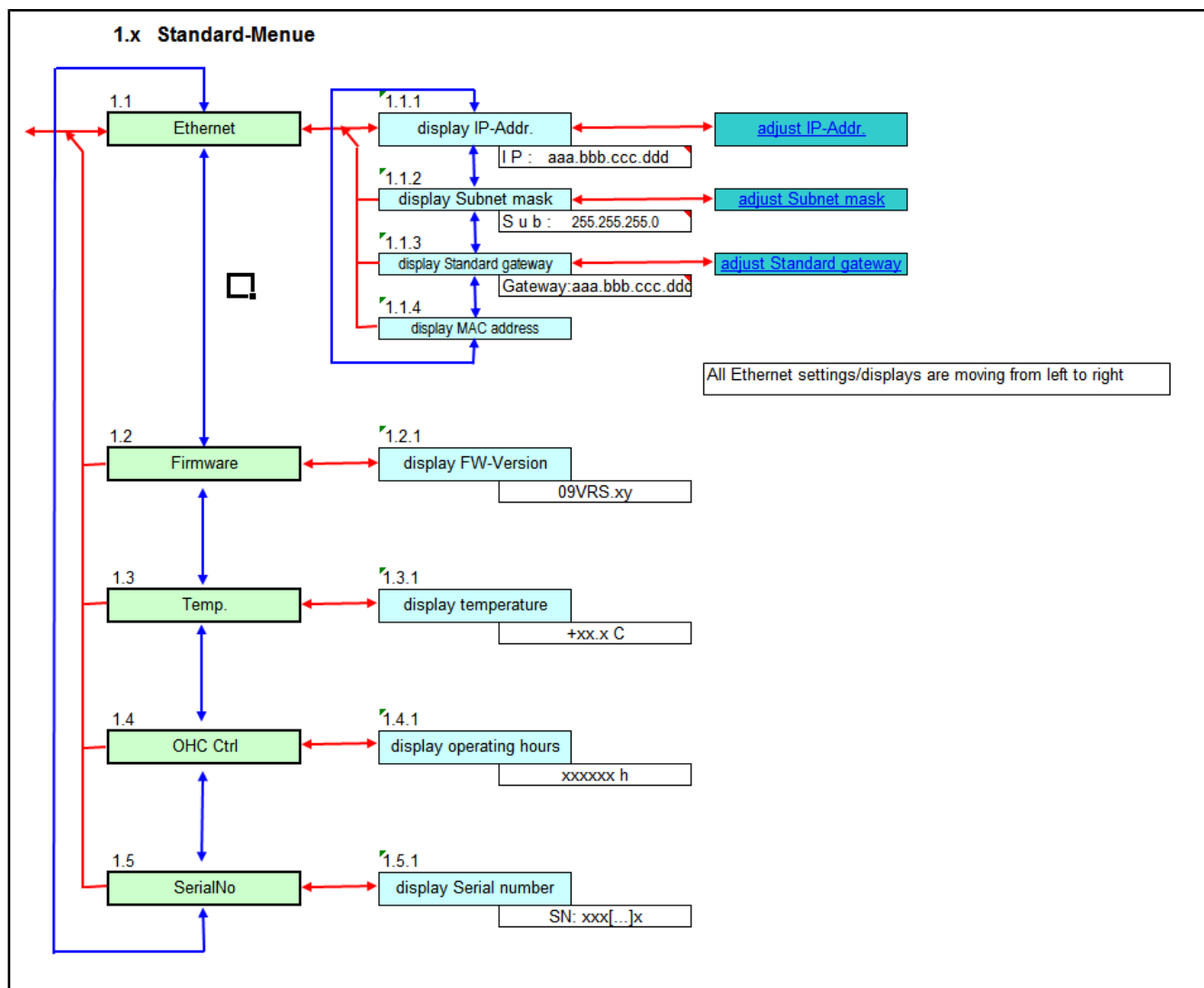


Fig. 5-41: Standard menu overview on the operation of display and keyboard

1. Move with <Enter> from the standard display **BB STOP** to the **ETHERNET** display
2. Press <Enter> again to reach the **IP address**
3. The preset address can be changed block by block when pressing <ENTER> again (changing the numerical value with <V> or <^>. Confirm and continue with <Enter>). The individual blocks flash to visualize the change.
4. After the fourth block, <Enter> triggers the query: "OK : ?". It is confirmed with <Enter>, the change is applied and the **ETHERNET** display is reached. If <Esc> is pressed during the change, the change is discarded.
5. The subnet mask and, if necessary, the gateway address can be changed in the same way.

Description of the Steps

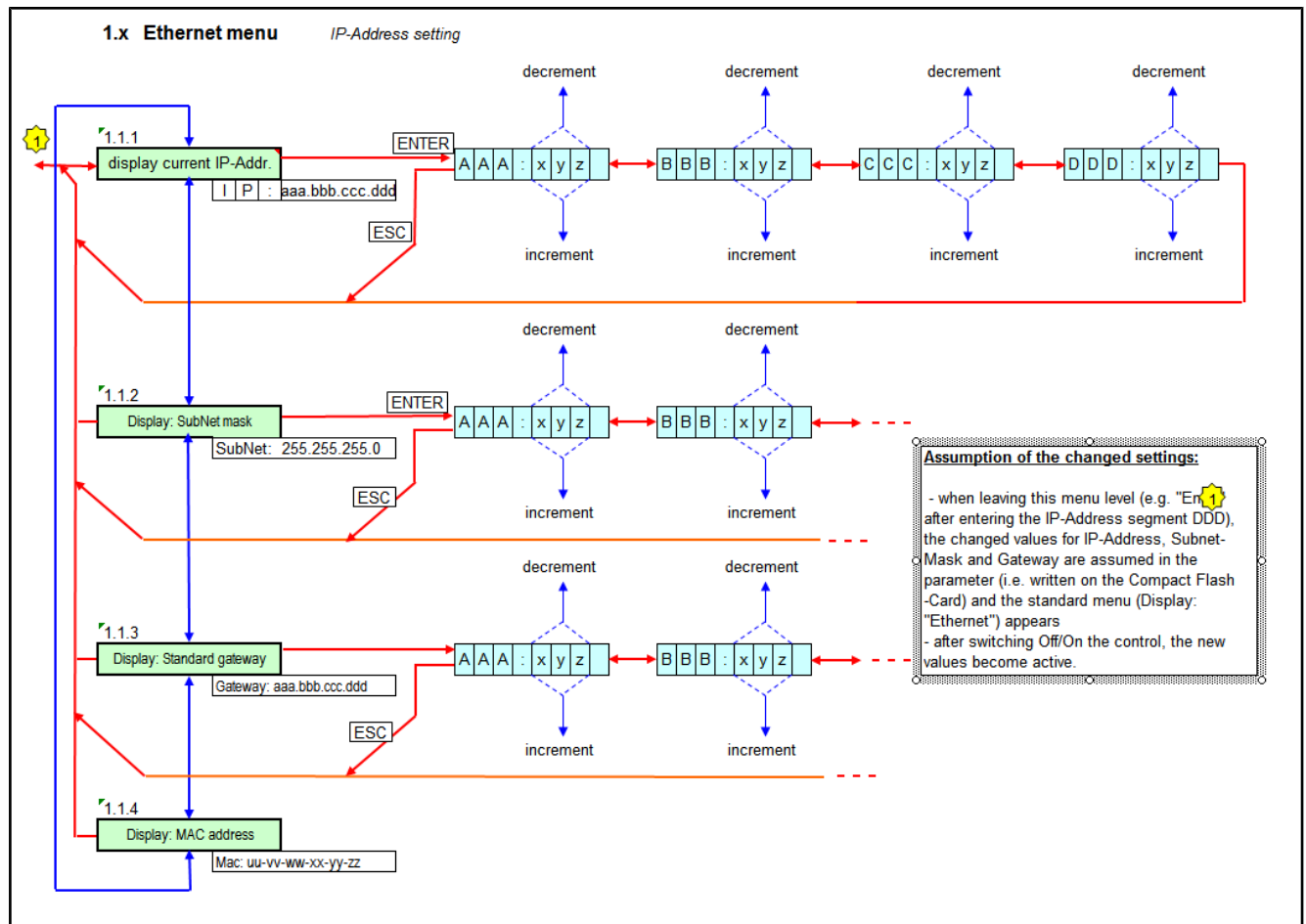


Fig. 5-42: Ethernet menu



An address change becomes only effective after the voltage has been switched off and on again (boot). Up to then, the new Ethernet settings are displayed although the previous values are still active.

As in the menu overview, the MAC address and the firmware version of IndraMotion MLC can be determined.



After setting the IP address and the subnet mask, they should correspond to the requirements for future usage.

5.4 Exchanging MLC Firmware

Goal The firmware in the control should be exchanged without loss of data.

Prerequisites

- The control is switched on
- The network settings on the control are correct
- IndraWorks has started and a project was loaded containing the control
- The IP address of the control in the project has to match the IP address of the connected control

Procedure

It is assumed that the control runs in **BB RUN** with active axes.

Description of the Steps



Read the release notes for the new firmware first.

In general, the parameter scope within a version remains stable so that the NVRAM does not have to be deleted.

To be on safe side, export all parameters first (except the S- and P-parameters (see [chapter 5.8 "Exporting Parameters" on page 78](#)). The control can contain old program components, parameterizations and PLC data from previous use that are removed by clearing the memory (see [chapter 5.5 "IndraMotion MLC - Deleting Memory" on page 72](#)).

It is recommended to follow this sequence:

1. Switch IndraMotion MLC to "Offline".



If the MLC is not switched offline, a message appears to switch the MLC offline.

Confirm this dialog.

2. Download the firmware via the context menu item "Firmware management" of the IndraMotion MLC control

The window can be enabled in the context menu of the respective control

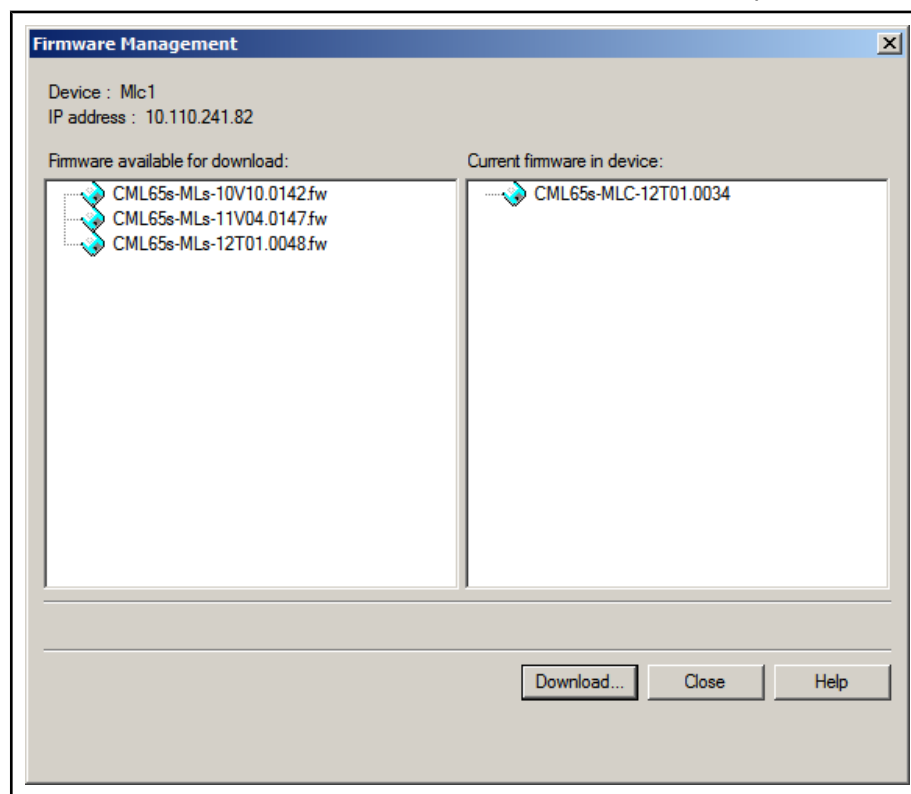


Fig.5-43: "Firmware Management" dialog

The available firmware versions are located on the left side. Select the desired version and start the download via the **Download...** button

The versions available for selection are located under:

<LW>:\All Programs\Rexroth\IndraMotion MLC\Firmware



The new firmware becomes only effective after a control restart.

3. Confirm the firmware download

Description of the Steps

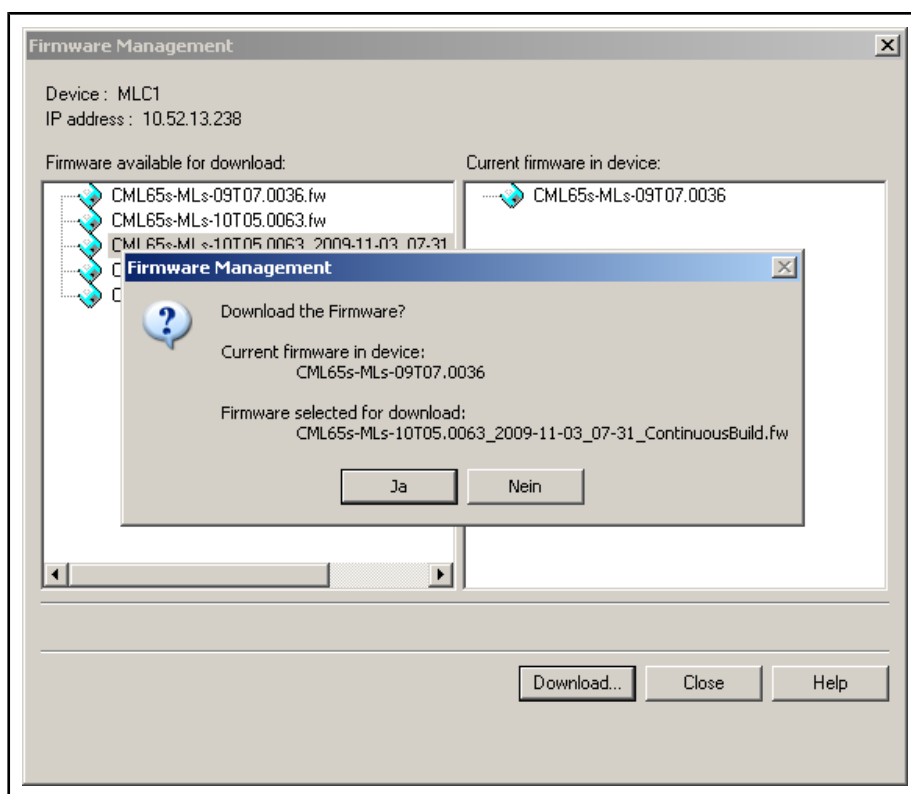


Fig. 5-44: Confirmation of the firmware download

4. The PLC is in "Run"

Confirm that the PLC should be stopped so that the firmware can be downloaded

CAUTION! Stopping the PLC triggers an emergency stop of all moving axes. Ensure that the control is in a secure state

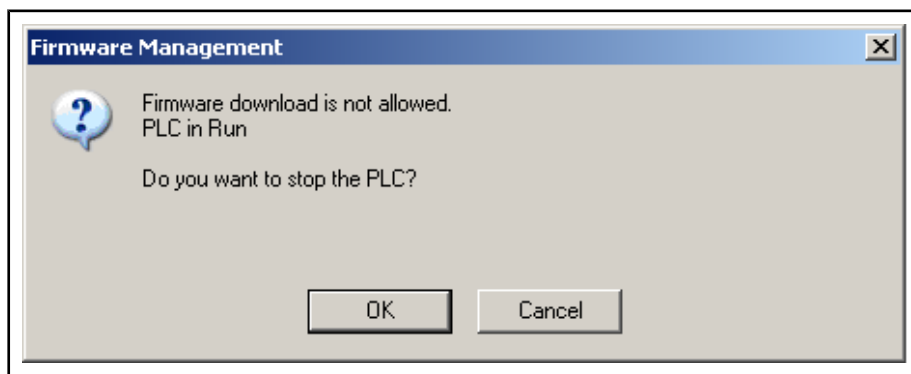


Fig. 5-45: Stopping the PLC

5. Confirm the dialog after you have established the safe state

Description of the Steps

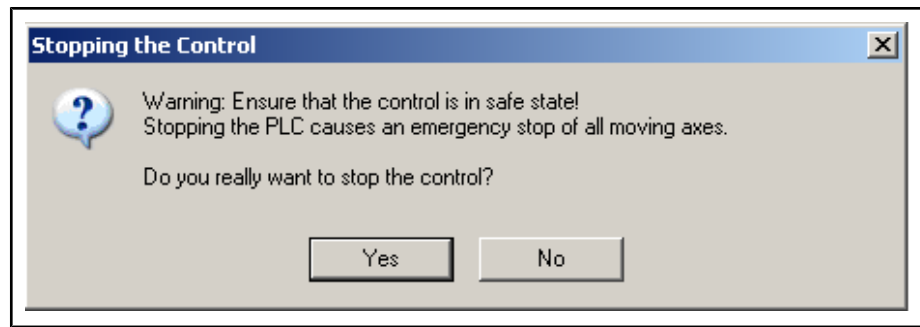


Fig.5-46: Safe state when stopping the control

6. Confirm the dialog for switching the MLC to Download mode (phase 0).

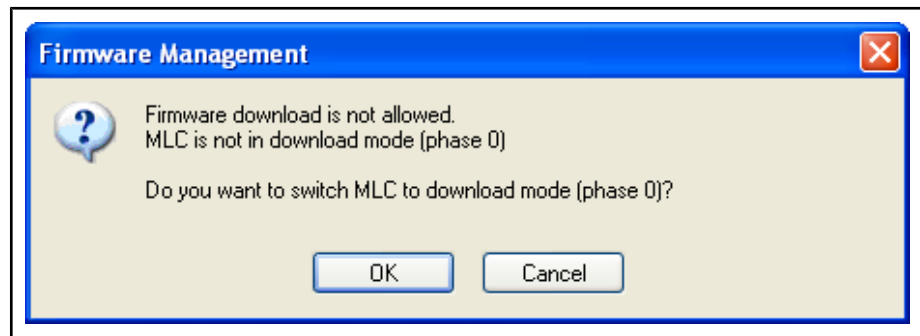


Fig.5-47: Switching to phase 0

The firmware is downloaded and the control is rebooted automatically
After the restart, the control runs up to **P2 Stop** or **BB Stop** depending on the setting of "C-0-0450, Startup target mode Motion".
Communication continues
A progress bar shows the status.

7. The control is generally rebooted automatically. However, in some cases, the control has to be restarted manually. In this case, "PWRCYCLE" is displayed on the control display. Disconnect the supply voltage for a short period and then restart the control
After the restart, the control runs up to **P2 Stop** or **BB Stop** depending on the setting of "C-0-0450, Startup target mode Motion"



At a firmware version upgrade, the MLC memory is deleted automatically.

At a firmware release update, the memory might be deleted manually in the prototype phase (see [chapter 5.5 "IndraMotion MLC - Deleting Memory" on page 72](#)).

5.5 IndraMotion MLC - Deleting Memory

From previous usage, the control can contain old program components, parameterizations and PLC data that are removed in this step by clearing the memory.

Description of the Steps



Starting with IndraWorks version 10V06, memory deletion takes place automatically during a firmware upgrade.

In the prototype phase, manual memory deletion may be necessary for a release update.

When using the function module as C2C interface (control link), consider the note on parameter C-0-0040.

With brand-new controls, this step can be omitted.



Fig.5-48: Startup phase of the control

1. After switching on the control, if <BOOT 1.01> appears, press both the keys at the outside edges below the display: <Esc> and **Enter**
BOOTSTOP is displayed.

2. Now, press both keys in the middle

CLEANUP is displayed and in case of an error-free run **REBOOT** is displayed. The keys can now be released.

If an error occurs, **CLEANERR** is displayed.



If the memory deletion has failed several times, inform customer support, since no information on the cause is displayed.

3. Now, the control runs up to **BB STOP**, the memory is cleared, the Motion components are ready for operation and the PLC components in process are stopped

5.6 Going online

This section describes how to "go online" with IndraWorks on a system. By going online, the Motion project data is adjusted to match the control and a connection to the MLC is established.

After going online was successful, axes can be parameterized and diagnostics can be read out.

It is assumed that the correct firmware is available on the control and the drives. This is for example the case following if commissioning has already been completed.

IndraWorks is started and the project is loaded.

1. **Start going online**

- **Project ► Switch devices online... or**
- right click on the control and then select **Switch online** in the menu or

- Click on  in the toolbar

Description of the Steps

2. Control selection

This step is only necessary if there are several controls in the project and switching to online has not been started using the control context menu.

The "Switch devices online" dialog appears.

In the dialog, select the control to be switched to online and confirm with **OK**

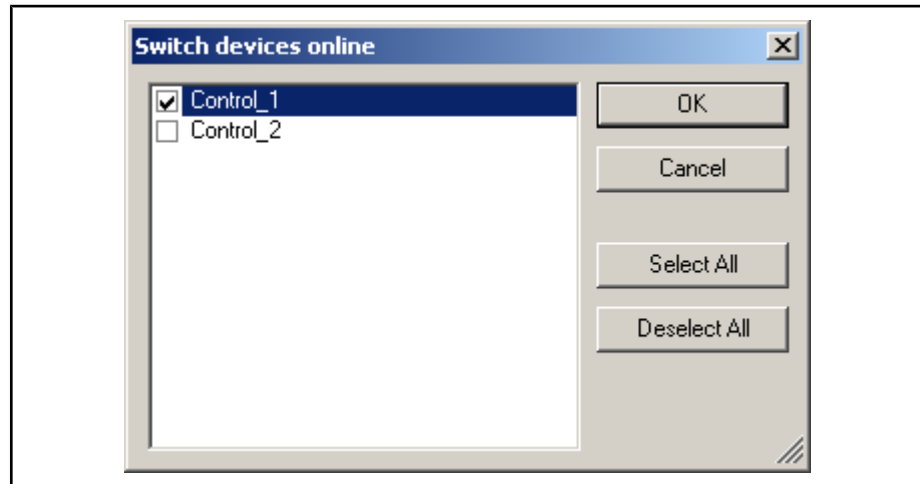


Fig.5-49: Dialog: Switch device online

3. Cross link module

This step is only necessary if either the function module "CrossComm SERCOS 2 (CFL01.1-Q2)" or "CrossComm SERCOS III (CFL01.1-R3)" are available in the project but not yet parameterized on the MLC.

Since both function modules share a similar behavior pattern, only the procedure for CrossComm SERCOS 2 (CFL01.1-Q2) is described in the following.

In the dialog, confirm the different function module configurations with **Yes**

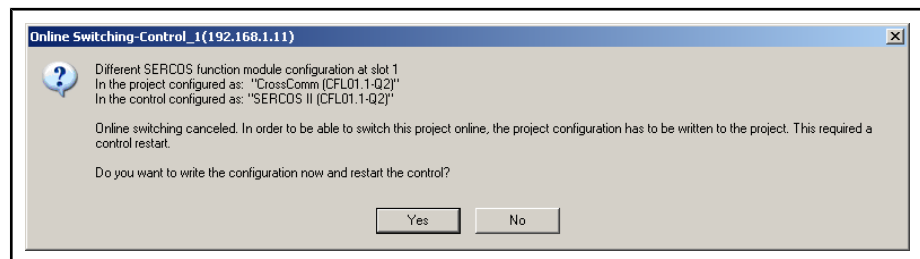


Fig.5-50: Message: Different function module

Restart the control and confirm the modified function module configuration in the dialog with **OK**

Description of the Steps

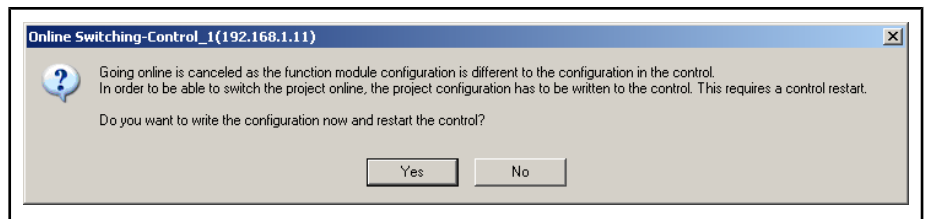


Fig. 5-51: Message: Modified function module configuration

Start at step 1 again

4. Adjusting the axis configuration



This step is only necessary if the axis configuration in the project differs from the one on the machine.

The dialog "Adjustment of the SERCOS Device Configuration" appears

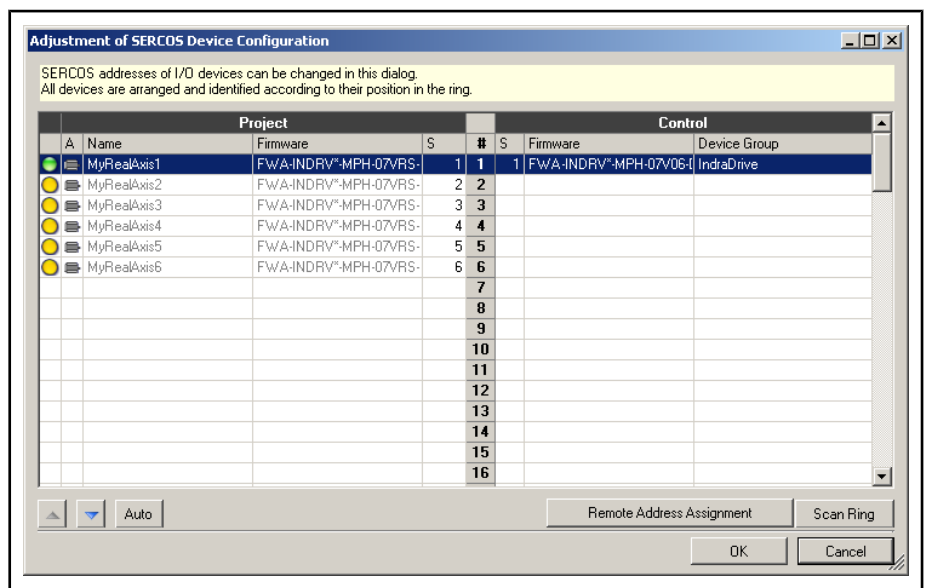


Fig. 5-52: Dialog: Adjustment of the SERCOS Device Configuration

1. Check if all of the drives have the correct SERCOS address.
2. Check if all of the drives are connected to the SERCOS bus.
3. Click the **Auto** button to deactivate the drives not present in the project.

The axis configuration in the device matches that in the project.

5. Parameter adjustment offline parameterization



This step is only necessary if an offline parameterization present in the project differs from the parameterization in the system.

The dialog "Parameter Adjustment Offline parameterization" appears

Description of the Steps

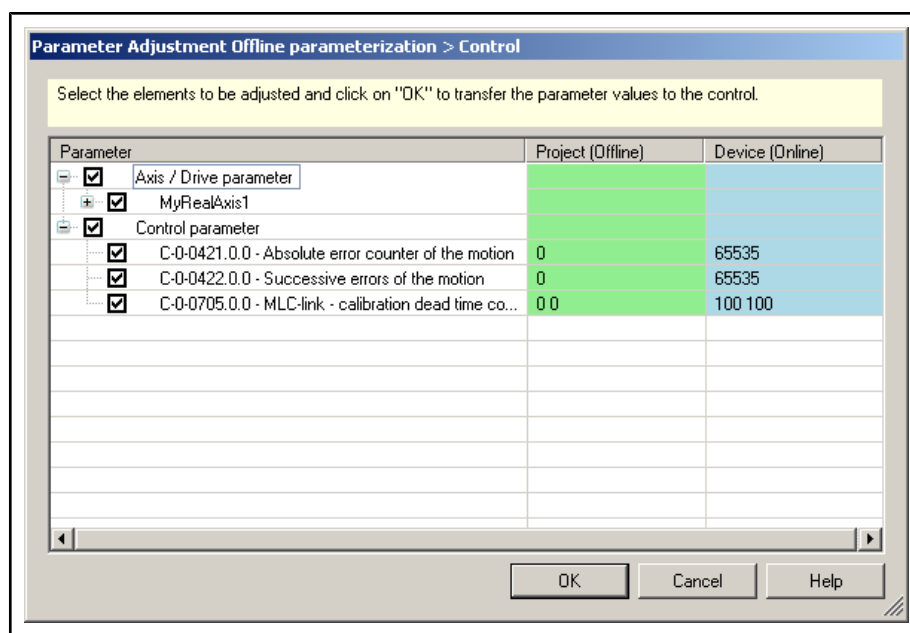


Fig.5-53: Dialog: Parameter adjustment offline parameterization

Click the **Cancel** button to not adjust the parameters

6. Setting the link address



This step is only necessary if there is a cross link function module (CrossComm) and if it has not been parameterized.

The message "The address for the control link is 0" appears

Confirm the message

The dialog "MLC link settings" appears

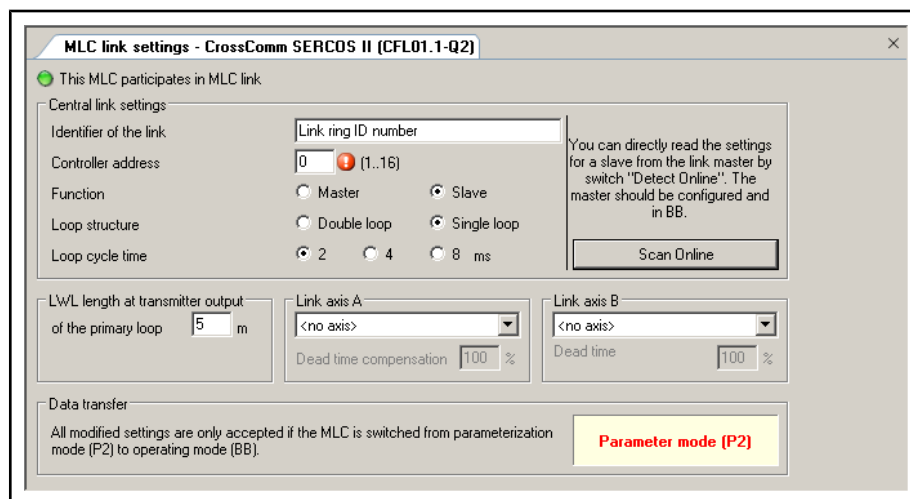


Fig.5-54: Dialog: MLC link settings

- Set control address
- Select master or slave
- Set ring structure
- Set ring cycle time and if necessary configure the link axes

Description of the Steps

Further information on link configuration can be found in [chapter 5.18 "Configuration of the Link and the Link Participants at SERCOS 2"](#) on page 162.

The control is now online

5.7 Uploading and Starting the PLC Program

This section describes the commissioning of the PLC. In this section, the PLC program is loaded to the control and started.

After this step is completed, the PLC program and all connected field buses are running.

It is assumed that the correct firmware is available on the control and the drives and that the drives and the control are parameterized.

IndraWorks is started and the project is loaded.

1. Login to the PLC

- **Debug ► Login to 'Application'**
 - or -
- in the project tree, right click on the "Application" node, then select **Login** in the context menu
 - or -
- click on  in the toolbar

2. Load the application to the control



This step is only necessary if there is no application or another application on the control.

The message "Application does not exist on the control" appears
Confirm with **Yes**

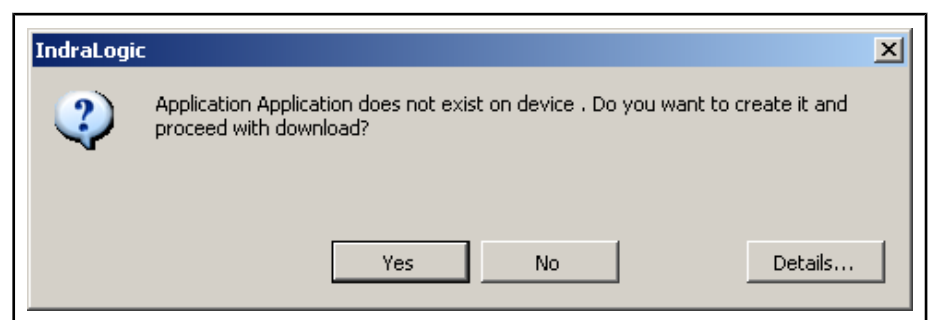


Fig. 5-55: Message: Application does not exist on the control

The PLC program is loaded to the control



Fig. 5-56: Display: Program loaded

3. Start PLC program

- **Debug ► Start 'Application'** or
- in the project tree, right click on the "Application" node, then select **Start** in the context menu

Description of the Steps

- or -

- click on  in the toolbar

The PLC program is running on the control

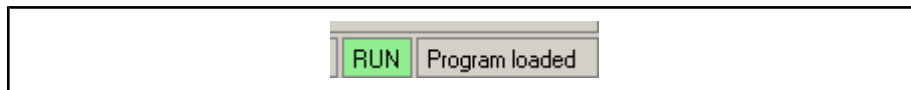


Fig.5-57: Display: Program started

4. Log out PLC

- **Debug ► Logout from 'Application'**

- or -

- in the project tree, right click on the "Application" node, then select **Logout** in the context menu

- or -

- click on  in the toolbar

The connection to the PLC has been terminated and the PLC program is running on the control

5.8 Exporting Parameters

The user can change the preset values using the dialog windows of the control, axes and, if required, drives. These changed values have to be saved in a file (exported) now and read to the control or drives from the file again, e.g. after a firmware update (see [chapter 5.9 "Importing Parameters" on page 81](#)).

In the "Offline Parameterization" mode, the parameters of the selected offline servers (IndraMotion MLC, drives) - the offline parameters of the project - are transferred to the xxx.par file.

In the "Online" mode, the parameters of the selected real devices (IndraMotion MLC, drives) are transferred to the xxx.par file.

The target of the xxx.par files can be freely selected.

If the project directory is selected, the xxx.par file is automatically included for archiving.

The parameters for the IndraMotion MLC (C-parameters) can be selected in groups for each axis (A-parameters) and each drive (S- and P-parameters) (see [fig. 5-59 "Parameter export: Parameter selection" on page 80](#)).

Open parameter export



Before starting the parameter export, the control should be switched to **P2**. A parameter export in **BB** is possible, but takes up to four times as long.

To open the parameter export dialog, right click on the control. Select the menu item **Parameter ► Export...** in the appearing context menu.

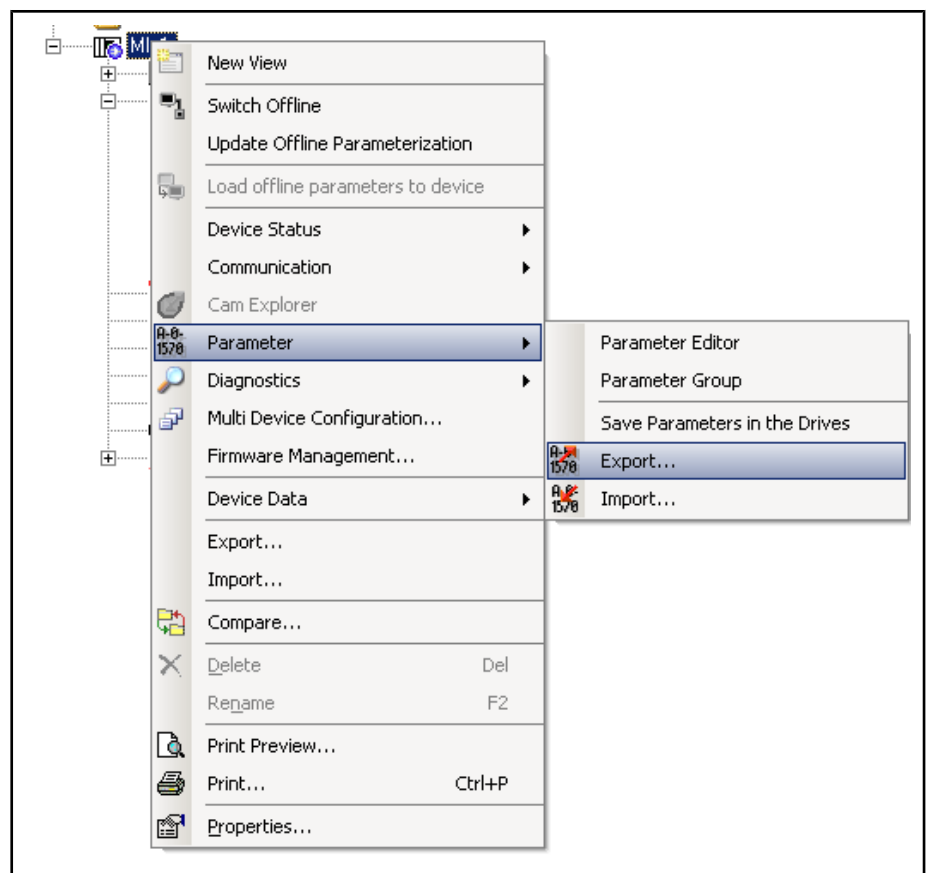


Fig.5-58: Starting the parameter export dialog using the control context menu in the Project Explorer

Description of the Steps

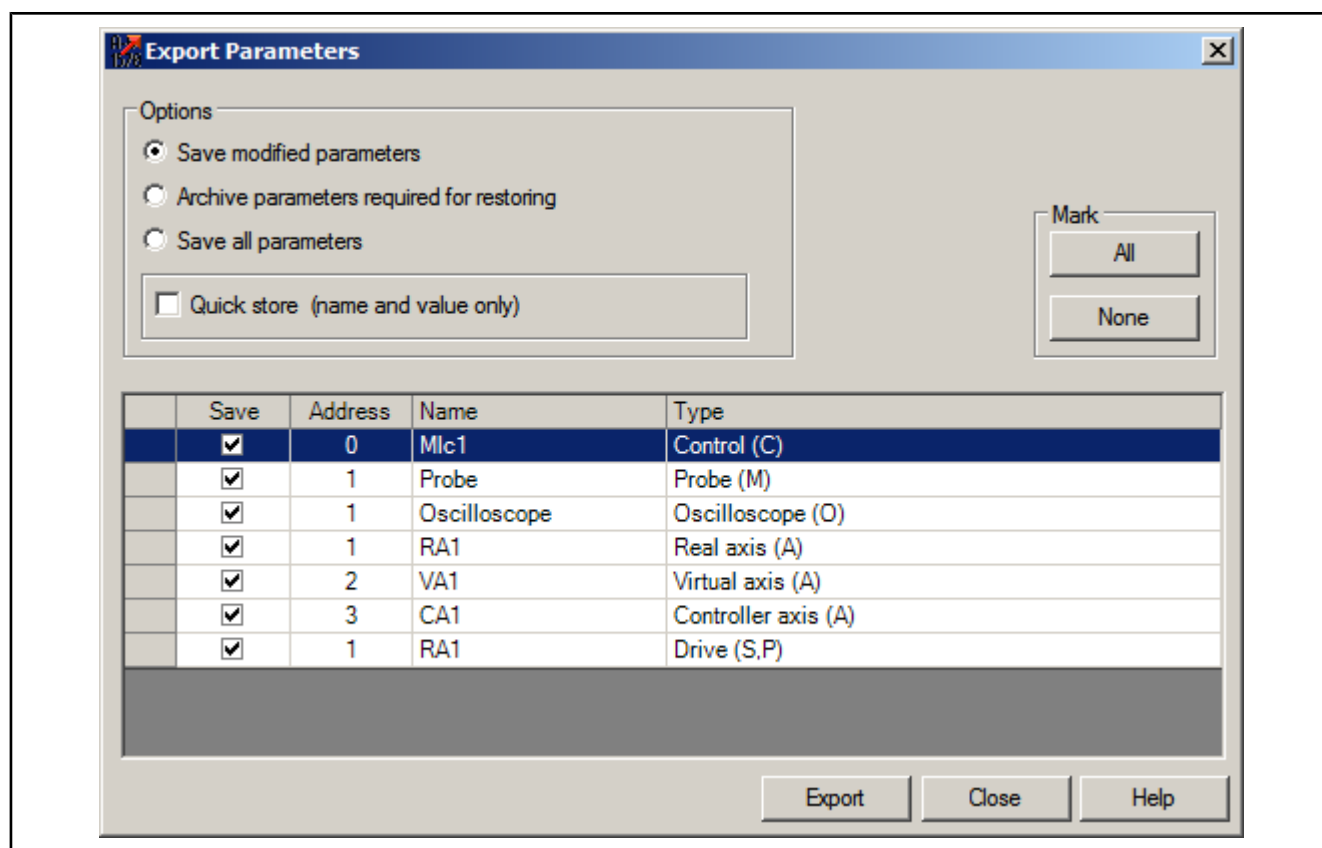


Fig.5-59: Parameter export: Parameter selection

- "Save modified parameters"
only saves the parameters changed
- "Archive parameters required for restoring"
saves all parameters that can be written again on the respective object
- "Save all parameters"
saves the complete data record of the object, even the parameters that cannot be written again, such as actual values
- "Quick store"
means that only the name and value of the parameter and a placeholder for the min./max. value and measuring unit are stored.



To save the selected function packages during a drive firmware update and reload them after the firmware update by importing the parameters, select "Archive parameters required for restoring".
If this is not the case, function packages have to be manually selected and set after a firmware update.



Controls store C-parameters. Real/virtual/encoder/link axes store A-parameters and IndraDrive/HydraulicDrive drives store S- and P-parameters.
If an axis/drive is disabled, only the A-parameters duplicated on the control can be exported.

Starting parameter export The "Export" button starts the parameter export.

Description of the Steps

The export can last several minutes. The result is collected parameter by parameter and stored as a readable file (xxx.par) that can be edited.

5.9 Importing Parameters

The user can change the preset values using the dialog windows of the control, axes and, if required, drives. These changed values have to be saved in a file now (see [chapter 5.8 "Exporting Parameters" on page 78](#)) and read to the control or the drives from the file again (imported), e.g. after a firmware update.

In the "Offline Parameterization" mode, the parameters are transferred to the selected offline server (IndraMotion MLC, drives) - or the offline parameters for the project.

In the "Online" mode, the parameters are transferred to the selected real devices (IndraMotion MLC, drives). For the parameters A, S and P, the assignment of parameter -> device can be freely selected (see [fig. 5-61 "Import presettings" on page 83](#)).

The xxx.par file can be freely selected (even outside of the project directory).

The parameters for the IndraMotion MLC (C-parameters) can be selected in groups for each axis (A-parameters) and each drive (S- and P-parameters) (see [fig. 5-61 "Import presettings" on page 83](#)).



Before starting the parameter import, switch the control to **P2**, since some parameters are write-protected in **BB**.

Opening parameter import

To open the parameter import dialog, right click on the control. Select the menu item **Parameter ► Import...** in the appearing context menu.

Description of the Steps

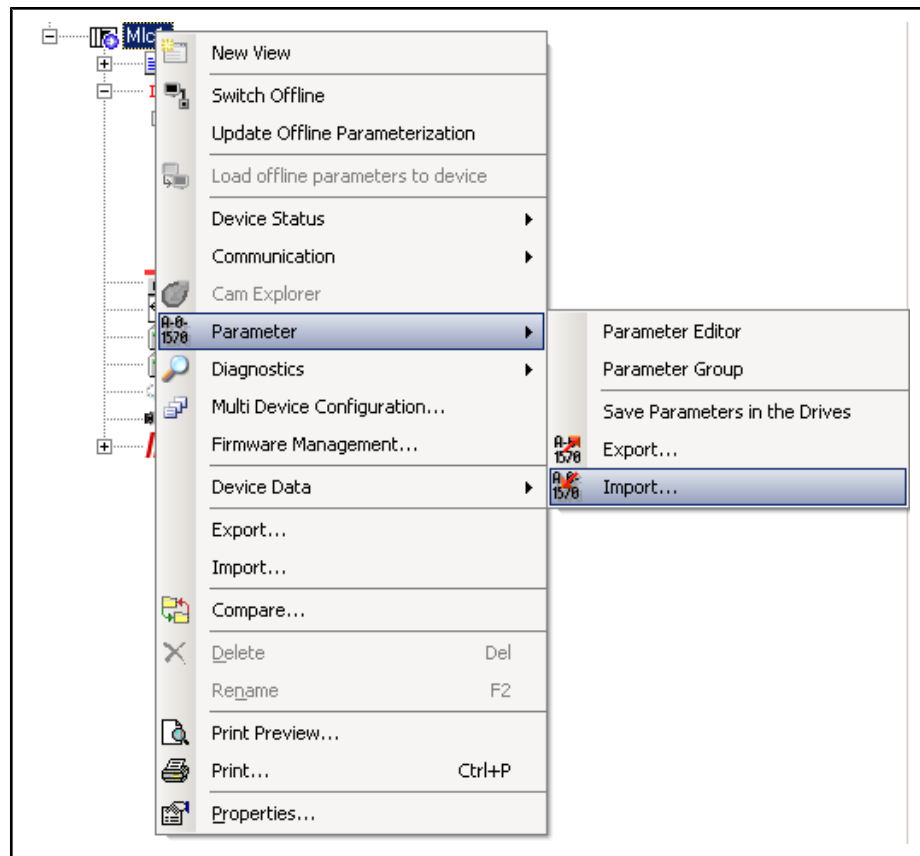


Fig.5-60: Starting the parameter import dialog using the control context menu in the Project Explorer

First, the parameter file to be imported is selected using the Windows "Open" dialog for the import.

The following options can be set:

Description of the Steps

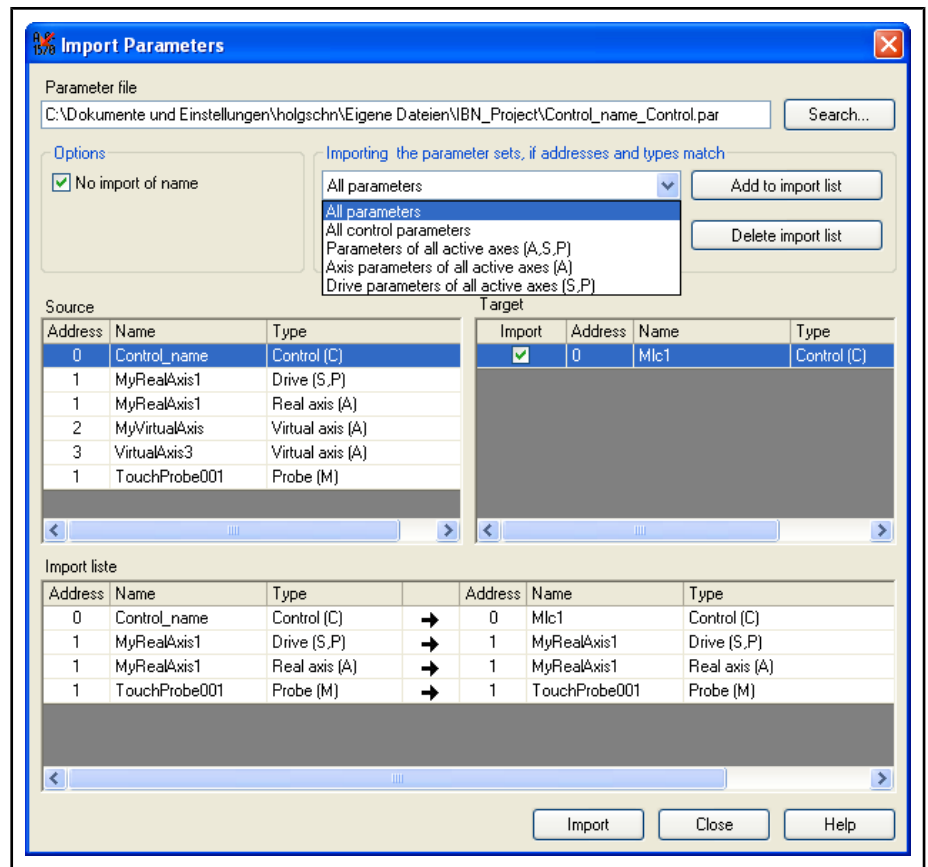


Fig.5-61: Import presets

No name import Means that the names of the individual objects are not overwritten, e.g. for multiple instances of identical machine components in one system.

Source - Target The "Source" table contains names of objects whose parameters have been exported.

The "Target" table contains the names of objects included in the current project. Preselect an object from the "Source" table and assign one or more target objects to it.

Creating import list Click on the **Create import list** button to generate the import list automatically. This adjusts the parameters in the import file to match the existing hardware. A-, S- and P-parameters are adjusted to match based on the SERCOS address. The type of parameters to be imported can also be selected. For example, only the **axis parameters for all active axes** can be imported.



The parameters are imported only if type and address match.

Thus, ensure that the correct link address was assigned to the control before the parameter import. Otherwise, the parameters to be imported have to be mapped manually.

Import list The import list is filled as follows:

1. Select the parameter block from the source list
2. Highlight the target device in the "Import" column in the target list.
This applies selection to the import list
3. Continue at step 1 until the import list contains all required parameter blocks

Description of the Steps



An import can also be carried out for axes of different types (e.g. from real to virtual). However, only the parameters present for both types are read in.

For deactivated axes, only the A-parameters can be reached, not the S-parameters or P-parameters.

Starting parameter import The "Import" button triggers the processing of the import list.

5.10 Switching IndraMotion MLC to BB

When switching to the Operating mode (**BB**), first the control configuration is adjusted to the drives. The SERCOS bus is switched to phase 4 and cyclic communication starts. Axis control is only possible when the control is in **BB**.

- Prerequisites**
- The control has to be online ([5.6 Going online page 73](#))
 - All parameters have to be imported ([5.9 Importing Parameters page 81](#))

Execution

1. Start switching to BB

- Select **Control name ► Device state ► Operating mode** from the menu - or -
- in the toolbar right click on the control, then select **Device state ► Operating mode** in the context menu or
- click on  in the toolbar

2. Error source 1: Wrong function package

After a previous update of the drive software, incorrect function packages might be activated in the drive. When switching to **BB**, this is indicated by the "Error Message Axis Configuration" message

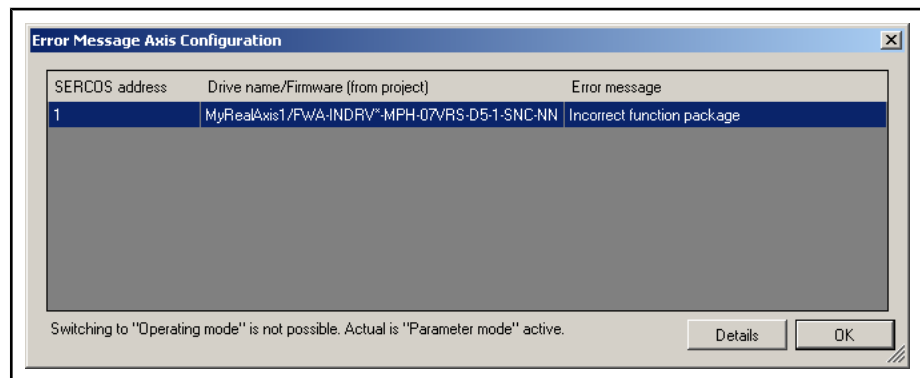


Fig.5-62: Message: Incorrect axis configuration

In this case, the correct function package has to be activated in the respective drive. When operating with the IndraMotion MLC, the "Synchronization" (SNC) function package is always required

After remedying the cause, start again at step 1

3. Error source 2: Invalid parameters

In exceptional cases, the parameters can be invalid after a control firmware update. In this case, the "Invalid parameters" dialog opens. In general, the parameters have to be performed once again. If this is not the case, a parameter is not within the limit values. Then, depending on the parameter, an investigation has to be carried out using the help function. After remedying the cause, start again at step 1

Description of the Steps

Further information on invalid parameters can be found in section [6.2.5 Invalid Parameters, page 180](#)

After switching successfully to **BB**, the  icon is highlighted and the  icon is not highlighted.

5.11 Device Data

5.11.1 Archiving Device Data

This menu item allows parameters and control data (parameters, kinematic data) and the Compact Flash partitions of the control to be saved in the project in order to restore them on a control with the same firmware version. This function is only available if there is an existing online connection to the device.

To get to the function, select

- **Control name ► Device data ► Archive**
or
- open the context menu in the project tree clicking on the control with the right mouse button and select **Device data ► Archive**

Data types There are four data types. A prerequisite for archiving is that the project is online.

The following overview shows which data is included in which data type.

Data type	Control data	User partition data	OEM partition data	System partition data
Archives stored on the device			X	
Firmware				X
Control parameters	X			
Drive parameters	X			
PLC retain data				X
Compiled PLC programs			X	
Kinematic parameters	X			
RCL program transferred to the control.	X			
RCL build transferred to the control	X			
Cam tables transferred to the control		X		

Description of the Steps

Data type	Control data	User partition data	OEM partition data	System partition data
Cam tables loaded to the drive	X			
MotionProfiles transferred to the control		X		

Fig.5-63: Data types

User interface

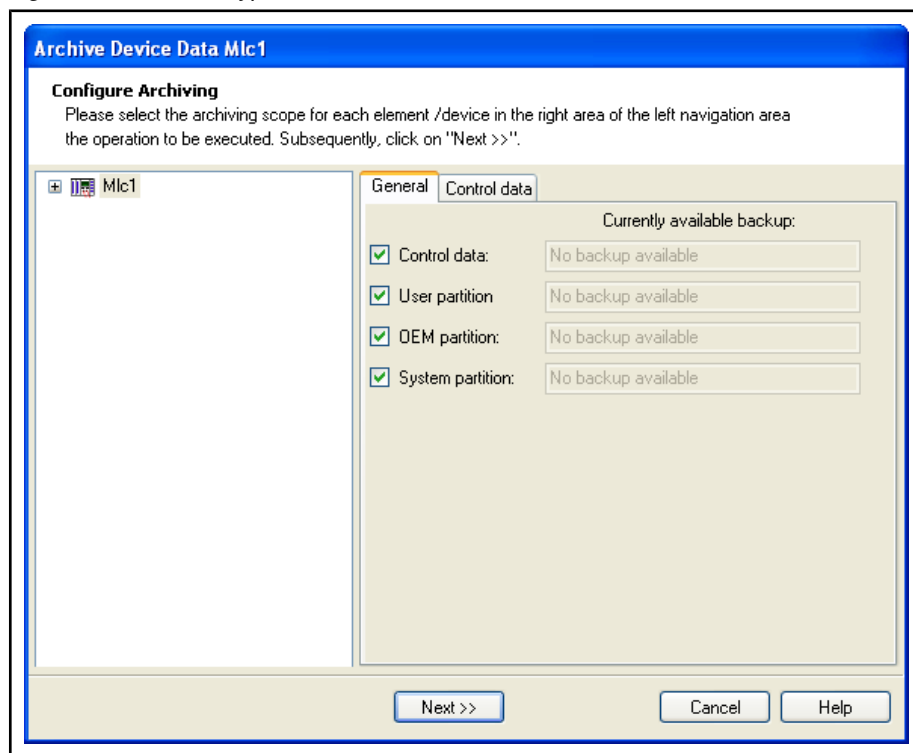


Fig.5-64: Archive configuration

The data type to be archived can be specified on the "General" tab.

If a data type is already in the project, the archiving date is displayed in the "Currently available backup" area.

If a data type is already in the project, it is overwritten during new archiving.

If a backup of the control data was selected, it is possible to set the parameters to be archived and whether the kinematic data is to be archived in the "Control data" tab. The "Other data" group is only available if at least one kinematics is configured in the project.

Description of the Steps

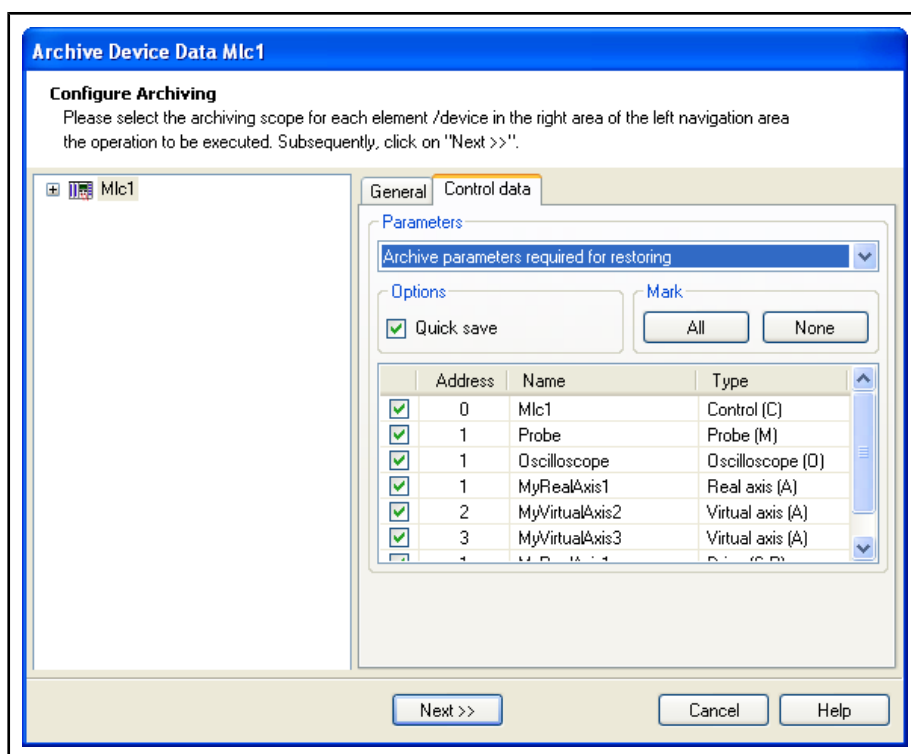


Fig. 5-65: Archiving Device Data

Finally, the data to be archived is displayed for confirmation purposes.

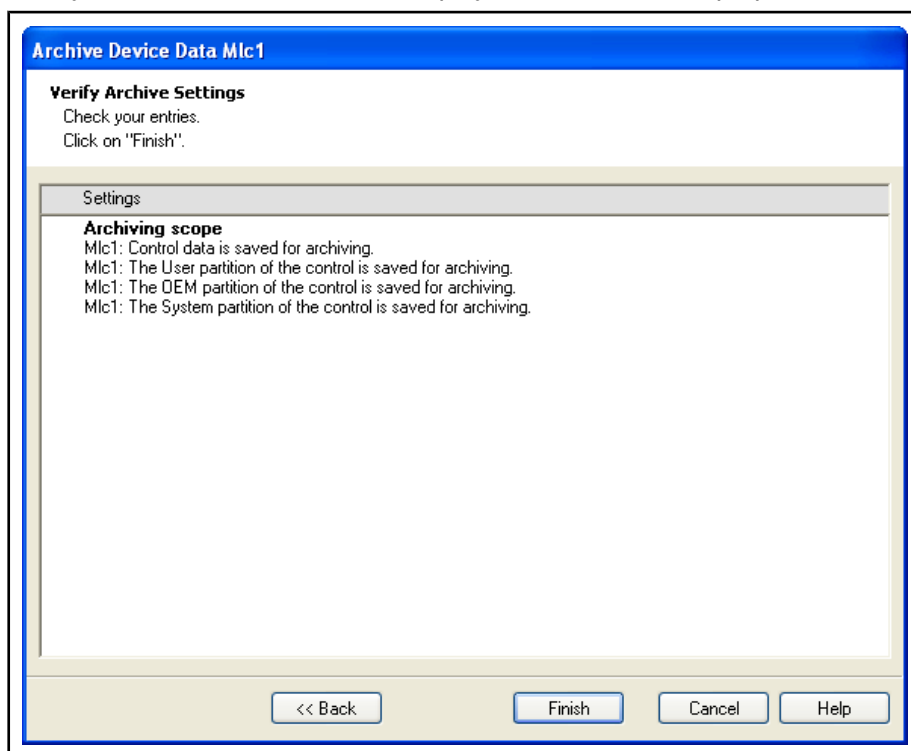


Fig. 5-66: Verifying archive settings

Click on **Finish** to start the archiving. The total progress is displayed.
At the end, a summary is output containing the archiving results.

Description of the Steps

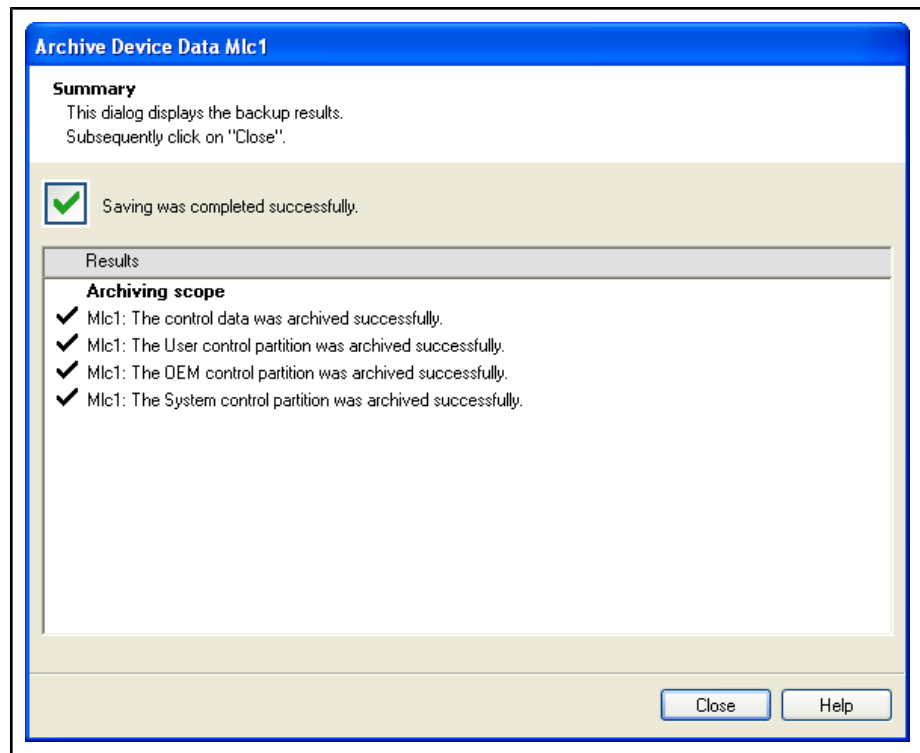


Fig. 5-67: Summary of the archiving results

Storage location

The archived data is located in the folder:

<ProjectDirectory>\<NameOfTheMLC>\ArchivedData

The individual files are provided with the following names:

- Parameters: Params.par
- Kinematic data: RoCo_Data.zip
- User partition data: CF_User.zip
- OEM partition data: CF_OEM.zip
- System partition data: CF_System.zip

5.11.2 Restoring Device Data

This menu item allows the restoration of control data (parameters, kinematic data) and the compact flash partitions on the control. This function is only available if there is an existing online connection to the device.

To get to the function, select

- **Control name ► Device data ► Restore**
or
- open the context menu in the project tree clicking on the control with the right mouse button and select **Device data ► Restore**

Description of the Steps

User interface

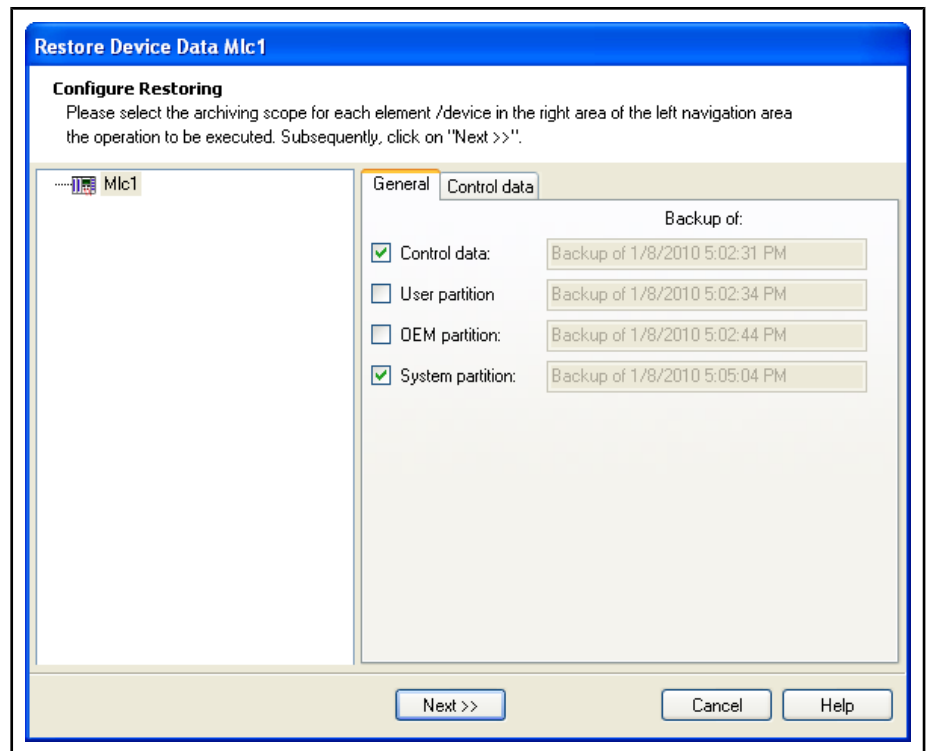


Fig. 5-68: Restoration configuration

The data types to be restored can be specified on the "General" tab.

A data type is in the project, the date of the last backup is displayed and the data type can be selected. Data types that are not in the project cannot be selected.



The restoration of the system partition overwrites the firmware currently on the control. All data and firmware settings are lost.

It may not be aborted. During the restoration of the system partition, the control is restarted.

If a restoration of control data was selected, it is possible to specify the parameters to be restored and whether the kinematic data should be restored on the "Control data" tab. The "Other data" group is only available if at least one kinematics is configured in the project.

Description of the Steps

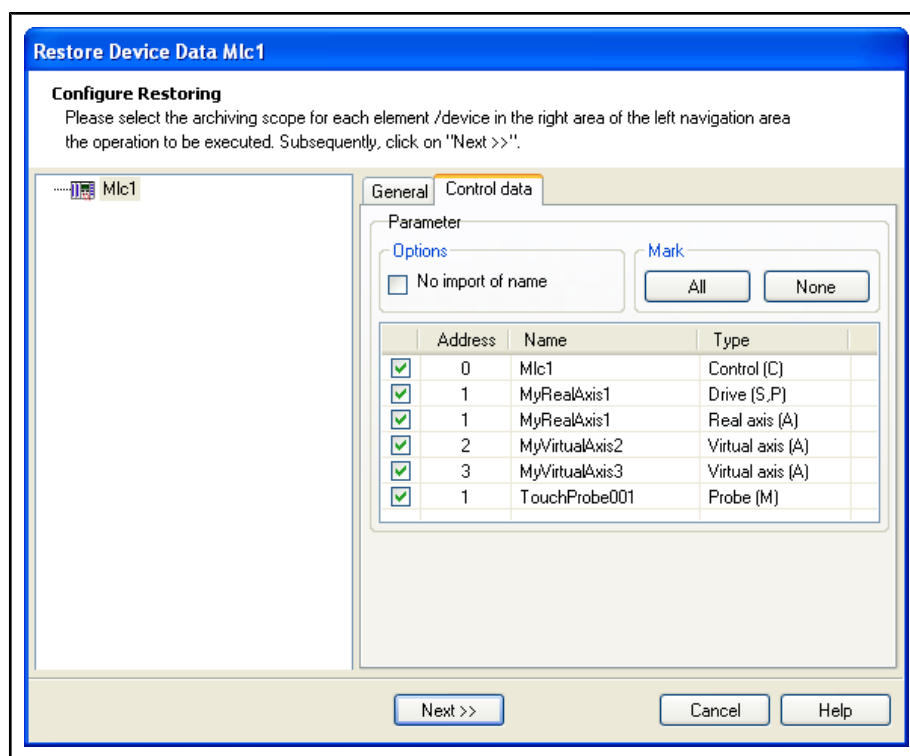


Fig.5-69: Restoration

Finally, the data to be restored is displayed for confirmation purposes.

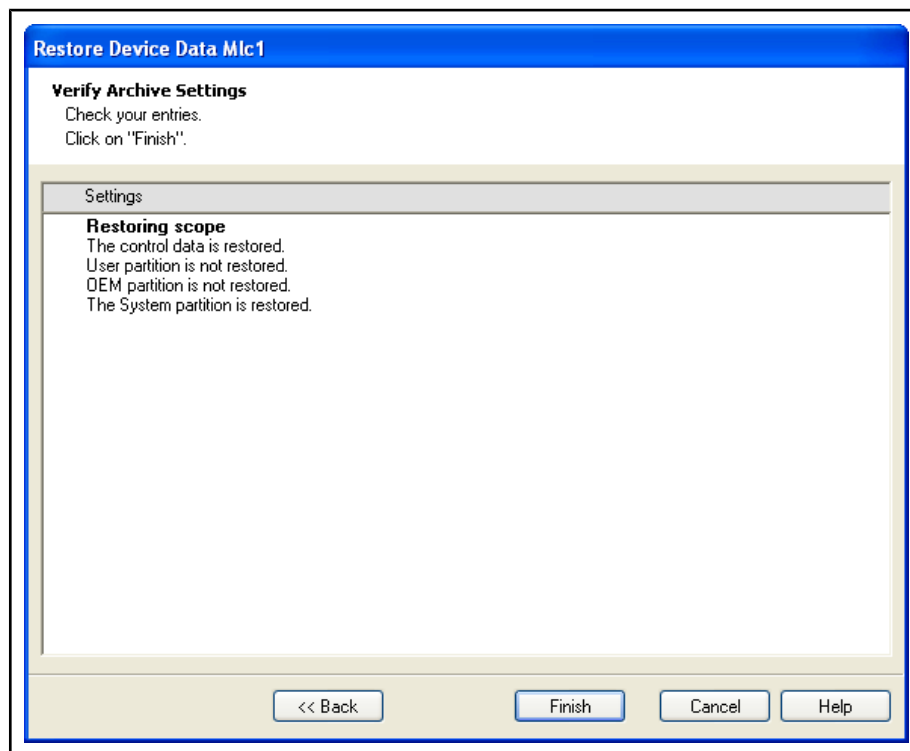


Fig.5-70: Verifying the restoration

Click on **Finish** to start the restoration. The total progress is then displayed. At the end, a summary is output containing the restoration result.

Description of the Steps

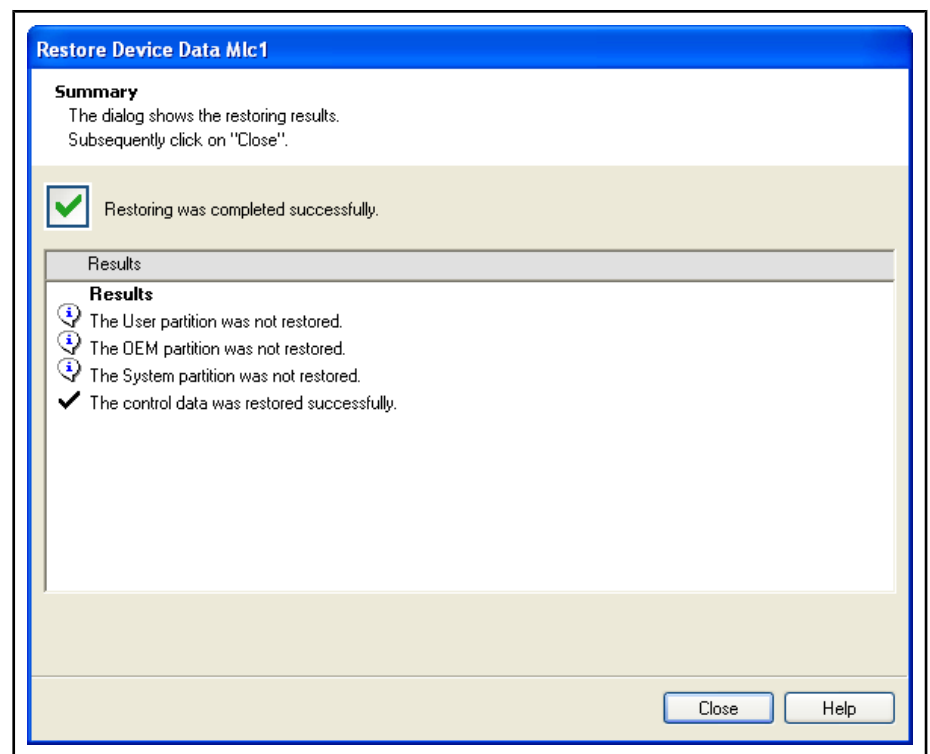


Fig. 5-71: Summary of the restoration

5.12 Display of the IndraMotion MLC

The control display is used to display the control status, configure the network settings and trigger single commands.

The status of the control is displayed after startup. If there is no error, the status of the PLC (STOP or RUN) and the status of the SERCOS bus (P0, P2 or BB) are displayed. If there is an error, the error number is alternately shown with a brief error description. A displayed error can be acknowledged pressing <Esc> on the display.

Press <Enter> on the display to reach the control menu. The keys on the operating terminal have the following function:

Enter	Open the next menu level or confirm the entry
Esc	One level back; discard a change. Once the uppermost level of the menu has been reached, the menu system can be quit pressing <Esc> and the status display becomes active again.
V	Navigating down in the menus or decrease the value
^	Navigating up in the menus or incrementing the value

Description of the Steps

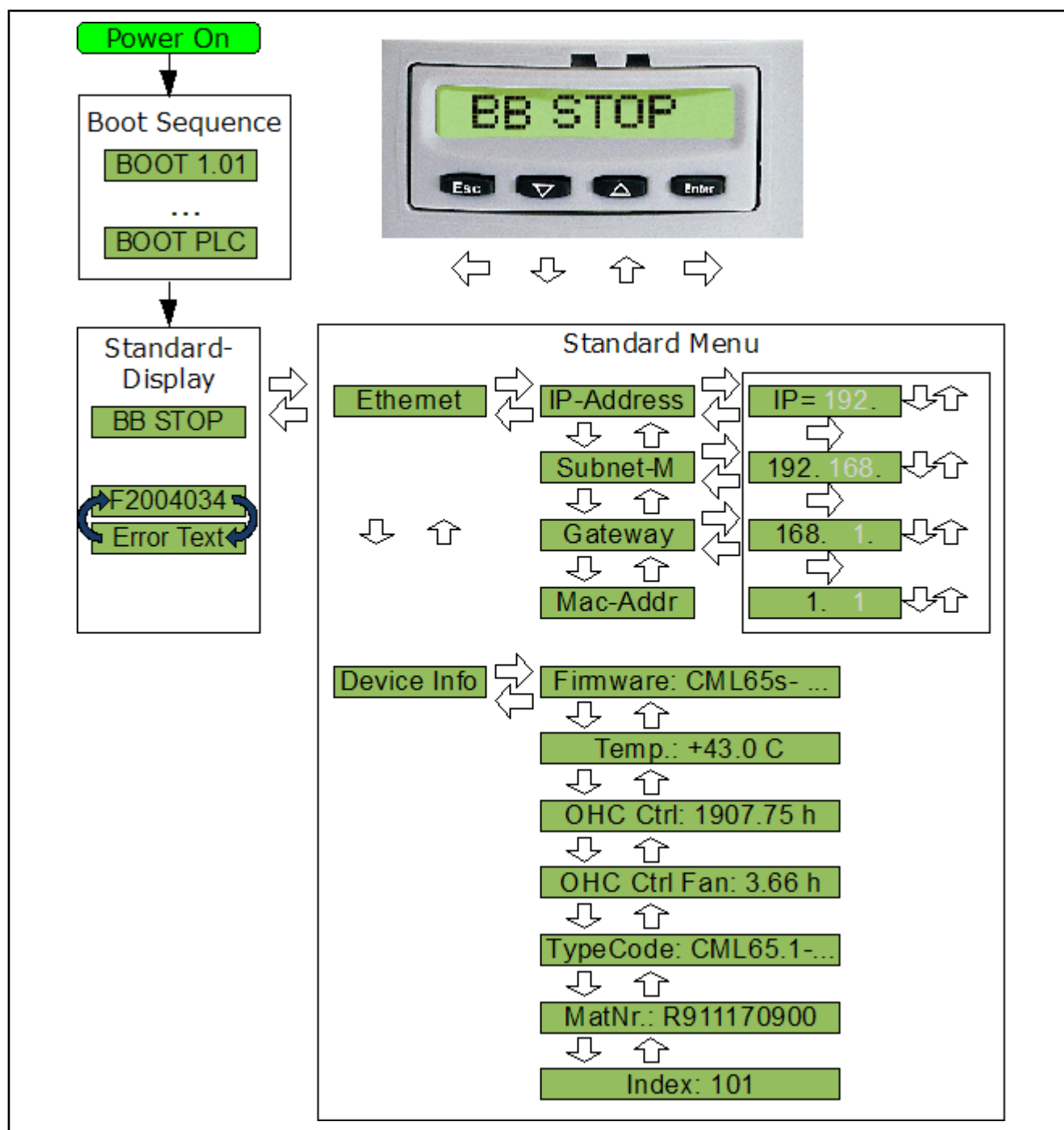


Fig.5-72: Diagnostics at the display of the IndraMotion MLC

By pressing <Esc> and <Enter> simultaneously at the control panel of the control for a period of eight seconds, it can be switched to the advanced (extended) mode. This shortcut enables the advanced functionality of the control display and should only be used by trained staff.

Description of the Steps

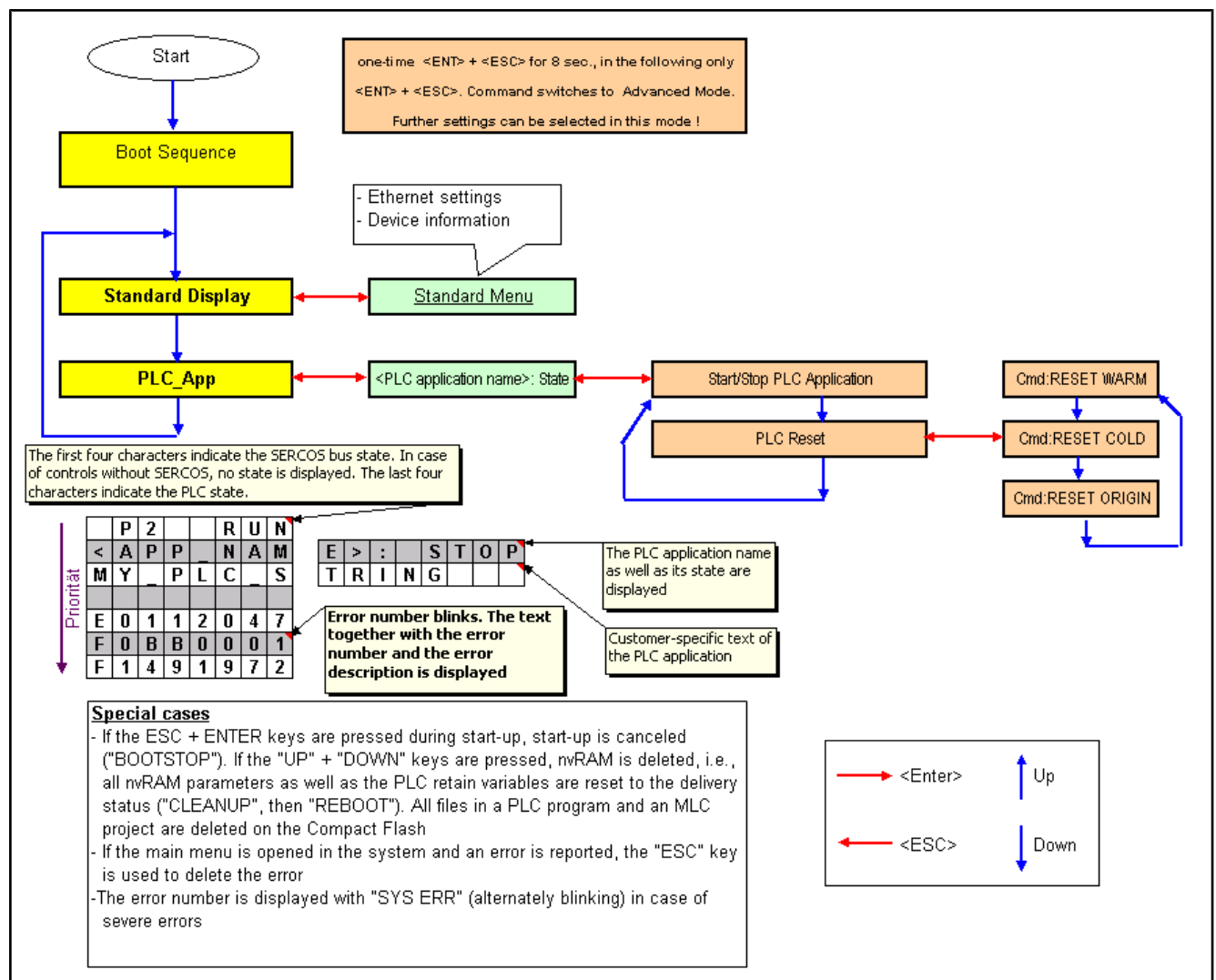


Fig.5-73: Menu in advanced (extended) mode

5.13 Basic Master Communication Functions

5.13.1 Brief Description

General

The basic master communication functions for IndraDrive drives apply for the SERCOS interface, SERCOS III, field bus interface, parallel interface and analog interface as well.

Characteristics

All master communication variants supported by IndraDrive have the following common functional features:

- **Address assignment**
→ communication address that can be freely parameterized (via master communication and control panel) using the parameter "P-0-4025, Drive address of master communication"
- **Command processing**

Description of the Steps

→ from externally activated drive commands (via master communication and control panel)

- **Device control** (state machine)

→ a separate state machine for the master communication and the device each

- The master communication state machine has various functionalities and a high complexity depending on the master communication variant. The specific communication states are differentiated and mapped in the status words of the respective master communication (e.g. for SERCOS: S-0-0014, S-0-0135)
- The device state machine depends on the master communication variant and maps the device-specific states in the parameter "S-0-0424, Status parameterization level". Operating mode (OM) and parameterization mode (PM) are always distinguished.

- **Advanced control options**

- Signal control word (S-0-0145) and signal status word (S-0-0144)
- Multiplex channel

For more information, refer to the chapter "Control Options/Additional Functions" in the manual "Rexroth IndraDrive Firmware for Drive Controllers MPH-, MPB-, MPD-, MPC-07" (see /10/ [chapter 1.3 "Required and Supplementing Documentations" on page 8](#)).



The master communication state machine is only treated briefly in this section. A detailed description can be found in the main section of the respective master communication including the individual state transitions.

Parameters involved

The following parameters are used regardless of the master communication variant:

Parameters for state machine and phase switching

- S-0-0011, Class 1 diagnostics
- S-0-0012, Class 2 diagnostics
- S-0-0013, Class 3 diagnostics
- S-0-0014, Interface status
- S-0-0420, C0400 Activate parameterization level 1 procedure command
- S-0-0422, C0200 Exit parameterization level procedure command
- S-0-0423, IDN-list of invalid data for parameterization levels
- S-0-0424, Status parameterization level
- P-0-4086, Master communication status
- P-0-4088, Master communication: Drive configuration

Parameter modes

- S-0-0032, Primary operation mode
- S-0-0033, Secondary operation mode 1
- S-0-0034, Secondary operation mode 2
- S-0-0035, Secondary operation mode 3
- S-0-0284, Secondary operation mode 4
- S-0-0285, Secondary operation mode 5
- S-0-0286, Secondary operation mode 6

Description of the Steps

Device-specific control and status words	• S-0-0287, Secondary operation mode 7 • S-0-0099, C0500 Reset class 1 diagnostics • S-0-0144, Signal status word • S-0-0145, Signal control word • P-0-0115, Device control: Status word • P-0-0116, Device control: Control word • P-0-4028, Device control word
SERCOS-specific parameters	For the "SERCOS Interface", the following additional parameters are used: • S-0-0021, IDN-list of invalid operation data for CP2 • S-0-0022, IDN-list of invalid operation data for CP3 • S-0-0127, C0100 Communication phase 3 transition check • S-0-0128, C5200 Communication phase 4 transition check • S-0-0134, Master control word • S-0-0135, Drive status word
Field bus-specific parameters	For field buses, the following additional parameters are used: • P-0-4068, Field bus: Control word IO • P-0-4077, Field bus: Control word • P-0-4078, Field bus: Status word
Specific parameters for the parallel/analog interface	For the parallel/analog interface, the following additional parameters are used: • P-0-4028, Device control word • P-0-0115, Device control: Status word

Diagnostics Involved

- C0100 Communication phase 3 transition check
- C5200 Communication phase 4 transition check
- C0200 Exit parameterization level procedure command
- C0400 Activate parameterization level 1 procedure command

5.13.2 Setting the Axis Address

Overview

Every drive is identified by its own address.



Multiple addressing is not permitted, i.e. an address number may only be assigned once in the link.

The drive address can be set as follows:

- Direct writing of the parameter "P-0-4025, Drive address of master communication" using the master communication.
- or -
- Modifying the content of "P-0-4025, Drive address of master communication" using the control panel (see [chapter "Setting the Address via a Standard Control Panel" on page 96](#))

Description of the Steps



The address entered in the parameter "P-0-4025, Drive address of master communication" becomes effective at the transition P0 → P1.

The address is also displayed in the parameter "P-0-4031, Overview of device addresses".

State of delivery Upon delivery, the address "99" is set.

Setting the Address via a Standard Control Panel

For IndraDrive controllers, the drive address can be set using the control panel of the standard operating unit on the front of the device.

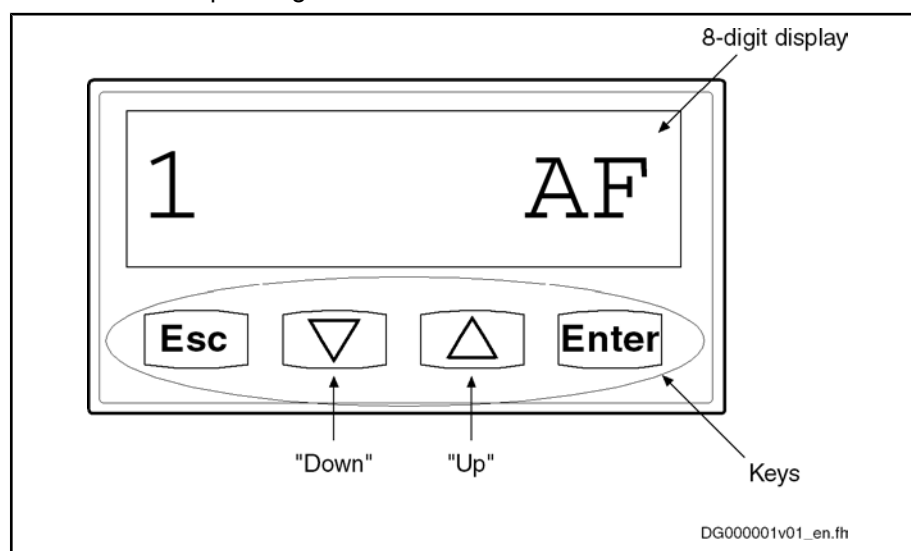


Fig.5-74: Control panel of the standard operating unit (display example)

The address via the control panel is set as follows:

1. Switch to "Commands/settings" mode.

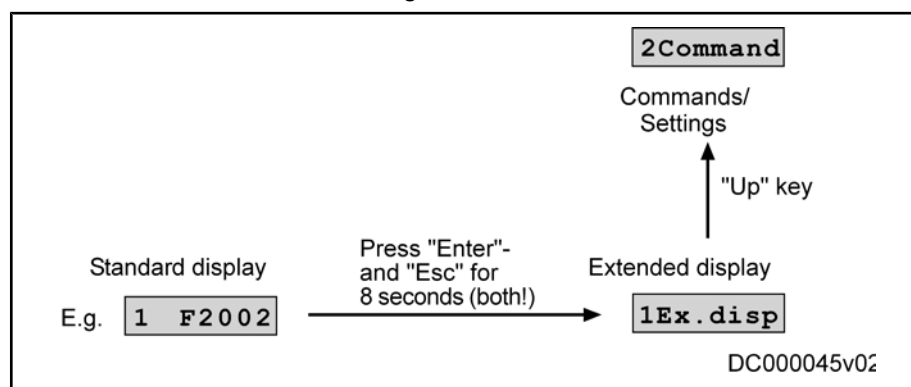


Fig.5-75: Activating "Commands/settings" mode

2. Select the element "2.1 Drive address" using the <Up>/<Down> keys and confirm with <Enter>.
3. Set the drive address using the <^>/<v> keys and confirm with <Enter>:
 - First, set the **tens digit**
→ "2.1.1" Drive address appears in the display
 - Then, set the **unit**
→ "2.1.2 Drive address" appears in the display

Description of the Steps

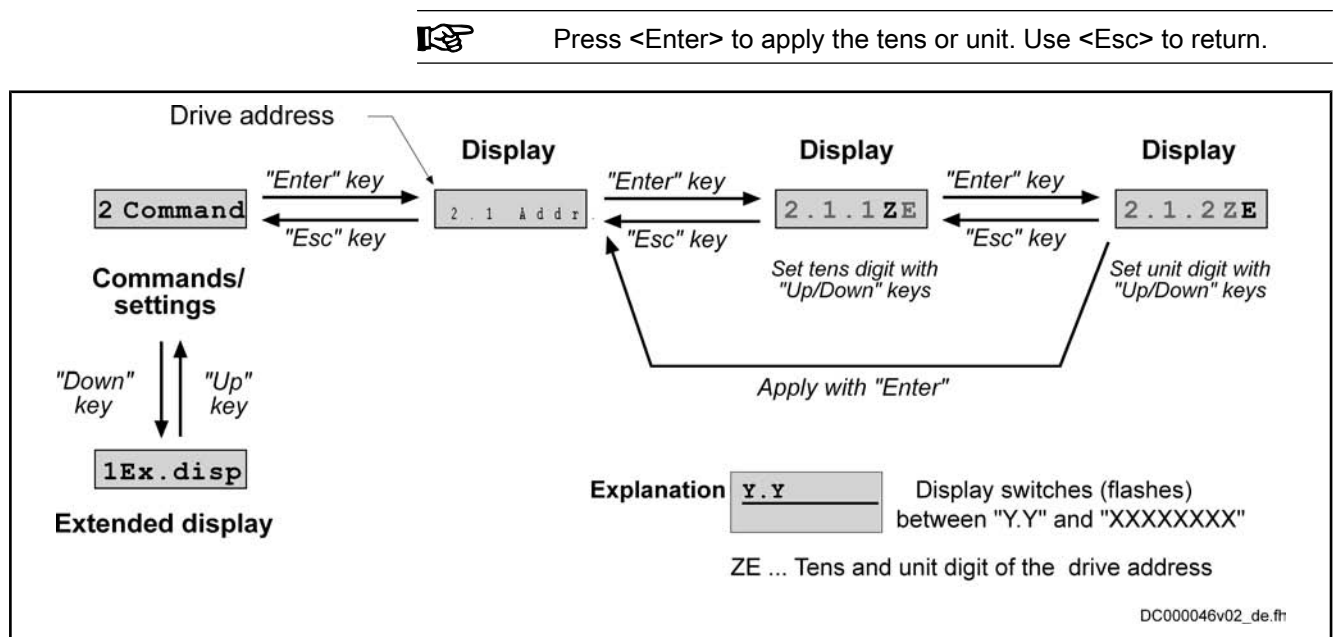


Fig. 5-76: Selecting and setting the drive address

Setting the Address via Parameter Access

The drive address can also be set by writing on the parameter "P-0-4025, Drive address of master communication". This is particularly interesting if the axis data is managed centrally in the control and if the address should be set by the control when a device is exchanged.

For more information, refer to the chapter "Notes on How to Replace the Devices" in the manual "Rexroth IndraDrive Firmware for Drive Controllers MPH-, MPB-, MPD-, MPC-07" (see /10/ [chapter 1.3 "Required and Supplementing Documentations" on page 8](#)).



The address written in the parameter "P-0-4025, Drive address of master communication" only becomes effective after a reboot or, for SERCOS devices, after the transition P-1 → P1.

5.13.3 System Command Processing

Overview

System commands are used to control complex functions in the drive. For example, the functions "Drive-controlled homing procedure" and "Communication phase 4 transition check" are defined as commands.



All commands in the drive are stored in the parameter "S-0-0025, IDN-list of all procedure commands".

Types of commands

There are three different types of commands:

- **Drive control commands**
 - can activate automatic drive motion
 - can only be started if drive enable is set
 - deactivate the active operation mode during execution
- **Monitor commands**
 - activate or deactivate monitorings or functions in the drive

Description of the Steps

- **Management commands**
 - execute management tasks
 - cannot be interrupted

Command execution

Basic information

Observe the following when executing system commands:

- A parameter used to control the command execution belongs to each command
- The superordinate master can start, interrupt and delete commands
- During command execution, the diagnostics "Cx" appears on the display. "x" stands for the command number
- Each command started by the master has to be actively deleted again

NOTICE

The internal memory (Flash) can be damaged due to cyclic command execution (write access to Flash)!

⇒ During the execution of some commands (see the description for the respective command diagnostics, e.g. "C0500 Reset class 1 diagnostics, error reset"), it is also written on the internal memory (Flash) which allows only a limited number of write accesses. Thus, ensure that this type of write access is not carried out too often.

Controlling the command execution

The command execution is controlled and monitored via the command specification and command acknowledgement. In the specification, the drive is informed whether the command execution is to be started, interrupted or ended. It is specified via the operating date of the respective parameter.

Command are started and ended as follows:

- Direct writing on the respective command parameter (e.g. "S-0-0099, C0500 Reset class 1 diagnostics" for the command "C0500 Reset class 1 diagnostics, error reset") via master communication

- or -

- a 0-1 edge if the command was assigned to a digital input

Refer also to the following chapters in the manual "Rexroth IndraDrive Firmware for Drive Controllers MPH, MPB, MPD, MPC-07" (/10/ in [chapter 1.3 "Required and Supplementing Documentations" on page 8](#)):

- Configurable signal control word
- Parallel interface
- Digital inputs/outputs

Possible command specifications

When the command is executed, the following specifications are possible (= content of the command parameter):

- **0:** Not set and not enabled
- **1:** interrupted
- **3:** set and enabled

Command acknowledgement

In the command acknowledgement, the drive provides information on the current state of the command execution. This stands in the data status of the command parameter.



You can get the command status by executing a write command on the parameter element 1 (data status) of the command parameter.

Description of the Steps

- Command status** The command status can be:
- **0x0:** Not set and not enabled
 - **0x7:** in process
 - **0xF:** error, command execution not possible
 - **0x5:** command execution interrupted
 - **0x3:** command executed correctly

Command Change Bit

At SERCOS in the parameter "S-0-0135, Drive status word" there is a "change bit command" to detect a change in the command acknowledgement made by the drive.

- The bit is set by the drive if the command acknowledgement switches from the "In process (0x7)" state to one of the following states:
 - Error, command execution not possible (0xF)
 - or -
 - command executed correctly (0x3)
- The bit is deleted if the master deletes the specification (0x0), i.e. writes "0" on the parameter belonging to the command.



The command change bit is only set if the command was activated via the master communication.

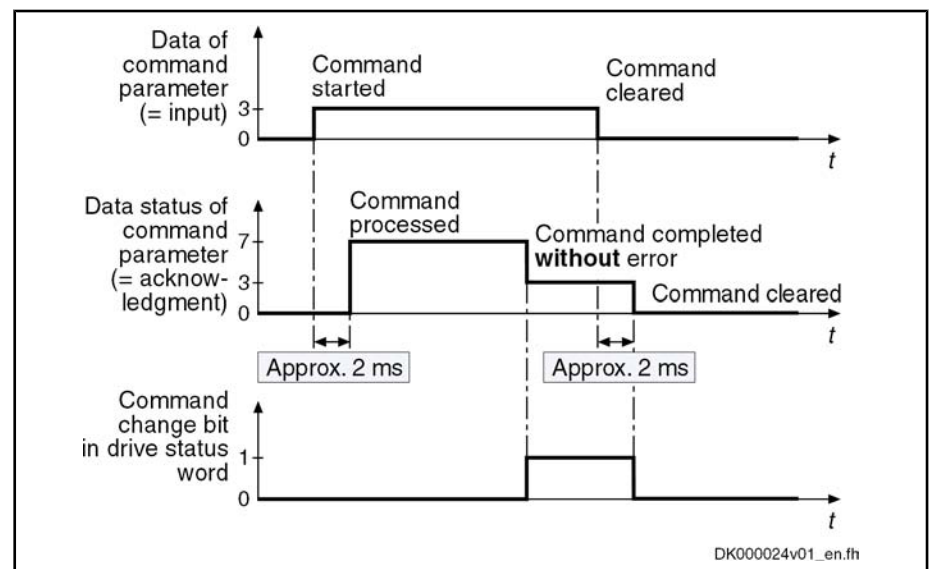


Fig. 5-77: Specification, acknowledgement and command change bit at correct execution

Description of the Steps

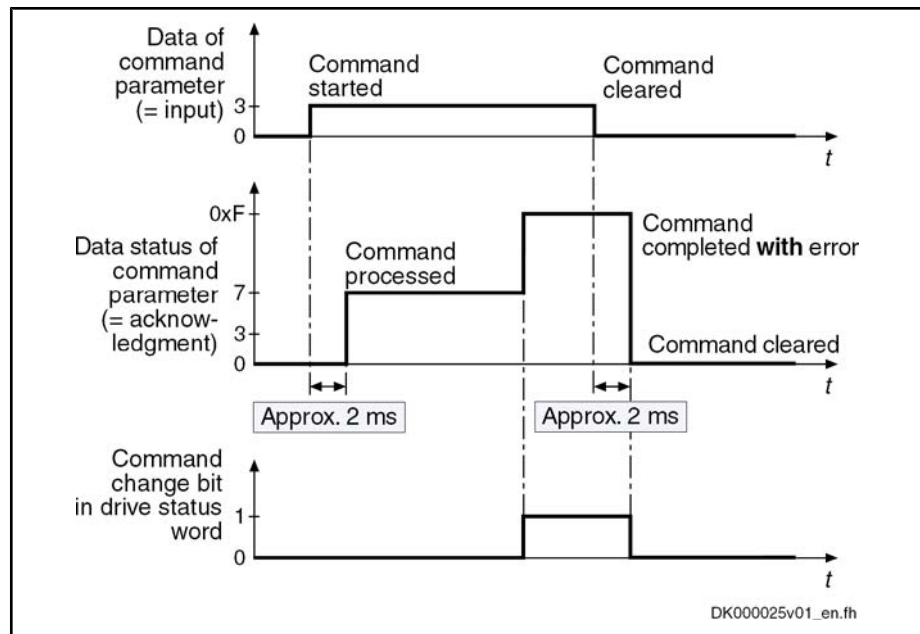


Fig.5-78: Specification, acknowledgement and command change bit at incorrect execution

5.13.4 Device Control and State Machines

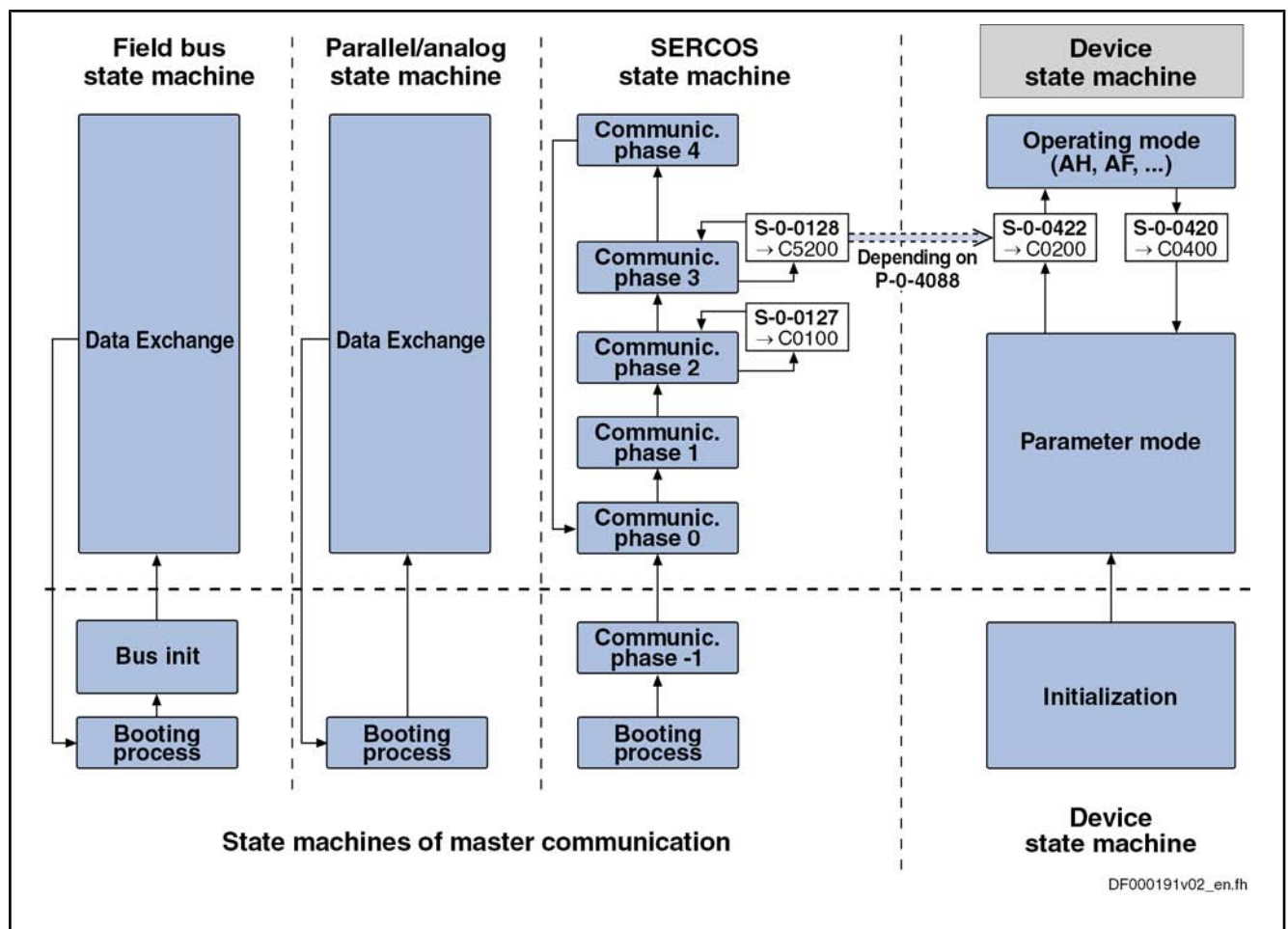
Overview

The drive state (e.g. drive halt, drive error) represents a specific internal and external drive behavior. It can be quit via defined events (e.g. drive commands, switching operation modes). The events are assigned to the respective state transitions. The state transitions and the interaction of control and status bits are called state machine.

It is distinguished between:

- device-internal state machines (define device-specific states that determine device behavior)
- state machine of the master communication

Description of the Steps



S-0-0127,
S-0-0128,
S-0-0420,
S-0-0422,
P-0-4088,
Fig.5-79:

C0100 Communication phase 3 transition check
C5200 Communication phase 4 transition check
C0400 Activate parameterization level 1 procedure command
C0200 Exit parameterization level procedure command
Master communication: Drive configuration

Overview: State machines for master communication and device

Device-internal state machine

Parameterization/operating mode

The following states are distinguished for the device-internal state machine:

- **Parameterization mode (PM)**
→ Enables write access to all drive parameters that are not password protected
- **Operating mode (OM)**
→ Enables write access only to the drive parameters that can be modified during operation and that, preferably, can also be exchanged cyclically

Switchover

Switching between these states is carried out using these commands:

- S-0-0420, C0400 Activate parameterization level 1 procedure command
- S-0-0422, C0200 Exit parameterization level procedure command

While switching, observe the following:

- In general, it can be switched by directly executing the switch command S-0-0420 or S-0-0422.

Description of the Steps

- For field bus devices, it can also be switched in the freely configurable operating mode (P-0-4084 = 0xFFFE or 0xFFFD) by specifying the desired mode using bit 1 in "P-0-4077, Field bus: Control word".
- At the "SERCOS Interface", the state machine of the master communication is connected to the device-internal state machine. This means that when the master communication is switched (communication phase 2 → communication phase 4 or vice versa), the device-internal state machine is switched along with it. This dependency can be deactivated using the parameter "P-0-4088, Master communication: Drive configuration"
- At a master communication other than the SERCOS Interface, the device-internal state machine switches to operating mode after booting. This behavior can also be specified using the parameter "P-0-4088, Master communication: Drive configuration"

Control word and status word The device-specific states can be seen in the following parameters:

- S-0-0424, Status parameterization level
- P-0-0115, Device control: Status word
- P-0-0116, Device control: Control word

State Machine of the Master Communication

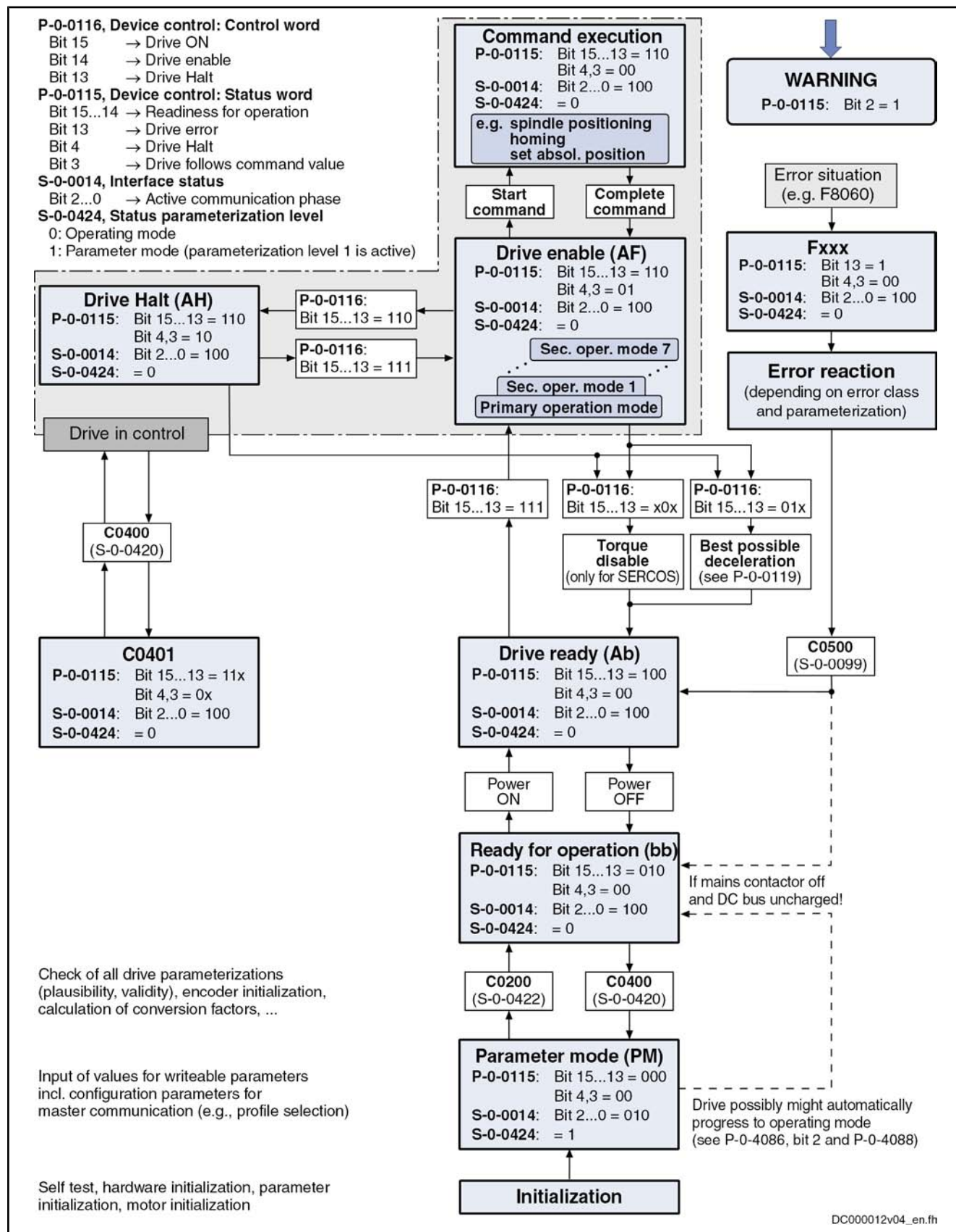


Fig.5-80: Device control (general state machine)

Description of the Steps

Three versions of the state machine of the master communication can be differentiated with respect to functionality and complexity:

- SERCOS state machine
- Field bus state machine
- Parallel/analog state machine



Only the most important states are presented in the following section. Detailed descriptions can be found in the respective master communication section.

SERCOS state machine

At the "SERCOS Interface" master communication, the following states specific to this type of communication are differentiated:

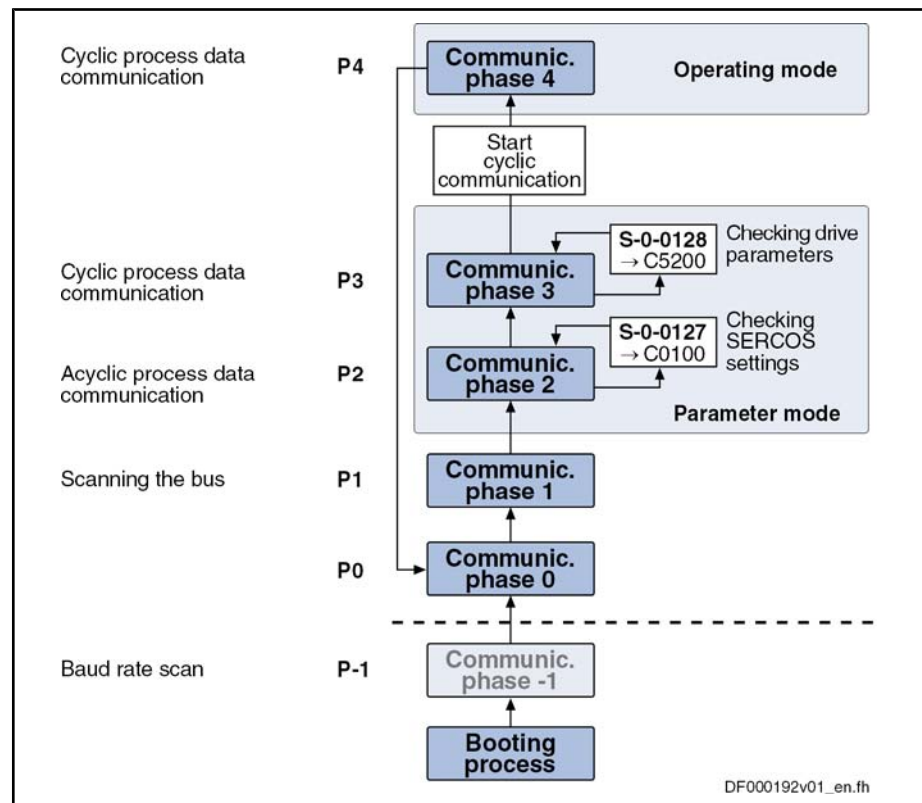


Fig.5-81: State machine of the communication phases of the drive according to the SERCOS specification

For more information, refer to the chapter "SERCOS Interface" in the manual "Rexroth IndraDrive Firmware for Drive Controllers MPH-, MPB-, MPD-, MPC-07" (see /10/ chapter 1.3 "Required and Supplementing Documentations" on page 8).



The currently applicable communication phase can be found in the parameter "S-0-0014, Interface status" (bit 0...2).

Field bus state machine

For the field bus master communication, the following states specific to this type of communication are differentiated:

Description of the Steps

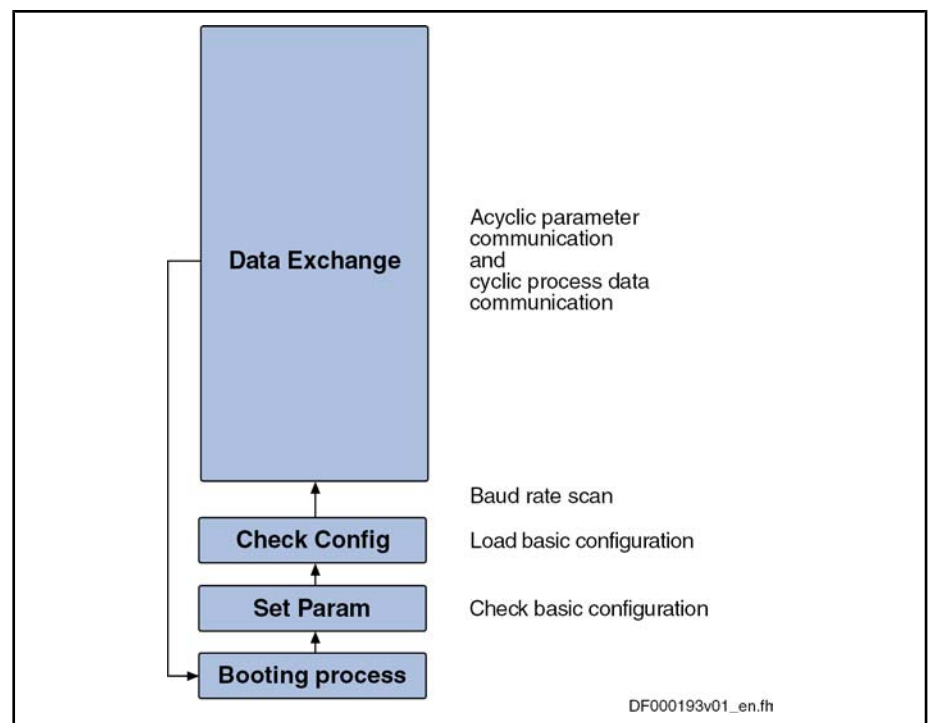


Fig.5-82: State machine for field bus interfaces

See also the sections on the respective variants of the field bus master communication.

Communication Phases of the Master Communication

The supported communication phases and the handling of the switching between the communication phases (e.g. parameterization and operating mode) depend on the master communication used.



The currently applicable communication phase can be found in the parameter "S-0-0014, Interface status" (bit 0...2) and for field bus drive additionally the parameter "P-0-4078, Field bus: Status word" (bit0, 1).

Communication phases according to the SERCOS specification

According to the **SERCOS specification**, the individual communication phases (states) have the following meaning:

- **P-1:** After it is switched on, the drive goes into phase 1 and executes a baud rate scan. As soon as the drive receives a valid SERCOS telegram from the master, it switches to phase 0.
- **P0:** The master checks the SERCOS ring by sending a synchronization telegram. During phase 0, communication is not yet possible between master and drive
- **P1:** If the ring is closed, the master switches to phase 1 and scans the slaves. In addition, it checks the configuration of the ring

Description of the Steps

- **P2:** In phase 2, the entire parameterization of the drive can be carried out. The following parameter types can **only be modified in phase 2**:
 - Communication parameters (according to SERCOS)
 - Configuration of the closed-loop axis control (scanning times)
 - All factory-specific settings (can only be modified via master password)
- **P3:** When switching from P2 → P3, the parameters that can only be modified in phase 2 (see above) are checked. In phase 3, the following parameters can still be modified:
 - Parameters for operation mode configuration
 - Error reaction settings
 - Motor configuration parameters, holding brake parameters
 - Encoder configuration parameters
 - Mechanical transmission elements (gears, feed constant)
 - Scaling and polarity parameters, format of the position data, modulo value
 - Configuration of analog and digital inputs/outputs
 - Configuration of the drive enable switch on/switch off sequence (waiting times, ...)



The parameterization mode is divided into phase 2 and 3 according to the SERCOS specification. The limit values for all scaling-dependent parameters are not yet known in phase 3. If these parameters are written in phase 3, an extreme value check is carried out for the first time when switching to phase 4.

- **P4:** In phase 4, the so-called "Operating mode", the cyclic data can be modified, but not the configuration parameters. Switching to the operating mode triggers a re-initialization of all functions present in the drive

Observe the following during **phase switching**:

- After it is switched on, the drive controller does not automatically switch to the operating mode. Instead, the master has to be used for the switch-over.
- This switching of the drive controller to the operating mode is closely linked to the establishment of the operational readiness
- The procedure includes several steps. This procedure is controlled by the master by specifying the communication phases 1 to 4 and by starting/ending the following commands:
 - S-0-0127, C0100 Communication phase 3 transition check
 - S-0-0128, C5200 Communication phase 4 transition check



At a SERCOS device, **all five communication phases** (and phase – 1 → baud rate scan) are supported. It is switched according to the SERCOS specification using the master to specify the communication phase.

Description of the Steps

Communication phases for a field bus interface

For devices with a **field bus interface**, there is only the "data exchange" state in addition to the basic initialization. In the "data exchange" state, the following device states are differentiated:

- Parameterization mode
- Operating mode

Communication phases for a parallel or analog interface

In general, the same communication phases as for the devices with a field bus interface apply to devices with an **analog or parallel interface**.

The switchover is always carried out by executing the transition check commands.



After it is switched on, the drive controller switches automatically to the operating mode!

Control and Status Words of the Master Communication

The control and status word of the respective master communication are significant components for the communication between the master communication master and drive.

Depending on the master communication, various parameters are used:

- SERCOS Interface
 - S-0-0134, Master control word
 - S-0-0135, Drive status word
- Field bus interface (e.g. PROFIBUS)
 - P-0-4077, Field bus: Control word
 - or -
 - P-0-4068, Field bus: Control word IO
 - P-0-4078, Field bus: Status word
 - or -
 - S-0-0144, Signal status word
- Analog/parallel interface (Analog mode)
 - P-0-4028, Device control word
 - P-0-0115, Device control: Status word

The following device-specific parameters are used drive-internally:

- P-0-0115, Device control: Status word
- P-0-0116, Device control: Control word

The following graphic shows the interaction between the control and status word mentioned above:

Description of the Steps

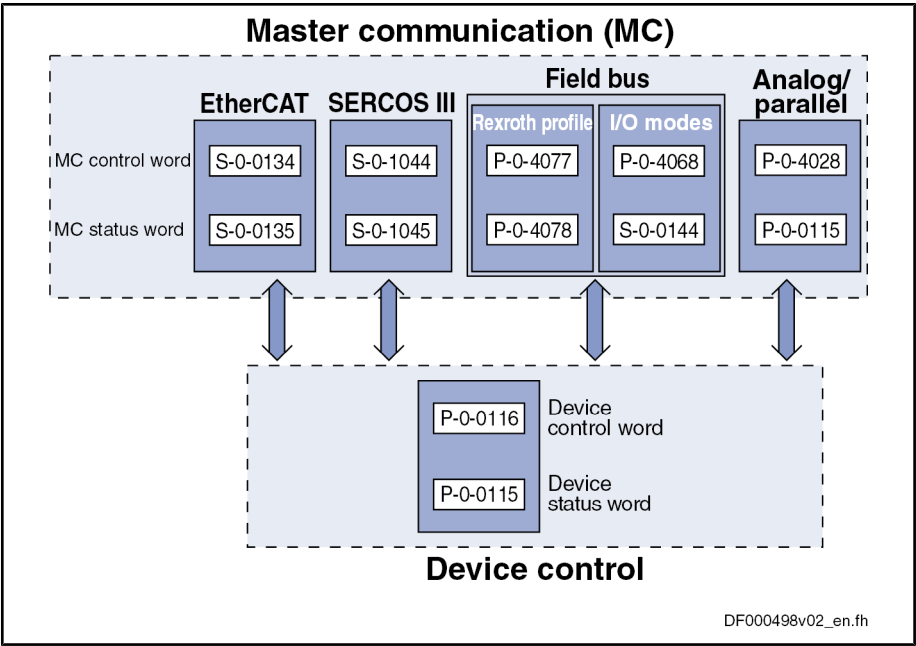
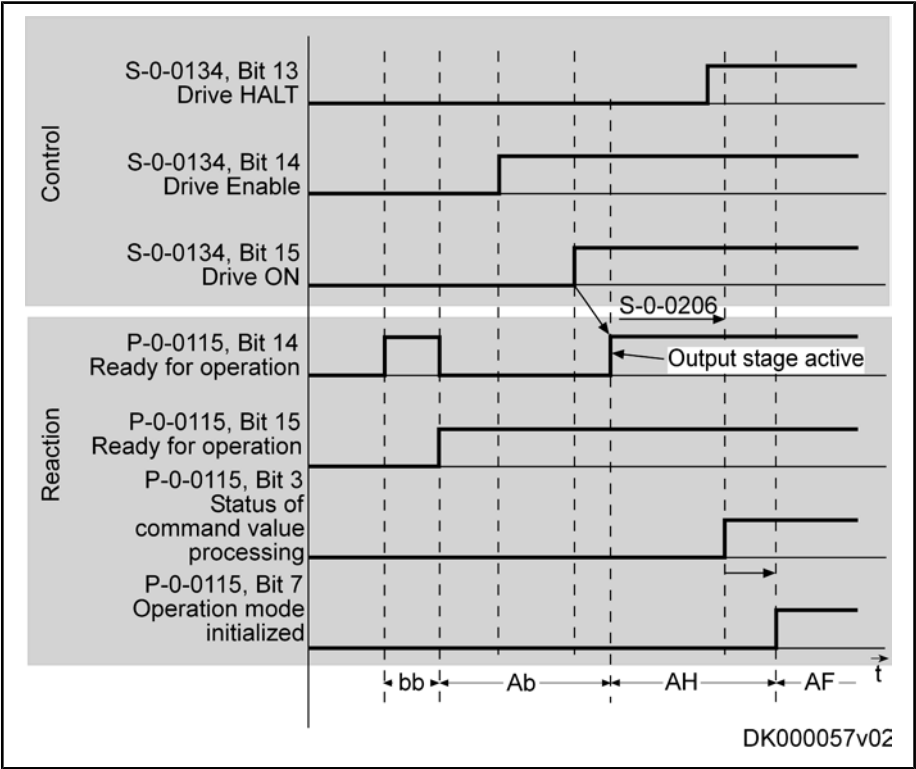


Fig.5-83: Interaction between the existing control and status words

Timing Diagram for Device Control

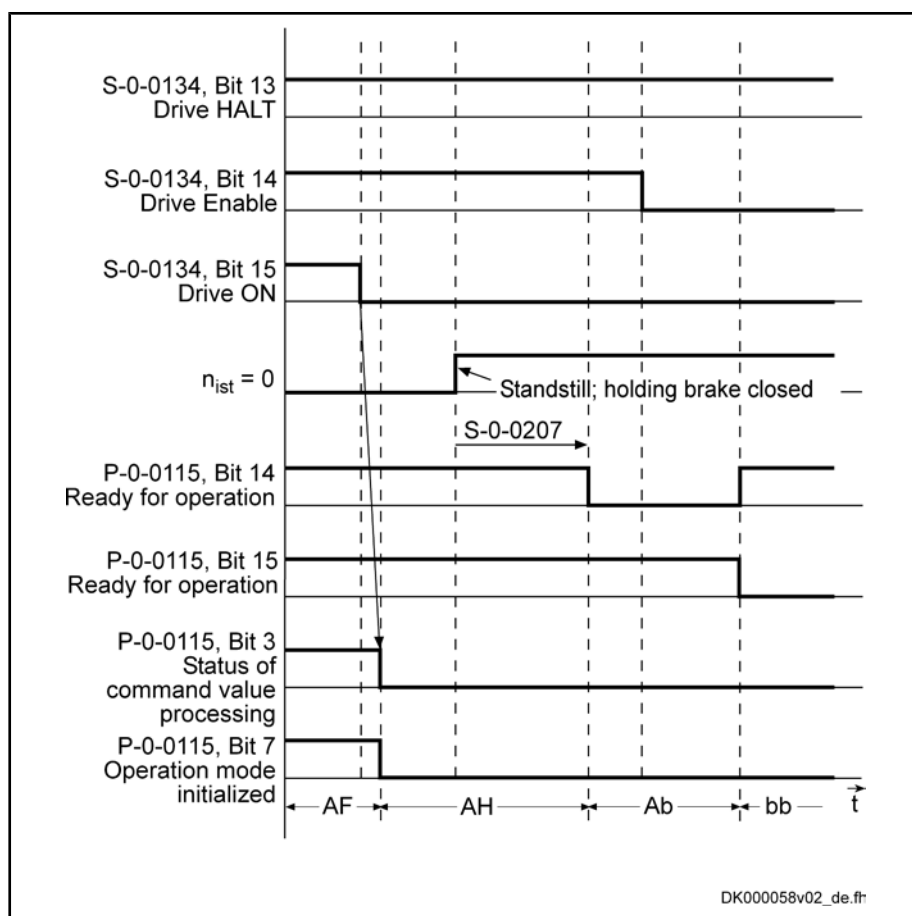
Bit sequence during switch-on procedure



S-0-0206 Drive On delay time
Fig.5-84: Bit sequence during switch-on procedure

Description of the Steps

Bit sequence during switch-off procedure



S-0-0207

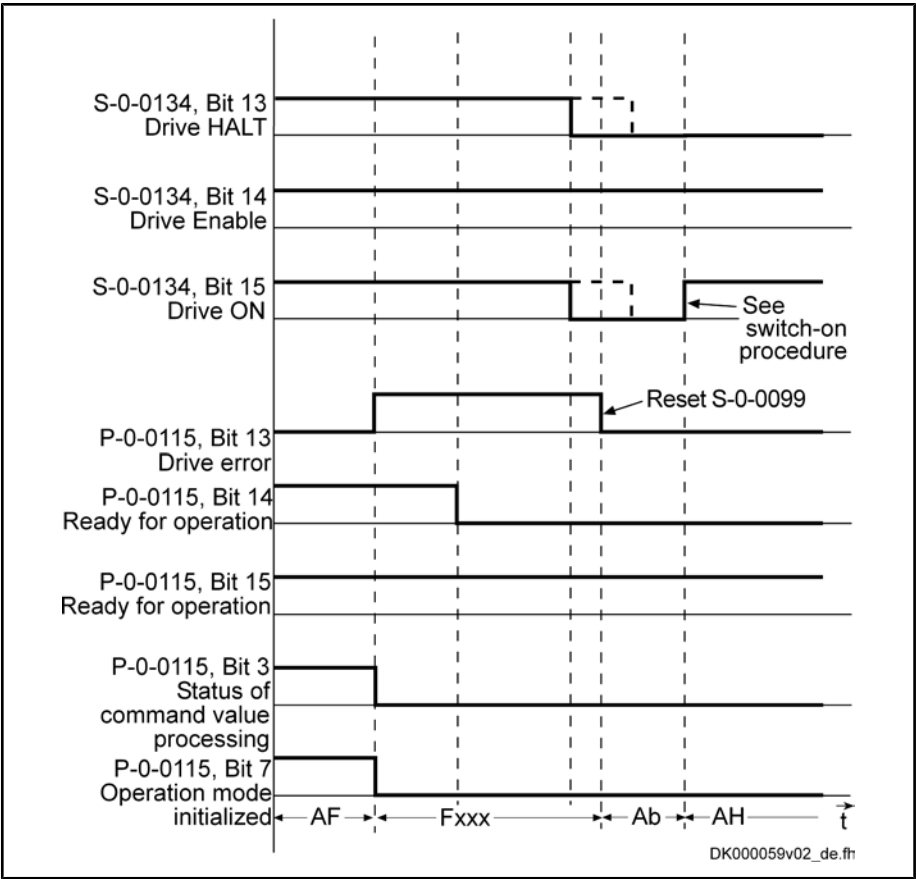
Drive Off delay time

Fig. 5-85:

Bit sequence during switch-off procedure

Description of the Steps

Bit sequence during error reaction



S-0-0099 C0500 Reset class 1 diagnostics
Fig.5-86: Bit sequence during error reaction

Description of the Steps

Bit sequence during operation modes switching

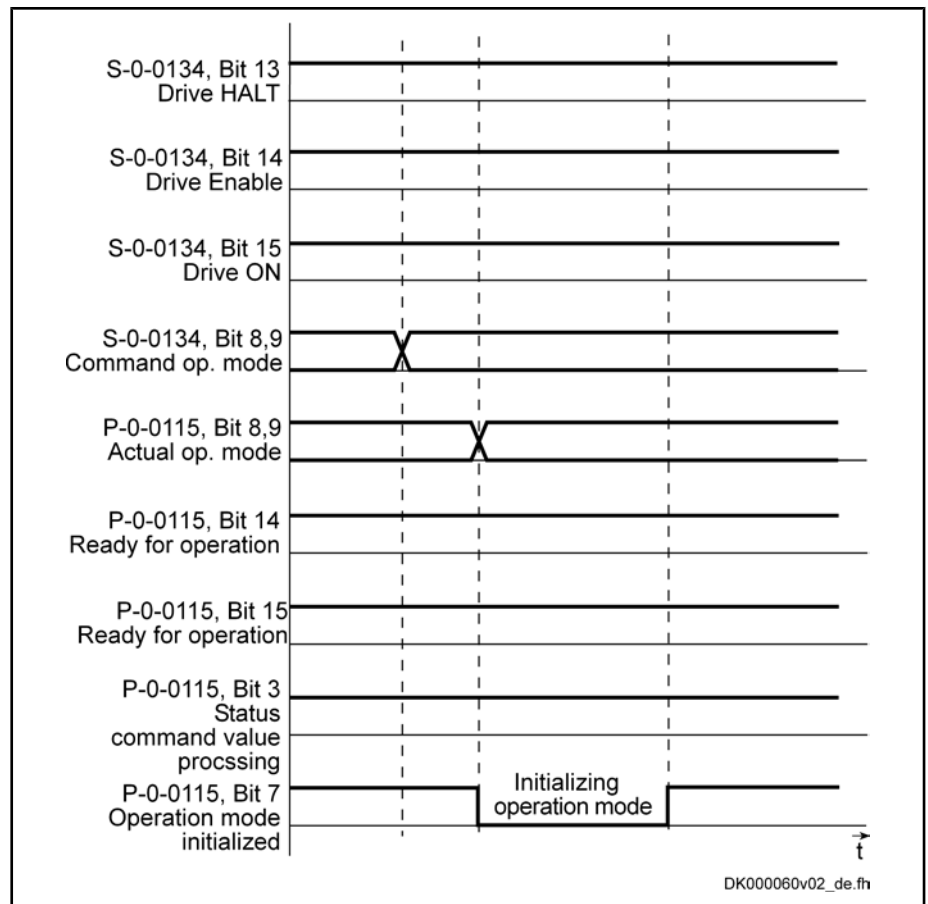


Fig.5-87: Bit sequence during operation mode switching

Commands and Diagnostics for Mode and Phase Switching

Differences in commands

Depending on the desired action, the commands are assigned to the following groups:

- Commands to switch between parameterization and operating mode:
 - S-0-0420, C0400 Activate parameterization level 1 procedure command
 - S-0-0422, C0200 Exit parameterization level procedure command
- Commands for transition check to communication phases 3 and 4 (only with SERCOS):
 - S-0-0127, C0100 Communication phase 3 transition check
 - S-0-0128, C5200 Communication phase 4 transition check



For SERCOS, the command C0200 (S00422) is automatically called while executing the command C5200 (S00128). Thus, after command C5200 starts, a command diagnostics C02xx can be displayed.

Transition check to communication phase 3

When executing the command "S-0-0127, C0100 Communication phase 3 transition check", a group of checks and parameter conversions are made that could cause the command diagnostics listed:

- Validity check of the parameters required for switching to phase 3

Description of the Steps

If it was not written on one of these parameters or buffering was incorrect, the error message "C0101 Invalid parameters (-> S-0-0021)" is generated. The Ident numbers for the incorrect parameters are listed in the parameter "S-0-0021, IDN-list of invalid operation data for CP2". These parameters have to be set valid by writing on them.

- C0101 Invalid parameters (-> S-0-0021)
- Check the device configuration
 - C0132 Invalid settings for controller cycle times
- Check the telegram configuration, in particular for configured telegrams
It is checked whether the selected parameters for the configurable data block in the cyclic command value channel (MDT) or the actual value channel (AT) may be configured and if the permitted length of the configurable data blocks is maintained.
 - C0104 Config. IDN for MDT not configurable
 - C0105 Maximum length for MDT exceeded
 - C0106 Config. IDNs for AT not configurable
 - C0107 Maximum length for AT exceeded
- If necessary, check of the timing parameters for the SERCOS communication in the phases 3 and 4 for plausibility and being within the boundary conditions
 - C0108 Time slot parameter > Sercos cycle time
 - C0109 Telegram offset unsuitable
 - C0110 Length of MDT (S-0-0010) odd
 - C0111 ID9 + Record length - 1 > length MDT (S-0-0010)
 - C0112 TNcyc (S-0-0001) or TScyc (S-0-0002) error
 - C0113 Relation TNcyc (S-0-0001) to TScyc (S-0-0002) error
 - C0114 T4 > TScyc (S-0-0002) - T4min (S-0-0005)
 - C0115 T2 too small
 - C0116 T3 (S-0-0008) within MDT (S-0-0089 + S-0-0010)
 - C0139 T2 (S-0-0089)+length MDT (S-0-0010)>TScyc (S-0-0002)
- Limit value check of the communication parameters and of the system
 - C0102 Limit error in parameter (-> S-0-0021)
 - C0103 Parameter conversion error (->S-0-0021)
 -

Transition check to communication phase 4 and "Exit parameterization level procedure" command

The commands "S-0-0128, C5200 Communication phase 4 transition check" or "S-0-0422, C0200 Exit parameterization level procedure command" can be used to execute the following checks and initializations that might cause the listed command errors:

- Check whether the function package selection was modified
 - C0299 Configuration changed. Restart
→ Drive has to be rebooted before it can be switched to the operating mode (OM)
- Validity check of parameters required for the following initializations
 - C0201 Invalid parameters (->S-0-0423)
 - C0212 Invalid control section data (->S-0-0423)

Description of the Steps

- Check the device configuration
 - C0223 Invalid settings for controller cycle times
- If necessary, check of the parameters for the field bus communication for plausibility and being within the boundary conditions
 - C0229 Field bus: IDN for cycl. command val. not configurable
 - C0230 Field bus: Max. length for cycl. command val. exceeded
 - C0231 Field bus: IDN for cycl. actual val. not configurable
 - C0232 Field bus: Length for cycl. actual values exceeded
 - C0233 Field bus: Tcyc (P-0-4076) incorrect
 - C0234 Field bus: P-0-4077 missing for cycl. command values
- Check the configuration of the multiplex channel
 - C0238 Order of cyclic command value configuration incorrect
 - C0239 IDN for command value data container not allowed
 - C0240 IDN for actual value data container not allowed
- Check the motor and encoder configuration
 - C0210 Feedback 2 required (->S-0-0423)
 - C0219 Max. travel range too large
 - C0270 Error when reading encoder data => motor encoder
 - C0271 Incorrect parameterization of motor encoder (hardware)
 - C0272 Incorr. parameteriz. of motor enc. (mechanical system)
 - C0273 Modulo value for motor encoder cannot be displayed
 - C0274 Motor encoder unknown
 - C0275 Error when reading encoder data => optional encoder
 - C0276 Incorrect parameterization of optional enc. (hardware)
 - C0277 Incorr. parameteriz. of opt. enc. (mechanical system)
 - C0278 Modulo value for optional encoder cannot be displayed
 - C0279 Optional encoder unknown
 - C0280 Maximum travel range cannot be displayed internally
 - C0284 Invalid motor data in encoder memory (->S-0-0423)
 - C0285 Type of construction of motor P-0-4014 incorrect
 - C0286 Several motor encoders connected
 - C0287 Error during initialization of motor data (->S-0-0423)
 - C0288 Rotary scaling not allowed
 - C0289 Error at init. of synchr. motor with reluctance torque
 - C0290 Error when reading encoder data => measuring encoder
 - C0291 Incorr. parameterization of measuring enc. (hardware)
 - C0292 Measuring encoder unknown
 - C0293 Modulo value for measuring encoder cannot be displayed
 - C0294 Incorrect measuring encoder configuration
- Check the modulo range
 - C0244 Act. modulo value cycle greater than max. travel range
- Checks during encoder initialization

Description of the Steps

- C0220 Error when initializing position of encoder 1
- C0221 Initialization velocity encoder 1 too high
- C0224 Error when initializing position of encoder 2
- C0225 Initialization velocity encoder 2 too high
- C0227 Error when initializing position of measuring encoder
- C0228 Initialization velocity measuring encoder too high
- Initialization of the optional additional functions (digital I/O)
 - C0243 Brake check function not possible
 - C0250 Probe inputs incorrectly configured
- Limit value check
 - C0202 Parameter limit error (->S-0-0423)
 - C0203 Parameter conversion error (->S-0-0423)
- General system checks
 - C0245 Operation mode configuration (->S-0-0423) not allowed
- Initialization of the fine interpolator
 - C0258 Error in relation TNcyc (S-0-0001) to fine interpol.
- Check the interface configuration
 - C0242 Multiple configuration of a parameter (->S-0-0423)
- Check the master communication
 - C0251 Error during synchronization to master communication
- Check whether a boot error is present or a firmware download was performed
 - C0298 Impossible to exit parameterization level

"Error-free" message If the drive reaches communication phase 4 without an error, "bb" appears in the display. The respective diagnostics is:

- A0013 Ready for power on

5.14 Control Panel of the Standard Operating Unit

5.14.1 Functional Description

Standard displays

The displays are provided with priorities so that several messages are not displayed at once.

Description of the Steps

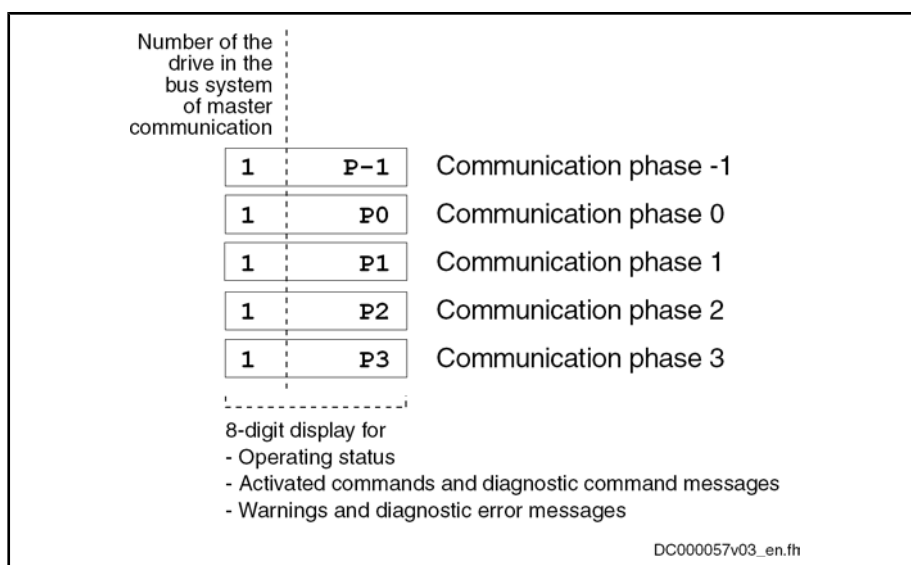


Fig.5-88: Displays during phase switchover of the master communication

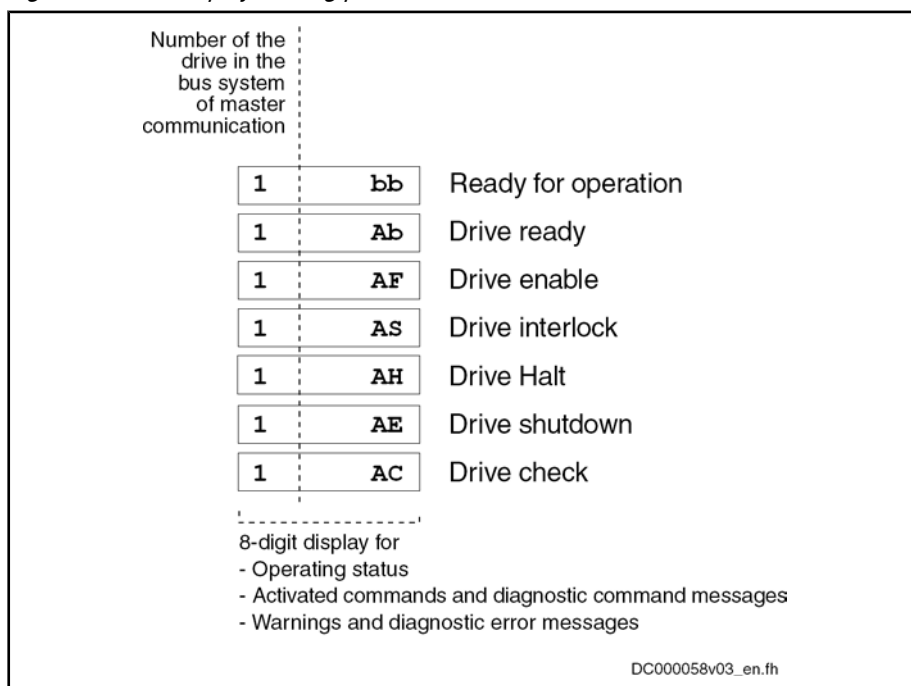


Fig.5-89: Displays during phase switchover of the master communication

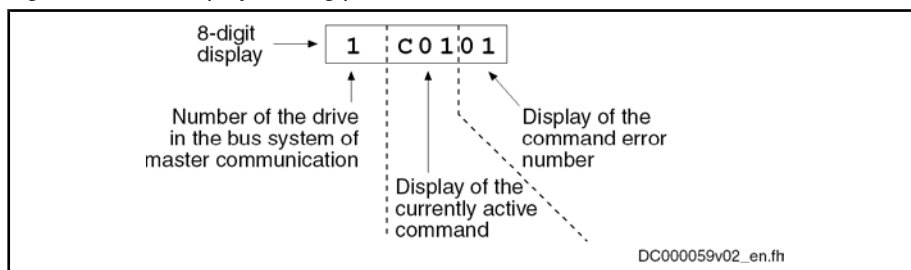


Fig.5-90: Explanation of command error displays

Description of the Steps

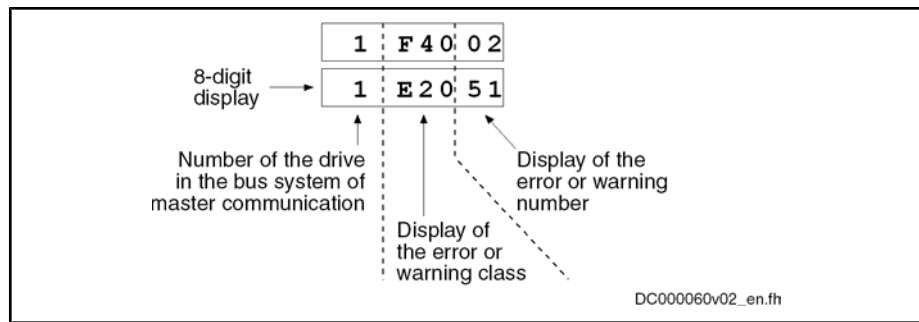


Fig.5-91: Explanation of error and warning displays

Display priorities

The current drive state with the highest priority is displayed.

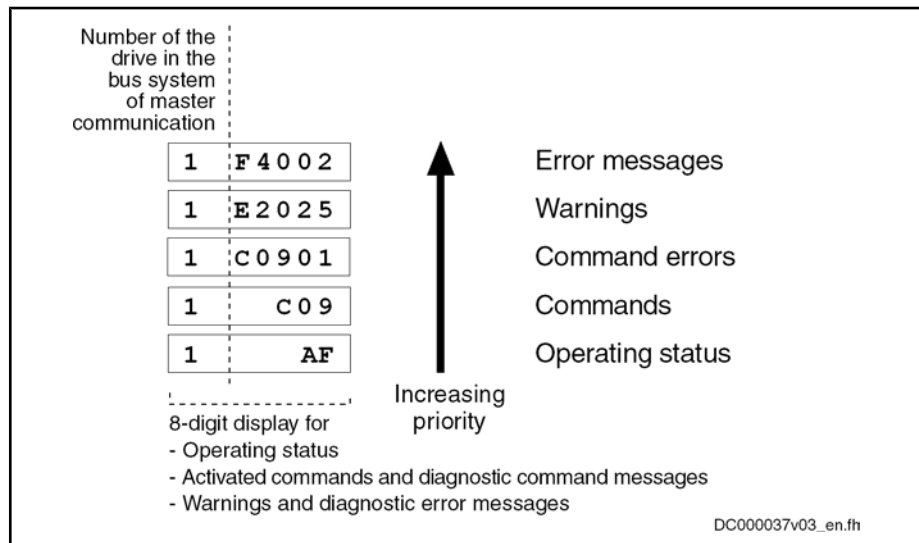


Fig.5-92: Priority sequence of the displays (with example displays)

In case of error messages, warnings and command errors, in addition to the flashing diagnostic number, the diagnostic text is also displayed in running text in the control panel of the standard operating unit (see also parameter description "S-0-0095, Diagnostic message").

**Activating the advanced display,
command menu, Easy menu and
Service menu**

The Easy menu can always be accessed (without being released) by pressing <Enter>.

By pressing <Enter> and <Esc> simultaneously (for eight seconds) in the standard display, the Command and the Service menu can be called additionally to the extended display.

Description of the Steps

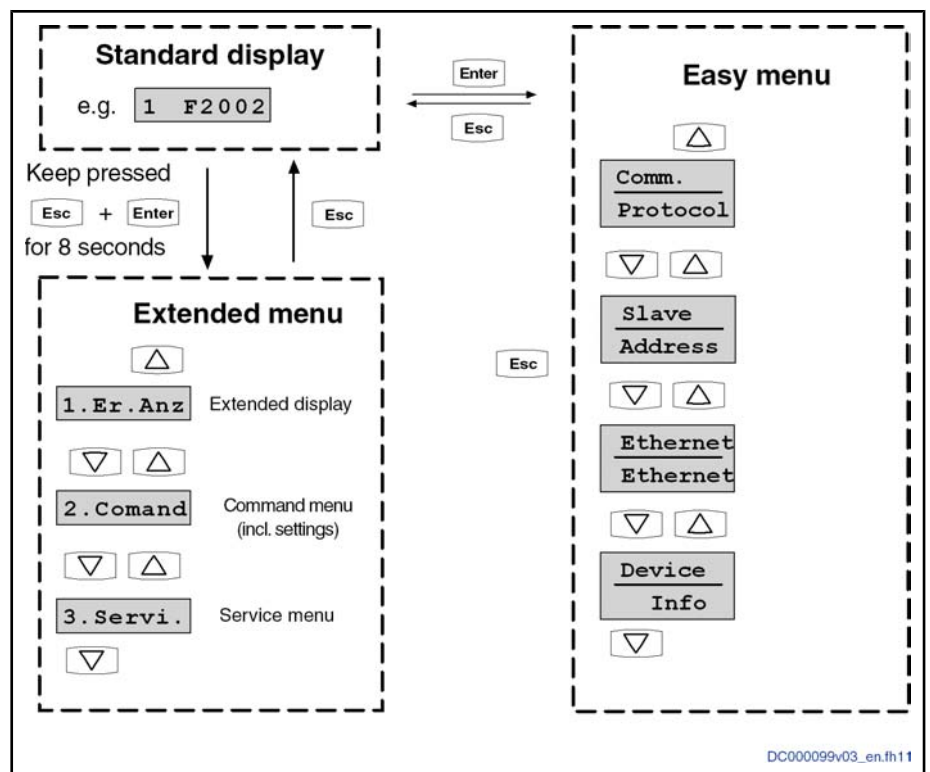


Fig.5-93: Activating the extended display, the Command menu and the Service menu

Easy menu

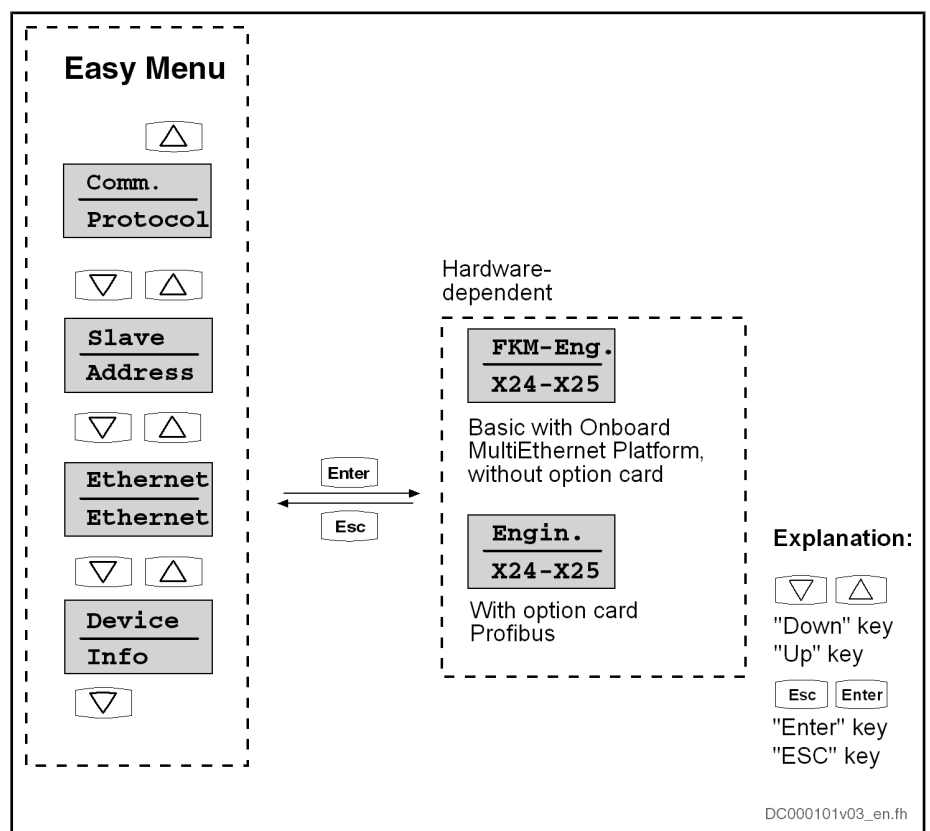


Fig.5-94: Easy menu

Description of the Steps

Display text	Comment/note
"Comm.____" "Protocol"	This submenu shows the current field bus protocol and can be changed if necessary
"Slave____" " _Address"	This submenu shows the current drive address. It can be changed if necessary
"Ethernet" "Ethernet"	In this menu, set the Ethernet connection can be accessed and set. The menu structure below "Ethernet" can vary depending on the hardware (see "Easy menu" on page 117).
"Device____" " ____Info"	This submenu shows information on the hardware used, e.g. firmware string (S-0-0030). Only for information purposes. Settings cannot be changed.

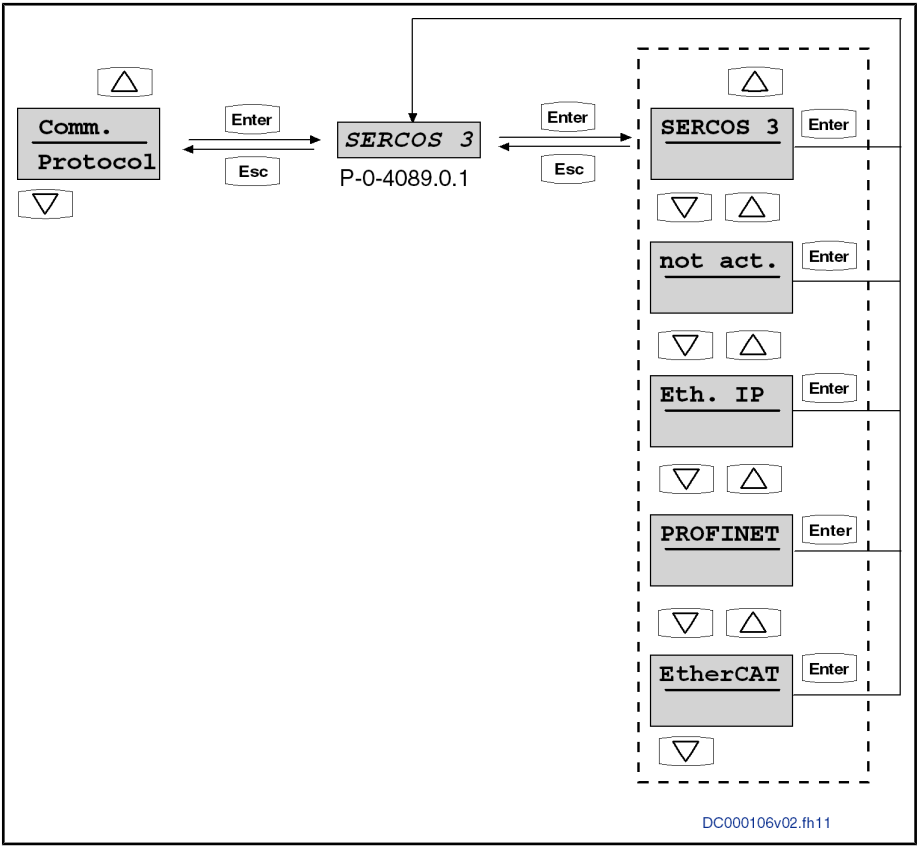


Fig. 5-95: Submenu for "Comm.____" "Protocol"

Description of the Steps

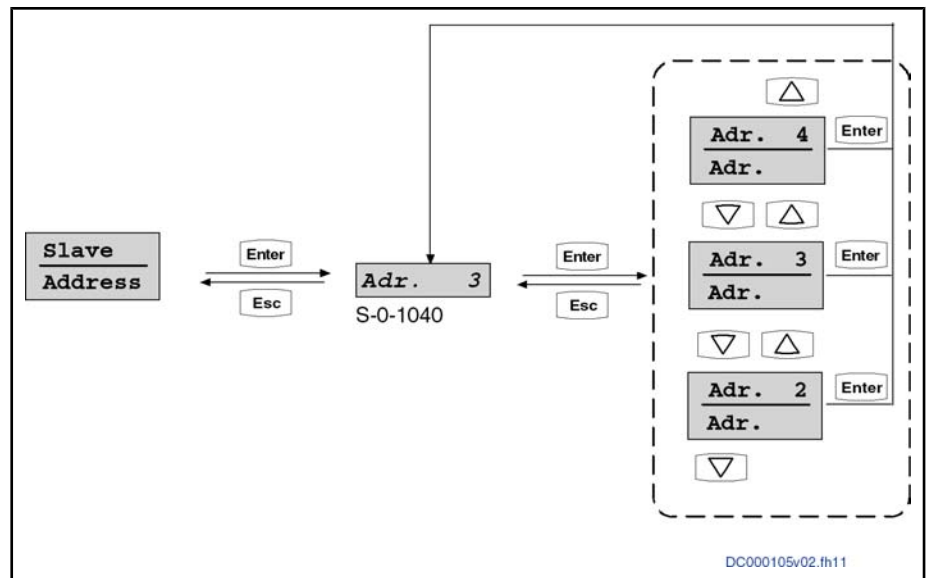


Fig.5-96: Submenu for "Slave__" " " Address"

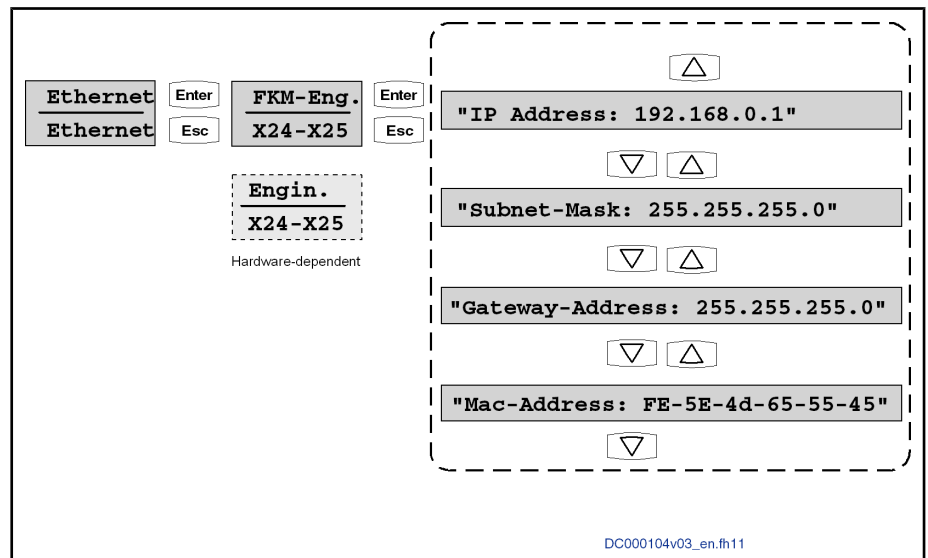


Fig.5-97: Submenu for "Ethernet" "Ethernet"

Description of the Steps

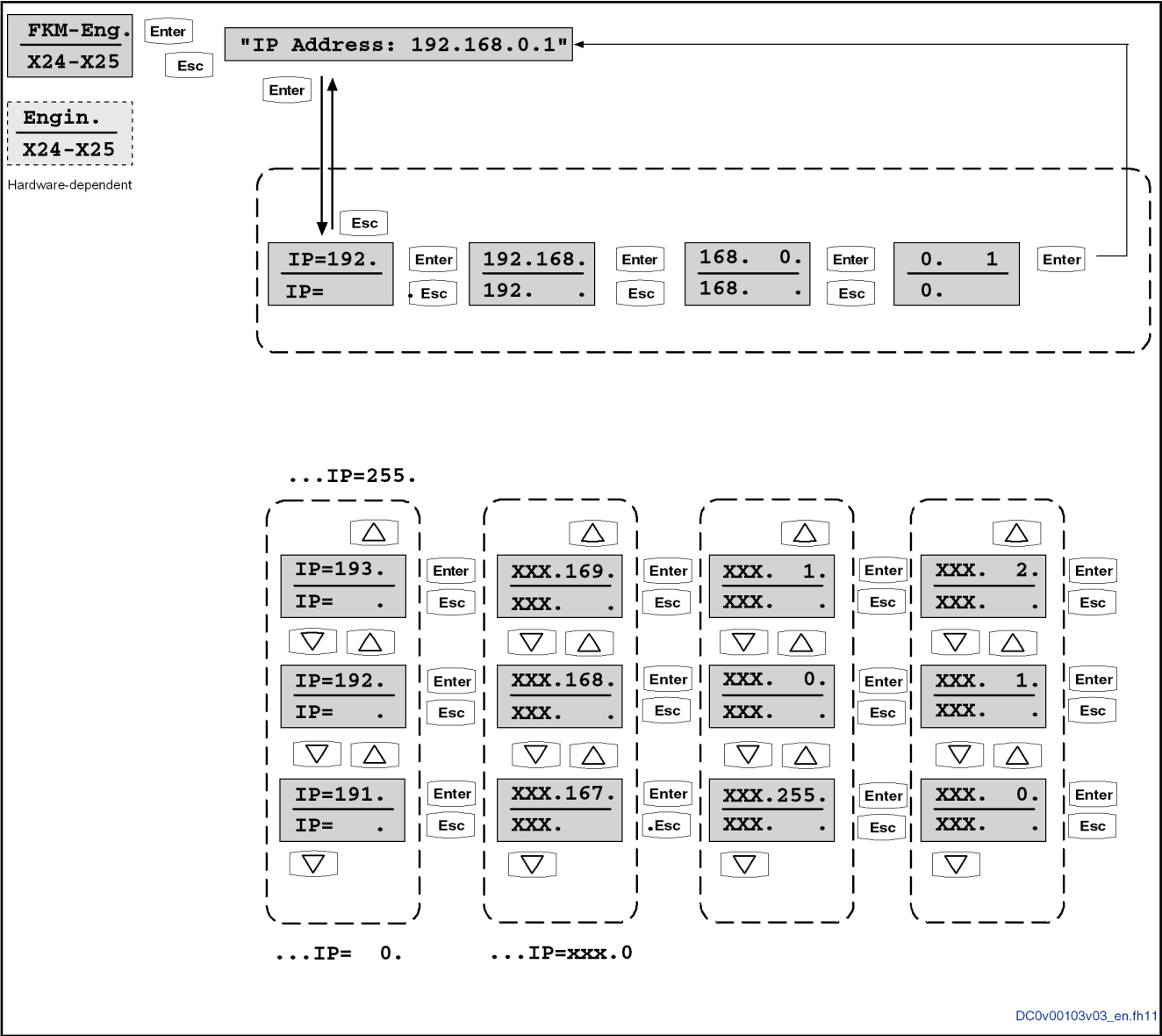


Fig.5-98: Example for setting the IP address for "master communication - Eng." "X24-X25"

Description of the Steps

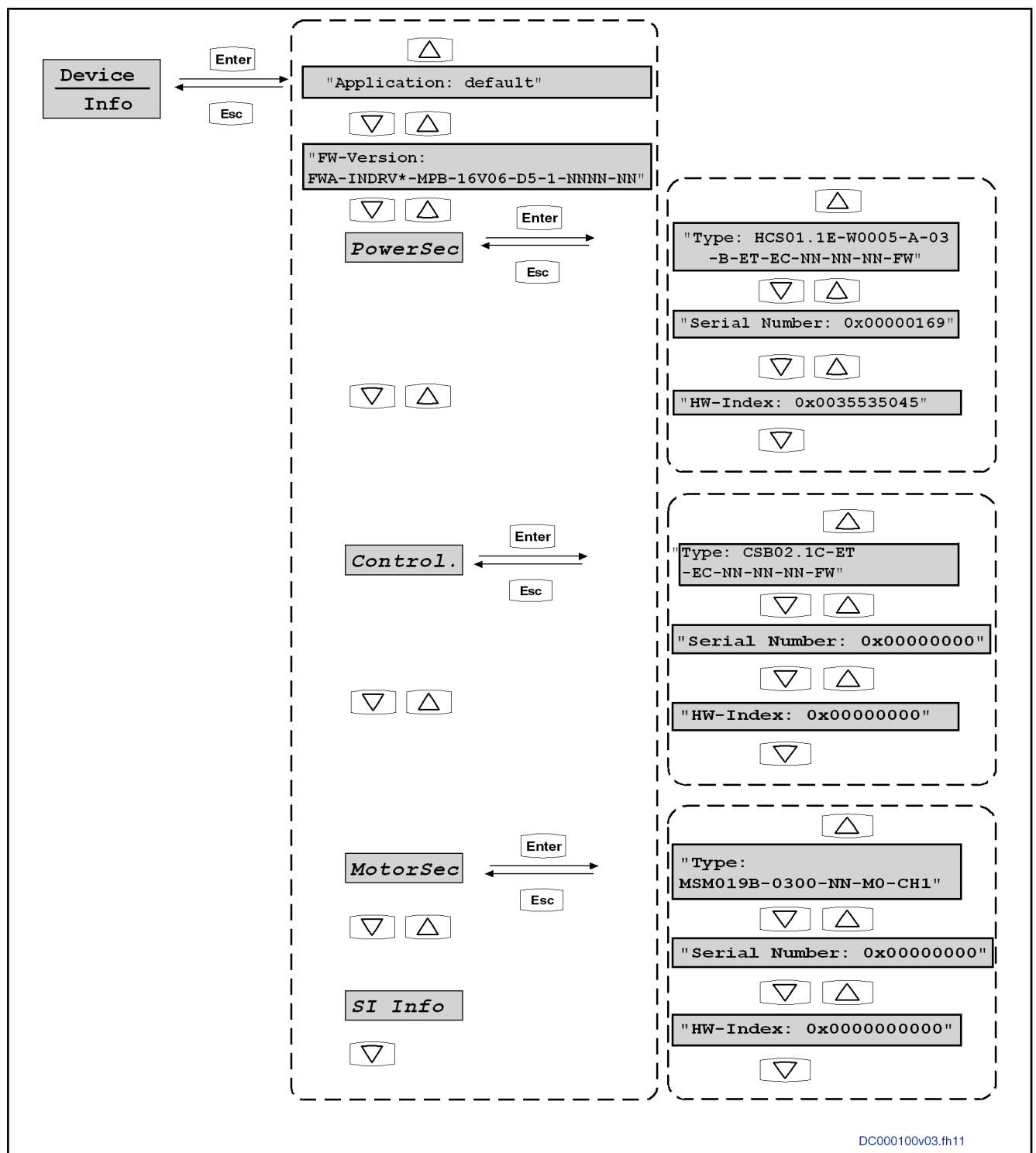


Fig. 5-99: Easy menu, structure under "Device__" "Info"

Assigning the entries in the "Device__" "Info" menu to the parameters used

Menu	Entry	Parameter used
-	Application	Text from "S-0-0142, Application type"
-	Firmware version	Text from "S-0-0030, Manufacturer version"

Description of the Steps

Menu	Entry	Parameter used
PowerSec	Type	Text from "S-0-0140, Controller type"
	Serial number	"P-0-1519, Module code of power section", 5th. element
	Hardware index	"P-0-1519, Module code of power section", 7th. element
Control	Type	Text from "P-0-1520, Control section type"
	Serial number	"P-0-1518, Module code of control section", 5th element
	Hardware index	"P-0-1518, Module code of control section", 7th element
MotorSec	Type	Text from "S-0-0141, Motor type"
	Serial number	"P-0-3000, Module code of motor, type plate", 5th Element
	Hardware index	"P-0-3000, Module code of motor, type plate", 7th Element
Safety technology information	-	-

Extended display Using the extended display, additional contents for certain parameters can be accessed:

- Error memory
- Diagnostic memory
- Operating hours counter: control unit
- Operating hours counter: power unit
- Type designation code for the active firmware in the device
- Safety technology ID, safety technology change counter and operating hours counter since last modification (if safety technology option exists)
- Field bus diagnostics (P-0-4073)

Description of the Steps

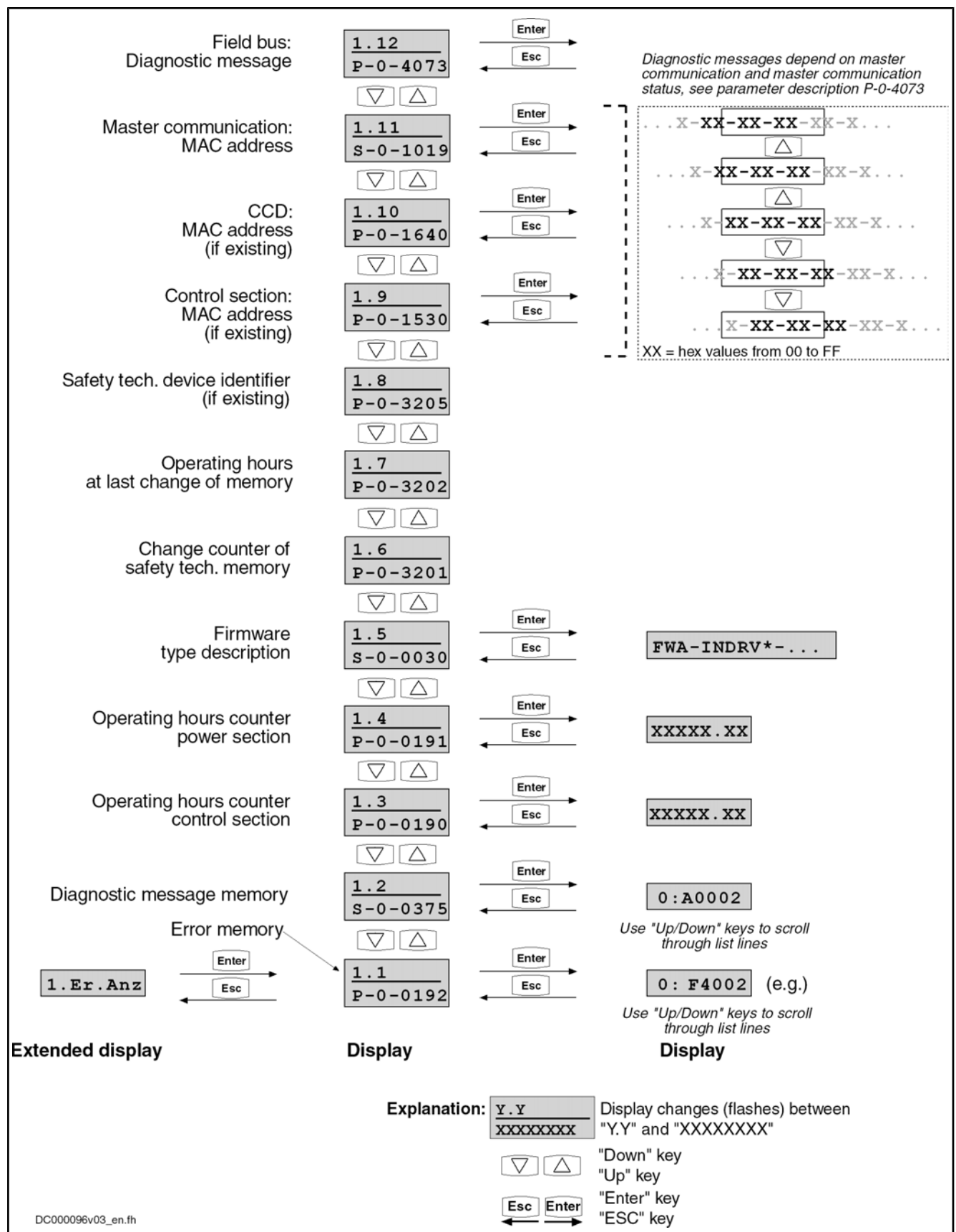


Fig.5-100: Activating the advanced displays

Description of the Steps

For more information on the diagnostics, error messages and operating hours counter, see the relevant sections in this documentation.

Command menu

From the advanced display, press <^> to activate the command menu. A variety of settings can be made in this menu:

- Setting the drive address (drive number in the bus system of the master communication)
- Further communication settings (IP address, gateway addresses and sub-net masks)
- Activating the easy master communication mode "Easy startup"
- Activating "S-0-0262, C07_x Load defaults procedure command" (load controller or basic parameters)
- Switching the communication phases between "operating mode" (OM) and "parameterization mode" (PM)

Description of the Steps

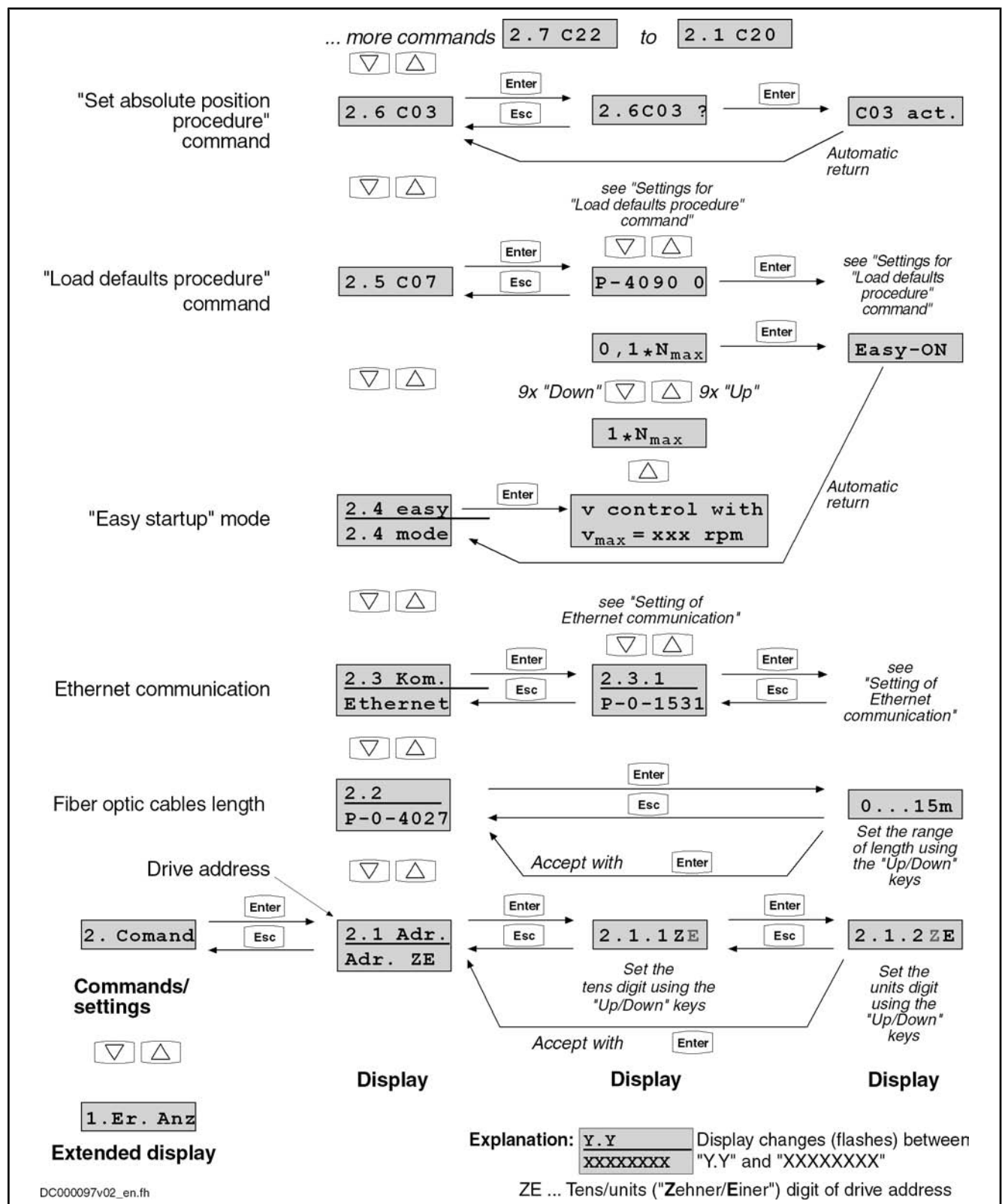


Fig.5-101: Activating commands/settings that can be accessed using the control unit (commands 2.1 to c.6)

Description of the Steps

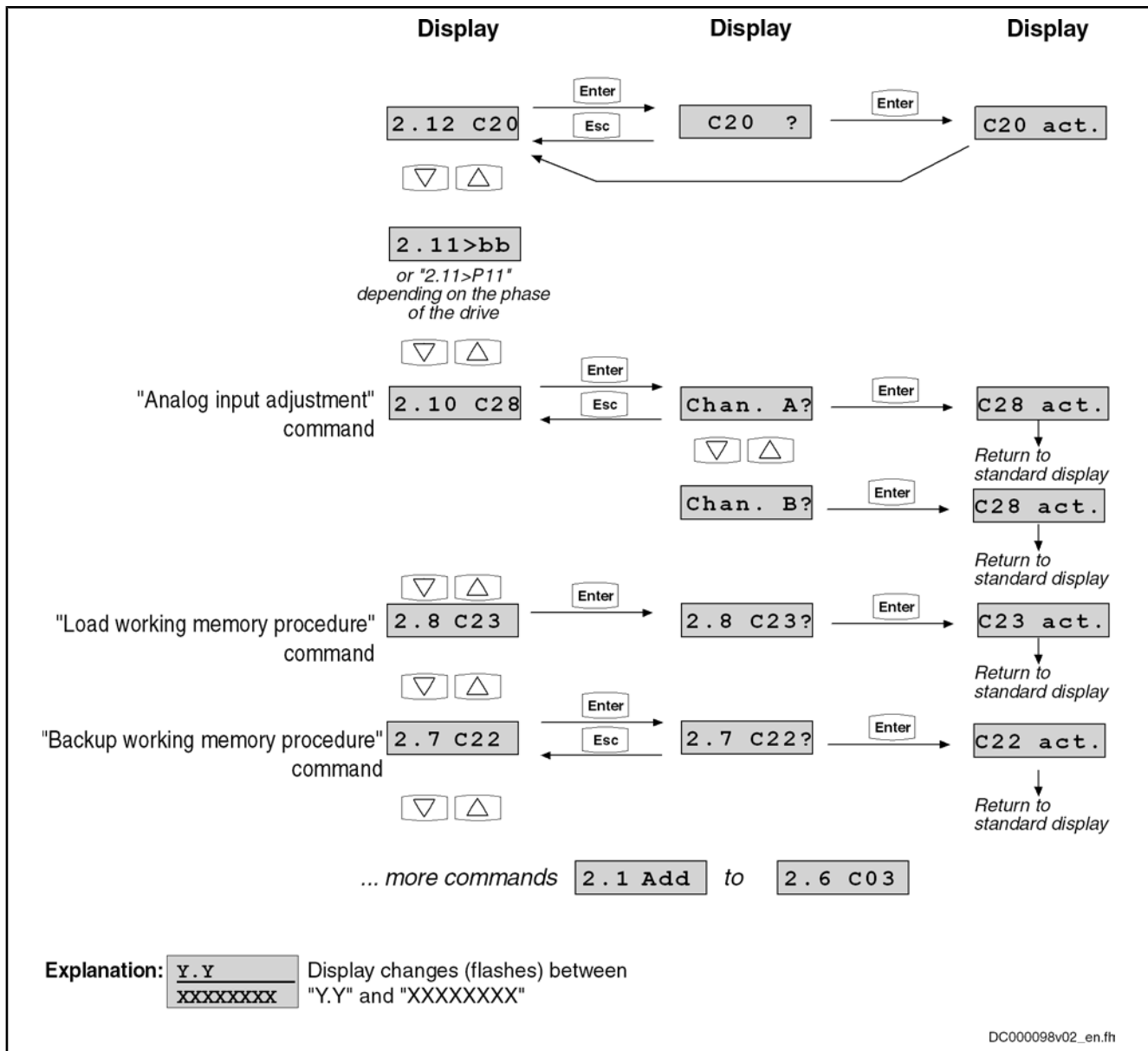


Fig. 5-102: Activating commands/settings that can be accessed using the control unit (commands 2.7 to c.12)

Settings for the "load defaults procedure" command

The parameter "S-0-0262, C07_x Load defaults procedure command" can also be activated using the standard control panel. Depending on the configuration in the parameter "P-0-4090, Configuration for loading default values", various basic parameter blocks are loaded device-internally. Using the standard control unit, the following configuration is possible in the parameter P-0-4090 in which the final two places of the hexadecimal parameter value are shown in the standard display:

- Load motor-specific control loop parameter values → 0x0000
- Load basic parameter values, without exception 0x0001
- Load basic parameter values (delivery setting) except the master communications parameters → 0x0011

Description of the Steps



After executing the command C07_x, the parameter P-0-4090 is automatically reset to the default value (0x0000).

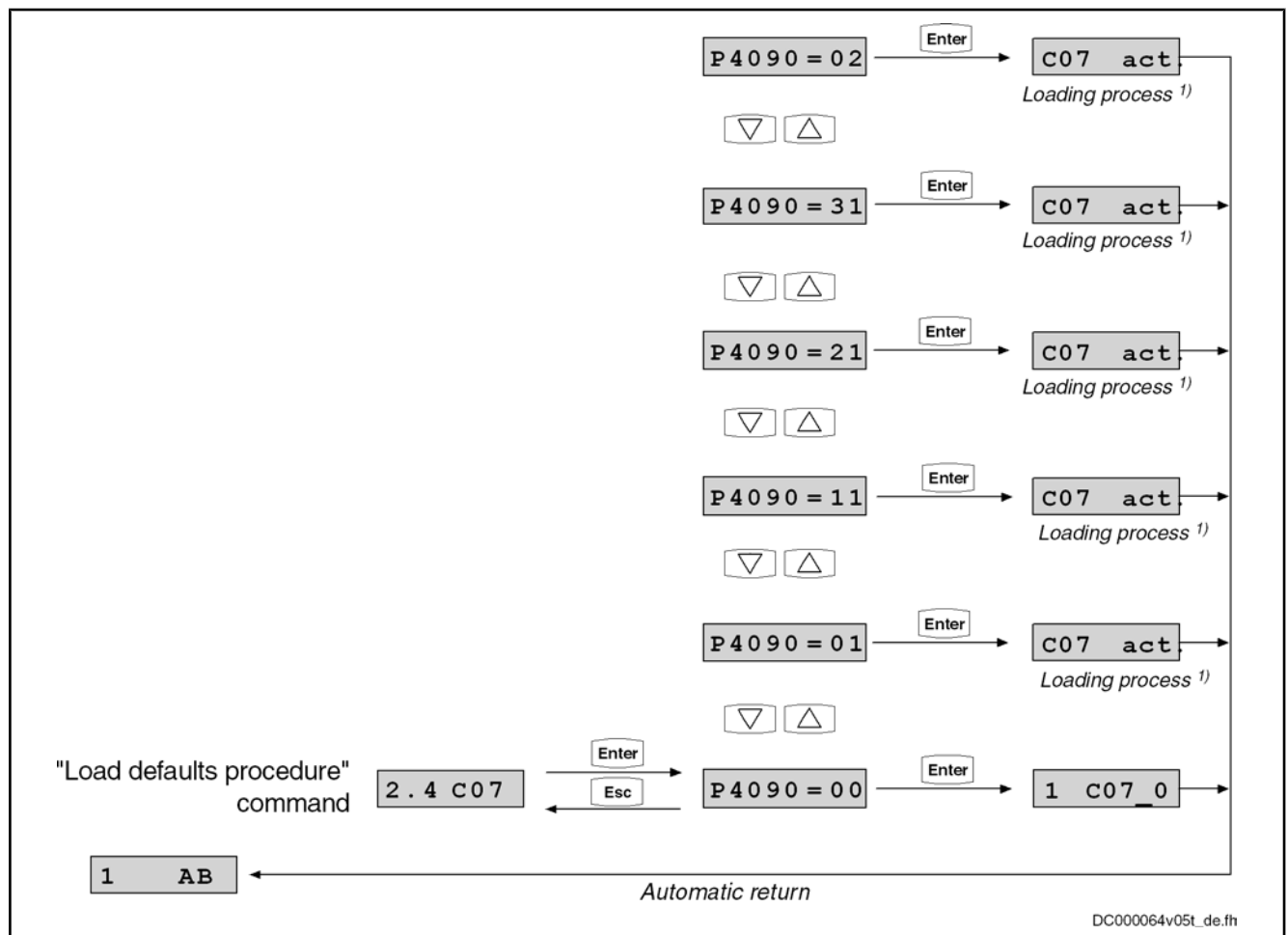


Fig.5-103: Setting of the parameter P-0-4090 for the "load defaults procedure" using the standard control unit

Switching the communication phases

Switching the communication phases between Operating mode (OM) and Parameterization mode (PM) using the control unit is possible with all master communications except for the SERCOS III. For SERCOS III, the control unit-controlled phase switching can only be carried out when "Easy startup" mode is active.



To execute "C07_1 Load defaults procedure command (load basic parameters)", the parameterization mode (PM) has to be active.

Description of the Steps

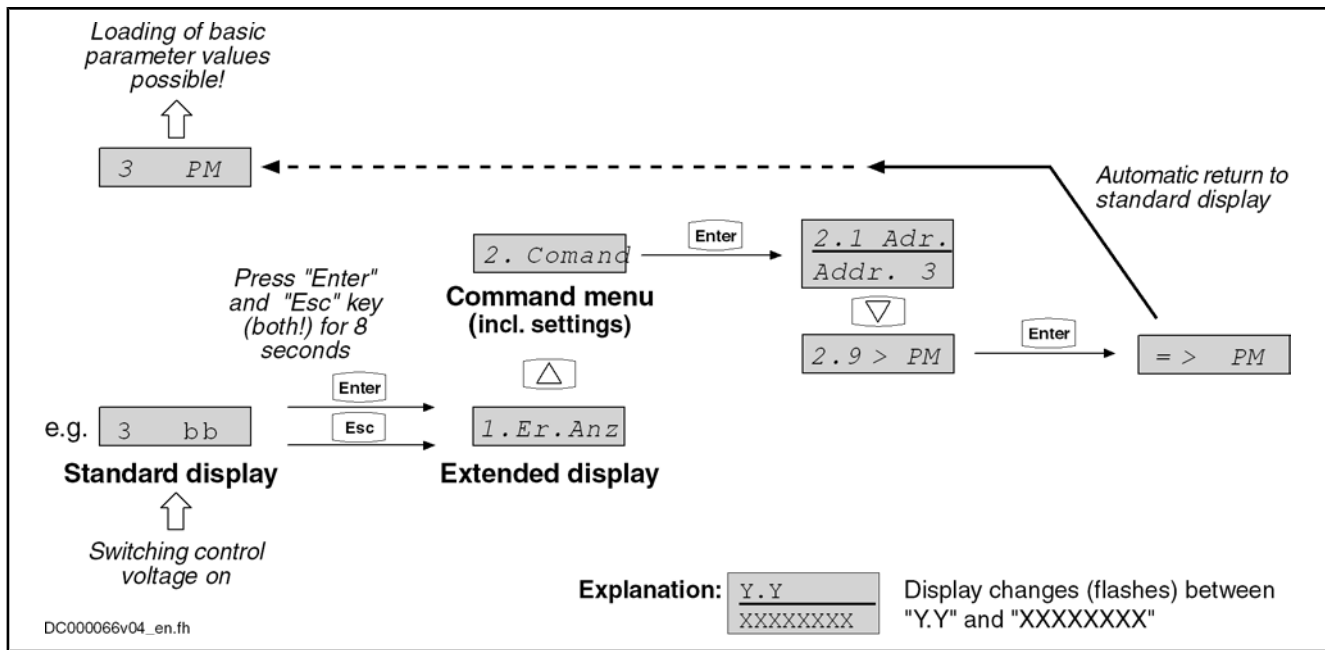


Fig.5-104: Activating the parameterization mode using the control unit

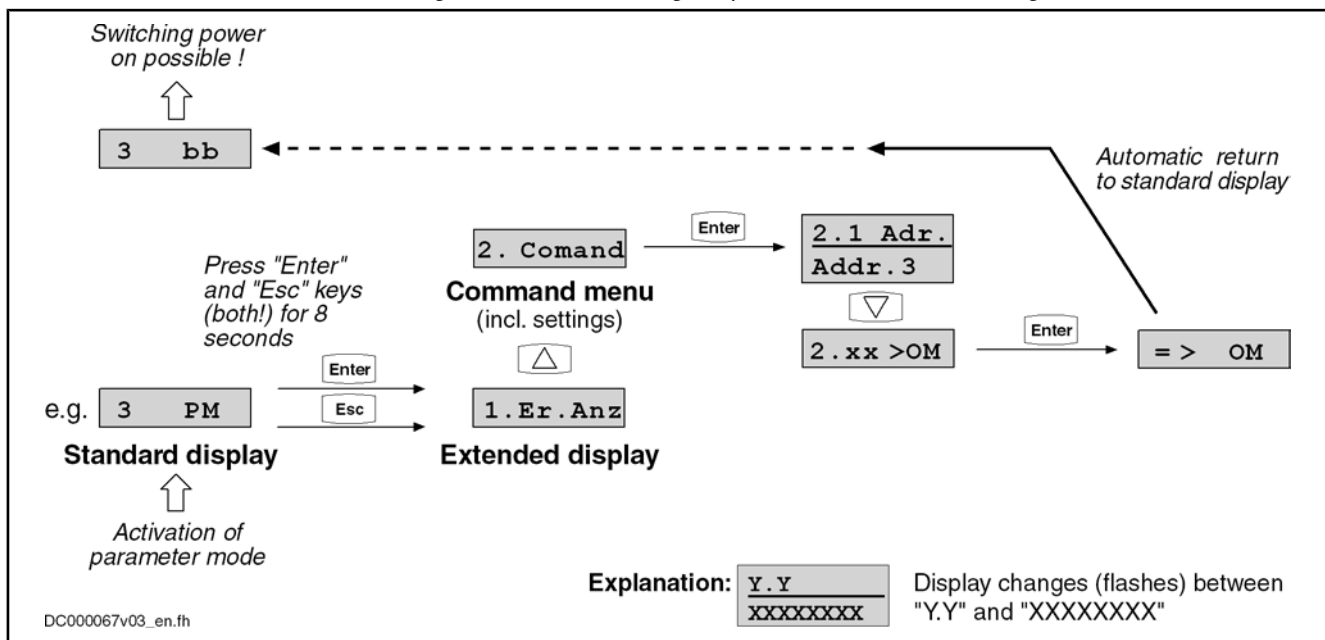


Fig.5-105: Switching from "parameterization mode" back to "operating mode" using the control unit

5.14.2 Commissioning Notes

NOTICE

Material damage may be caused by command required activation of motors and moving elements!

Move axes and moving elements to a secure starting position. Limit travel range and drive power.



Press <Esc> several times and the standard display appears again.



Key entries are queried in an 8 ms cycle. The display is also refreshed in an 8 ms cycle.

5.15 Firmware Exchange

5.15.1 General Notes on Firmware Exchange

Basics

Term definition

The following terms are used at firmware exchange:

- **Release update**

An old firmware release in the device (e.g. MPH07V04) is replaced by a newer firmware release (e.g. MPH07V06)

- **Version upgrade**

The old firmware version in the device (e.g. MPH06V12) is replaced by a new firmware version (e.g. MPH07V06)



The recommended options for firmware exchange for newer releases ("Update") or versions ("Upgrade") are described below.

The same conditions and procedural sequences apply for firmware exchanges to a previous release or previous firmware version.

For IndraDrive, a firmware exchange is carried out using the following hardware and software:

- **MultiMediaCard (MMC)**
- **PC with IndraWorks software**

Preparations and Boundary Conditions of the Firmware Exchange

Preparing for the firmware exchange

The following preparation have to be made for a firmware exchange:

1. The drive controller has to be switched on (24V power supply)
2. Before a firmware version upgrade, make absolutely sure that the parameter values are saved (this is recommended for a release update as well). Otherwise, completely new recommissioning is required (cf. [chapter 5.8 "Exporting Parameters" on page 78](#)).



To save the selected function packages during a drive firmware update and reload them after the firmware update by importing the parameters, select "Archive parameters required for restoring".

If this is not the case, function packages have to be manually selected and set after a firmware update.

3. The drive controller may **not** be in operating mode (communication phase 4) (cf. P-0-0115)

General notes on the execution

Observe the following when exchanging the firmware:

- The 24V control voltage may not be switched off during the firmware exchange
- The firmware exchange always has to be completed, i.e. the firmware on the optional safety technology module must also be exchanged.
- At a firmware exchange, **Release updates** and **Version upgrades** are differentiated.

Description of the Steps



A firmware exchange in connection with the "Safe Torque Off" (L2) option does not require any special measures, i.e. the following additional measures apply only when using option "S2".

5.15.2 Firmware Release Update

General

If the firmware exchange in a drive controller is carried out with a firmware of a **later release**, it is called firmware release update (e.g. FWA-INDRV*-MPH-07V04-D5 replaced by FWA-INDRV*-MPH-07V06-D5).

The procedures described for the firmware release update depend on the configuration of the control unit and the hardware used for the update (MMC or PC). The following illustration shows the generally recommended procedure for the firmware release update:

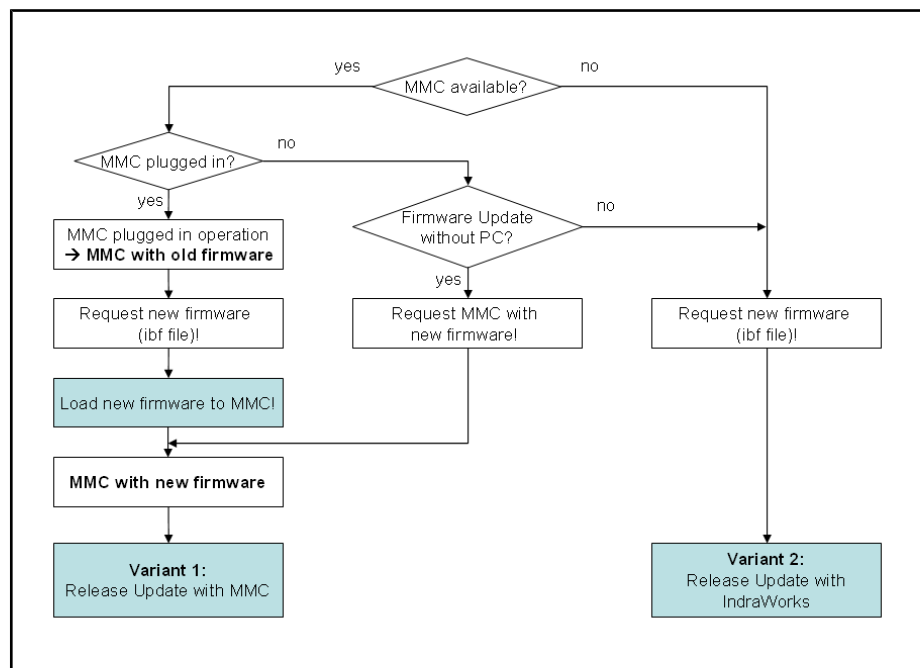


Fig. 5-106: Flowchart for firmware release update



The instructions highlighted with a dark background are described in the following sections.

Depending on the control unit, a version of the release update may already be specified. For a BASIC single axis control unit (not configurable) "CSB0x.xN", the release update has to be performed with the PC.

For the following control units, the release update can be performed with either an MMC card or with the PC:

- ADVANCED single axis control unit "CSH0x.x"
- BASIC double axis control unit "CDB0x.x"
- BASIC single axis control unit (configurable) "CSB0x.xC"

Loading to Firmware to the MMC

Prerequisites The following prerequisites have to be met to load a firmware to the MMC of the drive:

Description of the Steps

- New firmware available (ibf file)
- PC with MMC reader
- MMC with old firmware in the drive

Loading firmware on the MMC

The following steps are required to load the firmware on the MMC:

1. Switch off the drive and remove the MMC.
2. Insert the MMC into the MMC reader and open the "Firmware" folder on the MMC.
3. Delete the old firmware (e.g. FWA-INDRV_-MPH-07V04-D5.ibf).
4. Copy the new firmware (e.g. FWA-INDRV_-MPH-07V06-D5.ibf) to the "Firmware" folder.



Only one firmware file may be stored in the "Firmware" folder on the MMC.

If several firmware files are present, the message "MMC not correct" appears in the drive display after it is booted.

5. Remove the MMC from the MMC reader after the write procedure is complete.

Variant 1: Release Update with MMC

Selection criteria

Performing a firmware release update with MMC is reasonable if the controller is **not** equipped with a BASIC single axis control unit of type CSB0x.xN.

Firmware update with MMC

Using the optional MultiMediaCard (MMC) allows to transfer drive firmware quickly and easily to the drive controller.



Since the MMC is a storage medium that is easily writable (e.g. using a PC), testing the MMC contents before the firmware download is recommended. Ensure that the MMC actually contains the suitable firmware type.

An MMC that has the current release status of the required firmware can be obtained from one of our customer service areas.

The following steps are required for performing a firmware release update with MMC:

1. Load the firmware

⇒ Switch off the drive.

⇒ Insert the MMC with the new firmware into the corresponding slot on the controller.

⇒ Restart the drive with the MMC inserted.

After the drive is booted, the following message appears:

- "Firmware update?"

⇒ Acknowledge this message with <Enter> on the control panel. The firmware is loaded from the inserted MMC to the drive

Depending on the drive operating state, one of the following messages appears:

- "Load Param from MMC" or "Load new param?"
- "Activate new MMC?"

Description of the Steps

- "F2120 MMC: Defective or missing, replace"

⇒ Switch off the drive, remove the MMC (if the drive was operated without an MMC inserted) and restart the drive.

2. Set the machine to an operational state

⇒ Reset the machine to an operational state according to the instructions of the machine manufacturer.

⇒ Check the drive functions.

3. Check the safety technology parameters (only if the safety technology is activated in the drive)

The safety technology parameters remain intact in a release update. If the safety technology is activated, the following additional steps are required:

⇒ Check if the correct safety technology parameter settings for the drive are still present.

To do this, check the following:

- Specifications in parameter "P-0-3205, Safety technology device identifier"
- Status of the safety technology regarding parameter "P-0-3207, Safety technology password level" (for active and locked safety technology, Level is on 2)
- Change counter of safety technology memory (parameter "P-0-3201, Change counter of safety technology memory")
- Operating hours at last change of memory (parameter "P-0-3202, Operating hours at last change of memory")



If the integrated safety technology is used and a firmware release update is performed using a firmware status before MPx02V20, an acceptance test of the safety technology has to be repeated.

After the firmware release update, an acceptance test of the safety technology has to be repeated.

Variant 2: Release Update with IndraWorks

General IndraWorks can be used to perform a firmware release update starting with the MLC firmware version 10V06. Thus, connecting directly with the related drive is no longer necessary. Instead, the MLC can be used to transfer the firmware to all of the subordinate drives.

IndraWorks can be used to perform the firmware release update in the following use cases:

- Controller is operated without MMC
- or -
- Controller is equipped with a BASIC single axis control unit of type CSB0x.xN
- or -
- The firmware release update is to be performed using the PC

Prerequisites The following requirements must be met for a firmware release update using IndraWorks:

- Engineering PC with IndraWorks MLC 10V06 or higher
- MLC with firmware 10V06 or higher
- IndraDrive connected with master communication SERCOS III

Description of the Steps

- Engineering PC and MLC are in the same subnet



Saving the parameters before the firmware release update is recommended (cf. [chapter 5.8 "Exporting Parameters" on page 78](#)).

Firmware update with IndraWorks

The following steps are required for performing a firmware release update with IndraWorks:

1. **Open the IndraWorks project.**
2. **Switch the project online.**
3. **Call "Firmware management..." in the drive context menu below the SERCOS node.**

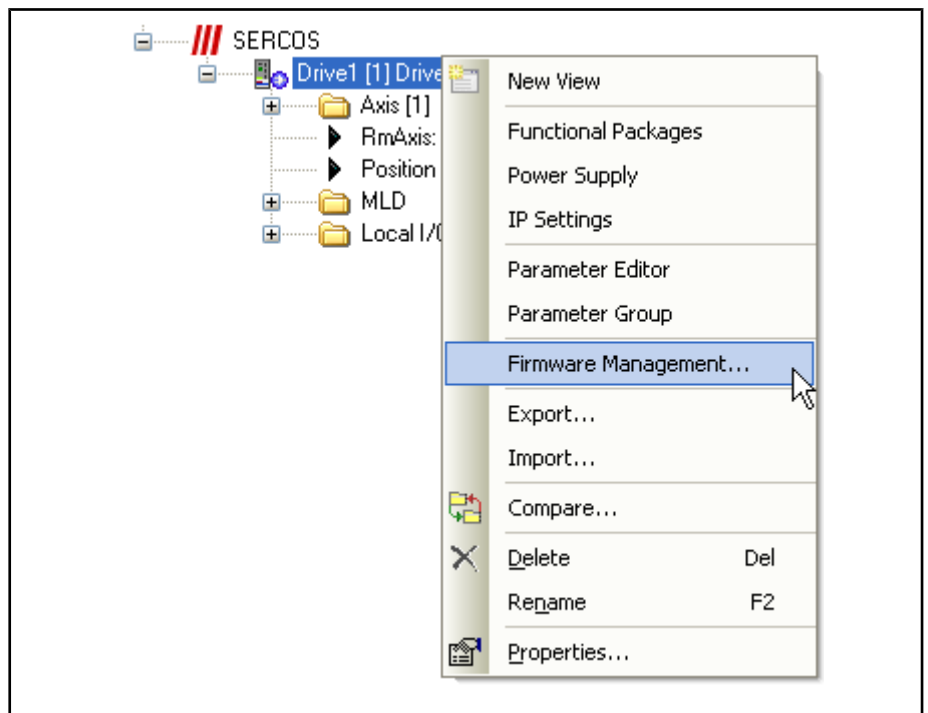


Fig.5-107: Calling firmware management

The following information dialog appears:

Description of the Steps

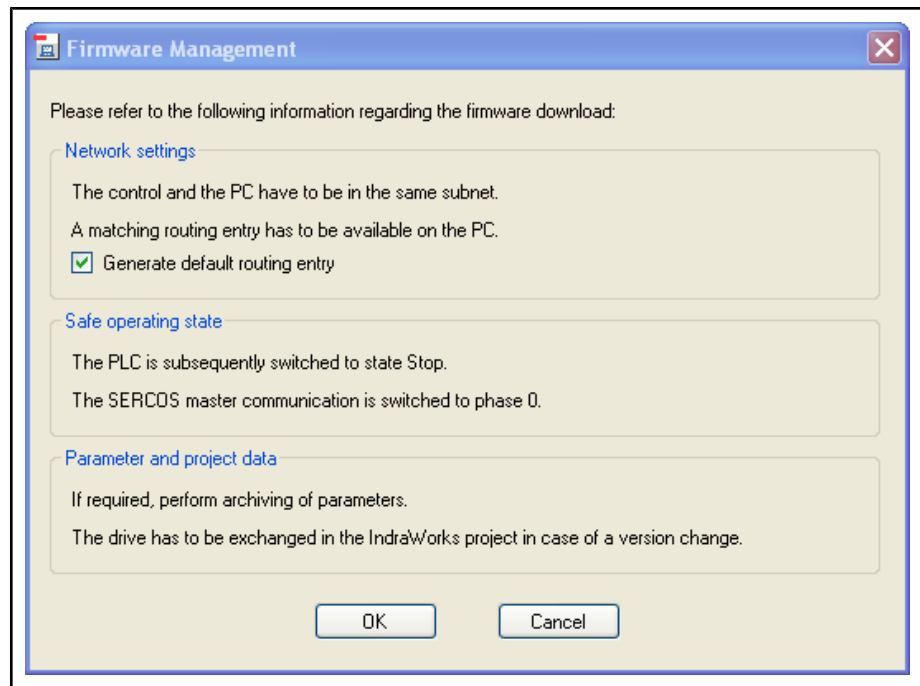


Fig.5-108: Information dialog and creating the standard routine entry

The control and the engineering PC have to be in the same subnet
This is necessary for the PC to connect to the drive directly using IP communication

To do this, IndraWorks can generate a standard routine entry on the PC.
This causes all IP packets with the drive IP address as a target to be redirected using the MLC. For this reason, it is recommended to generate the standard routine entry



Administrator rights are required for writing the routine entry.

4. Establish the secure operating state

For the firmware download, the control is switched to a secure operating state. Therefore, the PLC is stopped first and the SERCOS master communication is switched to phase 0

A security prompt appears

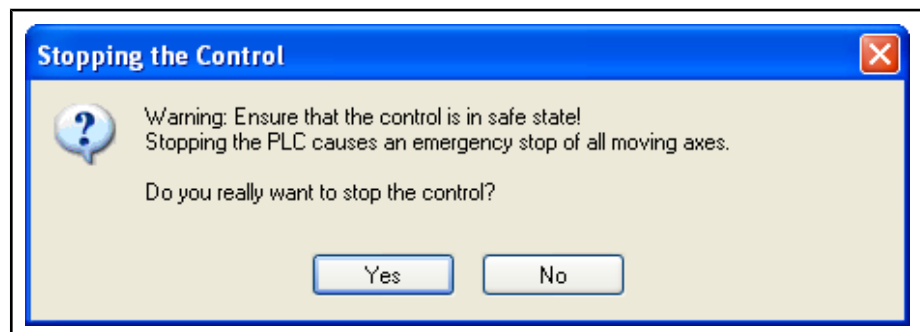


Fig.5-109: Stopping the control

5. Perform the firmware download

If all prerequisites are met, the dialog for the firmware download opens.

Description of the Steps

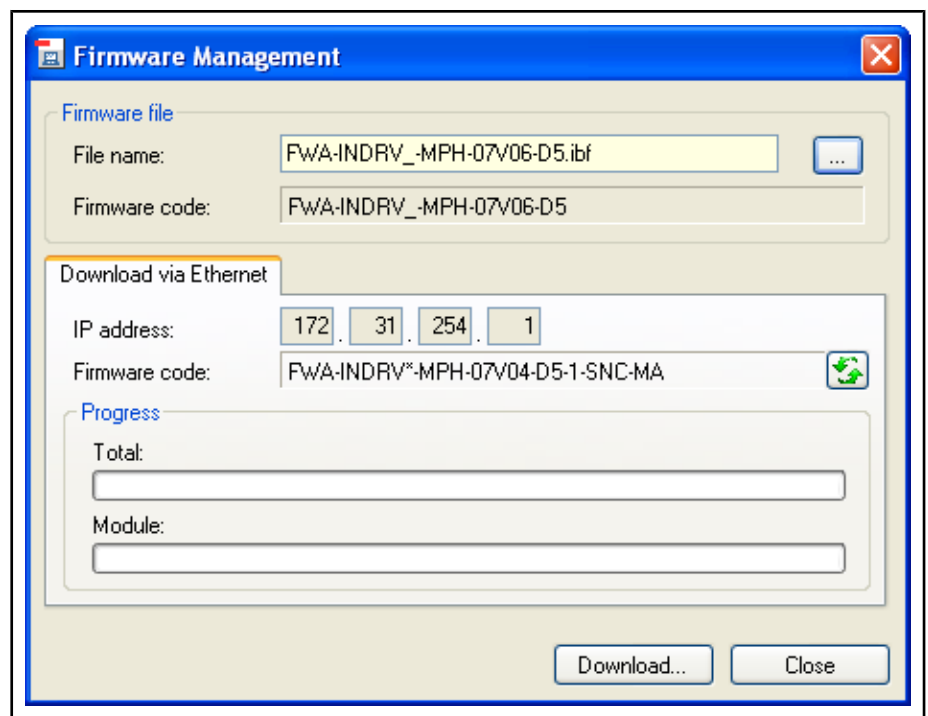


Fig.5-110: Selecting the firmware

The current firmware is displayed in the "Firmware code" field. The firmware file, which contains the new firmware, can be selected in the "File name" field.



Data loss - aborted firmware download

During the firmware download, neither the supply voltage of the control unit nor the Ethernet connection to the drive may be interrupted.

After you selected the correct firmware, start the download



If no device is found at this IP address, check the communication settings (see ["Problematic situation: no device found at this IP address" on page 137](#)).

6. Download the firmware

The firmware download takes place automatically. The progress is displayed in the dialog with a progress bar

Description of the Steps

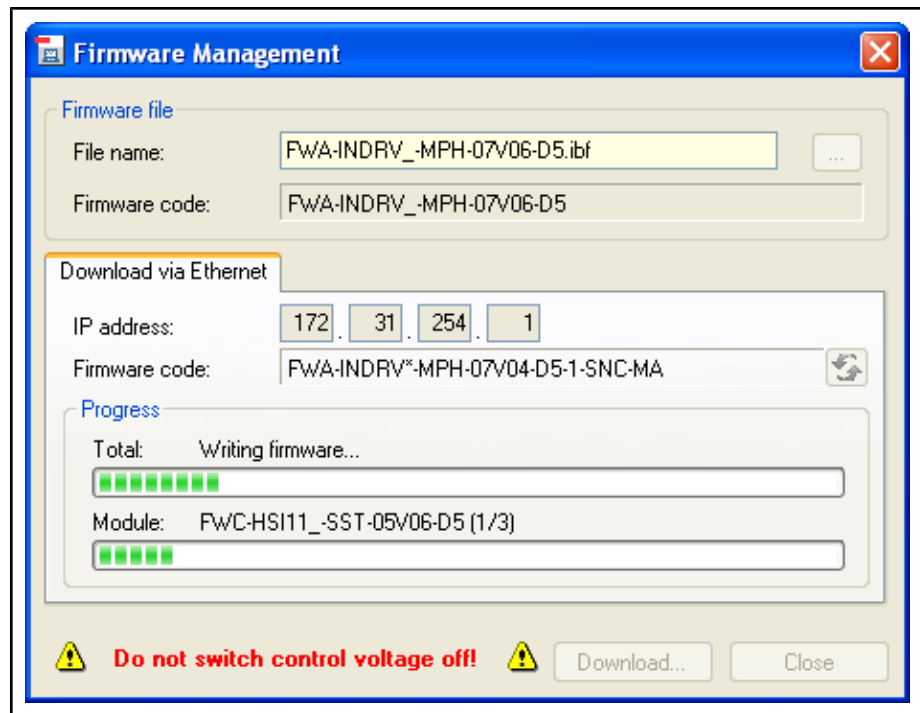


Fig.5-111: Firmware download

**Data loss - aborted firmware download**

During the firmware download, neither the control voltage nor the Ethernet connection to the drive may be interrupted.

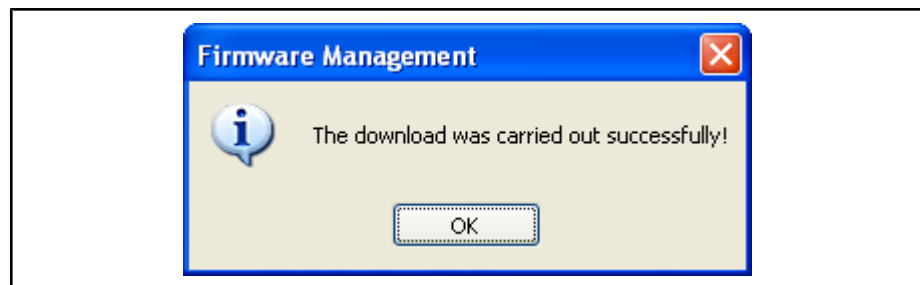
7. Successful completion of the download

Fig.5-112: End of the download

⇒ After the firmware download is complete, close the "Firmware Management" window.

8. Set the machine to an operational state

⇒ Reset the machine to an operational state according to the instructions of the machine manufacturer.

⇒ Check the drive functions.

9. Check the safety technology parameters (only if the safety technology is activated in the drive)

The safety technology parameters remain intact in a firmware release update

Description of the Steps

If the safety technology is activated, the following additional steps are required:

⇒ Check if the correct safety technology parameter settings for the drive are still present.

To do this, check the following:

- Specifications in parameter "P-0-3205, Safety technology device identifier"
- Status of the safety technology regarding parameter "P-0-3207, Safety technology password level" (for active and locked safety technology, Level is on 2)
- Change counter of safety technology memory (parameter "P-0-3201, Change counter of safety technology memory")
- Operating hours at last change of memory (parameter "P-0-3202, Operating hours at last change of memory")

Problematic situation: no device found at this IP address

In the dialog for the firmware download (step 6), there is no device found at this IP address. This may be due to faulty communication settings. For more detailed information, refer to "Rexroth IndraMotion MLC 12VRS Functional Description" (see /20/ in [chapter 1.3 "Required and Supplementing Documentations"](#) on page 8), Chapter "IP Communication".

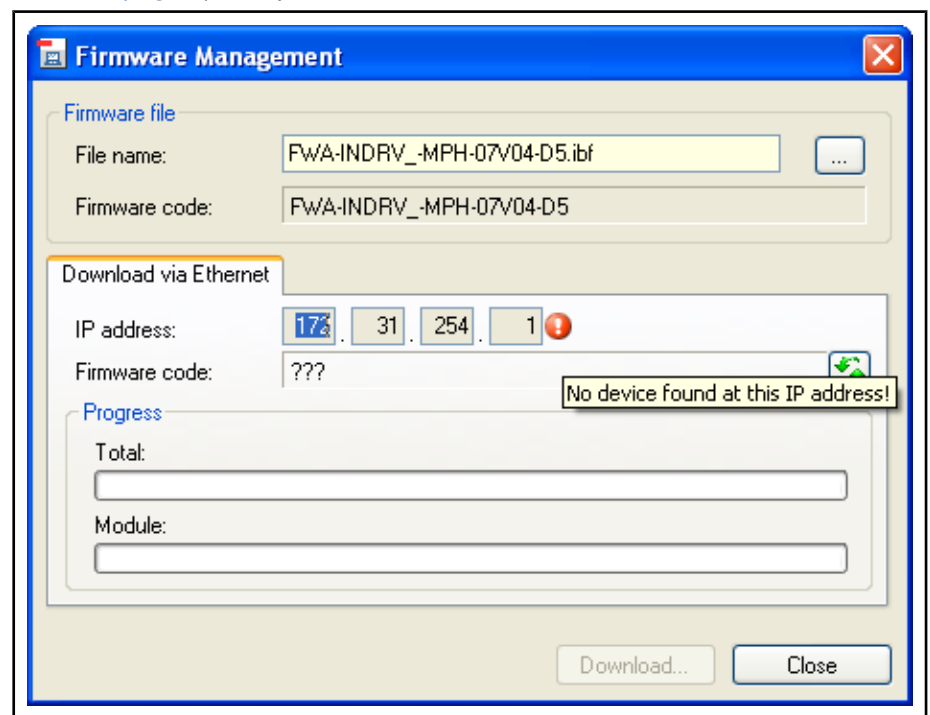


Fig.5-113: No device found at this IP address



First ensure that the engineering PC and the control are in the same subnet.

If the engineering PC and control are in the same subnet, check the communication settings in the control context menu. Therefore, open the context menu **Control name ► Communication ► Interfaces**. Open the **Bridge** tab and apply the command configuration.

Open the IP settings in the drive context menu below the SERCOS node. Confirm the Engineering via IP and open the tab **Engineering via IP**. Check the status of the IP configuration and, if necessary, activate the IP settings.

Description of the Steps

Then restart the drive to accept the settings.

Repeat the firmware release update.

5.15.3 Firmware Version Upgrade

General

⚠ DANGER

Hazardous motions possible!

Life-threatening danger, risk of injury, severe bodily harm or material damage!

In order to guarantee the correct function and to prevent the risk of personal injury, carry out a complete acceptance test after performing a firmware version upgrade on drive controllers with an optional safety technology module (S2).

If the firmware exchange in a drive controller is carried out with a firmware of a **later version**, it is called firmware version update (e.g. FWA-INDRV*-MPH-06V12-D5 replaced by FWA-INDRV*-MPH-07V06-D5).



Before carrying out a firmware version upgrade, all parameters have to be saved (e.g. with "IndraWorks").

After the firmware exchange, the parameters have to be restored, since the command "C07_1 Load defaults procedure command" is automatically executed. After loading the desired parameter file, the drive controller is ready for use again.

The firmware version upgrade procedures described depend on the configuration of the control unit and the firmware used. The following illustration shows the generally recommended procedure for the firmware version upgrade:

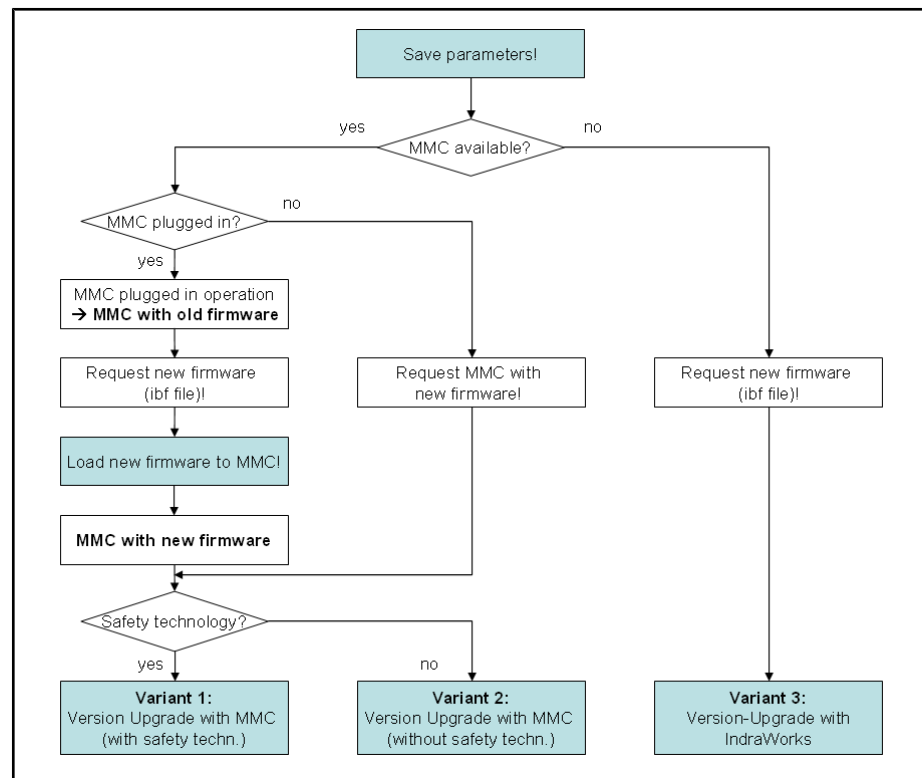


Fig. 5-114: Flowchart for firmware version upgrade

Description of the Steps



The instructions highlighted with a dark background are described in the following sections.

Depending on the control unit, a version of the firmware version upgrade may already be specified. For a BASIC single axis control unit (not configurable) "CSB0x.xN", the firmware version upgrade has to be performed with the PC. For the following control units, the firmware version upgrade can be performed with either an MMC card or with the PC:

- ADVANCED single axis control unit "CSH0x.x"
- BASIC double axis control unit "CDB0x.x"
- BASIC single axis control unit (configurable) "CSB0x.xC"

Archiving Parameter Values

Before the firmware upgrade, all application-specific parameter values have to be saved on a data carrier. The parameters can be saved using:

- IndraWorks
→ see [chapter 5.8 "Exporting Parameters" on page 78](#)



To save the selected function packages during a drive firmware update and reload them after the firmware update by importing the parameters, select "Archive parameters required for restoring".

If this is not the case, function packages have to be manually selected and set after a firmware update.

- or -

- **Control master:**
→ archive the parameter values to the master-side data carrier



Saving the parameters to the MMC present on the drive has no effect, since this backup is deleted during the firmware upgrade.

Loading to Firmware to the MMC

Prerequisites

The following prerequisites have to be met to load a firmware to the MMC of the drive:

- New firmware available (ibf file)
- PC with MMC reader
- MMC with old firmware in the drive

Loading firmware on the MMC

The following steps are required to load the firmware on the MMC:

1. Switch off the drive and remove the MMC.
2. Insert the MMC into the MMC reader and open the "Firmware" folder on the MMC.
3. Delete the old firmware (e.g. FWA-INDRV*-MPH-06V12-D5.ibf).
4. Copy the new firmware (e.g. FWA-INDRV*-MPH-07V06-D5.ibf) to the "Firmware" folder.



Only one firmware file may be stored in the "Firmware" folder on the MMC. If several firmware files are present, the message "MMC not correct" appears in the drive display after it is booted.

Description of the Steps

5. Remove the MMC from the MMC reader after the write procedure is complete.

Variant 1: Version Upgrade with MMC (with Safety Technology)

Selection criteria	The following prerequisites must be met so that performed a firmware version upgrade with MMC is reasonable (with safety technology): • Controller is not equipped with a BASIC single axis control unit • The optional area for safety technology is equipped with the optional "Safe Motion" module (S2) • The current axis parameters have been backed up
Firmware upgrade with MMC (with safety technology)	The following steps are required for performing a firmware version upgrade with MMC (with safety technology): 1. Load the firmware ⇒ Switch off the drive. ⇒ Insert the MMC with the new firmware into the corresponding slot on the controller. ⇒ Restart the drive with the MMC inserted. After the drive is booted, the following message appears: • "Firmware update?" ⇒ Acknowledge this message with <Enter> on the control panel. The firmware is loaded from the inserted MMC to the drive Depending on the drive operating state, one of the following messages appears: • "Load Param from MMC" or "Load new param?" • "Activate new MMC?" • "F2120 MMC: Defective or missing, replace" ⇒ Switch off the drive, remove the MMC (if the drive was operated without an MMC inserted) and restart the drive. 2. Set the drive to an operational state ⇒ After the drive is restarted, the error message "F8201" is generated (F8201 Safety command for basic initialization incorrect). ⇒ Delete all pending error messages and start the execution of "C07_2 Load defaults procedure command (Initial loading of safety technology)". ⇒ Since the number of parameters that need to be buffered has changed, "C07_1 Load defaults procedure command (load basic parameters)" have to be subsequently activated. This sets all buffered parameters to their default values 3. Load parameter values ⇒ Load the saved parameter file. ⇒ Switch off the drive and restart it to activate the parameterization 4. Complete commissioning of the integrated safety technology ⇒ Switch the drive to operating mode (communication phase 4). Now, the error message "F3152 Incorrect backup of safety technology data" appears, since the safety technology parameter block has changed among the firmware version 02, 03, 04 and 05 ⇒ Delete the error message. ⇒ Activate system command "Synchronize and save safety technology parameters". (C3000 Synchronize and store safety technology IDN)

Description of the Steps

⇒ Activate the safety technology by assigning the safety technology password (P-0-3206, Safety technology password).

⇒ Perform new acceptance test



Refer to the sections "Activating the Safety Technology" and "Acceptance Test" in the separate documentation "Integrated Safety Technology According to IEC61508" (DOK-INDRV*-SI2-**VRS**-AW**-EN-P; R911327664)

⇒ Perform a backup of the safety technology parameters and create an acceptance protocol and add it to the machine's safety-relevant documentation.

5. Set the machine to an operational state

⇒ Reset the machine to an operational state according to the instructions of the machine manufacturer.

⇒ Check the drive functions.

Variant 2: Version Upgrade with MMC (without Safety Technology)

Selection criteria The following prerequisites must be met so that performed a firmware version upgrade with MMC is reasonable (without safety technology):

- Controller is **not** equipped with a BASIC single axis control unit of type CSB0x.xN
- The optional area for safety technology is **not** equipped with the optional "Safe Motion" module (S2)
- The current axis parameters have been backed up

Firmware upgrade with MMC (without safety technology)

The following steps are required for performing a firmware version upgrade with MMC (without safety technology):

1. Load the firmware

⇒ Switch off the drive.

⇒ Insert the MMC with the new firmware into the corresponding slot on the controller.

⇒ Restart the drive with the MMC inserted.

After the drive is booted, the following message appears:

- "Firmware update?"

⇒ Acknowledge this message with <Enter> on the control panel. The firmware is loaded from the inserted MMC to the drive

Depending on the drive operating state, one of the following messages appears:

- "Load Param from MMC" or "Load new param?"
- "Activate new MMC?"
- "F2120 MMC: Defective or missing, replace"

⇒ Switch off the drive, remove the MMC (if the drive was operated without an MMC inserted) and restart the drive.

2. Set the drive to the operational state

⇒ Since the number of parameters that need to be buffered has changed, "PL" appears in the display (any pending errors have to be eliminated first.) Press the <Esc> key to set all buffered parameters to their default values. During this time, the message "C07 Load default parameters" appears in

Description of the Steps

the display. Any pending errors have to be eliminated first and command C07_1 must be activated manually.

3. **Load parameter values**

⇒ Load the saved parameter file.

⇒ Switch off the drive and restart it to activate the parameterization

4. **Set the machine to an operational state**

⇒ Reset the machine to an operational state according to the instructions of the machine manufacturer.

⇒ Check the drive functions.

Variant 3: Version Upgrade with IndraWorks

General IndraWorks can be used to perform a firmware version upgrade starting with the MLC firmware version 10V06. Thus, connecting directly with the related drive is no longer necessary. Instead, the MLC can be used to transfer the firmware to all drives below the SERCOS node.

IndraWorks can be used to perform the firmware version upgrade in the following cases:

- Controller is operated without MMC

- or -

- Controller is equipped with a BASIC single axis control unit of type CSB0x.xN

- or -

- The firmware version upgrade is to be performed using the PC

Prerequisites The following requirements must be met for a firmware version upgrade using IndraWorks:

- Engineering PC with IndraWorks MLC 10V06 or higher
- MLC with firmware 10V06 or higher
- IndraDrive connected with master communication SERCOS III
- Engineering PC and MLC are in the same subnet



All parameters have to be saved before the firmware version upgrade (cf. [chapter 5.8 "Exporting Parameters" on page 78](#)).

Firmware upgrade with IndraWorks

The following steps are required for performing a firmware version upgrade with IndraWorks:

1. **Open the IndraWorks project.**
2. **Switch the project online.**
3. **Call "Firmware management..." in the drive context menu below the SERCOS node.**

Description of the Steps

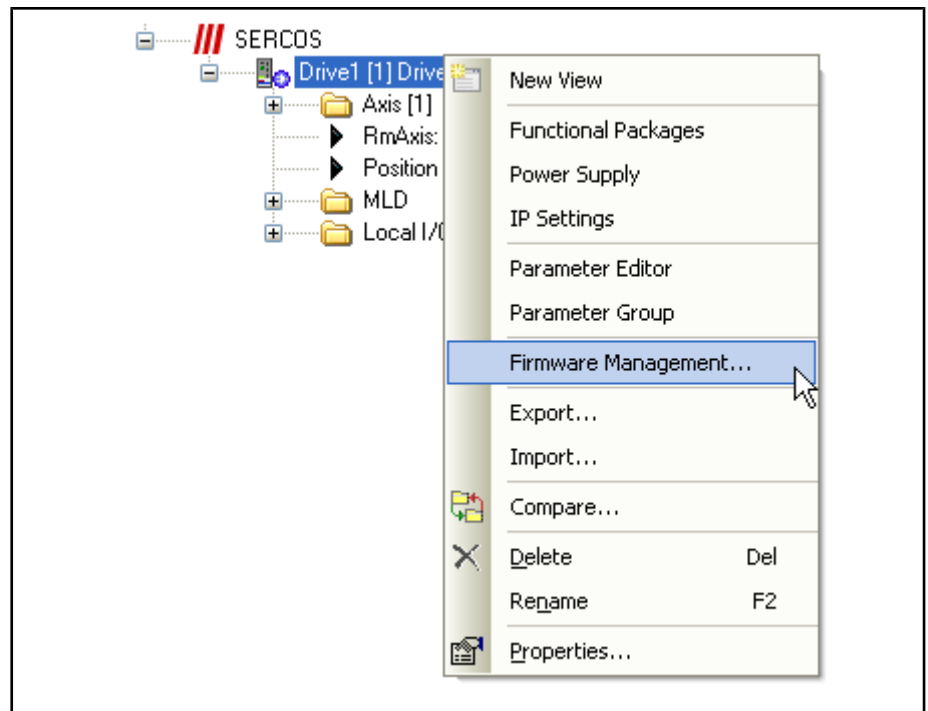


Fig.5-115: Calling firmware management

The following information dialog appears:

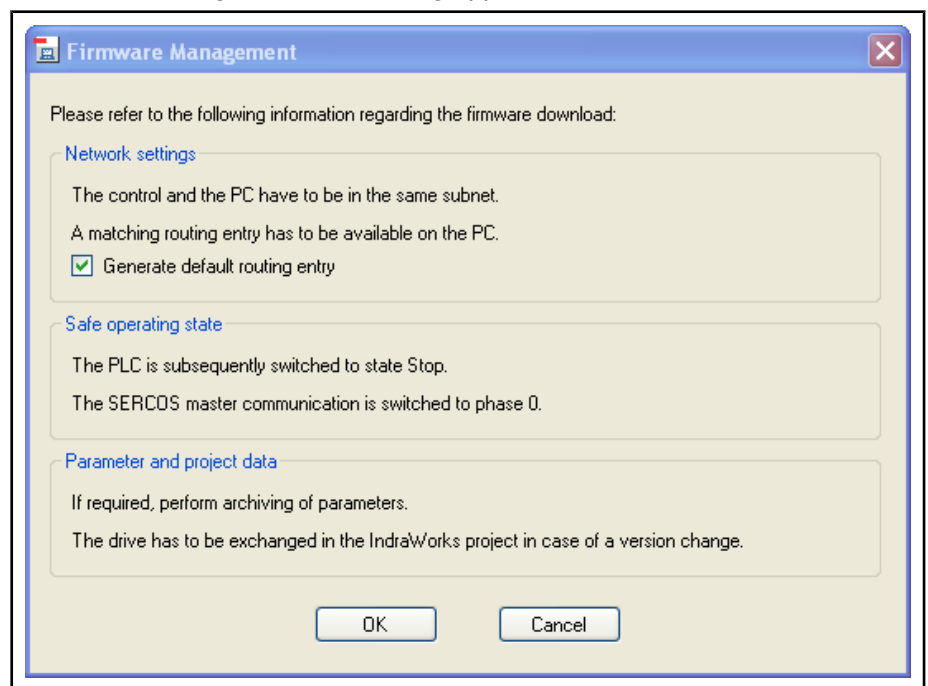


Fig.5-116: Information dialog and creating the standard routine entry

The control and the engineering PC have to be in the same subnet. This is necessary for the PC to connect to the drive directly using IP communication. To do this, IndraWorks can generate a standard routine entry on the PC. This causes all IP packets with the drive IP address as a target to be redirected using the MLC. For this reason, it is recommended to generate the standard routine entry

Description of the Steps



Administrator rights are required for writing the routine entry.

4. Establish the secure operating state:

For the firmware download, the control is switched to a secure operating state. Therefore, the PLC is stopped first and the SERCOS master communication is switched to phase 0. A security prompt appears

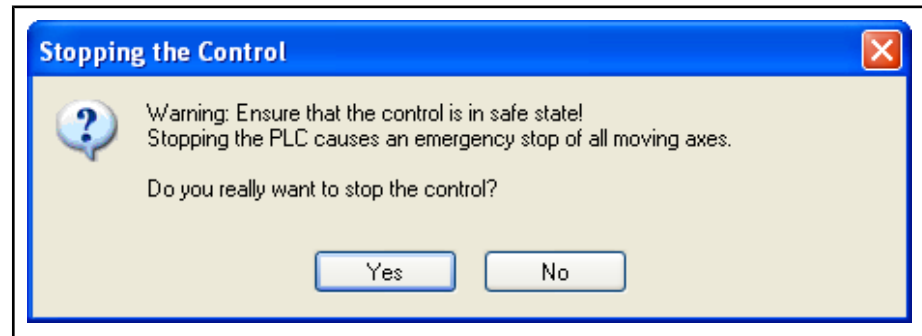


Fig.5-117: Stopping the control

5. Perform the firmware download:

If all prerequisites are met, the dialog for the firmware download opens:

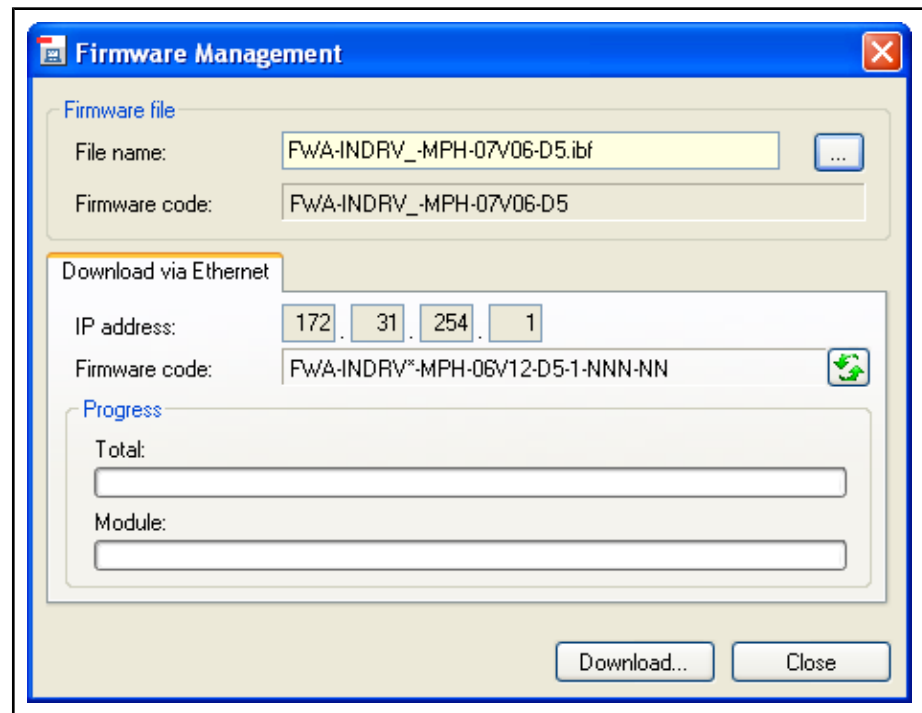


Fig.5-118: Selecting the firmware

The current firmware is displayed in the "Firmware code" field. The firmware file, which contains the new firmware, can be selected in the "File name" field.



Data loss - Aborted firmware download.

During the firmware download, neither the control voltage nor the Ethernet connection to the drive may be interrupted.

Description of the Steps

After you selected the correct firmware, start the download



If no device is found at this IP address, check the communication settings (see ["Problematic situation: no device found at this IP address"](#) on page 137).

6. Download the firmware:

The firmware download takes place automatically. The progress is displayed in the dialog with a progress bar

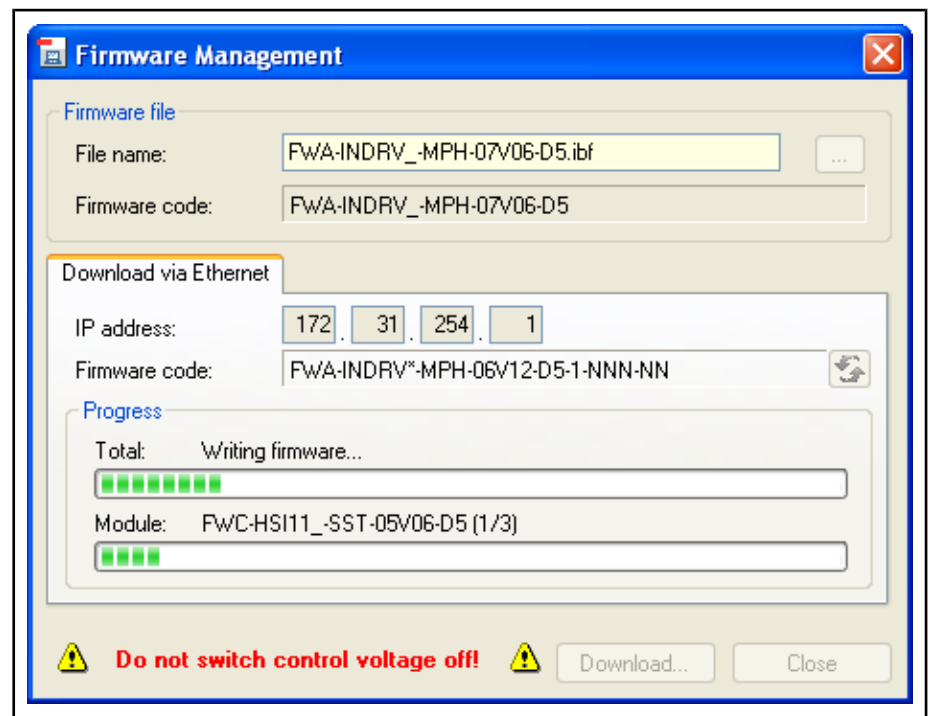


Fig.5-119: Firmware download



Data loss - Aborted firmware download.

During the firmware download, neither the control voltage nor the Ethernet connection to the drive may be interrupted.

7. Successful completion of the download:

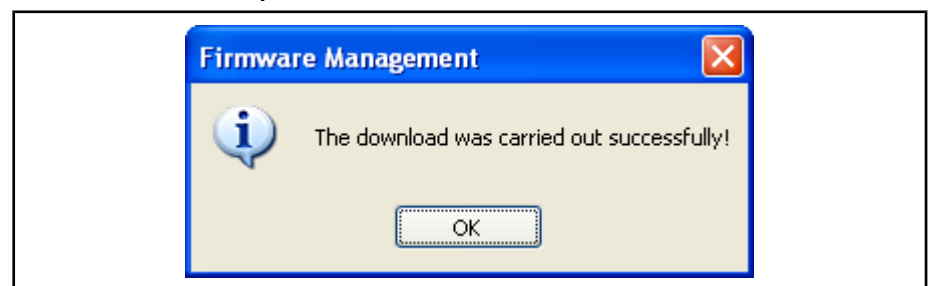


Fig.5-120: End of the download

⇒ After the firmware download is complete, close the "Firmware Management" window.

8. Load basic parameters:

⇒ Since the number of parameters that need to be buffered has changed, "PL" appears in the control display (any pending errors have to be elimi-

Description of the Steps

nated first). Press the <Esc> key to set all buffered parameters to their default values. During this time, the message "C07 Load default parameters" appears in the display

If the basic parameters do not load using the control display, the user has to do this manually afterwards (cf. [chapter 5.16 "Loading Basic Parameters to IndraDrive "](#) on page 148)

9. **Update the firmware version in the project:**

Due to the firmware version upgrade, the firmware versions in the drive and in the project no longer match. Thus, select "Change drive/firmware..." from the drive Motion node.

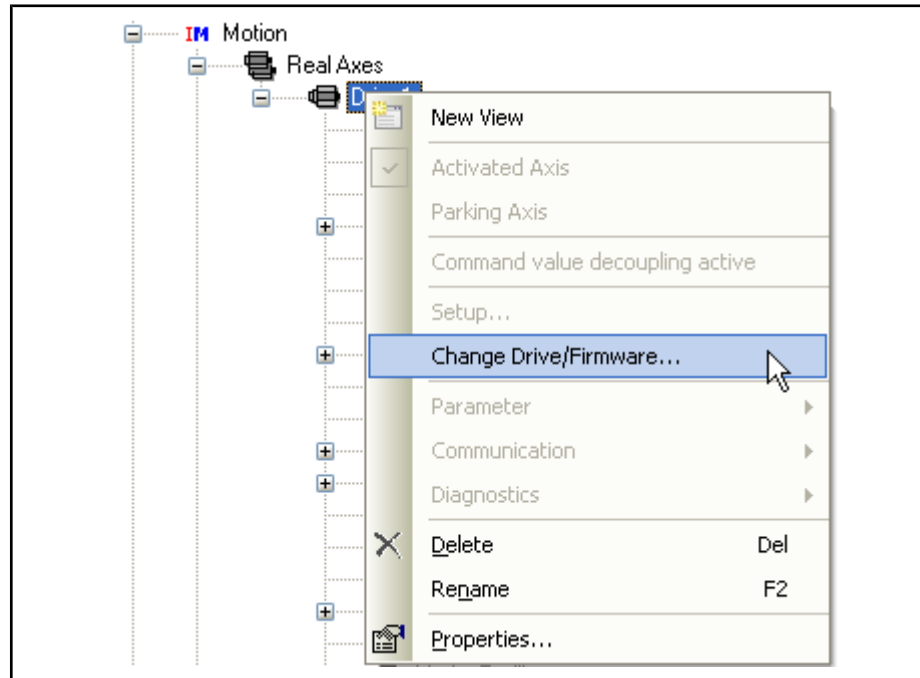


Fig.5-121: Exchange the drive firmware in the project

The drive with the new firmware can be recognized online and can be added to the project in place of the drive with the new firmware

If safety technology was not activated, skip the next step

10. **Only if safety technology is used: Load defaults procedure for safety technology**

Carry out the loading of the defaults procedure for safety technology in order to deactivate the safety technology and to reset it to its default settings:

see [chapter 5.17.4 "Loading of the Defaults Procedure for Drive-integrated Safety Technology"](#) on page 157

11. **Load parameter values**

⇒ Load the saved parameter file.

see [chapter 5.9 "Importing Parameters"](#) on page 81

⇒ Switch off the drive and restart it to activate the parameterization

If drive-integrated safety technology is used, continue with step 12

⇒ If no safety technology is used, reset the machine to an operational state according to the instructions of the machine manufacturer

Description of the Steps

- ⇒ Check the drive function
- ⇒ The firmware version upgrade was performed successfully
- 12. **Carry out a complete activation of the safety technology**
Save and synchronize the safety technology parameters by selected "Synchronize/save safety technology parameters" in the context menu of the dialog **Drive-integrated safety technology ► Diagnostics**
Activate the safety technology by entering a password in IndraWorks in the window **Drive-integrated safety technology ► Password**
Perform acceptance test:
 Refer to the sections "Activating the Safety Technology" and "Acceptance Test" in the separate documentation "Integrated Safety Technology According to IEC61508" (DOK-INDRV*-SI2-***VRS**-AW**-EN-P; R911327663)
⇒ Perform a backup of the safety technology parameters and create an acceptance protocol and add it to the machine's safety-relevant documentation.
⇒ Reset the machine to an operational state according to the instructions of the machine manufacturer.
⇒ Check the drive functions.

5.15.4 Possible Problems with Firmware Exchange

- Problematic situations** The firmware exchange is not completely executed if one of the following situations occurs during the firmware exchange procedure:
- 24V power supply for the control unit is switched off
 - Connection to the drive is interrupted (e.g. defective interface cable)
 - Software crash
- In this case, the drive controller may no longer be operable, since the firmware in the components is not longer compatible.
- If no valid firmware is found in the control unit in this case, the loader is started. The drive message "LOADER" appears in the display. The loader can only be used to perform an update of the control unit firmware. Optional modules such as "Safe Motion" (S2) or "Cross communication" (CCD) cannot be programmed in this state. This has to be executed after a successful firmware exchange in the control unit in a second pass based on the descriptions of the versions of the firmware exchange.
- In this situation, the exchange of the control unit firmware is only supported by "IndraWorks".



After the successful firmware exchange in the control unit, it has to be restarted. Then, all existing components have to be updated as well.

Requirements for loading the firmware

The following requirements must be met in order for firmware to be loaded on the drive:

- Serial connection to drive present
- The drive message "LOADER" appears in the display

Firmware exchange in the control unit in case of error

To load the firmware to the control unit in case of error, the following steps are required:

1. Call "IndraWorks Ds/D/MLD".

Description of the Steps

2. Call Firmware management in the menu under "Tools Drive → Firmware management"
3. Select the device and COM interface
A new window opens in which the firmware present in the current firmware directory is displayed on the left side
4. Highlight the new firmware (*.ibf file) on the left side and start the firmware download using the "Download" button.
The firmware download proceeds automatically and all necessary firmware components are loaded to the drive
5. After the firmware download is complete, close the "Firmware Management" window.
6. Restart the drive.

If there are no optional modules such as "Safe Motion" (S2) or "Cross communication" (CCD), follow the instructions for the release update or version upgrade. Otherwise, carry out the release update or version upgrade again in order to program the optional modules.

5.16 Loading Basic Parameters to IndraDrive

This section describes "loading basic parameters" for the drives with IndraWorks on a system. By loading the basic parameters, the drives are reset to their condition upon delivery. The parameters for the drive-integrated safety technology are not affected.

The basic parameters have to be loaded for each axis individually.

Prerequisites:

- The correct firmware has to be on the control and the drives
- IndraWorks is online on the control (see [5.6 Going online, page 73](#))

IndraWorks is started, the project is loaded and online on the control

1. **Make the axis visible in the Project Explorer**

In the Project Explorer below the control (in this case "print unit"), select the folder **Motion ► Real Axes** Select the respective axis (here "DW_3")

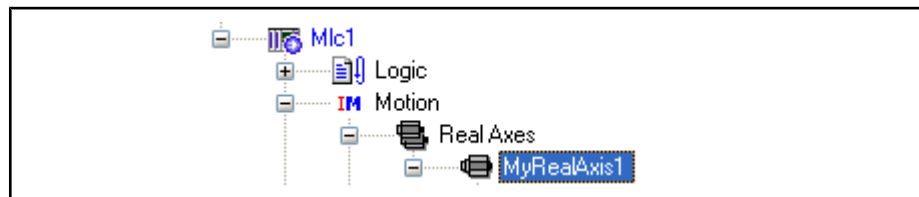


Fig.5-122: Selection of an axis in the Project Explorer

2. **Select "Load basic parameters" in the context menu**

Click on the axis with the right mouse button and then select **Parameter ► Load basis parameters laden...** in the context menu

Description of the Steps

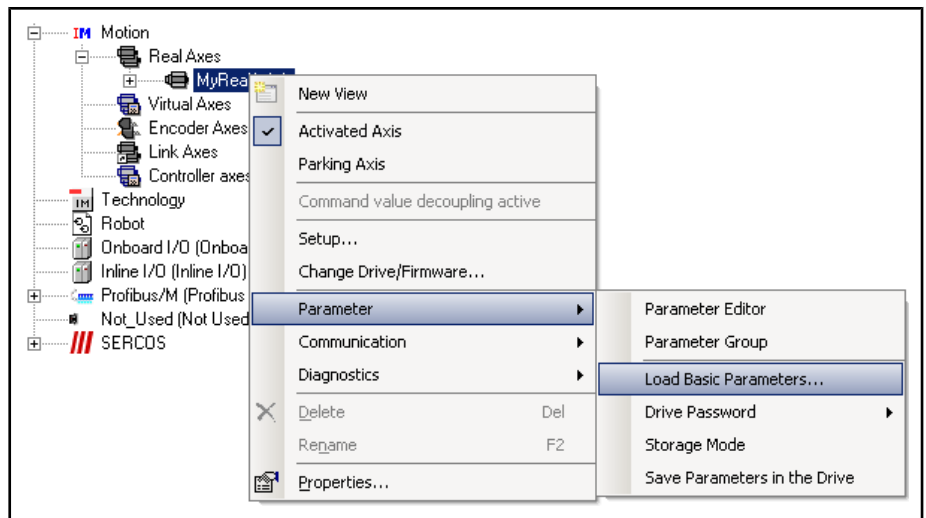


Fig.5-123: Context menu for "Load basic parameters"

3. Execute "Load basic parameters"

The "Load basic parameters..." query appears

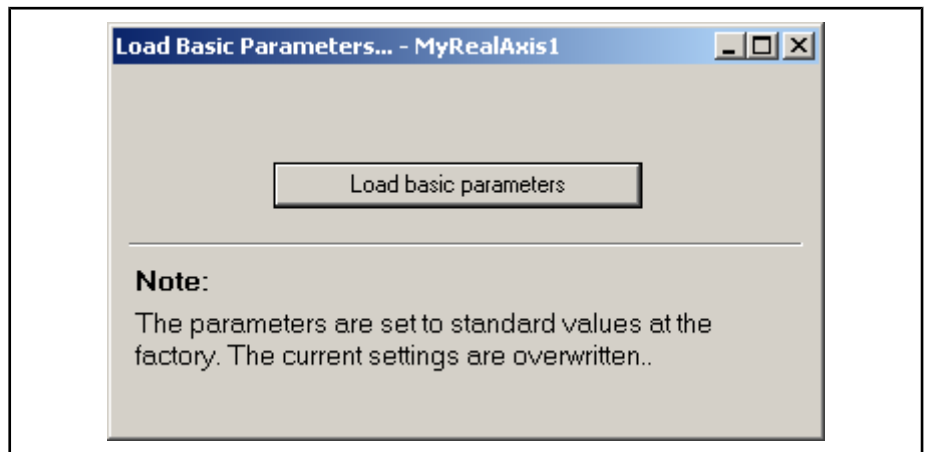


Fig.5-124: "Load basic parameters..." query

Click the **Load basic parameters** button to start the procedure

A confirmation appears indicating that the basic parameter were loaded successfully

Acknowledge the dialog with **OK**

5.17 Drive-integrated Safety Technology

5.17.1 General

This section includes the frequently used steps when safety technology is used. These demonstrate a few recommended procedures.



For a detailed description of safety technology, please refer to the respective documentation:

"Rexroth IndraDrive Integrated Safety Technology" (DOK-INDRV*-SI2-***VRS**-AW**-EN-P; parts no. R911327664).

Description of the Steps

5.17.2 Setup

This section describes the initial commissioning of the drive-integrated safety technology with IndraWorks on a system.

The drive-integrated safety technology has to be set up individually for each axis. However, parameters can be imported to other drives (cf. [chapter 5.17.6 "Importing Safety Technology Parameters of a Drive to Other Drives"](#) on page 160).

- Prerequisites:**
- The correct firmware has to be on the control and the drives
 - IndraWorks is online on the control (cf. [5.6 Going online, page 73](#))
 - The safety technology was not yet configured or is deactivated (cf. [5.17.4 Loading of the Defaults Procedure for Drive-integrated Safety Technology, page 157](#)).

IndraWorks is started, the project is loaded and online on the control

1. **Make the axis visible in the Project Explorer**

In the Project Explorer below the control (in this case "MLC1"), select the folder **Motion ► Real Axes**

Select the corresponding axis (here "MyRealAxis1")

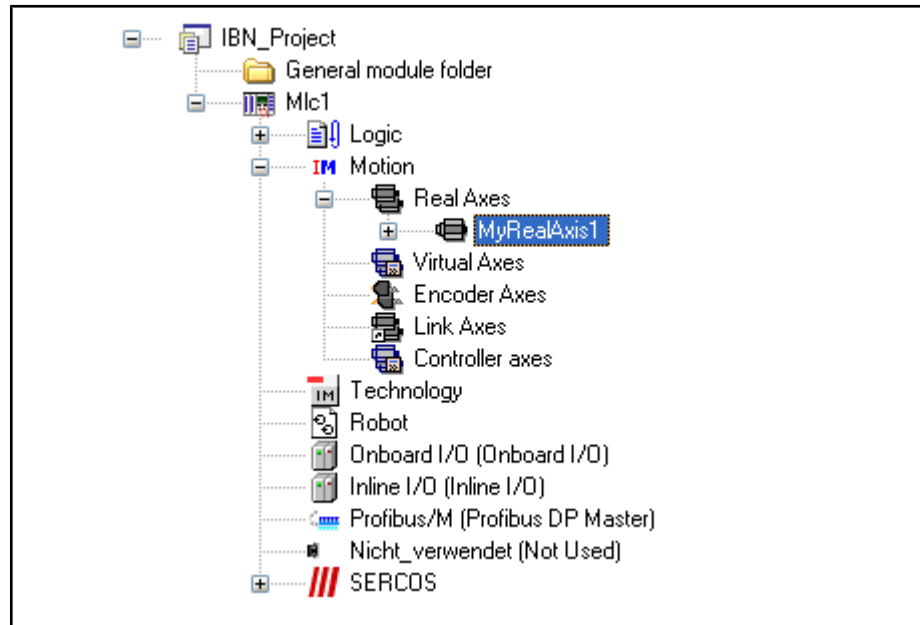


Fig.5-125: Selection of an axis in the Project Explorer

2. **Display Setup dialog**

Click on the plus sign to the left of the axis name to display the axis dialog. In the dialog **Drive-integrated safety technology**, open the dialog **Initial Commissioning...** by double-clicking on the item

Description of the Steps

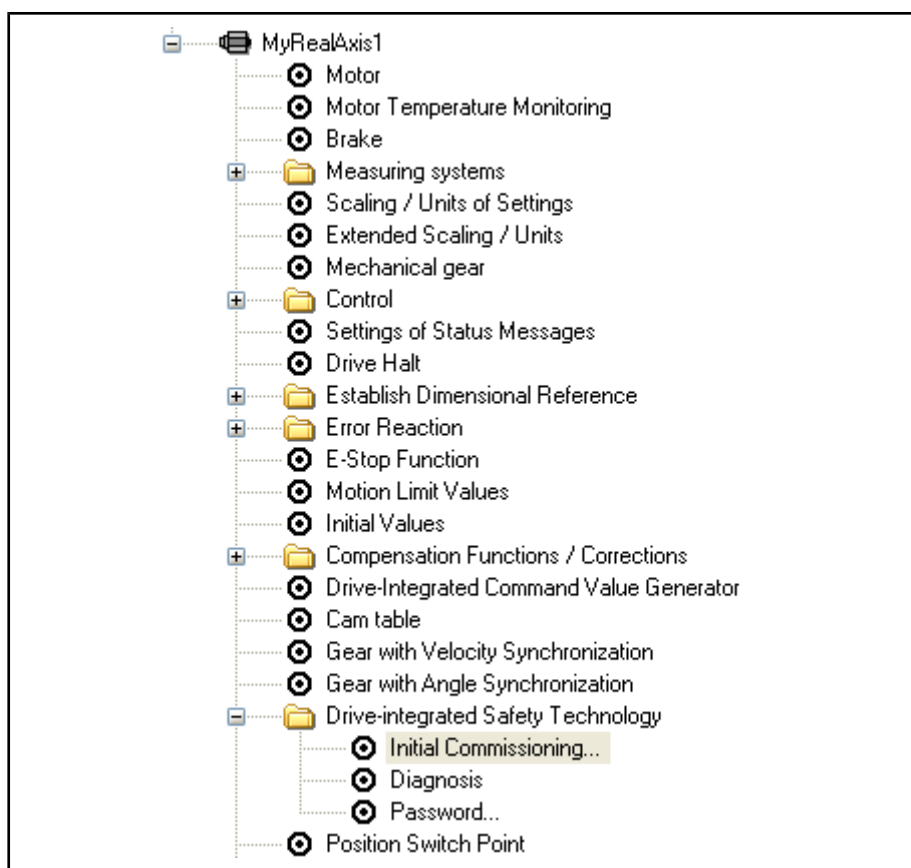


Fig. 5-126: Drive-integrated safety technology in the Project Explorer

3. Perform the setup

A safety technology wizard guides you through the setup of the integrated safety technology

Description of the Steps

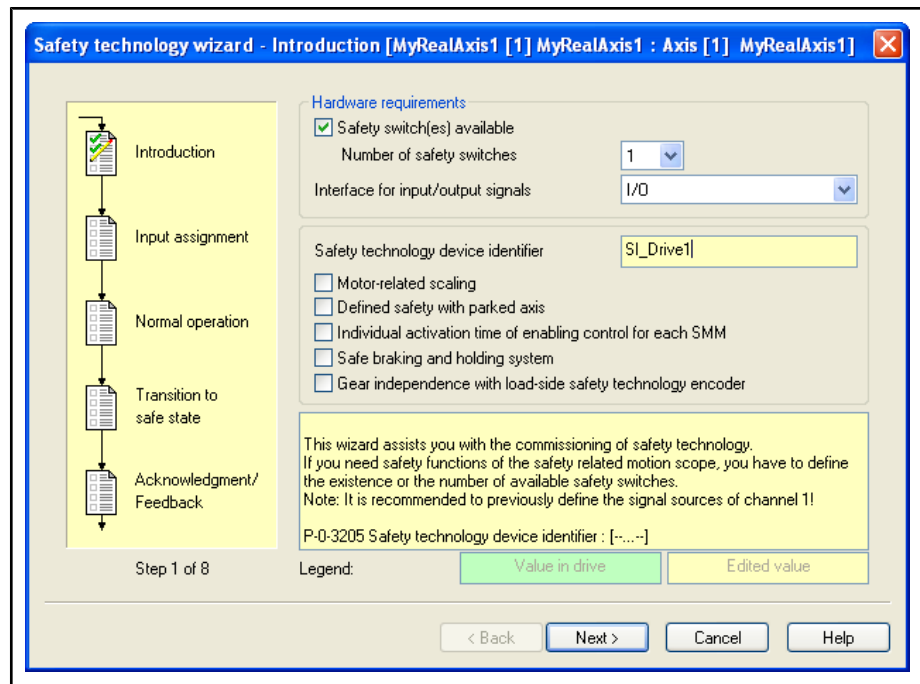


Fig.5-127: Safety technology wizard

Enter an unambiguous safety technology device identification

Parameterize the integrated safety technology in accordance with your machine configuration. The safety technology wizard leads you step by step through the individual entries. Each entry has to be confirmed

4. Export parameters

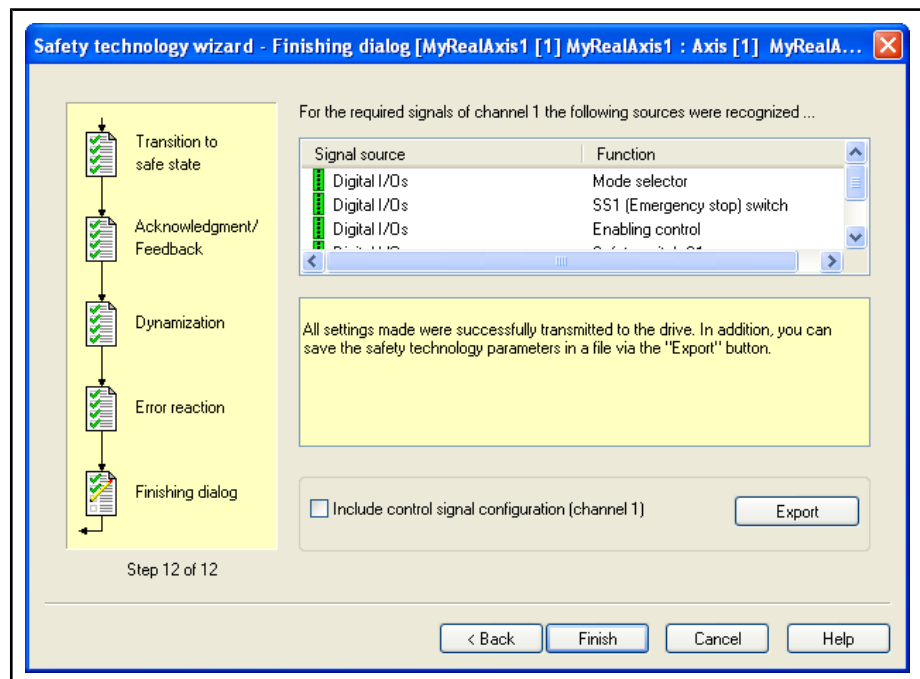


Fig.5-128: Export parameters before clicking "Finish".

Before completing the procedure, the parameters can be exported. This is recommended in order to have a backup copy and to import these parameters to drives with identical safety settings. It can still be selected

Description of the Steps

whether to include the control signal configuration for channel 1 in the backup

Click the "Export" button



If "Include control signal configuration (channel 1)" is selected, the parameters P-0-0300, P-0-0301 and P-0-0302 are saved containing the configuration of the digital inputs/outputs of the control unit in addition to the safety technology parameters (P-0-32xx).

5. Perform the export

Select the path and file name under which the integrated safety technology parameters are to be saved

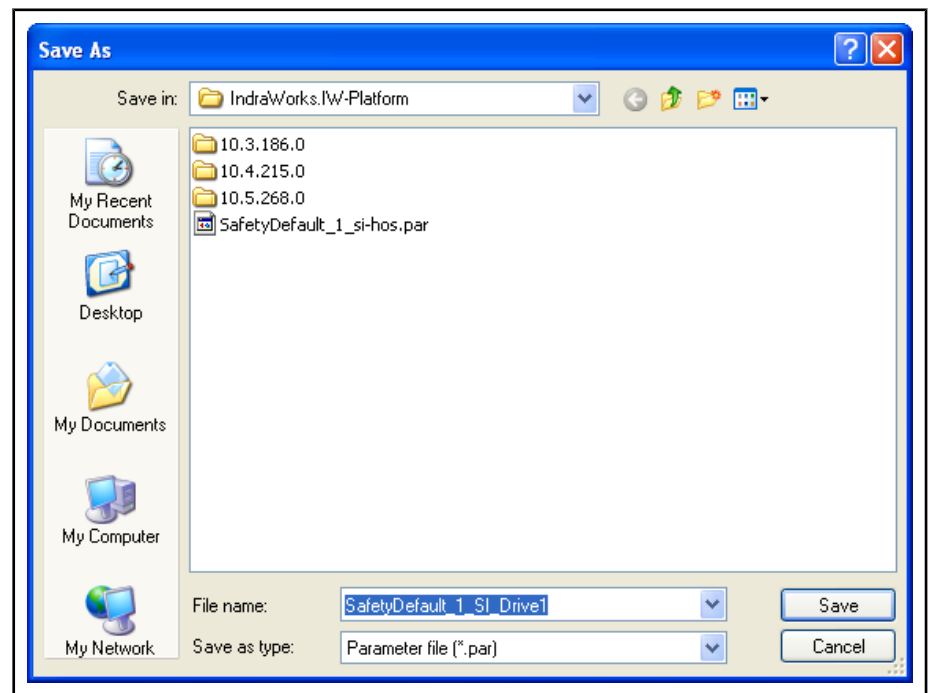


Fig.5-129: Selection the storage location

6. Phase switching

Click **Finish**

A dialog opens stating that is has to be switched to operating mode

Description of the Steps

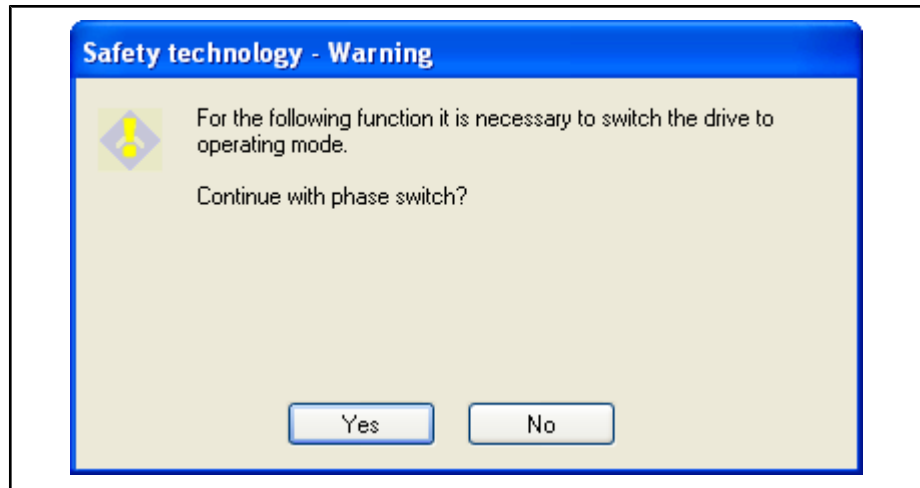


Fig.5-130: Phase switching

Confirm this dialog with **Yes**

The safety technology parameters are synchronized

7. **WARNING! Life-threatening danger, risk of injury, severe bodily harm or material damage are possible!**

First, perform a parameter verification before using the axis safety function
Do not enter the danger zones until the parameters are verified.

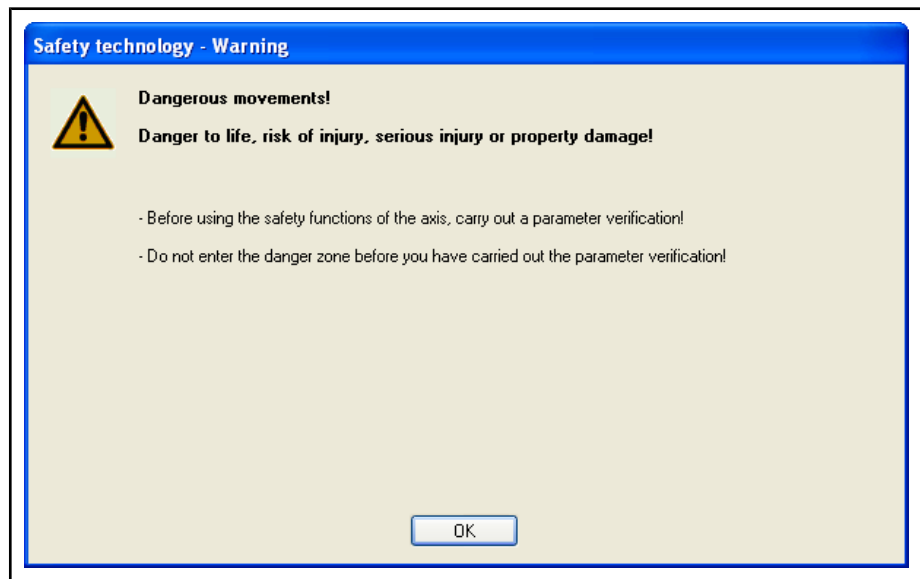


Fig.5-131: Warning: Dangerous movements

Confirm the warning with **OK**



After a successful setup and commissioning, perform the parameter verification.

8. **Password administration**

In order to activate and unlock the safety technology, enter a password and confirm it

Description of the Steps



Fig.5-132: Password administration

This activates the safety technology

9. Perform acceptance test.



Refer to the sections "Activating the Safety Technology" and "Acceptance Test" in the separate documentation "Integrated Safety Technology According to IEC61508" (DOK-INDRV*-SI2-***VRS**-AW**-EN-P; R911327664)

WARNING! Hazardous motions possible! Life-threatening danger, risk of injury, severe bodily harm or material damage!

In order to guarantee the correct function and to prevent the risk of personal injury, carry out a complete acceptance test after performing the setup on drive controllers with an optional safety technology module (S2)

⇒ Create acceptance protocol and add it to the safety-relevant documentation of the machine.

10. Parameterize the other drives

If there are other drives, repeat the procedures for parameterizing the integrated safety technology for each other drive

Note, parameters from a drive already parameterized can be imported see [chapter 5.17.6 "Importing Safety Technology Parameters of a Drive to Other Drives"](#) on page 160

11. Set the machine to an operational state

⇒ Reset the machine to an operational state according to the instructions of the machine manufacturer.

⇒ Check the drive functions.

Description of the Steps

5.17.3 Activating Safety Technology

The drive-integrated safety technology can be activated using the password administration of the drive-integrated safety technology. This dialog can be accessed in one of the following ways:

- In the project tree under <Control name> ► **Drive-integrated safety technology** ► **Password....** Open the dialog with a double-click
- In the project tree under <Control name> ► **Drive-integrated safety technology** ► **Diagnostics** in the context menu in the left part of the dialog under **Password management**



Fig.5-133: Password administration

Activating and unlocking safety technology

The safety technology can be activated by entering the safety technology password (P-0-3206, Safety technology password) in the menu item "Activate and unlock safety technology" and confirm it with the "Apply" button.

The safety technology is now activated and unlocked.

In this state, the safety technology parameters can be modified without password.

Each time a change is made, the command "P-0-3204, C3000 Synchronize and save safety technology parameters" have to be executed in order to apply the change.

Activating and locking safety technology

In the safety technology password management, the safety parameters can now be write-protected using the "Activate and lock safety technology" field.



When the drive is switched off, the safety technology is automatically locked.

Change safety technology password

Use the "Change safety technology password" to change the password for safety technology.

5.17.4 Loading of the Defaults Procedure for Drive-integrated Safety Technology

This section describes "loading of the defaults procedure" for the drive-integrated safety technology with IndraWorks on a system. During the loading of the defaults procedure for the safety technology, it is deactivated. With a subsequent parameter import, the safety technology can be reparameterized and activated.

The load defaults procedure for the drive-integrated safety technology has to be performed individually for each axis.

Prerequisites

- The correct firmware has to be on the control and the drives
- IndraWorks is online on the control (see [5.6 Going online, page 73](#))

IndraWorks is started, the project is loaded and online on the control

1. Make the axis visible in the Project Explorer

In the Project Explorer below the control (in this case "print unit"), select the folder **Motion ► Real Axes** Select the respective axis (here "DW_3")

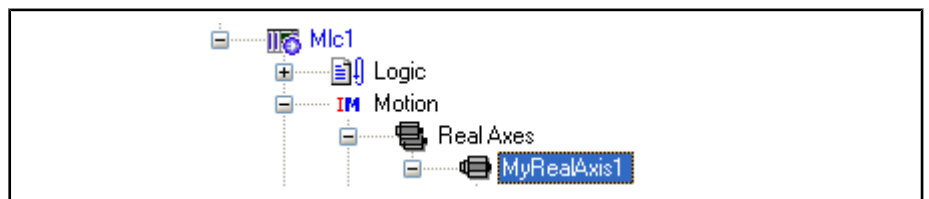


Fig. 5-134: Selection of an axis in the Project Explorer

2. Display the Safety Technology Diagnostics dialog

Click on the plus sign to the left of the axis name to display the axis dialog

In the dialog **Drive-integrated safety technology**, open the dialog **Diagnostics** by double-clicking on the item

Description of the Steps

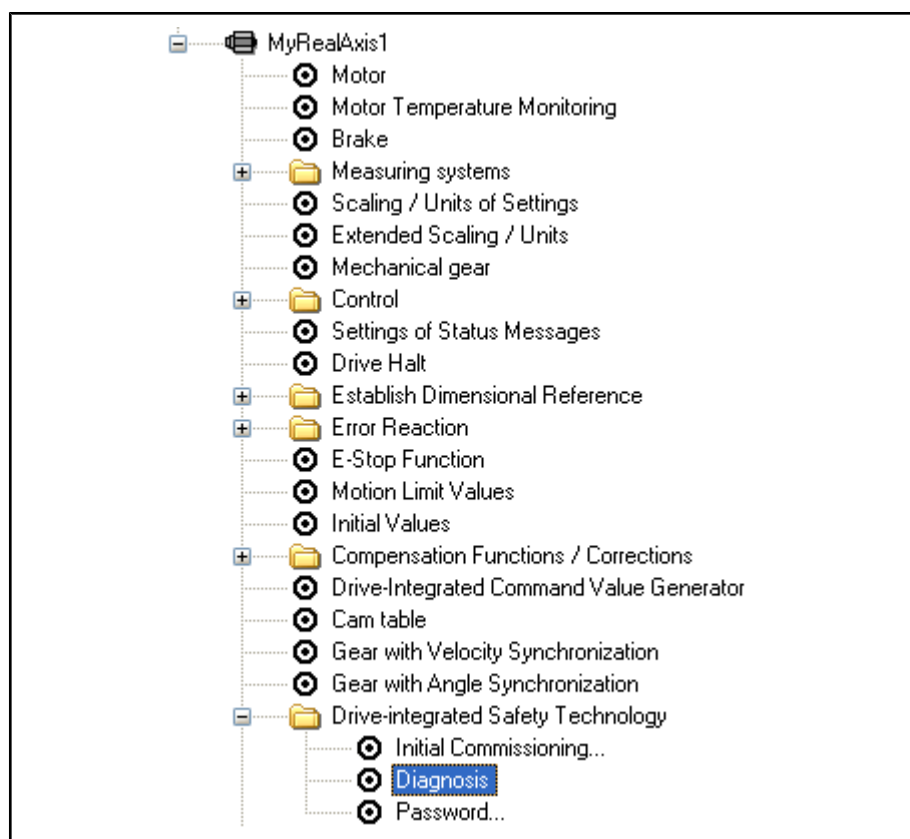


Fig.5-135: Drive-integrated safety technology in the Project Explorer

3. **Start the command "Load defaults procedure for safety technology"**
On the left side of the entry, select a signal or safety technology status
Open the context menu with the right mouse button and select the item
Load defaults procedure for safety technology

Description of the Steps

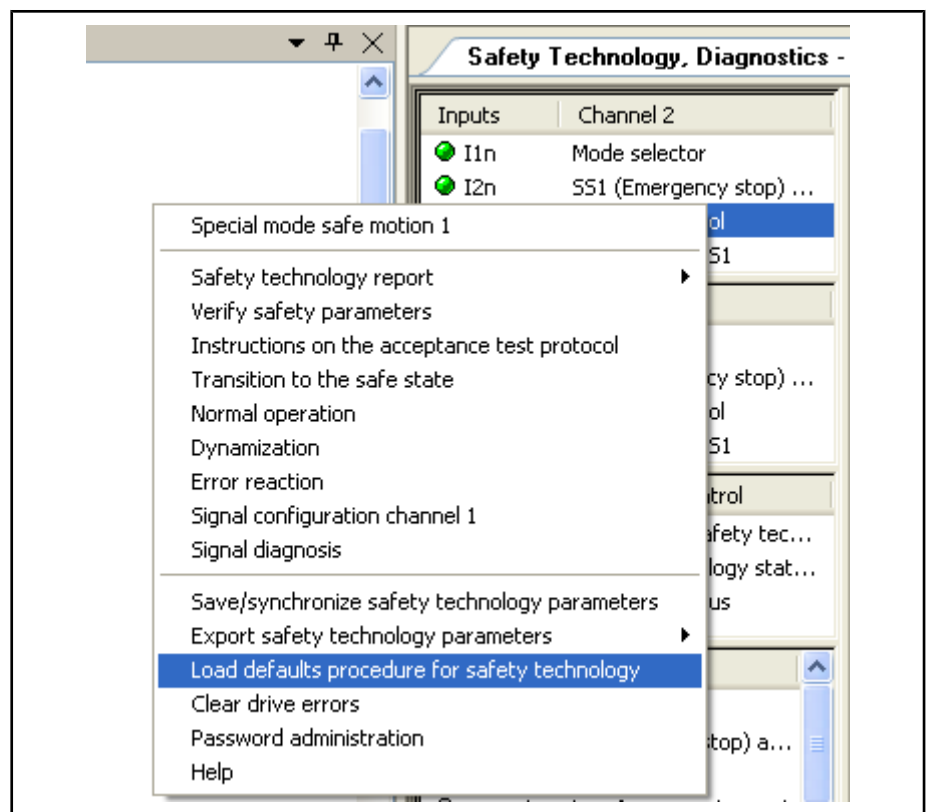


Fig.5-136: Execute the command "Load defaults procedure for safety technology"

4. Execute "Load defaults procedure for safety technology"

The "Safety technology - Warning" appears

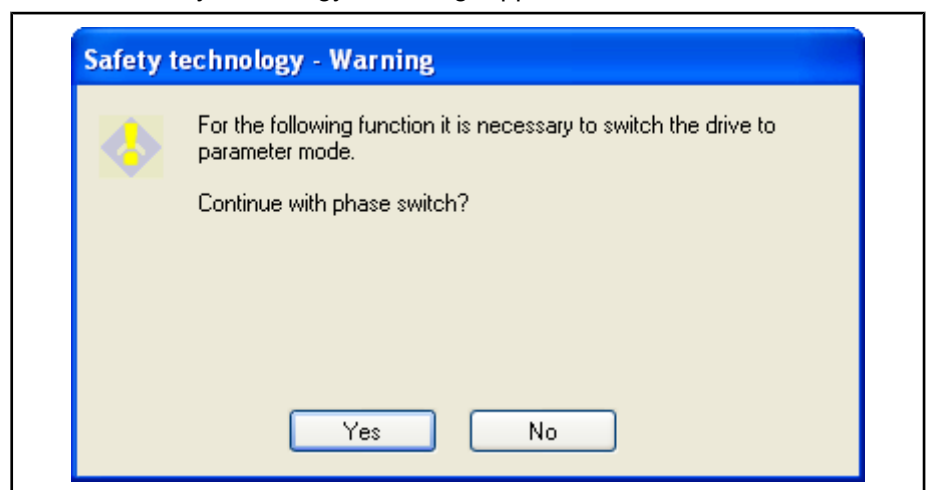


Fig.5-137: "Load defaults procedure for safety technology" warning

Click the **Yes** button to start the procedure

The safety technology is reset and can then be reparameterized

5.17.5 Firmware Update with Drive-integrated Safety Technology

The firmware release update with drive-integrated safety technology is described in the section [chapter 5.15.2 "Firmware Release Update" on page 130](#).

Description of the Steps

The firmware version upgrade with drive-integrated safety technology is described in the section [chapter 5.15.3 "Firmware Version Upgrade" on page 138](#).

5.17.6 Importing Safety Technology Parameters of a Drive to Other Drives

This section describes how to transfer the safety technology parameters for a drive for which safety technology has already been configured to other drives.

- Prerequisites:**
- The correct firmware has to be on the control and the drives
 - IndraWorks is online on the control (cf. [5.6 Going online, page 73](#))
 - The safety technology was set up and commissioned on a drive see [chapter 5.17.2 "Setup" on page 150](#)

IndraWorks is started, the project is loaded and online on the control

1. Export the parameters of the configured drive

In the Project Explorer below the control (in this case "MLC1"), select the folder **Motion** ► **Real Axes** ► **<Axis names>** ► **Drive-integrated safety technology** ► **Diagnostics**

In the context menu on the left side of the dialog, select "Export safety technology parameters". It can still be selected whether to include the control signal configuration for channel 1 in the backup

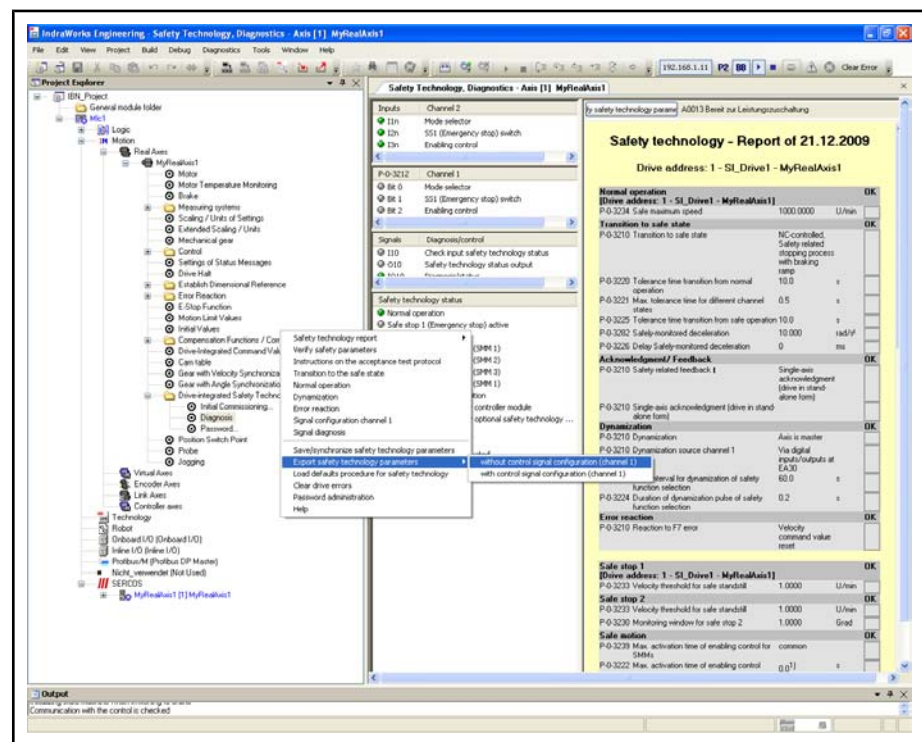


Fig.5-138: Exporting safety technology parameters

Enter path and file name for the backup of the safety technology parameters

2. Loading of the defaults procedure for safety technology

In the drive in which the parameters are to be imported, the safety technology has to be deactivated. If no safety technology is active, step 3 can be skipped. Otherwise, the load defaults procedure for safety technology has to be performed.

Description of the Steps

see chapter 5.17.4 "Loading of the Defaults Procedure for Drive-integrated Safety Technology" on page 157

3. Import parameters

In the control context menu select **Parameter ► Import**

Select path and file name used to save the safety technology parameters

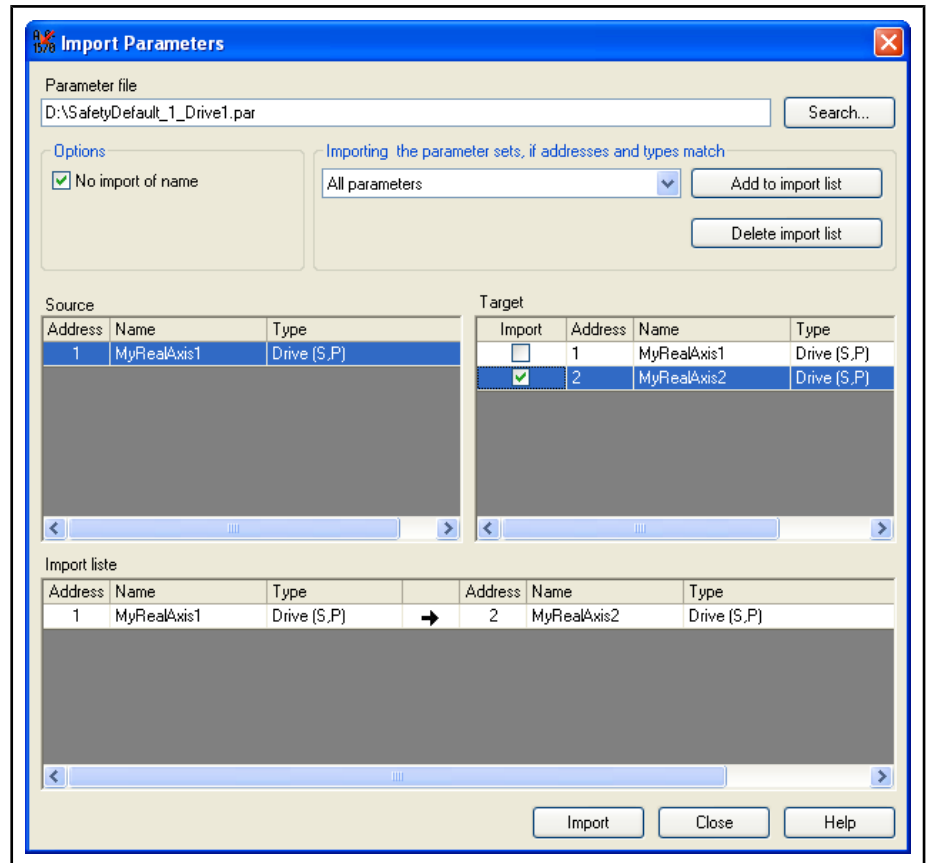


Fig.5-139: Import parameters

In this example, the safety parameters from "MyRealAxis1" are imported to the second axis "MyRealAxis2"

Select the axes that are to receive this safety parameter block and confirm the selection with **Import**

A message appears regarding the successful execution of the import

4. Phase switching

Switch the drive to phase 4

5. Save/synchronize safety technology parameters

Save and synchronize the safety technology parameters by selected "Synchronize/save safety technology parameters" in the context menu of the dialog **Drive-integrated safety technology ► Diagnostics**

6. Activating Safety Technology

Activate the safety technology by entering a password in IndraWorks in the window **Drive-integrated safety technology ► Password**

Description of the Steps

7. Perform acceptance test.



Refer to the sections "Activating the Safety Technology" and "Acceptance Test" in the separate documentation "Integrated Safety Technology According to IEC61508" (DOK-INDRV*-SI2-**VRS**-AW**-EN-P; R911327664)

WARNING! Hazardous motions possible! Life-threatening danger, risk of injury, severe bodily harm or material damage!

In order to guarantee the correct function and to prevent the risk of personal injury, carry out a complete acceptance test after performing the setup on drive controllers with an optional safety technology module (S2)

⇒ Create acceptance protocol and add it to the safety-relevant documentation of the machine.

8. Parameterize other drives

If there are other drives which have the same parameterization of the drive-integrated safety technology, repeat this import procedure for the safety parameters for these other drives

9. Set the machine to an operational state

⇒ Reset the machine to an operational state according to the instructions of the machine manufacturer.

⇒ Check the drive functions.

5.18 Configuration of the Link and the Link Participants at SERCOS 2

In Online mode, the link has to be configured in the "Settings of the MLC link ..." dialog.

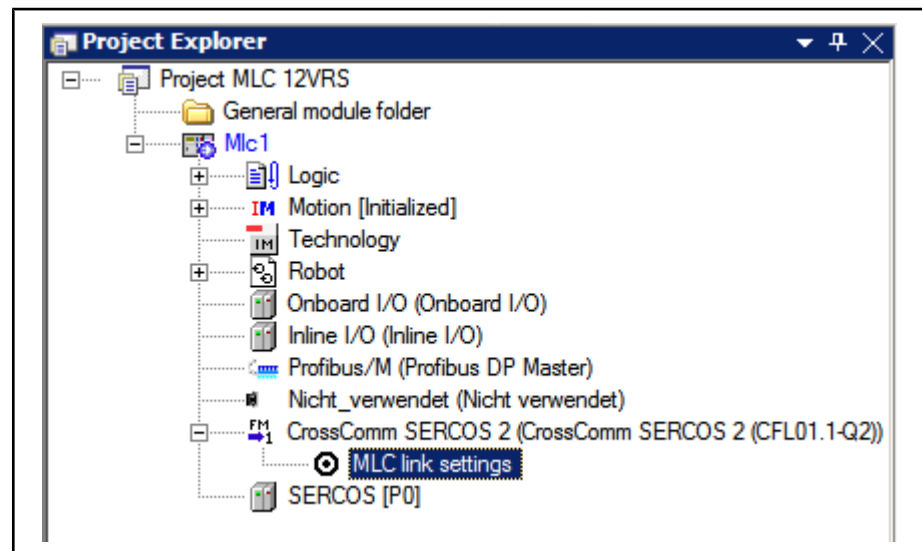


Fig.5-140: Calling the settings for the MLC link using Project Explorer

It is reasonable to make the settings on the link master first.

Then, switch to the project of the respective slave MLC.

Assuming that the controls are connected via Ethernet, the basic settings (ring structure and cycle time) can be applied from the link master. These settings can also be defined separately on the respective slave MLC.

This procedure is the same for further link participants.

Description of the Steps

MLC link settings - CrossComm SERCOS II (CFL01.1-Q2)

This MLC participates in MLC link

Central link settings

Identifier of the link: Link ring ID number

Controller address: 15 (1..16)

Function: ☒ Master ☐ Slave

Loop structure: ☐ Double loop ☒ Single loop

Loop cycle time: ☒ 2 ☐ 4 ☐ 8 ms

You can directly read the settings for a slave from the link master by switch "Detect Online". The master should be configured and in BB.

Scan Online

LWL length at transmitter output of the primary loop: 5 m

Link axis A: VA1
Dead time: 100 %

Link axis B: RA1
Dead time: 100 %

Data transfer

All modified settings are only accepted if the MLC is switched from parameterization mode (P2) to operating mode (BB).

Operating mode (BB)

Fig. 5-141: Settings for the MLC link in IndraWorks

This MLC participates in the MLC link

The green display for "This MLC participates in the MLC link" indicates that this MLC participates in the link.

Link ID

The link ID is only an informative value that provides a reasonable description of the link to differentiate it from others.

Control address

Each link participant receives a control address.

The address set is read in once, each time the IndraMotion MLC switches to Operating mode. It has to be unique within the link and defines the positions of the master positions within the link MDT.



The control address has to be in the range from 1 to 64.

Gaps between addresses are allowed.

Function

With regard to its function in the cross communication, the IndraMotion MLC control acts as a

- Link master [data producer (provider) and consumer (user), message monitoring and management]
- Link slave [(data producer (provider) and consumer (user))]
- Stand-alone participant (does not participate in link)

Link master

The link master controls the cross communication. It specifies the timing (cycle time) in the link in the drive rings for all IndraMotion MLCs participating in the link. The link master collects and cyclically distributes the master axis positions of all slaves in the link.

Link slave

A link slave forms a connection to the fiber optic cable ring of the MLC link. It synchronizes the telegram processing for its drive ring with the cross communication.

Description of the Steps

Standalone participant

Participants integrated into the fiber optic cable ring of the MLC link but that have not been parameterized in the MLC link, just ensure that link telegrams are forwarded. This means that it only forwards the signal arriving at its input to its output (repeater function). It does not participate in the cross communication.



The MLC link is a SERCOS ring in which exactly one participant **has to** be configured as master. Only this participant monitors and manages all telegram traffic.

This causes a **significantly** greater processing load compared to a link slave.

Ring structure The CrossComm SERCOS 2 (CFL01.1-Q2) function module supports both the double and single ring.

Single ring

With a single ring, only the primary ring is used and the secondary ring is not connected.

Double ring

For a double ring, both the primary and the secondary ring are used for cross communication. The orientation of both rings run opposite to each other.



The ring structure setting has to be identical on all participating controls.

Ring cycle time In the MLC link, 2 ms, 4 ms or 8 ms are supported as cycle time. The cycle time set determines the maximum number of supported link slaves, the permissible link addresses and the cycle time in the drive ring.



The ring cycle time setting has to be identical on all participating controls.

Permissible control addresses and number of link slaves

The values are displayed in the following table:

Ring cycle time	Permissible Control addresses	Maximum number of link slaves
2 ms	1...16	15
4 ms	1...32	31
8 ms	1...64	63

Fig. 5-142: Permissible control addresses for an MLC link with CrossComm SERCOS 2 (CFL01.1-Q2)



Since all link participants synchronize their telegram processing on the link master, all drives in these drive rings operate synchronously. This also applies for the control algorithms in the drives.

If the ring cycle time for the link is changed and no longer matches with the cycle time of the local drive ring, a message displaying the difference is output and provides the option to automatically adjust the cycle time of the drive ring.

Description of the Steps

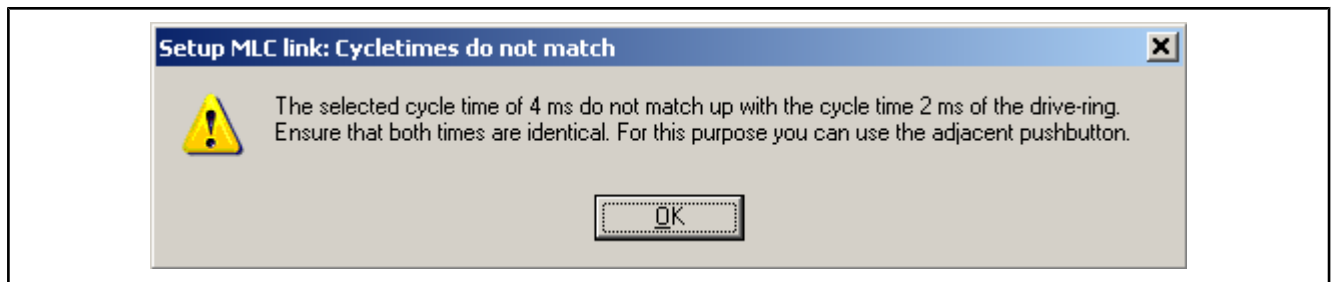


Fig.5-143: Cycle times do not match - Adjust automatically?

In addition, the cycle time of the drive ring can be adjusted via this button:



This button is only active if there are differences in the cycle times between both rings. Furthermore, a difference is indicated by the red error icon in the line of the ring cycle time.



A mouse tool tip displays further information.

5.19 Using the FDT Container to Integrate a DTMs

5.19.1 General

This section describes the use of FDT Containers to integrate DTMs. First, the installation and setup of DTM is described. Then the configuration and the procedure for device exchange are shown. Finally, examples of diagnostic options for a DTM are given.

FDT (Field Device Tool) is a manufacturer independent concept for configuring, parameterizing, diagnosing and managing field devices. The FDT functionality of IndraWorks is called an FDT Container. The IW FDT Container is used to integrate 3rd party engineering tools that are provided by the device manufacturer as DTMs (device type managers). It is based on the FDT standards 1.2 and 1.2.1 of the FDT Group.



The FDT functionality is available in the IndraWorks library using the "FDT Container" node.

5.19.2 Installation and Initial Commissioning of a DTM

This section describes the installation and initial commissioning of a DTM.



The installation and commissioning are performed based on an example DTM, "digiClip DF30DP".

DTMs by other manufacturers are installed and commissioning in the same way. However, individual steps may have to be changed.

Installation of DTMs

The 3rd party engineering tools (DTMs) are provided by the device manufacturer. The DTMs have to be previously installed on the PC.

To do this, Windows applications should be closed and IndraWorks as well.



The installed DTMs are listed under **Start - System control - Software**. If necessary, they can also be removed here.

Description of the Steps

Updating the DTM catalog in the library

Proceed as follows:

1. Start IndraWorks
2. In the **View** menu, the "Library" function has to be active so that the library is shown
3. Start the "Update DTM catalog" function in the **Tools** menu.

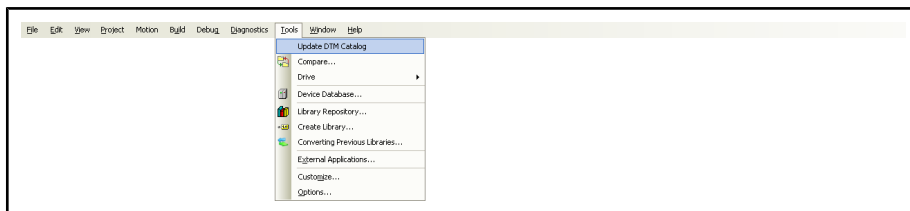


Fig.5-144: Updating the DTM catalog

A progress display appears. This can take a few minutes

- IndraWorks searches for installed DTMs in the Windows registry and displays them in the library in the "DTM catalog" folder.
- The DTMs are structured using subfolders. The subfolders correspond with the supported field bus protocols, e.g. "PROFIBUS DP"
- A GSD file is extracted from the DTMs for PROFIBUS slaves and imported to the "periphery" of the library.

Activating FDT Container functionality in the project

1. Select the **"FDT Container"** item in the "Drive and Control" folder In the library.

Description of the Steps

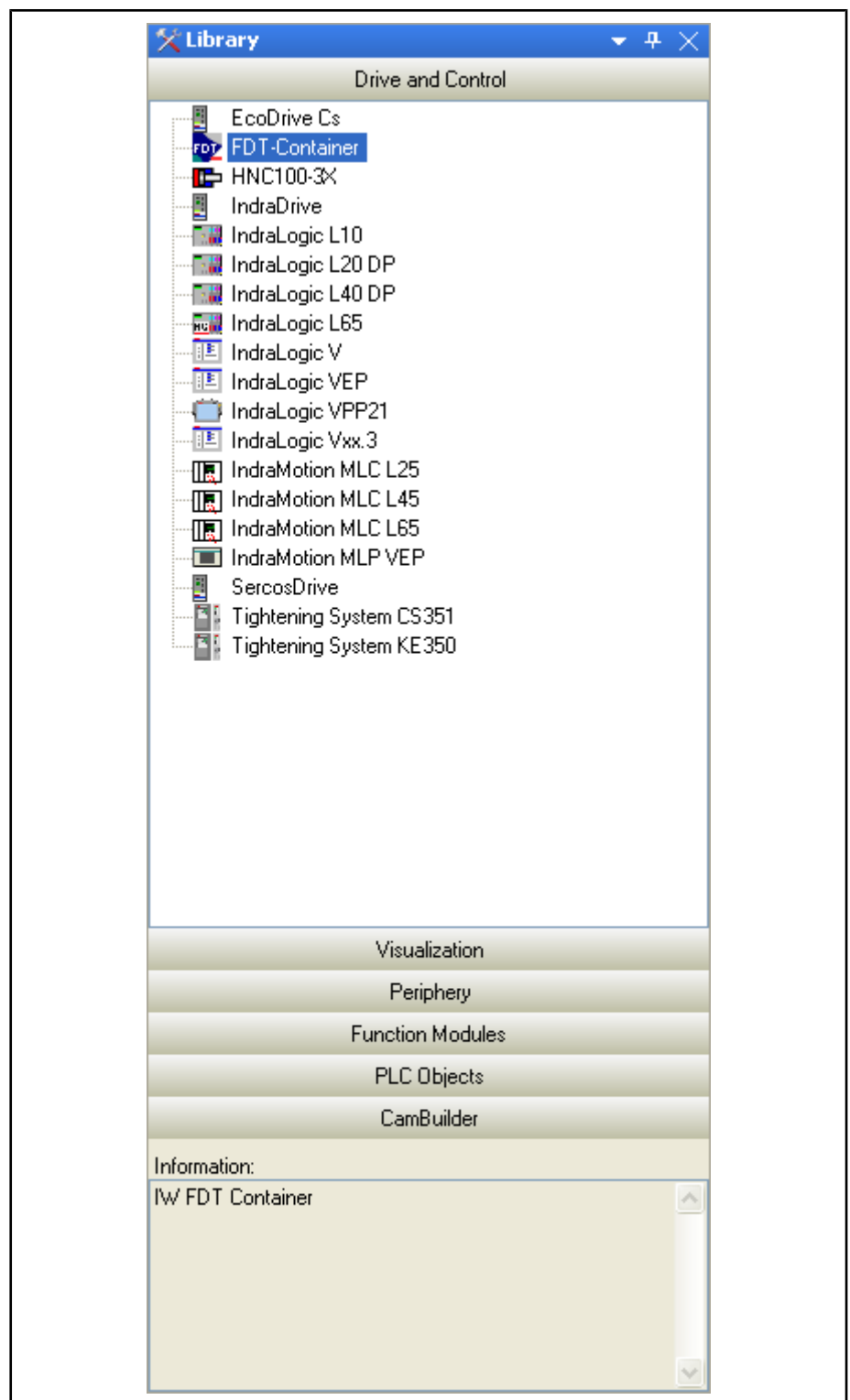


Fig.5-145: FDT Container in the library

2. Drag it to a node in the Project Explorer (the "Control" node in this example)

Description of the Steps

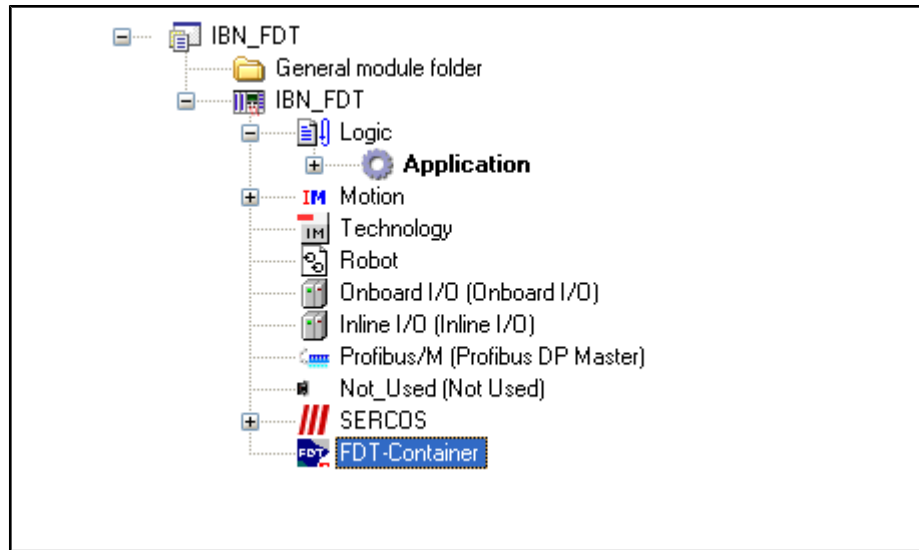


Fig.5-146: Adding the FDT Container

The following nodes allow the **"FDT Container"** to be added:

- Project
- Folders that are located in a direct sequence below the project node
- Control



Only the selected controls based on IndraLogic 2 G support the FDT Container.



So that the DTM can access to the field bus device below the MLC, for MLC systems, the FDT Container has to be dragged to the MLC.

FDT communication channel

If the "FDT Container" is located in the "Project Explorer" below a control, the dialog "FDT communication channel" is available in the context menu. The FDT communication channel can be parameterized here.

The protocol and the hardware assembly can be selected in the "FDT communication" field. For PROFIBUS DP-V1 communication, select a PROFIBUS master, e.g. "PROFIBUS , master index 0".



Fig.5-147: Setting the FDT communication channel

Description of the Steps

If "PROFIBUS " is selected for FDT communication, only DTMs for PROFIBUS DP Slaves (PROFIBUS slave DTMs) can be added directly at the FDT Container.

Inserting DTMs to the project

Use drag and drop or the DTM context menu to add the DTM to be inserted into the project to the FDT Container.

1. Select the desired DTM in the "DTM catalog" folder in the library.
2. Drag the DTM to the project folder on the "FDT Container" node.

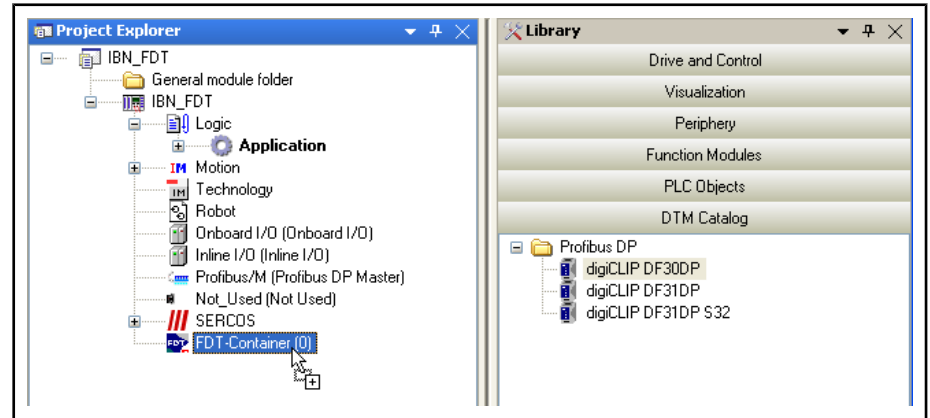


Fig.5-148: Dragging the DTM to the FDT Container



As an option, the DTM can also be dragged to a subfolder of the FDT Container or another DTM.

Setting the DTM address

The dialog "Setting DTM address" appears a PROFIBUS slave DTM is added to an FDT Container for which PROFIBUS is parameterized as a FDT communication channel. The address for the PROFIBUS slave DTM is entered here for the first time.

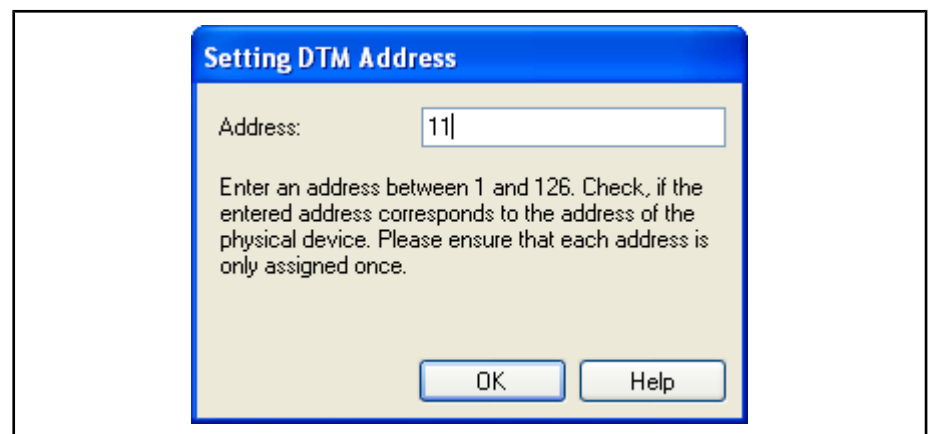


Fig.5-149: Setting the DTM address



The PROFIBUS address has to match the device address below the DP node.

Going online

Then, go online in the context menu of the DTM.

Description of the Steps

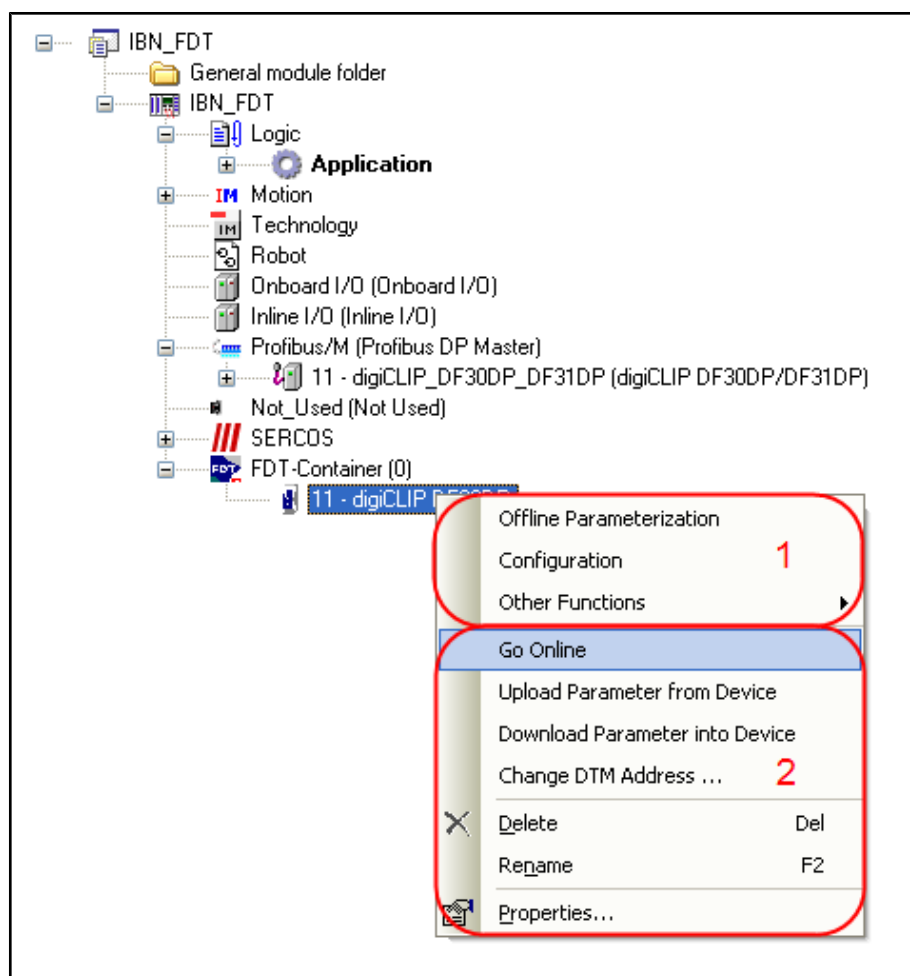


Fig.5-150: Going online in the DTM

The upper section (1) of the context menu depends on the DTM (is generated by the DTM); the lower section (2) is specific to IndraWorks and is always there.

DTM configuration

After the DTM is switched to online, **Online parameterization** appears in the context menu.

Description of the Steps

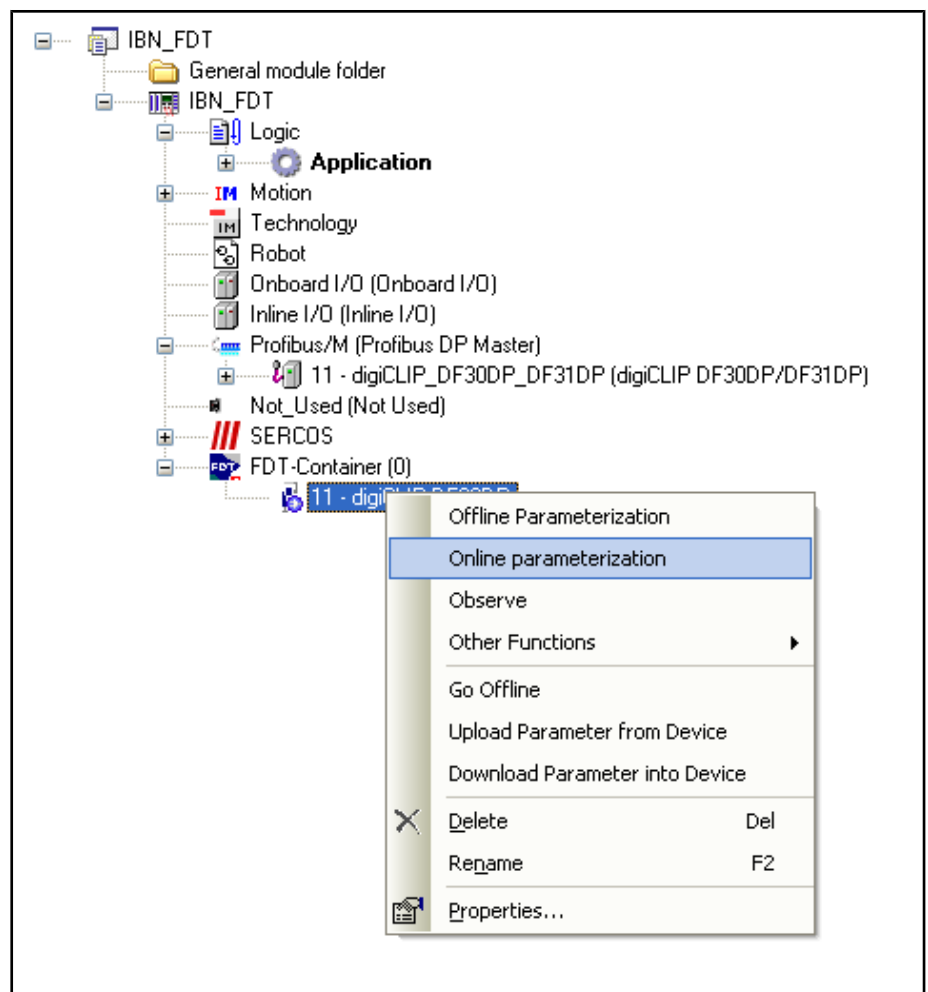


Fig. 5-151: Online parameterization

The DTM can now be parameterized by selecting this menu item.



Note that depending on the configuration, only one DTM can be switched online at a time. Go offline with non-required DTMs.



The DTM dialogs appear depending on the DTM (integrated or external application) in the IndraWorks window or in their own Windows window.

5.19.3 Procedure for DTM Device Exchange

This section describes the exchange of a DTM. It is assumed that the system has already been commissioned.

Loading the parameters from the device

1. First, go to the context menu of the DTM that is to be exchanged
2. Select **"Upload parameters from the device"**

Description of the Steps

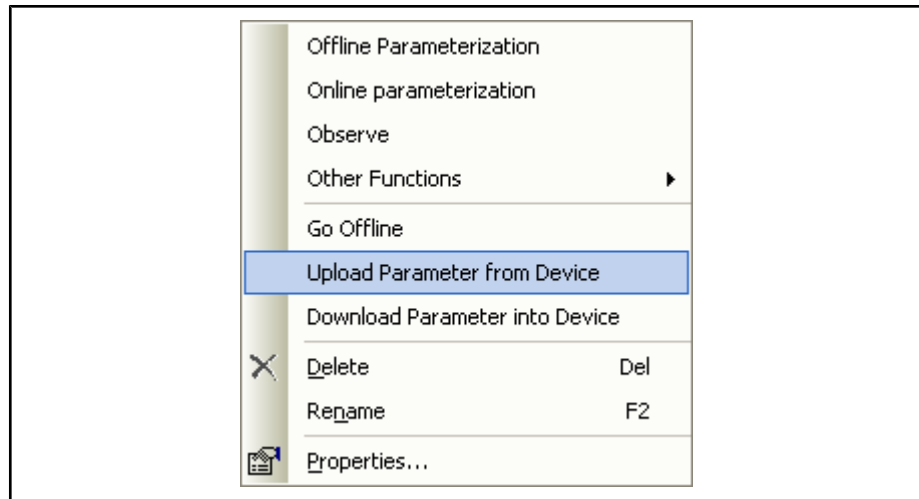


Fig.5-152: Loading the parameters from the device

This reads out the data from the DTM device and saves it in the directory of the IndraWorks project. When the project is archived, this data is then also contained in the project archive

The data is saved based on the DTM. For example, a progress bar may appear, which disappears again after a successful upload

Exchanging the DTM device

1. Save your data and go offline
2. De-energize the DTM device and the MLC
3. Then, exchange the device
4. After a successful exchange, the system can be switched on again and go online

Writing parameters to the device

To restore the original configuration of the device, write the saved parameters to the device again.

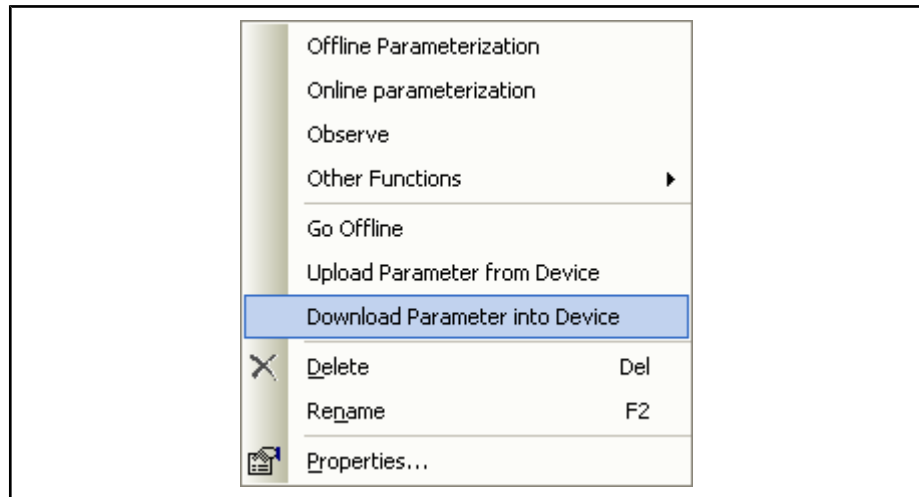


Fig.5-153: Write parameters to device

Depending on the DTM, a progress bar appears, which disappears again after the parameters have been successfully downloaded to the device. The original situation has been restored. Now, use the DTM again, go online and make changes.

5.19.4 Special Situations when Archiving and Restoring Projects with DTMs

DTM - archiving The archiving of projects is described in [chapter 5.2.2 "Complete Backup Procedure" on page 56](#). If DTMs are present in a project, the following additional steps have to be carried out.

1. Before creating an archive, each DTM has to be selected
2. Go online with the first DTM
3. Select **"Upload parameters from the device"**
(see [fig. 5-152 "Loading the parameters from the device" on page 172](#))
4. After downloading the parameters to the device, switch this DTM offline again
5. Repeat this procedure, starting with step 2, for each DTM
6. When the parameters for each DTM are uploaded from the device, the project can be archived

DTM - Restoration Restoring projects is described in [5.2.3 Project Restoration Procedure, page 61](#))

If additional DTMs are present in a project, the following additional steps have to be carried out:



- The DTM installations are not contained in the archive.
- If the project is restored on another PC where the DTMs are not yet installed, install the DTMs on your PC first in order to work with the DTMs after the restoration.

1. If the DTMs are already installed on the PC, skip to step 2. Otherwise, install the DTM(s) (see ["Installation of DTMs" on page 165](#)).
2. Restore the project
3. Go online with the first DTM
4. Select **"Download parameters to the device"**
(see [fig. 5-153 "Write parameters to device" on page 172](#))
5. After downloading the parameters to the device, switch this DTM offline again
6. Repeat this procedure, starting with step 3, for each DTM
7. In your project, you can work with the most recently performed parameterization

5.19.5 Diagnostic Options

Each DTM has the item **"Properties"** in its context menu.

Here, you can find information on the instance and the type of the DTM.

Description of the Steps

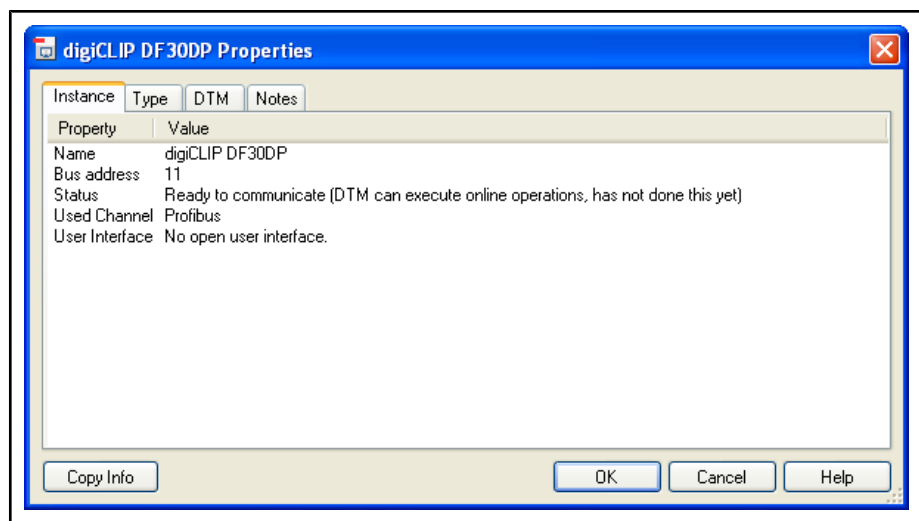


Fig.5-154: DTM properties

In the upper section of the context menu, DTM specific selection options are provided. Depending on the DTM installed, further diagnostic options are available.

6 Diagnostics

6.1 Diagnostic Numbers and Diagnostic Texts as Display for the IndraMotion MLC L25/L45/L65 Display

Diagnostic numbers and texts are displayed via the IndraMotion MLC L25/L45/L65 display. They describe the control startup, show the control state and display errors flashing as error number or alternating for drive numbers and drive errors.

The following figure shows the possibilities of the error display for the IndraMotion MLC:

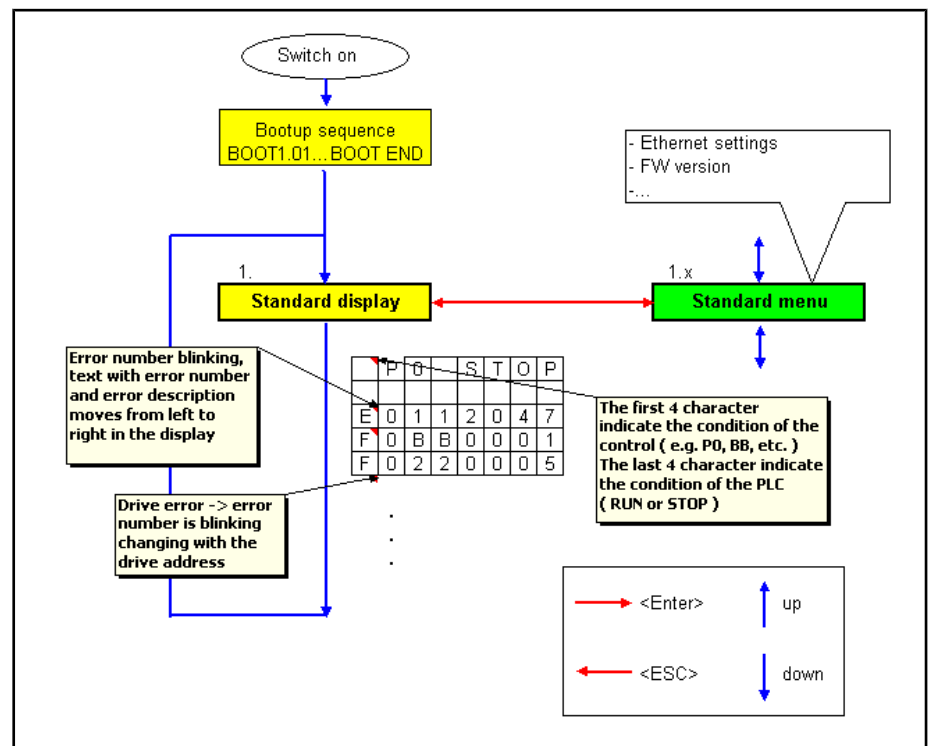


Fig.6-1: Default display



Fig.6-2: Display of an IndraMotion MLC L25/L45/L65

If <Esc> + <Enter> are pressed while booting, the boot up is aborted ("BOOT-STOP").

If <V> + <^> are pressed within a certain period of time, the NVRAM is deleted. That means that all NVRAM parameters as well as retain variables of the PLC are reset to delivery state ("CLEANUP" then "REBOOT").

Additionally, all files belonging to a PLC program as well as the files belonging to an MLC project are deleted on the Compact Flash card.

Diagnostics

If the system is in the main menu and an error is present, press <Esc> to clear the error.

In case of severe errors, the error number and "SYS ERR" flash alternately.

6.2 Diagnostics with IndraWorks

6.2.1 Device Status

The dialog window provides an overview on the essential properties of the current control.

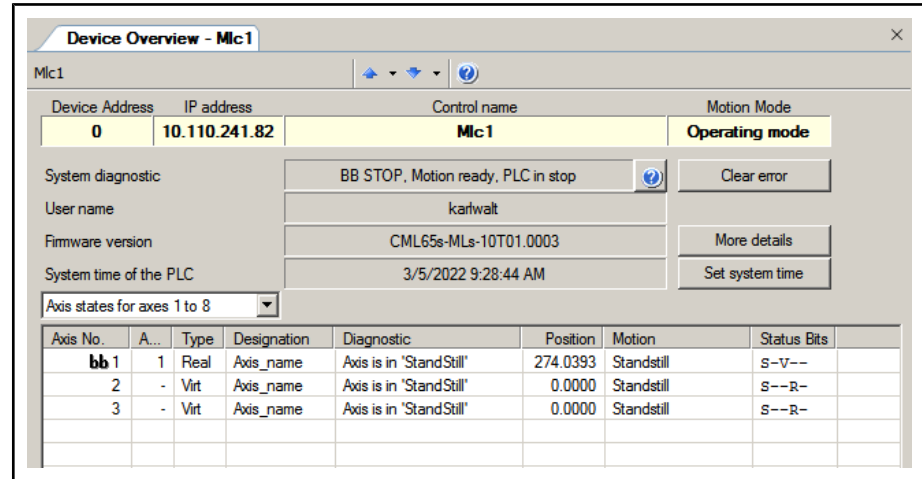


Fig.6-3: Example: "Device status" dialog of an IndraMotion MLC

With the **Clear error** button, all present errors of the control can be deleted. The current status is displayed in the "System diagnostics" field.

The display shows events according to priority, i.e. if several events are present, the event with the highest priority is displayed.

Therefore, the following rule applies (descending priority):

Error class 9 ...⇒ ... Error class 0 ⇒ Warnings ⇒ Messages

Double-click on the display field of the current system diagnostics to open the dialog "Error/Diagnostic memory" (see page 178).

The button **More details** opens the window "Advanced Properties" (see [Extended Properties](#), page 177).

The button **Set System Time** transfers the system time of the PC to the control.

The list of all defined axes provides an overview on the current status of these axes.

The axis number is displayed in the "Axis Number" column.

The "Addr" column indicates the address of the drive set in the drive ring (e.g. SERCOS).

In the "Status Bits" column, the most important feedback of the axis is indicated in an abbreviated form.

The letters have the following meaning:

- S - At standstill
- P - In position
- V - In velocity
- R - In reference, homed
- Y - Synchronized

Diagnostics

Move the mouse pointer across several lines and columns of the axis list to show tool tips with further explanation on the individual cells.

Right click to open a context menu with additional functions in the axis list.

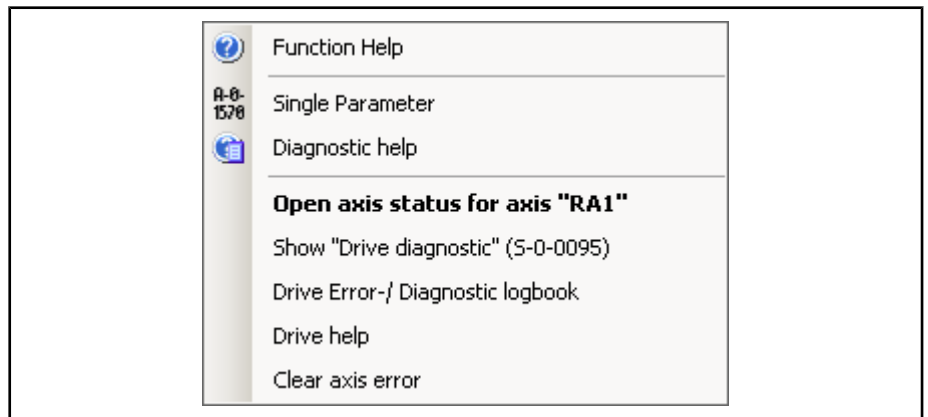


Fig. 6-4: Additional functions

The **bold** entry corresponds to the double-click on the axis.

6.2.2 Extended Properties

The "Extended Properties" dialog contains additional details on the hardware and firmware of the control. This information is particularly valuable for support in case service is required.

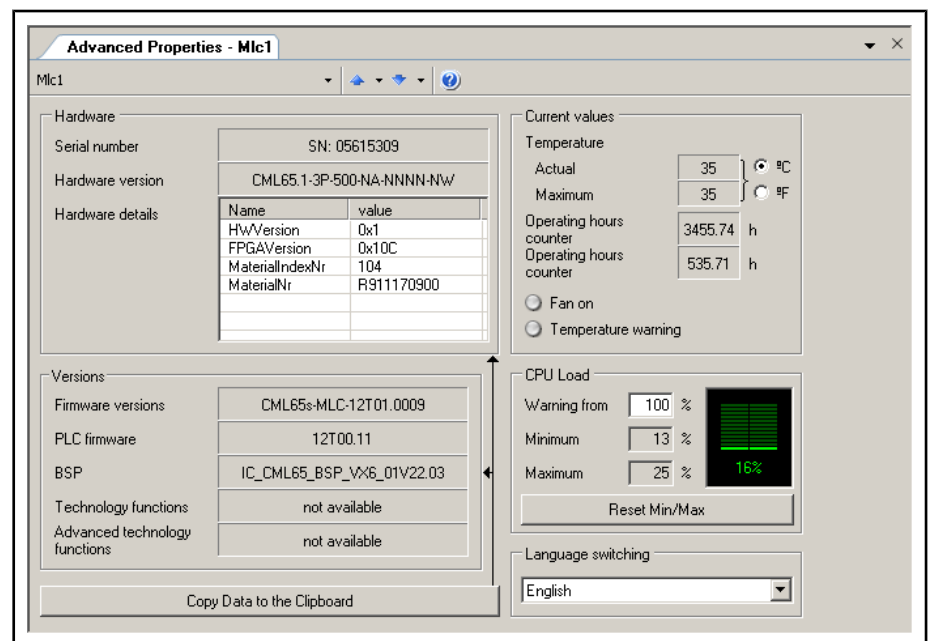


Fig. 6-5: Example: "Properties" dialog of an IndraMotion MLC

In the "Current Values" container, some additional status values of the control are displayed. The temperature warning is switched on when 60 °C is reached and switched off again if the temperature is lower than 55 °C. The "Maximum temperature" value refers to the measuring period since the last reset or the last switch-on of the control.

6.2.3 Clearing Errors

The command "C-0-1030, Clear all control errors" is executed. All errors in the drives are also deleted.

Diagnostics



Currently, warnings of the control are also deleted if this command is executed.

Clear Error can be called from different locations:

- in the context menu of the control via **Clear Diagnostics/Error**
- in the [Example: "Device status" dialog of an IndraMotion MLC, see page 176](#)
- in the [Error/Diagnostic Memory dialog, see page 178](#) and
- in the toolbar using "Clear errors"

6.2.4 Error/Diagnostic Memory

The "Error/Diagnostic Memory" window provides an overview on the error states of the control and its drives. It analyzes the logbook of the control. It is accessed via the parameters described below. Error memory/logbook are organized as batch. The current status is shown on top. It has the highest index (top line, see [fig. 6-7 "Startup, error-free" on page 179](#)).

A maximum of 1000 status messages can be stored in the control (they are automatically saved in NVRAM and on the Compact Flash card).

Due to the great number, the display can be limited.

Possible settings: 10/20/50/all.

A differentiation is made between errors, warnings and messages.

In case of errors and warnings, incoming and outgoing is stored. Messages are only one time in the logbook.

Due to memory space, the status messages which follow an error deletion, for example, are not always indicated/registered completely if the deletion for **BB RUN** is carried out according to the plan.

Categories	Remark
 Message	Status information of message type
 Error	Error comes in, error reaction is triggered, error is active
 Error	Error passive, error cause still exists, but the error was reset
 Error	Error goes out, the error cause does not exist any longer and the error was reset
 Warning	Warning comes in, the warning reaction is triggered, the warning is active
 Warning	Warning passive, the warning cause still exists, the warning was reset
 Warning	Warning goes out, warning cause does not exist any longer and the warning was reset

Fig. 6-6: Status information

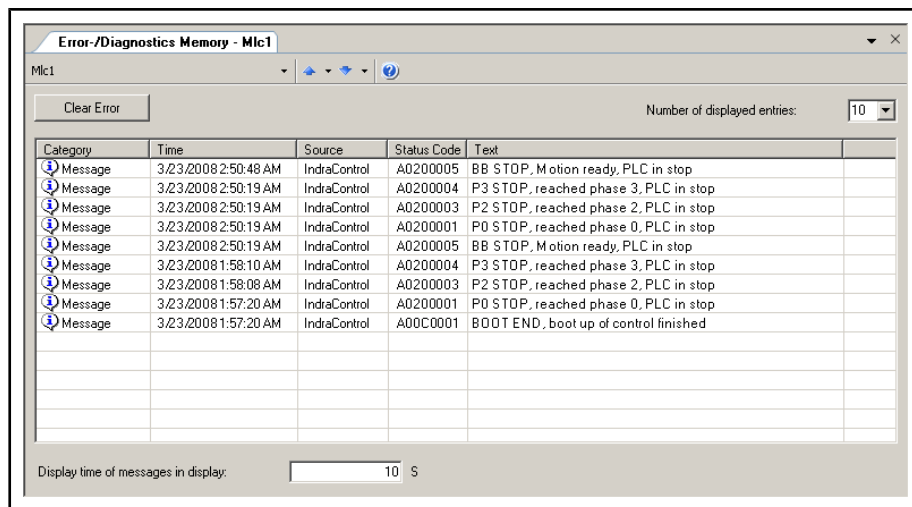
Indicated are category, time of log on/off, source - whether the information was received from the control or from which axis - status code and its explanatory text.



The status code and the text are documented in the "Notes on Troubleshooting" or in the online help.

Error-free startup

For an error-free startup, take the diagnostic/error memory and the interpretation of its display into consideration first.



The screenshot shows the 'Error-/Diagnostics Memory - Mlc1' window. It contains a table with the following data:

Category	Time	Source	Status Code	Text
Message	3/23/2008 2:50:48 AM	IndraControl	A0200005	BB STOP, Motion ready, PLC in stop
Message	3/23/2008 2:50:19 AM	IndraControl	A0200004	P3 STOP, reached phase 3, PLC in stop
Message	3/23/2008 2:50:19 AM	IndraControl	A0200003	P2 STOP, reached phase 2, PLC in stop
Message	3/23/2008 2:50:19 AM	IndraControl	A0200001	P0 STOP, reached phase 0, PLC in stop
Message	3/23/2008 2:50:19 AM	IndraControl	A0200005	BB STOP, Motion ready, PLC in stop
Message	3/23/2008 1:58:10 AM	IndraControl	A0200004	P3 STOP, reached phase 3, PLC in stop
Message	3/23/2008 1:58:08 AM	IndraControl	A0200003	P2 STOP, reached phase 2, PLC in stop
Message	3/23/2008 1:57:20 AM	IndraControl	A0200001	P0 STOP, reached phase 0, PLC in stop
Message	3/23/2008 1:57:20 AM	IndraControl	A00C0001	BOOT END, boot up of control finished

Fig.6-7: Startup, error-free

The startup is documented starting with the bottom line:

"Message **BOOT END**, booting the application completed".

The control runs automatically up to **BB STOP** (5th line from the bottom).

The user switches the control from offline to online.

The control runs up to **P2 STOP** (7th line from the bottom). After booting, parameterizations are common. However, this is not necessary now, thus proceed in the startup from **P2** to **BB**. The control runs to **BB STOP**.

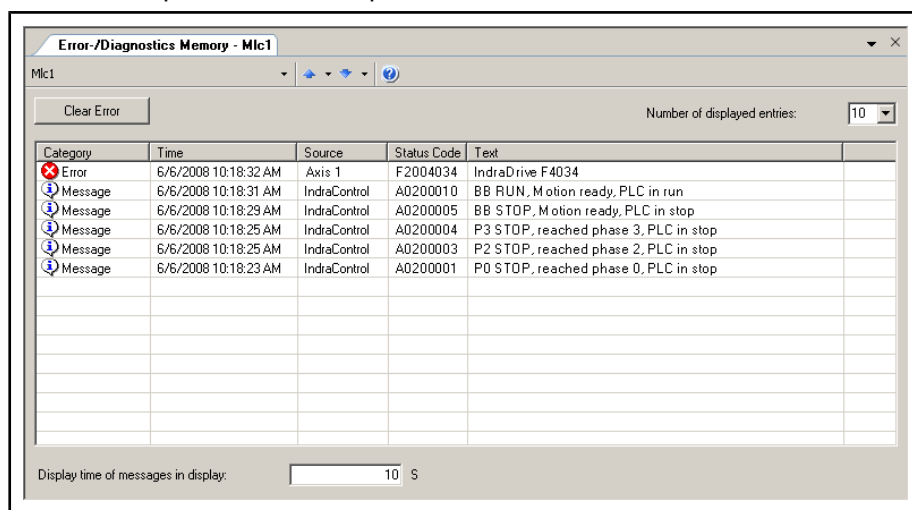
Diagnostics in case of an error

"F4034, E-Stop of the Drive of Axis 2" is considered as error.



In the "E-Stop Function" dialog, the "Analysis via Digital Input" has to be enabled and the "Interpretation as an Error Message F4034" has to be selected.

The drive provides a function used to monitor an E-Stop input (connection of an external hardware switch). The axis is set to standstill as described in "P-0-0119, Optimum standstill procedure".



The screenshot shows the 'Error-/Diagnostics Memory - Mlc1' window. It contains a table with the following data:

Category	Time	Source	Status Code	Text
Error	6/6/2008 10:18:32 AM	Axis 1	F2004034	IndraDrive F4034
Message	6/6/2008 10:18:31 AM	IndraControl	A0200010	BB RUN, Motion ready, PLC in run
Message	6/6/2008 10:18:29 AM	IndraControl	A0200005	BB STOP, Motion ready, PLC in stop
Message	6/6/2008 10:18:25 AM	IndraControl	A0200004	P3 STOP, reached phase 3, PLC in stop
Message	6/6/2008 10:18:25 AM	IndraControl	A0200003	P2 STOP, reached phase 2, PLC in stop
Message	6/6/2008 10:18:23 AM	IndraControl	A0200001	P0 STOP, reached phase 0, PLC in stop

Fig.6-8: Error F4034 comes in

Diagnostics



If the source of the warning or the error is located in a drive/its supply, its original error (warning) is indicated in the text. The status code consists of the original number supplemented by the group information "Drive": F4034 → F200**4034**.

In the toolbar, an active error is indicated. The axis reporting the error is highlighted in the Project Explorer. If the error affects a drive directly, the latter can - based on the severity of the error - be set to a standstill according to the chosen strategy.

Double-click on the white cross on red background to activate the diagnostic memory and error memory window in case it is not opened in the foreground.

The drive display now indicates: **2 F4034**,

SERCOS address **2**, error **F4034**. Its electronics signals that the E-Stop input has responded.

The control display indicates: **F2004034**, axis **2**. For the control, this is an axis error of severity "F2" which leads to the disabling of the individual axis.

The diagnostic and error memory window combines both information (see "Error F4034 occurs", page 179).

Acknowledging the error

Remove the malfunction which has triggered the E-Stop and delete the error (reset key or "Clear Error" command). Then, switch on the power supply again and clarify the cause that triggered the E-Stop.

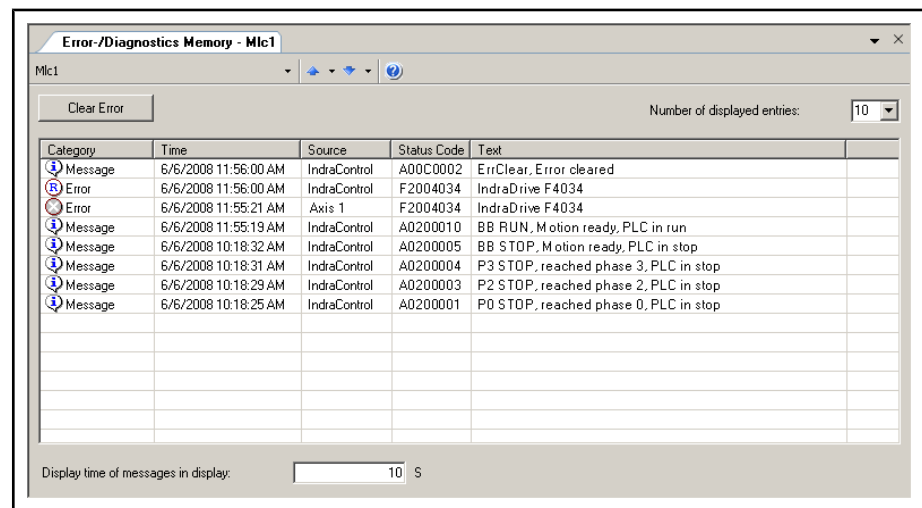


Fig. 6-9: Acknowledging the error after eliminating the cause

The acknowledgment of the error on the drive triggers the first three diagnostic lines.

The diagnostic messages up to **BB RUN** are not required if the procedure runs normally.

6.2.5 Invalid Parameters

The dialog window displays the current system diagnostics of the control and lists all invalid parameters:

- for the control the parameters included in "C-0-0111, List of all invalid C-parameters"
- for each axis the parameters included in "A-0-0011, List of all invalid A-parameters", or "A-0-0014, List of non-transferable A-parameters"

Diagnostics

- for real axes and encoder axes, the parameters included in "S-0-0021, IDN list of invalid operating data for phase 2" and "S-0-0022, IDN list of invalid operating data for phase 3" are also analyzed

Example:

Using the dialog

The "positive velocity limit value" should be increased. In doing so, the maximum admissible input value is exceeded.

The user is in the operating mode **BB**. The input is immediately transferred to the drive that responds with an error message.

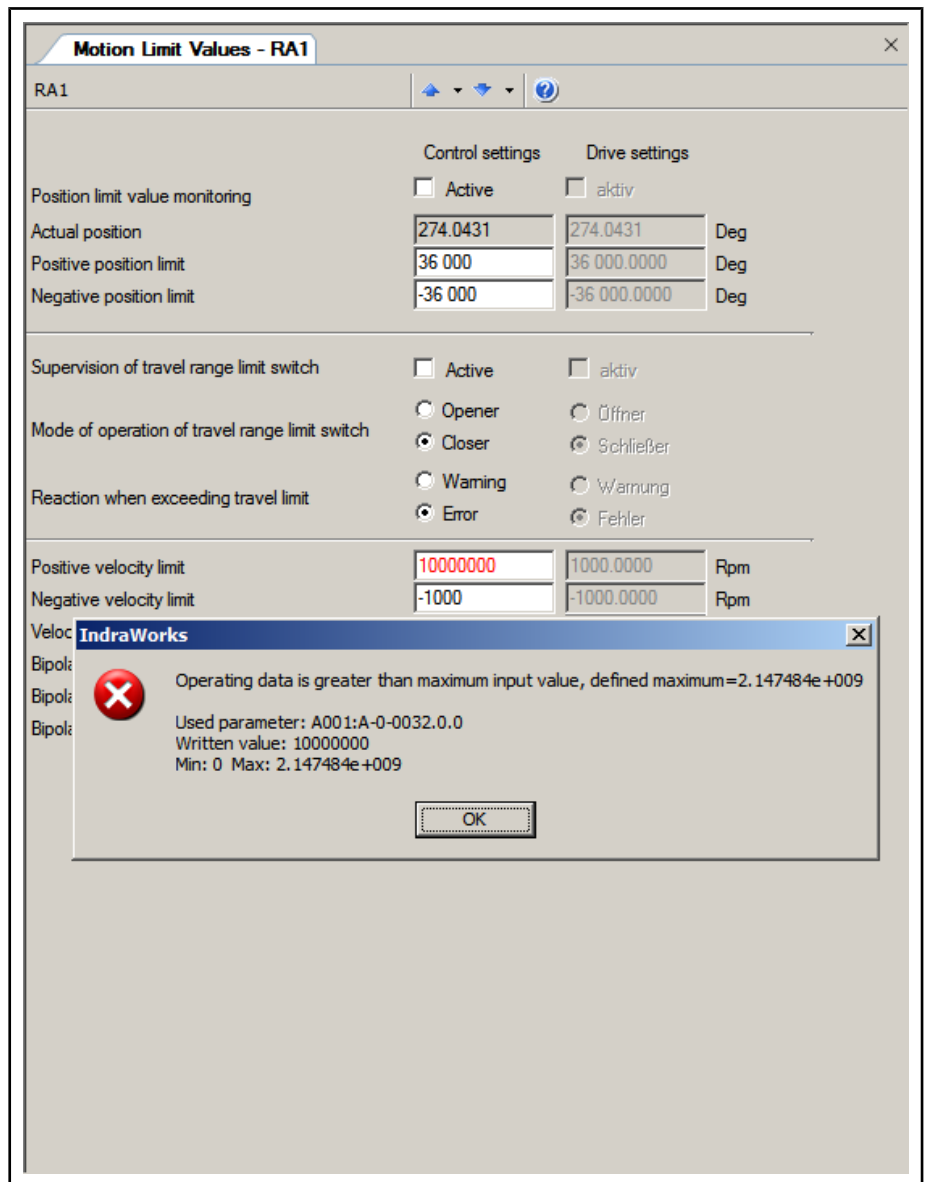


Fig. 6-10: Incorrect entry, value not within the range permitted

If, however, the change is made in the parameterization mode **P2**, the transfer does not take place before switching from **P2** to **BB**. Since several incorrect entries might have been made, it is advisable to list all these errors. Therefore, the "Invalid Parameters" window is automatically opened.

Diagnostics

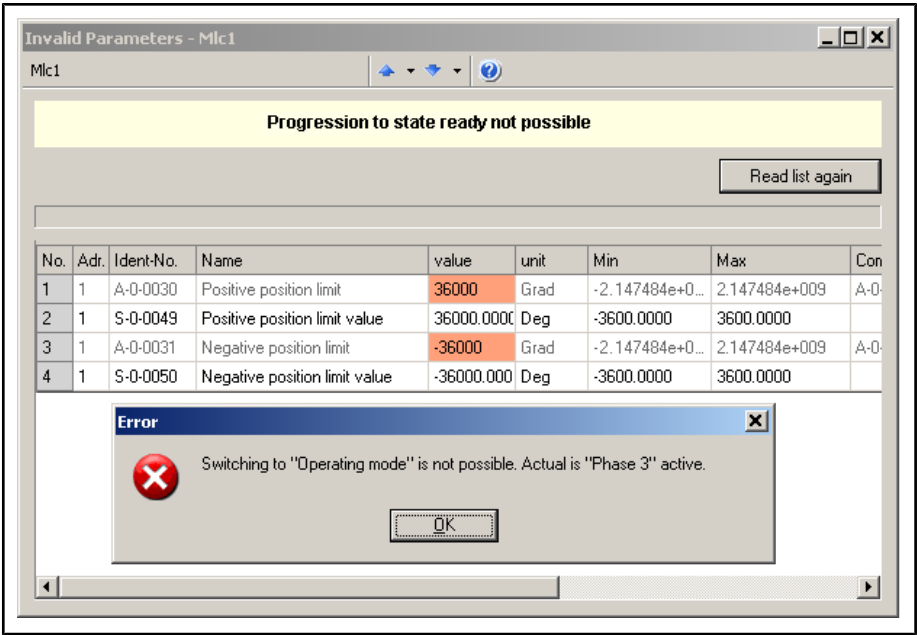


Fig.6-11: Invalid parameters when switching from P2 to BB

Now, it is recommended to make the appropriate correction(s) - here in lines 1 and 3 (position limit values) - and to repeat the attempt to switch from **P2** to **BB**.



Frequently, lines are listed which seem to be identical at first glance. The reason is that the S-parameters and P-parameters determined as invalid are often overwritten with A-parameters. In this case, it is necessary to write data on the corresponding A-parameter. Writing on the S- or P-parameter would have no effect. Therefore, the parameters to be changed are highlighted in red. In the comment column, this is described for each case.

6.3 Cross Link Diagnostics

This section describes the diagnostic options on the CrossComm SERCOS 2 function module.

It is assumed that the correct firmware is available on the control and the drives and that the drives and the control are parameterized.

Front view

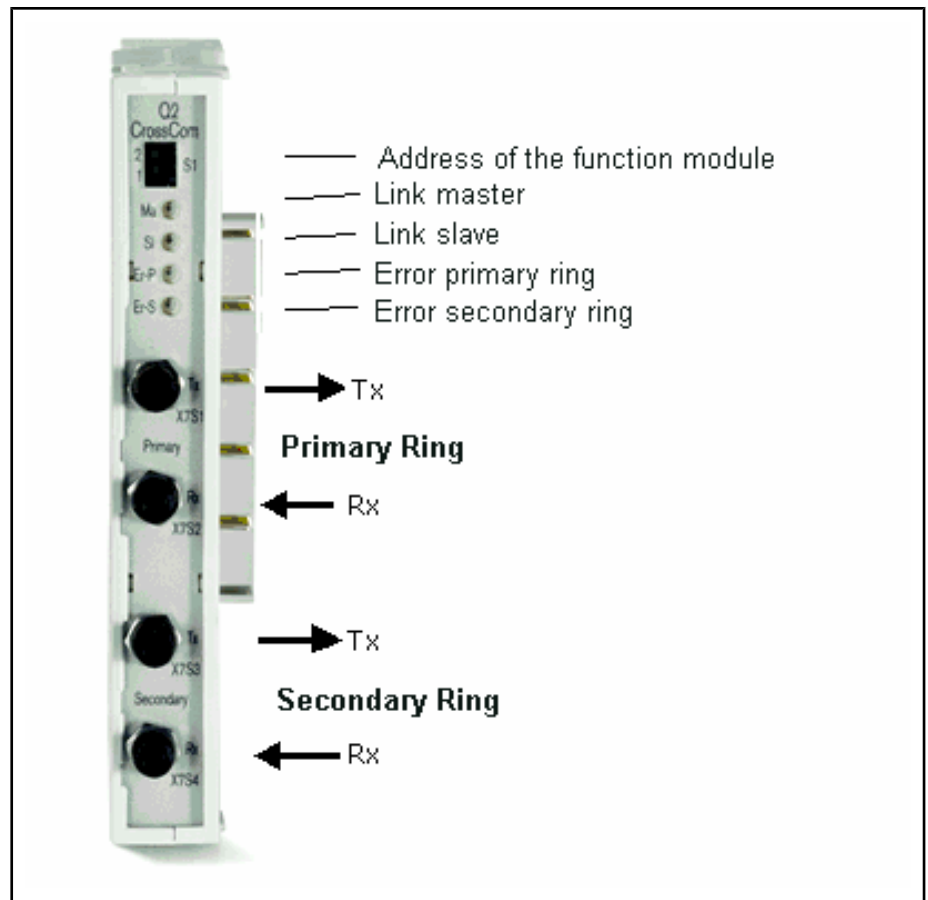


Fig.6-12: Front view of the CrossComm SERCOS 2 (CFL01.1-Q2)

Link displays

On the CrossComm SERCOS 2 (CFL01.1-Q2), the "Ma" LEDs (green) and the "SI" LEDs (yellow), master/slave indicate an active MLC link. If neither the "Ma" nor the "safety technology" LED are on, a cross link is not configured.

Distortion displays

The distortion displays for CrossComm SERCOS 2 (CFL01.1-Q2) (red LEDs "Er-P" or "Er-S"), error primary/secondary ring can be used to check the quality of the received optical signal. The LEDs are on if the incoming signal is too strong or too weak. In the operating state, both distortion displays must off.

Diagnostic messages

Problems with the MLC link are reported by the diagnostics (errors/warnings/messages) in IndraWorks, by binary status variables in PLC components and on the function module itself.

Diagnostics
F0160035, Error during configuration of link communication
F0160036, Error during configuration of link communication
F0160037, Error during configuration of link communication
F0280004, Link ring - transmission distance broken
F0280005, Link ring - Master axis position incorrect MDT
F0280006, Link ring - Master axis position incorrect AT

Fig.6-13: Error messages for MLC link errors

In these cases, the "Ma", "SI", "Er-P" and "Er-S" indicators on the CrossComm SERCOS 2 (CFL01.1-Q2) function module can be used to search for causes.

Diagnostics

Reasons may include

- incorrect parameterization of the MLC link (single ring, double ring, no MLC link, several masters, PLC time slot too large)
- incorrectly set transmission power of the primary or secondary ring
- defective optical fiber cables
- defective hardware

for example.

MLC link dialog - Status - Cross-Comm

As for the IndraMotion MLC and all of the axes, a diagnostic window in IndraWorks can also be opened for the MLC link in the context menu of the CrossComm function module.

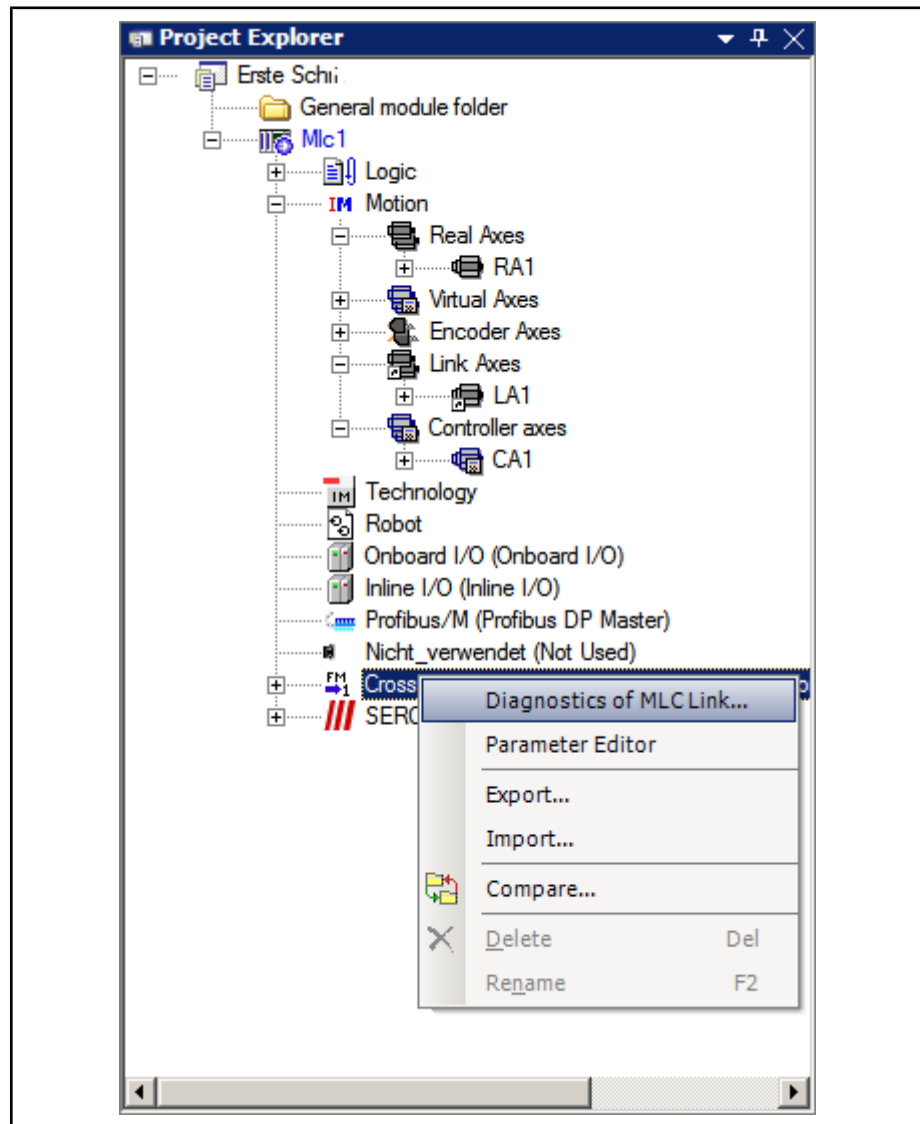


Fig.6-14: Calling the diagnostic function - Context menu of the CrossComm SERCOS 2 (CFL01.1-Q2) function module

The most important link settings as well as a list of the MLCs in the link are displayed. In addition, an error present in the function module CrossComm is displayed under "Messages".

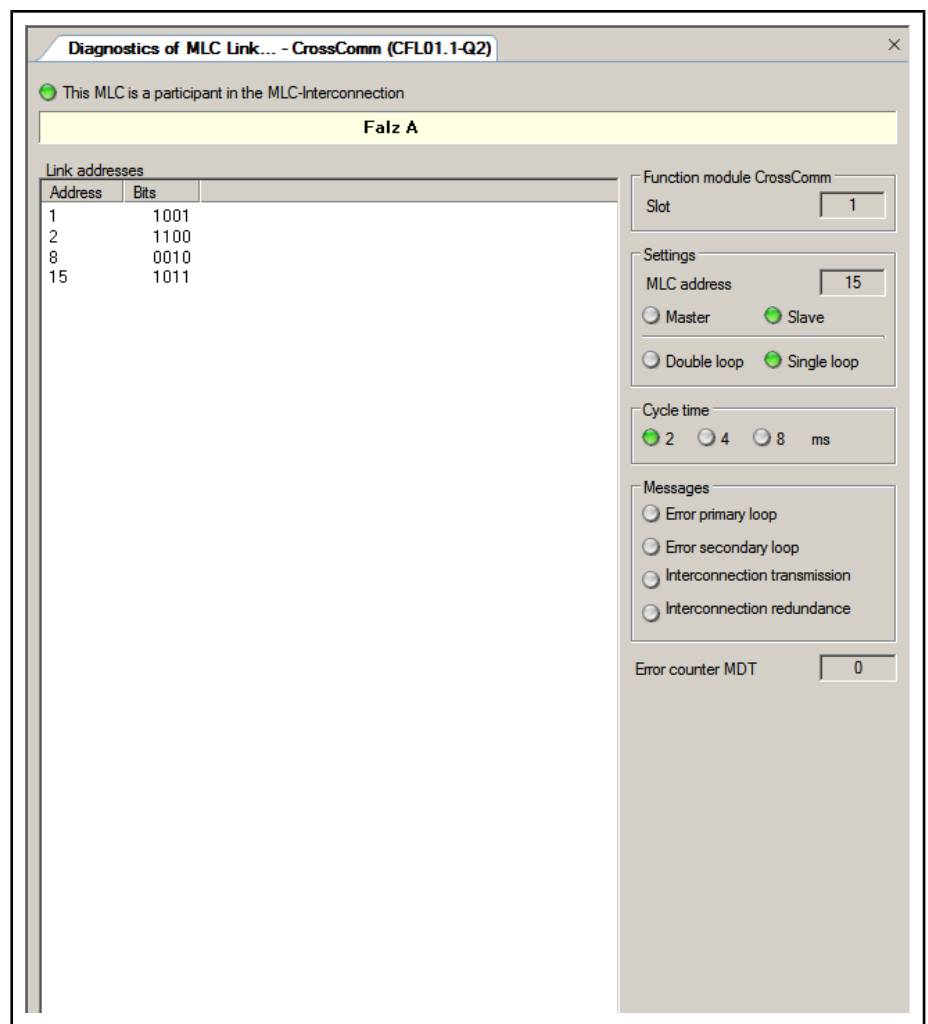


Fig. 6-15: Diagnostics of the MLC link from the perspective of participant Folder A (Falz A)

6.4 Diagnostic and Status Displays for the Control and Inline Modules via LED

6.4.1 General

For local error diagnostics, both the IndraControl L25/L45/L65 and all modules are equipped with diagnostics and status LED.

Diagnostics The diagnostic displays (red/green) provide information on the type and location of the error. If all green LEDs are on, a module is working properly.

After the error has been eliminated, the displays immediately indicate the current state.

Status The status displays (yellow) indicate the status of the respective input/output and the connected device.



The "function description" contains information on which diagnostic and status displays are present on a specific module.

6.4.2 Displays on the IndraControl L25/L45/L65

The following is a summary of the LEDs on the IndraControl L25/L45/L65.

Diagnostics

Interface LED

A variety of LEDs are arranged on the left side of the IndraControl L25/L45/L65 which indicate interface states in particular:

LED "Stop"	Meaning (firmware-dependent)
Off	Normal state
Red	STOP/system error
Red, flashing	Outputs are blocked

Fig. 6-16: Meaning of the "STOP" LED

LED "Dist." (optional)	Meaning
Off	Normal state
Red	The distortion is too high or the reception signal is missing (SERCOS interface)

Fig. 6-17: Meaning of the "Dist." LED (distortion display SERCOS interface)

LED "Ready" (optional)	Meaning
Off	Watchdog not started or ready-contact opened by software (the watchdog is still triggered internally)
Green	Ready contact closed. Watchdogs are triggered
Red	Ready error. At least one watchdog responded

Fig. 6-18: Meaning of the "Ready" LED

LED at the power supply

The following LEDs are arranged at the terminal block for the power supply:

LED "UM"	Meaning
Off	Main circuit supply missing
Green	24 V power supply U_M for the main circuit present

Fig. 6-19: Diagnostic LED of the infeed terminal

LED "US"	Meaning
Off	Segment circuit supply missing
Green	24 V power supply U_S of the segment circuit present

Fig. 6-20: Diagnostic LED of the segment terminal

LED "UL"	Meaning
Off	Power supply U_{LS} missing
Green	24 V power supply U_{LS} present

Fig. 6-21: Diagnostic LED of the power supply

LED "FS" and "FN"	Meaning
	Currently without function

Fig. 6-22: LEDs "FS" and "FN"

LED at onboard I/O

Onboard I/Os are only available for the variants IndraControl L45/L65.

Diagnostics

At the digital onboard I/Os, an LED is assigned to each input and output that indicates the state of that respective input or output.

LED 1, 2, 3, 4	Meaning
Off	Corresponding input/output is not set
Yellow	Corresponding input/output is set

Fig.6-23: Status LED of input/output terminals

In addition, an LED labeled with D is placed:

LED D	Meaning
Off	24 V missing
Green	24 V present
Red	Short circuit or overload

Fig.6-24: LED "D"

6.4.3 Displays at the Supply Terminals

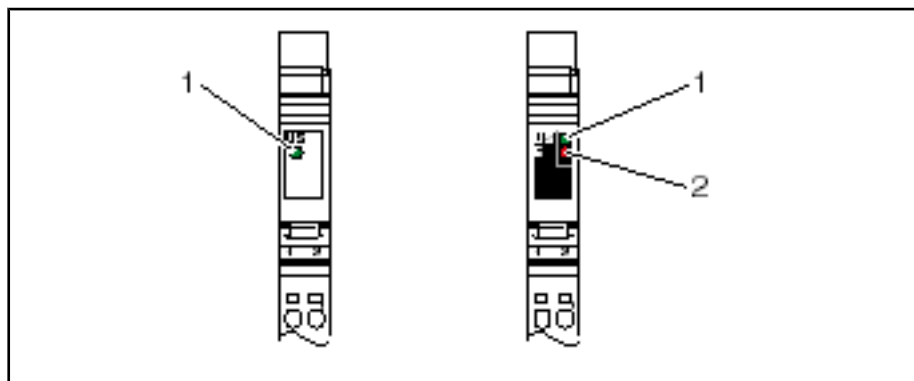


Fig.6-25: Possible displays on supply terminals (here: segment terminals with and without fuse)

Diagnostics

The following states can be read from the power supply terminals:

LED	Color	State	Description of the LED states
UM (1)	Green	On	24 V power supply of the main circuit present
		Off	Main circuit supply not present

Fig.6-26: Diagnostic LED of the infeed terminal

LED	Color	State	Description of the LED states
US (1)	Green	On	24 V power supply of the segment circuit present
		Off	Segment circuit supply not present

Fig.6-27: Diagnostic LED of the segment terminal

LED	Color	State	Description of the LED states
E (2)	Red	On	No fuse or fuse triggered
		Off	Fuse OK

Fig.6-28: Diagnostic LED of the segment terminal

Diagnostics

For modules with a fuse, the green LED indicates the presence of the principal or segment voltage in front of the fuse. That means that if green LED is on, there is voltage in front of the fuse. If the red LED is also on, the voltage is not available at the output side.

6.4.4 Displays on the Input/Output Modules

 Onboard I/Os are only available for the variants IndraControl L45/ L65.

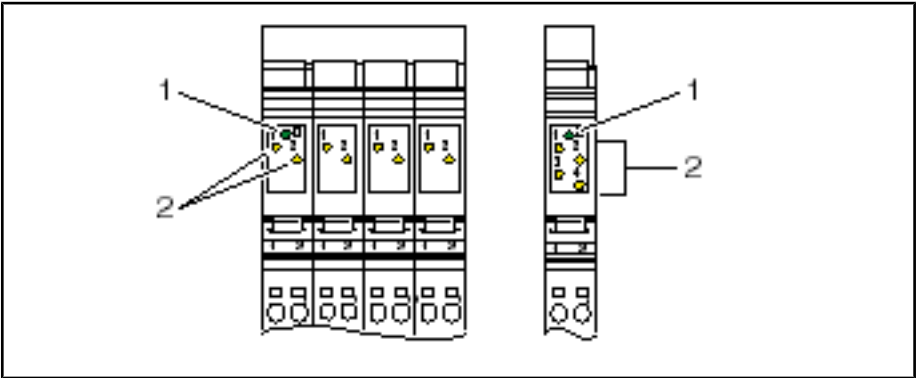


Fig.6-29: Displays on the input/output modules

Diagnostics The following states can be read out from input/output modules:

LED	Color	State	Description of the LED states
D (1)	Green	On	Local bus active
		Flashing: 0.5 Hz (slow)	Logic voltage present. Local bus inactive
		2 Hz (average)	Logic voltage present, local bus active, periphery error pending
		4 Hz (fast)	Logic voltage present, module in from of the mod- ule failed or this module itself is defective modules starting from the flashing module are no longer in the configuration frame
		Off	Logic voltage not present, local bus inactive

Fig.6-30: Diagnostic LED for input/output modules

Status The status of the input or output can be read out at the respective yellow LED.

LED	Color	State	Description of the LED states
1, 2, 3, 4 (2)	Yellow	On	Respective input/output is set
		Off	Respective input/output is not set

Fig.6-31: Status LED of input/output terminals

Assignment between status LED and input/output

The assignment between a status LED and the respective input/output is speci-
fied in the "Functional Description".

6.4.5 LED Displays and Diagnostics on the SERCOS Bus Coupler

Diagnostic and Status Displays

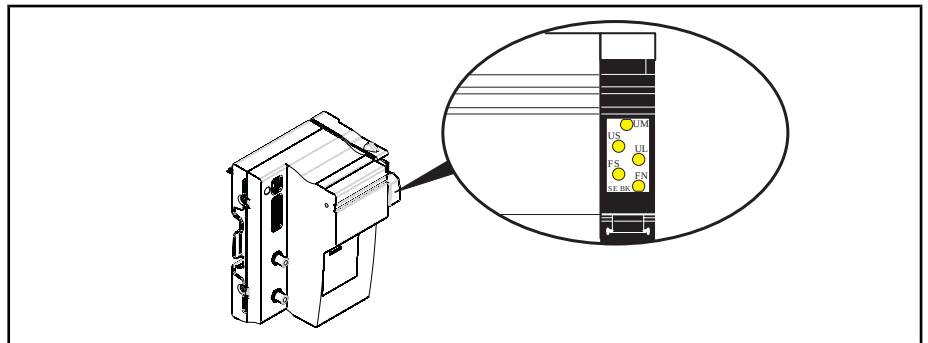


Fig. 6-32: Displays on the SERCOS bus coupler

The SERCOS bus coupler detects module errors. These errors are displayed via the bus coupler LED. The symbol used have the following meanings:

Symbol	Meaning
	LED ON
	LED OFF
	LED, flashing

Fig. 6-33: LED combinations

LED	Color	Meaning	State	Description of the LED states
UM	Green	UMain		24 V power supply for the main circuit U_M present
				Main circuit supply U_M not present
US	Green	USegment		24 V power supply for the segment circuit U_S is present
				Segment circuit supply U_S not present
UL	Green	ULogicSupply		24 V power supply for logic U_{LS} present
				Logic supply U_{LS} not present
FS	Red	Failure Select		If FS is red, FN indicates the "error class"
				If FS is off, FN indicates the "error number"
FN	Red	Failure Number		Flash pulses for error number or error class
				No error

Fig. 6-34: Diagnostic LED of the SERCOS Bus Coupler

Seven Segment Display "H1" on the SERCOS Bus Coupler

The current operating state of the bus coupler results from any present errors, warnings and commands. In addition, it is also indicated if the participants are ready for operation or in parameterization mode.

A multi-digit message is displayed is successively displayed on the single-digit seven segment display.

Diagnostics

Example:

For "Deactivation, double MST failure", "F", "4", "0", "1" are shown in succession on the H1 display.
Then, there is a short pause (display off) before the message is displayed again.

Communication phases

The following communication phases (Initialization) run after the bus coupler has been switched on. They are shown on the H1 display:

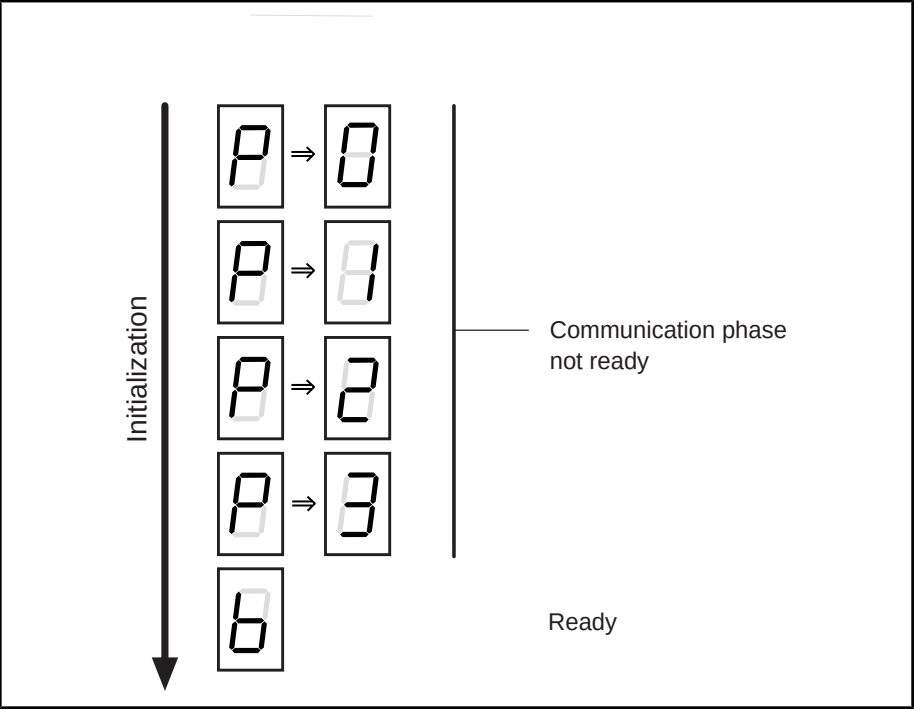


Fig. 6-35: Communications phases of the SERCOS bus coupler

Display	Meaning
P0	Communication phase 0
P1	Communication phase 1
P2	Communication phase 2
P3	Communication phase 3
b	Ready for operation

Fig. 6-36: Communication phases

Displays on the Power Supply Terminals on Input and Output Modules

The displays on the power supply terminals and the input and output modules are described in [Displays on Power Supply Terminals, page 187](#) and in [Displays on Input/Output Modules, page 188](#).

6.4.6 Displays on Other Inline Modules

Diagnostic and status displays on other Inline modules (e.g. function modules or power modules) behave similarly. Non-excluding differences can be found in the "Rexroth IndraMotion MLC 12VRS Functional Description" (see /20/ in [chapter 1.3 "Required and Supplementing Documentations" on page 8](#)) and Rexroth IndraControl Lxx 12VRS Function Modules (see /24/ in [chapter 1.3 "Required and Supplementing Documentations" on page 8](#)).

6.5 Diagnostic Options for Field Buses

6.5.1 General Diagnostics for All Field Buses

In this section, the diagnostic options for the tree view and the diagnostic window that are available to all field buses are discussed first.

Then, details on specific diagnostic options for individual field buses are given, categorized by master and slave.



Installation and configuration descriptions can be found in the respective documentation.

Diagnostic overview in the tree view

In this example, the PROFIBUS master and the subordinate slaves are shown in the IndraWorks project tree. This display of the diagnostics in the IndraWorks project tree demonstrates the same behavior for all field buses. The display also contains a status display of the slaves. If no errors are present, there are no other icons, i.e. the display is identical to the logged out state (see [Diagnostics in the IndraWorks project tree \(no error\)](#)).

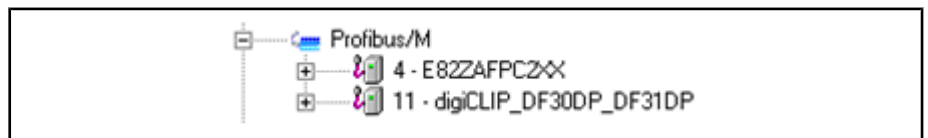


Fig. 6-37: Diagnostics in the IndraWorks project tree (no error)

If an error is present, a yellow exclamation mark is displayed on the master and the affected slaves to signal the error (see [PROFIBUS diagnostics \(error on slave\)](#)).

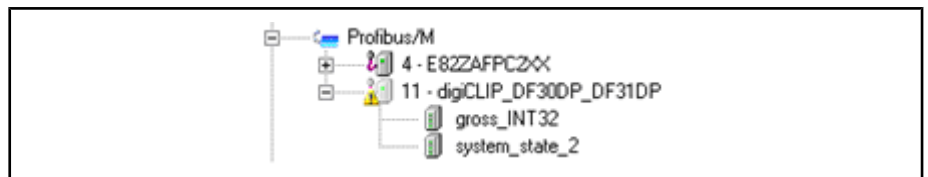


Fig. 6-38: PROFIBUS diagnostics (error on slave)

The status of the master or slave can be seen using the "Status" tab in the master or slave dialog (accessible by double-clicking on the master or slave node).

The status queries for the following field buses are displayed:

- [PROFIBUS DP Master, page 192](#)
- [PROFIBUS DP Slave, page 196](#)
- [PROFINET I/O-Controller, page 197](#)
- [PROFINET I/O-Device, page 200](#)
- [SERCOS III I/O, page 200](#)

Field bus diagnostics in the diagnostic window

For field buses, IndraWorks provides a detailed diagnostics of the participants. This diagnostics is called via **IndraWorks ► Diagnostics ► Field bus diagnostics**.

Diagnostics

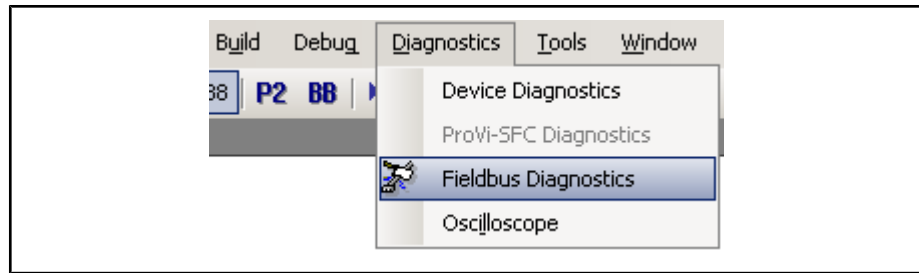


Fig. 6-39: Calling field bus diagnostics for PROFIBUS



In the current version, the extended field bus diagnostics is only available for the PROFIBUS DP Master.

The window display always shows the field bus diagnostics for the node highlighted in the project tree.

If no error is present, the following message is output

"There are no diagnostic messages."

If an error is present, the diagnostic information is shown in a tree structure in the display.

The diagnostic window of the PROFIBUS DP Master is described in ["PROFIBUS diagnostics in the diagnostic window" on page 194](#).

6.5.2 Diagnostics: PROFIBUS DP Master

The status of the PROFIBUS DP Master can be queried in the tree view (cf. ["Diagnostic overview in the tree view" on page 191](#)).

Status of the PROFIBUS Master

The status of the master can be seen using the "Status" tab in the master dialog (accessible by double-clicking on the PROFIBUS master node). [fig. 6-40 "Status dialog of the PROFIBUS DP Master without error" on page 192](#) shows the status if no error is present.

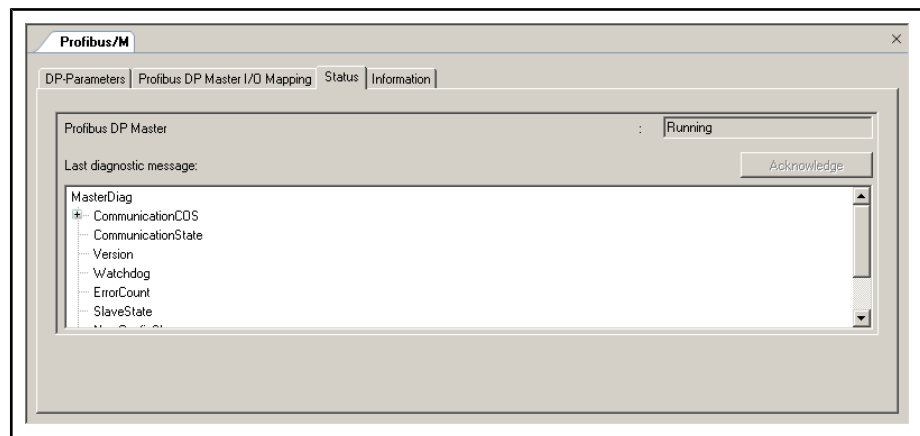


Fig. 6-40: Status dialog of the PROFIBUS DP Master without error

In [Status dialog for the PROFIBUS DP Master with error on a slave](#) is an example of a status display if a slave is missing. It can be seen that

- three slaves are configured
- two slaves are active

Diagnostics

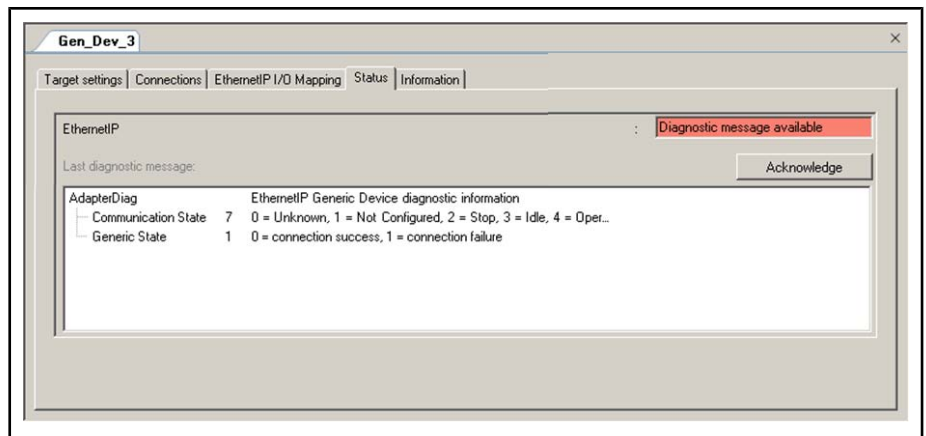


Fig.6-41: Status dialog of the PROFIBUS DP Master with error on a slave

Use the **Acknowledge** button to acknowledge an error after it has been eliminated.

In addition, the diagnostics of all bus participants can be acknowledged from the PROFIBUS DP Master context menu.

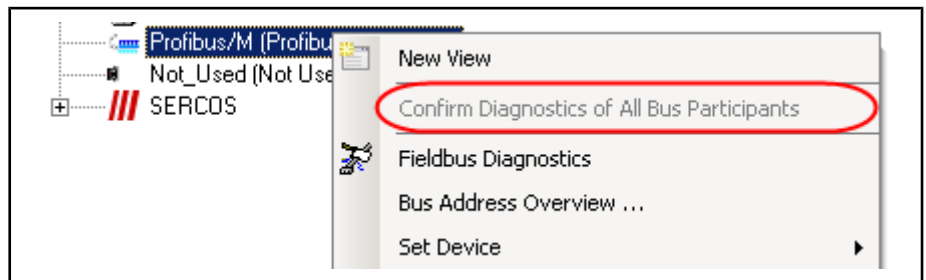


Fig.6-42: Delete diagnostics of all bus participants

Status of a PROFIBUS DP Slave

The status of a slave can be seen using the "Status" tab in the slave dialog (accessible by double-clicking on the corresponding slave node).

Status dialog of the PROFIBUS DP Slave without error shows the device status of a PROFIBUS slave without an error.

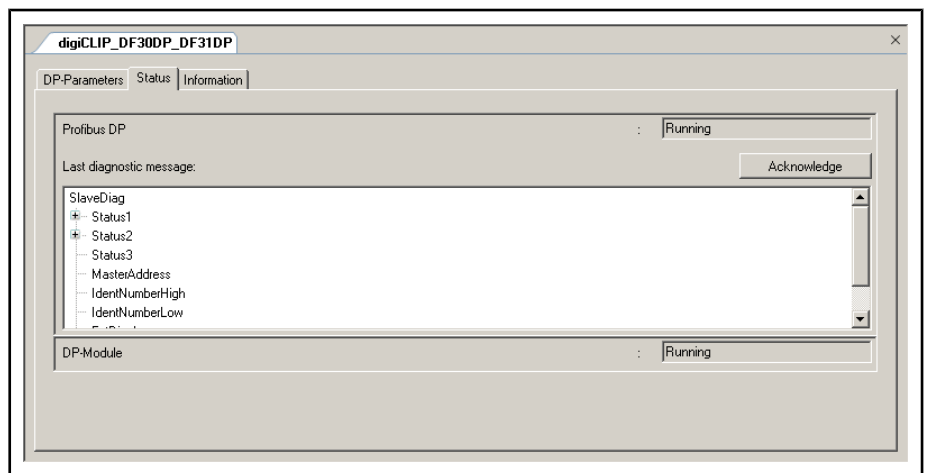


Fig.6-43: Status dialog of the PROFIBUS DP Slave without error

If an error is present (e.g. slave reports an error), it is shown in Status dialog of the PROFIBUS DP Slave.

Diagnostics

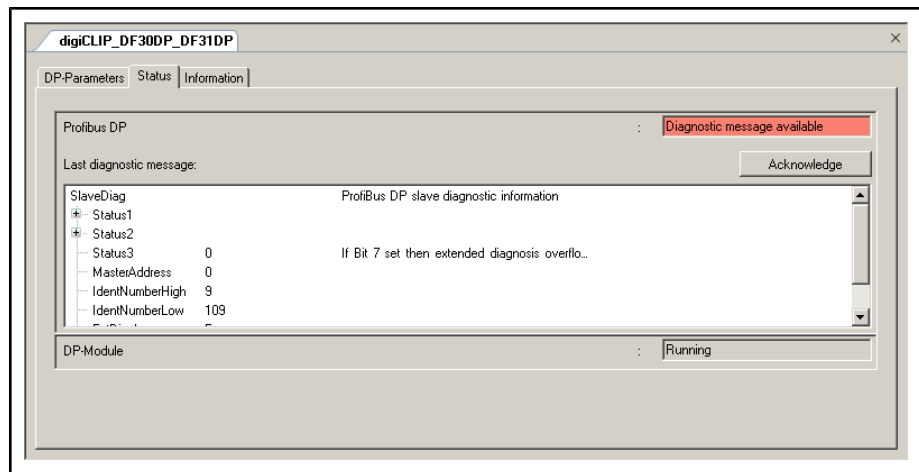


Fig. 6-44: Status dialog of the PROFIBUS DP Slave

Use the **Acknowledge** button to acknowledge errors after they have been recovered.

In addition, the diagnostics of a PROFIBUS DP Slave can be acknowledged using its context menu.

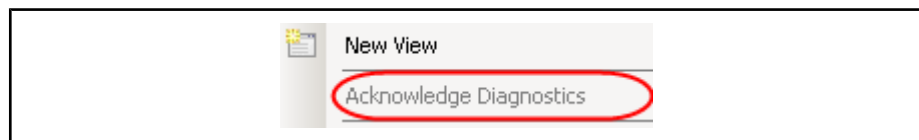


Fig. 6-45: Deleting the diagnostics of a PROFIBUS DP Slave

PROFIBUS diagnostics in the diagnostic window

The diagnostic window (cf. "Field bus diagnostics in the diagnostic window" on page 191) provides detailed diagnostics for the PROFIBUS DP Master.

In fig. 6-46 "Field bus diagnostics with diagnostics on a slave" on page 194, the PROFIBUS diagnostics is shown in the diagnostic window using a slave as example. An error on a device with PROFIBUS address 2 (module 2) is assumed in which the second module on the bus coupler had a short circuit at the output.

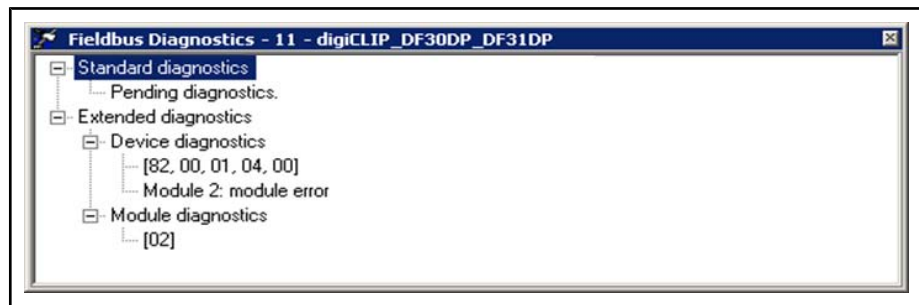


Fig. 6-46: Field bus diagnostics with diagnostics on a slave

Standard diagnostics

The standard diagnostics provides general PROFIBUS error messages.

There are the following messages:

- "Configuration error"
The configuration data most recently received from the master does not match with the data determined by the slave.
Most likely, the slave components are different that those set in the project
- "Bus participant is deactivated"

Diagnostics

The slave is labeled as not active in the DP slave parameter set and removed from cyclic processing

- "Diagnostics is present"

More diagnostic data is present

- "Bus participant has too much diagnostic data"

There is more diagnostic data than master or slave can process

- "Bus participant has received a freeze telegram"

This message is sent by the slave as soon as it has received the freeze control command

- "Implausible response sent by bus participant"

An implausible response has been received from a slave addressed

- "Bus participant was parameterized by a different master"

The DP slave has been parameterized by a different master

- "Bus participant does not support the service"

The slave does not support a required function

- "Error in parameter telegram"

This message is sent by a slave if the most recent parameter telegram contained an error, e.g. incorrect length, incorrect Ident number, invalid parameters.

- "Bus participant has to be reparameterized and configured."

Slave must be reparameterized and configured. This message remains until a parameterization is performed

- "Bus participant has a static diagnostics (e.g. no valid user data)".

The slave sends this message if it cannot provide any valid user data for example

- "Bus participant is not reachable"

Slave no reachable via bus

- "Bus participant is not ready for data exchange"

Slave is not yet ready for data exchange

- "Bus participant received Sync telegram"

The slave sends this message as soon as it has received the Sync control command

- "Response monitoring is activated"

Response monitoring is activated for the slave

Extended diagnostics

The extended diagnostics provides detailed information that does not depend on a specific device. It is again divided into the blocks

- Device-related diagnostics
- ID-related (module) diagnostics
- Channel-related diagnostics

The extended diagnostics is not supported by every slave and not all of the blocks must be sent.

Device-related diagnostics

Provides further device-specific diagnostic information. The possible messages are defined in the GSD file of the slave.

ID-related (module) diagnostics

Diagnostics

Provides a list of indexes of I/O modules reporting diagnostics.

Channel-related diagnostics

Provides diagnostic information for individual channels. Contains the module number, channel number, channel type and error type.

The channel type can assume the following values:

- Bit
- 2 bits
- 4 bits
- Byte
- Word
- 2 words

The error type can be one of the following types:

- Short circuit
- Undervoltage
- Overvoltage
- Overload
- Overtemperature
- Cable breakage
- Upper limit value exceeded
- Below lower limit value
- Error

6.5.3 Diagnostics: PROFIBUS DP Slave

The status of the PROFIBUS DP Slave can be queried via the tree view (cf. ["Diagnostic overview in the tree view" on page 191](#)).

Status of the PROFIBUS DP Slave

The status of the slave can be seen using the "Status" tab in the slave dialog (accessible by double-clicking on the PROFIBUS DP Slave node). [fig. 6-47](#) ["Status dialog of the PROFIBUS DP Slave without error" on page 196](#) shows the status if no error is present.

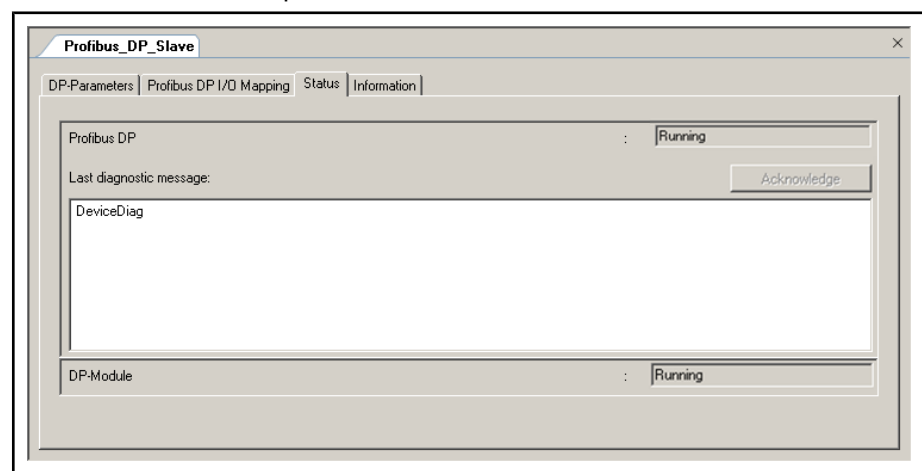


Fig. 6-47: Status dialog of the PROFIBUS DP Slave without error

In [Status dialog for the PROFIBUS DP Slave with error on a module](#) is an example of a status display if there is no bus connection.

Diagnostics

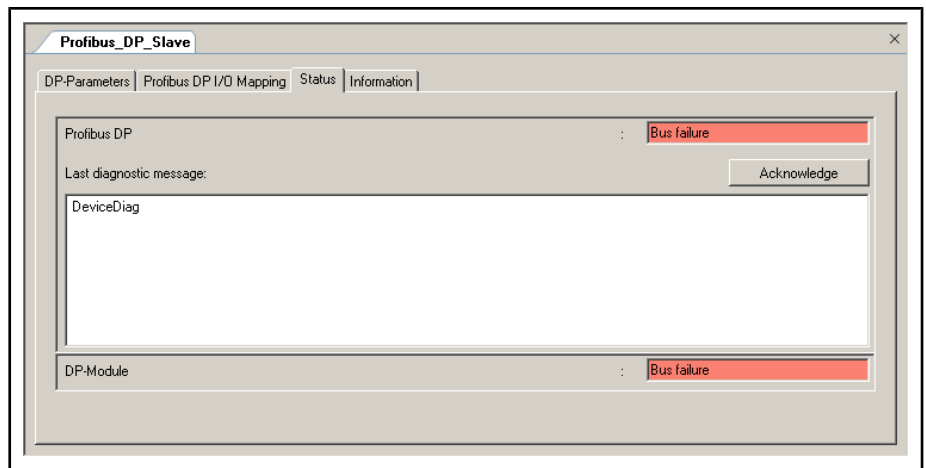


Fig. 6-48: Status dialog of the PROFIBUS DP Slave with error on a module

Use the **Acknowledge** button to acknowledge an error after it has been eliminated.

6.5.4 Diagnostics: PROFINET I/O-Controller

Status of the PROFINET I/O-Controller

The status of the PROFINET I/O-Controller can be queried via the tree view (cf. ["Diagnostic overview in the tree view" on page 191](#)).

The status of the controller can be seen using the "Status" tab in the controller dialog (accessible by double-clicking on the "Controller" node). [fig. 6-49 "Status dialog of the controller without error" on page 197](#) shows the status if no error is present.

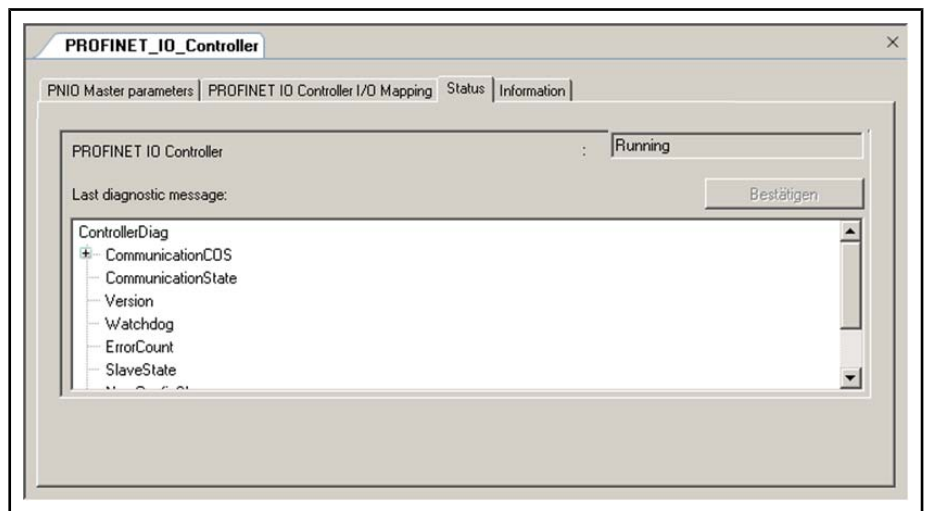


Fig. 6-49: Status dialog of the controller without error

In [Status dialog for the controller with an error on a device](#) is an example of a status display if a device is missing. It can be seen that

- three devices are configured
- one device is active
- two devices exist with one present diagnostics

Diagnostics

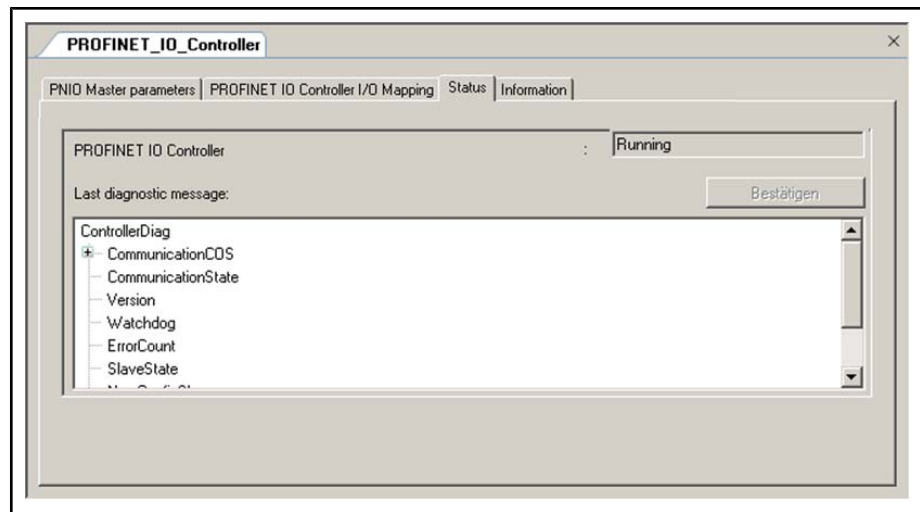


Fig. 6-50: Status dialog of the controller with error on a device

Use the **Acknowledge** button to acknowledge an error after it has been eliminated.

Status of the PROFINET I/O-Device

The status of a device can be seen using the "Status" tab in the device dialog (accessible by double-clicking on the corresponding "Device" node). [Status dialog of the PROFINET I/O-Device without error, page 198](#) shows the device status of a PROFINET I/O-Device without error.

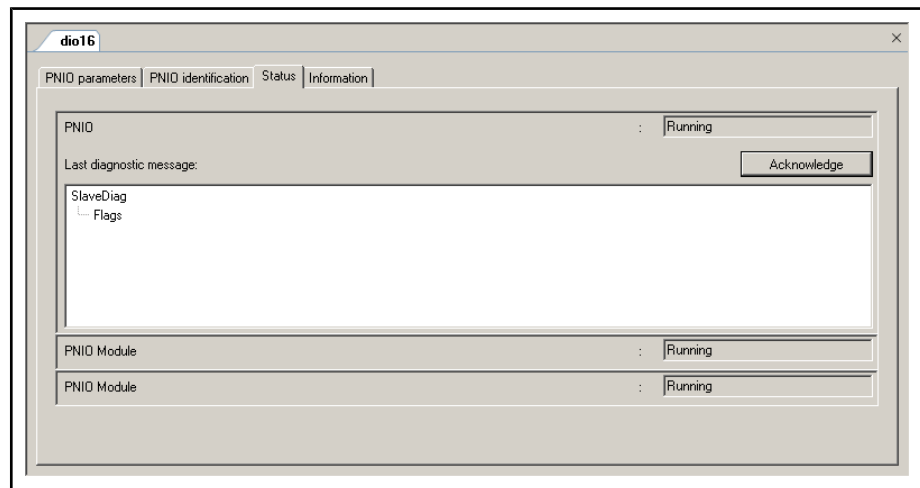


Fig. 6-51: Status dialog of the PROFINET I/O-Device without error

If there is an error (device reports an error), it is shown as in [Status dialog of the PROFINET I/O-Device \(example: Missing network connection to device\)](#) shown.

Diagnostics

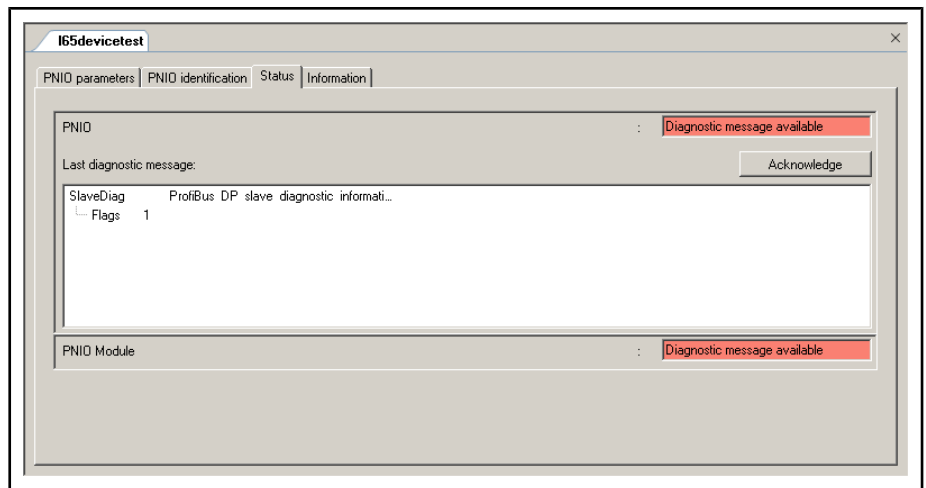


Fig. 6-52: Status dialog of the PROFINET I/O-Device (example: missing network connection to device)

Use the **Acknowledge** button to acknowledge an error after it has been eliminated.

The meaning of the flag (see [Status dialog of the PROFINET I/O-Device \(example: Missing network connection to device\)](#)) is shown in the following table.

Bit no.	Value	Meaning
0	1	The device does not exist or does not respond to DCP Ident requests
1	2	The device is not ready
2	4	The device has a configuration error (e.g. its station name or IP address is used more than once in the network)
3	8	The device sends invalid responses (invalid response), e.g. DCP "Set IP" was not successful
4	16	The device has a parameterization error (e.g. at bus startup, Connect_Request or Write_Record is rejected with an error code)
5	32	The device has been deactivated (by the user)
6	64	Diagnostic data present
7	128	The device sends the alarm "Diagnostic disappeared alarm"
8	256	The controller buffer for the diagnostic data was too small for the amount of diagnostic data sent by the device
9	512	The controller buffer for diagnostic data was overwritten with new diagnostic data before the previous diagnostic data were read out by the controller
10	1024	The diagnostic data request telegram is too small to accept the diagnostic data of the device
11	2048	The device reports an error "ModuleDiffBlock" while the connection is being established

Fig. 6-53: Overview on diagnostic flags

Diagnostics

In the example in [Status dialog of the PROFINET I/O-Device \(example: missing network connection to device\)](#), page 199 it can be seen that bit 0 is set (flags: 1); this means that the device does not respond.

6.5.5 Diagnostics: PROFINET I/O-Device

The status of the PROFINET I/O-Device can be queried via the tree view (cf. ["Diagnostic overview in the tree view" on page 191](#)).

Status of the PROFINET I/O-Device

The status of the slave can be seen using the "Status" tab in the slave dialog (accessible by double-clicking on the corresponding PROFIBUS slave node). [Status dialog of the PROFINET IO-Device without error](#) shows the status when no error is present.

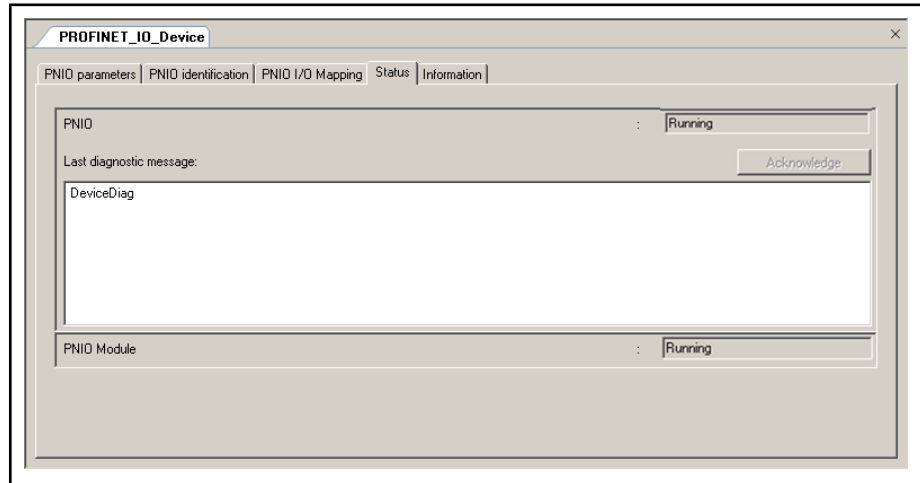


Fig. 6-54: Status dialog of the PROFINET IO-Device without error

In [Status dialog for the PROFINET IO-Device with error on a module](#) is an example of a status display if a bus connection is missing.

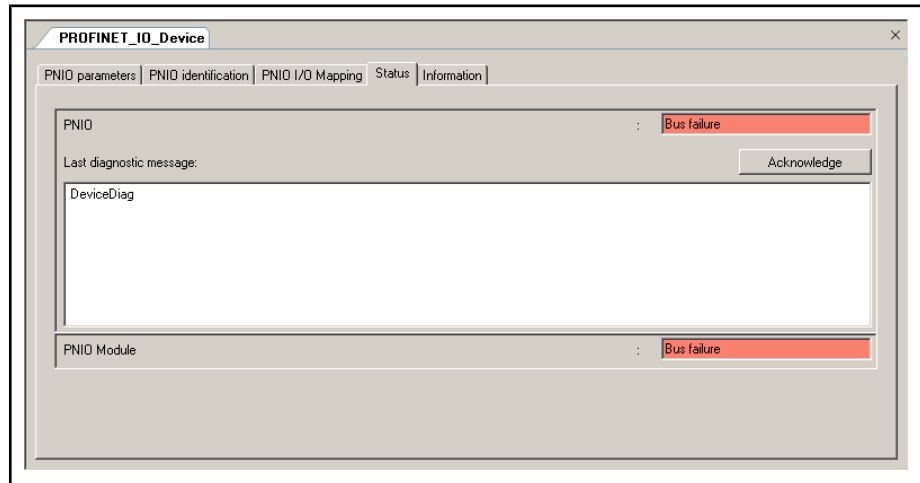


Fig. 6-55: Status dialog of the PROFINET I/O-Device with error at a module

Use the **Acknowledge** button to acknowledge an error after it has been eliminated.

6.5.6 Diagnostics: SERCOS III I/O

Status of the SERCOS III master

The status of the master is shown using the standard control diagnostics. This can be accessed using the context menu of the control.

Diagnostics

In addition, the status of the SERCOS communication (download mode (P0), parameterization mode (P2) and operating mode) is shown in the toolbar. The warning or error status is displayed via the two highlighted symbols on the upper right in the figure. [Figure of the SERCOS III master without error](#) shows the status when no error is present.

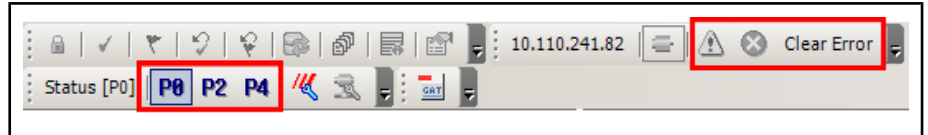


Fig. 6-56: SERCOS III master without error

In figure [Status display for the controller with error on a device](#) is an example of a status display if an error is present. Note I/O errors can currently not be deleted with the **Clear Error** button. They have to be deleted via the dialog of the respective slave device.

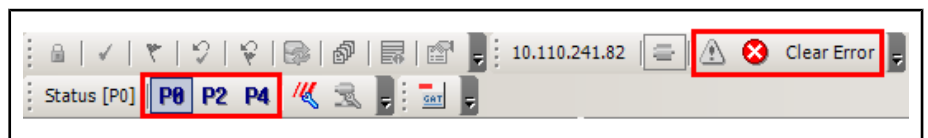


Fig. 6-57: Status display of the controller with error on a device

Open the "Error/diagnostic memory" dialog via the **Clear error** button. Once the error has been recovered, the pending error message can be deleted via the **Clear error** button.

Status of a SERCOS III I/O Slave

The status of a slave can be seen using the "Status" tab in the slave dialog (accessible by double-clicking on the respective I/O slave node). [Status dialog for the SERCOS III I/O-Slave without error](#), page 201 shows the device status of a PROFINET I/O-Device without error.

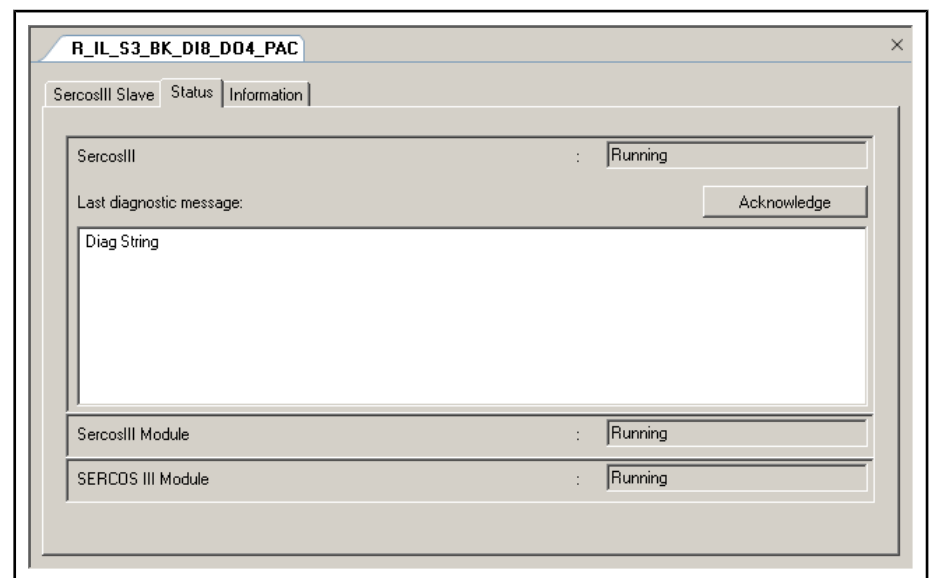


Fig. 6-58: Status dialog of the SERCOS III I/O-Slave without error

If there is an error (slave reports an error), it is shown as in [Status dialog of the SERCOS III I/O-Slave \(example: incorrect configuration\)](#).

Diagnostics

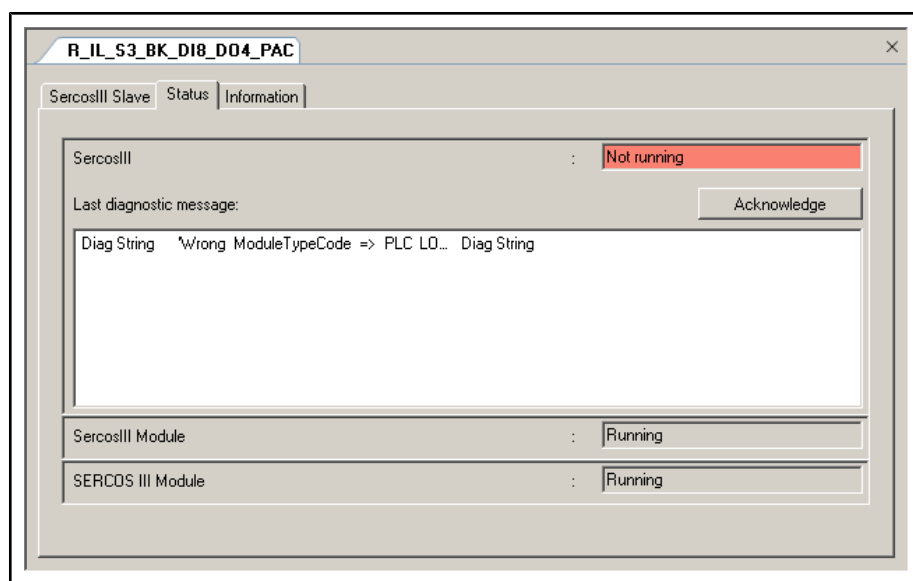


Fig.6-59: Status dialog of the SERCOS III I/O-Slave (example: incorrect configuration)

Use the **Acknowledge** button to acknowledge an error after it has been eliminated. However, restarting the SERCOS III communication is also often necessary. This can be done using the "bb" button or the PLC

6.6 Reading Out Hardware Information

6.6.1 MLC Hardware Information

The hardware information on the control can be read out as follows:

1. Switch the control online
2. **Diagnostics ► Device status** can be selected in the context menu of the MLC

The firmware version and the system time can be read out in the "Device status" tab

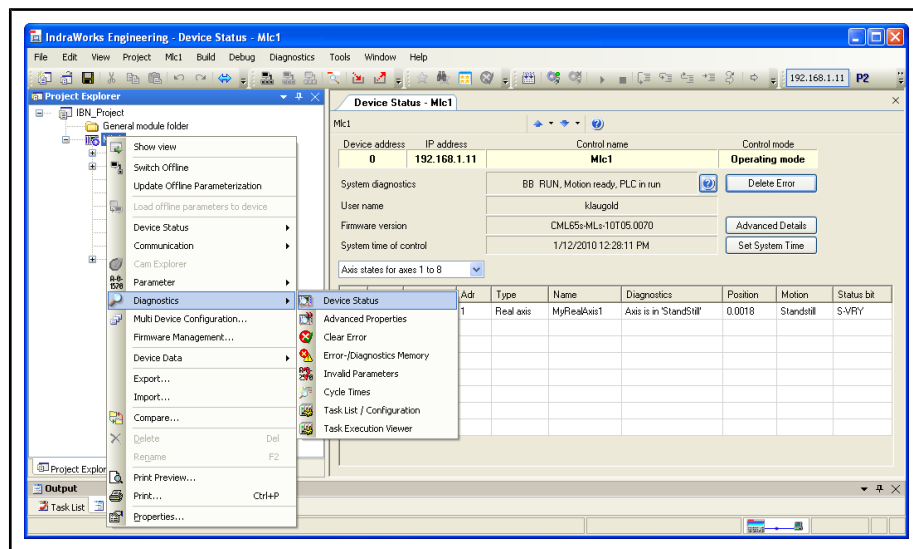


Fig.6-60: MLC device status

Diagnostics

- If **"Advanced Properties"** is selected, MLC hardware information appears, including serial number, hardware version or hardware details for example. This information can be copied to the clipboard for further processing by using **"Copy data to clipboard"**

The **"Advanced Properties"** tab is also directly accessible from **"Diagnostics"** in the context menu of the control

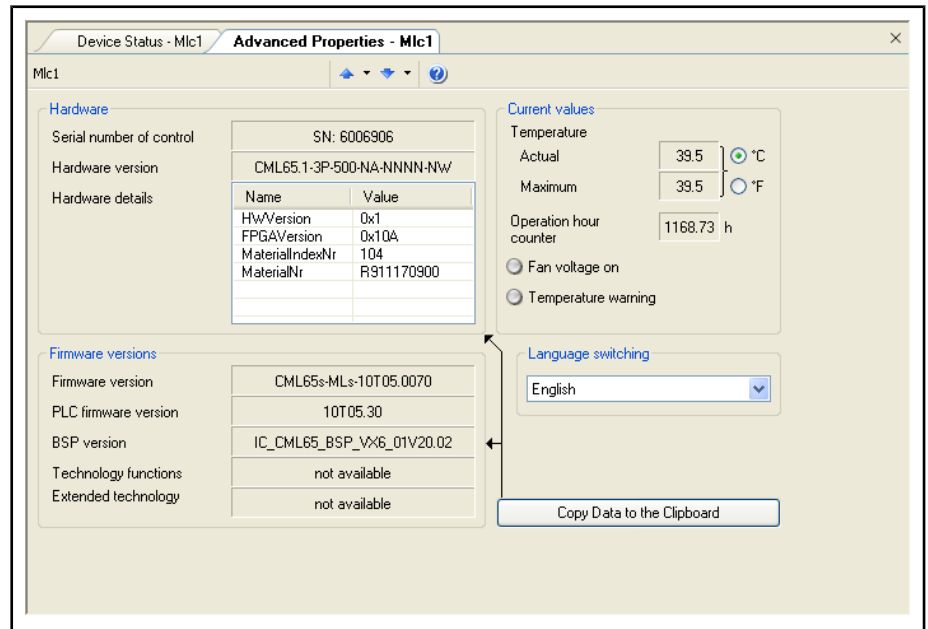


Fig.6-61: MLC hardware information

6.6.2 IndraDrive hardware information

To read out hardware information for the IndraDrive, go online with IndraWorks at the control where the axis was configured. Select the IndraDrive device under the SERCOS node in the project tree. Select **"Properties"** in the context menu.

Diagnostics

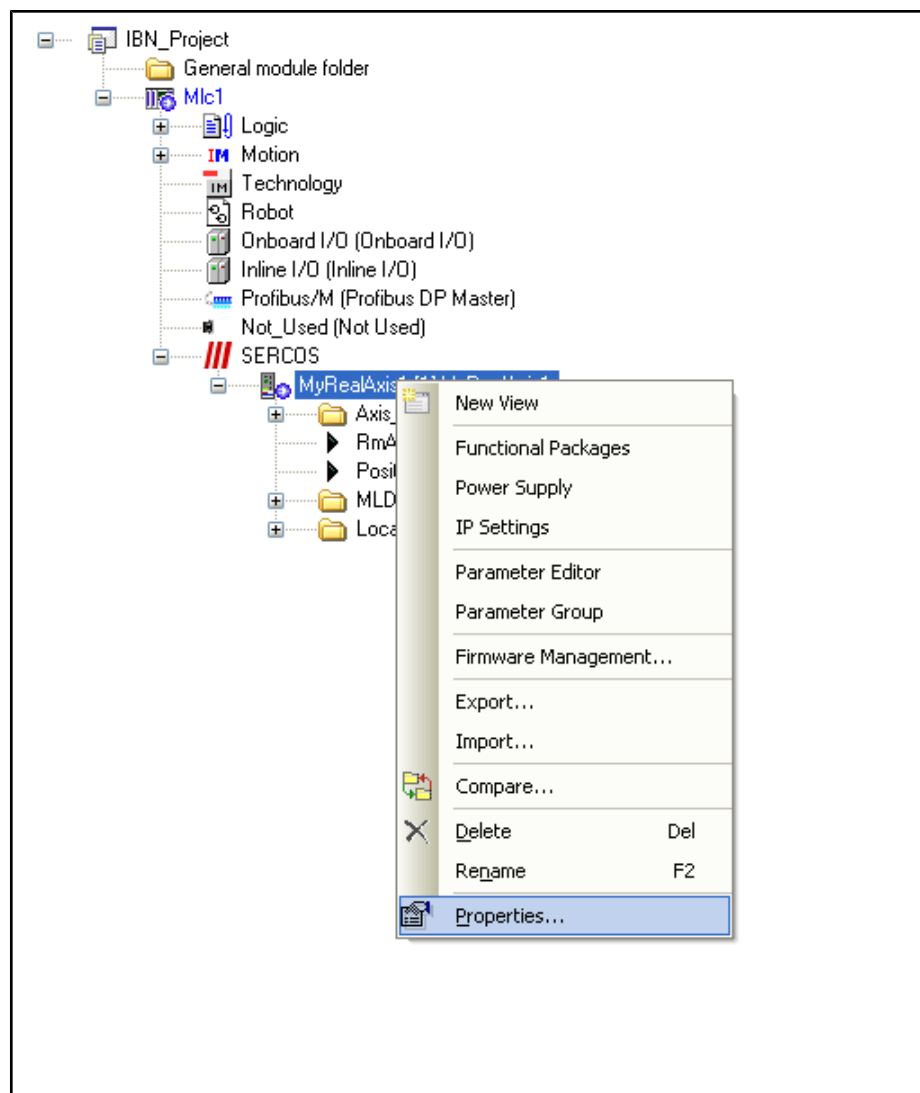


Fig.6-62: "Properties" selection at IndraDrive

The **"Advanced"** tab shows hardware information of the IndraDrive. The **Details** button shows further information such as motor assembly or power unit assembly.

Diagnostics

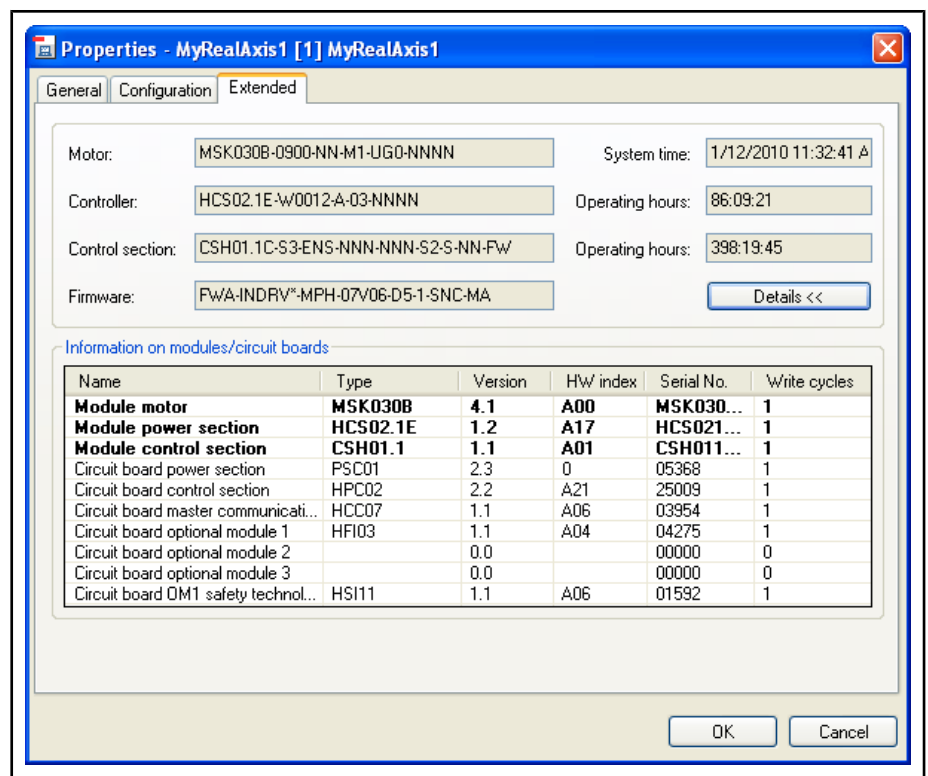


Fig.6-63: IndraDrive hardware information

6.7 PLC Diagnostics

6.7.1 PLC Status

The status of the PLC can be read out from both the IndraWorks project tree and at bottom right in the IndraWorks window.

The following states are differentiated here:

- The user is not logged in the PLC

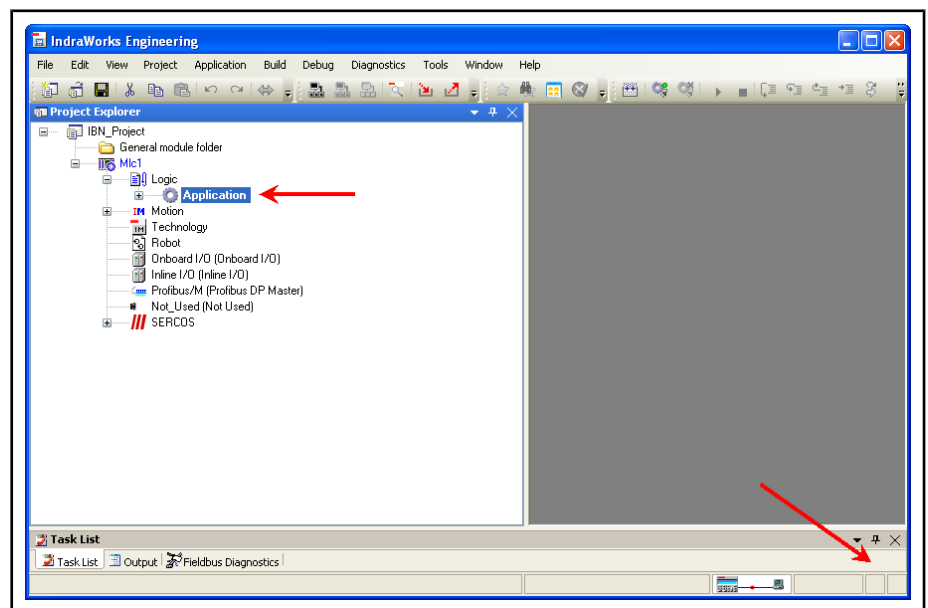


Fig.6-64: PLC is offline

Diagnostics

In the project tree, "**Application**" is shown in a black font on a white background. At bottom right in the IndraWorks window, there is no display of PLC status because the user is offline.

To display the PLC status, log on to the PLC ()

- The user is logged on to the PLC and the application is stopped

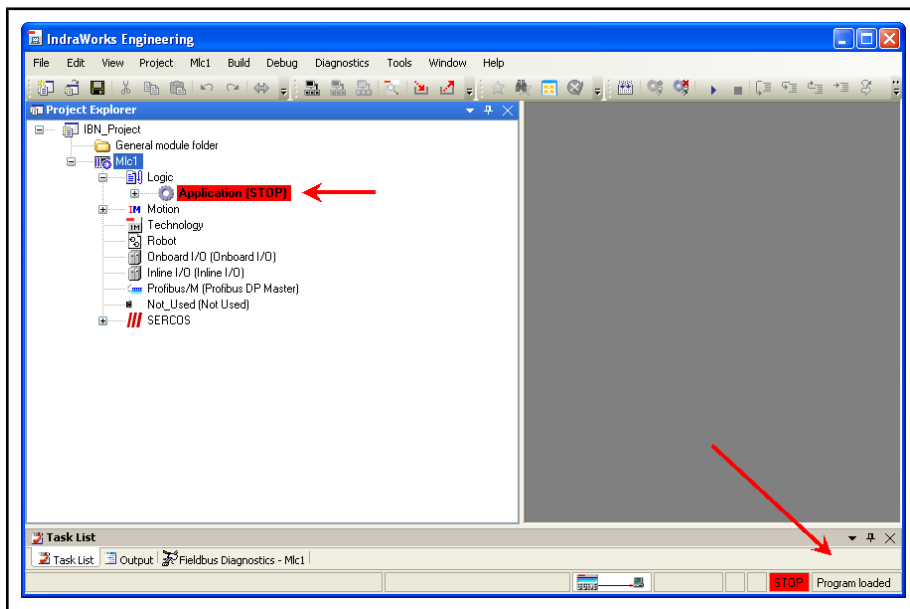


Fig.6-65: PLC is stopped

In the project tree, "**Application**" is highlighted in red and the "**STOP**" indication appears in parentheses. At bottom right in the IndraWorks window, "**STOP**" is also highlighted in red. To the right it can be seen whether there is a program on the PLC.

- The user is logged on to the PLC and the application is running

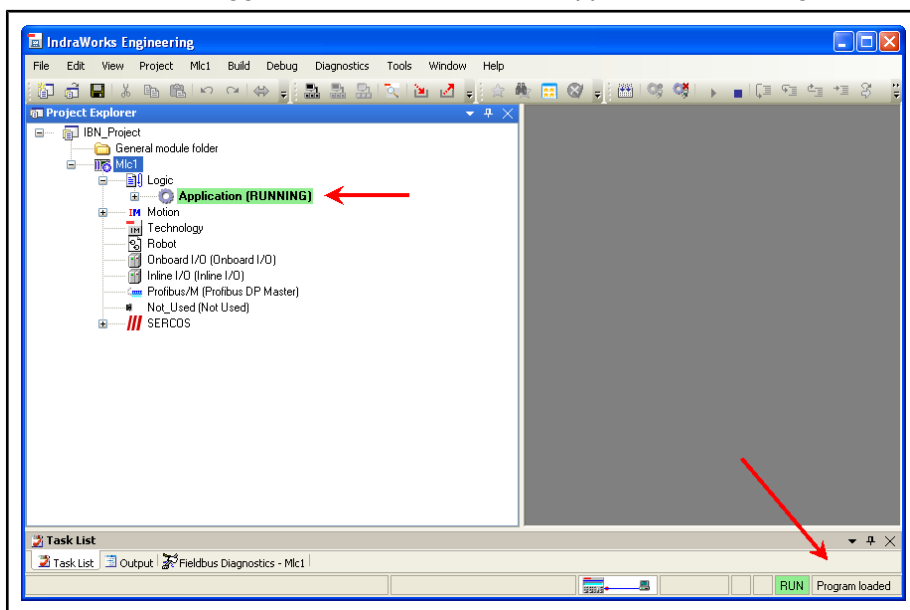


Fig.6-66: PLC is running

In the project tree, "**Application**" is highlighted in green and "**RUNNING**" appears in parentheses. At bottom right in the IndraWorks window,

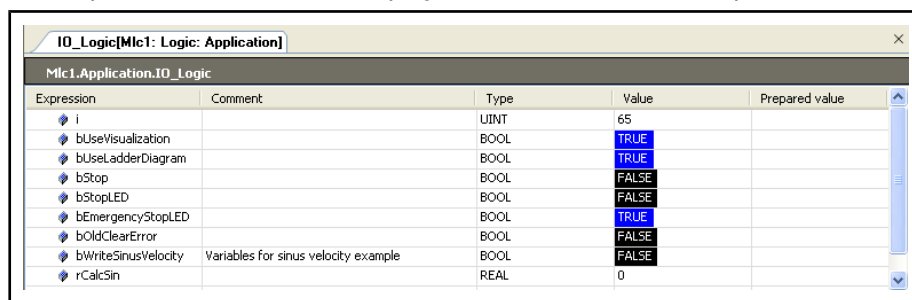
"RUN" is also highlighted in green. To the right, it can be seen that a program is loaded to the PLC.

6.7.2 Reading Out PLC Variables

In order to obtain a display of the current state of the PLC variables, you have to be logged on to the PLC. The state can be seen in the declaration of the POU or in a user-defined monitoring window.

Declaration

In order to see the current state of the PLC variables of a POU, the POU has to be opened in the IndraWorks project tree. Double-click to open it.



Expression	Comment	Type	Value	Prepared value
l		UINT	65	
bUseVisualization		BOOL	TRUE	
bUseLadderDiagram		BOOL	TRUE	
bStop		BOOL	FALSE	
bStopLED		BOOL	FALSE	
bEmergencyStopLED		BOOL	TRUE	
bOldClearError		BOOL	FALSE	
bWriteSinusVelocity	Variables for sinus velocity example	BOOL	FALSE	
rCalcSin		REAL	0	

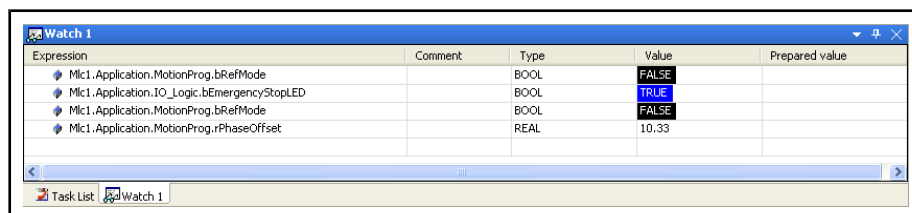
Fig. 6-67: PLC variables in the declaration

the current value of the variable is in the "Value" column. It can be modified in the "Prepared value" column.

Monitoring window

For POU-comprehensive overview on the current variable status, up to four monitoring windows can be defined. Thus, relevant data can be seen at a glance.

The monitoring windows can be opened in the menu via **Debug ► Monitoring ► Monitor x**. Click in the "Expression" field to select the respective variables via a wizard.



Expression	Comment	Type	Value	Prepared value
Mlc1.Application.MotionProg.bRefMode		BOOL	FALSE	
Mlc1.Application.IO_Logic.bEmergencyStopLED		BOOL	TRUE	
Mlc1.Application.MotionProg.bRefMode		BOOL	FALSE	
Mlc1.Application.MotionProg.rPhaseOffset		REAL	10.33	

Fig. 6-68: PLC variables in the monitoring window

In the figure, variables from different POUs are monitored in one monitoring window. The variables can also be modified using this monitoring window.

6.7.3 Status of Onboard I/Os

To see the current state of the onboard I/Os, log on to the PLC.

1. In the project tree below the control, click on the node **Onboard I/O**
2. Extract the contents of both the "OnboardIn" and the "OnboardOut" nodes
The current states of the I/Os can now be seen and information on the mapping of I/Os can be obtained

Diagnostics

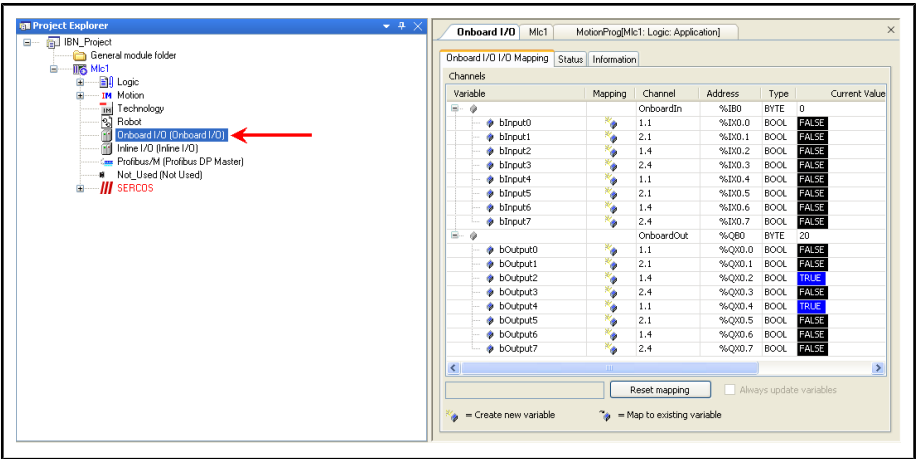


Fig.6-69: Status of Onboard I/Os



The status of the Inline I/Os can be queried in the project tree below the "Inline I/O" node in the same way.

7 Diagnostics with IMST

7.1 General

The IndraMotion Service Tool (IMST) is a web-based diagnostic tool with used to establish an Ethernet connection with an IndraMotion MLC L25, L45, L65 control system. IMST enables OEMs, end users and service technicians to access these systems using a PC and the Internet Explorer 6, 7 or higher. IMST is suitable as remote maintenance and diagnostic tool.

This chapter describes IMST use cases only. It is designed to give the person responsible for commissioning an overview on the most frequent use cases for device exchange and diagnostic purposes. A more detailed description of IMST can be found in the respective documentation (see /26/ in [chapter 1.3 "Required and Supplementing Documentations" on page 8](#)).



The use cases described may be subject to limited availability depending on user authorizations. The default passwords set by Bosch Rexroth can be modified by another user. Ensure that you have the proper user authorizations.

The system requirements and firmware versions can be found in the "IMST" documentation.

The IMST provides easy support in the following use cases:

1. Device exchange:

[Saving, Restoring and Comparing Device Parameters, page 213](#) and [Set Absolute Position, page 216](#)

2. Reading out diagnostics:

[Logging In and Reading Out Firmware, page 209](#) and [Reading Out Diagnostic Data, page 211](#)

3. Editing variables and parameters:

[Reading Out and Modifying PLC Variables, page 216](#); [Editing Parameters, page 217](#) and [User-Specific Parameter List, page 218](#)

4. Reading out and saving hardware details:

[chapter 7.9 "Displaying and Saving Hardware Details" on page 220](#)

7.2 Logging In and Reading Out Firmware

- Logging in
1. Log in to IMST by opening the Internet Explorer and entering the IP address of the control - with which a connection should be established - to the command line
The log in dialog opens

Diagnostics with IMST

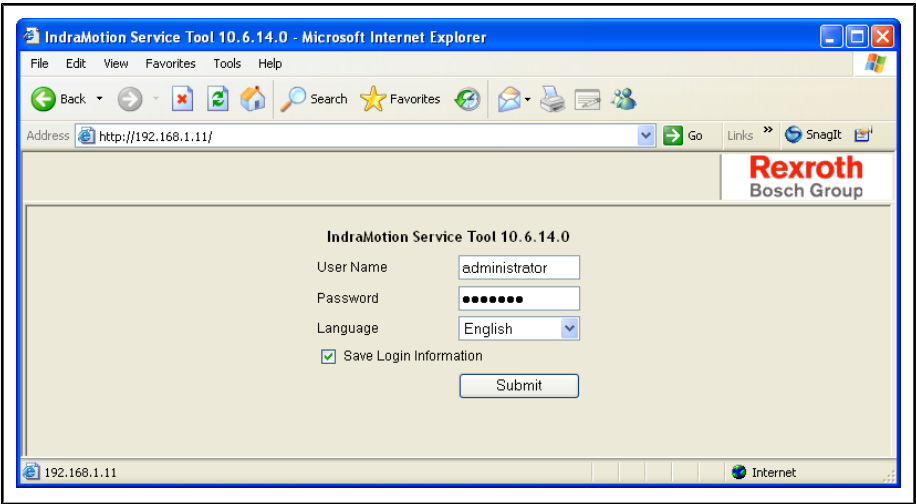


Fig.7-1: Logging in to IMST



If the log in dialog does not open, check your network settings under **Tools ► Internet Options ► Connections ► Settings**. Ensure that an automatic configuration script or a proxy server is not used.

- 2. Log in with the user name and password. The default user name and passwords are:

User name	Password
administrator	rexroth
service	service
user	user
guest	No password required

Fig.7-2: Default user authorizations

Reading out firmware

Under **Hardware Overview**, the current firmware for the control and the real axes can be read out.

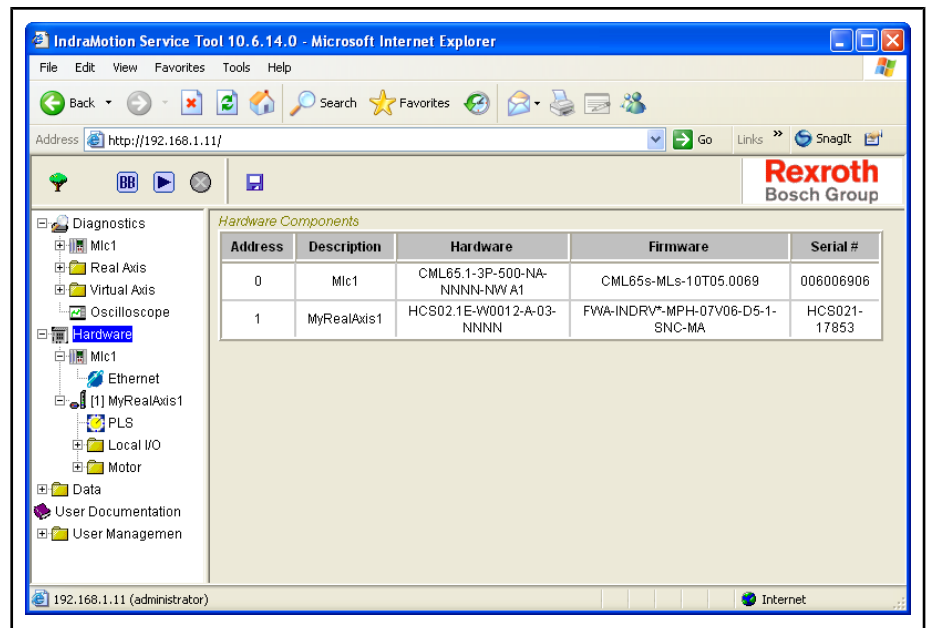


Fig.7-3: Reading out the current firmware

Detailed information on hardware components for the control and the real axes can be read out in the subfolders of **hardware overview**

7.3 Reading out Diagnostic Data

Under **Diagnostics**, the components configured in the IndraWorks project and loaded to the control are listed.

The following components are supported:

- IndraMotion control L25/L45/L65
- Real Axes
- Virtual Axes
- Encoder Axes
- Link Axes
- Controller Axes

Control In the MLC folder **Mlc1**, the current diagnostic(s) of the control can be queried.

Diagnostics with IMST

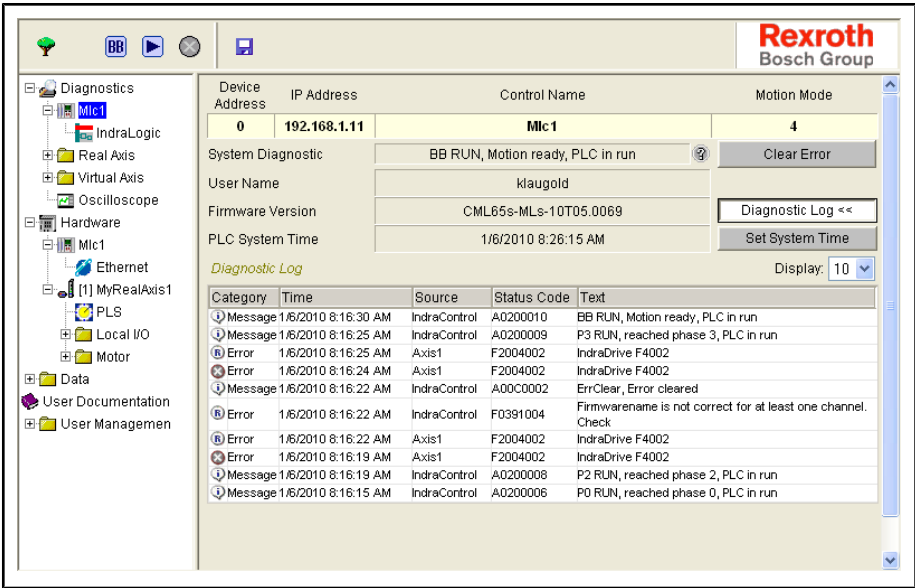


Fig. 7-4: MLC diagnostic data

In this dialog, pending errors can be deleted, error and diagnostic memory can be shown and hidden and the system time can be set.

Real Axes Under **Real Axes**, the axes configures in IndraWorks are displayed.

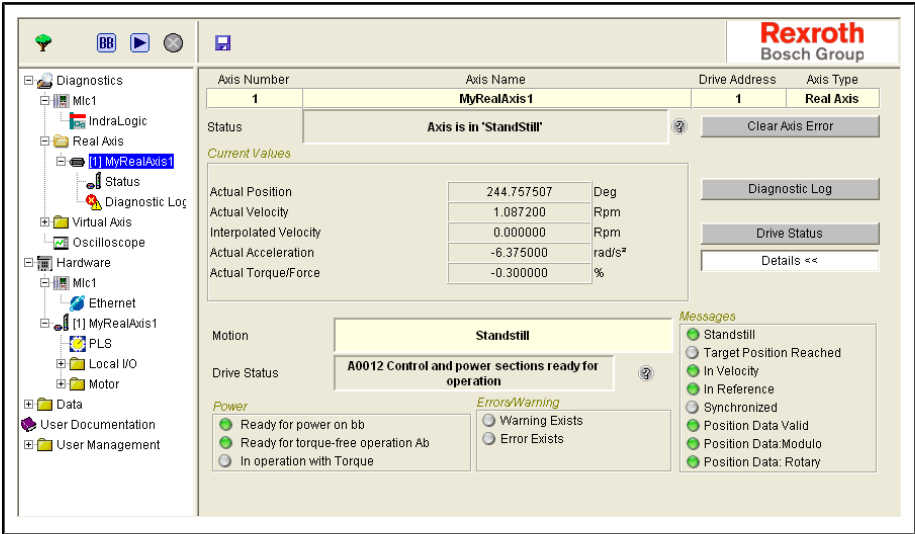


Fig. 7-5: Diagnostic data of real axes

Axis errors can be deleted, error and diagnostic memory can be shown and hidden and the drive status can be displayed. Further details on the drive status can be displayed.

Status display and direct link to the diagnostics

The status display shows the current control phase. In addition, it displays whether the PLC is stopped or running.

If there is a current diagnostic message, the diagnostic button became red. Click on the button to move to the view in which the diagnostic message is displayed. Click several times to switch between all views displaying information on the pending error.

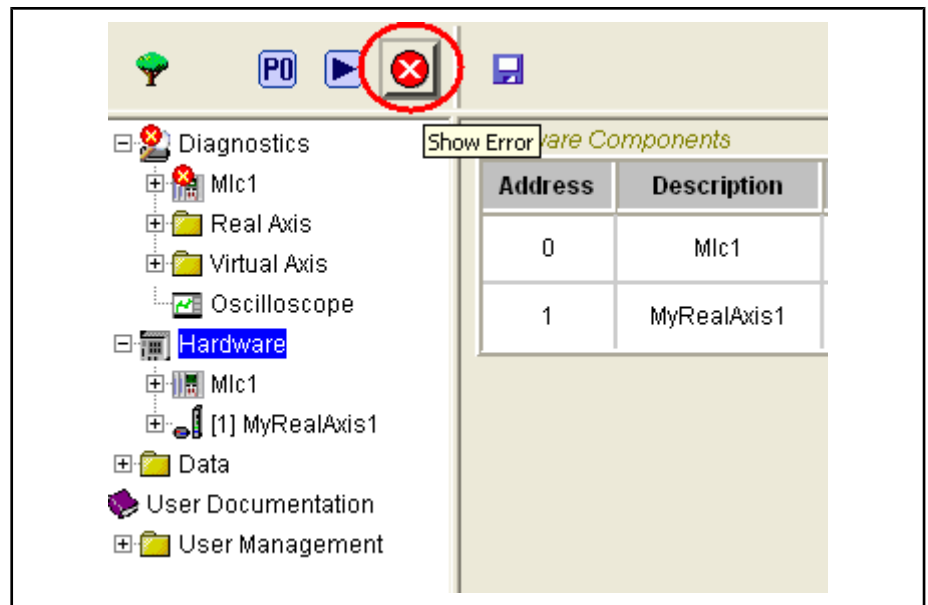


Fig. 7-6: Status display with current diagnostic message

In the figure, the control is in Operating mode and the PLC is running. The "Diagnostic" button successively calls the existing diagnostics on the error.

7.4 Saving, Restoring and Comparing Device Parameters

In the **Data** folder under **Archive**, the parameters of the control and real axes can be saved, restored or compared with a current parameter set.

The following basic conditions must be taken into consideration:

- The operations **Save**, **Restore** and **Compare** can be selected for each of the respective devices.
- The control must be in phase **P2**
- All parameters are saved on the memory card of the control
- During operation, a progress bar is shown

The following figure shows data being saved on the Compact Flash card of the control.

Diagnostics with IMST

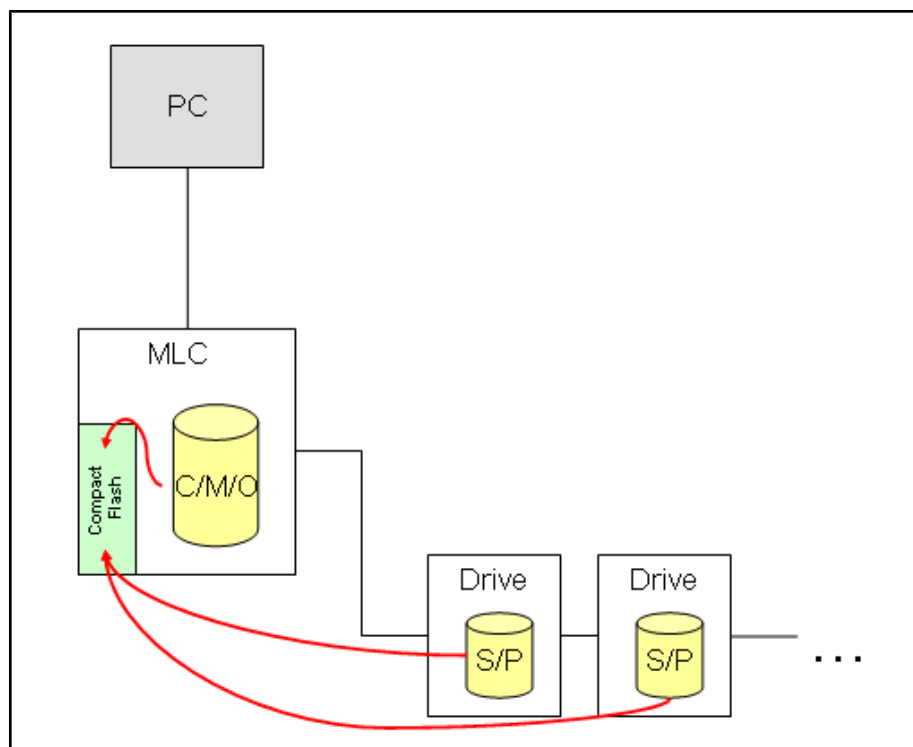


Fig. 7-7: Archiving data on the Compact Flash card

The data of the control, in this case C-, M- and O-parameters, are saved on the Compact Flash card of the control. In addition, the parameters (S and P) of the selected drives are saved on the Compact Flash card of the control.



Note that the data is not saved on your PC, but on the Compact Flash card of the control.

Saving parameters

- To save parameters, select **Backup**. The devices from which the data is to be saved, can be selected. Therefore, decide whether to save device parameters, PLC retain data and hardware exchange data. For hardware exchange data, the parameters in the list of the parameter P-0-0195 are considered for example. The following figure lists for which parameter(s) (lists) are relevant for which data

	Backup		Restore	
	Control	Drive	Control	Drive
Device Parameters	C-0-1010	{S-0-0192}	C-0-1011	{S-0-0192}
PLC Retain Data	C-0-1002	P-0-1359 (P-0-4054 if MLD-M)	C-0-1001	P-0-1359 (P-0-4055 if MLD-M)
MLD Boot Project	NA	P-0-1352 P-0-1353 P-0-1354 P-0-1355 P-0-1356 P-0-1357 P-0-1358	NA	P-0-1352 P-0-1353 P-0-1354 P-0-1355 P-0-1356 P-0-1357 P-0-1358
Hardware Exchange Data	NA	{P-0-0195}	NA	{P-0-0195}

Fig. 7-8: Parameters involved when backing up and restoring data

- Select and start archiving the device data pressing **Start**.

Diagnostics with IMST

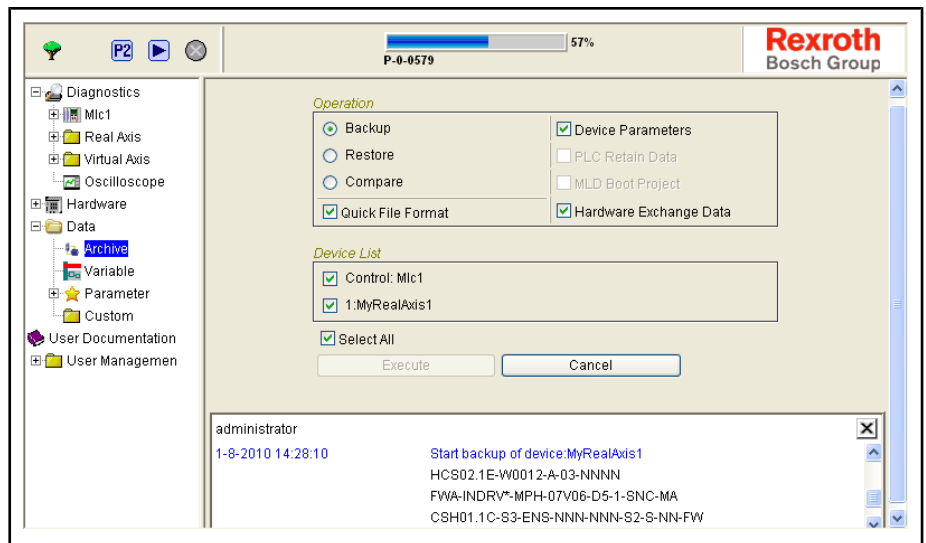


Fig. 7-9: Archiving device data with IMST

The progress bar is displayed in the header

The updated report appears in the lower half of the window

After successful archiving, the parameters are stored on the memory card of the control

Restoring parameters

1. If the device parameters backed up on the MLC memory card are to be restored, select **Restore**. It has to be specified for which devices the data (device parameters, PLC retain data and hardware exchange) is to be restored
2. After restoration has been started, confirm that you actually wish to restore the data

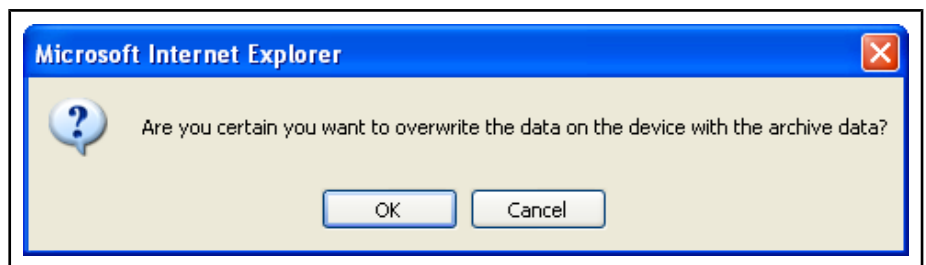


Fig. 7-10: Confirming data restoration

A progress bar appears to inform about the current restoration state

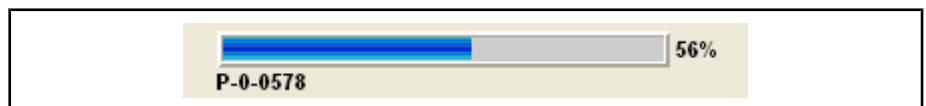


Fig. 7-11: Progress bar at restoration

After a successful restoration, a message on the data restoration appears in the message window

Comparing parameters

In addition, use **Compare** to compare the archived parameters with those that are currently on the device.

1. To do this, select the device containing the parameters to be compared
2. Start the comparison and the progress bar appears
The result of the comparison appears in the message window

Diagnostics with IMST

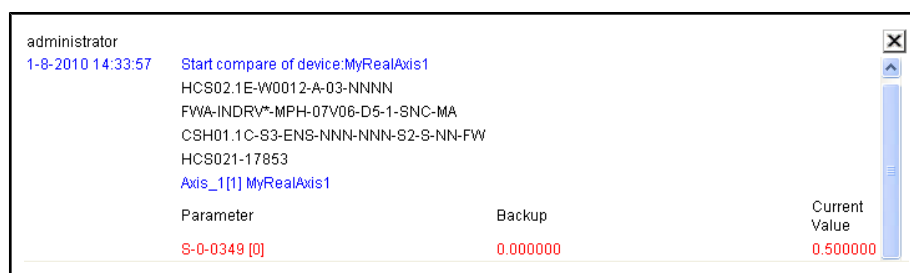


Fig. 7-12: Message window after comparing device parameters

The example described above differentiates between archived and current device data in the parameter S-0-0349.

7.5 Setting Absolute Measuring (Position)

When commissioning a system [chapter 4.1.4 "System Commissioning" on page 30](#), exchanging a hardware [chapter 4.2.1 "Firmware Update for MLC and Drives" on page 32](#) and updating the firmware [chapter 4.2.3 "Exchanging the Drive Control Section without a Multimedia Card \(MMC\)" on page 33](#), the last step is setting the absolute measuring (position) of the drive. This can be easily carried out via a dialog in the IMST.

Under **Hardware overview** ► **Axis name** ► **Motor** ► **Reference Motor Encoder**, the absolute position of the drive can be set.

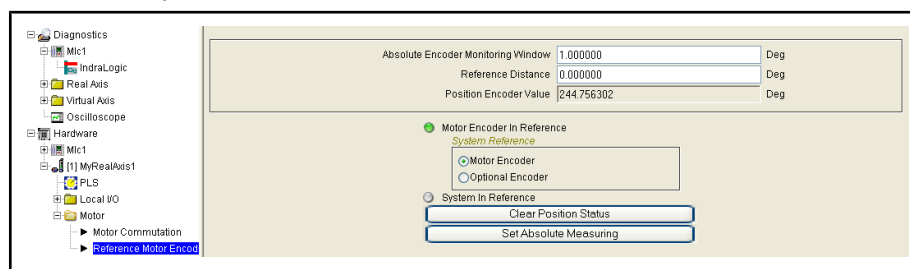


Fig. 7-13: Setting absolute position (measuring) of the drive

7.6 Reading Out and Modifying PLC Variables

The variable folder allows PLC variables created in the symbol configuration of the IndraWorks project and loaded to the control to be displayed and modified.



To configure PLC variables, Rexroth IndraWorks engineering environment version 10 or higher is required.

1. Select a variable

Its status and value are displayed. The value can be modified with a corresponding entry

Diagnostics with IMST

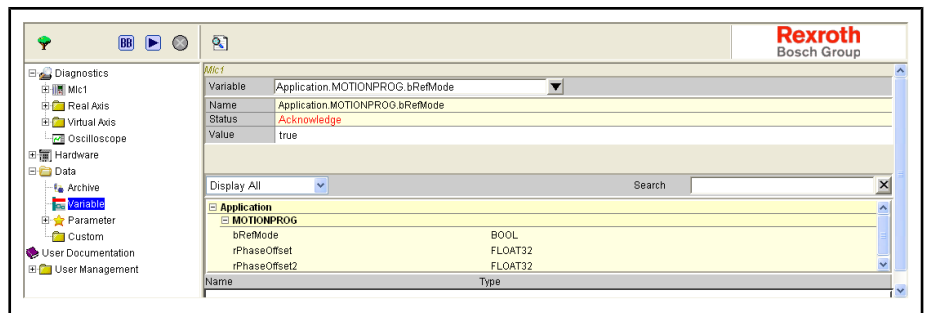


Fig. 7-14: Reading and modifying a PLC variable

Creating the symbol configuration

The following section describes the creation and downloading of the symbol configuration to the control:

1. Open the project using IndraWorks version 10 or higher
2. Drag **Symbol Configuration** into the IndraWorks library and drop it below the **Application** node.
3. Select the relevant variables and data types and download the project to the control.

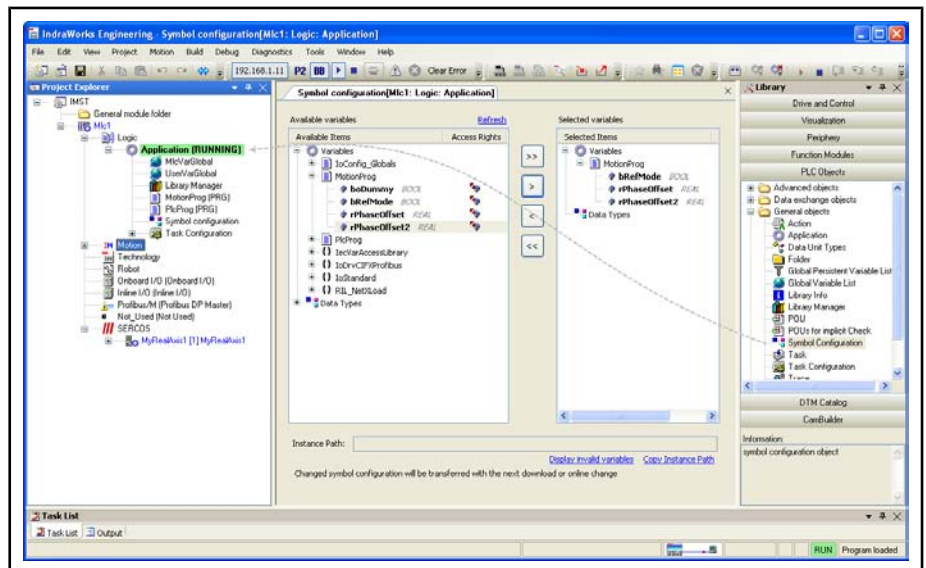


Fig. 7-15: Creating a symbol configuration



In order to display the variables in the IMST, they must be used in the project.

7.7 Editing Parameters

The parameter folder provides a parameter editor used to read and modify control and drive parameters. In the navigation structure, it has to be selected first whether control or axis parameters are to be edited. After the selection, the parameters can be searched for in a variety of ways:

- Enter parameter IDN
- Search with the "Search" toolbar icon
- Search by entering a description

Diagnostics with IMST

Entering a parameter IDN

To search for or modify a known parameter, only enter the parameter letter and the number in the IDN field (e.g. A-0-0005). The leading zeroes can be omitted. For example, only "A5" needs to be entered for this parameter.

Search with the "Search" toolbar icon

Click on the "Search" toolbar icon  to select parameter from a list.



For a drive, enter the respective parameter type on the right next to the IDN field (A-, S- or P-parameter).

Search by entering a description

A list of selected parameters appears, which can be selected with specific properties.

Enter a description in the **Search** text field to display the respective parameters in the lower section of the page.

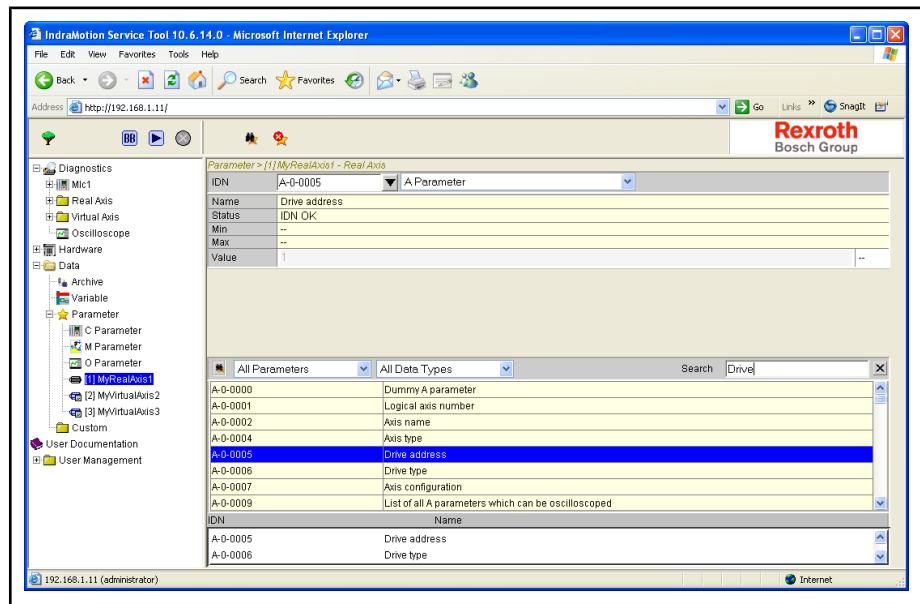


Fig. 7-16: Parameter search

In the example listed above, the A-parameters of the real axis **MyRealAxis1** were searched via the "Search" toolbar icon. To limit search results, the parameters were searched based on the "drive". Then, both parameters for the drive address and the drive type were displayed. The user selected the parameter A-0-0005 whose value ("1") is displayed in the parameter description in the upper half of the IMST.

7.8 User-Specific Parameter List

The **Custom** can be used to create user-defined Groupings of PLC variables, control and drive parameters. This user-defined view can to display and modify the included parameters.



Note that in order to create and modify the user-specific parameter list, you have to be provided with the appropriate user authorizations.

The following data types can be included in a custom parameter list:

- PLC variables (PLC variables can only be used if they were created in the symbol configuration, see ["Creating the symbol configuration" on page 217](#))

- C-parameters
- M-parameters
- N-parameters
- O-parameters
- A-, S- and P-parameters (here the respective axis must be selected)

Creating a user-specific list or table

A user-specific list or table can be created as follows:

1. Right click on the **Custom** folder and select **Add data group**
2. In the **Add/Modify Custom Screen**, enter a name first

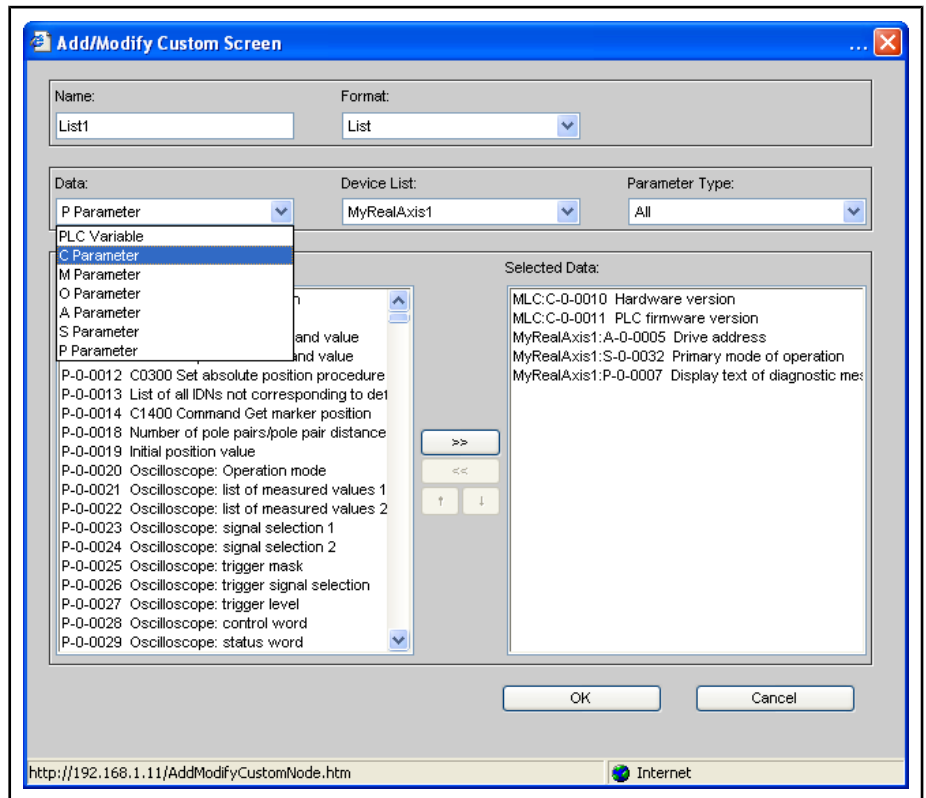


Fig. 7-17: Creating a user-defined parameter list

3. Select the format as list or table. A list is normally used for a display without list parameters, since it provides a quick overview on the parameter properties. A table is generally to be used to display list parameters
4. Select the data type for the parameters to be displayed
5. The parameters are selected from **Available data** (double-clicking on the parameter or after activating the parameter or using the arrow keys >> and <<)
Use the up/down arrow keys (↑, ↓) to change the parameter sequence.
6. After the selection of the parameters is complete, click **OK**.
The new list or table appears below the **Custom** folder

Modifying a list or table

To modify or remove a user-defined list or table created, right click on the navigation structure. Click on the name to open the list.

Diagnostics with IMST

IDN	Name	Value	Units	Comment
MLC:C-0-0010	Hardware version	CML65.1-3P-500-NA-NNNN-NW	--	
MLC:C-0-0011	PLC firmware version	10T05.20	--	
MyRealAxis1:A-0-0005	Drive address	1	--	
MyRealAxis1:S-0-0032	Primary mode of operation	0b0000000000001011		
MyRealAxis1:P-0-0007	Display text of diagnostic message	Ab		

Fig. 7-18: User-defined parameter list

Editing user-defined lists

Read-only and write access for respective user groups can be assigned to the lists created. With sufficient user rights, the parameters in a user-defined parameter list can be modified by clicking on the **Value** field.

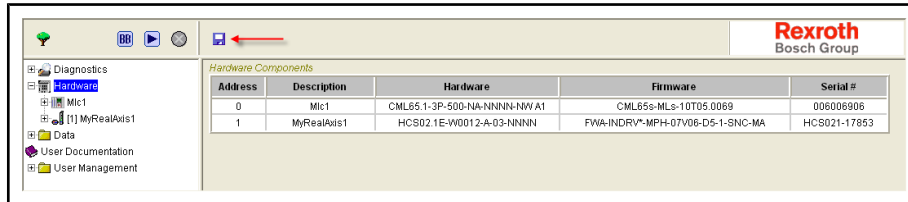
If the value can be changed in the current SERCOS phase, a cursor appears used to modify the parameter. For read-only parameters, no cursor appears.

IDN	Name	Value	Units	Comment
MLC:C-0-0010	Hardware version	CML65.1-3P-500-NA-NNNN-NW	--	
MLC:C-0-0011	PLC firmware version	10T05.20	--	
MyRealAxis1:A-0-0005	Drive address	1	--	
MyRealAxis1:S-0-0032	Primary mode of operation	0b0000000000001011		
MyRealAxis1:P-0-0007	Display text of diagnostic message	Ab		
MyRealAxis1:S-0-0091	Bipolar velocity limit value	200.000000	Rpm	

Fig. 7-19: Changing a parameter value in a user-defined parameter list

7.9 Displaying and Saving Hardware Details

The **hardware overview** displays hardware components connected to the control and created in the project.



Address	Description	Hardware	Firmware	Serial #
0	Mic1	CML65.1-3P-500-NA-NNNN-NW A1	CML65s-MLs-10T05.0069	006006906
1	MyRealAxis1	HCS02.1E-W0012-A-03-NNNN	FWA-INDRV-MPH-07V06-D5-1-SNC-MA	HCS021-17853

Fig. 7-20: Hardware overview

The "Save" button (disc icon) can save hardware information in HTML or XML format. Thus, hardware data can be imported into a database and managed.

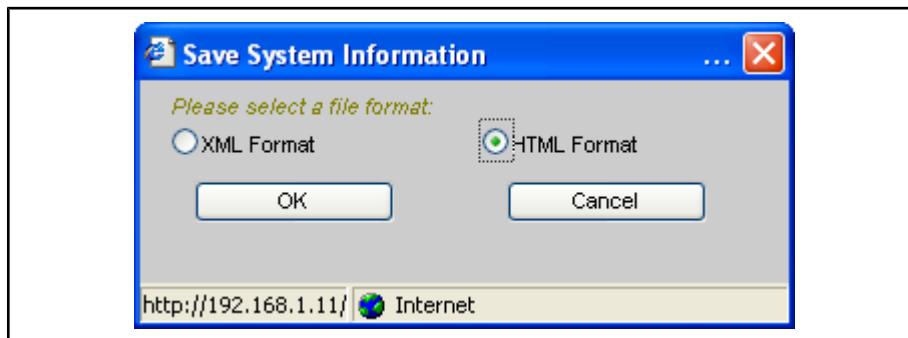


Fig. 7-21: Saving hardware overview

After the data saving format has been selected, click **OK** to save. A browser opens displaying hardware information in the desired file format. The data can now be saved to the PC by using the save function of the browser.

Diagnostics with IMST

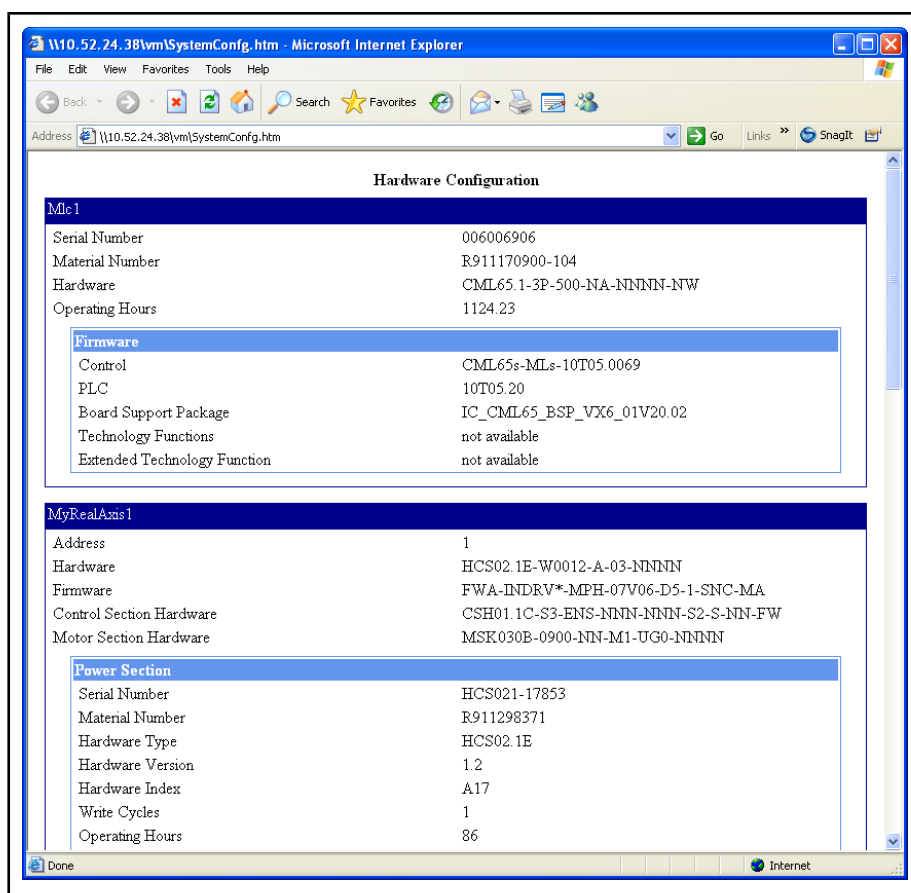


Fig. 7-22: Saved hardware overview in HTML format

8 Service and Support

Our service helpdesk at our headquarters in Lohr, Germany and our worldwide service will assist you with all kinds of enquiries. You can reach us **around the clock - even on weekend and on holidays**.

	Helpdesk	Service Hotline Worldwide
Phone	+49 (0) 9352 40 50 60	Outwith Germany please contact our sales/service office in your area first.
Fax	+49 (0) 9352 40 49 41	
E-mail	service.svc@boschrexroth.de	For hotline numbers refer to the sales office addresses on the Internet.
Internet	http://www.boschrexroth.com You will also find additional notes regarding service, maintenance (e.g. delivery addresses) and training.	

Preparing Information

For quick and efficient help please have the following information ready:

- Detailed description of the fault and the circumstances
- Information on the type plate of the affected products, especially type codes and serial numbers
- Your phone, fax numbers and e-mail address so we can contact you in case of questions.

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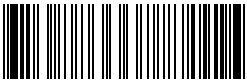
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