

INTERBUS Configurator CMD

Application Manual

SYSTEM200

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CMD

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- explains the operation of the CMD configurator,
- describes the commissioning of INTERBUS modules,
- serves to configure INTERBUS systems.

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1 Introduction

1.1 Hints for Using this Manual

Please consider the following hints:

For safe use of your device in all life cycles, we request that you carefully read and consider this manual. The following hints serve as orientation for the use of this manual.

1.2 Restriction of the User Group

This manual describes the use of the product exclusively for qualified application programmers and software engineers that are familiar with the safety concepts of the automation technology and the nationally valid standards. Phoenix Contact does not assume any liability in case of erroneous handling and damages resulting on products of Phoenix Contact and external products because of disregarding of information in this manual.

1.3 Explanation of Symbols Used



ATTENTION

The attention symbol refers to erroneous handling which could lead to damage of the hardware or software in indirect connection with dangerous process peripherals to personal injury.

Note: The text marked in this way informs you of system-related conditions that must absolutely be observed to achieve error-free operation. Furthermore, notes give you tips and advice on the efficient use of hardware and on software optimization.

1.4 Statement of Legal Authority

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The INTERBUS configurator CMD is mainly based on the INTERBUS configurator IBS CMD G4 of

Phoenix Contact GmbH & Co.

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Parts of this manual are extracted from the manual of Phoenix Contact. It describes the functionality of CMD in combination with WinPCL in System 200 of Rexroth Indramat. The original tool of Phoenix Contact possibly offers more features that can not be used in combination with System 200.

The original software was not adapted to the system and/or company specifications.

Rexroth Indramat assumes the responsibility and the support for CMD and this manual.

2 Important Directions for Use

2.1 Appropriate Use

Introduction

Rexroth Indramat 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 manner that is defined as appropriate. If they are used in an inappropriate manner, then situations can develop that may lead to property damage or injury to personnel.

Note: Rexroth Indramat, 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 Indramat products, make sure that all the prerequisites for 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 product takes 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.
- Make sure that the products have been installed in the manner described in the relevant documentation.

Areas of Use and Application

The INTERBUS configurator CMD is a global fieldbus configurator that can be used in combination with the programming software WinPCL in the system 200. CMD is for use in the following cases:

- Commissioning of INTERBUS devices
- Diagnostics

Note: The INTERBUS configurator CMD may only be used with the accessories and parts specified in this document. If a component has not been specifically named, then it may not be either mounted or connected. The same applies to cables and lines.

Operation is only permitted in the specified configurations and combinations of components using the software and firmware as specified in the relevant function descriptions.

2.2 Inappropriate Use

Using the INTERBUS configurator CMD outside of the above-referenced areas of application or under operating conditions other than described in the document and the technical data specified is defined as "inappropriate use".

The INTERBUS configurator CMD may not be used

- if it is subject to operating conditions that do not meet the above specified ambient conditions,
- for applications that Rexroth Indramat has not specifically released for the intended purpose. Please note the specifications outlined in the general Safety Instructions!

3 Safety Instructions for Electric Drives and Controls

3.1 Introduction

Read these instructions before the initial startup of the equipment in order to eliminate the risk of bodily harm or material damage. Follow these safety instructions at all times.

Do not attempt to install or start up this equipment without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation of the equipment prior to working with the equipment at any time. If you do not have the user documentation for your equipment, contact your local Rexroth Indramat representative to send this documentation immediately to the person or persons responsible for the safe operation of this equipment.

If the equipment is resold, rented or transferred or passed on to others, then these safety instructions must be delivered with the equipment.



WARNING

Improper use of this equipment, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, may result in material damage, bodily harm, electric shock or even death!

3.2 Explanations

The safety instructions describe the following degrees of hazard seriousness in compliance with ANSI Z535. The degree of hazard seriousness informs about the consequences resulting from non-compliance with the safety instructions.

Warning symbol with signal word	Degree of hazard seriousness according to ANSI
 DANGER	Death or severe bodily harm will occur.
 WARNING	Death or severe bodily harm may occur.
 CAUTION	Bodily harm or material damage may occur.

Fig. 3-1: Hazard classification (according to ANSI Z535)

3.3 Hazards by Improper Use



DANGER

**High voltage and high discharge current!
Danger to life or severe bodily harm by electric shock!**



DANGER

Dangerous movements! Danger to life, severe bodily harm or material damage by unintentional motor movements!



WARNING

High electrical voltage due to wrong connections! Danger to life or bodily harm by electric shock!



WARNING

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



CAUTION

Surface of machine housing could be extremely hot! Danger of injury! Danger of burns!



CAUTION

Risk of injury due to improper handling! Bodily harm caused by crushing, shearing, cutting and mechanical shock or incorrect handling of pressurized systems!



CAUTION

Risk of injury due to incorrect handling of batteries!

3.4 General Information

- Rexroth Indramat GmbH is not liable for damages resulting from failure to observe the warnings provided in this documentation.
- Read the operating, maintenance and safety instructions in your language before starting up the machine. If you find that you cannot completely understand the documentation for your product, please ask your supplier to clarify.
- Proper and correct transport, storage, assembly and installation as well as care in operation and maintenance are prerequisites for optimal and safe operation of this equipment.
- Only persons who are trained and qualified for the use and operation of the equipment may work on this equipment or within its proximity.
 - The persons are qualified if they have sufficient knowledge of the assembly, installation and operation of the equipment as well as an understanding of all warnings and precautionary measures noted in these instructions.
 - Furthermore, they must be trained, instructed and qualified to switch electrical circuits and equipment on and off in accordance with technical safety regulations, to ground them and to mark them according to the requirements of safe work practices. They must have adequate safety equipment and be trained in first aid.
- Only use spare parts and accessories approved by the manufacturer.
- Follow all safety regulations and requirements for the specific application as practiced in the country of use.
- The equipment is designed for installation in industrial machinery.
- The ambient conditions given in the product documentation must be observed.
- Use only safety features and applications that are clearly and explicitly approved in the Project Planning Manual.

For example, the following areas of use are not permitted: construction cranes, elevators used for people or freight, devices and vehicles to transport people, medical applications, refinery plants, transport of hazardous goods, nuclear applications, applications sensitive to high frequency, mining, food processing, control of protection equipment (also in a machine).
- The information given in the documentation of the product with regard to the use of the delivered components contains only examples of applications and suggestions.

The machine and installation manufacturer must

 - make sure that the delivered components are suited for his individual application and check the information given in this documentation with regard to the use of the components,
 - make sure that his application complies with the applicable safety regulations and standards and carry out the required measures, modifications and complements.
- Startup of the delivered components is only permitted once it is sure that the machine or installation in which they are installed complies with the national regulations, safety specifications and standards of the application.
- Technical data, connections and operational conditions are specified in the product documentation and must be followed at all times.

- Operation is only permitted if the national EMC regulations for the application are met.
The instructions for installation in accordance with EMC requirements can be found in the documentation "EMC in Drive and Control Systems".
The machine or installation manufacturer is responsible for compliance with the limiting values as prescribed in the national regulations.

3.5 Protection Against Contact with Electrical Parts

Note: This section refers to equipment and drive components with voltages above 50 Volts.

Touching live parts with voltages of 50 Volts and more with bare hands or conductive tools or touching ungrounded housings can be dangerous and cause electric shock. In order to operate electrical equipment, certain parts must unavoidably have dangerous voltages applied to them.



DANGER

High electrical voltage! Danger to life, severe bodily harm by electric shock!

- ⇒ Only those trained and qualified to work with or on electrical equipment are permitted to operate, maintain or repair this equipment.
 - ⇒ Follow general construction and safety regulations when working on high voltage installations.
 - ⇒ Before switching on power the ground wire must be permanently connected to all electrical units according to the connection diagram.
 - ⇒ Do not operate electrical equipment at any time, even for brief measurements or tests, if the ground wire is not permanently connected to the points of the components provided for this purpose.
 - ⇒ Before working with electrical parts with voltage higher than 50 V, the equipment must be disconnected from the mains voltage or power supply. Make sure the equipment cannot be switched on again unintended.
 - ⇒ The following should be observed with electrical drive and filter components:
 - ⇒ Wait five (5) minutes after switching off power to allow capacitors to discharge before beginning to work. Measure the voltage on the capacitors before beginning to work to make sure that the equipment is safe to touch.
 - ⇒ Never touch the electrical connection points of a component while power is turned on.
 - ⇒ Install the covers and guards provided with the equipment properly before switching the equipment on. Prevent contact with live parts at any time.
 - ⇒ A residual-current-operated protective device (RCD) must not be used on electric drives! Indirect contact must be prevented by other means, for example, by an overcurrent protective device.
 - ⇒ Electrical components with exposed live parts and uncovered high voltage terminals must be installed in a protective housing, for example, in a control cabinet.
-

To be observed with electrical drive and filter components:



DANGER

**High electrical voltage on the housing!
High leakage current! Danger to life, danger of
injury by electric shock!**

- ⇒ Connect the electrical equipment, the housings of all electrical units and motors permanently with the safety conductor at the ground points before power is switched on. Look at the connection diagram. This is even necessary for brief tests.
- ⇒ Connect the safety conductor of the electrical equipment always permanently and firmly to the supply mains. Leakage current exceeds 3.5 mA in normal operation.
- ⇒ Use a copper conductor with at least 10 mm² cross section over its entire course for this safety conductor connection!
- ⇒ Prior to startups, even for brief tests, always connect the protective conductor or connect with ground wire. Otherwise, high voltages can occur on the housing that lead to electric shock.

3.6 Protection Against Electric Shock by Protective Low Voltage (PELV)

All connections and terminals with voltages between 0 and 50 Volts on Rexroth Indramat products are protective low voltages designed in accordance with international standards on electrical safety.



WARNING

**High electrical voltage due to wrong
connections! Danger to life, bodily harm by
electric shock!**

- ⇒ Only connect equipment, electrical components and cables of the protective low voltage type (PELV = Protective Extra Low Voltage) to all terminals and clamps with voltages of 0 to 50 Volts.
- ⇒ Only electrical circuits may be connected which are safely isolated against high voltage circuits. Safe isolation is achieved, for example, with an isolating transformer, an opto-electronic coupler or when battery-operated.

3.7 Protection Against Dangerous Movements

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

- improper or wrong wiring of cable connections
- incorrect operation of the equipment components
- wrong input of parameters before operation
- malfunction of sensors, encoders and monitoring devices
- defective components
- software or firmware errors

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

The monitoring in the drive components will normally be sufficient to avoid faulty operation in the connected drives. Regarding personal safety, especially the danger of bodily injury and material 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.



DANGER

Dangerous movements! Danger to life, risk of injury, severe bodily harm or material damage!

- ⇒ Ensure personal safety by means of qualified and tested higher-level monitoring devices or measures integrated in the installation. Unintended machine motion is possible if monitoring devices are disabled, bypassed or not activated.
- ⇒ Pay attention to unintended machine motion or other malfunction in any mode of operation.
- ⇒ Keep free and clear of the machine's range of motion and moving parts. Possible measures to prevent people from accidentally entering the machine's range of motion:
 - use safety fences
 - use safety guards
 - use protective coverings
 - install light curtains or light barriers
- ⇒ Fences and coverings must be strong enough to resist maximum possible momentum, especially if there is a possibility of loose parts flying off.
- ⇒ Mount the emergency stop switch in the immediate reach of the operator. Verify that the emergency stop works before startup. Don't operate the machine if the emergency stop is not working.
- ⇒ Isolate the drive power connection by means of an emergency stop circuit or use a starting lockout to prevent unintentional start.
- ⇒ Make sure that the drives are brought to a safe standstill before accessing or entering the danger zone. Safe standstill can be achieved by switching off the power supply contactor or by safe mechanical locking of moving parts.
- ⇒ 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
 - ensuring sufficient equilibration of the vertical axes

The standard equipment motor brake or an external brake controlled directly by the drive controller are not sufficient to guarantee personal safety!

- ⇒ Disconnect electrical power to the equipment using a master switch and secure the switch against reconnection 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 electronics circuits and supply leads. If the use of such equipment cannot be avoided, verify the system and the installation for possible malfunctions in all possible positions of normal use before initial startup. If necessary, perform a special electromagnetic compatibility (EMC) test on the installation.
-

3.8 Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting

Magnetic and electromagnetic fields generated near current-carrying conductors and permanent magnets in motors represent a serious health hazard to persons with heart pacemakers, metal implants and hearing aids.



WARNING

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

- ⇒ Persons with heart pacemakers, hearing aids and metal implants are not permitted to enter the following areas:
 - Areas in which electrical equipment and parts are mounted, being operated or started up.
 - Areas in which parts of motors with permanent magnets are being stored, operated, repaired or mounted.
 - ⇒ If it is necessary for a person with a heart pacemaker to enter such an area, then a doctor must be consulted prior to doing so. Heart pacemakers that are already implanted or will be implanted in the future, have a considerable variation in their electrical noise immunity. Therefore there are no rules with general validity.
 - ⇒ Persons with hearing aids, metal implants or metal pieces must consult a doctor before they enter the areas described above. Otherwise, health hazards will occur.
-

3.9 Protection Against Contact with Hot Parts



CAUTION

Housing surfaces could be extremely hot! Danger of injury! Danger of burns!

- ⇒ Do not touch housing surfaces near sources of heat! Danger of burns!
- ⇒ After switching the equipment off, wait at least ten (10) minutes to allow it to cool down before touching it.
- ⇒ Do not touch hot parts of the equipment, such as housings with integrated heat sinks and resistors. Danger of burns!

3.10 Protection During Handling and Mounting

Under certain conditions, incorrect handling and mounting of parts and components may cause injuries.



CAUTION

Risk of injury by incorrect handling! Bodily harm caused by crushing, shearing, cutting and mechanical shock!

- ⇒ Observe general installation and safety instructions with regard to handling and mounting.
- ⇒ Use appropriate mounting and transport equipment.
- ⇒ Take precautions to avoid pinching and crushing.
- ⇒ Use only appropriate tools. If specified by the product documentation, special tools must be used.
- ⇒ Use lifting devices and tools correctly and safely.
- ⇒ For safe protection wear appropriate protective clothing, e.g. safety glasses, safety shoes and safety gloves.
- ⇒ Never stand under suspended loads.
- ⇒ Clean up liquids from the floor immediately to prevent slipping.

3.11 Battery Safety

Batteries contain reactive chemicals in a solid housing. Inappropriate handling may result in injuries or material damage.



CAUTION

Risk of injury by incorrect handling!

- ⇒ Do not attempt to reactivate discharged batteries by heating or other methods (danger of explosion and cauterization).
- ⇒ Never charge non-chargeable batteries (danger of leakage and explosion).
- ⇒ Never throw batteries into a fire.
- ⇒ Do not dismantle batteries.
- ⇒ Do not damage electrical components installed in the equipment.

Note: Be aware of environmental protection and disposal! The batteries contained in the product should be considered as hazardous material for land, air and sea transport in the sense of the legal requirements (danger of explosion). Dispose batteries separately from other waste. Observe the legal requirements in the country of installation.

3.12 Protection Against Pressurized Systems

Certain motors and drive controllers, corresponding to the information in the respective Project Planning Manual, must be provided with pressurized media, such as compressed air, hydraulic oil, cooling fluid and cooling lubricant supplied by external systems. Incorrect handling of the supply and connections of pressurized systems can lead to injuries or accidents. In these cases, improper handling of external supply systems, supply lines or connections can cause injuries or material damage.



CAUTION

Danger of injury by incorrect handling of pressurized systems !

- ⇒ Do not attempt to disassemble, to open or to cut a pressurized system (danger of explosion).
- ⇒ Observe the operation instructions of the respective manufacturer.
- ⇒ Before disassembling pressurized systems, release pressure and drain off the fluid or gas.
- ⇒ Use suitable protective clothing (for example safety glasses, safety shoes and safety gloves)
- ⇒ Remove any fluid that has leaked out onto the floor immediately.

Note: Environmental protection and disposal! The media used in the operation of the pressurized system equipment may not be environmentally compatible. Media that are damaging the environment must be disposed separately from normal waste. Observe the legal requirements in the country of installation.

Notes

4 Quick-start CMD and WinPCL

4.1 General Information

The configuration of the fieldbus modules as for example INTERBUS and PROFIBUS in combination with the programming interface WinPCL is executed by special external configuration tools. Thereby, the advantage is that powerful programs are available allowing an easy configuration, operation and diagnostics of the fieldbuses.

The following sections only describe the essential proceeding for the configuration of a fieldbus. For further information refer to the corresponding manual.

4.2 INTERBUS Configuration

Software Tool IBS CMD G4

To configure the INTERBUS, software IBS CMD G4 (for short: CMD) is available. Besides the bus configuration this program also allows the monitoring and diagnostics in case of an error.

Component Selection

After starting the installation program and entering the serial number a dialog appears with which the components to be installed have to be selected. Besides the program IBS CMD driver RS 232 has to be selected. Then, the IBS ISA SC driver has to be deactivated.

Furthermore, ensure that the directories of the destination folder has not more than eight letters.

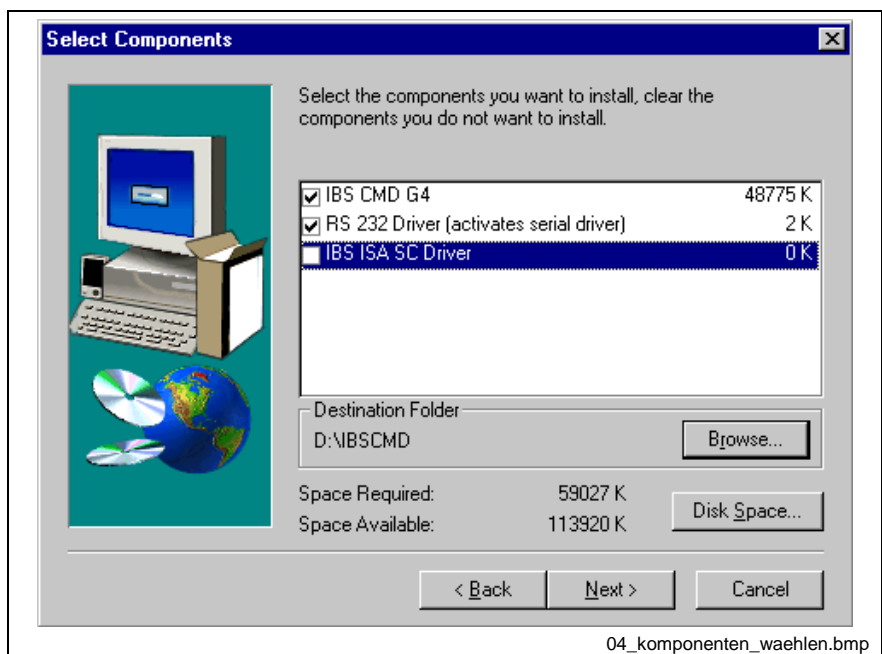


Fig. 4-1: Selection of the components to be installed

Password Entry

The following dialog requests passwords. These must not be entered:

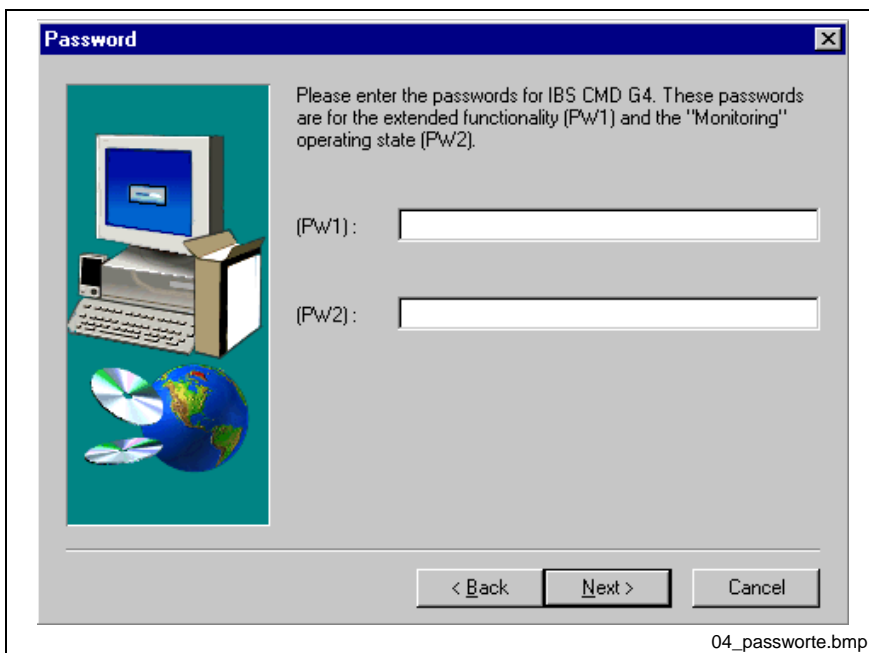


Fig. 4-2: Password dialog

Offline/Online Operation

As the bus structure planning of an installation and the configuration of the individual devices is also possible during offline operation (i.e. without connection to the controller board), monitoring and bus diagnostics is only possible during online operation. To start the online operation, connect the diagnostics interface X64 of the INTERBUS module via a serial interface RS232 (KB0030) with a serial COM1 to COM4 interface of the PC. If this cable is not available, alternatively, a serial connection (Pin 2 -> 2, Pin 3 -> 3 and Pin 5 -> 5) can be created.

Proceedings INTERBUS Configuration

The following sections describe an INTERBUS online configuration without process data preprocessing.

Create New Project

Select menu File/New. A new project is created as in Abb. 4-3.

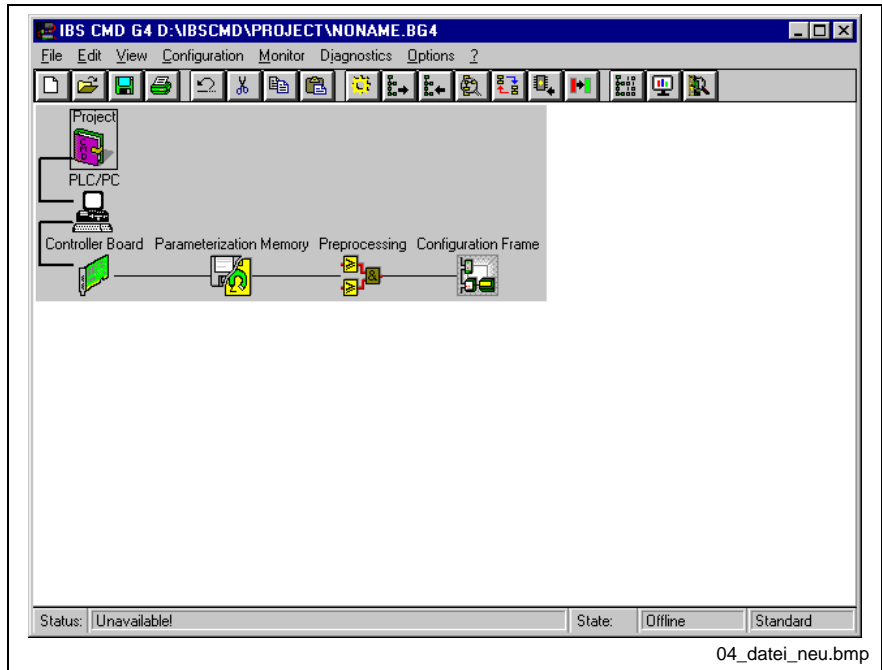


Abb. 4-3: New project

Select Controller Board Type

Select the element "Controller Board" with the right mouse button. Chose the entry "Type ..." in the context menu.

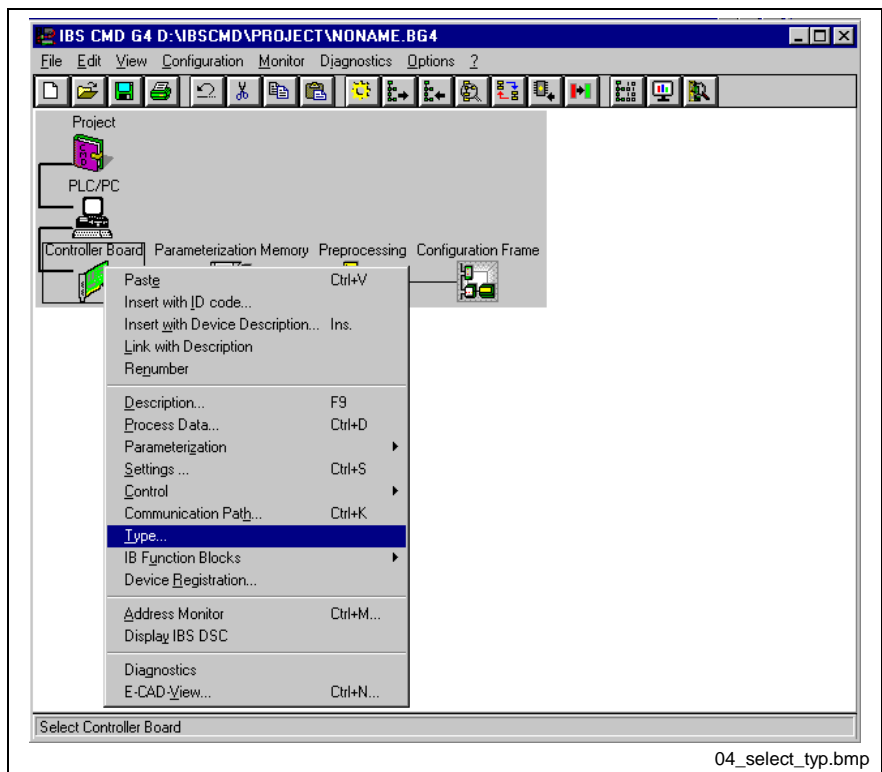


Fig. 4-4: Selection of controller board type

Mark type "IBS PC104 SC-T" in the "Select Controller Board" window and confirm with OK (see Fig. 4-5: Selection of the controller board type).

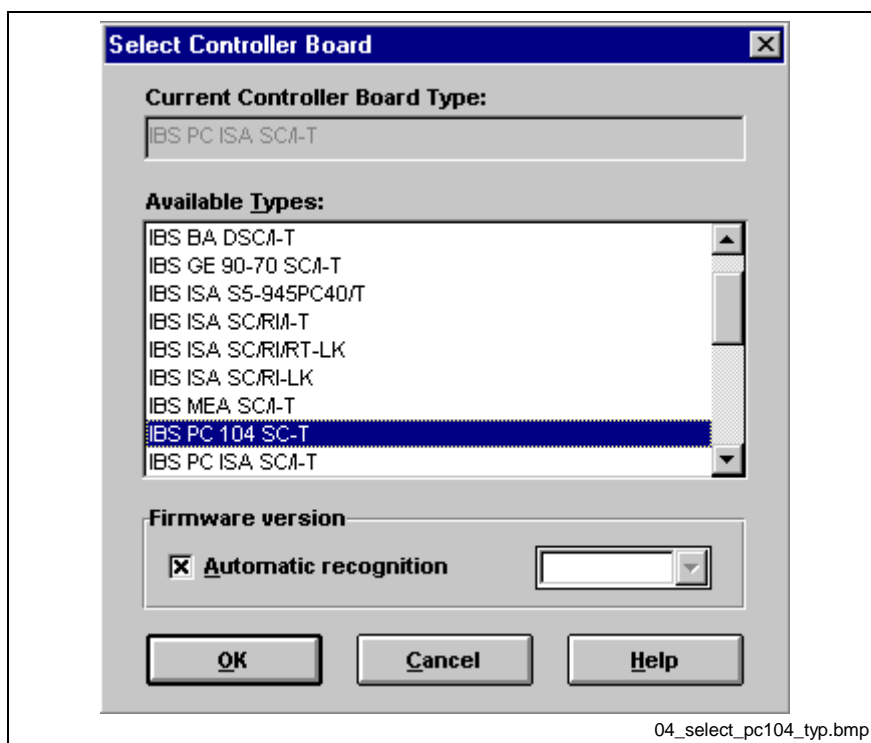


Fig. 4-5: Selection of the controller board type

Communication Path Settings

To read in the configuration, it is necessary that a connection from CMD to the controller board is created (see offline/online operation). The corresponding communication path has to be set depending on the interface connected with the controller board. To do so, call-up the "Controller Board" context menu with the right mouse button and select "Communication Path ...". Then, set the corresponding interface project-specific in window "Communication Path Settings".

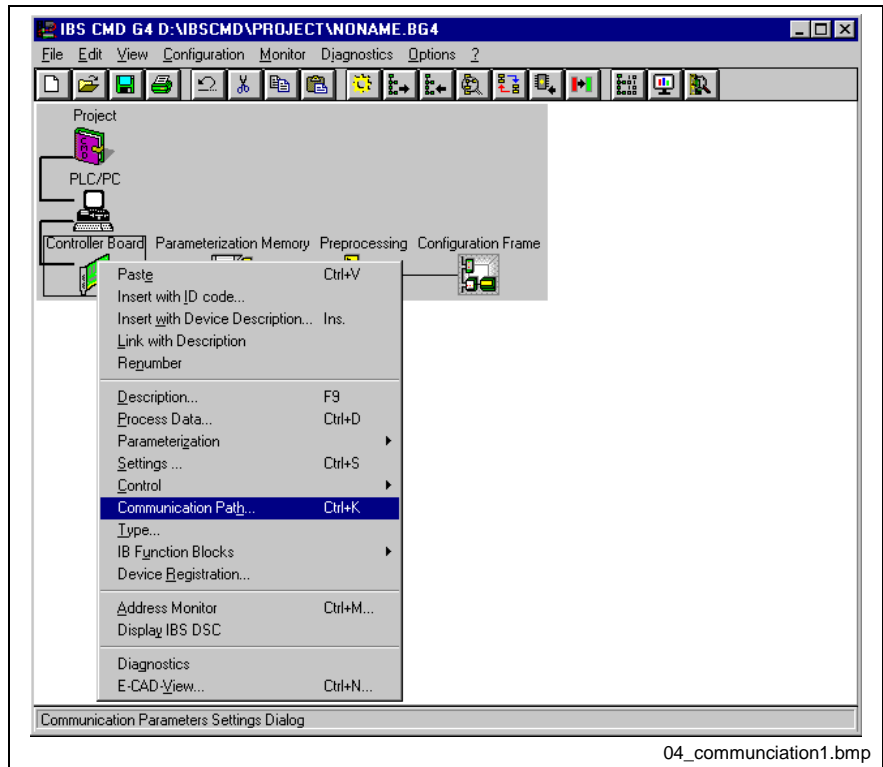


Fig. 4-6: Setting of the communication path

In the following dialog box the corresponding interface can be selected project-specific or generally (standard).

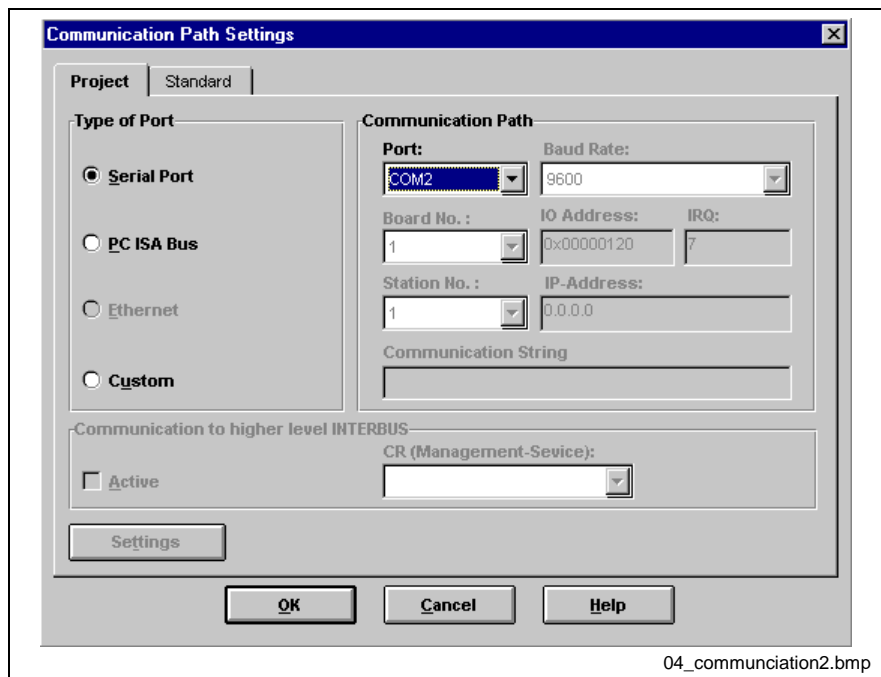


Fig. 4-7: Dialog box to set the communication path

Read In Configuration Frame (from memory)

To read in the bus configuration, select the element "Configuration Frame" with the right mouse button. Select then entry "Read In (from memory)" in the context menu.

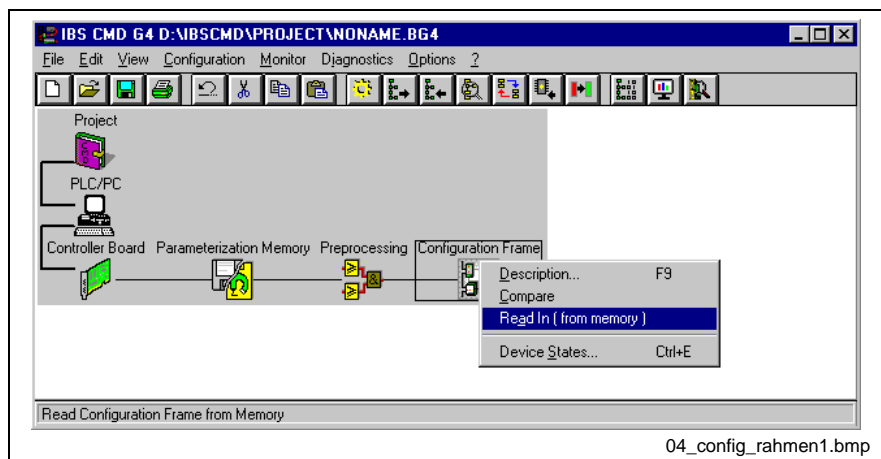


Fig. 4-8: Read in configuration frame

Thereupon, the dialog box "Set Operating State" appears which has to be confirmed with "Yes". In this case, the existing configuration frame is read in and the bus devices are represented corresponding to the bus structure.

Note: If the bus configuration is changed without resetting the controller board (control reset, voltage reset), the changed bus configuration is not recognized (e.g. after extension of the bus configuration) during reading in the configuration frame (bus configuration). The configuration frame is read out of the memory and represented.

In this case, deactivate the configuration frame with the "Controller Board" context menu → 'Operate' → 'Read In Configuration Frame' and afterwards read it in again.

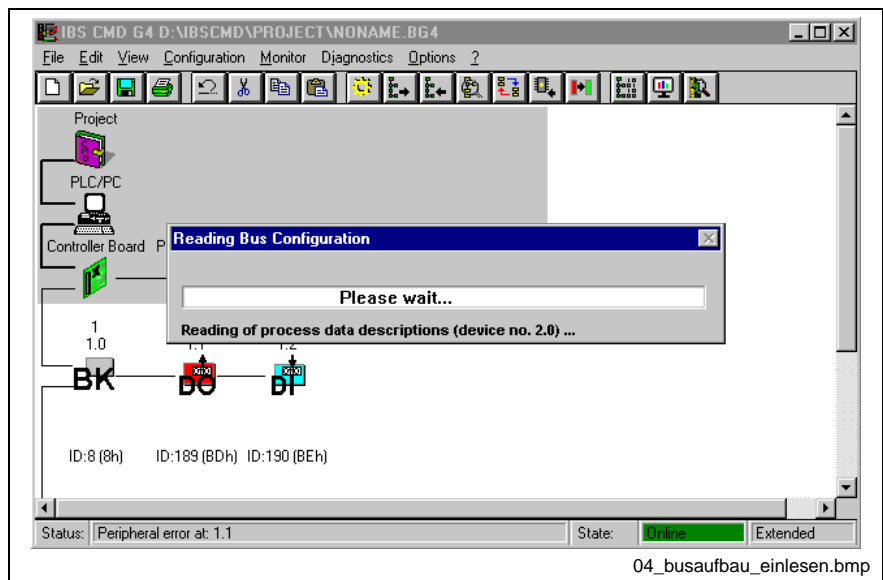


Fig. 4-9: Read in bus configuration

A precondition that the configuration frame is read in completely is that there's no error in the bus structure. Otherwise, the status changes automatically to "Diagnostics". In this state an error localization is executed and corresponding hints to localize the errors are given. If an error occurs, the status changes from OFFLINE to BUS ACTIVE.

Process Data Assignment

After the bus configuration has been read in, the addresses of the individual devices are automatically assigned corresponding to their physical position in the ring of CMD. You will receive an overview of all device addresses when opening the entry "Process Data ..." in the controller board's context menu.

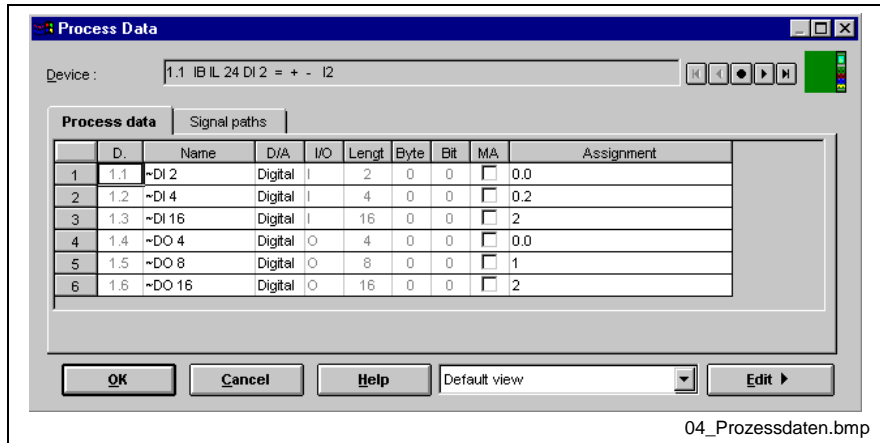


Fig. 4-10: Process data of all devices

In the right column "Assignment" you will find the addresses assigned by CMD. A changing of the addresses is possible by double-clicking the left mouse button.

Note: Bit modules are summarized to common byte addresses until the byte is occupied or the module does not fit in the byte anymore, i.e. the individual bits of a module are not divided up to different bytes.
Word modules (16 bit) are always starting with even addresses.

In combination with WinPCL this addresses correspond to the respective start address in the Dual Port RAM.

Standard and Function Register

If the INTERBUS control blocks (DIAG_OFF, DIAG_ON, START_D, STOP_D, CLR_DIAG) in the PLC program or the two diagnostics and status registers of the INTERBUS are used, the addresses of this registers have to be determined. To do so, open the 'Settings' menu in the context menu of the controller board.

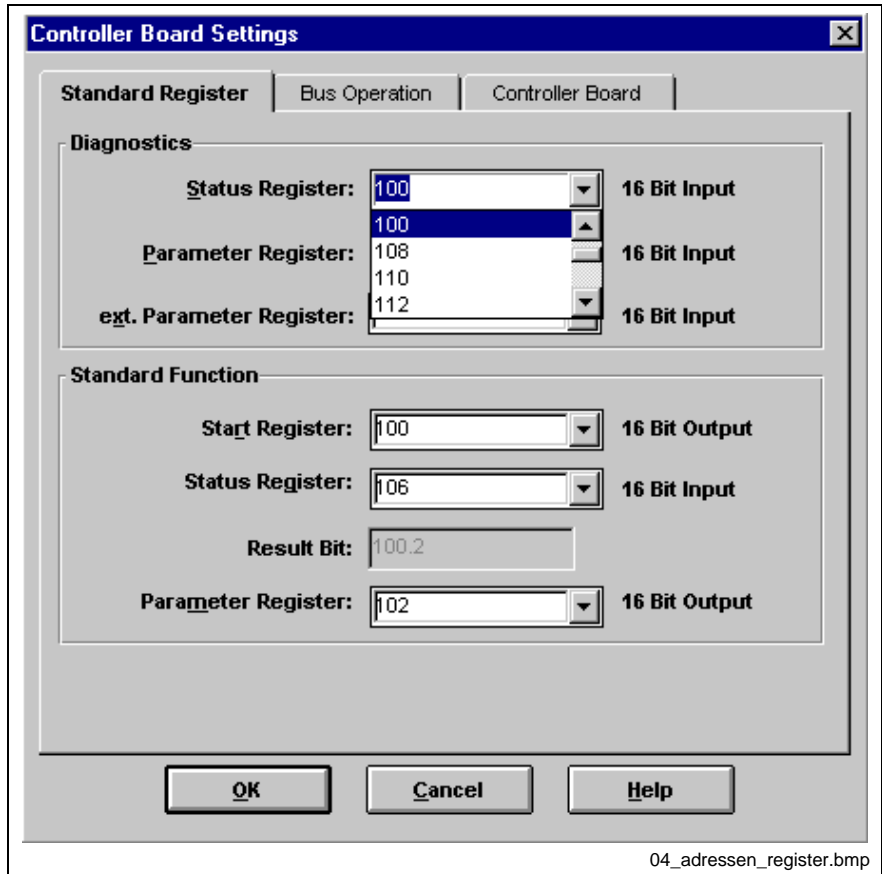


Fig. 4-11: Address assignment of the standard register

Principally, the addresses of the individual registers can be freely selected, as they don't come into conflict with the existing addresses of the modules (process data). A double addressing is not possible, if addresses offered in the pull-down menu are used.

Note: If the register addresses are assigned before the configuration frame is read in, there will occur address conflicts after the configuration frame is read in. These are recognized with the execution of the parameterization and displayed in a dialog box.

Starting-up Behavior/Parameterization of the INTERBUS

Parameterizations allow to realize different starting-up behaviors, for example, with or without process data processing. To do so, call-up the "Controller Board" context menu and select 'Parameterization' -> 'Execute'.

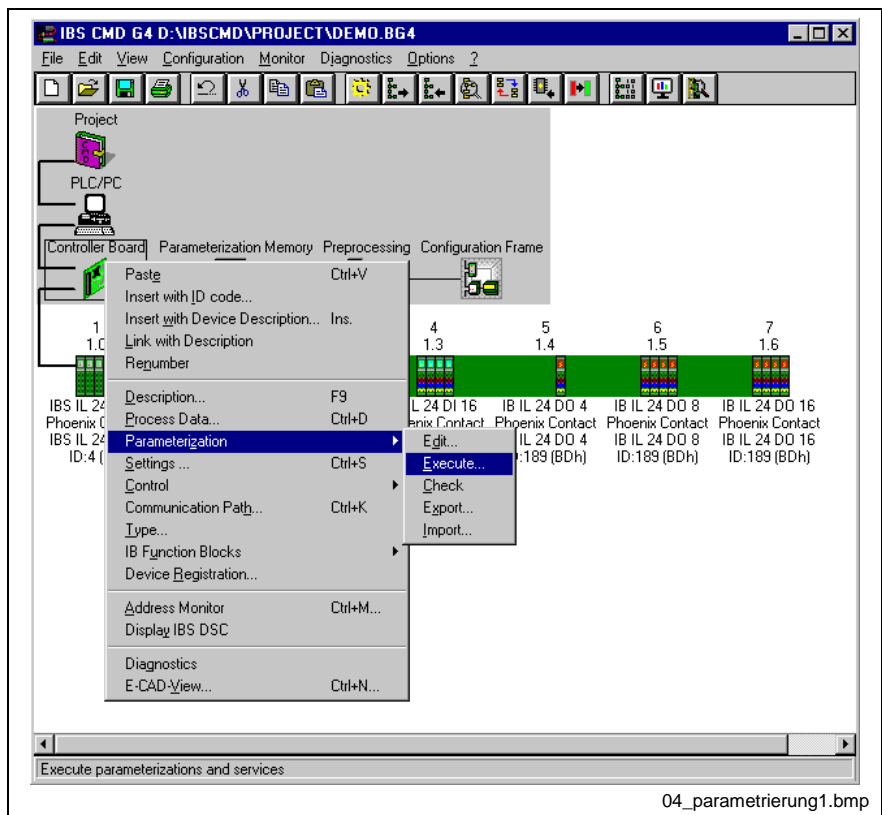


Fig. 4-12: Context menu 'Parameterization'

Exemplary, 'Start-up without PDP' is selected in the following window, because no process data preprocessing should be executed on the INTERBUS controller board. For further information about the process data preprocessing refer to the CMD online help.

After a successful parameterization the status of the INTERBUS changes from "Bus Active" to "Bus Runs", i.e. data cycles are run.

In case of an address conflict the parameterization can not be executed. A corresponding message specifying the coinciding addresses appears.

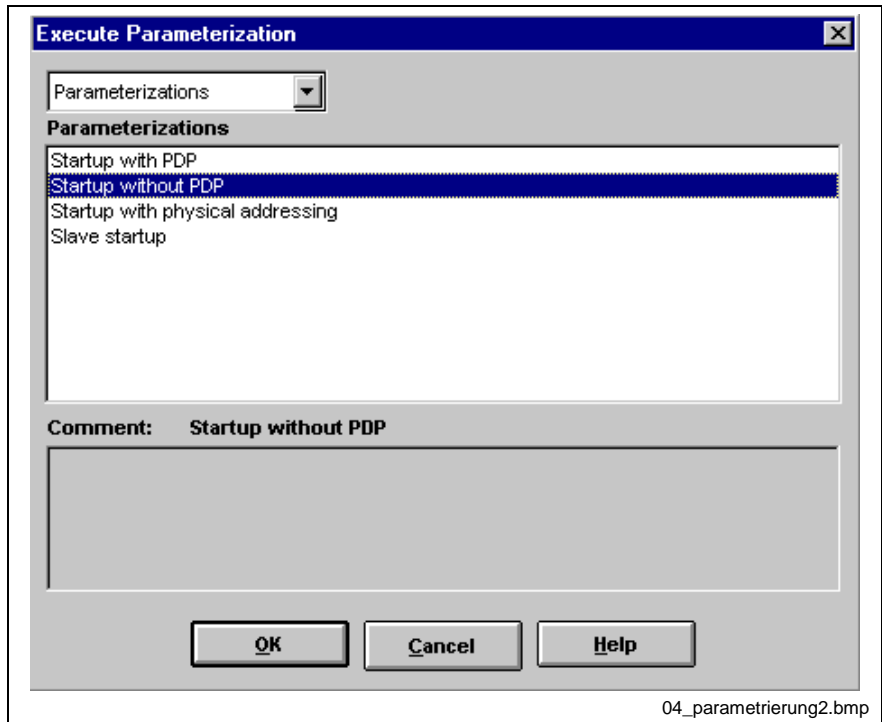


Fig. 4-13: Parameterization without preprocessing

Save Project

Select the "File/Save As ..." menu and assign a project name (max. 8 characters).

Parameterization Memory

The parameterization memory is used for resident storage of INTERBUS parameterization, program and diagnostic data. After each control reset the INTERBUS is re-initialized with data from the parameterization memory.

To save the data, select the element "Parameterization Memory" with the right mouse button and in the context menu entry "Write".

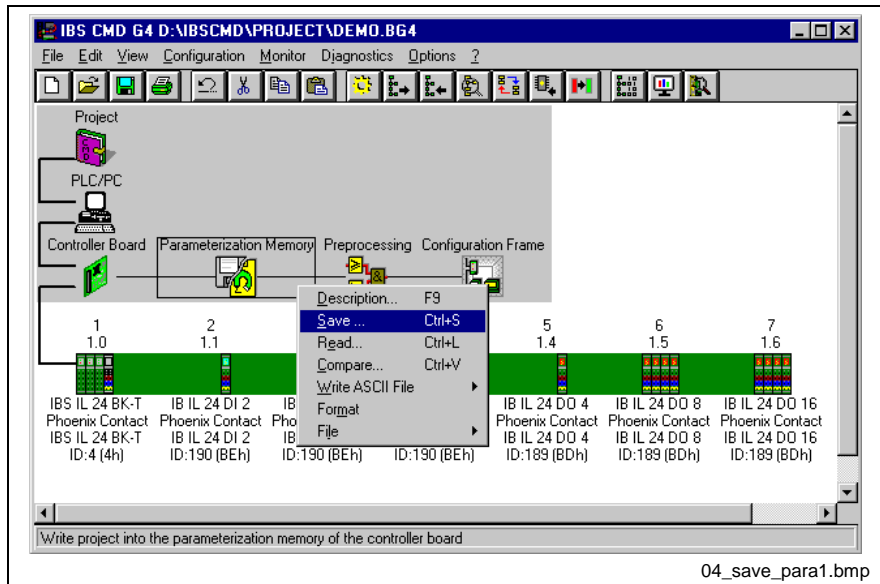


Fig. 4-14: Write parameterization memory

In the appearing dialog box you can choose whether only INTERBUS data shall be written in the parameterization memory or in addition, project-specific data. Only in the last-mentioned case, the entire project can be re-read from the parameterization memory, i.e. all settings, descriptions of the devices, etc. are stored on the controller board.

Note: With the programming interface WinPCL a new controller board with configuration memory has been introduced. It has the designation 'LK IBM02/02 PC104'. For the versions lower than V21 controller boards without configuration frame have been used (designation: 'LK IBM 2 PC104'). These modules can not be used.

Programming Interface WinPCL

I/O Editor

To assign the addresses between the INTERBUS controller board and the variables, the I/O editor is available in the programming interface WinPCL ("View/I/O editor" menu) on resource level.

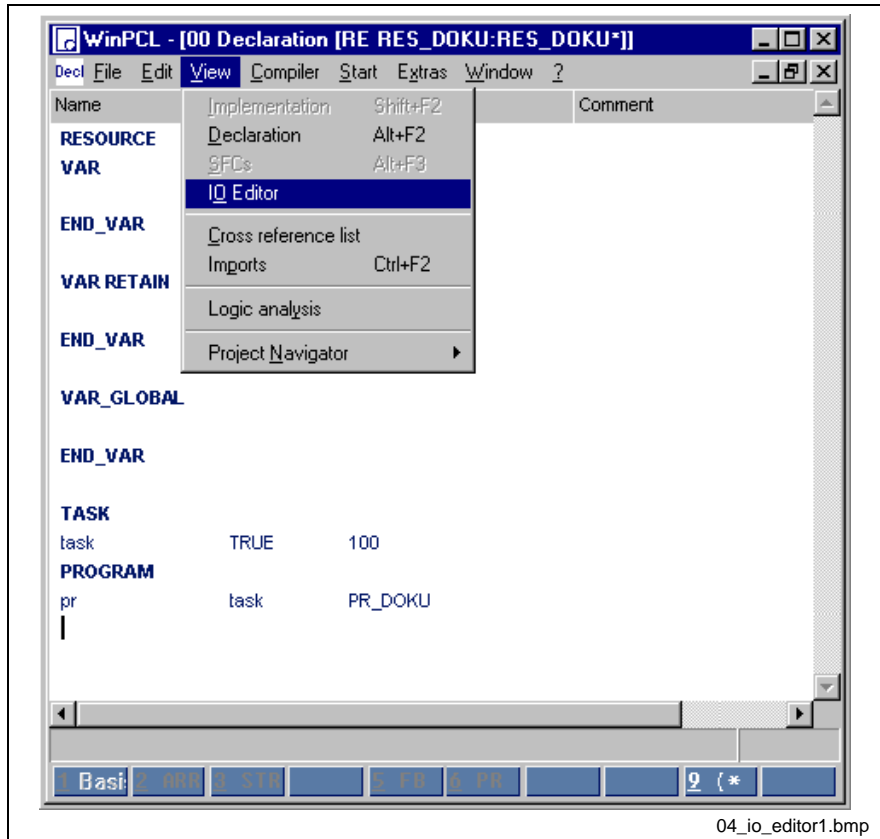


Fig. 4-15: Call-up I/O editor on resource level

Principally, there are several possibilities to select an I/O data assignment of the INTERBUS to the logic devices of the programming interface. For further information refer to the documentation "Programming with WinPCL" (German edition MN: 291135; English edition MN: 291134).

For example, it is possible to assign logic number 1 to the module inputs, logic number 10 to the standard registers (input), logic 2 to the module outputs and logic number 20 to the standard register (outputs).

Referring to Fig. 4-10: Process data of all devices the 4 bytes length if the module's input bytes result in:

- 1 byte on byte0: 2 bit module + 4 bit module,
- 1 blank byte on byte1 (16 bit modules starting on even addresses)
- 2 bytes for the 16 bit module on byte2 and 3.

The 4 byte length of the modules' output byte result in:

- 1 byte on byte0: 4 bit module,
- 1 byte on byte0: 8 bit module and,
- 2 bytes for the 16 bit module.

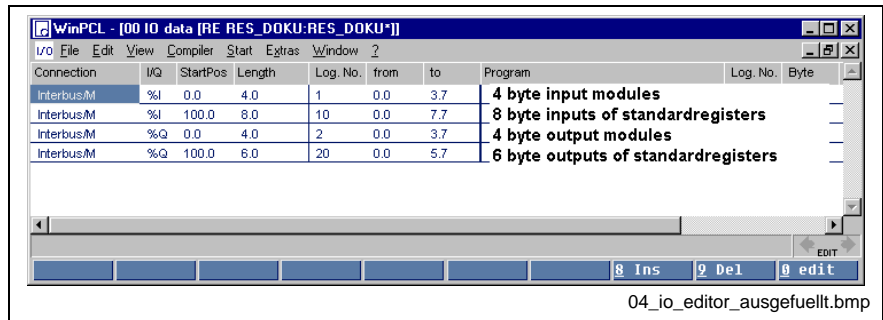


Fig. 4-16: I/O editor

Declaration Editor

Based on the I/O editor definition you can access the inputs and outputs of the individual modules and/or the standard registers by the following variable declarations:

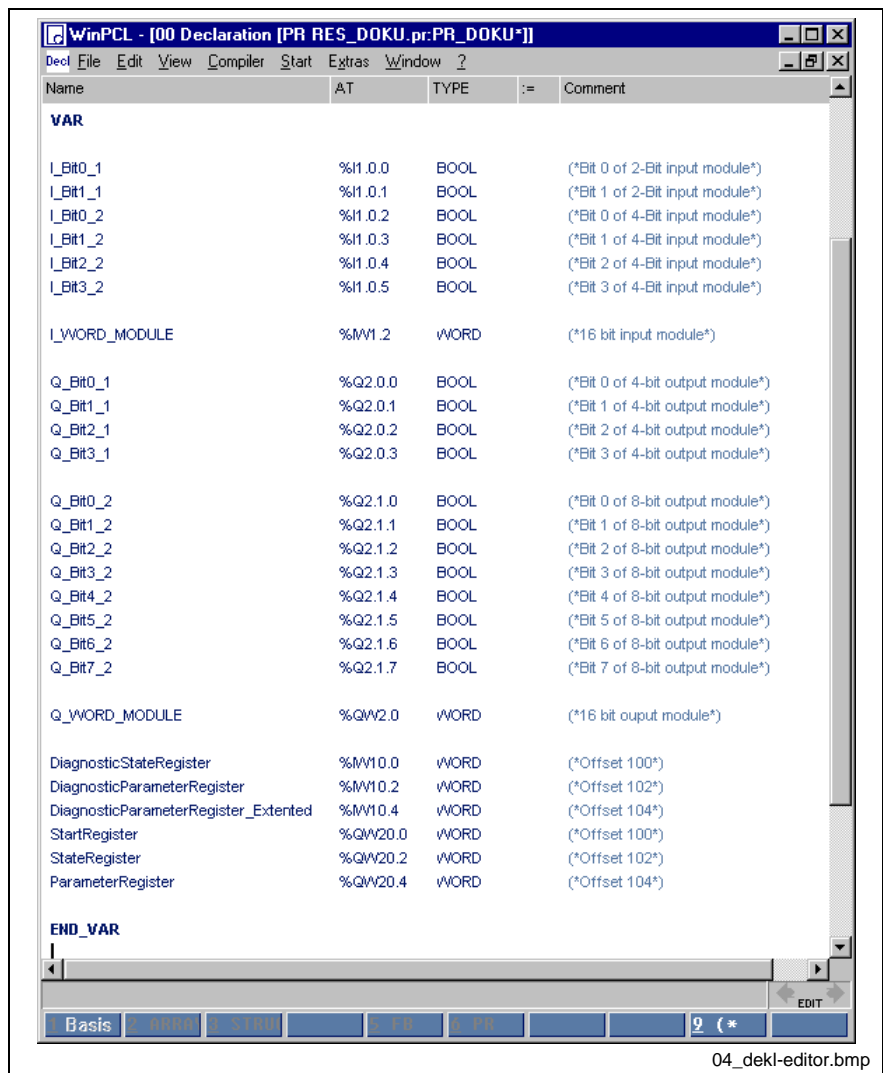


Fig. 4-17: Declaration editor

4.3 Installation and Use of the Indramat Device Database

Creation of the Bus Structure

Principally, there are several possibilities to create the bus structure.

1. Online with the configuration frame's context menu "Read In (From memory)"
2. Offline with the context menu "Insert With ID Code"
3. Offline with the context menu "Insert With Description"

Regarding the first two possibilities the bus devices are only represented as standard devices containing the following information:

- IDENT Code
- Process data channel length
- Standard icon

If the individual bus devices are represented with a device description form the Indramat device database, these manufacturer-specific information (device type, article no., etc.) appears as well as with a product-specific icon.

Installation of the Indramat Device Database

Proceeding to install the Indramat device database:

Start the SETUP.EXE. You will find the Indramat device database in directory ...\\Database\\de on the C DSWD-WinPCL-PO*-0*VRS.

Specify the source directory of the database file INDRAMAT.MDB.

Specify the destination directory and/or the installation directory of CMD; e.g. C:\\IBSCMD

Specify the database name. Under this name the Indramat database appears in CMD. Indramat is preselected as default name.

Selection of the options to be installed. Select both options. The selection can be later changed in CMD.

Application of the Indramat Device Database

After creating the bus structure, you can link the standard device descriptions with the device descriptions of the Indramat device database. The proceeding is described in chapter menu "Edit ... Link With Description" on page 6-16.

5 General Information

5.1 Basic Principles

INTERBUS, the fast, universal sensor/actuator bus system.

The INTERBUS network (or IBS for short) shifts the I/O level from the master PLC or PC system (Host) directly to the machine or system. A serial bus cable connects the host with the I/O modules installed in the system. This reduces the amount of wiring involved to a minimum compared to conventional parallel wiring.

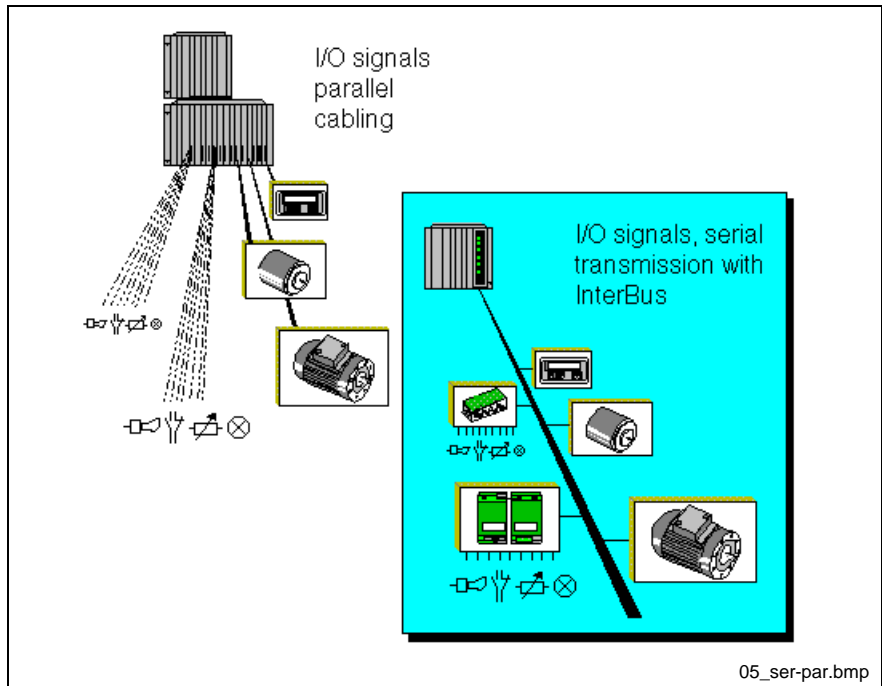


Fig. 5-1: Basic principles

5.2 Automation with INTERBUS

The constantly growing degree of automation and the more complex requirements of production and process engineering demand more and more powerful sensors and actuators for the special application. Today, the INTERBUS system is already supported as open bus system by more than 600 equipment manufacturers with various products. This enables you, as the user, to select the most efficient and economical system components for your application.

5.3 Device Types

Controller boards for

- Programmable logic controls (PLC)
- Computer systems such as PCs, VME systems and industrial computers

Input/output units for

- Analog input/output
- Digital input/output
- Degree of protection IP 20/65/67

High-tech modules for

- Wrenching controls
- Positioning controls
- Robot controls
- Drives
- DRIVECOM standard
- Frequency converter, servo drives
- General drive engineering
- Pneumatic valve terminals
- Hydraulic valve terminals
- Encoders
- ENCOM standard
- Identification systems
- Operating and display equipment
- MMICOM standard

5.4 Topology

The INTERBUS network is installed as compact line following one direction. Starting at the controller board, the bus system connects the respective PLC or PC system (Host) with the INTERBUS devices installed in the periphery (e.g. digital and analog I/O modules).

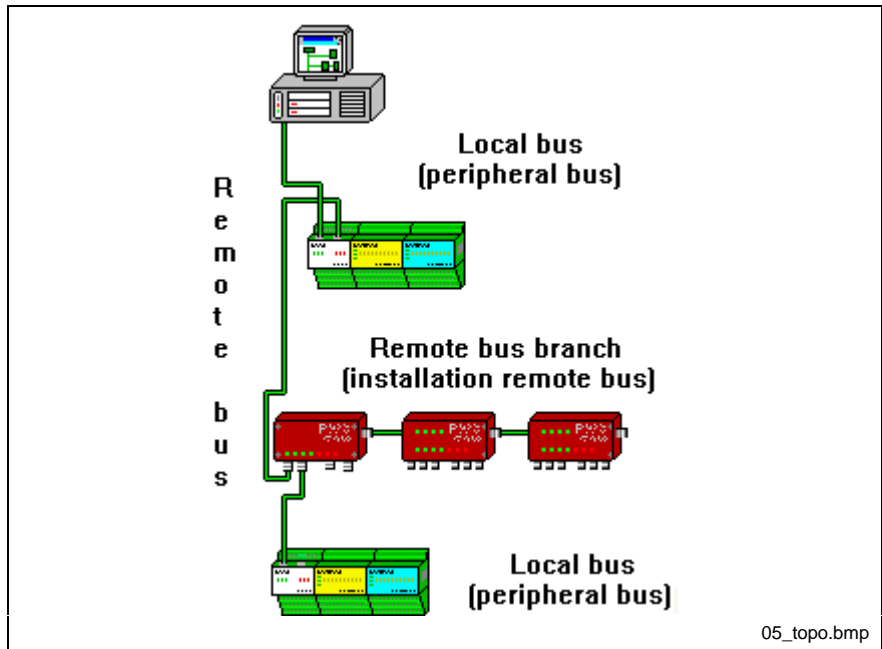


Fig. 5-2: INTERBUS topology

Remote Bus The main line installed through the system is known as the remote bus and bridges the distances between the distributed sub-stations. The whole remote bus may be up to 12.8 km long (from the controller board to the last remote bus device). The remote bus branch or local bus may branch off from the remote bus.

From the remote bus, side lines (branching lines) are possible as local branching lines. These are known – depending on their type – as remote bus, installation remote bus or local bus.

Local Bus The local bus is designed for low-cost, flexible configuration of a distributed sub-station in cabinets and terminal boxes. A bus terminal module (BK module) starts the local bus. The local bus cables connect the various local bus modules to the respective BK module and to each other.

Installation Remote Bus The installations remote bus corresponds in its configuration to the remote bus but offers the option of carrying a supply voltage for sensors in the cable (hybrid cable structure). The installation remote bus can be configured with CDI, CDO, DIO modules and other installation remote bus devices. It is suitable for configuring distributed sub-stations with direct connection of sensors and actuators. This results in a shorter and less expensive sensor/actuator connection.

5.5 Program Description

IBS CMD G4 is a software which enables interactive and control-independent configuration, operation and diagnostics of all connected devices in an INTERBUS network.

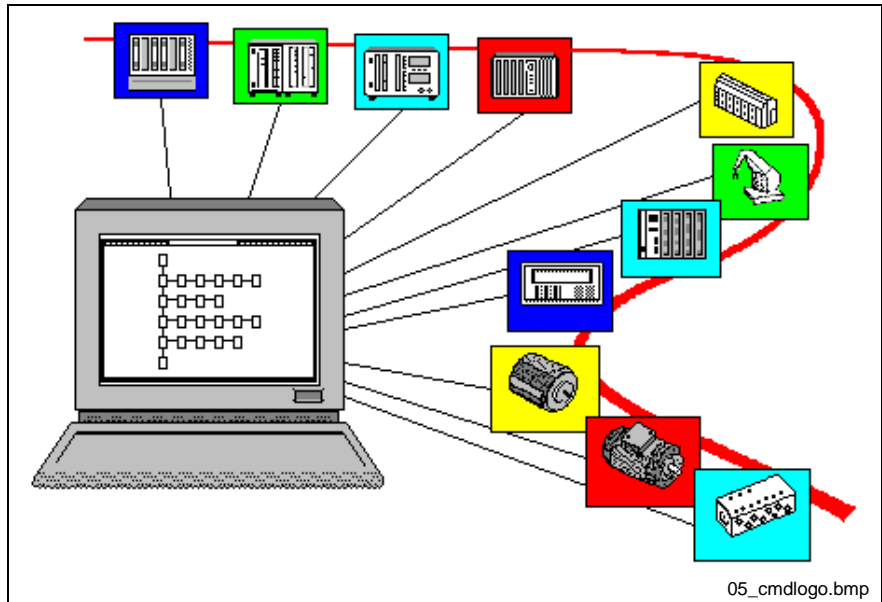


Fig. 5-3: Parameterization of all INTERBUS devices

IBS CMD G4 runs on standard PCs under MS-Windows and can be used for a number of INTERBUS controller boards. The connection to a controller board can be realized on two communication paths:

Through a serial interface (RS 232 level) Connect one the serial ports of your PC (COM1 to COM4) with the diagnostic interface on the front panel of the host controller board. The connection is realized by a serial connecting cable.

For PC controller boards through the respective slot (e.g. ISA bus). If there are several PC controller boards in **one** PC, the respective board number of the controller board must be specified. Board numbers from 1 to 8 are possible.

If you press the right mouse button on a selected element, a context menu containing all functions available for this element opens. In addition, the entries in the main menu are adapted accordingly to the functions assigned to the device.

Connecting Cable

You use the serial connecting cable (IKB0030/000,0, MN: 291736) to connect the serial interface of your PC with the diagnostic interface of the controller board or the system coupler.

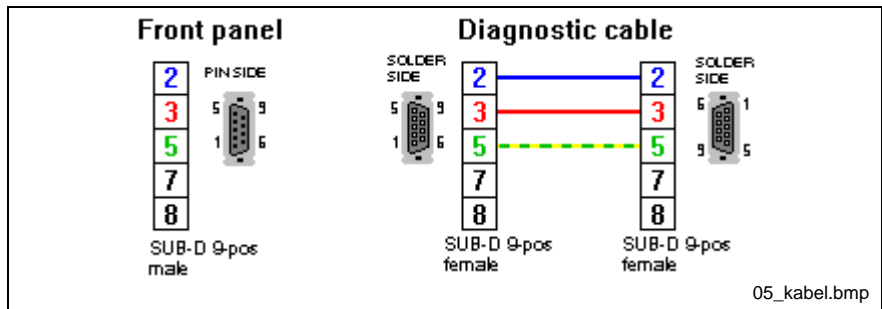


Fig. 5-4: Connecting cable

5.6 Configuration

With the aid of these menu commands in IBS CMD G4 you can design a complete bus configuration for a system and configure all devices connected to INTERBUS. For example, you can add new devices or search for devices. It is possible to assign addresses, variables and direct links (other process data descriptions) to the input/output channels of the bus devices. You can combine individual bus segments to form groups. It is also possible to check the bus configuration before startup.

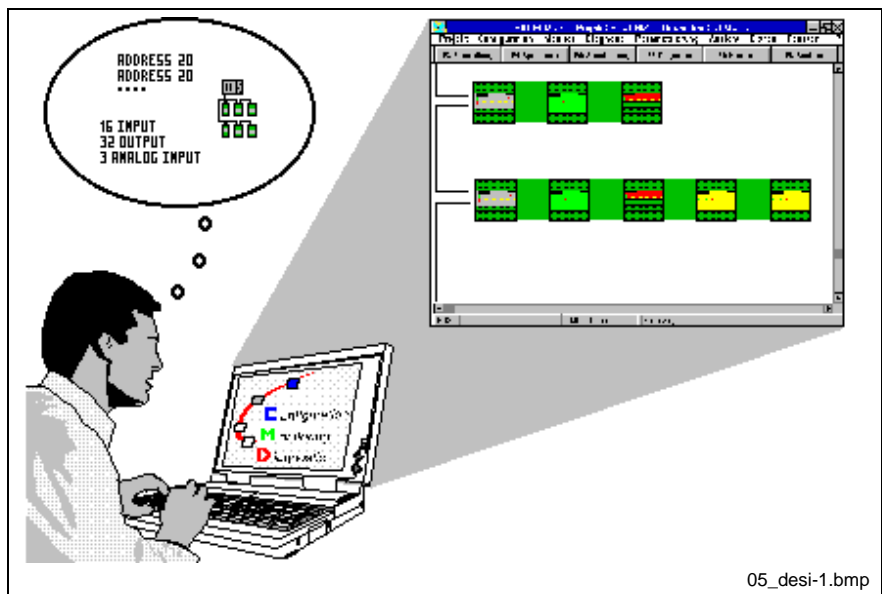


Fig. 5-5: Configuration

5.7 Monitoring

With the aid of these add-on programs you can monitor and manipulate the data of all connected devices. The process data of connected devices can be displayed or output states can be changed during system operation. The presentation of the displayed data depends on the individual device and/or the device description supplied by the manufacturer. Furthermore, it is possible to select an optimized presentation (e.g. numerical value or bar chart).

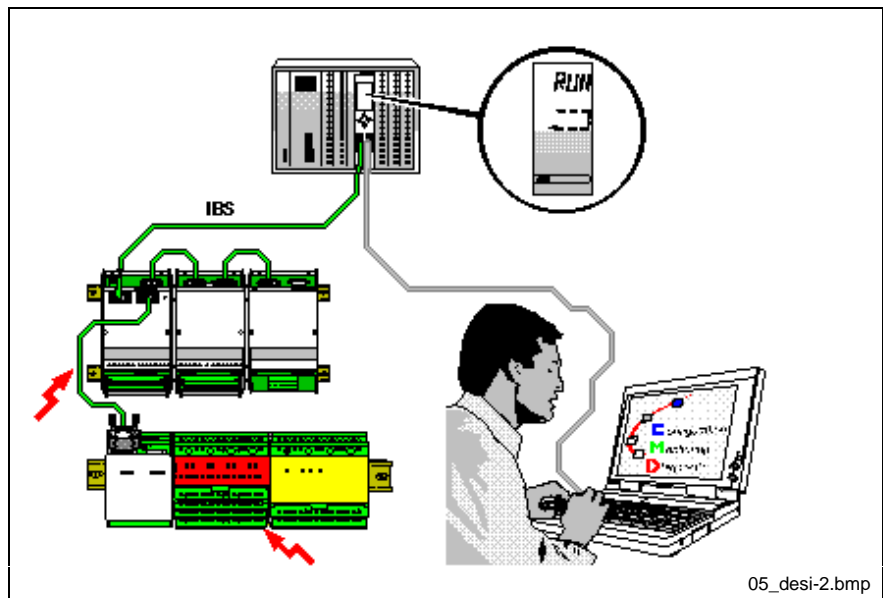


Fig. 5-6: Monitoring

5.8 Diagnostics

This operating status offers you fast and effective help concerning the recognition, localization and elimination of error sources in the system. This includes, for example, the recognition of defective bus devices, missing local bus voltage and errors in the connected sensors and actuators.

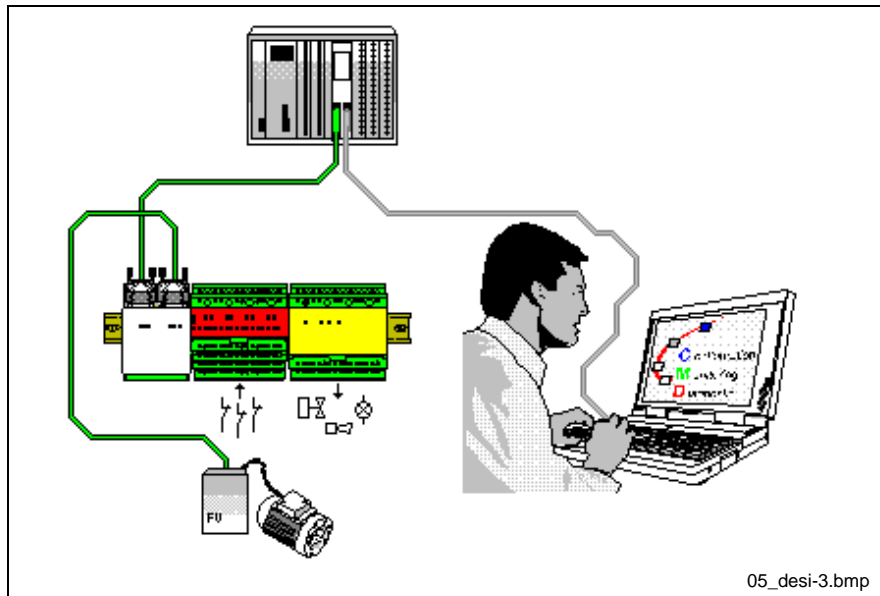


Fig. 5-7: Diagnostics

5.9 Add-on Programs

The software IBS CMD G4 enables the integration of add-on programs (monitoring, diagnostics and configuration programs) which are, for example, specially provided by the device manufacturers for their devices.

Add-on programs that can be integrated via a standardized interface can manufacturer-independently parameterize and monitor the connected devices of an INTERBUS network.

Manufacturers of INTERBUS devices can use the fixed interface to develop own programs especially for their devices and link them into IBS CMD G4.

Note: You can request a description of the standardized interface(s) from the INTERBUS-S Club e. V.

INTERBUS-S Club e.V.

Branch

Postfach 1108

32817 Blomberg, Germany

Phone: +49-(0)-52 35 - 34 21 00

Fax: +49-(0)-52 35 - 34 12 34

5.10 Hardware Requirements

You should at least have the following hardware/software equipment to operate IBS CMD G4:

- 80486 processor with 33 MHz (Pentium 90 MHz recommended)
- 8 Mbytes RAM (32 Mbytes recommended)
- 35 Mbytes free hard disk space
- 3,5" floppy disk drive and/or CD_ROM
- Mouse
- Windows 3.1 or higher
- Serial interface (COM1 ... COM4)
- Parallel interface (LPT1 ... LPT2)
- INTERBUS Generation 4 controller board

Occasionally, the free conventional memory may not be sufficient. In this case, remove unnecessary memory resident programs and drivers such as the DOS mouse driver, CD-ROM, scanner, sound driver or load these programs into a memory area above 640 Kbytes.

5.11 Checking the Hardware



⇒ When installing the INTERBUS system, several regulations must be considered which cannot be checked by the IBS CMD G4 software or are presently not being checked.

Examples:

You may not exceed the maximum distance between two INTERBUS devices. Depending on the device type (remote bus, local bus, installation local bus, ST ...) the maximum distance between two devices may differ.

The wiring of INTERBUS, especially the remote bus cables and the connection of the sensors/actuators, must meet special regulations. These regulations include:

- a large-area shield
- shielded, twisted pair sensor lines
- a correct PE connection

5.12 General Operating Instructions

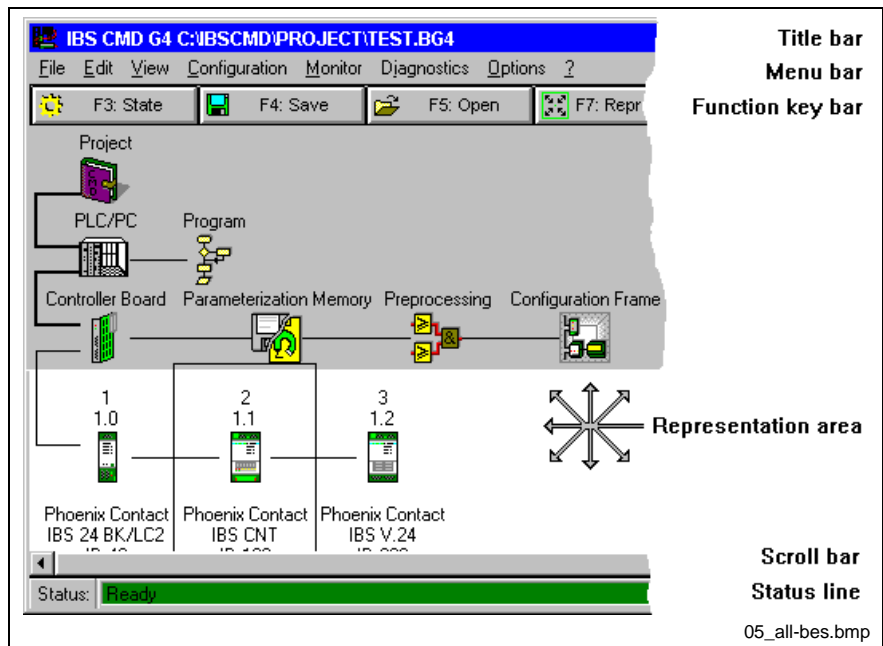


Fig. 5-8: Main window

Operating and Display Elements

- Title Bar** The name of the program (IBS CMD G4), the path, and the name of the central project file are displayed.
- Menu Bar** The menu bar contains the menu entries to control the programs. Every menu item is assigned a pop-up window in which the menu commands are listed. The content of a sub-menu is variable. These are the context-sensitive menus that offer the convenient menu for the respective element.
- Function Key Bar** The function key bar permits a faster program operation. The most important menu commands are included in the function key bar as buttons. You can execute the appropriate command by pressing the buttons.
- Representation Area** The representation area is the area between the function key bar and the status line. It displays the devices and the bus topology. When the available display structure is exceeded, scroll bars appear which you can use to move the bus topology within the window.
- Status Line** The status line is located at the bottom of the screen and contains various status information. Among other things, you will see the operating status of IBS CMD G4. The "Status" box is displayed in gray in the "Configuration (Offline)" operating state. In the "Online operating states" it may adopt the colors green or red depending on whether there is fault or the bus is in operation.

Operation with the Keyboard

Selecting or Canceling Menus	After changing to menu bar with <ALT>, use <Right> or <Left> arrow key to select the menu items. You open the marked menu with <ENTER>. Menus which contain an underscored letter can be called with the key combination <Alt> + <Letter>. You exit the menu and return to the representation area with the <Alt> or <F10> key.
Selecting Menu Items	On the one hand, you can select menu items from sub-menus with the arrow key <Up> or <Down> and then confirm with <Enter> or, on the other hand, by entering the underscored letter directly. A grayed out menu entry is inactive. A check marks an active command or a selected feature. Often a command can be called directly by function keys or a <CTRL> key combination.
Moving around in the Dialog Box	Press the <TAB> key to move forwards or the <SHIFT> + <TAB> key to move backwards in the dialog box. If the name of the dialog element contains an underscored letter, press the <Alt> + <Letter> keys to jump directly to the dialog selection.

5.13 Project Structure

An automation project can be divided as follows:

A project may consist of several PLCs/PCs. Several controller boards may be installed in one PLC/PC system. There may be several configuration frames on one controller board which contains INTERBUS devices.

The representation of a project in IBS CMD G4, therefore, always contains the following basic structure:

- Project
- PLC/PC
- Program
- Controller board
- Parameterization memory
- Preprocessing
- Configuration frame

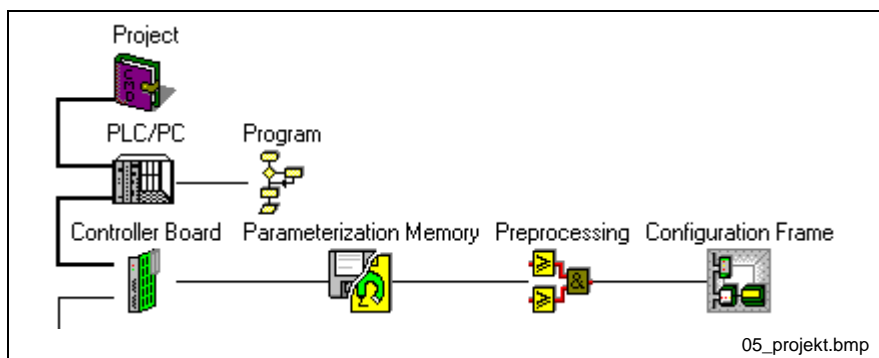


Fig. 5-9: Description of the single elements

5.14 Project Files

IBS CMD G4 generates the following project files:

<PROJEKT>.BG4	Contains the actual bus topology, the configuration, the addressing, etc.
<PROJEKT>.MES	Diagnostics message file. This file only appears if you change to the "Diagnostics" operating state and messages arrive.
<PROJEKT>.STC	Diagnostics statistics file. This file only appears if you change to the "Diagnostics" operating state.
<PROJEKT>.INI	Project initialization file.

All files of a project are stored on the hard disk in a common directory. Loading and saving is carried out using a Windows file menu. With the "Save As" dialog box, all files with this project name are copied. If files already exist with the same name in the target directory, an overwrite warning is issued.

Other files:

There are a number of other file types in addition to the central project files.

*.GP	In this files you can store individual worksheets from the preprocessing.
*.PAX	In this files you can store the parameterization of your INTERBUS projects. For example, the parameterization contains the startup behavior of INTERBUS and the bus topology.
*.SVC	The SVC file contains the complete parameterization and can be used in controller boards without parameterization memory. The SVC file is an ASCII file.
.CSV	Comma Separated Value. The SVC file is used to make the project data (.BG4) available in binary format accessible to other programs.
*.PEX	The PEX file is a CSV-format text file that can be re-imported. It contains all project information in the BG4 file.
*.EPL	You can transfer the INTERBUS structure and the process data assignments to the "EPLAN" program via these files.
*.FCX	In the FCX files you can save macros, user functions and events. These are listed under the menu item "Functions" in the context menu of the controller board.

5.15 Description of Elements

The elements available in the workspace are:

Project, PLC/PC, program, controller board, parameterization memory, preprocessing and configuration frame as well as every device can be described respectively by a special dialog box. In these dialog boxes, information about the type, programmer, position, comment, etc. can be assigned to the individual elements.

6 Menu Structure

Some of the menu items are context menus. The entries in these context menus depend on the selected element in the representation area. Only the menu items valid and useful for an element are displayed. For example, the element "Device" or the element "Project" are assigned to a corresponding menu. The context menu can be called with the right mouse button.

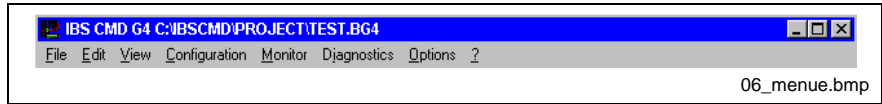


Fig. 6-1: Main menu

In order to reach the unmarked elements of the context menus at any time, the menu commands of these elements can be found as sub-menus under their designation in the menus "Edit", "Configuration", "Monitor", and "Diagnostics".

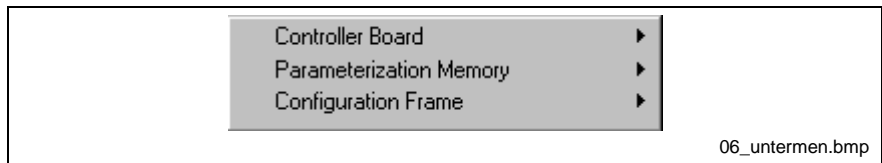


Fig. 6-2: Context menu of unmarked elements

6.1 Menu "File ..."

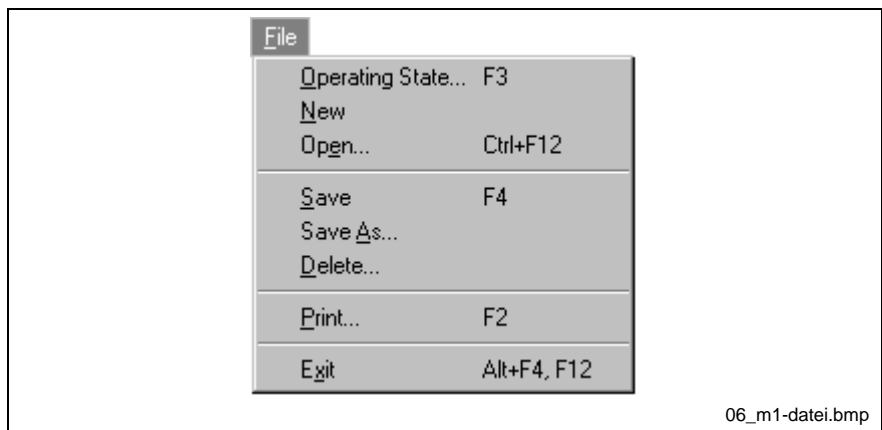


Fig. 6-3: Menu "File ..."

Menu "File ... Operating State"

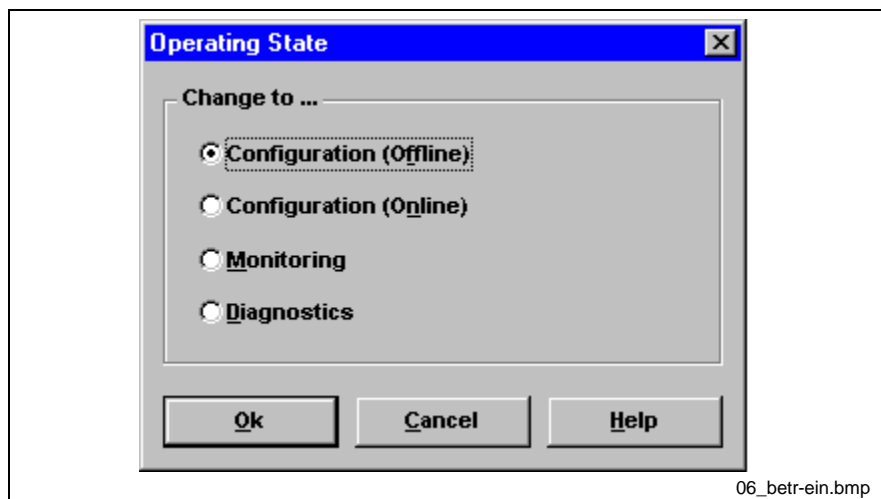


Fig. 6-4: Set operating state

Configuration (Offline) The operating state "Configuration (Offline)" offers the possibility of creating a parameterizing a bus configuration without being connected to a controller board. You can assign addresses, define groups and link process data "Offline".

Note: In this operating state no data exchange takes place between IBS CMD G4 and the controller board. It is, therefore, possible to configure an INTERBUS system without additional hardware.

Configuration (Online) In this operating state a connection to the controller board is established. Furthermore, you can read in a physically available bus configuration or copy data configured in IBS CMD G4 to the controller board and have them executed there. In addition to that, you can write to the parameterization memory of a PLC controller board.

Error messages are reported to IBS CMD G4 and displayed. When changing from the "Configuration (Offline)" to the "Configuration (Online)" operating state it is checked whether the right controller board type and an adequate firmware version are available.

Diagnostics In the "Diagnostics" operating state it is ensured that the displayed INTERBUS configuration of IBS CMD G4 matches the currently activated configuration frame of the controller board. This means the position of the devices and the process data lengths are compared with the bus configuration loaded in IBS CMD G4. In the "Diagnostics" add-on program you can evaluate among other things statistics for data transmission and view and analyze message files.

Monitoring When changing to the "Monitoring" operating state, not only the device position and the process data lengths but also the process data descriptions and the process data assignments are checked. You can visualize the data of an INTERBUS network in the "Monitoring" operating state with various monitor programs.

Menu "File ... New"

This command creates a new, empty project.

A project consists of a file set (*.ini, *.bg4, *.stc, *.mes) which can be created in any directory (Default=C:\IBSCMD\PROJECT).

The empty project is assigned the name "NONAME" (also NONAME.INI, NONAME.BG4 etc.). The file with the extension *.BG4 is the central project file which you specify when opening a project. If changes to the old project are not saved, the "Save As ..." dialog box is called up.

The new project contains, by way of default, the following elements: "Project", "PLC/PC", "Program", "Controller Board", "Parameterization Memory", "Preprocessing" and "Configuration Frame". You can only create a new project in the "Configuration (Offline)" operating state.

Menu "File ... Open ..."

This commands opens an existing project. Pay attention to the correct path specification in order to be able to view the desired project with the ending "*.BG4" in the selection box. Only one project can be opened at a time.

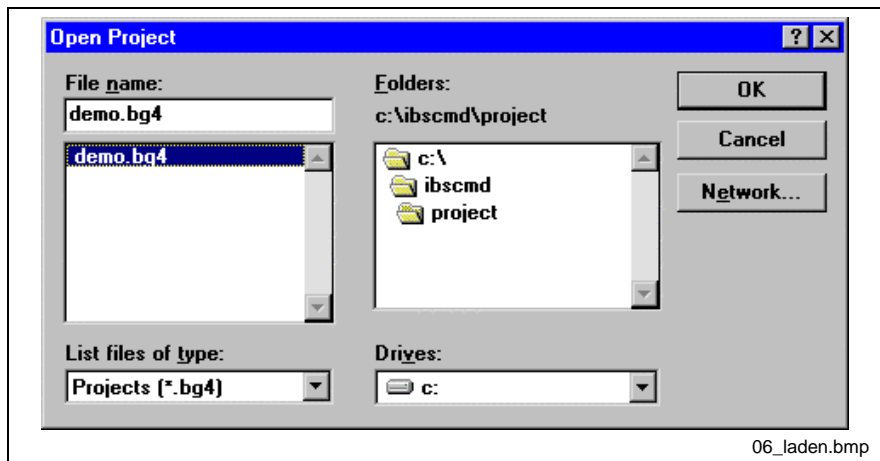


Fig. 6-5: Open project

You have the possibility to load projects from older IBS CMD versions. To do this, select the file name extension *.BUS under "File Format". This is the file format of IBS CMD up to Version 1.x. You can save these projects as *.BG4 files with IBS CMD G4.

Conversion Instructions (BUS -> BG4)

If you open a project from an older IBS CMD G4 version the text file is started with the program "NOTEPAD.EXE". The text file contains hints to adapt the old BG4 project to the new IBS CMD G4 version.

Note that the following changes will occur during conversion:

The input of the host controller board type Generation 3 is converted into a corresponding type of Generation 4, insofar as this is possible. Otherwise the type "Other" or "Firmware universal" is entered.

Note: Of the process data links, only the byte and bit copy commands are converted.

New process data descriptions may be created in certain cases which are marked by a number in square brackets [4] after the process data name. These process data descriptions may be deleted if they have no assignment.

The former diagnostic bit register is now entered under diagnostic status register. The diagnostic parameter register and the communication register (IBS S5 DSC/I-T) are also maintained.

Menu "File ... Save"

With this command you save a currently open project under the current name. If the project has the name NONAME or an old project has been changed „Save As ...“ is called up.

If you have loaded an older project file with the file name extension "*.BUS", the "Save As ..." command is called and the file is saved as "*.BG4".

Menu "File ... Save As ..."

"Save As" is used to save a project under a different name and, by changing the path specification, into another directory. All project files (*.INI, *.BG4, *.STC, *.MES, *.ZWT) which carry the old project name are copied into the above displayed directory with a different name. You can use this command when a second project is to be generated from a similar, existing project.

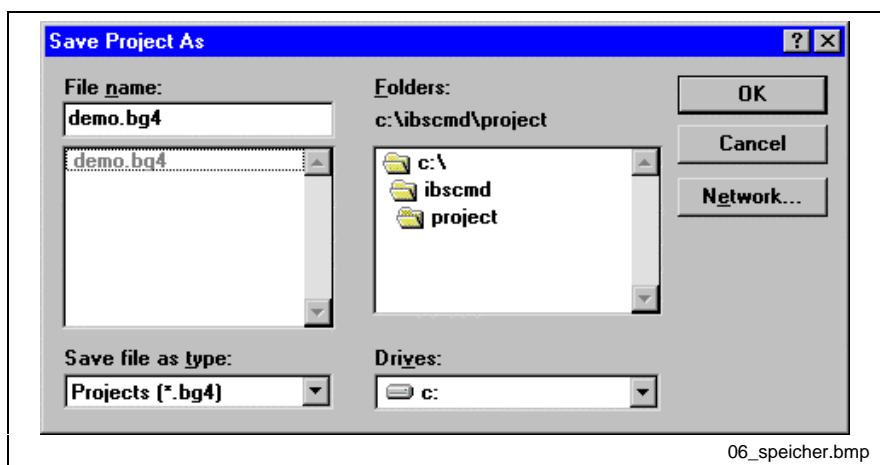


Fig. 6-6: Save project as

Menu "File ... Delete ..."

A project (filename.bg4) is deleted from the hard disk after a security prompt. All project files that have this project name are also deleted.

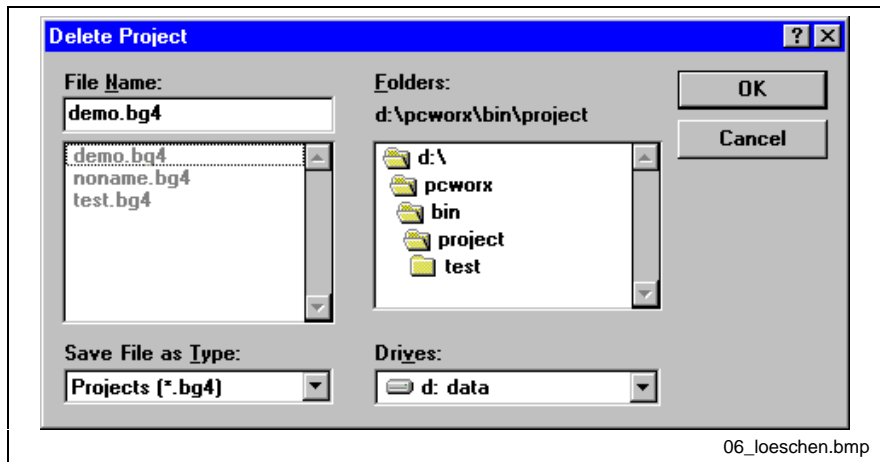


Fig. 6-7: Delete project

Note: Only projects which are **not** opened can be deleted. It is not possible to delete the NONAME project.

Menu "File ... Print ..."

With this dialog box you select which parts of your project you would like to print.

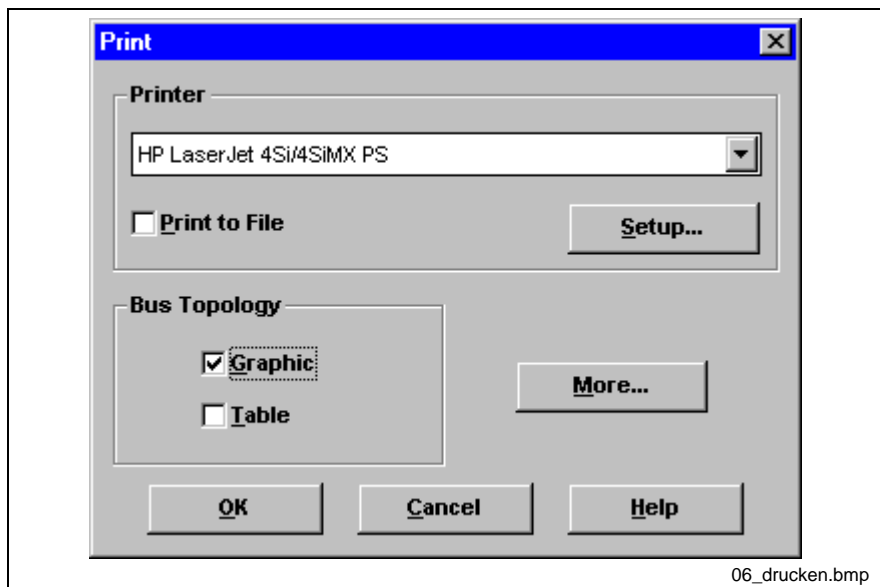


Fig. 6-8: Print

- Printer** Here you select one of the printers installed under Windows.
- Print to File** If this option box is marked, the printout is routed to a file instead of a printer.
- Setup** With this button you call a dialog box to select special settings for the printout. This includes among other things paper format and orientation. Further settings are available depending on the printer driver used.

- Bus Topology** The bus topology of the currently opened project is output in tabular or graphic form. The tabular printout is usually faster than the graphic form.
- More ...** Here you can select individual parts of the configuration which you like to print. To do this, mark a line in the following dialog box. If you want to select several specific, keep the <Ctrl> key pressed while clicking the desired lines. If you want to select a certain range, click the first desired line and then the last desired line with the <Shift> key pressed.

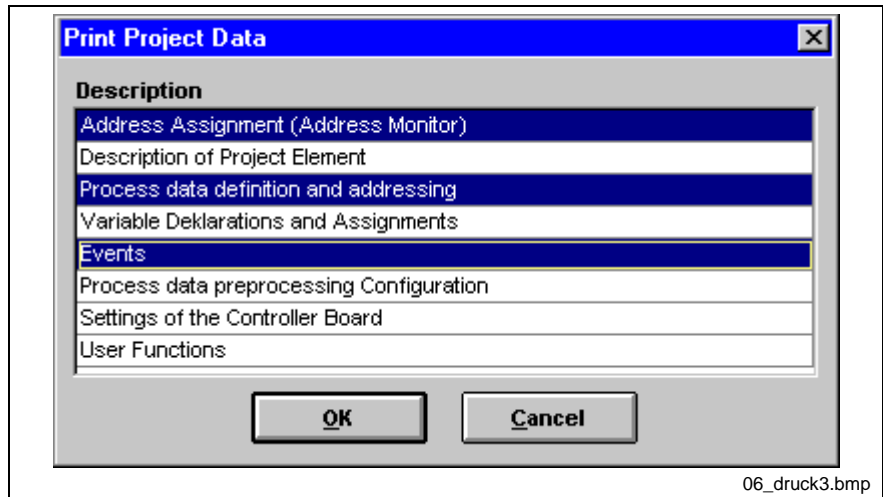


Fig. 6-9: Print ..." More ...

Menu "File ... Exit"

Use this command to exit IBS CMD G4.

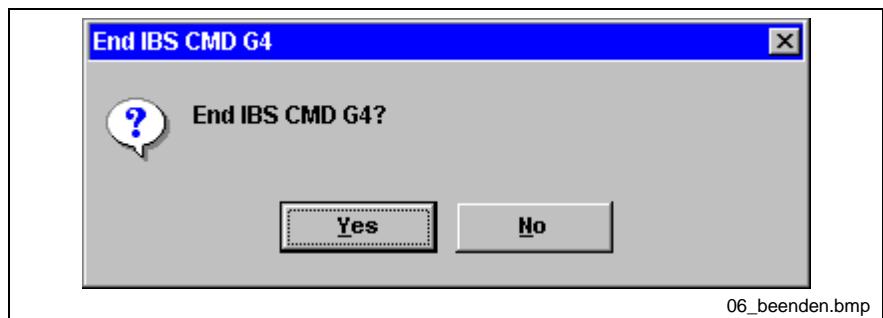


Fig. 6-10: End IBS CMD G4?

Before exiting, the program checks whether open projects were changed but not yet saved. If so, you decide in a dialog box whether you want to save the changes.

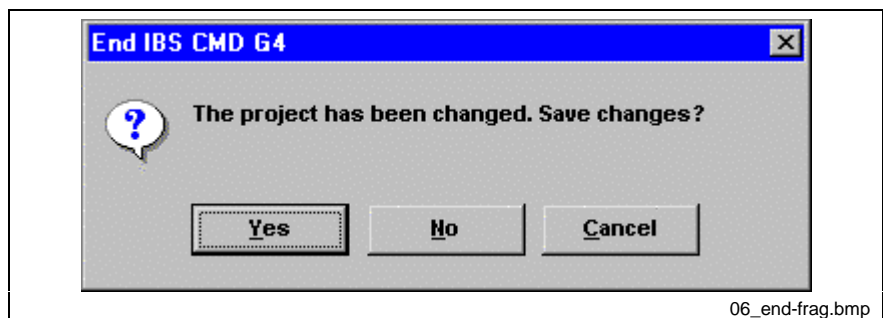


Fig. 6-11: Save changes?

Then the program is ended.

6.2 Menu "Edit ..."

The menu "Edit" has context menu entries. The commands in this menu change with the element selected in the representation area.

General Commands for All Elements:	Undo Search
Device:	Cut Copy Delete Replace
Controller Board and Devices:	Insert Insert with Ident Code ... Insert with Device Description ... Link with Description Controller board and bus terminal: Renumber

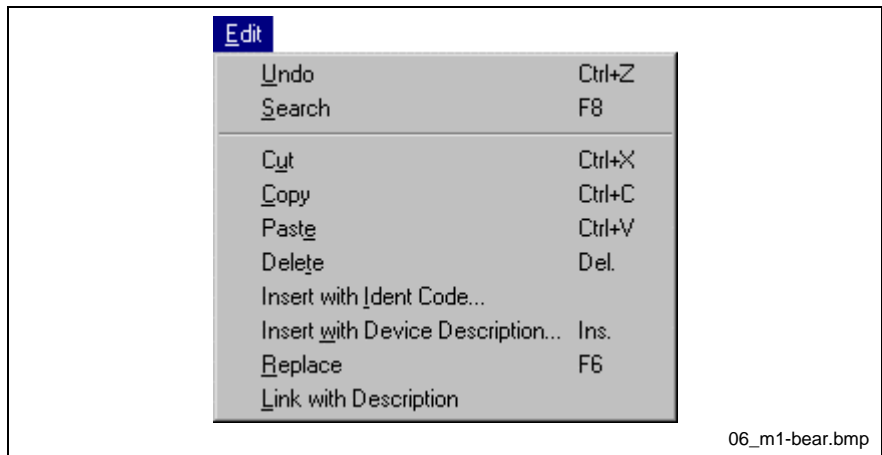


Fig. 6-12: Menu "Edit ..."

Menu "Edit ... Undo"

With this menu item deletion of a device can be undone. However, only the last removed device can be restored.

Menu "Edit ... Search ..."

Use this command to search for a bus device in the current bus configuration.

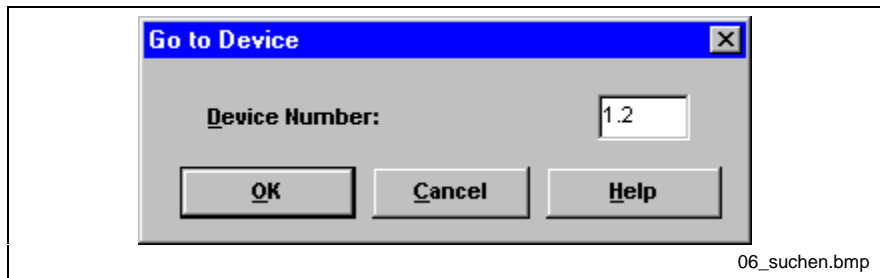


Fig. 6-13: Search for a bus device

Format of the Input: Left digit: Bus segment Right digit: Position in the bus segment

The two digits are separated by a point (.). After successful search the section of the bus topology is shifted so that the searched device is visible and marked.

Menu "Edit ... Cut"

The marked device is removed and copied into the clipboard. Use this function to restructure the bus configuration in connection with the "Paste" command by moving devices (and the assigned data).

The "Cut" function is not possible for the elements "Project", "PLC/PC", "Program", "Controller Board", "Configuration Frame", "Preprocessing" and "Parameterization Memory".

Note: The data of the device that you have cut can also be pasted as ASCII data into other programs (e. g. a word processing application).

Besides of this command you can also use the "Drag and Drop" function.

Menu "Edit ... Copy"

The marked device is copied into the clipboard. Use this command to restructure the bus configuration in conjunction with the "Paste" command by shifting devices. The "Copy" function is not possible for the elements "Project", "PLC/PC", "Program", "Controller Board", "Configuration Frame", "Preprocessing" and "Parameterization Memory".

Note: The data of the device that you have cut can also be pasted as ASCII data into other programs (e. g. a word processing application).

Besides of this command you can also use the "Drag and Drop" function.

Menu "Edit ... Paste"

With the "Paste" command a device is copied from the clipboard to the right of or underneath the marked device. An error message appears if you try to paste a cut or copied device into an invalid position. (Example: Cut the local bus device and re-paste it into the remote bus.)



Fig. 6-14: Insertion not possible

To "Paste" the elements "Project", "PLC/PC", "Program", "Configuration Frame", "Preprocessing" and "Parameterization Memory" is not possible.

Note: The data of the device that you have cut can also be pasted as ASCII data into other programs (e. g. a word processing application).

Besides of this command you can also use the "Drag and Drop" function.

Menu "Edit ... Delete"

The marked device is deleted. The "Delete" function is not possible for the elements "Project", "PLC/PC", "Program", "Controller Board", "Configuration Frame", "Preprocessing" and "Parameterization Memory".

A deleted device can only be restored if you use the "Undo" command directly after "Delete".

Menu "Edit ... Replace"

Use this command to replace a device by assigning a new device description. You can select the device description to be replaced from the device database. If the type of the new device manipulates the consistency of the bus topology, the address or group assignment is only replaced after a security prompt. If replacement is not possible (e.g. local bus device in the remote bus), an error message appears.

Note: Note that all previous changes and assignments of the old device description of this bus will be lost.

Menu "Edit ... Insert with ID Code"

With this menu item you insert a new device at a marked device in the bus configuration. To do this you enter the ID code and the process data channel length of the device to be inserted. If you don't know these values, please refer to the appropriate data sheet.

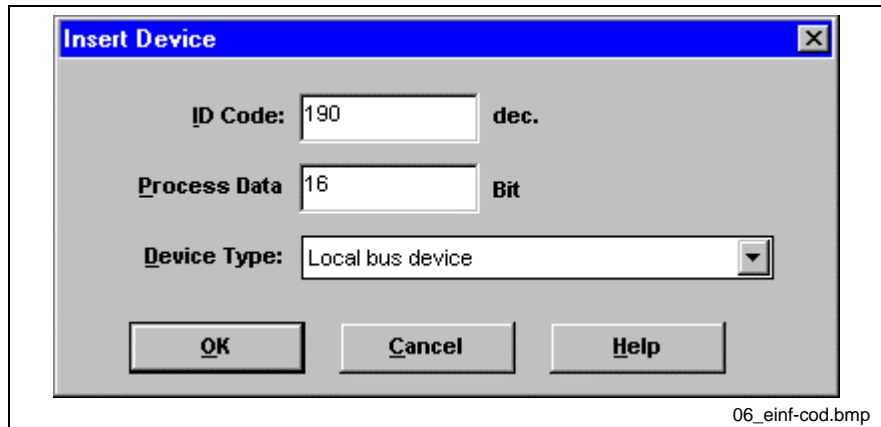


Fig. 6-15: Insert device with ID code ...

- | | |
|-----------------------------|---|
| ID code | Enter the ID code of the device to be inserted here. After each entered digit the device type is determined and displayed in the appropriate box. The ID code is printed on most of the devices in decimal form. |
| Hex./dec. | These options allow you to specify a format for the ID code you enter. You can choose between decimal (dec.) and hexadecimal (hex.) format. If you already have entered an ID code, it is automatically converted to reflect the option you select. |
| Process Data Channel | Enter the process data channel length in bits. Upon pressing the "OK" button, the input in the "Device type" box is compared with the ID code. |
| Parameter Channel | If you have entered a value in the ID code box that points to a PCP device with a variable parameter data channel length, you can enter the length of the parameter data channel here. |
| Device Type | The device types are stored here. The display of the "ID code" is automatically updated depending on the value of the ID code and if the ID code is clear. The following device types exist: <ul style="list-style-type: none"> • Local bus: Is displayed, if the appropriate bit is set in the ID code. • Remote bus: Is displayed, if this is a remote bus device without bus terminal functionality. • Bus coupler with local bus branch: Is displayed, if the ID code refers to a bus terminal. • Bus coupler with remote bus branch: Is displayed, if the ID code has the value of 12. |

Menu "Edit ... Insert with Description"

With this menu item you insert a new device at a marked device in the bus configuration. A device description must exist in the in the database for the device to be inserted. If this is not the case you will have to insert the new device with its ID code and process data channel width with the aid of the menu item "Insert with ID Code".

If the marked device is a bus terminal, you must first determine whether the device to be inserted belongs in the local bus (branching (OUT1)) or in the remote bus (outgoing (OUT1)).

Bus Terminal A bus terminal links a local bus or an installations remote bus with the remote bus.

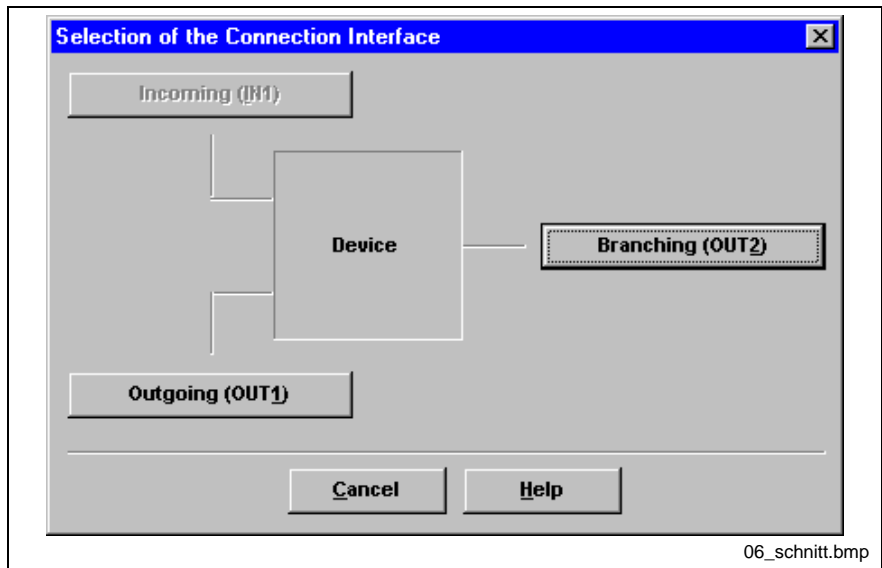


Fig. 6-16: Selection of the outgoing interface

After selecting the interface select a device from the device data base.

If you have inserted a with variable ID code and/or variable process data length you will be requested to determine this data for the inserted device.

Dialog Box "Define Process Data Length"

In the following dialog boxes you define the length of the process data or for the device to be inserted. This dialog boxes are only available on devices with a variable ID code or with a variable process data length (e.g Slave devices, DZIs etc.)

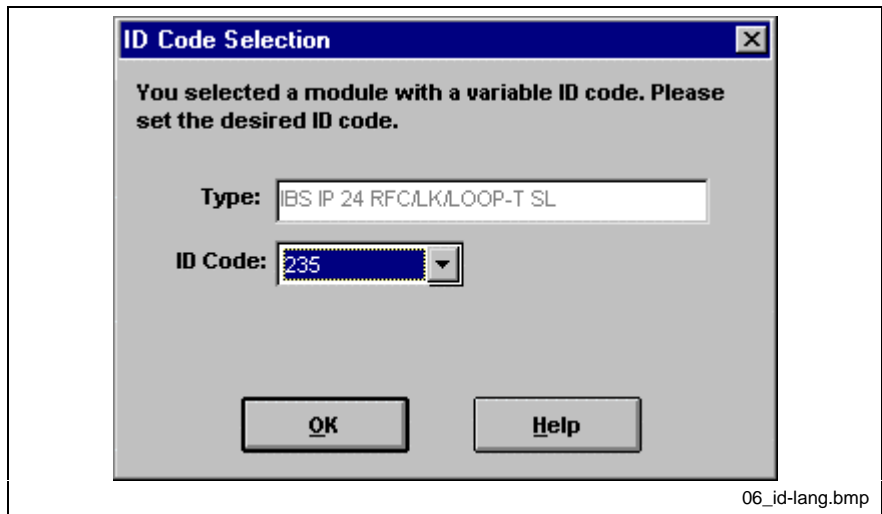


Fig. 6-17: Select process data length



Fig. 6-18: Define process data length

Dialog Box "Device Database"

In the device data base, every device is stored in lines with "Group", "Manufacturer", "Type", "ID" and "PD length".

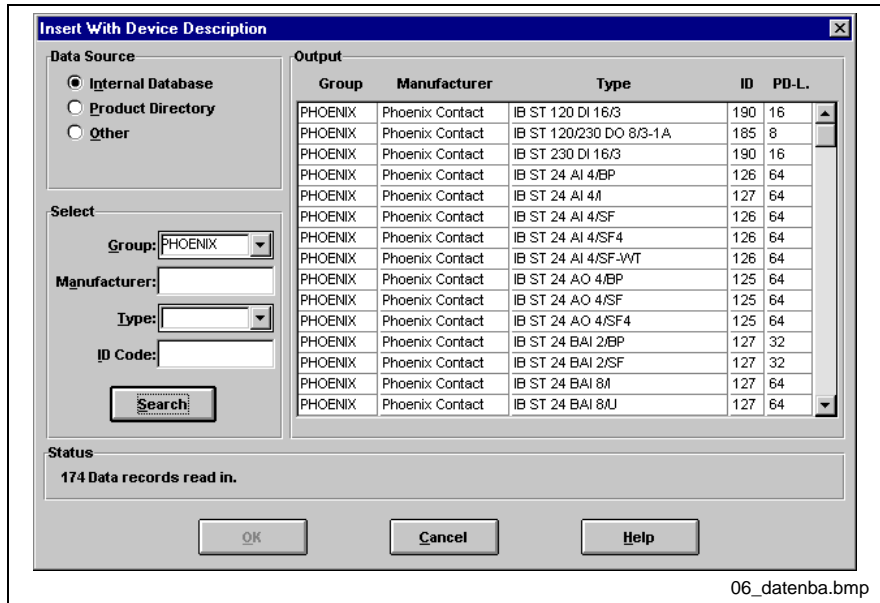


Fig. 6-19: Device database

- Data Source** Here you specify from which data source the device database is to be loaded.
- Internal Database** The internal IBS CMD G4 program database is supplied on the installation disks. Check this option if you wish to utilize the internal database.
- Product Directory** The product directory is a CD-ROM which is published at regular intervals by the INTERBUS-S Club e.V. and contains device descriptions of the various INTERBUS devices. To use the CD-ROM, you need to specify in the dialog box "Extras ... Options ... Device Database" the drive letter of your CD-ROM drive.
- Others** You can install additional IBS CMD G4 databases besides the internal database and the product directory. These databases are available from third-party vendors for their devices. If you mark the option "Others", a selection box is displayed in which you can select the required device database.
- Select** Here you can enter search filters for selecting certain devices. To do this, you can use the wild card character "*" (as in MS DOS) to select certain areas. Click the "Search" button to search through the database according to your criteria.

Example:

Entering "P*" in the "Group" box lists all group entries which start with the letter "P".

The most important search filters are predefined in the "Group" and "Type" boxes. You can select these predefined search filters by clicking on the selection box at the right hand side of the box.

In the selection box "Group", INTERBUS devices are listed by manufacturer.

These are for the internal database:

PHOENIX:	Current Phoenix Contact devices
PHOE-OLD	Devices of Phoenix Contact which are not included in the current catalog (expiry models)
PHOE-PRJ	Special Phoenix Contact variants and developments
MMICOM	Devices based on the MMICOM specification
ENCOM	Devices based on the ENCOM specification
DRIVECOM	Devices based on the DRIVECOM specification

Output The device descriptions found according to the criteria entered in the "Select" area are listed here and can be selected by clicking-on.

Status Here is displayed whether data records are currently read in and how many data records have been read in.

Menu "Edit ... Link with description"

If you have determined the bus configuration with "Read Again" or created with "Insert with ID Code", only standard devices are represented in the bus configuration. A standard device contains the following information:

- IDENT Code (ID Code)
- Process data channel length (PD length)
- Standard Icon

The **ID Code** contains the low-order byte of the device code which describes the function of the device.

To link the bus devices with a device description from the device database and thus with real existing products, use the "Link with Description command".

Only device descriptions can be assigned whose ID code and process data channel length match the data of the respective standard bus device.

Depending on whether you call the command "Link with Description" from the "Controller Board" element or from a device, the function of the command changes.

Link with description (from "Controller Board" element)

All bus devices can be linked consecutively with a device description. You can end the link at any time with the "Cancel" button.

Link with description (from "Device" element)

Only the devices in the current bus segment are linked, starting with the selected device. For every device in the bus segment you can select whether you want to link this device.

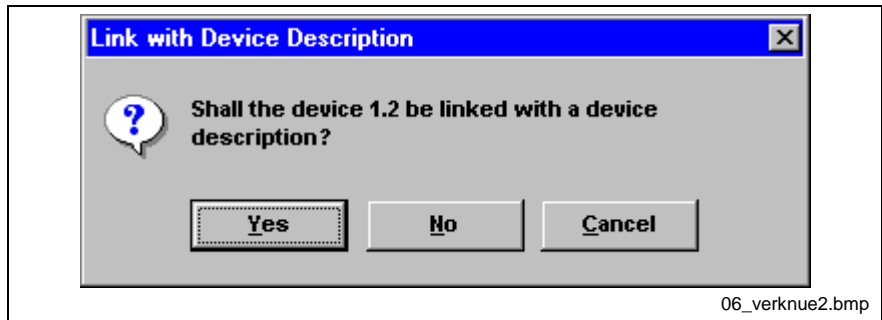


Fig. 6-20: Link?

- Yes** Use this command to link the displayed device with a device description from the database whose ID code and process data channel length match those of the current device. After this link, the dialog box is called for the next bus device in the bus segment.
- No** Use this command if you don't want to link the displayed device with a device description from the database. After this selection, the dialog box is called for the next bus device in the bus segment.

If several suitable entries for a device are found in the database, you can select the entry suitable for your application from a list in the following dialog box.

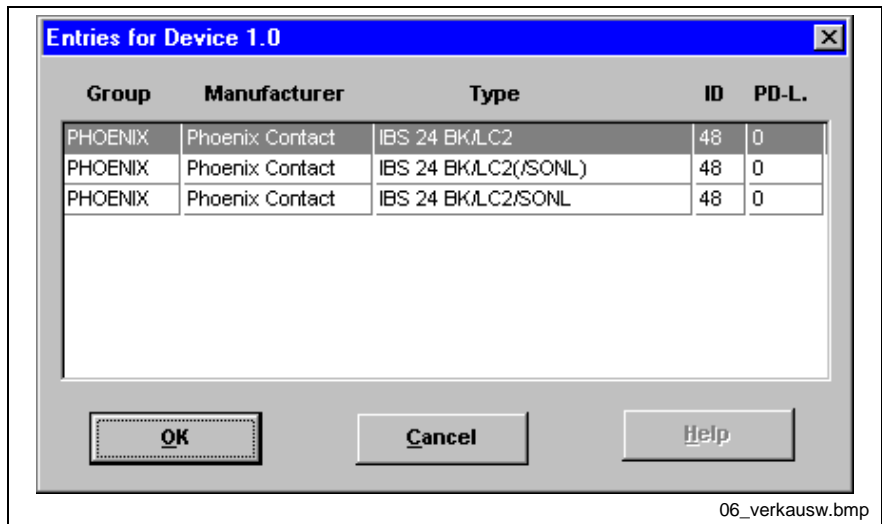


Fig. 6-21: Select device for connection

- Group** In this column, the device group is displayed. All INTERBUS devices in the database are assigned to a group.
- Manufacturer** The device manufacturer appears in this column (e.g. Phoenix Contact).
- Type** The device name (e.g. IBS ST 24 BK-T) appears here.
- ID** In this column, the ID code appears in decimal notation.
- PD Length** The process data channel length appears here.

Menu "Edit ... Re-assigning Device Numbers"

You can use this command to re-assign the device numbers. The command works differently depending on whether it is accessed from the controller board's context menu or a bus terminal.

Controller Board When a command is accessed from controller board's context menu, all the INTERBUS devices are renumbered. Starting with device 1.0 all the remote bus segments (1.x, 2.x...etc.) and all local bus devices are numbered consecutively.

Bus Terminal When the command is accessed from a bus terminal's context menu, all the local bus devices connected to the module are numbered consecutively.

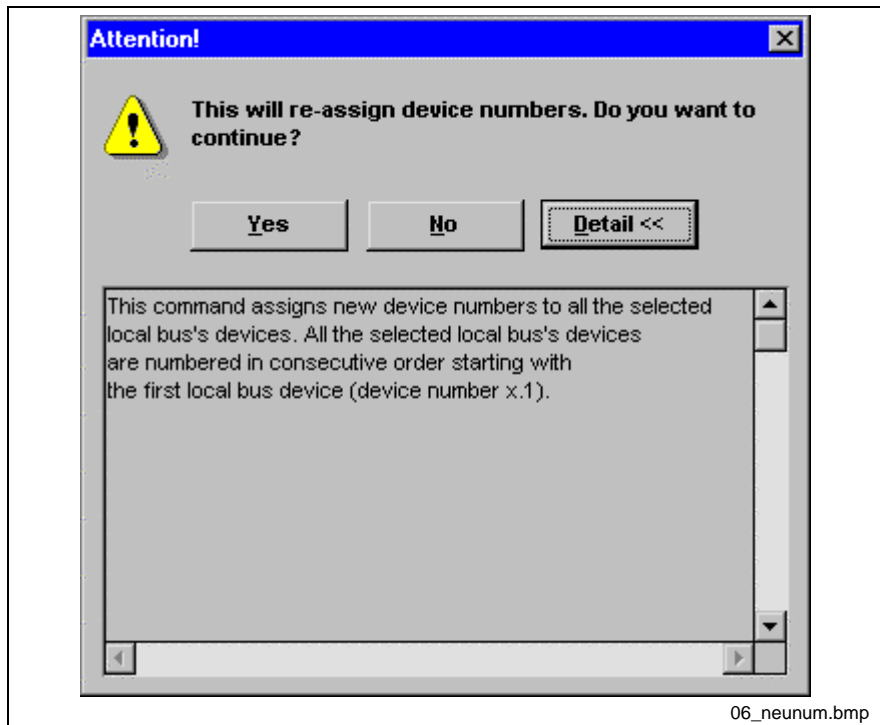


Fig. 6-22: Re-assigning device numbers

Note: If you are using the device numbers as parameters in your application program or in the IB function blocks, you will have to renumber the parameters accordingly to the devices.

The assignment between process data descriptions and preprocessing variables remains unaffected by the new numbering. When devices are renumbered, all device numbers are automatically transferred to the process data assignments.

6.3 Menu "View ..."

You determine the representation of the bus devices with this menu.

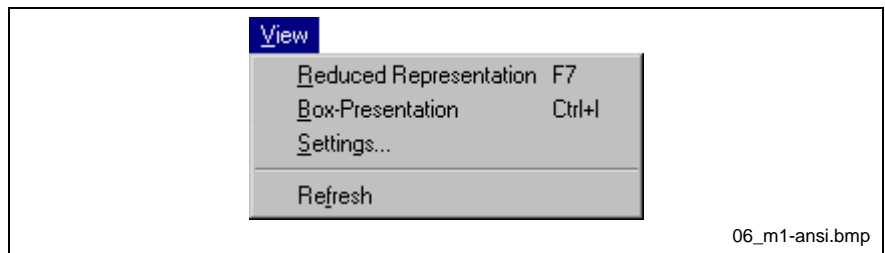


Fig. 6-23: Menu "View ..."

Menu "View ... Reduced Representation"

With this command you can change between the standard representation and the reduced representation of the bus configuration display.

A check next to this menu item indicates that the reduced representation is used at the moment.

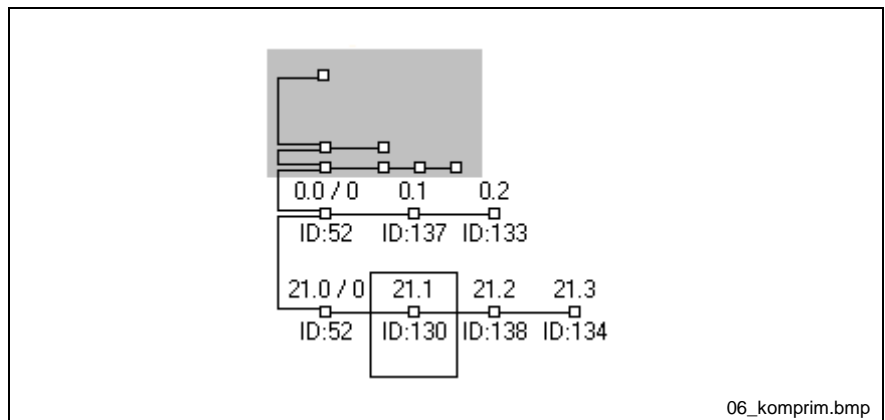


Fig. 6-24: Reduced representation

Use this command to get an overview of the bus topology.

Menu "View ... Box Display"

You can use this command to change the way in which the device bus configuration is displayed. You can toggle between standard and box display.

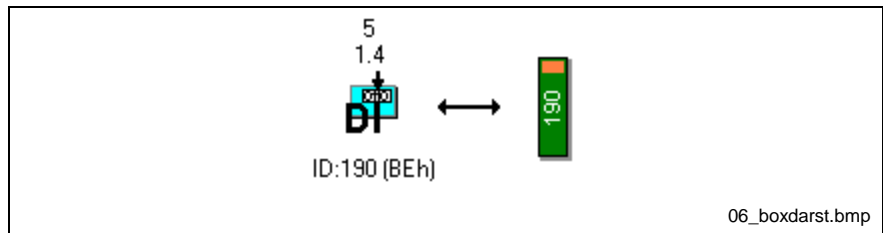


Fig. 6-25: Box display

Standard Display In this mode, you can display the essential device information. The device icon can be selected in an icon library (ICL file). You can specify which device data is displayed in the dialog box "Settings" on the menu "View".

Box Display In box display mode, you can select the device information (select one item) that is to appear on the standardized device icon (box). The box display is specially designed for Inline devices; however, it can also be used for any INTERBUS device.

Reduced Representation This display mode is designed to provide an overview of the entire bus configuration connected to the controller board.

Menu "View ... Settings ..."

Use this command to define the standard box display, the box display and the reduced display of the bus topology.

Decide on what information should be displayed and their respective representation type using the option and dialog boxes.

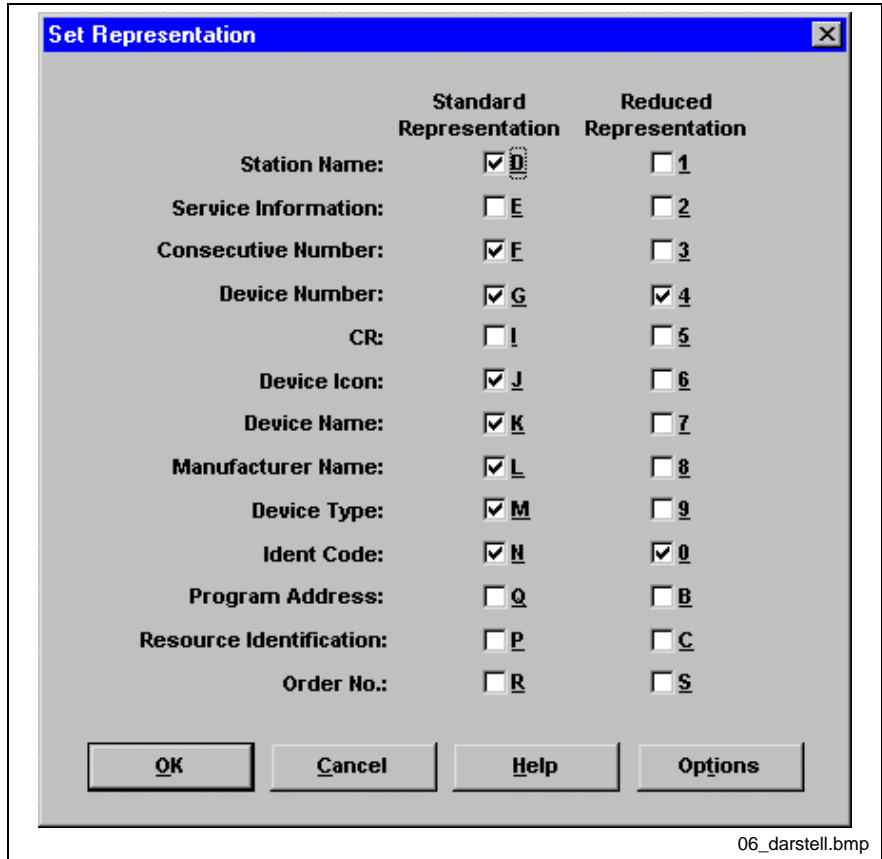


Fig. 6-26: Set representation

Standard Representation Indicate all option boxes in this column which shall be displayed in the standard representation of the bus devices.

Reduced Representation Indicate all option boxes in this column which shall be displayed in the reduced representation of the bus devices.

The individual boxes can also be selected with the keyboard by entering the letter or number, respectively, on the right hand side of the option box

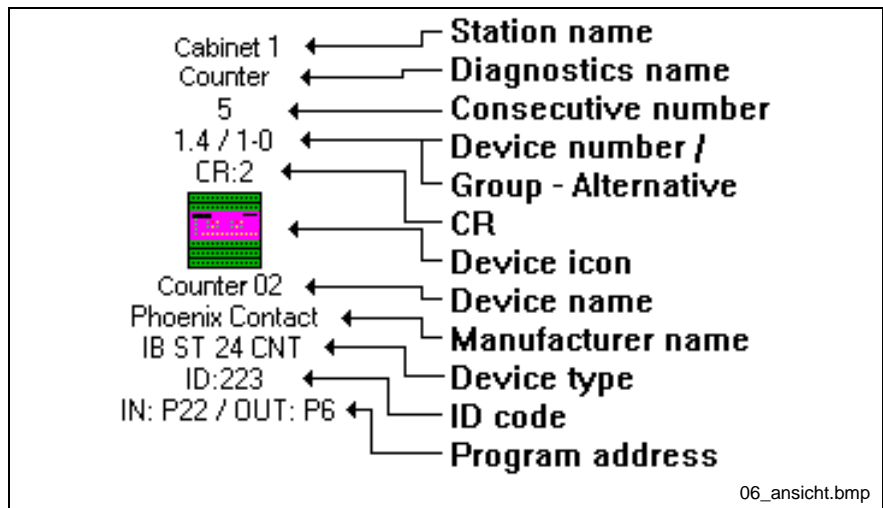


Fig. 6-27: Representation of a device

Note: In the representation area, only the program addresses of the standard process data descriptions are displayed!

Program Address If the display of the program address contains the wild card character "*" (e.g. IN:*), another process data description or a variable is assigned to process data description of this device.

Service Info in the bus configuration, the Service Info is displayed in three brackets ([1234][1234][1234]). Each pair of brackets may contain up to four characters. This display method was chosen because it matches the Service Info display on certain controller boards. The diagnostic display has three rows each of which can display four characters.

Buttons

Options Here, you can define the box display and the size of the local bus.

Dialog Box "Display Options"

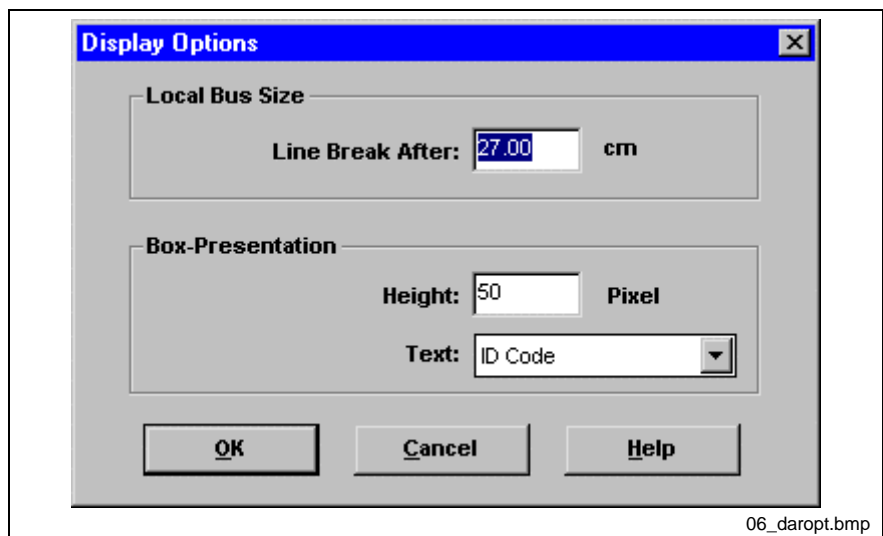


Fig. 6-28: Display Options

Local Bus Size

Line Break After: Set the horizontal extents of the bus configuration as a value in centimeters. This value is only of relevance when printing the graphical bus structure. A line break is forced on local buses with many devices when the specified width is exceeded.

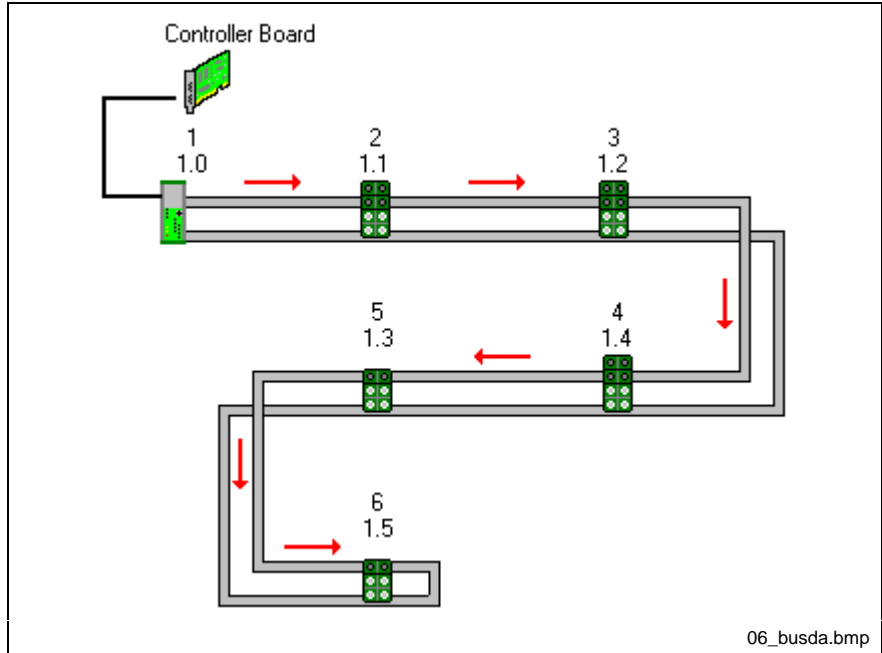


Fig. 6-29: Box display

Box Display

Height Here you can set the height of the device icon in the box display. You can vary the height in order to adapt the box display to the length of the label. Set a low box height for a label with ID code and a higher value for a label with device name.

Label You can specify which device data is used to label the devices in the box display.

The setting you make applies – as well as the height setting - to all devices in the project.

Menu "View ... Refresh"

After renaming devices or changing the bus configuration, it may be necessary to update the representation area. To do this, use the menu item "Refresh". When this command is executed, the bus configuration with all current settings is refreshed on the screen.

The graphic representation of malfunctions or errors is also updated.



Fig. 6-30: Error at device x.y

6.4 Menu "Configuration ..."

If you press the right mouse button on a selected element in the representation area, a context menu containing all functions available for this element opens. In addition to that, the entries in the menus are adapted to the element.

The following menu items are available for the elements:



Project

Description ...

Export project data (<Project_name>.PEX) ...

EPLAN Viewer



PLC/PC

Description ...



Program

Description ...



Controller Board

Description ...

Process Data ...

Settings ...

IB Function Blocks >

Parameterization >

Control >

Type ...

Device Registration



Parameterization Memory

Description ...

Write ASCII File >

Write ...

Read ...

Compare ...

Delete

Format

File >



Preprocessing

Description ...

Variables ...

Programming

Import



Configuration Frame

Description ...

Read Again

Compare



Device

Description ...

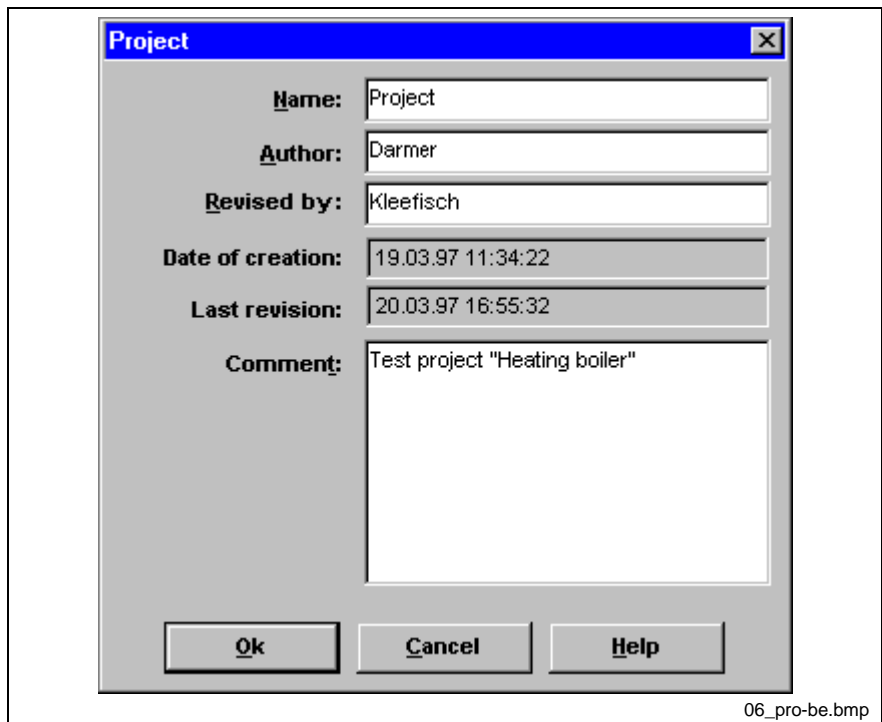
Process Data ...

Device Registration

Device Parameterization

Menu "Project ... Description"

All data serves to describe the current project clearly with its features.



06_pro-be.bmp

Fig. 6-31: Project description

The entry in the input box "Name" is also displayed in the representation area of the main window.

In the input box "Comment" you can insert the text in order to describe the project in more detail. For this purpose, eight text lines with the width displayed in the dialog box are available.

Menu "Project ... Export Project Data (<Projekt_name>.PEX)"

You can use this command to export the IBS CMD G4 project for further processing in other applications. The exported data contains the entire BG4 project and is available as PEX file. The PEX file is an ASCII file in which the individual entries are separated by commas (CSV = Comma Separated Value).

You can process the PEX file in a word processing application, a spreadsheet program or a database and you can import it back into IBS CMD G4 if required.

Menu "Project ... EPLAN Viewer ..."

If you have installed the viewer for EPLAN projects, you can start it by clicking-on this menu item.

You can export the bus structure, the process data assignments and other parameters of the opened INTERBUS project for use in EPLAN. To do this, use the command "Write ASCII file ... EPLAN Data (*.EPL)" on the parameterization memory's context menu.

EPLAN is a CAE system to issue electrical documentation. Terminal drawings, wiring diagrams, assembly drawings, parts schedules can be created easily and quickly by using EPLAN.



Fig. 6-32: EVIEW main menu

Menu "PLC/PC ... Description"

In this dialog box you describe the PLC or PC where the controller board is installed.

The entry in the input box "Name" is also displayed in the representation area of the main window.

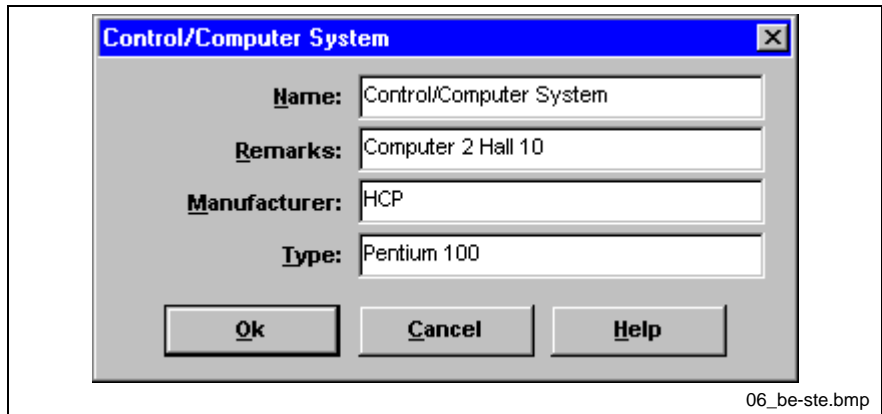


Fig. 6-33: PLC/PC description

Depending on the set controller board type, the icon of the PLC or PC changes in the representation area. The displayed icon depends on whether the it is a controller board for a PLC or for a PC.



Fig. 6-34: Element "PLC/PC ..."

Menu "Program ... Description ..."

With this dialog box you describe your application program.

The "Name" is also displayed in the representation area. Furthermore, there is an input box for remarks and one for the name of the author of the application program.



Fig. 6-35: Program description

Menu "Controller Board ... Settings"

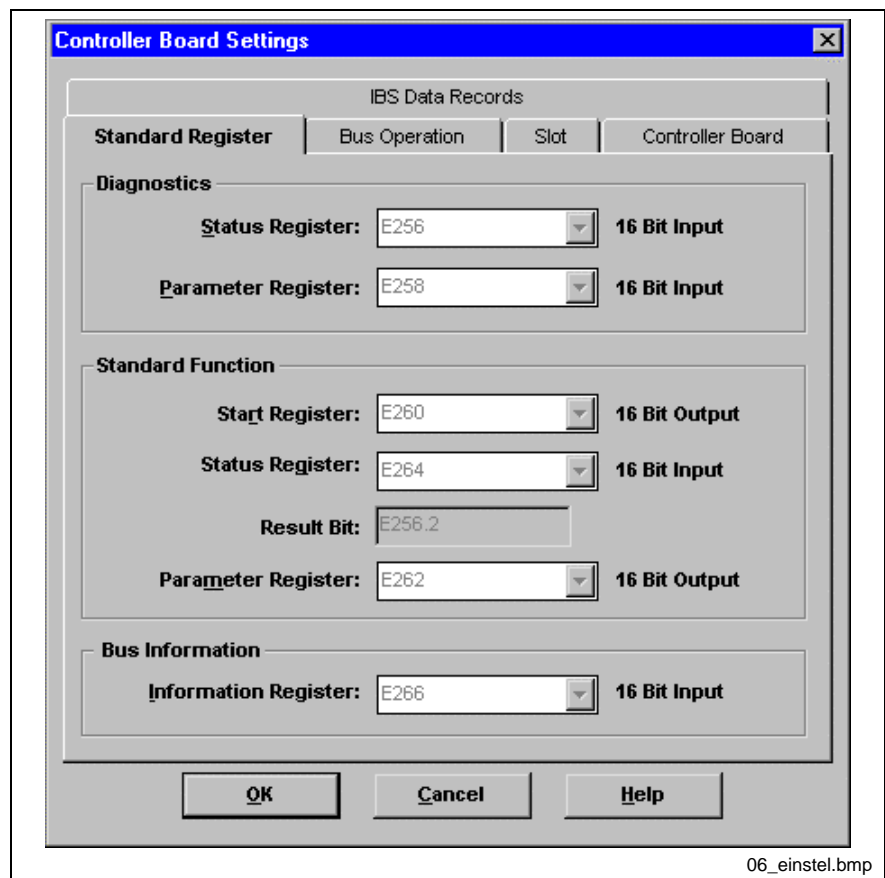


Fig. 6-36: Controller board settings

The dialog box consists of several "file cards". When you click-on a file card in the top section, the dialog part of this card is displayed.

Dialog Box "Settings ... Standard Register"

Here you determine the addresses for the INTERBUS-specific registers.

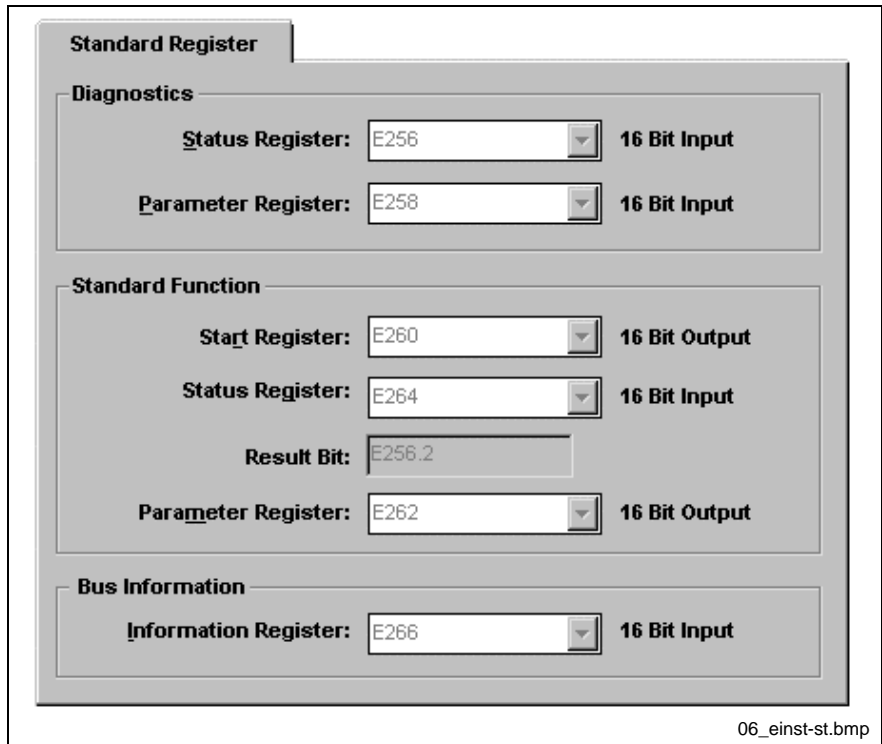


Fig. 6-37: Standard register

Diagnostic register:

- Diagnostic Status Register** The operating and error states of the controller board are stored here.
- Diagnostic Parameter Register** Error type and error location are stored here as additional data.

Standard function register:

- Standard Function Register** The firmware on the controller board provides the standard functions which can be started by setting individual bits in this register. Every standard function is assigned one bit of the standard function start register.
- Standard Function Start Register** The status of the standard functions during execution can be read from this register.
- Standard Function Result Bit** If a standard function has been executed, you can determine the result of the execution from this bit. The standard function result bit is a bit from the diagnostic status register.
- Standard Function Parameter Register** You can assign parameters to the standard functions. This parameters are communicated to the standard function by means of this register.

Diagnostic Status Register / Parameter Register

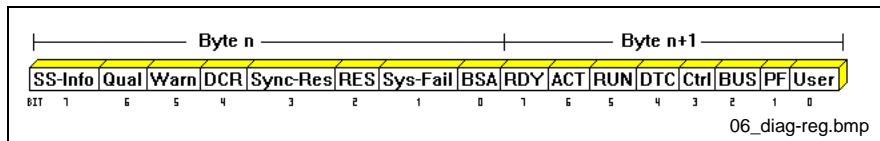


Fig. 6-38: Diagnostic register

Diagnostic Status Register

Byte n+1:

- 0 **User** User error
- 1 **PF** Peripheral fault
- 2 **BUS** Remote bus (RB) – or local bus (LB) - fault
- 3 **Ctrl** Controller board error
- 4 **DTC** Detection (bus error localization is running)
- 5 **RUN** Data cycles are running
- 6 **ACT** The bus is active (only ID cycles are running)
- 7 **RDY** Controller board is ready

Byte n:

- 0 **BSA** One or several bus segments are switched off
- 1 **Sys-Fail** Sys-Fail of the host system (lock the output data)
- 2 **RES** Result of a standard function (1 = negative)
- 3 **Sync-Res** Synchronization error (only in synchronous mode of operation)
- 4 **DCR** Data cycle error (only in synchronous mode of operation)
- 5 **Warn** Bus warning time has run out (parameterizable)
- 6 **Qual** Bus quality has deteriorated (parameterizable)
- 7 **SS-Info** There is still a message in the standard signal interface.

Diagnostic Parameter Register

The diagnostic parameter register contains additional information on the malfunction reported in the diagnostic status register. This may be the location of a malfunction (bus errors) or the type of malfunction as indicated by the error code (e.g. 0A50h for address overlapping).

Standard Function Start Register / Status Register / Parameter Register

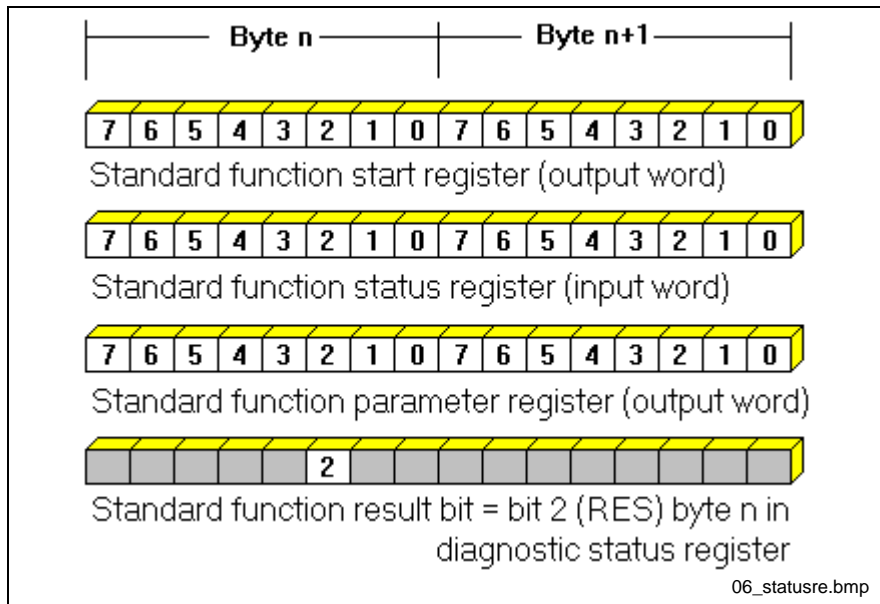


Fig. 6-39: Standard function register

Standard Function Start Register

With the standard function start register you can execute predefined and frequently used functions by setting a bit in this register. The individual bits of the standard function start register are assigned the following functions:

- Byte n+1 bit 0: Start the INTERBUS system
- Byte n+1 bit 1: Stop the INTERBUS system and the reset the outputs
- Byte n+1 bit 2: Clear diagnostic display
- Byte n+1 bit 3: Switch off device
- Byte n+1 bit 4: Switch on device
- Byte n+1 bit 5: Jumper device
- Byte n+1 bit 6: Cancel device jumpering

Standard Function Start Register

You can monitor the running process with the standard function status register. As long as a function is processed, the corresponding bit is set in the standard function status register. The bit is reset to zero after processing irrespectively of whether or not the service could be executed successfully.

Standard Function Parameter Register

The functions on the bits

- Byte n+1 bit 1:
- Byte n+1 bit 3:
- Byte n+1 bit 4:
- Byte n+1 bit 5 and
- Byte n+1 bit 6:

require another parameter for execution. You can enter this parameter in the standard function parameter register. This parameter represents the configuration frame number for the function on bit 1 and the device number for the functions on bit 3 to bit 6

Standard Function Result Bit This bit indicates whether the currently executed function has been terminated successfully or not. The "RES" bit is part of the diagnostic status register (byte n bit 2).

RES = 1 function not terminated successfully

RES = 0 function terminated successfully

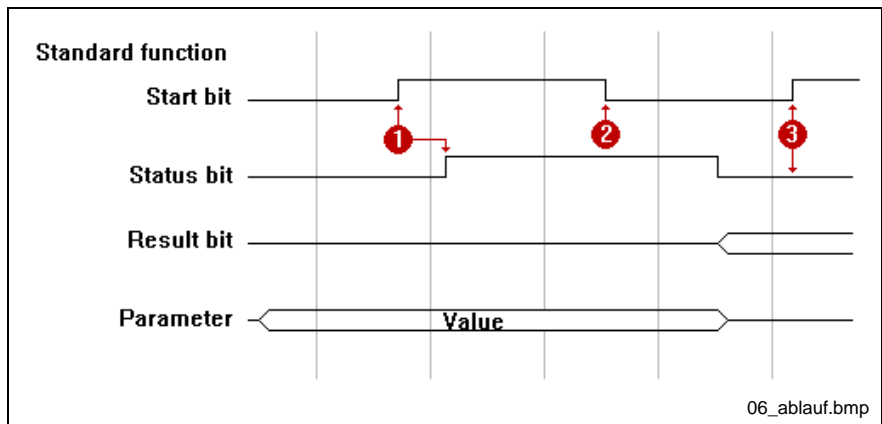


Fig. 6-40: Flow chart "Standard functions"

1

The function execution which you start with the standard function start bit is displayed by the status bit.

2

You have to reset the start bit after recognizing the status bit.

3

You should only set the start bit if the status bit indicates that the function is completely executed.



ATTENTION

⇒ Only **one** function can be executed at one time. The next function cannot be started until the execution of the first function has been completed.

Dialog Box "Settings ... Bus Mode"

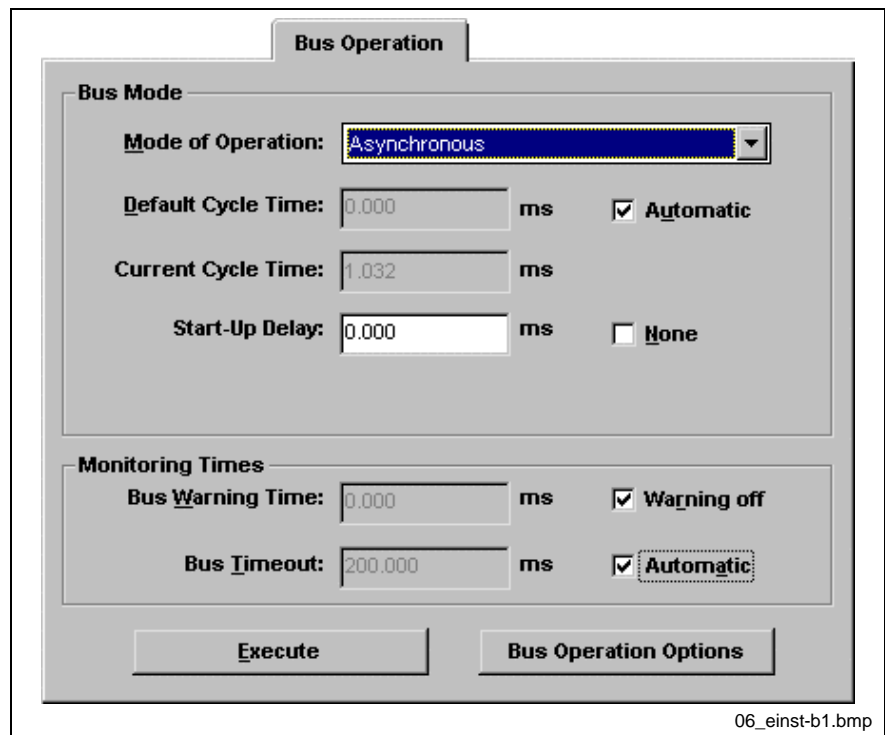


Fig. 6-41: Settings "Bus Mode"

Bus mode

- Mode of Operation: Asynchronous** Running of the bus cycles takes place in the shortest possible time for the configuration and is not linked to any further events.
- Mode of Operation: Bus Triggered** The application program receives a message (interrupt) as soon as a bus cycle is terminated. In this mode of operation the application program waits for the end of the current running INTERBUS cycle.
- Mode of Operation: Program Triggered** The controller board receives a message (interrupt) as soon as an application program is terminated. In this mode of operation the controller board waits for the end of the current running application program cycle.
- Default Cycle Time** The default cycle time must be greater than the minimum cycle time for the respective bus configuration. Depending on the bus configuration, the length of the minimum cycle time can vary. If no default cycle time is specified, or the specified default cycle time is too small, the minimum cycle time is adopted as default value. The minimum cycle time is calculated during an ID cycle of the controller board.
The entry of a default cycle time is only effective in the "Asynchronous" and "Bus triggered" operating modes.
- Automatic** If you want to have the cycle time specified automatically from the controller board, mark this option box.
- Current Cycle Time** The current cycle time is displayed in this info box. The current cycle time is determined by the controller board when the bus is running. This display is not active in the "Configuration (Offline)" operating state.
- Start-up Delay** Enter the amount of time that is to elapse between the switching on the power supply and starting up the controller board. The start-up delay ensures that all the INTERBUS devices can be initialized before the INTERBUS starts up with the controller board.
- Automatic** When this option box is selected, the start-up delay is disabled.

Monitoring times

- Bus Warning Time** If a fault in the data transmission occurs on the INTERBUS network, the application program receives a warning message after the bus warning time. The default value for the bus warning time is 0 ms, i.e. no warning messages are generated.
- Warning Off** Even if a bus warning time was defined, you can deactivate this in this option box. If the option box is marked, the bus warning time is not taken into account.
- Bus Timeout** If a fault lasts longer than the bus timeout, the bus cycles are stopped and the INTERBUS network is switched off. The outputs are reset. The default value for the bus timeout is 20 times the cycle time but at least 200 ms. If a default cycle time is specified, the bus timeout is **not** automatically set to 20 times the value.
- Automatic** If you have marked this option box, the bus timeout is assigned automatically on the basis of existing bus parameters. One of this parameters is e.g. the current cycle time.

Buttons

- Execute** Pressing this button transfers and applies the changed settings to the controller board.

Dialog Box "Operating Mode Options"

Use this dialog box in the synchronous operating modes to synchronize the controller board with the control system or other controller boards by using interrupts.

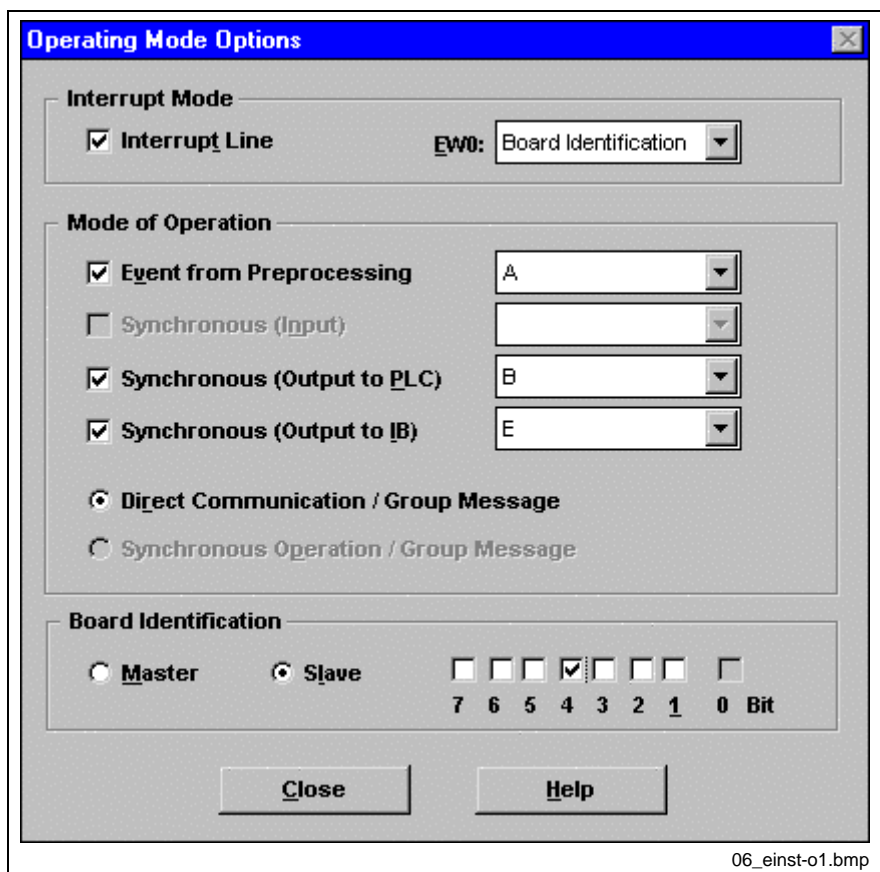


Fig. 6-42: Operating mode options

Interrupt mode

Interrupt Line Mark this option box, if you want to use the control system's interrupt lines. The interrupt lines A to F are physical leads on the backplane (data and control bus on the back of the control rack).

The option "Interrupt Line" option enables the "Event from Preprocessing" and "Synchronous (Output)" options.

EW0 To see the interrupts in the address area (process data area) select "Board ID" in this selection box. Depending on the board ID the interrupts are displayed within the EW0 process data word. If you select the entry "Process Data" in the "EW0" selection box instead, the input word 0 is not used for interrupts but to represent process data.

Operating mode

Event from Preprocessing You can send interrupts from the preprocessing to the control system and other controller boards. If you want to use this option, select this option box. A special function block is used in the preprocessing to generate the event.

Synchronous (input) When this option is selected the controller board will react to external interrupts (e.g. from other controller boards). Thus, you can synchronize the INTERBUS with other controller boards.

Synchronous (output to PLC) When this option is selected the controller board sends interrupts to the control system. Select this option if you want to use the controller board as clock pulse generator for the control system.

Synchronous (output to IBS) When this option is selected the controller board sends interrupts to the control system. Select this option if you want to use the controller board as clock pulse generator for other controller boards of the control system.

Direct Communication / Group Message This option is available when the entry "Board ID" has been selected in the "EW0" selection box. The EW0's low-order byte is then used to represent direct communication. The group messages are in the EW0's high-order byte. Direct communication also has to be selected in the S5 control system's synchronization block.

Synchronous Operation / Group Message This option is available when the entry "Board ID" has been selected in the "EW0" selection box. The EW0's low-order byte is then used to represent synchronous operation. The group messages are in the EW0's high-order byte. Direct communication also has to be selected in the S5 control system's synchronization block.

Board ID

Specify whether the controller board is to operate as master or slave within the control system. At least one of the controller boards used has to be configured as a master.

Note: Identical board Ids may not be assigned within a control system.

Master Mark this option box to configure the board as a master.

- Slave** Mark this option box to configure the controller board as slave. Select a bit that will serve as unique identification for the board in the control system.
- Bit (7..0)** Select the controller board's slave here. You can configure up to seven controller boards in the control system as slaves in this way. Bit 0 is reserved for the "Master" board ID and is automatically set.
- Interrupt mode of the host system**
The following settings have to be made in the S7 environment in the same way.
- Function** The interrupt mode's function is set to "Process Alarm" by default.
- INT-Line to CPU** Set the control system's interrupt line that is to be used. The interrupt lines 1 to 4 are physical leads on the backplane (data and control bus on the back of the control rack).
- Alarm OB** Select the operation block (OB) to be invoked with an interrupt.

Note: The settings should match those in the S7 environment.

Dialog Box "Settings ... Controller Board"

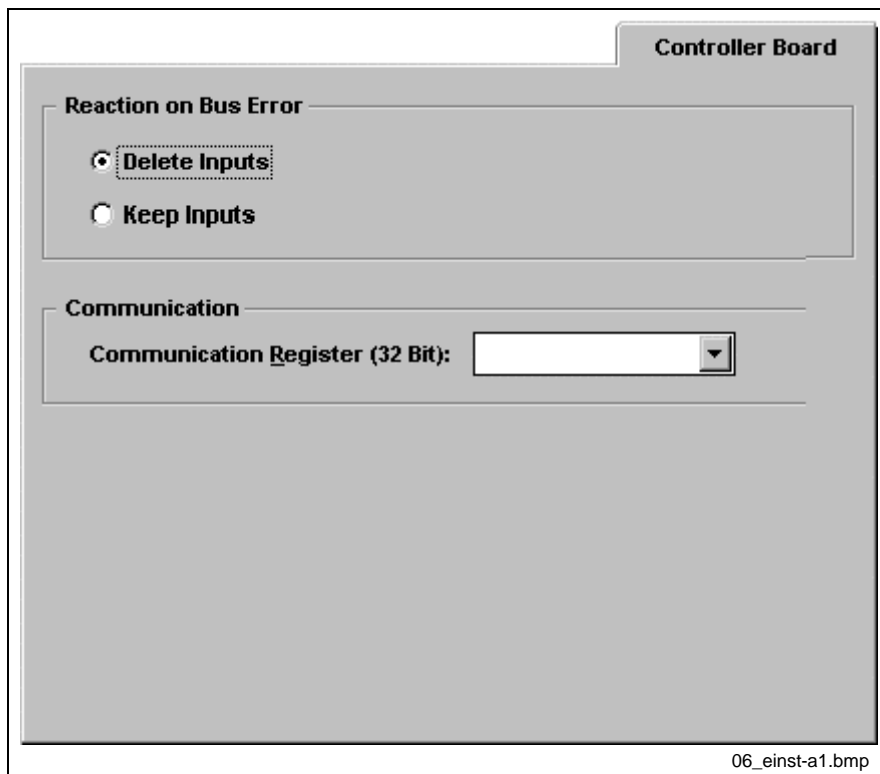


Fig. 6-43: Settings "Controller Board" (S5, S7 400 and BA)

Dialog Box "Settings ... I/O Coupling"

System couplers and some controller boards have, in addition to the function of a controller board, the property of appearing as a device in the INTERBUS system or connecting another bus system to the INTERBUS system. The properties of this device can be freely defined by the ID code and the process data channel length to be assigned and thus any device with process data and parameter data can be generated.

Note: When you change the process data channel length, all the device's process data descriptions are re-initialized. In other words, this will delete process data descriptions (except the new, default ones) and assignments!

Fig. 6-44: Settings I/O Coupling

ID data

- ID Code** Set the ID with which the device is to appear in the INTERBUS system. In the case of system couplers, this is the ID code used for the device in the higher-level INTERBUS system.
- Process Data Channel** In this selection box you can choose the process data channel length of the device in the INTERBUS or in the higher-level INTERBUS system in case of system couplers.
- Parameter Channel** The length of the parameter data channel is displayed here. This value is derived from the ID code.
- CR in the higher-level bus**
- CR** To exchange data with higher-level bus, the communication reference (CR) of the PCP device (system coupler) must be specified in the higher-level bus.
- Activate** You can activate or deactivate the use of CR. The CR is activated if you have marked the option box.

Menu "Controller Board ... Parameterization"

Menu "Controller Board ... Edit Parameterization ..."

Use this menu item to define one or more sequences (parameterizations) of INTERBUS actions. You can select one of the defined parameterizations to have it executed when starting up the controller board.

An action is a service assigned with parameters or a predefined service sequence.

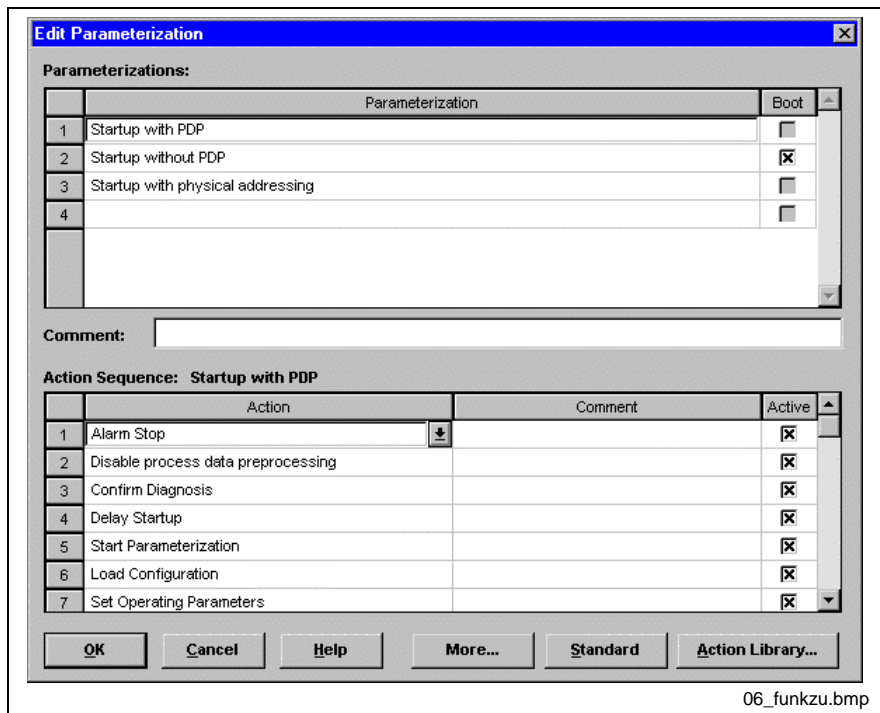


Fig. 6-45: Context menu "Edit Parameterization"

Parameterizations

Parameterization Name	Contains the name of a defined action sequence. The name must not be longer than 64 characters. The parameterization name must be unambiguous and may only be assigned once.
BOOT	A parameterization is assigned the BOOT attribute if it is to be executed when starting up the controller board. Only one of the defined parameterizations can be assigned to the BOOT attribute.
Comment	You can describe the selected parameterization in more detail in this input box.
Action Sequence	This table indicates which actions are assigned in what order to the above selected parameterization. When you have marked a box, you can select an action from the selection list appearing here.
Action Name	This column indicates the name of the selected action. With the button "Action Library" you can edit the action or add a new action. The texts in the boxes of this column cannot be edited directly.
Comment	You can describe the selected action in more detail in this input box.
Active	You can activate or deactivate individual actions within a parameterization. If the option box is marked, the action is taken into account while executing the parameterization.

Buttons

Action Library To define new actions, use the button "Action Library".

Standard Use this button to undo all the changes you have made and restore the original (default setting) parameterizations.

The following diagram shows the relationship between parameterization, action and (firmware) service. A parameterization is composed of actions. An action is a service assigned with parameters or a non-editable sequence.

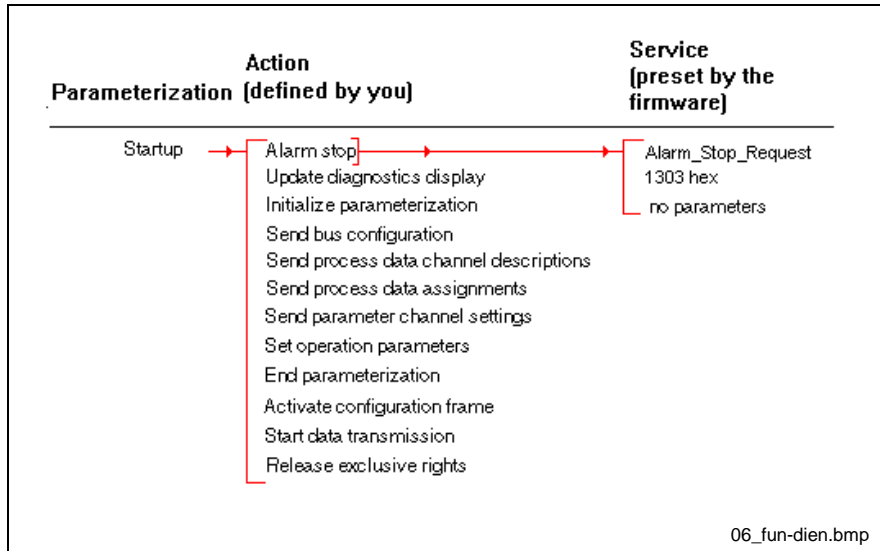


Fig. 6-46: Parameterization/action/ service

More ... This button only appears when a BG4 project of an earlier IBS CMD G4 version is loaded. Here you can determine and change the addresses that were assigned to actions in the old project.

Context Menu "Edit Parameterization"

The "Edit Parameterization" dialog box has a context menu for easy-to-use operation of the dialog box. Like the other context menus, you call up this menu with the right mouse button or with <Shift> + <SPACE> or <Shift> + <F10>.

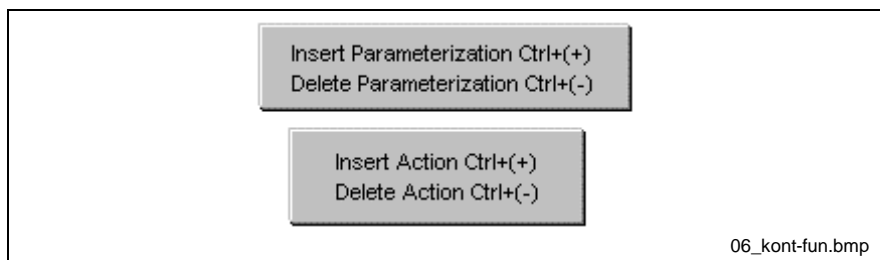


Fig. 6-47: Context menu "Edit Parameterization"

Depending on whether the mouse pointer is in the "Parameterization" or "Action Sequence" area, the appropriate context menu appears.

Insert Parameterization/Action This command inserts a new parameterization/action in the dialog box above the marked line.

Delete Parameterization/Action The command deletes the marked line from the dialog box.

Dialog Box "Action Library"

In this dialog box you can edit an existing action (or one selected in the "Edit Parameterization" dialog box). You can also create new actions, i.e. services parameterized to meet your requirements.

After selecting the action, the "Comment" and "Used in Parameterization" info box are always updated. When this dialog box is called, the selected action name is transferred to the "Action Name" input box.

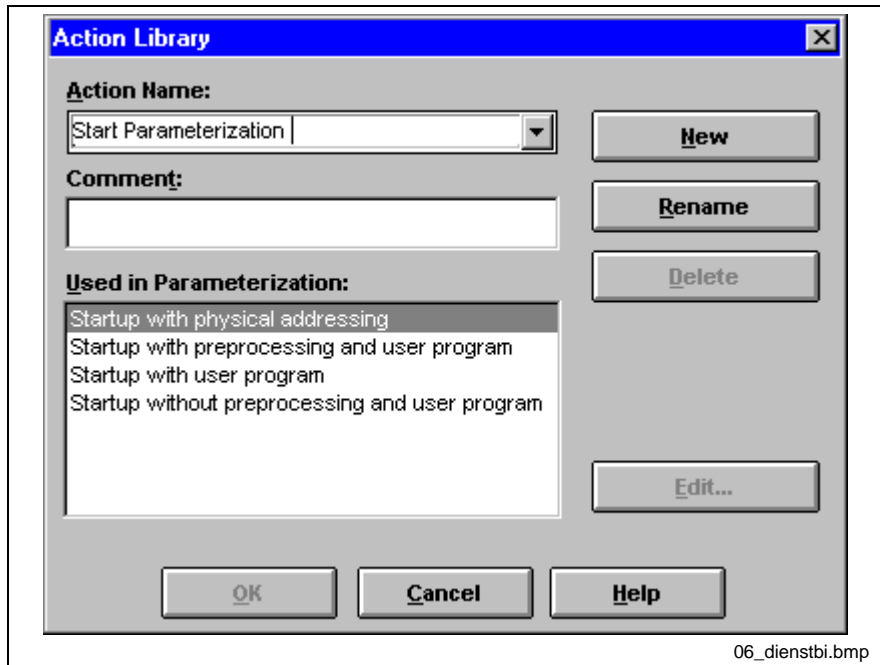


Fig. 6-48: Action library

- Action Name** This selection box contains the name of the action which is to be edited or changed. If an action already exists, the button "Rename" is enabled (the "New" button is disabled). The "Comment" and "Used in Parameterization" boxes are automatically updated. As soon as you enter a character to create a new action, the button "New" is enabled (the button "Rename" and "OK" are disabled).
- Comment** Here you can describe the respective action in more detail, e.g. to clarify your function. This comment is then indicated in the action sequence.
- Used in Parameterization** This input box shows you in which parameterizations the above displayed action is already used.
- Buttons**
- New** After the complete input of the new action name, confirm this name with the "New" button. Then you go to the action editor with the "Edit" button to enter the parameters necessary for the new action.
 - Rename** With this button you can rename the selected action.
 - Delete** With this button you can delete the selected action from the list.
 - Edit** To edit an action, select the "Edit" button.

Dialog Box "Action Editor"

In this dialog box you can assign parameters to the firmware services (requests) and store them under a previously selected action name. The structure of the firmware services cannot be changed. With the action editor, however, you have the possibility to adapt all services to your requirements by using corresponding parameters. This parameterized and commented services can then be combined in parameterizations and stored on the controller board.

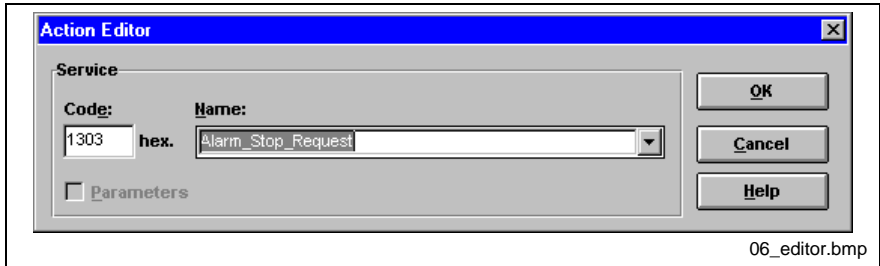


Fig. 6-49: Action editor without parameter

Service

- Code** This box contains the value of the firmware service. Each firmware service has a four-digit hexadecimal code.
- Name** This box contains the service name in its original form. This name is clearly linked to the four-digit code. Select the service which you want to use and parameterize from this list.
- Parameters** If parameters follow the firmware service you have selected, this option box is marked and the dialog box is extended by the following area:

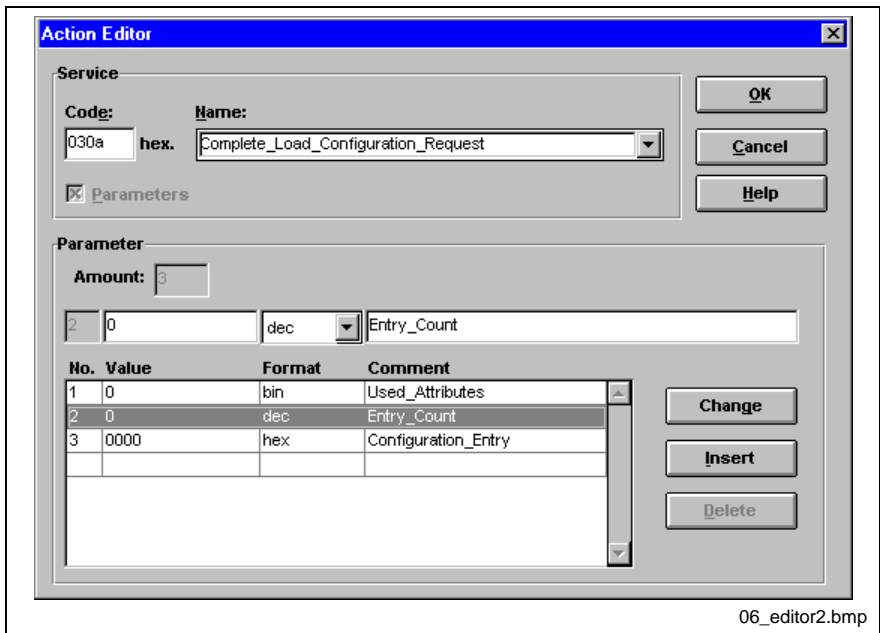


Fig. 6-50: Action editor with parameter

Parameters

This area shows the parameters of the service specified above. Pre-requirement is that appropriate parameters are defined for the service.

The list contains the parameters of the service. There is always a blank entry at the end of the list so that at least one blank entry exists. You can append a maximum of 510 parameters to a service. The parameter list is pre-assigned from a service data base.

The input boxes above are updated according to the selected line.

Amount Here you can see how many parameters follow the service or how many parameters you have entered in the parameter list.

The line under the info box "Amount" is the input line for the parameters. Here you enter your changes for "Value", "Format" and "Comment".

No. Consecutive number of the parameter.

Value Enter the value in this input box which you want to assign to the parameter. While entering the value please note the data format set in the option box "Format".

Format

Comment Here you can enter a text to describe the respective parameter.

Buttons

Change Enter a new value for the parameter values in the input box and press this button. Then, the entry is transferred to the parameter list.

Insert The function of this button refers to the line which has just been selected. The entries in the input boxes are checked. In case of a positive result, the entries are written in one line that is inserted before the marked line. The button cannot be selected, if the service does not allow you to insert further parameters.

Delete The function of this button refers to the currently marked line. The marked line is deleted. The button cannot be selected, if the service does not allow you to delete parameters.

Format The format of the entry "Value" can be selected. An already inserted value is converted into the appropriate format, if you change its display format in this box.

The following formats exist:

hex Hexadecimal

dec Decimal

dec,dec Decimal input for the high-order or the low-order byte of a 16 bit integer. The order is: <high>, <low>.

Bin Binary

When the list window is opened, a selected format is not transferred until the list window is closed again. The original status of the opened list window can be restored by pressing the <ESC>-key.

Transfer of a list becomes valid with a column change or by pressing the <Return>-key.

Parameterization, Actions and Their Services

Every INTERBUS parameterization consists of a sequence of actions. The actions, in turn, consist of a firmware service assigned with parameters. Some actions are special because they consist of several services. This (special) actions cannot be edited or deleted. All actions take their parameters from the currently loaded project.

Actions of the "Start-Up With Processing" parameterization:

Action Name	(Service) Code
Alarm Stop	1303h
Lock Preprocessing	0750h
Update Diagnostic Display	0760h
Initiate Parameterization	030Eh
Send Bus Structure	(Special) action
Set Operating Parameters	(Special) action
Send Process Data Channel Descriptions	(Special) action
Send Process Data Assignments	(Special) action
Send Process Data Channel Settings	(Special) action
Delete Macros	0144h
Send Macros	(Special) action
Delete User Functions	0149h
Send User Functions	(Special) action
Delete Events	014Eh
Send Events	(Special) action
Exit Parameterization	030Eh
Send Preprocessing	(Special) action
Activate Configuration Frame	0711h
Release Preprocessing	0750h
Start Data Transmission	0701h
Release Exclusive Rights	014Fh

Fig. 6-51: Actions of the "Start-Up With Processing" parameterization

Actions of the "Start-Up With Processing" parameterization:

Action Name	(Service) Code
Alarm Stop	1303h
Update Diagnostic Display	0760h
Initiate Parameterization	030Eh
Send Bus Structure	(Special) action
Set Operating Parameters	(Special) action
Send Process Data Channel Descriptions	(Special) action
Send Process Data Assignments	(Special) action
Send Process Data Channel Settings	(Special) action
Delete Macros	0144h
Send Macros	(Special) action
Delete User Functions	0149h
Send User Functions	(Special) action
Delete Events	014Eh
Send Events	(Special) action
Exit Parameterization	030Eh
Activate Configuration Frame	0711h
Start Data Transmission	0701h
Release Exclusive Rights	014Fh

Fig. 6-52: Actions of the "Start-Up With Processing" parameterization

Actions of the "Start-Up With Physical Addressing" parameterization:

Action Name	(Service) Code
Alarm Stop	1303h
Update Diagnostic Display	0760h
Read Configuration Frame From Bus	0710h
Start Data Transmission	0701h
Release Exclusive Rights	014Fh

Fig. 6-53: Actions of the "Start-Up With Physical Addressing" parameterization

(Default) Actions:

Alarm Stop

- Alarm_Stop_Request (1303_{hex})

Delete User Functions

- Delete_Signal_Object_Request (0149_{hex})

Start Data Transmission

- Start_Data_Transfer_Request (0701_{hex})

Update Diagnostic Display

- Confirm_Diagnostics_Request (0760_{hex})

Delete Events

- Delete_Event_Object_Request (014E_{hex})

Request Exclusive Rights

- Change_Exclusiv_Rights_Request (014F_{hex})

Release Exclusive Rights

- Change_Exclusiv_Rights_Request (014F_{hex})

Activate Configuration Frame

- Activate_Configuration_Request (0711_{hex})

Read Configuration Frame From Bus

- Create_Configuration_Request (0710_{hex})

Delete Macros

- Delete_Action_Object_Request (144_{hex})

Exit Parameterization

- Control_Parameterization_Request (030E_{hex})

Initiate Parameterization

- Control_Parameterization_Request (030E_{hex})

Release Preprocessing

- Set_Value_Request (0750_{hex})

Lock Preprocessing

- Set_Value_Request (0750_{hex})

(Special) actions:

Send Bus Structure

- Initiate_Load_Configuration_Request (0306_{hex})
- Load_Configuration_Request (0307_{hex})
- Terminate_Load_Configuration_Request (0308_{hex})

Set Operating Parameters

- Set_Value_Request (0750_{hex})

Send Process Data Channel Descriptions

- Initiate_Put_Process_Data_Description_List_Request (0320_{hex})
- Put_Process_Data_Description_List_Request (0321_{hex})
- Terminate_Put_Process_Data_Description_List_Request (0322_{hex})

Send Process Data Assignments

- Initiate_Load_Process_Data_Reference_List_Request (0324_{hex})
- Load_Process_Data_Reference_List_Request (0325_{hex})
- Terminate_Load_Process_Data_Reference_List_Request (0326_{hex})

Send Process Data Channel Settings

- Load_CRL_Attribute_Loc_Request (0264_{hex})

Send Macros

- Initiate_Load_Action_Object_Request (0140_{hex})
- Load_Action_Object_Request (0141_{hex})
- Terminate_Load_Action_Object_Request (0142_{hex})

Send User Functions

- Initiate_Load_Signal_Object_Request (0145_{hex})
- Load_Signal_Object_Request (0146_{hex})
- Terminate_Load_Signal_Object_Request (0147_{hex})

Send Events

- Initiate_Load_Event_Object_Request (014A_{hex})
- Load_Event_Object_Request (014B_{hex})
- Terminate_Load_Event_Object_Request (014C_{hex})

Send Preprocessing (03A0_{hex})

Dialog Box "Parameterization Data"

This dialog box only appears, when a project from IBS CMD G4 Version 4.16 or earlier is opened. In the projects in these versions of IBS CMD G4 it was possible to assign each action (a row or parameterization sequence) a control or computer address. Actions were executed via these addresses.

To create new, user-defined parameterization sequences (user functions), please use the IB function blocks.

To determine and utilize the start, status and result addresses in the old BG4 projects, the following dialog box is provided for each line in the parameterization sequence.

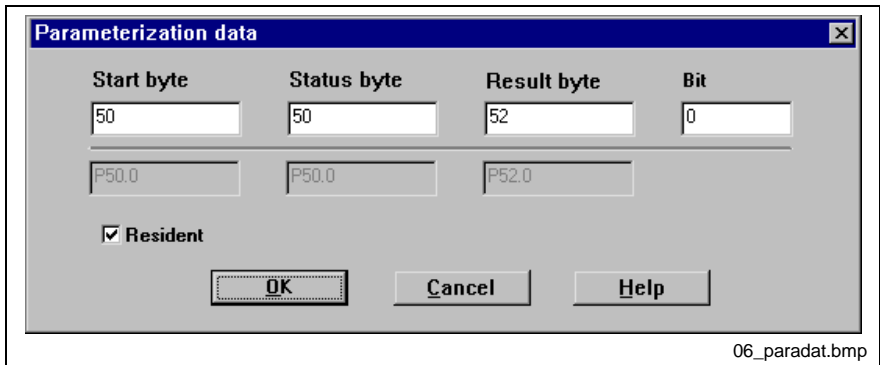


Fig. 6-54: Parameterization data

The edit boxes with a white background show the syntax of the address as it was entered in the old BG4 project. The syntax of the converted addresses for the currently selected controller board type is displayed in the gray display boxes below.

Resident

To be able to start an action via an assigned address, the address assignments have to be transferred to the controller board. Mark this option box to be able to execute and monitor the actions via the assigned addresses.

Menu "Controller Board ... Parameterization ... Check"

All parameterization data of the bus configuration is checked. If an error could be localized, the affected device and the cause of the error are output in a message window.



⇒ A bus terminal's current is **not** checked. If you load a bus terminal with too many local bus devices, it may not have enough power for all devices.

ATTENTION

Menu "Controller Board ... Parameterization ... Import ..."

With this menu item, you can import a parameterization (or several parameterization sequences) from a file. The file has the file name extension "PAX". The file is opened in a Windows standard dialog.

The entire parameterization is saved in a PAX file which has been there at a certain time in an opened project.

Menu "Controller Board ... Parameterization ... Export ..."

With this menu item, you can export the parameterization in a file. The file has the file name extension "PAX". The file is saved in a Windows standard dialog.

The entire parameterization available in the current projects is saved in the PAX file.

Menu "Controller Board ... Parameterization ... Execute"

With this dialog box, you can execute individual actions or action sequences, so-called parameterizations. The parameters of these actions and parameterizations are taken from the currently open IBS CMD G4 project or you defined them in the action library.

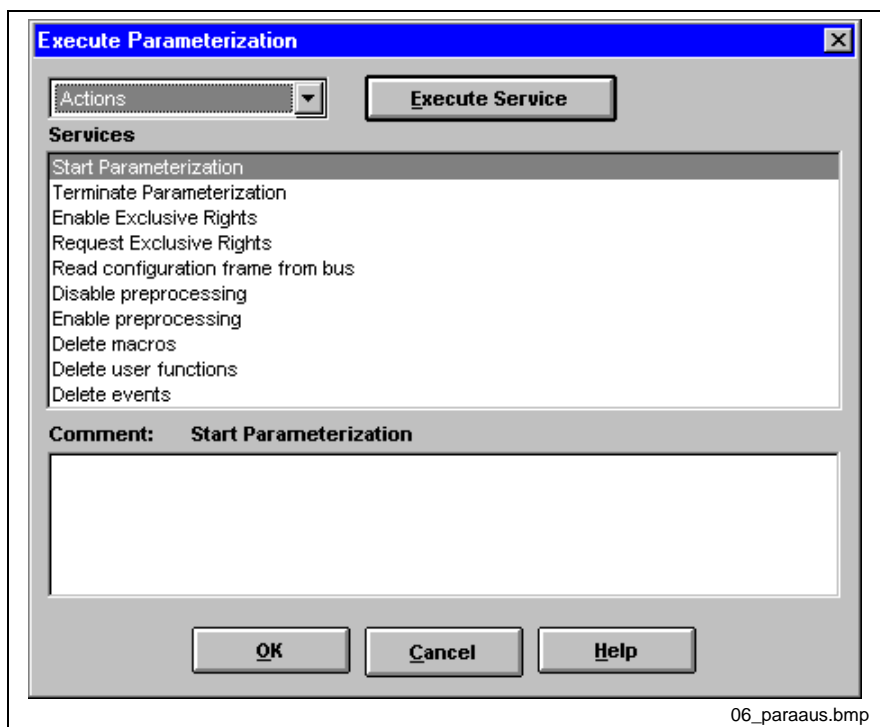


Fig. 6-55: Execute parameterization

In the above selection box, you can choose whether you want to execute a parameterization or an action. Depending on the setting in this box you will see a list of available actions or parameterizations.

Comment In the input box "Comment" you can comment on the parameterization or action you have just selected.

Parameterizations Different start-up behaviors of the INTERBUS can be realized with the parameterizations. For example, a start-up with or without preprocessing. The parameters of the actions of which the parameterization consists, are taken from the currently open IBS CMD G4 project and the actions you have defined.

Actions This list contains individual actions. Actions are services assigned with parameters or also pre-defined service sequences. Some actions are permanently defined and cannot be deleted or edited. This non-editable actions consist of several services and take their parameters from the current bus configuration.

Menu "Controller Board ... Control ..."

With these commands you can easily operate your controller board and thus activate the individual operating states of the controller board.

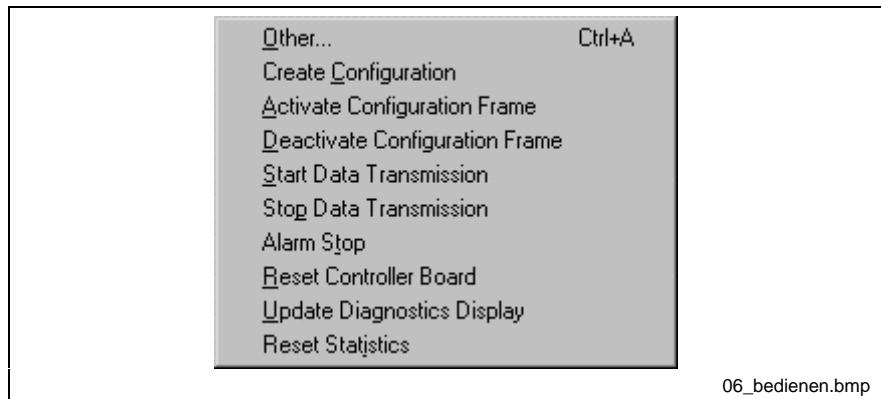


Fig. 6-56: Control parameterization

All commands listed under this menu item can only be executed in the "Extended" range of functions and only after confirming a security prompt.

Operating States of the Controller Board

The Generation 4 controller boards know the following operating states:

- READY (RDY)** The controller board has run the self-test successfully and is ready to function. However, a configuration frame may exist which is not activated. You can only change from the "READY" state to "ACTIVE" state with "Controller Board, Control, Activate Configuration", if there is a configuration frame on the controller board. If no configuration is frame is active, you can change from "READY" to "ACTIVE" with the "Configuration Frame, Read Again" command.
- ACTIVE (ACTV)** A configuration frame is active on the controller board. ID cycles are transmitted at regular intervals ("BA" LED flashes on the devices).
- RUN (RUN)** Data cycles are transmitted.

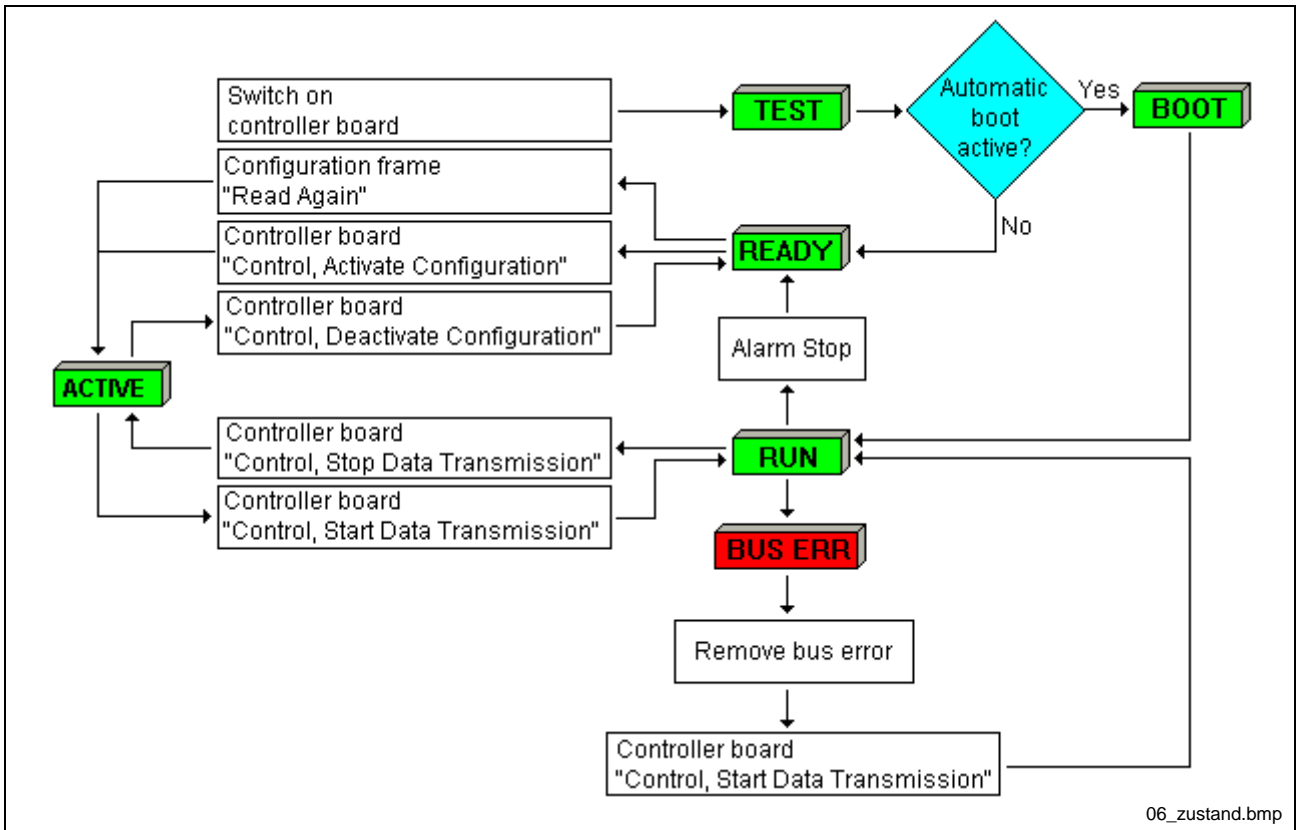


Fig. 6-57: Operating states of the controller board

Menu "Controller Board ... Control ... Other ..."

You can select individual services from this dialog box and execute them directly. If you have marked the "Display Service Results" option, you will be shown the result (the CONFIRMATION) of the service in dialog box. This dialog box is the "Action Service Editor" dialog box which you will also find under the "Parameterization Edit ..." menu command.

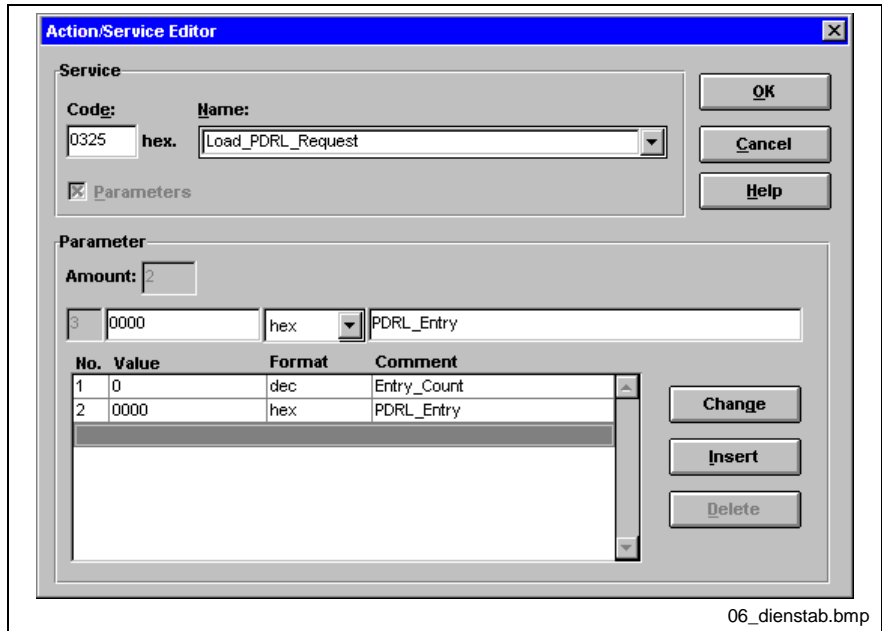


Fig. 6-58: Action/service editor

If you have selected a service and entered parameters where necessary, you can transfer the service to the controller board with the "OK" button where it can be executed.

Menu "Controller Board ... Control ... Create Configuration Frame"

This command creates a configuration frame on the controller board that contains the physically connected bus configuration. This command does not affect the bus configuration displayed in IBS CMD G4, nor does it affect the current project. After a configuration frame has been created on created on the controller board, the bus can be put into operation using "Start Data Transmission".

Menu "Controller Board ... Control ... Activate Configuration Frame"

This command checks that IBS CMD G4's configured data of the configuration frame matches the currently connected configuration. If no error is found, the controller board switches the bus devices of the configuration frame active. The controller board displays the "ACTIVE" state (BA LEDs flash).

To activate a configuration frame, the controller board must be in the "READY" state. IBS CMD G4 always activates the configuration frame "1".

Menu "Controller Board ... Control ... Deactivate Configuration Frame"

Note: The active configuration frame can be deactivated with this command, if the controller board is in the "ACTIVE" state. If the configuration frame is not active or if the controller board is in the "RUN" state, an error message is output. You have the possibility to configure different configuration frames in the configuration phase by deactivating a configuration frame and to activate and deactivate them for testing.

Note: Before a new configuration frame is activated, the previous one must be deactivated as only one configuration frame may be active at any time.

Menu "Controller Board ... Control ... Start Data Transmission"

This program command activates the cyclic data traffic on an INTERBUS network. The controller board must be in the "ACTIVE" state. The controller board is in the "RUN" state after successfully executing this command.

Menu "Controller Board ... Control ... Stop Data Transmission"

This program command stops the cyclic data traffic on an INTERBUS network. The controller board changes from the "RUN" to the "ACTIVE" state.



ATTENTION

⇒ The moment at which this program command is executed, must be timed to the current system state, as the actuator outputs of the active bus devices remain in the current state at the stop time. The controller board displays the "ACTIVE" state.

Note: To ensure that the outputs are reset at the same time as the INTERBUS system is stopped, use the "Alarm Stop" command.

Menu "Controller Board ... Control ... Alarm Stop"

This program command stops the cyclic data traffic on an INTERBUS network. The outputs of all bus devices are reset. The command is executed immediately after completion of the current data cycle. The controller board changes from the "RUN" to the "READY" state.

Menu "Controller Board ... Control ... Reset Controller"

This program command resets the controller board and thus the outputs of the bus devices. Then, the controller board runs its self-test until it reaches the "READY" state. If a parameterization memory with a valid and bootable parameterization exists, this parameterization is loaded and executed.



ATTENTION

⇒ Note that the outputs are also reset by resetting the controller board. This may lead to dangerous situations depending on which functions you have assigned to this outputs.

Menu "Controller Board ... Control ... Update Diagnostic Display"

This command updates the diagnostic display on the front panel of the controller board and the contents of the diagnostic register.

Menu "Controller Board ... Control ... Reset Statistics Counter"

You can use this menu item to delete all the statistical data like TOP Ten and Peripheral Bus Malfunctions stored on the controller board. You can call-up this command also from the "Diagnostics" add-on program.

Menu "Controller Board ... Description"

The controller board controls the data traffic on the INTERBUS network. Here you can describe the controller board with name and remarks. All other boxes are not editable.

The input boxes "Manufacturer" and "Type" are read from the initialization of the project. The input box "Version Info" is read from the controller board as soon as the first online connection was established.

Among other things, the input box "Version Info" contains information on the firmware version.

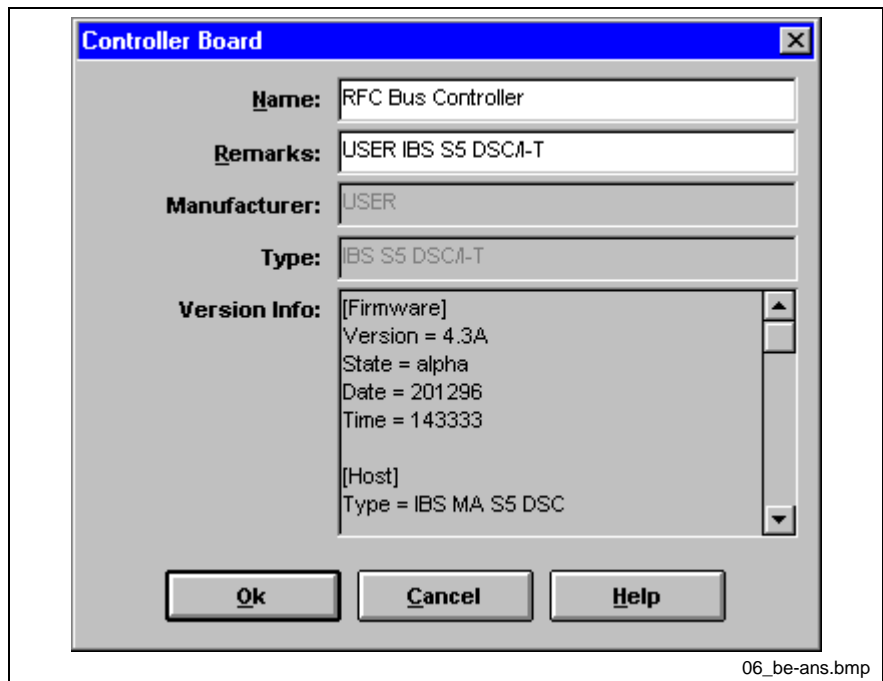


Fig. 6-59: Controller board description

Menu "Controller Board ... IB Function blocks ..."

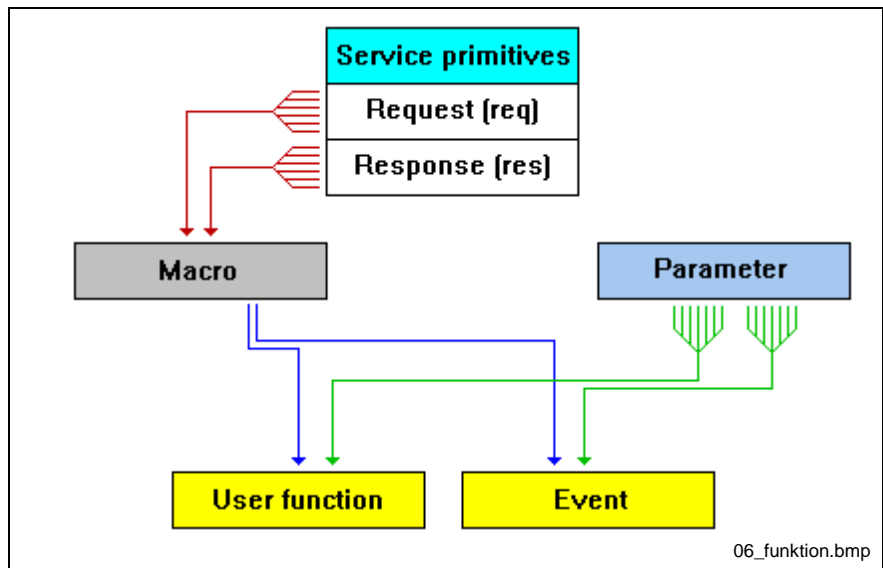


Fig. 6-60: User functions/events/parameters

You can define user functions and events with the "IB Function Blocks" menu. These user functions and events are each assigned **one** macro and – depending on the selected service primitives – different numbers of parameters.

User functions can be started by setting a bit in the application program.

Events are started, when the INDICATION defined in an event appears.



Fig. 6-61: Menu "IB Function Blocks"

Menu "Controller Board ... IB Function blocks ... User Functions ..."

You create the user functions in this dialog box. A user function is a macro assigned with parameters. You can start and monitor an user function from your application program. The addresses (bit addresses) with which you start the user functions can be freely defined.

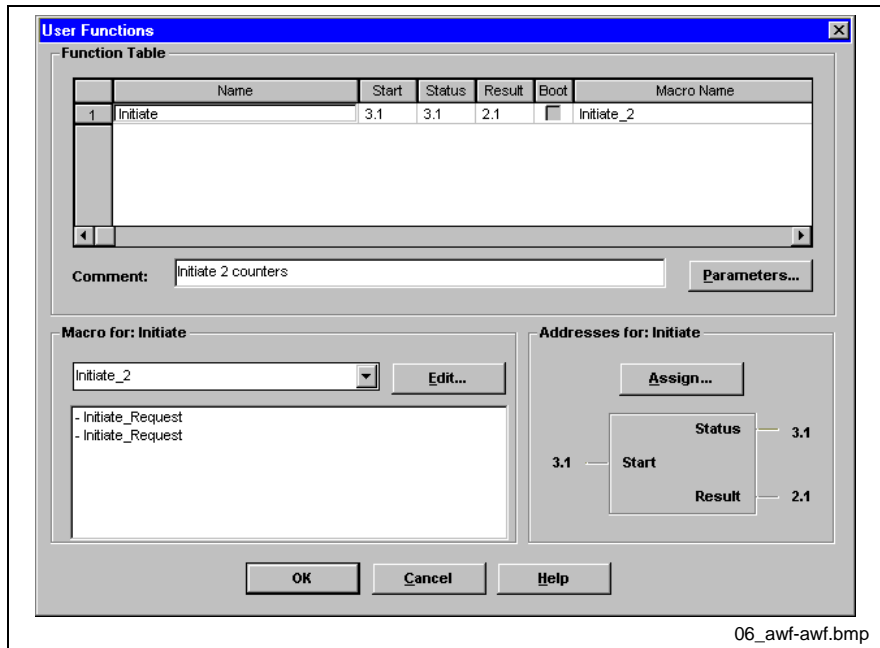


Fig. 6-62: User functions

Function table

- Name** In this column assign an unambiguous name for the user function.
- Start** In this column assign the address of the bit which starts the user function. If you set this bit to "1", you will start the user function.
- Status** After you have started the user function, you can recognize from this bit whether the user function is still being executed. This bit has the "1" state during execution of the user function. Assign the status bit address in this column.
- Result** If an user function **cannot** be successfully executed, the result bit is set. Enter the address of the result bit in this column.
- Boot** A function is assigned the BOOT attribute if it is to be executed when booting the controller board.
- Macro Name** In this column the macro name is displayed which you have assigned to the user function. To assign a macro, first mark the line of the desired user function and then select the desired macro in the "Macro for:" box.
- Comment** You can comment directly on every user function in this input box. The created comment is displayed depending on the marked user function.
- Macro for:** Select the desired macro for the marked user function in this input box. The services used in this macro are displayed in the info box below.
- Addresses for:** In this input box the addresses of the start, status and result bit are displayed which you can select with the "Assign" button.

Buttons

- Parameters ...** With this button you go to a dialog box in which you can supply the macro of the current user function with parameters.
- Assign ...** Press this button to assign the user function with the addresses for one start, status and result bit respectively.
- Edit ...** This button opens the dialog box "Macros" in which you can create, change or delete macros.

Dialog Box "Bit Selection User Function"

In this dialog box you can select the addresses for the start, status and result bit.

First select the byte addresses for "Start", "Status" and "Result" and then the "Bit" number within the byte.

The bit number must be the same for all three addresses. After ending the dialog box, the selected settings are entered in the function table.

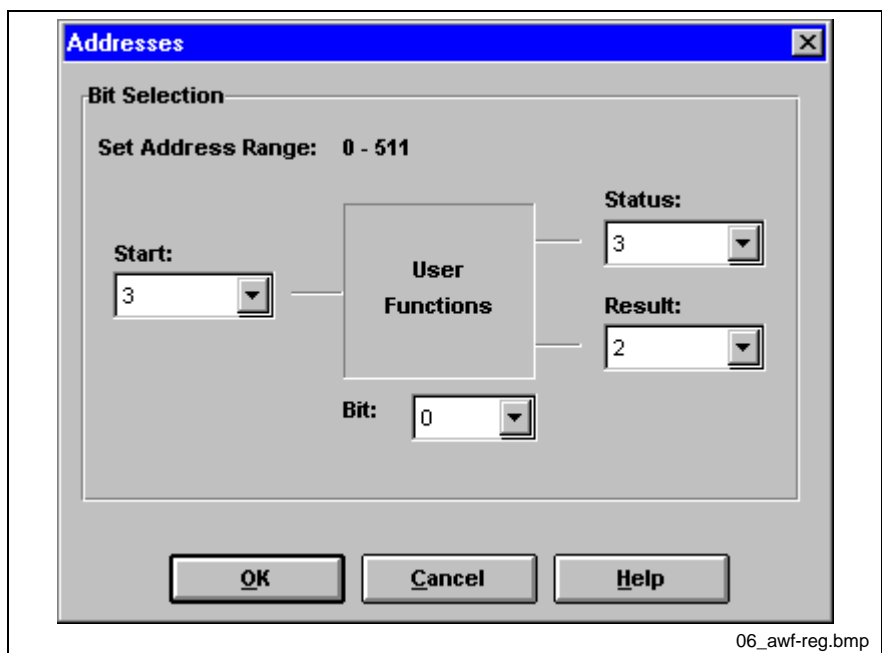


Fig. 6-63: Bit selection "User functions"

Menu "Controller Board ... IB Function blocks ... Events ..."

In this dialog box you define the events. An event is macro assigned with parameters which can be started by an INDICATION. You have to define the INDICATION which causes the start of the "Event"

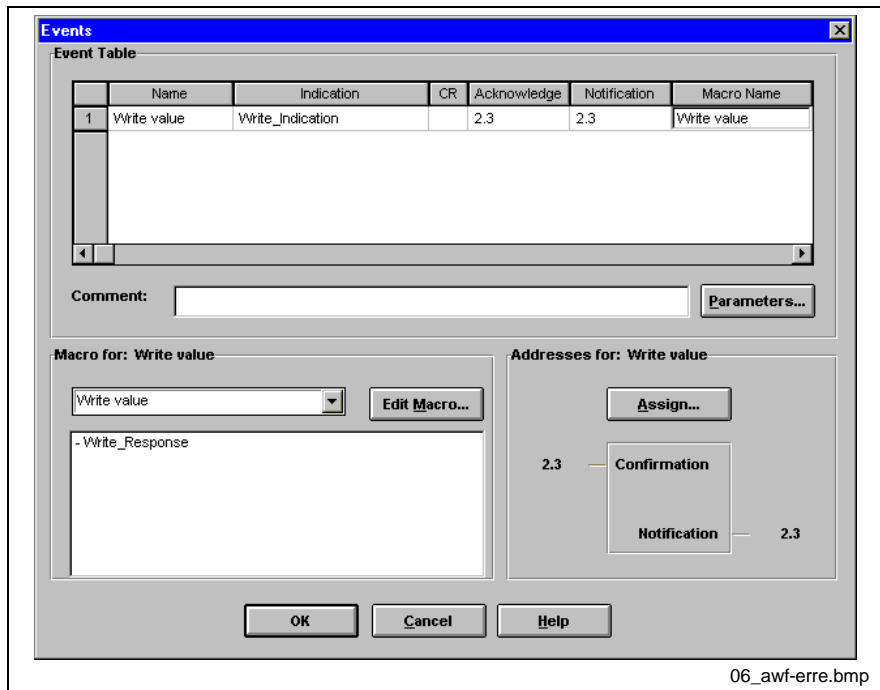


Fig. 6-64: Events

Event table

- Name** Assign an unambiguous name for the event in this column.
- Indication** In this column you select to which INDICATION the event is to react. You can create one event for every INDICATION (e.g. Write_Indication). The event is started as soon as the INDICATION arrives. An indication can, for example, be sent by a PCP device that requests a service.
- CR** Enter the communication reference (CR) of the PCP device for which the event is to apply.
- Confirmation** Enter here the address of the confirmation bit. You have to acknowledge an INDICATION by setting the confirmation bit. You can recognize an indication from the notification bit.



ATTENTION

⇒ You have to confirm every INDICATION. An unconfirmed INDICATION prevents the process of other INDICATIONS.

- Notification** Enter here the address of the notification bit. The notification bit signals the application program that an INDICATION has occurred.
- Macro Name** In this column the macro name is displayed which you have assigned to the event. To assign a macro, first mark the line of the desired event then select the desired macro in the "Macro for:" box.

Comment You can comment directly on every event in this input box. The created comment is displayed depending on the marked event.

Macro for:

Select the desired macro for the marked event in this input box. The services used in this macro are displayed in the info box below.

Addresses for:

In this input box the addresses of the confirmation and notification bit are displayed which you can select with the "Assign" button.

Buttons

Parameters ... With this button you go to a dialog box in which you can supply the macro of the current event with parameters.

Edit Macro ... This button opens the dialog box "Macros" in which you can create, change or delete macros.

Assign ... Press this button to assign the addresses for confirmation and notification bit to an event.

Dialog Box "Bit Selection Events"

In this dialog box you select the addresses for the confirmation and notification bit.

First select the byte addresses for "Confirmation" and "Notification" then the "Bit" number within the byte.

The bit number must be the same for all three addresses. After ending the dialog box, the selected settings are entered in the event table.

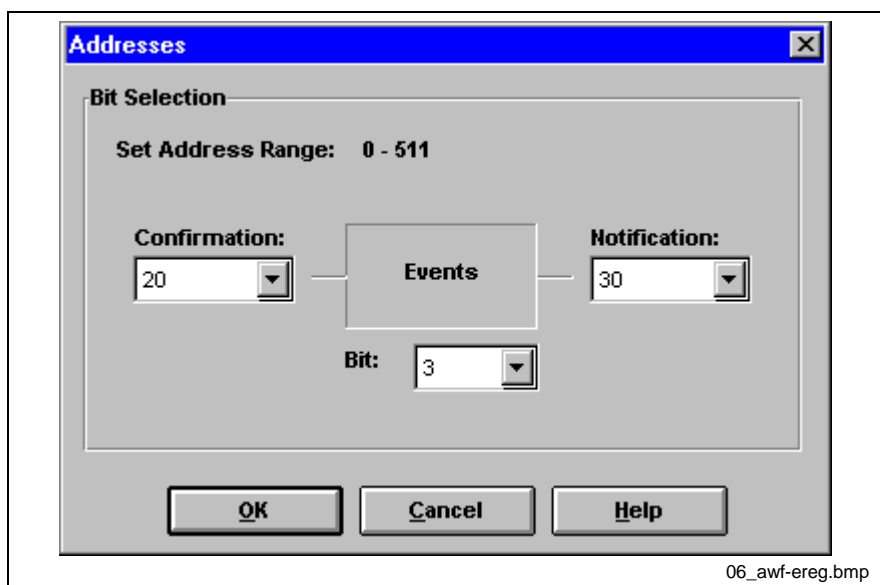


Fig. 6-65: Bit selection "Events"

Menu "Controller Board ... IB Function blocks ... Export ..."

In order to manage macros, events and application functions easily, you have the option to export your definitions into files.

The file format for these files is "FCX". You can import existing FCX files with menu item "Import".

Import and export of the FCX files takes place in a Windows standard dialog box for file selection.

Structure of a Service

A full service (firmware and PCP) consists of four service primitives.

- REQUEST** (RES) Request a service
- INDICATION** (IND) Receipt of the service request
- RESPONSE** (RES) Response to the service request
- CONFIRMATION** (CON) Confirmation of the service

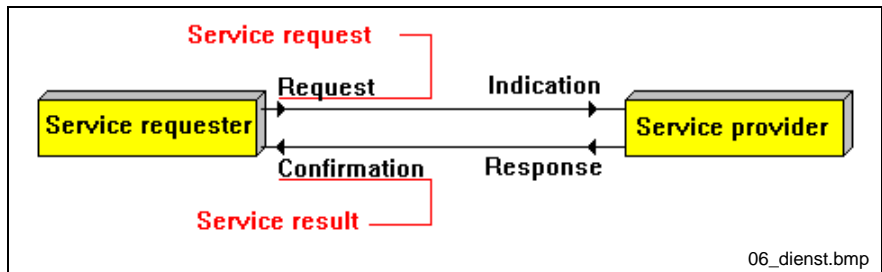


Fig. 6-66: Service primitives

A service primitive consists of a block of data words. The parameters contained in this block are represented in hexadecimal numbers (hex) or binary (bin). All services are structured according to the following pattern:

- Service_Code** Code of the service primitive in hexadecimal representation.
- Parameter_Count** Number of following words. If no other words follow, Parameter_Count has the value 0000hex.
- Parameter 1..n** With the parameters you define, for example, which device you want to address with this service or in which way a service is to be executed. Please refer to the firmware and PCP manuals or the "Parameters" table the dialog box "Edit Parameters" for an exact description.

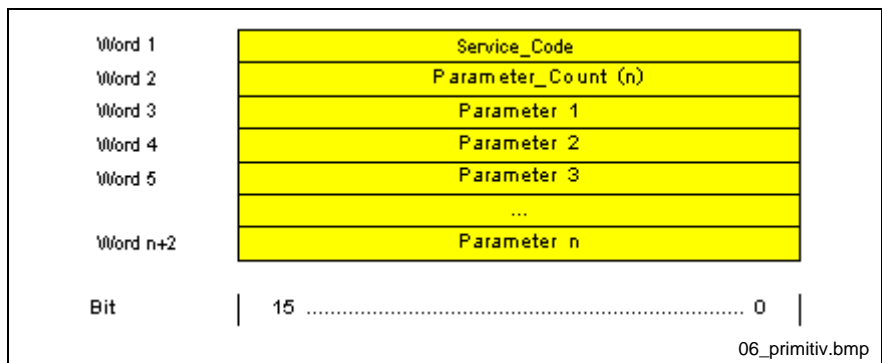


Fig. 6-67: Structure of a service

Dialog Box "Edit Parameter"

In this dialog box you provide the services with parameters, in order to create a functional user function in the marked macro.

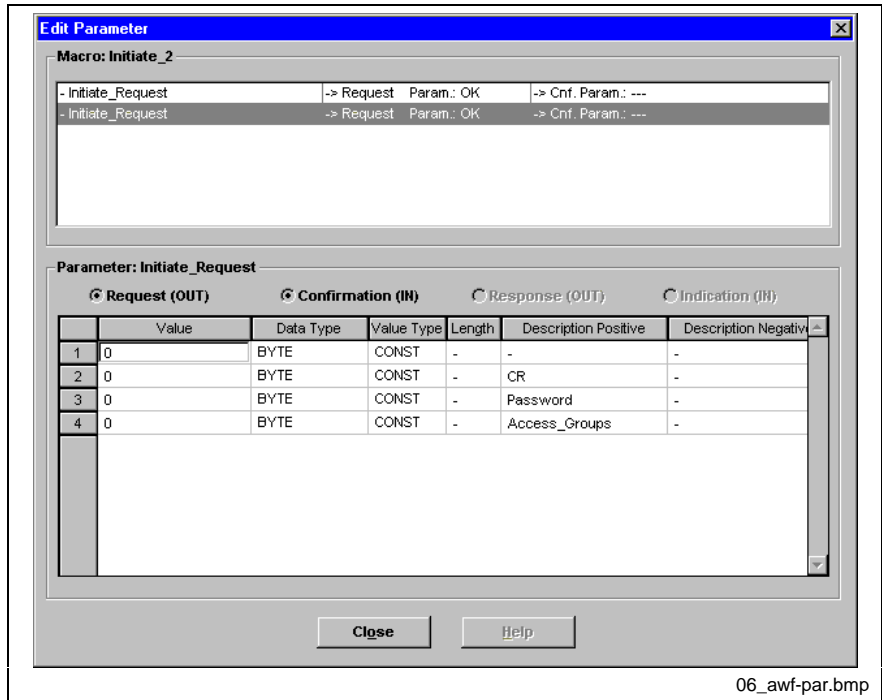


Fig. 6-68: Edit parameter

- Macro** If you mark a service primitive from the macro, a table of parameters is read in from a provided database. According to the selected service primitive, the respective parameter table is displayed. As soon as you have marked a service primitive and the parameter table was displayed, the service primitive is marked with "OK" to indicate that it is selected. This gives you an overview which of the service primitives you have already selected.
- Parameters** Depending on whether you define an user function or an event, you must supply different service primitives with parameters (REQUEST / RESPONSE) or assign the incoming parameters to addresses (INDICATION / CONFIRMATION).
- Request** You can edit this parameter table, when you define a REQUEST to a service provider.
- Confirmation** You can edit this parameter table, when you define a REQUEST to a service provider.
- Response** You can edit this parameter table, when you define a RESPONSE to a service provider.
- Indication** You can edit this parameter table, when you define a RESPONSE or a REQUEST to a service provider.

	User function	Event
Inserted primitive: REQ	REQ / CON	REQ / CON / IND
Inserted primitive: RES	RES	RES / IND

Fig. 6-69: Overview available service primitives

Value	The parameter values and addresses can be entered in different formats.															
	<table border="0"> <thead> <tr> <th style="text-align: left;">Number format</th> <th style="text-align: left;">Abbreviation</th> <th style="text-align: left;">Syntax</th> </tr> </thead> <tbody> <tr> <td>Decimal</td> <td>dec</td> <td>nnn</td> </tr> <tr> <td>decimal in bytes</td> <td>dec,dec</td> <td>nn,nn</td> </tr> <tr> <td>hexadecimal</td> <td>hex</td> <td>\$nnnn</td> </tr> <tr> <td>binary</td> <td>bin</td> <td>%nnnnnnnn</td> </tr> </tbody> </table>	Number format	Abbreviation	Syntax	Decimal	dec	nnn	decimal in bytes	dec,dec	nn,nn	hexadecimal	hex	\$nnnn	binary	bin	%nnnnnnnn
Number format	Abbreviation	Syntax														
Decimal	dec	nnn														
decimal in bytes	dec,dec	nn,nn														
hexadecimal	hex	\$nnnn														
binary	bin	%nnnnnnnn														
Data Type	The data types BYTE, WORD, BYTE_ARRAY and WORD_ARRAY are available. If you use one of the arrays, you can only use addresses (ADDR) as a value type. The length of the array is entered in the "Length" column. A WORD_ARRAY of length n allocates n*16 bits and starts at the address entered under "Value".															
Value Type	<p>CONST (Constant), ADDR (Address) and IGN (Ignore) are available as value types.</p> <p>CONST</p> <p>With the "CONST" value type you assign the parameter a constant value. Enter this constant value in column "Value". The value type "CONST" is only valid for the REQUEST and RESPONSE service primitives.</p> <p>ADDR</p> <p>With the "ADDR" value type you refer to an address. In the "Value" column you enter this PLC and PC address and thus refer to the actual value of the parameter. With the service primitives REQUEST and RESPONSE is read from this address. With the service primitives REQUEST and RESPONSE is read from this address.</p> <p>IGN</p> <p>With the "IGN" value type you ignore the value of the parameter. The parameter is ignored in the service primitives CONFIRMATION and INDICATION, the parameter is not transferred to the service provider in the REQUEST and RESPONSE service primitives.</p>															
Length	Enter the length of the array for WORD_ARRAY and BYTE_ARRAY data types in this column. Enter the value in words or bytes, as appropriate for the array's data type.															
Description Positive / Description Negative	<p>A description of the parameter is displayed in this columns. You can edit this description as you wish. To display CONFIRMATIONS the description was divided into positive and negative descriptions. If a service could not be executed correctly, the service provider transfers a negative confirmation. Positive confirmation is given, if the service is executed properly. Since the parameter contents differ from each other, these parameters are described in two columns.</p> <p>Menu "Controller Board ... IB Function blocks ... Import ..."</p> <p>In order to manage macros, events and application functions easily, you have the option to export your definitions into files.</p> <p>The file format for these files is "FCX". You can import existing FCX files with menu item "Import".</p> <p>Import and export of the FCX files takes place in a Windows standard dialog box for file selection.</p>															

Menu "Controller Board ... IB Function blocks ... Macros ..."

You can create macros with this dialog box. A macro is a sequence of the service primitives "Request" and "Response".

You can use a macro in different user functions or events, but only one macro per user function or event.

If you assign parameters to this macro or the services in this macro, you create an user function or event.

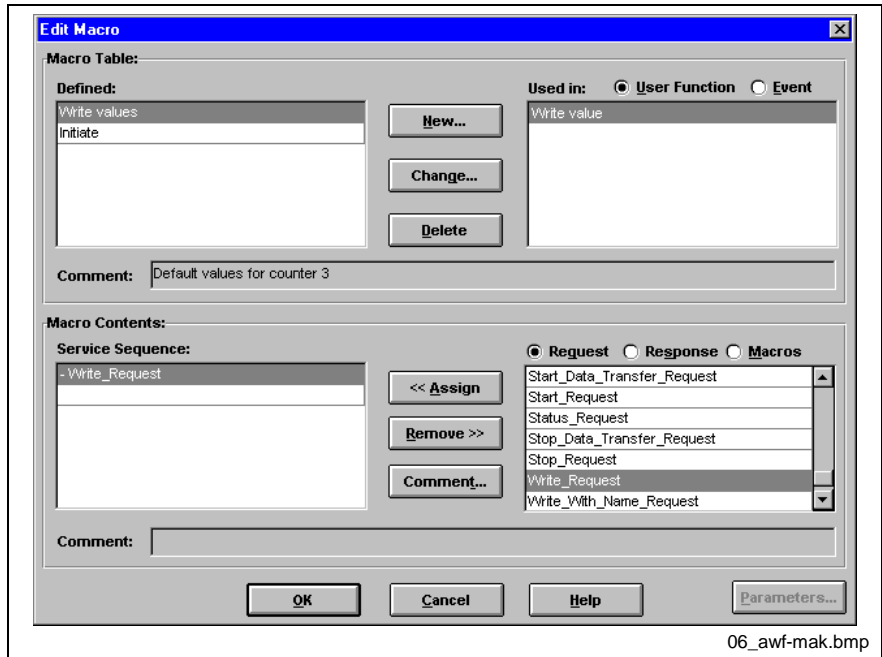


Fig. 6-70: Edit macro

Macro table:

Defined The defined macros are listed in this table. You can select a macro respectively to

- change or delete the name,
- display and edit the services or to
- comment on macro and services.

Used in This input box shows you in which user functions or in which events the selected macro is used.

Comment In this input box the comment belonging to the macro is displayed. This info box cannot be edited directly. You can change/enter the comment for the selected macro by clicking the "Change" button.

Buttons

New you create a new button with this macro. Assign an ambiguous name to the new macro and a comment if necessary.

Change ... This dialog box affords the opportunity to change the name of the macros and of its comment.

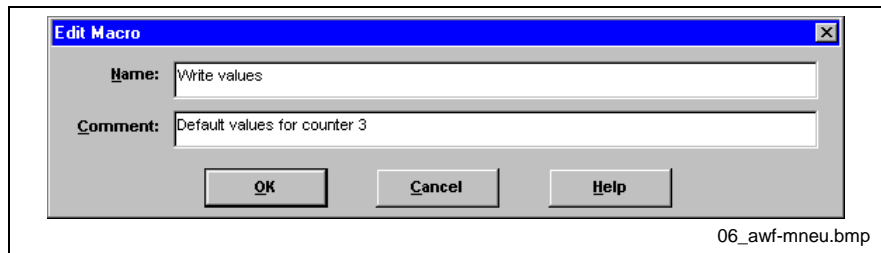


Fig. 6-71: Comment or rename macro

Delete You delete the selected macro with this button.

Macro contents:

Service Sequence This table shows you which services have already been assigned to the selected macro. These services or service primitives represent the actual macro.

Request/Response With these option boxes you select which service primitives you want to assign to your selected macro. You can select between:

- REQUEST (request a service)
- RESPONSE (response to a service request (INDICATION))

Comment You can comment on every service primitive. To do this, select the desired primitive in the "Service Sequence" box and then click the "Comment" button. This info box cannot be edited directly.

Buttons

<<Assign With this button you assign service primitives to your macro. Mark the desired service and click then on the "<<Assign" button. The service primitive is entered in the "Service Sequence" input box above the marked line.

Delete With this button you delete the marked service from your macro.

Comment Use this button to comment on the service marked under "Service Sequence".

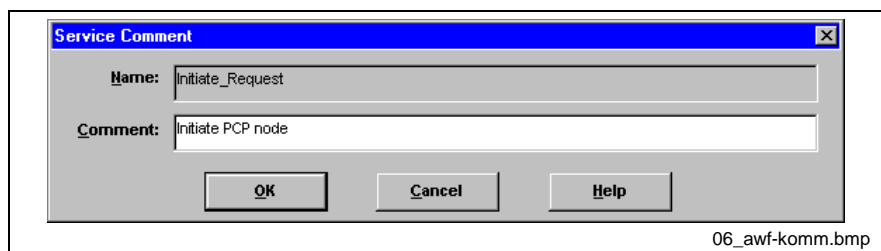


Fig. 6-72: Comment service

Menu "Controller Board ... (Device ...) Device Registration"

Device registration (abbreviated BMK) allows you to clearly identify your INTERBUS devices. The data already available in the bus configuration can be used to generate the BMK automatically. The device registration can be used within the IBS CMD G4 project for the controller board and all existing devices in the bus configuration. If you click on the command "Device Registration" of a device's context menu, you see the BMK for this device in a dialog.

The device registration is part of DIN 40719 and consists of four registration fields. The first three fields can be filled out in IBS CMF G4.

Note: Only alphanumeric characters and the decimal point are permitted in device registrations. Blanks and symbols are not allowed.

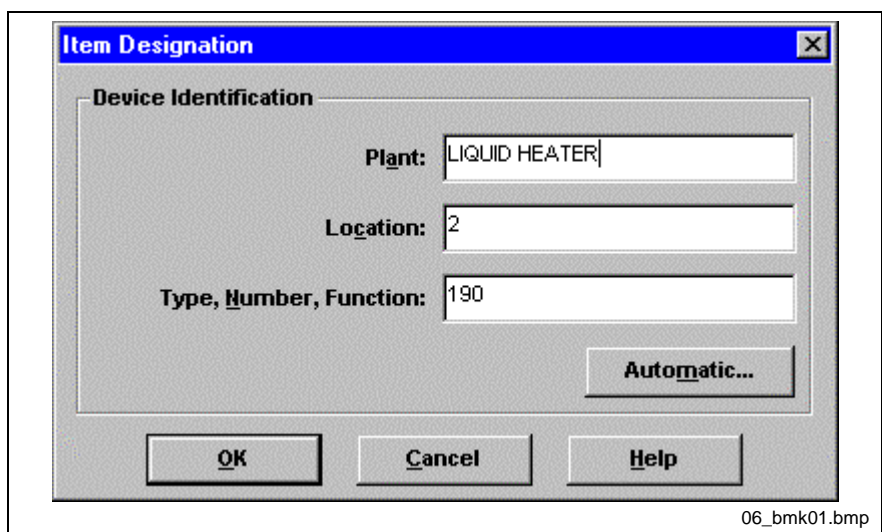


Fig. 6-73: Device registration

Device identification

- System** Registration field 1 of the device registration. Here you can enter the name of the system. This device identifier is preceded by an equal sign (=) in the bus display.
- Location** Registration field 2 of the device registration. Enter here the location of the device registration (of the INTERBUS devices). This device identifier is preceded by a plus sign (+) in the bus display.
- Type, Counter, Function** Registration field 3 of the device registration. Here you can enter, for example, the device number or name. This device identifier is preceded by a minus sign (-) in the bus display.

Buttons

- Automatic** The device registration of single or all devices can be generated automatically based on existing project data. Click this button to access a dialog box where you can select the parameters for the automatic device registration.

Dialog Box "Device Registration (Automatic)"

You can use the tools in this dialog box to generate the device identifiers automatically based on data in the current project. Eight parameters are provided for this purpose. Each parameter is preceded by a "\$" symbol followed by identification letters for the parameter in question. You can use several parameters in an identification field. Besides parameters, you can also enter alphanumeric text.

Example: Let us assume that you want to insert the device number for each device as a device identifier for the "System" dialog box.

To do this, enter "\$N" in the "System" dialog box. Select the option box "All Devices" in the "Type of Replacement" area and in the "Replacement Mode" area "All Fields". If you want to enter a series of parameters, avoid to use blanks and special characters as these are not allowed for the device registration.

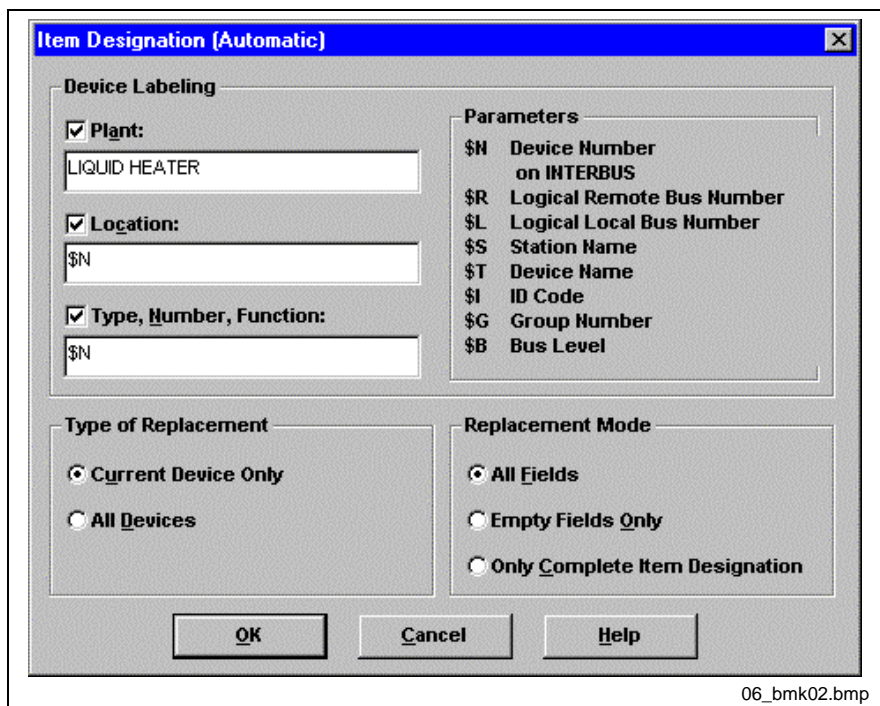


Fig. 6-74: Automatic device registration

Device Labeling

- | | |
|--------------------------------|--|
| System | Registration field 1 of the device registration Here you can enter the parameter for the system's name. |
| Location | Registration field 2 of the device registration Enter here the parameters to specify the location of the device (of the INTERBUS devices). |
| Type, Counter, Function | Registration field 3 of the device registration Here you can enter, for example, the parameter for the device number or name. |
| Parameters | This area includes a list of the used parameters for the automatic BKM. Enter one or several parameters in the desired input box. |

Type of Replacement

Current Device Only Select this option box if you want to generate only the device registration of the device on which the dialog was opened.

All Devices When you check this option, the device registrations will be generated for all devices and for the controller board according to your settings.

Replacement Mode

All Fields Select this option to re-generate the entire device registration. All fields of all devices are re-written.

Empty Fields Only Select this option if you simply want to fill out empty registration fields.

Entire BMK Only When you have selected this option, the device registration of a device is only re-generated if all fields for this device are empty.

Double BMK If one or more device identifiers are identical in all fields, this is indicated in the "Item Designation (Automatic)" dialog box.

Change the BMK so that there are no identical registrations.

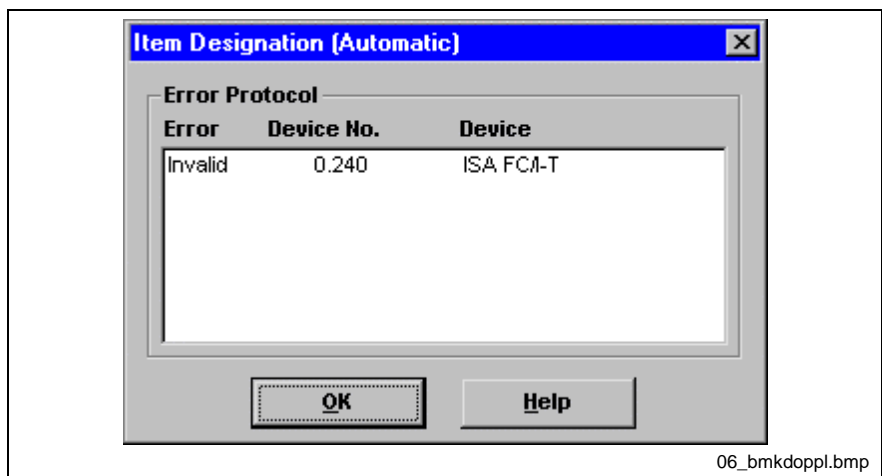


Fig. 6-75: Double BMK

Menu "Controller Board ... Type ..."

Select the required controller board in this dialog box.

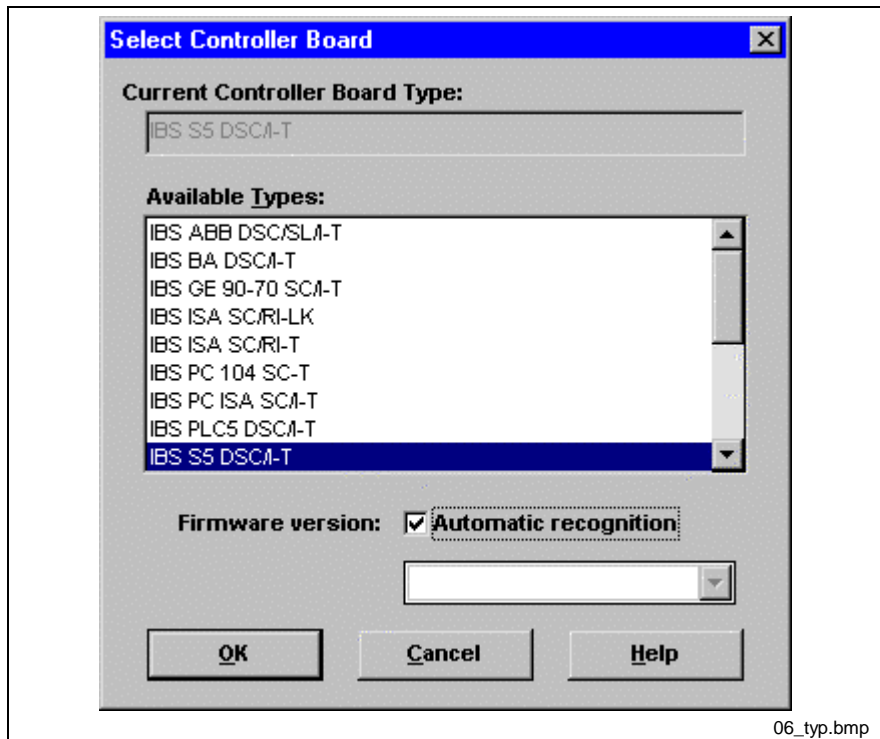


Fig. 6-76: Select controller board

You can select a controller from the "Available Types" list. The selected type appears in the "Current Controller Board" input box.

Depending on the set controller board type, the icon of the controller board in the representation area.

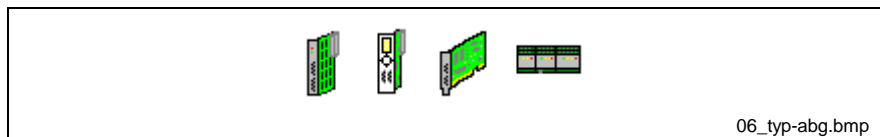


Fig. 6-77: Element "Controller Board"

Address Conversion When you change the controller board type, all already assigned addresses are converted to the address format of the new controller board (e.g. "P20" in a IBS S5 DSC I/T will become "20" in a IBS PC ISA I/T). Addresses that cannot be converted to the new address format or that are not valid are displayed in brackets.

Firmware Version

The range of available functions depends on the firmware version on the controller board. To adapt the functional range of IBS CMD G4 to the functionality of the firmware on the controller board, you can define a firmware version number. Enter the desired firmware version in the input box or select one of the default values.

Auto-Detect When you select this option, IBS CMD G4 determines the firmware version of the controller board as soon as it switches to one of the online operating states. The online operating states are "Configuration (online)", "Monitoring" and "Diagnostics".

Menu "Controller Board ... Process Data"

The process data dialog is used to create process data descriptions of your INTERBUS device according to your needs and to reproduce them on addresses, variables or other process data descriptions.

The standard process data description available after the insertion of a device can be divided into individual components by creating further process data descriptions to meet your requirements (e.g. a channel of an AI-device in a process data description).

In the "Process Data" dialog box you can assign the following destinations to the process data descriptions of the INTERBUS devices.

- **Addresses** of the PLC or the PC in the respective address format (e.g. P20 for S5 or 20 for PCs).
- **Direct links** to other process data descriptions
Input data are copied to output data.
- **Variables** used in the preprocessing.

Note: If you open the process data dialog box from the "Controller Board" element, you will see the process data descriptions of all devices in the current INTERBUS project. If you open the "Process Data" dialog box from a device, you will only see the process data descriptions of that device.

Device: "Process data"

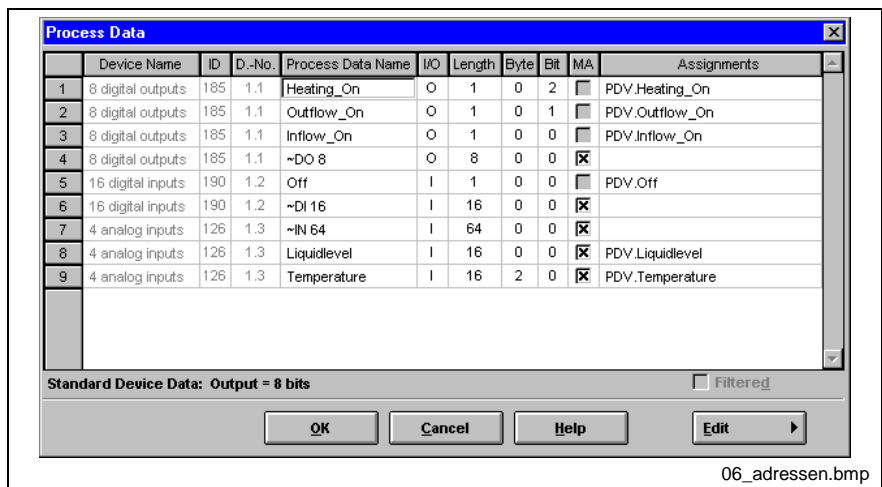


Fig. 6-78: Dialog box "Process data"

Display

Standard Device Data

This display shows the whole process data channel length that is assigned by one device in the INTERBUS process data channel. Thereby, the process data channel length of the device's process data description you have selected is displayed.

Buttons

Edit When you press this button, the context menu of the dialog opens. The commands of this menu allow you to edit the process data descriptions in the dialog box.

Option Box

Filtered If you have restricted the representation of the process data descriptions in the "Filter" dialog box, you can activate or deactivate the filter function with this option box.

Device name Enter the device name with the device description.

ID Code The ID code can be taken from the data sheet and is printed on every device.

Device Number (D. No.) The device number designates the logical position of the device in the INTERBUS data ring.

Process Data Name The process data name clearly designates the selected process data description.

I/O I/O displays whether it is input (I) or output (O) data.

Length Enter the process data length in bit in this input box.

Byte Enter here the byte number at which the process data description has to be started within the standard process data description.

Bit For process data descriptions < 8 bit you can specify the bit of the byte at which the process data description is to be started.

MA If you want to assign several addresses or variables to a process data description, you have to activate the option box "MA" = Multiple Assignment. If you select the "MA" box of a standard process data description, all process data descriptions derived from the first can also be assigned several times.

Assignments This column serves to enter the assignments. These are variables, addresses or also other process data descriptions. Use the context menu to select the assignments or enter the assignment directly.

Example:

Create a process data description for the third channel of a 4-channel AI-device.

The device has a process data length of 4 * 16 bits = 8 bytes = 4 words.

A channel has a length of 16 bits = 1 word. The third channel starts at byte 4, as channel 1 and 2 are assigned to the bytes 0 to 3 (2 words). Within this word the process data description starts with bit 0 because the process data description is > 8 bit.

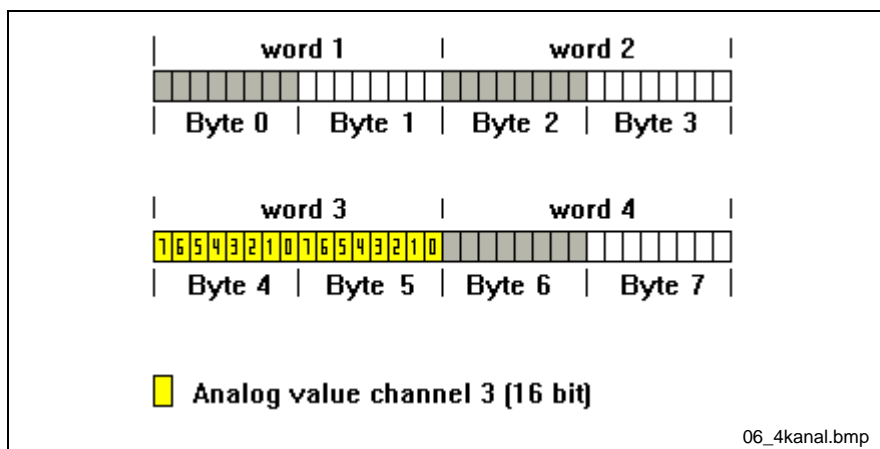


Fig. 6-79: Example of a process data description

Note: The number specifications for length, byte and bit must be within the maximum values of the greatest process data items, e.g. a 16-bit device may not have an entry > 2 in the "Bytes" column.

mark a process data description of the device's process data description you want to copy. You can copy this process data description with the <Ins>-key. Then, you only need to change the data in the "Process Data Name", "Length", "Byte" and "Bit" input box according to you requirements.

Assignments

In the column of the "Process Data" dialog box the destinations are assigned to the process data descriptions. You can assign the following destinations:

- **Addresses** of the PLC or PC in the respective address format (e.g. 20 for PCs).
- **Process data descriptions**, i.e. input data are copied to output data.
- **Variables** used in the preprocessing.

Note: You can only change the "Length" box, if no destinations were selected in the "Assignment" column.

Syntax of the assignments:

Addresses Enter the addresses of the PLC or PC in the host-specific format.

Examples:

- 20; 22.1; 24.5 for PC addresses
- N20:0; N30:0.4 for Allen Bradley addresses

Input in HEX Format If you prefix a ("\$\$") sign, you enter the address in hexadecimal format. Example: \$2a for the PC address 42.

Consistency Area You can enter consistency areas by identifying the required consistency together with a colon (":") behind the assignments.

Example: P20 :16 for the S5 address P20 with the consistency 16 bit.

Process Data Descriptions Process data links have the following syntax:

'Device segment.'device position.'process data name.'

Example: 1.2.Emergency_Off for a direct link to the process data item "Emergency_Off" of the device in the bus segment 1 at position 2.

Variables Variables are input with the syntax: ART.variable name. The variables TYPE distinguishes between:

VAR = Variable for PROGRAM WORX

PDP = Variable for the preprocessing (process data preprocessing)

Example:

PDP.Emergency_Off for linking the process data item with the preprocessing variables "Emergency_Off".

Separating the Entries in Case of Multiple Addressing The separating character in case of multiple addressing is the semicolon (";"). Example: P20; P22; P24 for the assignment of a process data item to three S5 addresses.

Context Menu "Process Data"

The "Process Data" dialog box has a context menu for easy-to-use operation of the dialog box. Like the other context menus, you call up this menu with the right mouse button or with <Shift> + <SPACE> or <Shift> + <F10>.

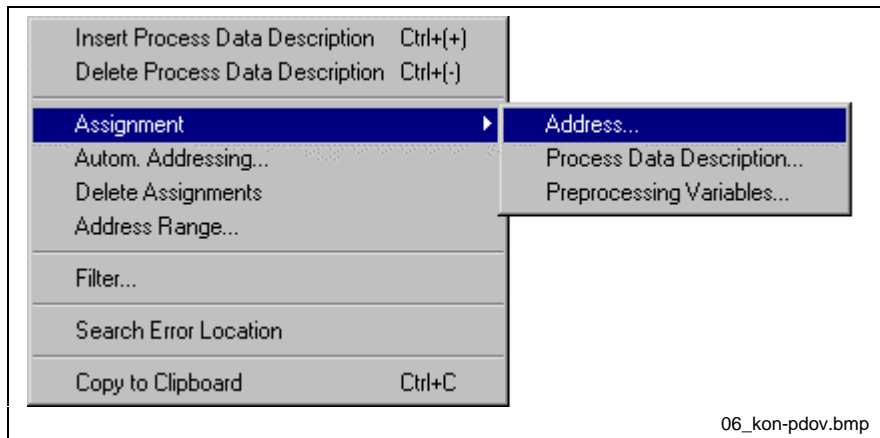


Fig. 6-80: Select controller board

Insert Process Data Description	This command inserts a new line in the dialog box above the marked line. Every line represents a process data item of a defined length.
Delete Process Data Description	Deletes the marked line from the dialog box.
Assignment ... Addresses	Select this menu item to assign addresses of the PLC or PC to the process data descriptions.
Assignment ... Process Data Description	Select this menu item to link process data descriptions with other process data descriptions. The input process data item is thereby immediately copied to the assigned output process data item.
Assignment ... Preprocessing	Select this menu item to link process data descriptions with variables of the preprocessing.
Autom. Addressing	With this menu item, you can assign free addresses automatically to the process data descriptions of the PLC or the PC. An address is only assigned to those process data descriptions for which no assignment exists.
Delete Assignments	With this menu item, you delete the assignments to the process data descriptions. If you want to delete several assignments simultaneously, you must mark the desired process data descriptions at first with the mouse. To mark process data descriptions move the mouse along the line numbers of the process data descriptions while continually pressing the mouse button.
Address Range	With this menu item, you can determine the address range that you want to use in the automatic addressing.
Filter	With this menu item, you open a dialog box for filtered representation of the process data descriptions.
Search Error Location	You can search for an error occurred during the execution of the parameterization.
Copy to Clipboard	Copies the marked line to the Windows clipboard.

Dialog Box "Address Range"

With this menu item, you can determine the address range that you want to use in the automatic addressing.

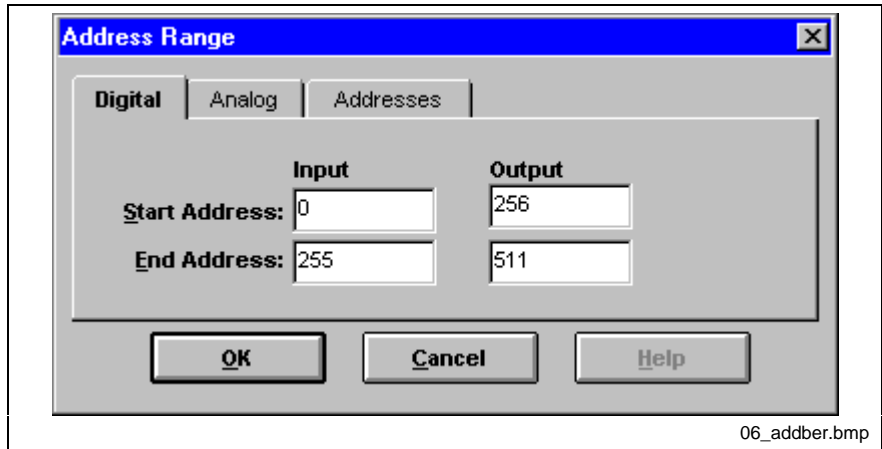


Fig. 6-81: Dialog Box "Address Range"

Digital

Start Address Here you enter addresses at which the address assignment for digital process data is to start. The addresses have to be separated respectively according to input and output data.

End Address Here you enter addresses at which the address assignment for digital process data is to end. The addresses have to be separated respectively according to input and output data.

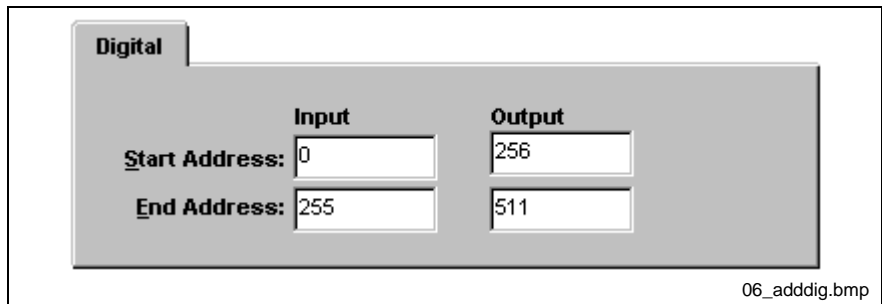


Fig. 6-82: "Digital" address range

Analog

Start Address Here you enter addresses at which the address assignment for analog process data is to start. The addresses have to be separated respectively according to input and output data.

End Address Here you enter addresses at which the address assignment for analog process data is to end. The addresses have to be separated respectively according to input and output data.

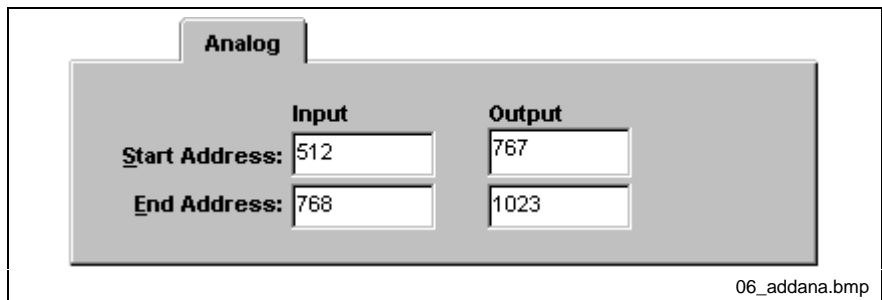


Fig. 6-83: "Analog" address range

Addresses

Max. Number of Addresses

Specify here how many addresses you want to have offered at the same time in the address assignment. The less free addresses you want to have faded in the better is the performance of your system. As long as free addresses are available, these are displayed in the "free addresses" input box, but only the maximum number that you have defined.

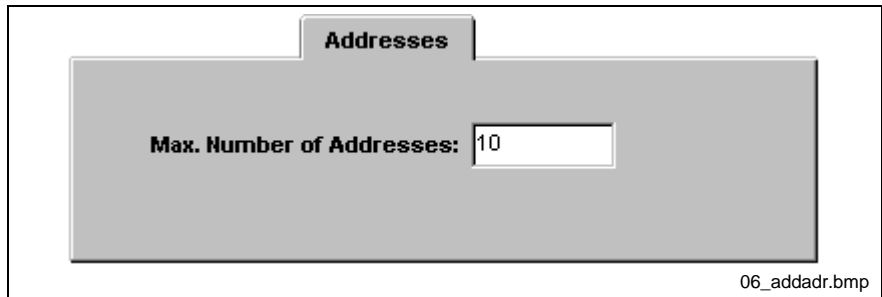


Fig. 6-84: Max. number of addresses

Dialog Box "Automatic Assignment"

With this dialog box, you can assign individual (marked area) or all process data, free addresses of the PLC or the PC.

Standard process data descriptions are the process data description of a device as it is available in the physical addressing. Every device is assigned a maximum of one process data description for input data and one for output data. The standard process data descriptions cannot be deleted.

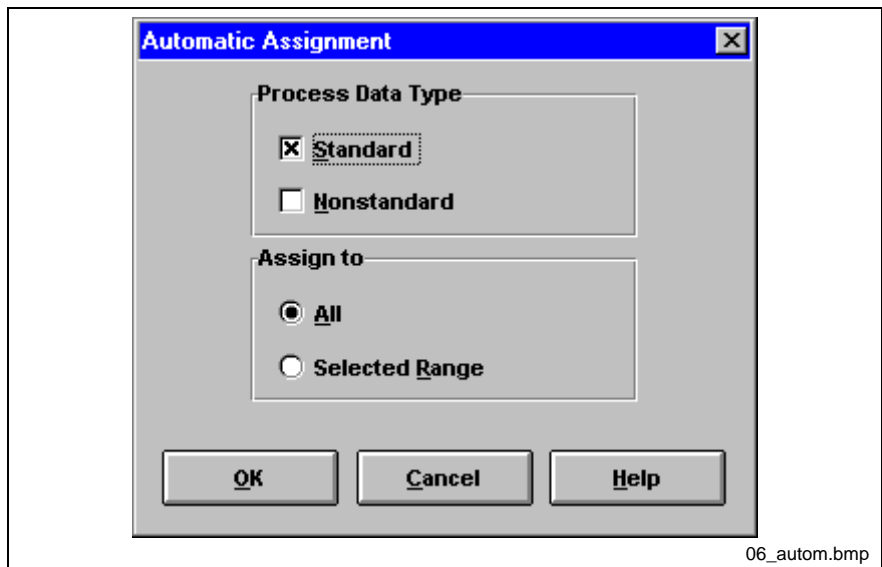


Fig. 6-85: Automatic assignment

Process data type

Standard Process Data

If this option is activated, addresses are only assigned to the standard process data descriptions.

Non-standard Process Data

If this option is activated, addresses are only assigned to non-standard process data descriptions.

Assign to

All Within the defined address area the free addresses of the PLC or PC are assigned to the process data descriptions. This assignment is independent of the current filter setting and addresses all process data descriptions even if they are not standard.

Selected Range If this option is activated, addresses are only assigned to process data descriptions previously marked.

Dialog Box "Search Error Location"

If an error should occur during execution of the parameterization, you can have the error location displayed in the error message determined with this dialog box. An error during execution of the parameterization may occur for example, due to an illegal multiple addressing.

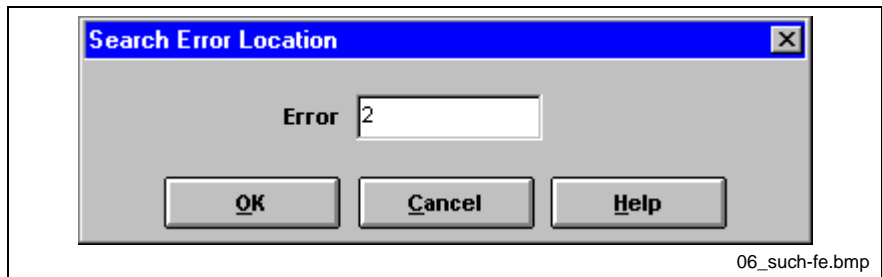


Fig. 6-86: Search error location

Dialog Box "Direct Link/Variables"

In this dialog box you can select process data descriptions or variables that match the selected process data description in terms of length and data direction. Select the required process data description or variable and press "OK". This assigns the variable or process data description to the selected process data description.

When you assign process data descriptions to other process data descriptions, input data can be copied directly on the output data without stressing an application program or the preprocessing.

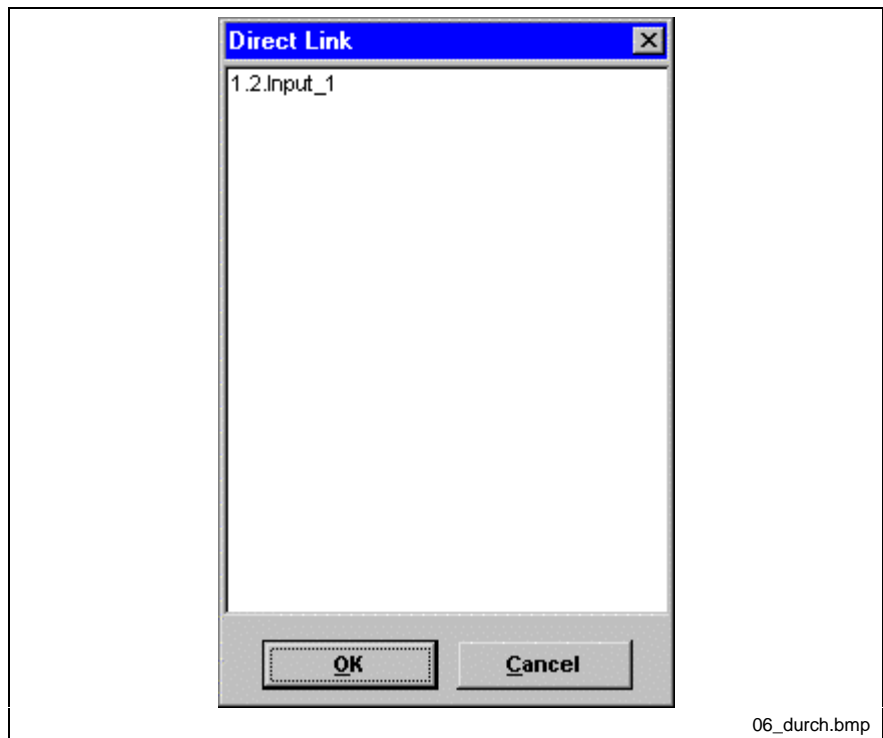


Fig. 6-87: Direct link

Dialog Box "Address Assignment"

In this dialog box you can assign (PLC or PC) addresses to process data descriptions.

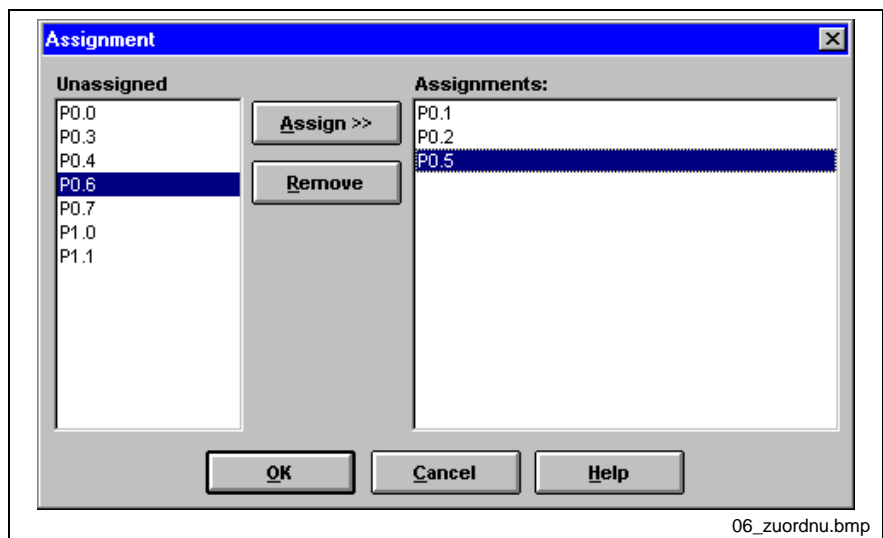


Fig. 6-88: Address assignment

Selection boxes

Free Addresses This selection box contains all addresses that are available for the process data descriptions selected beforehand; i.e. it contains addresses that have not been used yet. You can reduce the number of the displayed addresses.

Assignments This list contains addresses that have been assigned to the currently selected process data description.

Buttons

- Assign >>** Select an address in the "Available Addresses" box and press this button. The selected address is transferred to the "Assignments" box and is thus assigned to the process data description.
- Remove** Select an address in the "Assignments" box and press this button. The selected address is removed from the list. Addresses that have been removed from the list are re-inserted in the list of available addresses.

Dialog Box "Filter (Process Data)"

Here you select the options that restrict the representation of the process data descriptions. Only the process data descriptions matching all the requirements specified here are displayed.

Several options can be selected simultaneously.

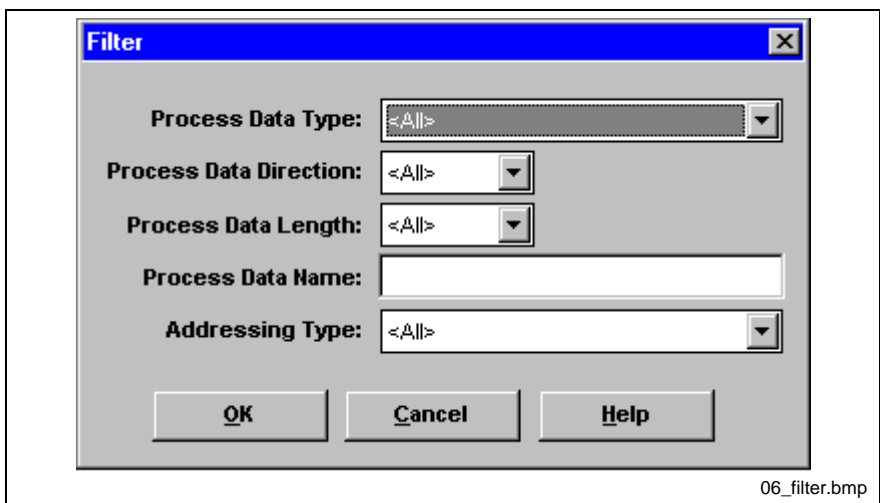


Fig. 6-89: Filter for process data descriptions

- Process Data Type** Display of the "Standard" or Non-standard process data descriptions".
- Process Data Direction** Display of all process data descriptions or the process data descriptions with input or output data.
- Process Data Length** Display of all process data descriptions or the process data descriptions with length specified in bits.
- Process Data Name** Display of all process data descriptions or the process data descriptions with specified names.
- Addressing Type** Display of all process data descriptions or the process data descriptions with specified addressing (addresses, direct link, etc.).

Note: The displayed devices or process data descriptions are possibly not complete when the option "filtered" is active.

Data Consistency

In order to ensure that the INTERBUS process data read out of the controller board memory in **one** program or PLC cycle originate from **one** INTERBUS cycle, you can create consistency areas. Consistency areas can also be used to ensure that certain data from the application program is written in **one** INTERBUS cycle.

Without consistency areas, related data may be read in from different INTERBUS cycles in an application program cycle in asynchronous mode of operation.

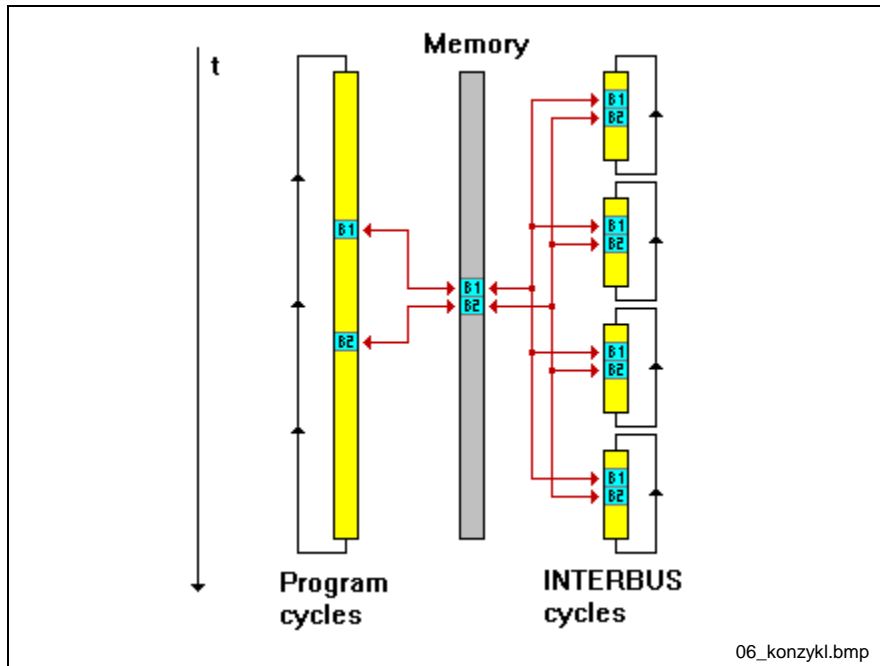


Fig. 6-90: Data consistency

You can create consistency areas of 8, 16, 32 and 64 bits. To do this, enter a colon followed by the value of the consistency area after the program or PLC address in the "Assignments" column of the "Process Data" dialog box.

Example: An analog value with 16 bytes in length should be read in consistently. After every INTERBUS cycle, all input process data is updated in the controller board memory. The analog word is in the memory after the first INTERBUS cycle. Shortly after the first INTERBUS cycle the application program has received the access rights to the memory and reads the first byte of the analog word. Now, INTERBUS receives the access rights again and updates both bytes of the analog word. If the application program now reads the second byte of the analog value, both bytes originate from to different INTERBUS cycles. However, the analog value may have changed between both cycles so that it cannot be established without consistency that the data read from the controller board memory is the correct analog value. With consistency the second byte will not be overwritten until it is called from the application program. enter "IP20:16" for a consistency area of 16 bits starting from address P20. This guarantees that the 16 bit analog values starting from address P20 and read in by the application program originate from an INTERBUS cycle.

Menu "Parameterization Memory ... Write ASCII File"

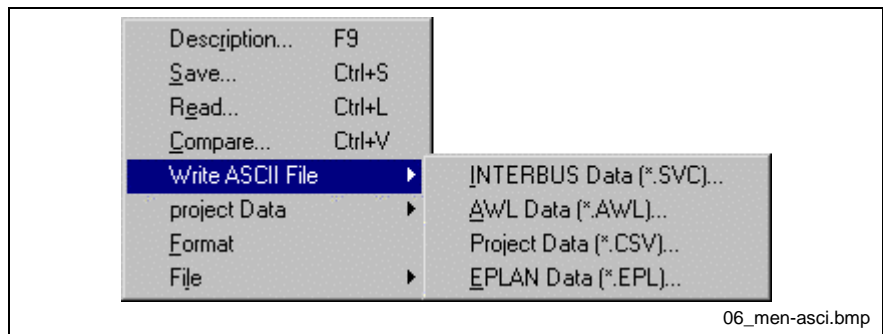


Fig. 6-91: Menu "Write ASCII File"

Menu "Parameterization Memory ... Write ASCII File ... Project Data (*.CSV)"

With this command you write the data of the opened project in an ASCII file (*.CSV). The CSV file (Comma Separated Value) contains the data from the IBS CMD G4 file. The CSV file is used to make the project data (*.BG4), otherwise available in binary format, also accessible to other programs.

Define in the following dialog box the project data that you want to store in the CSV file.

After selecting the project data you have to determine the file name and the path of the CSV file in a Windows standard dialog box.

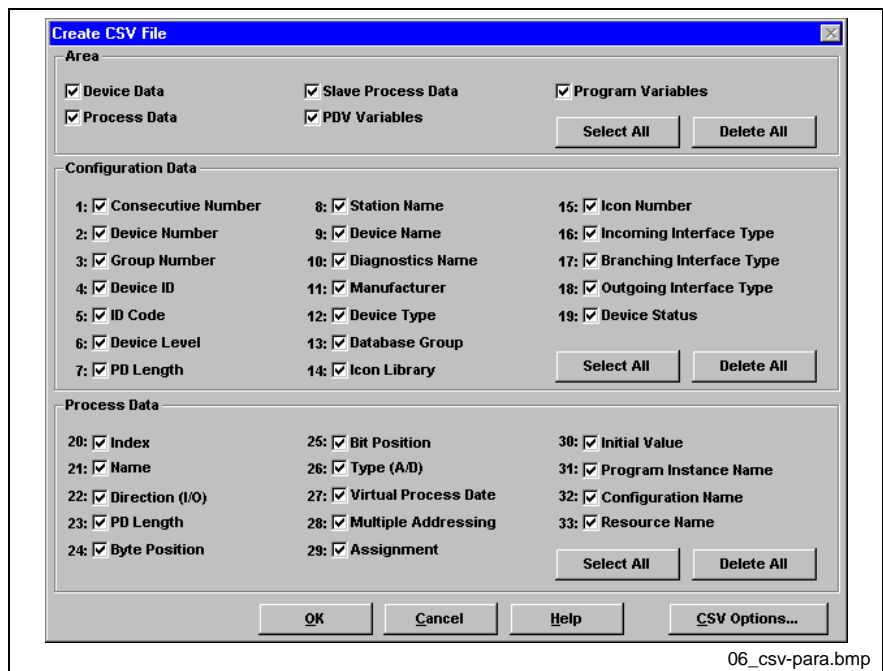


Fig. 6-92: Create CSV file

Area Here you select the areas of the BG4 file which you want to save as CSV file.

Device Data With this option box you write the information about all devices such as type, number, Id etc. in the CSV file.

Process Data	With this option box you save all information concerning the process data. These are the full process data descriptions including their assignments.
Slave Process Data	INTERBUS controller boards with slave functionality and system couplers have a process data area of a defined length in their slave part. With this option box you can write the description of these slave process data in the CSV file.
PDV Variables / Program Variables	All information about variables can be written in the CSV file with this option boxes. PDV variables are the preprocessing variables. Program variables are the variables of the application program which you can use in the "PC WORX" software.
Parameter Channel	You can use this option to add the name of the PCP services that support the controller board for the respective device to the CSV file. The entry is coded and can also be accessed in the "Device ... Description ... Parameter Channel ..." dialog box.
Configuration Data	The area of the configuration data contains the following entries that can be displayed or hidden with the respective option box:

Consecutive Number	(No)
Device Number	(LogDevNo)
Group Number	(GrpNo)
Device ID	(Uniqueld)
ID Code	(Ident)
Device Level	(BusLevel)
PD Length	(PDLen)
Station Name	(StationName)
Device Name	(DeviceName)
Diagnostics Name	(DiagName)
Manufacturer	(VendName)
Device Type	(DevType)
Database Group	(DbGroup)
Icon Library	(IconLib)
Icon Number	(IconNo)
Incoming Interface Type	(TypA1)
Branching Interface Type	(TypW1)
Outgoing Interface Type	(TypW2)
Device Status	(DevState)

Process Data The area of the process data contains the following entries that can be displayed or hidden with the respective option box:

Index	(PdIdx)
Process Data Name	(PdName)
Direction (I/O)	(PdDir)
PD Length	(PdLen)
Byte Position	(PdBytePos)
Bit Position	(PdBitpos)
Process Data Type (A/D)	(PdType)
Virtual Process Data	(Virtual)
Multiple Addressing	(MultAdr)
Process Data Assignments	(PdAss)
Initial Value	(InitVal)
Program Instance Name	(InstName)
Configuration name	(CfgName)
Resource Name	(ResName)

Buttons:

Select All With this button you activate all option boxes in the appropriate area.

Delete All With this button you deactivate all option boxes in the appropriate area.

CSV Options With this button you select the other options to create the CSV file. The entries of the interface types "TypA1", "TypW1" and "TypW2" in the CSV file are coded as follows:

0	Not assigned
1	Universal
2	2-wire local bus
3	2-wire remote bus
4	8-wire local bus
5	Reserved
6	Fiber optics remote bus
7	Fiber optics local bus
8	2-wire installation remote bus
9	INTERBUS Loop

The entry of the "DevState" in the CSV file is coded as follows:

1hex	Normal state
2hex	Software has localized error
4hex	Device grayed out
10hex	Bus error localized
20hex	Device message

Dialog Box "CSV Options"

You can set the CSV file parameters with this dialog box. The separating characters separate the individual entries. If you want to import the CSV file to another program later, you can react to this separating character by setting the program import filter to the separating character set here.

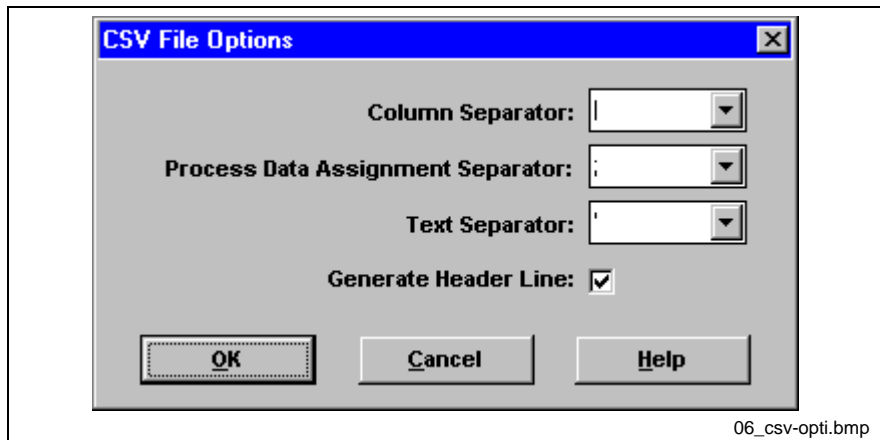


Fig. 6-93: CSV file options

Selection boxes

Column Separator Here you set the character which separates the individual column entries from each other.

The "Process Data Assignment Separator" and the "Text Separator" are used within these column separators.

Process Data Assignment Separator You separate the individual process data assignments from each other with this character. Particularly, this is significant for multiple assignments.

Text Separators This character marks text within a column. The text is "framed" by the text separator.

Option box

Generate Header Line If you have marked this option box, the first line of the CSV file is displayed as a header line. The header line marks each individual column with an abbreviation.

Menu "Parameterization Memory ... Write ASCII File ... EPLAN Data (*.EPL)"

You can use the "EPLAN Data (*.EPL)" command to export the bus structure and the process data assignment of the current INTERBUS project for use in EPLAN. Additionally, you can export further information in three labeling fields.

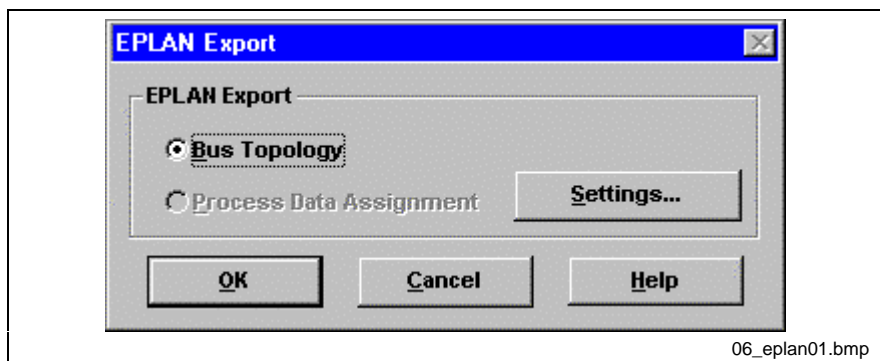


Fig. 6-94: EPLAN export

EPLAN export

Bus Structure Select this option if you want to export the bus structure of your INTERBUS system.

The exported bus structure contains the following data:

- Serial number (starting at 0)
- Device type (coded as hexadecimal value)
- Remote bus level
- Interface similarity (a 1 indicates an interface that is compatible with the preceding device)
- Device identifier (all used fields are exported)
- Macro name (if a specific macro is to be used for a device in EPLAN)
- Manufacturer
- Order number
- Labeling fields 1 to 3 (these can be defined by clicking "Settings")

Buttons

Settings You can define three labeling fields for each of your INTERBUS devices. Click this button to access the dialog box for selecting the labels. The export of the labeling fields is linked to the export of the bus structure.

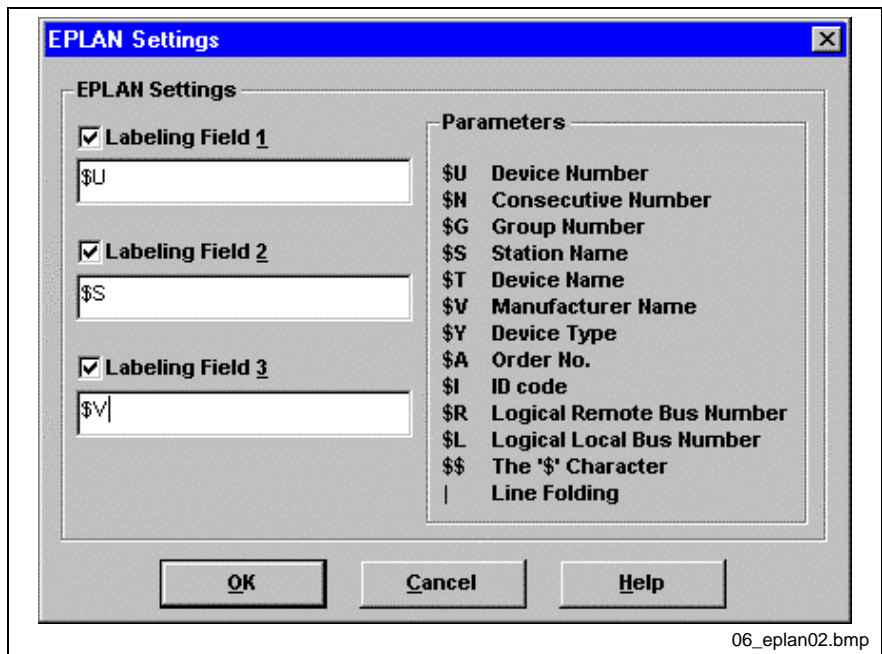


Fig. 6-95: EPLAN settings

Labeling Field x Select an option to use the corresponding labeling field. You can enter parameters and plain text in the input box below. The parameters are preceded by a "\$" symbol followed by identification letters for the parameter in question. You can use several parameters in a labeling field. As opposed to device registration, blanks and symbols are allowed here.

Parameters A list of parameters that can be used to automatically generate the device labels is displayed here. Enter one or several parameters in the desired input box.

After pressing "OK" to confirm the "EPLAN" dialog box, a Windows dialog box will appear where you must enter a name and specify a path for the export file. The filename extension for the EPLAN data is "EPL".

If during the export of the EPL file devices are found whose "Manufacturer" and "Order Number" fields are empty, you will be prompted to enter a macro name. The macro will be used by EPLAN to interpret the device. In the case of devices from Phoenix Contact the macros are automatically identified via the "Manufacturer" and "Order Number" fields.

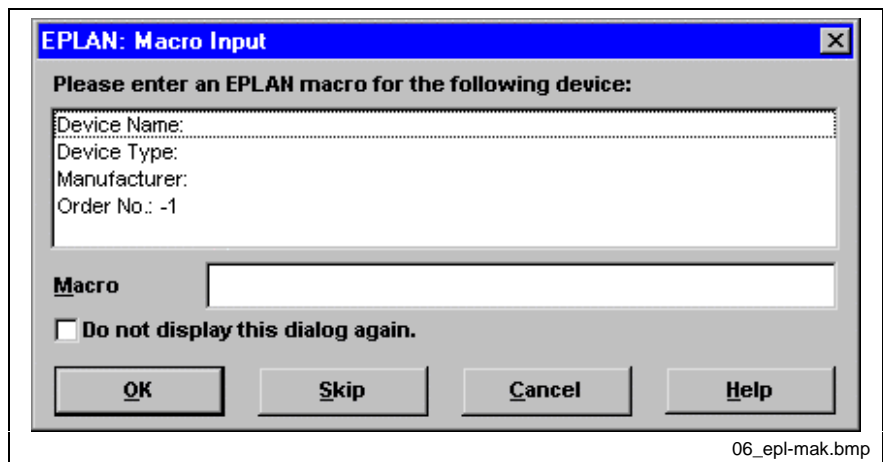


Fig. 6-96: EPLAN macro

Macro Name Enter the name of the EPLAN macro for the device displayed above.

Do not display this dialog again. When this option box is selected, the system will no longer issue a prompt when missing macro assignments are detected.

Menu "Parameterization Memory ... Write ASCII File ... INTERBUS Data (*.SVC)"

With this command you write the data of the opened project in an ASCII file (*.SVC). The SVC file contains the complete parameterization and is required for controller boards without parameterization memory (e.g. IBS PC ISA SC/I-T).

The information contained in the SVC file is identical to the parameterization data transferred to the parameterization memory of the controller board (e.g. IBS S5 DSC/I-T) when the parameterization is saved.

IB Loader The IB Loader executes the INTERBUS system's parameterization process by interpreting an ASCII file (the SVC file) and transferring the services and parameters stored in this file to the controller board. Data is transferred via a serial port or the PC's data bus.

SVC File Structure The SVC file contains firmware/PCP services and their parameters separated by the entry "#CMD#". When booting from the parameterization memory, the commands (services) executed are the same as those transferred from the SVC file when booting with the IB Loader.

```
#CMD#      ;First service line
#0x1303#; Service code (here: Alarm_Stop_Request)
#0x0000#;Number of parameters
#CMD#      ;First service line
#0x0750#; Service code (here: Set_Value_Request)
#0x0003#;Number of parameters
#0x0001#;Parameter 1
#0x0108#;Parameter 2
#0x0000#;Parameter 3
```

Operating the IB Loader The IB Loader is an EXE file for DOS, WIN 3.1x and WIN NT. The IB Loader is also available as DLL for WINDOWS (16 and 32 bit). This DLL (Dynamic Link Library) can be called e.g. from your application program. When calling up your IB Loader you need to transfer some parameters and the name of the SVC file to it.

By entering the IB Loader in the AUTOEXEC.BAT or putting in the AUTOSTART group the INTERBUS is parameterized each time the host PC boots.

Use:

```
IBLOADER IBCOM1 C:\TEST.SVC
```

to transfer the file "TEST.SVC" to the controller board via the serial port "COM1".

Menu "Parameterization Memory ... Description ..."

The parameterization memory is used for resident storage of INTERBUS parameterization, program and diagnostic data. The parameterization memory may be differently structured depending on the controller board. The product line ranges from pluggable ICs and plug-in boards up to permanently installed ICs. All parameterization memories are flash EPROMs which can be written to and read by IBS CMD G4.

In this dialog box you write in the parameterization memory. The "Name" is also displayed in the representation area. Furthermore, there is an input box for remarks and one for the name of the author of the parameterization memory contents.

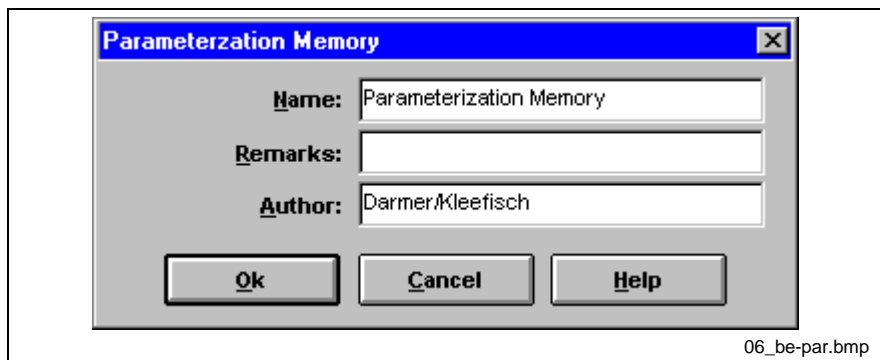


Fig. 6-97: Parameterization memory description

Menu "Parameterization Memory ... Format"

Formatting the parameterization memory deletes its entire contents.

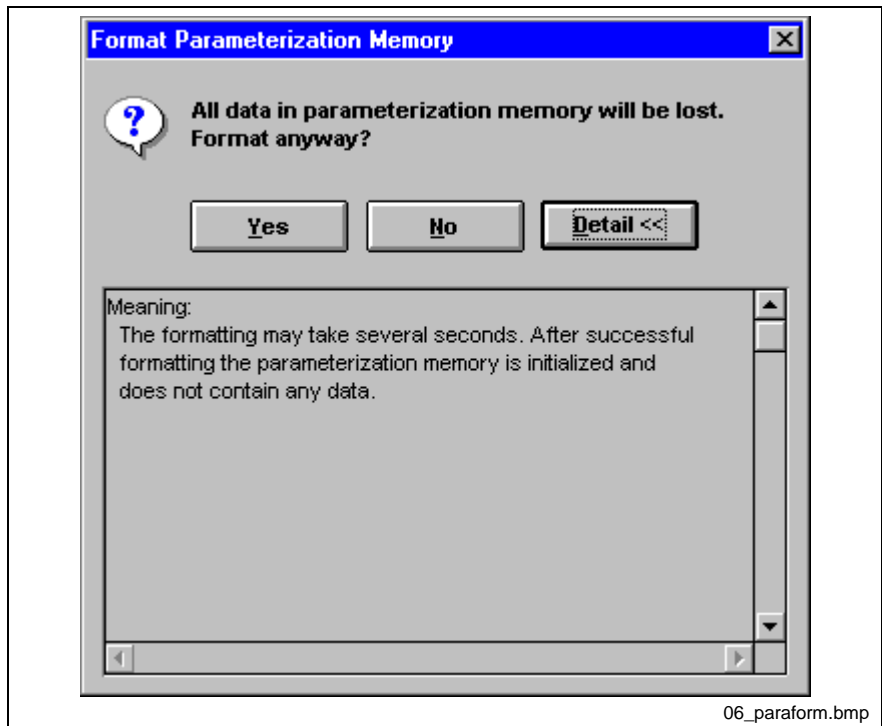


Fig. 6-98: Format parameterization memory

If no error occurs during formatting of the parameterization memory, the following message appears:

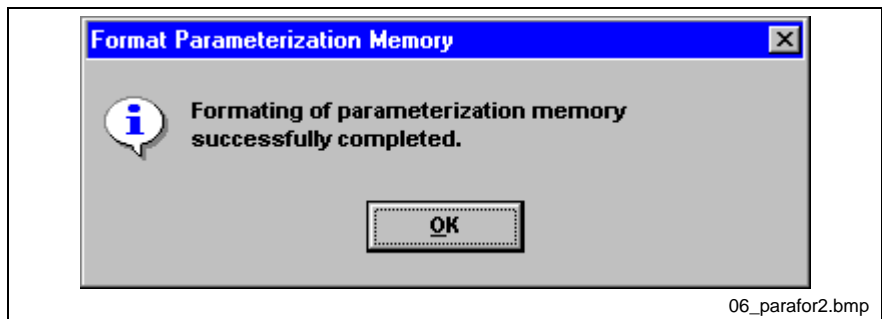


Fig. 6-99: Parameterization memory successfully formatted

During formatting the controller board displays: SCANDISK.

Menu "Parameterization Memory ... Read"

In addition to the parameterization data the entire project can also be stored in the parameterization memory. The parameterization data is required by the controller board to start INTERBUS according to your parameterization. The project files (*.BG4, *.INI) can be restored from the parameterization memory by IBS CMD G4.

If you have saved your project in the parameterization of the controller board with restorability, this command reads out the project with the files *.BG4, *.INI and, if available, *.ZWT.

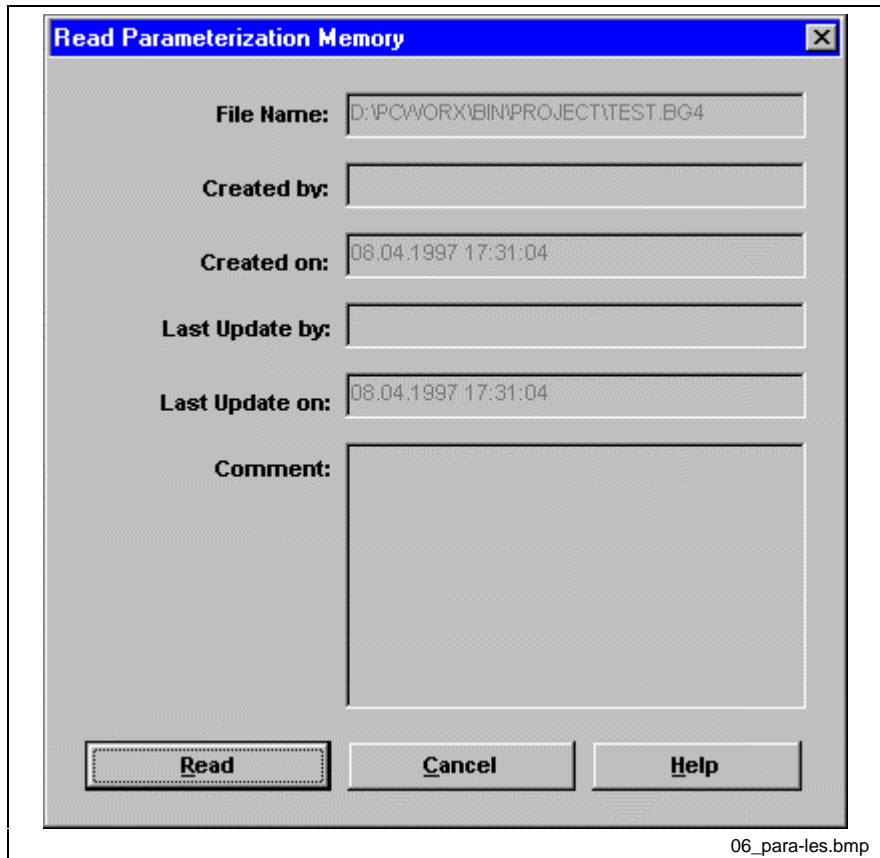


Fig. 6-100: Read parameterization memory

The entries displayed in the info boxes "Created by:", "Last updated by:" and "Comment:" refer to menu "**Project**\Description". The data entered there is displayed in the dialog box.

Note: Not all controller boards have a parameterization memory. For PC controller boards with no parameterization memory the parameterization can be stored as an ASCII file on the PC drives.

Menu "Parameterization Memory ... Write"

With this command, you write the project opened in IBS CMD G4 into the controller board's parameterization memory. Besides the bus structure also the user functions, events, process data descriptions with their assignments are transferred to the controller board.

The parameterization data can be booted directly from the parameterization memory when starting up the controller board.

In addition to the parameterization data the entire project (*.BG4, *.INI etc.) can be stored in the parameterization memory. Whether you want to save the entire project in the parameterization memory and thus ensure the restorability of the project in IBS CMD G4 is decided in the following dialog box.

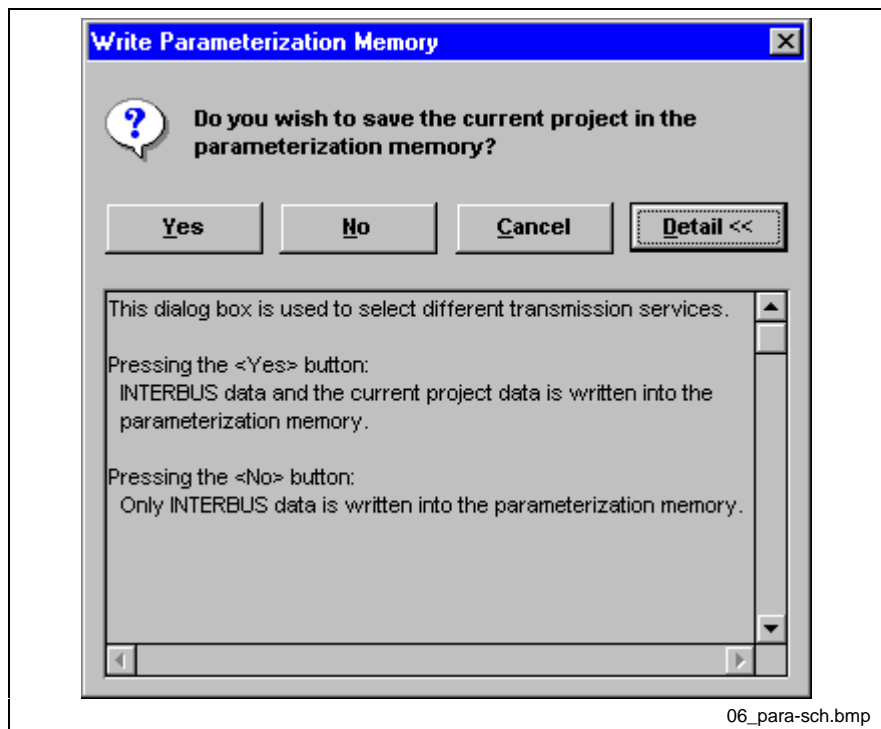


Fig. 6-101: Write parameterization memory

Note: Not all controller boards have a parameterization memory. For PC controller boards with no parameterization memory the parameterization can be stored as an ASCII file on the PC drives.

Menu "Parameterization Memory ... Compare"

With this command, you compare the project opened in IBS CMD G4 with a project in the controller board's parameterization memory. File name, date and comment of the projects are displayed in a dialog box.

The "State" line shows whether the two projects are identical after the comparison.

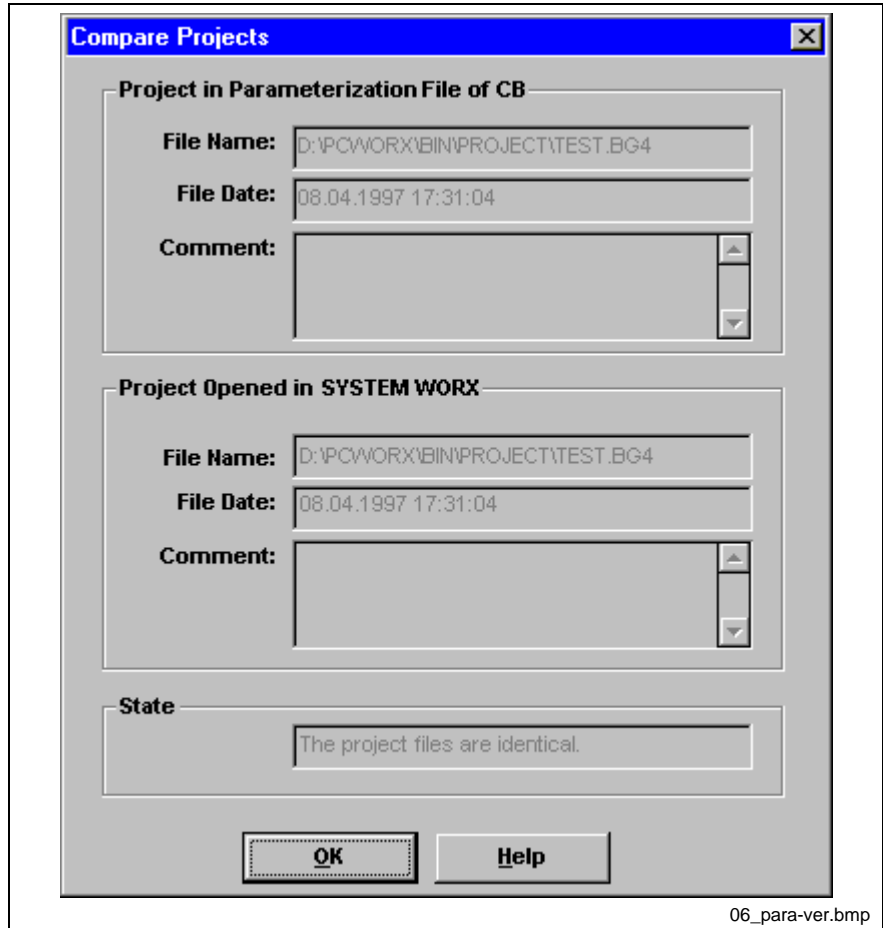


Fig. 6-102: Compare projects

Menu "Parameterization Memory ... File"

Besides the parameterization and the project files which can read back, you can also store other user files in the controller board's parameterization memory. Certain PCP devices (e.g. operating and display devices) can load and use these user files directly from the parameterization memory via special PCP services.

Start by selecting the user files and specifying whether they are to be saved in the parameterization memory in compressed or uncompressed format. The currently selected file set is compared with the file set in the parameterization memory prior to being saved there. Files missing in the current file set may be deleted from the parameterization memory. Files that already exist can be overwritten.

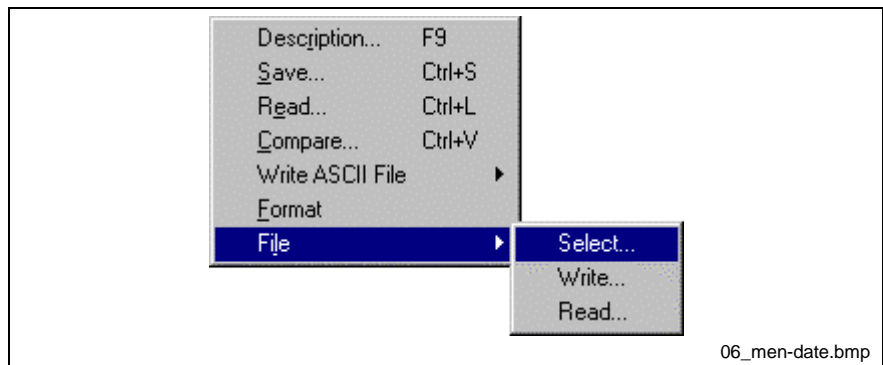


Fig. 6-103: Menu "File"

Menu "Parameterization Memory ... File ... Select"

Start by selecting the files you want to save in the parameterization memory. The files you select can be on any drive or in any directory.

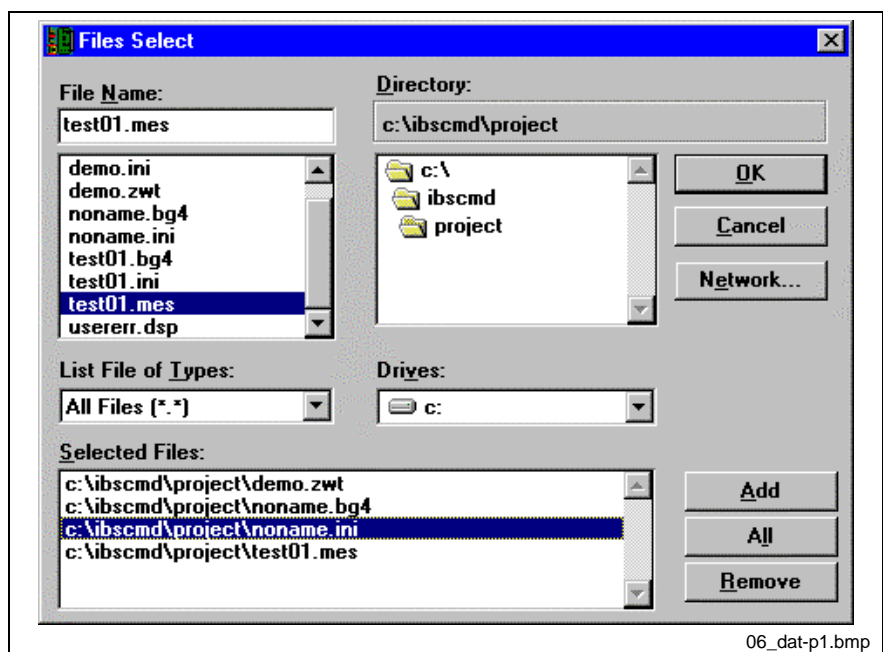


Fig. 6-104: Selecting files

- File Name** This input box displays the files on the current drive in the selected directory. Double-click on a file to add it to your file set.
- Directory** Select the directory containing files you want to add to your file set.
- Drives** Select the drive containing the files you want to select.
- File Type** Specify the file type of the files displayed in the "File Name" input area.
- Selected Files** The files (incl. The drive and path) you have added to the file set are displayed here. Double-click on a file to remove it from the selection.

Buttons

- Add** This button is used to add the file selected in the "File Name" area to your file set. You can also add a file by double-clicking on it.
- All** Click this button to add all the files displayed in the "File name" area to your file set.
- Remove** This button is used to remove the file selected in the "Selected Files" area from your file set. You can also remove a file by double-clicking on it.

Menu "Parameterization Memory ... File ... Read"

You can use this command to read files from your controller board's parameterization memory and put it in the directory specified in "Save In".

The dialog box shows the files available in the controller board's parameterization memory. To select and save a file in the selected directory, click on it.

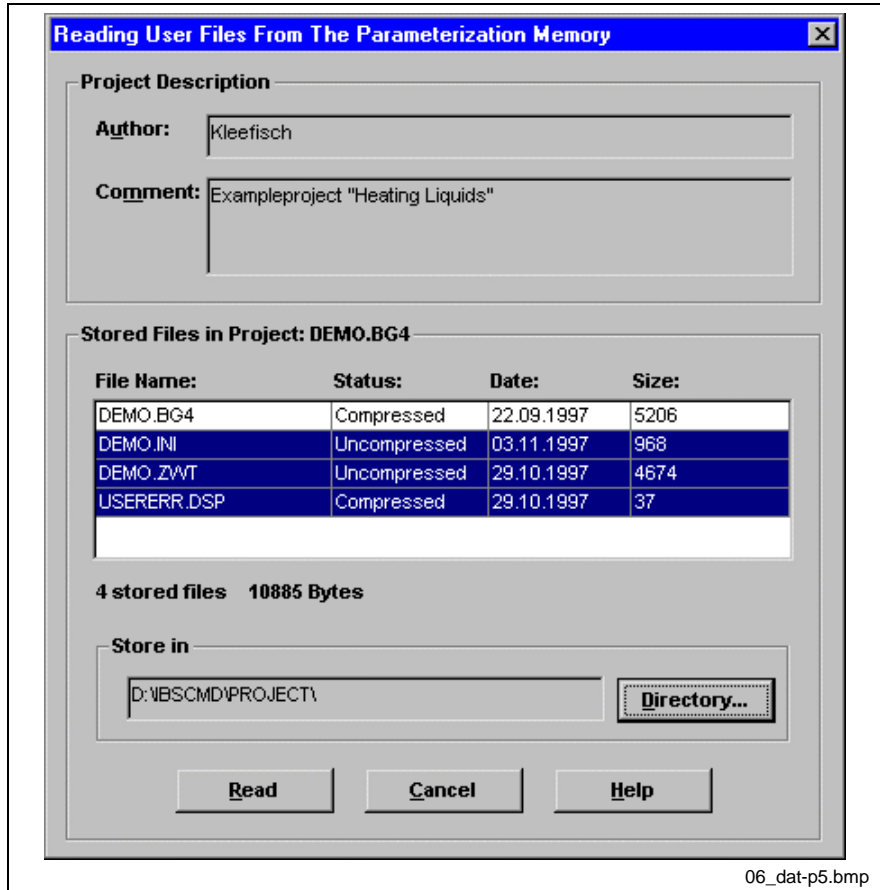


Fig. 6-105: Reading files

Project description

Author: The name of the author of the file set that was last saved in the parameterization memory is displayed here.

Comment: Comments on the file set that is currently in the parameterization memory are shown in this display box.

Stored Files in the Project: This table shows which files are in your controller board's parameterization memory.

File Name The name of the file in the parameterization memory is displayed here.

Status You can see here whether the file in the parameterization memory is compressed or not.

File Date This column shows the date of the original file.

File Size The file size displayed here is the size of the uncompressed file.

Save In The path to the directory and the drive where the files in the parameterization memory will be stored are displayed here. You can specify a default directory in "Options ... Settings ... General" or use "Directory" to select a different path.

Buttons

Directory You can use this button to change the drive and directory where the files from the parameterization memory are to be stored.

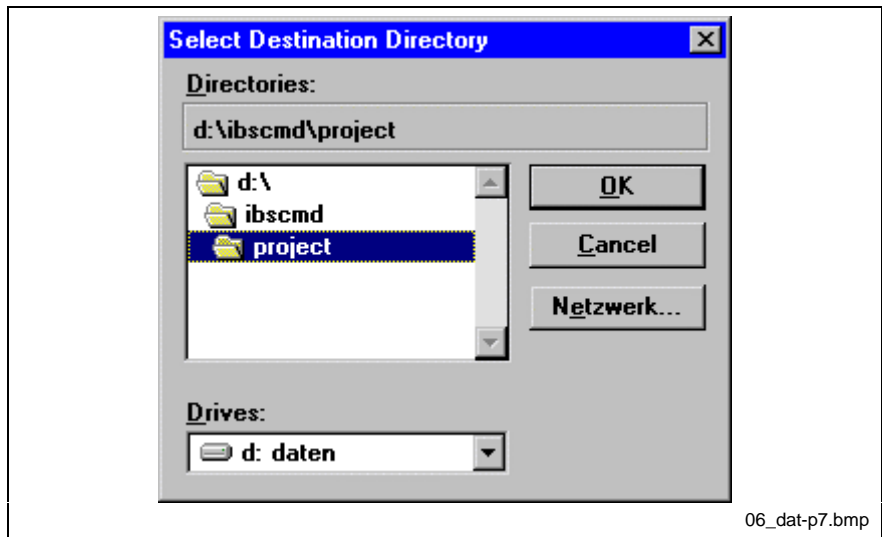


Fig. 6-106: Select destination directory

Read After selecting the files and a destination directory, click this button to start the read operation. If the file already exists in the destination directory, you can choose to save it in a different directory with another name.

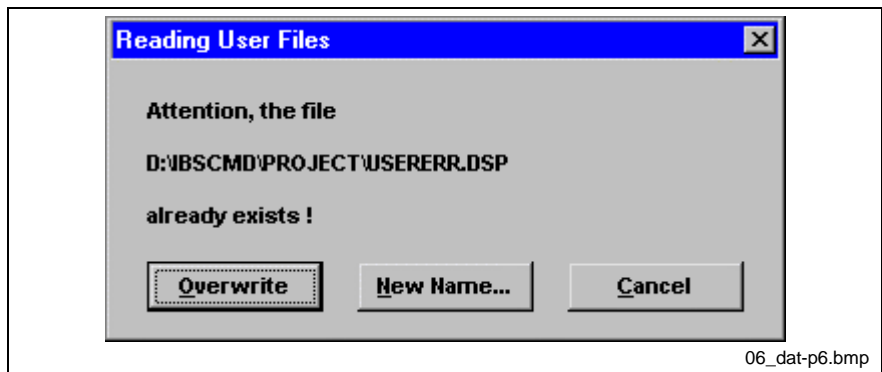


Fig. 6-107: Reading user files

Overwrite Click this button to overwrite the file in the destination directory with the file in the parameterization memory.

New Name ... This button opens the Windows Save dialog box. You can use it to save the file from the parameterization memory in a different directory with a different name.

Menu "Parameterization Memory ... File ... Write"

You can use this command to write the files in the current file set to the parameterization memory. The current file set is displayed and you can select the files to be written in compressed or uncompressed format to the parameterization memory.

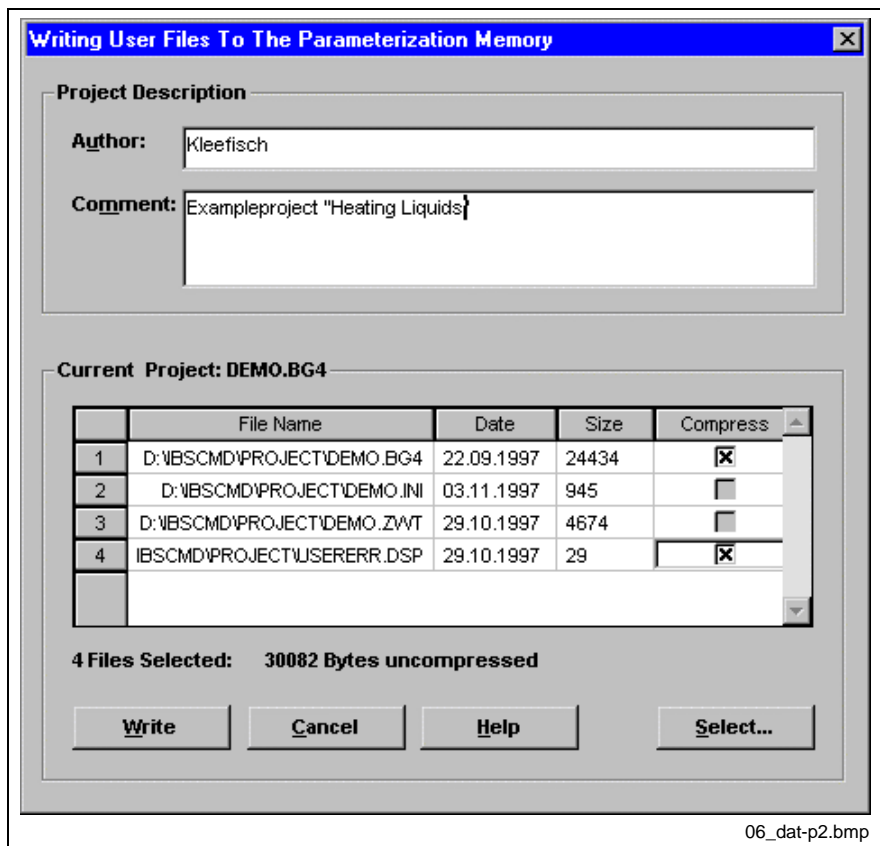


Fig. 6-108: Writing user files to the parameterization memory

Project description

Author: Enter your name in this box.

Comment: Enter comments about the file set.

Current project:

The name of the currently loaded project file is displayed here. Each row of the following table represents a file in the current file set.

File Name The file name, the path and the drive from which the file is written to the parameterization memory are displayed here.

File Date This column shows the date of the original file.

File Size The file size displayed here is the size of the uncompressed file.

Compressed Select this option if you want the file to be saved in the parameterization memory in a compressed format. Please consider that files used by PCP devices must not be compressed, because otherwise they cannot be used by the devices.

Buttons

Write When you click on this button, the system will start by comparing the files in the current file set with the files in the parameterization memory. After the files have been compared, the relevant files are written to the parameterization memory.

Select Click this button to access the dialog box for selecting the files to be written to the parameterization memory.
 Before a file in the parameterization memory is overwritten, the following message will be displayed to prompt whether you wish to overwrite the file or not.

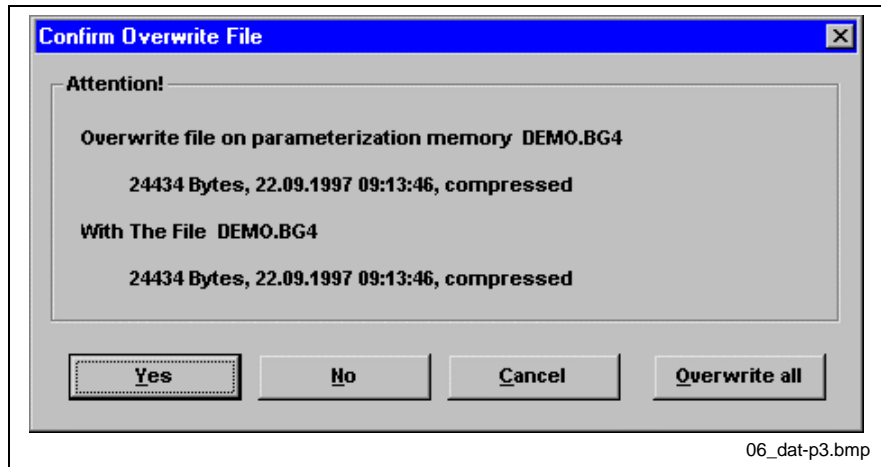


Fig. 6-109: Overwriting a file

Yes Click this button to overwrite the file in the parameterization memory.
No Click this button, if you don't want to overwrite the file in the parameterization memory.
Overwrite All Click this button, if you want to overwrite all files in the parameterization memory with file names identical to those in your file set.
 Before the file set is actually transferred, a dialog box will appear to show you which files in the parameterization memory will be deleted or overwritten and which will remain unchanged.

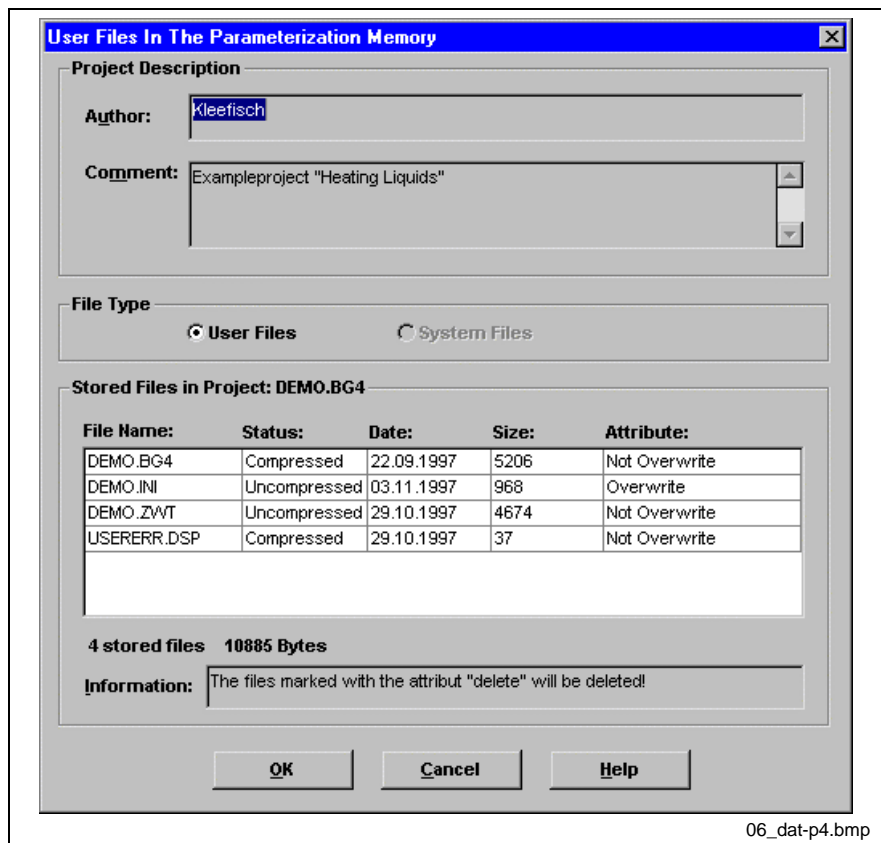


Fig. 6-110: User files in the parameterization memory

Project description

Author:	The name of the author of the file set that was last saved in the parameterization memory is displayed here.
Comment:	Comments on the file set that is currently in the parameterization memory are shown in this display box.
	Stored files in the project:
	This table shows which files are in your controller board's parameterization memory.
File Name	The name of the file in the parameterization memory is displayed here.
Status	You can see here whether the file in the parameterization memory is compressed or not.
File Date	This column shows the date of the original file.
File Size	The file size displayed here is the size of the uncompressed file.
Attribute	The result of the file comparison is displayed in this column. The following attributes exist for the files in the parameterization memory:
Overwrite	The file is in the file set and in the parameterization memory. However, you have decided not to overwrite the file in the parameterization memory.
Delete	The file is not in the file set. Therefore, the file is deleted in the parameterization memory.
Do Not Overwrite	The file is in the file set and in the parameterization memory. However, you have decided not to overwrite the file in the parameterization memory. Additionally, the total number of files and their file sizes (uncompressed) is displayed.

Note: Files with the "delete" attribute are deleted from the parameterization memory.

Menu "Preprocessing ... Variables"

In this dialog box you can create variables that are made available to the "Preprocessing" add-on program. After creating a variable you must assign the required process data description.

Note: Note the relationship between data type and process data length. For example, a 8 bit process data item could be a SINT or a BYTE.

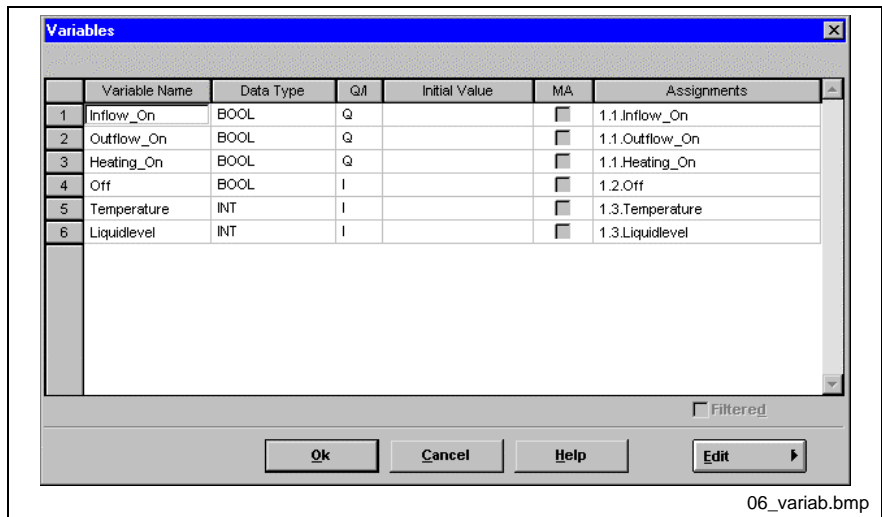


Fig. 6-111: Program variables

Creating the First Variable

To create the first variable, click on the empty table and press then the <Ins> key. You can also use the "Insert Variable" command from the context menu (right mouse button).

Creating a New Variable

To create other variables with the keyboard, you must first mark a line number (<Cursor left> key). Press the <Ins> key, when the line number of the whole line is marked.

If you insert a variable with the context menu, it is **not** necessary to mark the line. If the insertion mark is in the last line of the table, you can also create variables by pressing the <ENTER> key.

Variable Name

Enter an unambiguous name for your variable in this column. You use this variable names in the "Preprocessing" add-on program or in PROGRAM WORX.

Data Type

Here you can select the desired data type from a selection box. Note that you can only assign the variables to process data descriptions of the correct length.

- 1 bit** (BOOL)
- 8 bit** (BYTE, SINT)
- 16 bit** (WORD, INT)
- 32 bit** (DWORD, DINT, REAL)

Q/I

Enter the letter "Q" for output data and the letter "I" for input data in this column to define your variable as an input or output variable.

Initial Value

If you want to assign a specific default value to a variable, you can specify this value here. You must specify the initial value according to the syntax: Datatype#Value.

MA

In this column you can switch the **Multiple Assignment** for the respective process data description ON or OFF. If several process data descriptions have an assignment, each one must be capable of multiple addressing.

Assignments In this column the variables are linked with process data descriptions. Use the "Direct Link ..." command from the context menu to input the assignment.

Option boxes

Filtered If you have restricted the representation of the variables in the "Filter" dialog box, you can activate or deactivate the filter function with this option box.

Buttons:

Edit When you press this button, the context menu of the dialog box opens. The commands of this menu allow you to edit the variables in the dialog box.

Context Menu "Preprocessing Variables"

The "Variables" dialog box has a context menu for comfortable operation. Like the other context menus, you call up this menu with the right mouse button or with <SHIFT>+<SPACE> or <SHIFT>+<F10>.

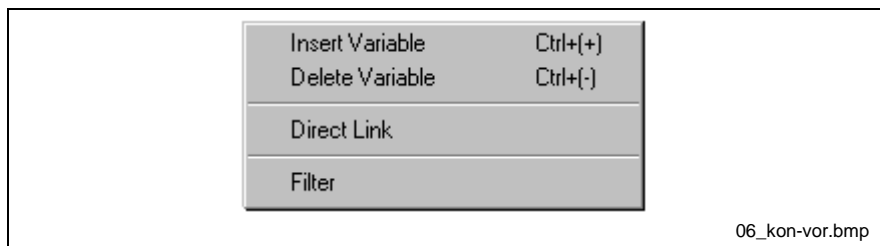


Fig. 6-112: Context menu "Variables"

- Insert Variable** This command inserts a new line in the dialog box above the marked line. Every line represents a variable.
- Delete Variable** Deletes the marked line from the dialog box.
- Direct link** With this menu item you open a dialog box which offers you the process data descriptions available for the marked variable (matching in the data length).
- Filter** With this menu item, you open a dialog box for filtered representation of the variables.

Dialog Box Filter (Variables)

Here you select the options that restrict the representation of the variables. Only the variables matching all the requirements specified here are displayed.

Several options can be selected simultaneously.

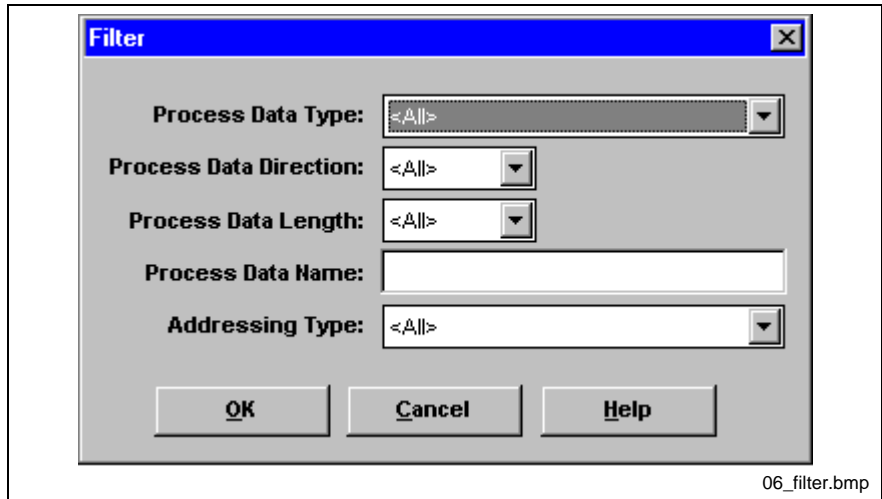


Fig. 6-113: Filter for variables

- Program Instance Name** With this filter setting you can specifically display the variables of a certain program instance.
- Variable Name** Display all variables which match the corresponding search filter. The asterisk character "*" is used as a wild card.
Example: "a*" shows all variables beginning with "a".
- Data Type** Display of all variables with specified data type such as BOOL, BYTE, WORD, etc.
- Data Direction** Display of all variables with specified data direction (input or output data).
- Addressing Type** Display of all with specified addressing (with or without direct link).

Note: The displayed variables are possibly not complete when the option "filtered" is active in the variable box.

Dialog Box "Process Data Assignments"

In this dialog box you can assign process data descriptions to preprocessing variables.

Only process data descriptions that correspond in terms of length to the variables selected beforehand are displayed.

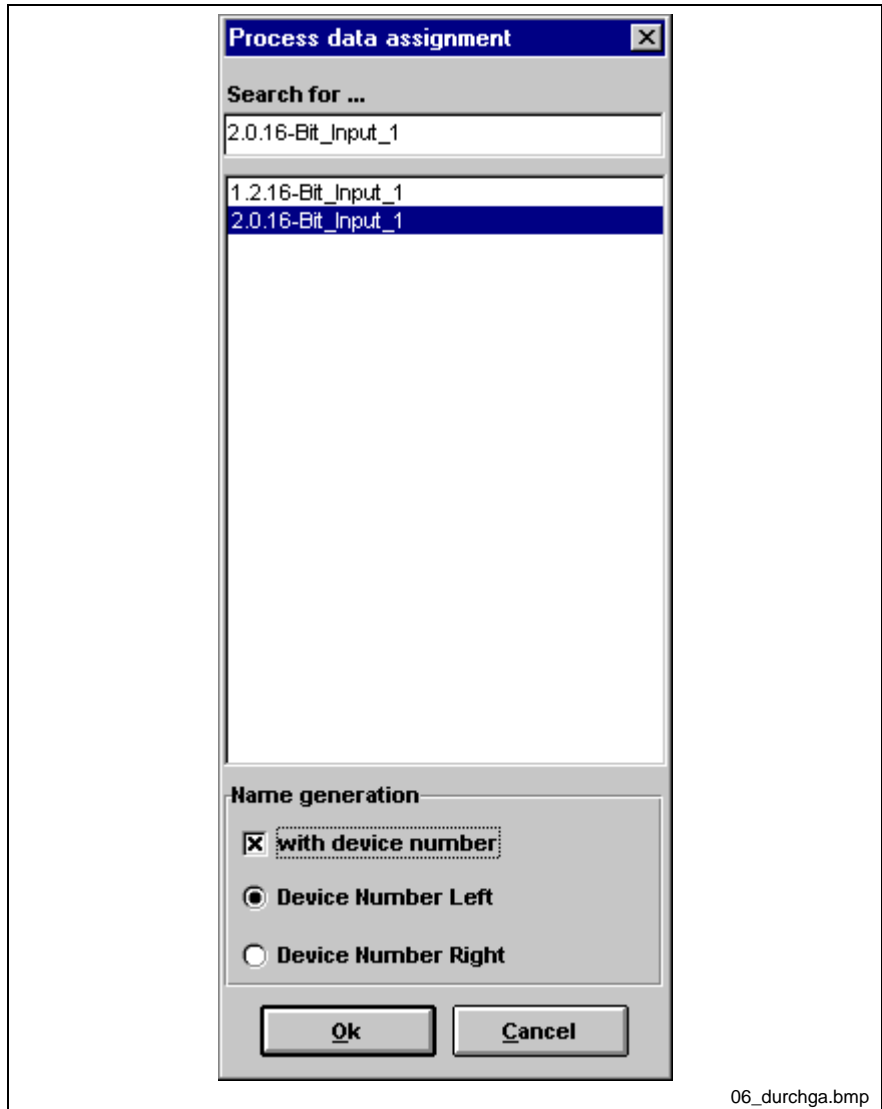


Fig. 6-114: Process data assignment

The names of the variables can be automatically generated based on the name of the process data description assigned. The automatic name generation is only active while the variable has no name. In addition to the name of the process data description assigned, the variable name can also contain the device number. You can specify whether the device number is placed in front of or after the name of the process data description.

Menu "Preprocessing ... Description ..."

In this dialog box you describe the (process data) preprocessing. The "Name" is also displayed in the representation area. Furthermore, there is an input box for remarks and one for the name of the author.

In the "IBS CMD G4" software, the preprocessing consists of **FBDE** = **F**unctional **B**lock **D**iagram **E**ditor. With the FBDE you are able to create programs in the "FBD" programming language and execute them on the controller board.

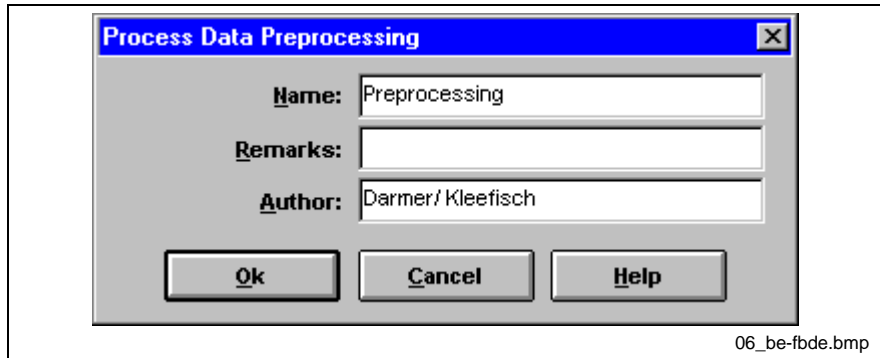


Fig. 6-115: Preprocessing description

Menu "Preprocessing ... Programming"

With this menu item, you start the "Preprocessing" Add-on program with which you can realize the preprocessing of the process data in a graphic editor. The graphic editor offers you the possibility of creating a program in the "FBD" (Function Block Diagram) programming language. This program is used for preprocessing your INTERBUS data.

Menu "Preprocessing ... Import"

You can import GLV files with this menu item. GLV files contain definitions of global variables for the preprocessing of process data. You save the global variables in a file in order to make them available to several projects.

Import and export of the GLV files takes place in a Windows standard dialog box for file selection.

Rules for Assigning Variable names according to IEC 1131-3

A variable name **must** be specified with at least one and at the maximum 31 characters. The first 30 characters must be unambiguous.

The variable name may only contain alphanumeric characters (A-Z, a-z, 0-9) and underscores (_). Special characters are not permitted.

The first character of the variable name may not be a digit.

The first character of the variable name may not be an underscore (_). However, there may not be two underscores at the beginning of the variable name.

No keywords may be used.

Reserved Keywords according to IEC 1131-3

The following keywords (according to IEC 1131-3) may not be used as variable names:

A	ABS, ACOS, ACTION, ADD, AND, ANDN, ANY, ANY_BIT, ANY_DATE, ANY_INT, ANY_NUM, ANY_REAL, ARRAY, ASIN, AT, ATAN
B	BOOL, BUSY, BY, BYTE
C	CAL, CALC, CALCN, CASE, CD, CDT, CLAIM, CLK, CONCAT, CONFIGURATION, CONSTANT, COS, CTD, CTU, CTUD, CU, CV
D	D, DATE, DATE_AND_TIME, DELETE, DINT, DIV, DO, DS, DT, DWORD
E	ELSE, ELSIF, END_ACTION, END_CASE, END_CONFIGURATION, END_FOR, END_FUNCTION, END_FUNCTION_BLOCK, END_IF, END_PROGRAM, END_REPEAT, END_RESOURCE, END_STEP, END_STRUCT, END_TRANSITION, END_TYPE, END_VAR, END_WHILE, EN, ENO, EQ, ET, EXIT, EXP, EXPT
F	FALSE, F_EDGE, F_TRIG, FIND, FOR, FROM, FUNCTION, FUNCTION_BLOCK
G	GE, GT
I	IF, IN, INITIAL_STEP, INSERT, INT, INTERVAL
J	JMP, JMPC, JMPCN
L	L, LD, LDN, LE, LEFT, LEN, LIMIT, LINT, LN, LOG, LREAL, LT, LWORD
M	MAX, MID, MIN, MOD, MOVE, MUL, MUX
N	N, NE, NEG, NOT
O	OF, ON, OR, ORN
P	P, PRIORITY, PROGRAM, PT, PV
Q	Q, Q1, QU, QD
R	R, R1, R_TRIG, READ_ONLY, READ_WRITE, REAL, RELEASE, RE-PEAT, REPLACE, RESOURCE, RET, RETAIN, RETC, RETCN, RE-TURN, RIGHT, ROL, ROR, RS, RTC, R_EDGE
S	S, S1, SD, SEL, SEMA, SHL, SHR, SIN, SINGLE, SINT, SL, SQRT, SR, ST, STEP, STN, STRING, STRUCT, SUB
T	TAN, TASK, THEN, TIME, TIME_OF_DAY, TO, TOD, TOF, TON, TP, TRANSITION, TRUE, TYPE
U	UDINT, UINT, ULINT, UNTIL, USINT
V	VAR, VAR_ACCESS, VAR_EXTERNAL, VAR_GLOBAL, VAR_INPUT, VAR_IN_OUT, VAR_OUTPUT
W	WHILE, WITH, WORD
X	XOR, XORN

Menu "Configuration Frame"

Menu "Configuration Frame" Read Again

This menu item reads in the configuration frame activated on the controller board. An already loaded bus configuration is overwritten.

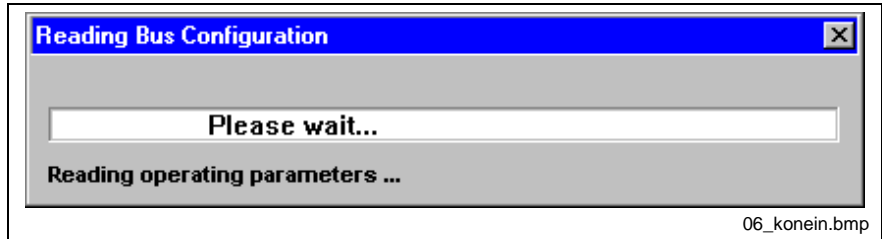


Fig. 6-116: Read configuration frame



⇒ If the controller board is in the "READY" state, the connected configuration is read in by "Create Configuration". All data of the loaded project will be lost.

Menu "Configuration Frame ..." Description

The configuration frame contains the bus topology, the process data descriptions and their assignments, the group assignment and other parameters which determine the configuration of the bus.

With this menu item you describe the configuration frame. For this purpose, you can enter a name, remarks and an author. The entry in the input box "Name" is also displayed in the representation area.

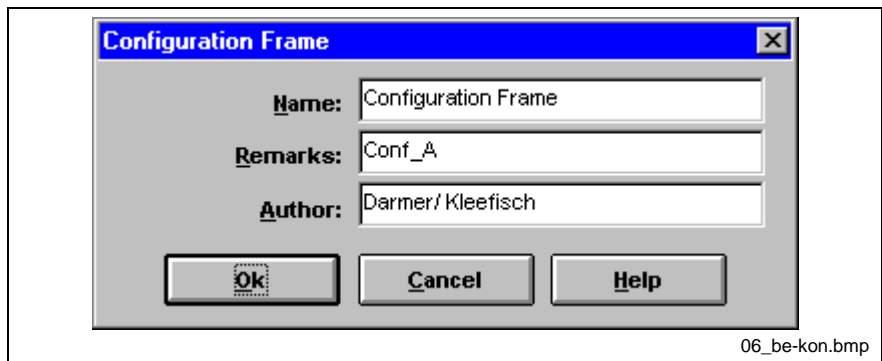


Fig. 6-117: Configuration frame description

Menu "Configuration Frame ..." Compare"

The active configuration frame on the controller board is compared with the configuration frame IBS CMD G4. If there is a difference between the two configuration frames and if this difference is allocated to a device, the device is marked and an appropriate message is displayed.

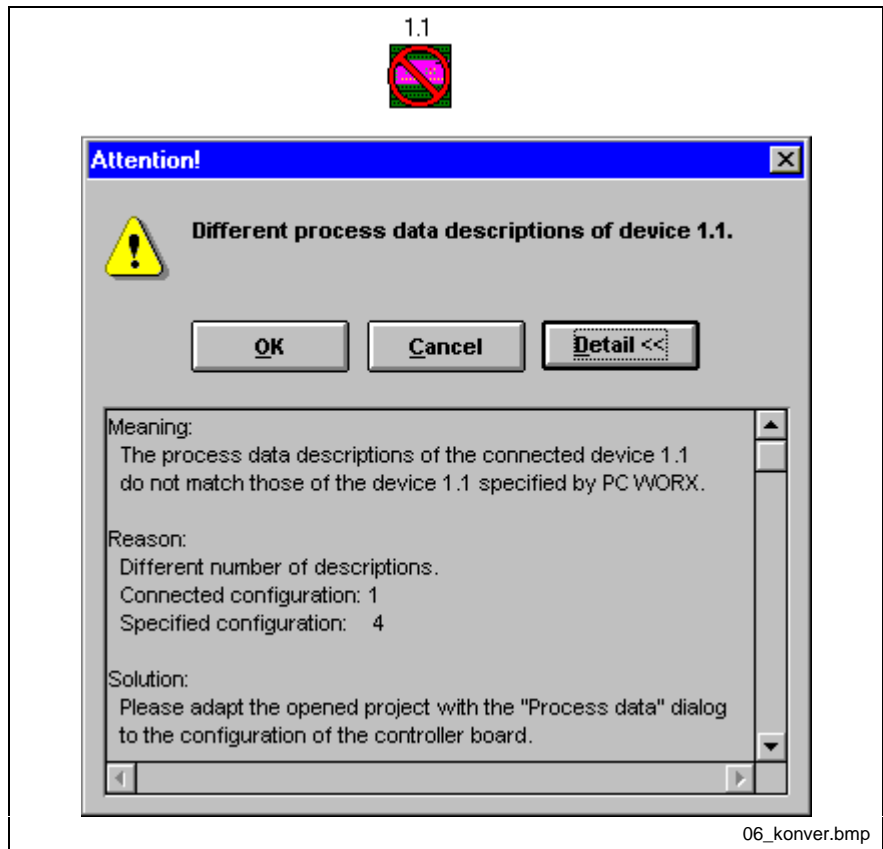


Fig. 6-118: Compare configuration frame

Menu "Device ..."

Menu "Device ... Description ..."

With this dialog box you can create a description for a marked device. A device is an unit participating in data traffic via the INTERBUS.

The entries after "Manufacturer Name" can be taken, for example, from the data sheet or determined in "Options ... Print Device Description".

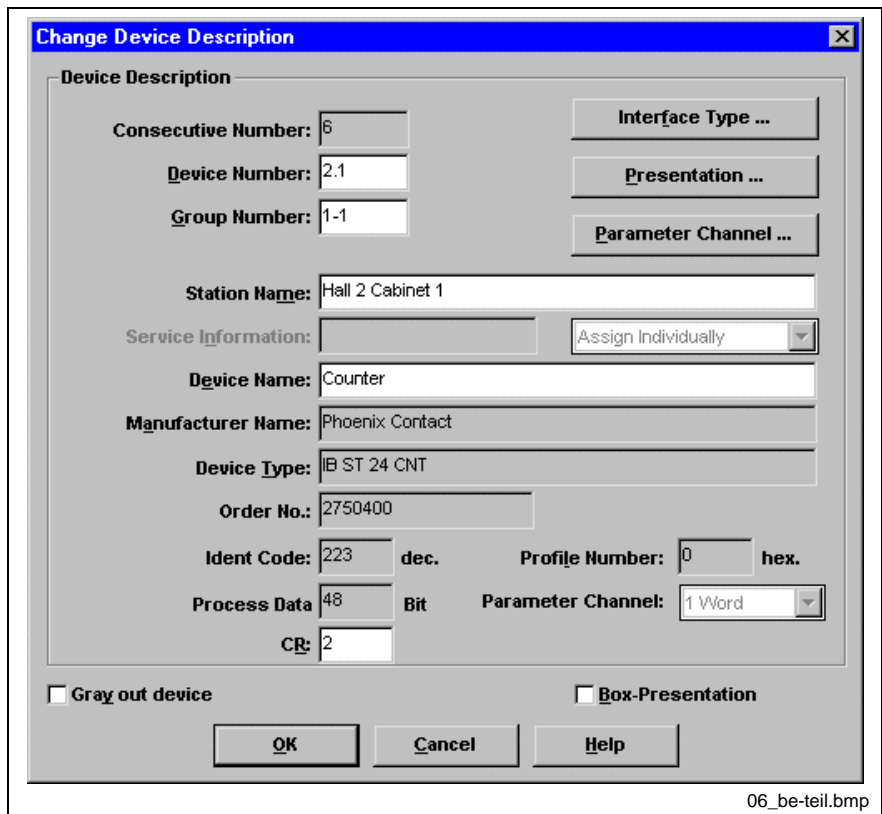


Fig. 6-119: Device description

Display/Edit boxes:

- Consecutive Number** The number is displayed for the consecutively numbered INTERBUS devices.
- Device Number** The device number indicates the number of the bus device. It consists of the bus segment number and the position number within the bus (e.g. 1.3).
- Group Number** You can combine individual bus segments to form groups. It is also possible to define alternative groups. Thus, the group number is composed of: [group] - [alternative].
- Station Name** Here you can describe the station's position in which the device is used (e.g. hall 4, switch cabinet 2).
- Service Info** You can assign a Service Info to an INTERBUS device, in order to identify them clearly and quickly in case of a malfunction. The Service Info has a maximum of 12 characters. The service information of the individual INTERBUS devices are saved in the configuration frame and are, therefore, available in system operation on the controller board. The service information of the devices causing the malfunction can be displayed on the (hardware or software) LCD. To edit the service information according to your requirements, you have to select the option "Assign Individually" in the "Service Info" selection box.

"Service Info" Selection Box	In this selection box you can select the device data that you want to use as service information. You can choose e.g. "Station Name" in the selection box, if you want to use the first twelve characters in the station name for the Service Info. The station name is then copied automatically into the "Service Info" box.
Device Name	Here you assign a name to the device (e.g. limit stop switch group 3 or motor current M1 to M4).
Manufacturer Name	Here the name of the manufacturer appears. This entry is taken from the device data base.
Device Type	Here you can see the product designation of the device (e.g. IB ST 24 BK-T). This entry is taken from the device data base.
Order No.	Here the order number of the device is displayed provided it as a Phoenix Contact product.
ID Code	The ID Code is the low-order byte of the device code which describes the function of the device.
Profile Number	The profile number codes a certain device function within a device specification, such as DRIVECOM, ENCOM or MMICOM. A device is clearly assigned to a specification by the profile number.
Process Data Channel	This entry shows how many bits the device occupies within the process data channel.
Parameter Channel	This entry shows how many words the device occupies within the parameter data channel. If you open the dialog box on a device with a variable parameter data channel length, you can select the length of this parameter data channel in this selection box.
CR	<p>Enter here the communication reference (CR) of the device. The CRs start at 2 and must be assigned without interruption in ascending order. Thereby, the position of the PCP device in the bus system is irrelevant.</p> <p>The communication reference (CR) identifies an INTERBUS device in the parameter data channel (PCP). To send a PCP service to a device, its CR must be specified.</p> <p>The Input box "CR" is only available for devices with parameter data.</p> <p>Option box:</p>
Gray out Device	In this option box you can gray out the device in the configuration frame. This means that the data from or for this device is not taken into account by the controller board in the data transmission.
Box Display	When this option is checked, the device is displayed in box display mode.

Dialog Box "Parameter Channel ..."

In the "Parameter Channel" dialog box you determine the services that the controller board supports for the marked PCP node. These services can be executed by the controller board at a request of the PCP node.

You can enter a comment and assign the services and message lengths to the standard values.

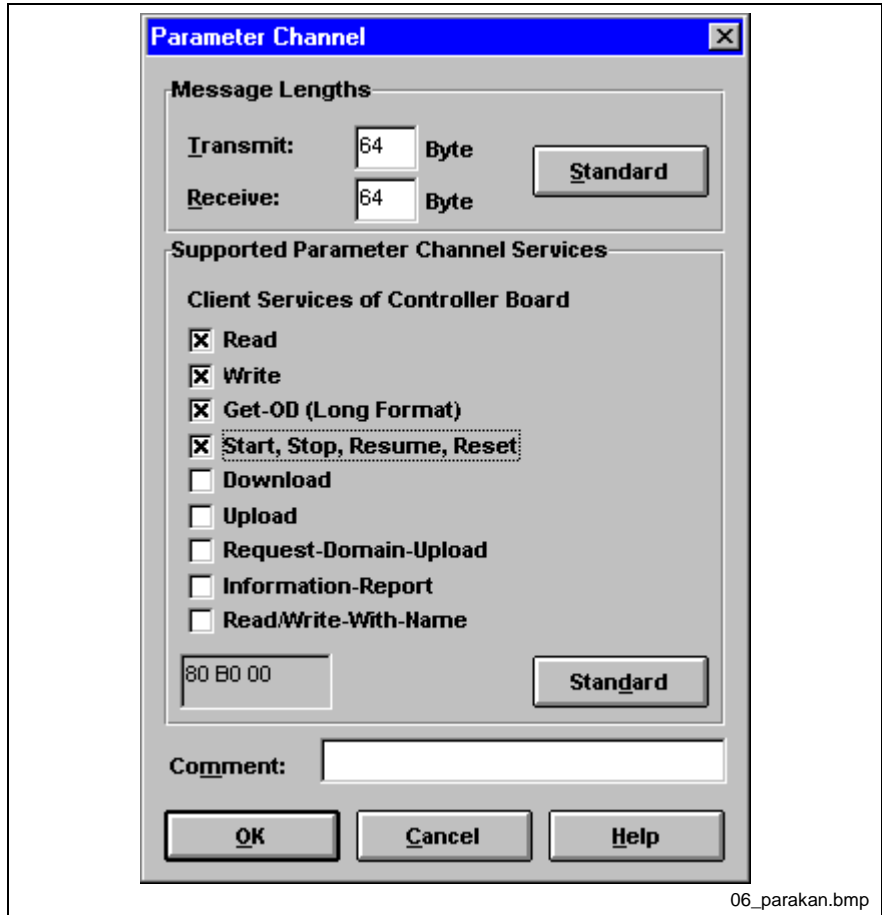


Fig. 6-120: Parameter channel

Message Lengths Enter the total message lengths in bytes into the input box. The message lengths marks the transmit and receive buffer of a PCP node. A service sent from or to a PCP node may not exceed a maximum length.

Standard These two buttons set the settings for message lengths and supported parameter data channel services to standard values. The standard value is 64 bytes for the message lengths as well as "Read" and "Write" as supported parameter data channel services.

Depending on the selected PCP services a hexadecimal number code displayed.

PCP nodes with permanently defined programs exist that send a predefined confirmation specified by their program back on REQUEST. In addition, there are so-called "intelligent" PCP nodes in which you can create the program (an application program) yourself. In application programs running on these devices you must acknowledge the response bit with the confirmation bit after receiving an INDICATION.

Dialog Box "Interface Type for Bus Terminal Mode"

With the "Interface Type for Bus Terminal Mode" you determine with which INTERBUS interfaces the device is equipped. Hereby, a distinction is made between the incoming interface (IN1), the outgoing interface (OUT1) and the branching interface (OUT2).

INTERBUS interfaces are e.g. 2-wire remote bus, fiber optics remote bus, 8-wire local bus, etc.

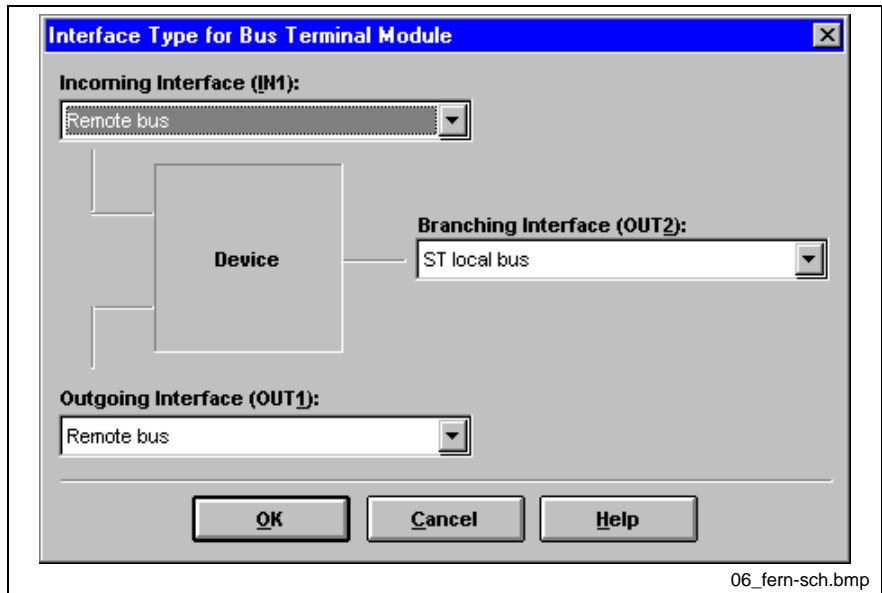


Fig. 6-121: Interface Selection

If you use an interface that does not correspond to any preset interface type, you should use the "Universal" interface type.

Note: If the wrong interface type is selected, you receive an error message. However, the device will be positioned and the connection drawn with a dotted line to indicate the wrong interface type. If the device interface is set to "Universal" on one side of a connection, a different interface type is not indicated.

Dialog Box "Display"

In this dialog box you can select an icon that will be visible in standard display mode and set the color and width of the box display.

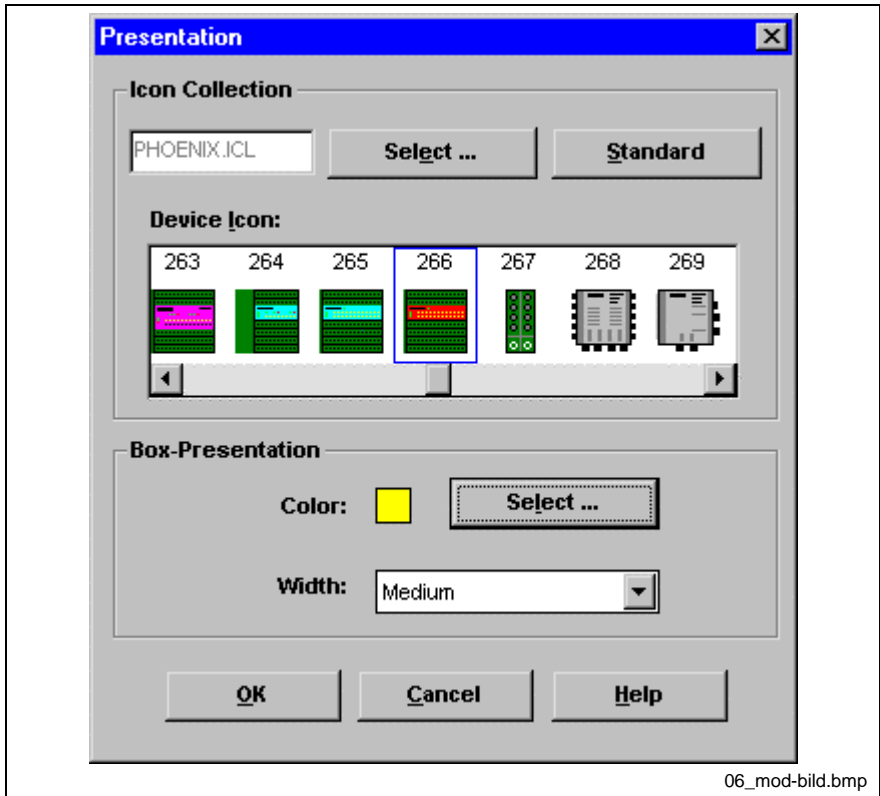


Fig. 6-122: Presentation

Icon Library You can use "Icon Library" to assign an icon to the device. This icon is only visible in the standard display mode.

You can take an icon either from the standard library or from the manufacturer-specific library. Icon libraries have the file name extension ICL (Icon Library). Besides the icon libraries, you can also assign individual icons. These icons have the file name extension "ICO".

Select Press this button to select the desired icon library in a file selection dialog box.

Standard To use the standard icon library, click this button.

Custom Icons:

To create your own icons, you need to draw the icon first using an icon editor. Then, a Windows DLL has to be created using a suitable compiler and the file name extension has to be changed from DLL to ICL. The IBS CMD G4 CD-ROM contains a detailed description on how to do this together with a demo program.

Box Presentation

These settings control how the INTERBUS appears in the box display. You can choose a color for the ID strip and set the width of the device (narrow, standard, wide).



Fig. 6-123: Box presentation"

Groups and alternatives

Groups

You can join individual devices to groups, in order to switch all devices on and off at the same time. A group may also include devices that do not follow consecutively. If you switch off a group, all devices of this group and the devices depending on these devices (e.g. the corresponding local bus branch) are switched off.

All devices within a local bus segment (except the bus terminal) must have the same group number.

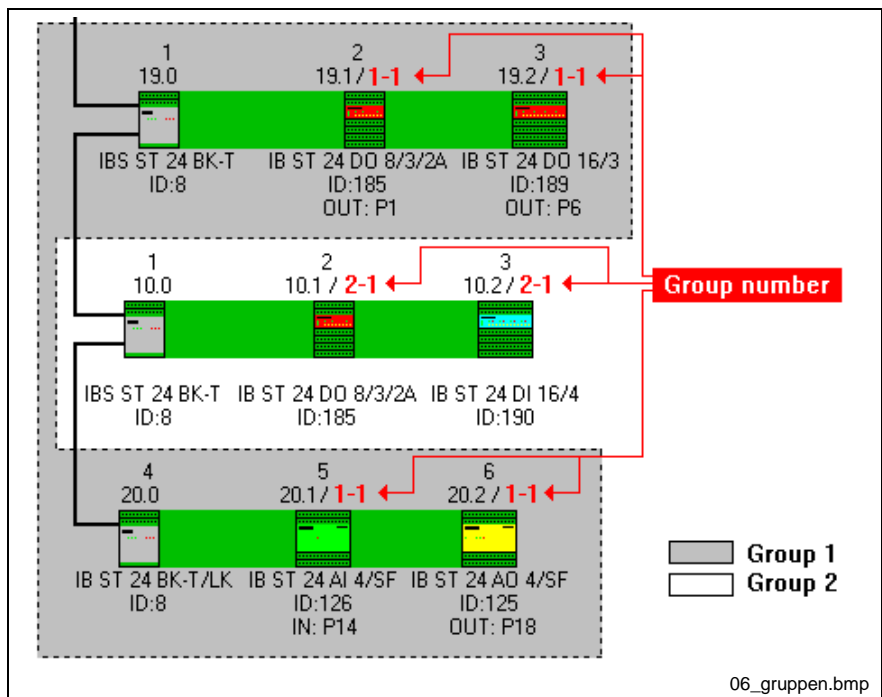


Fig. 6-124: Groups

You can switch a group on and off with the firmware service

Control_Active_Configuration_Request (0713 hex).

The device number is then transferred to the firmware service.



ATTENTION

⇒ If the device to be switched off is assigned to a group, this group is completely switched off. When you switch off a bus terminal, always switch off all the following remote bus devices including the local bus on the bus terminal module.

Note: The group number consists of group and alternative with the syntax: GROUP - ALTERNATIVE.

Group The "Group" parameter assigns a device or local bus segment to a group.

Alternative An alternative is a self-contained part of the bus configuration that can be activated at a certain position alternatively to the rest of the bus configuration.

You can define alternative bus segments within a group. According to the requirements one of the defined alternatives can be connected.

Note: An alternative group can only be connected to a remote bus device.

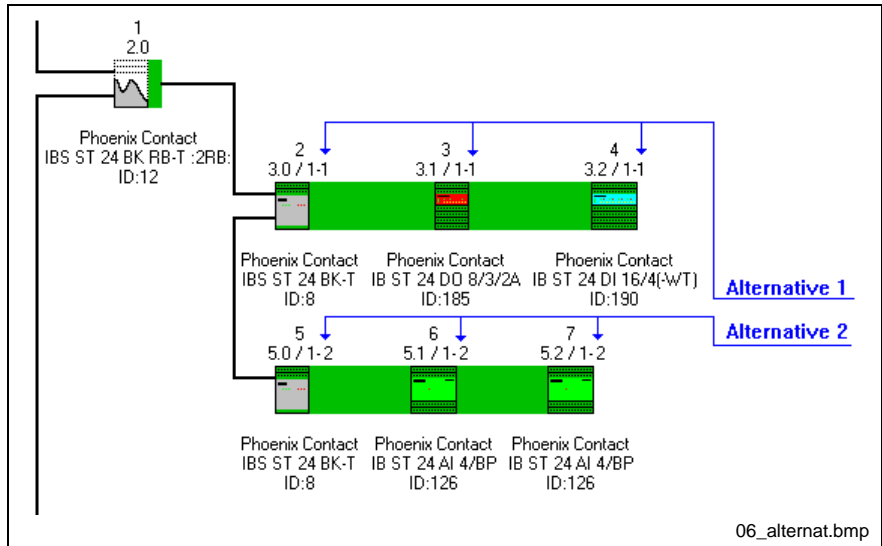


Fig. 6-125: Alternatives

Menu "Device ... Process Data"

Process Data Descriptions

A process data description describes the process data of a device.

Name,

data direction,

data length,

and the assigned destinations (addresses, variables, direct links).

Each process data description is represented by **one** line in the process data dialog box. For example, you can create one process data description for one single bit of a digital device or a channel of an analog device. So, you have the possibility to assign process data specifically to addresses or linking them which each other.

Note: If you open the process data dialog box from the "Controller Board" element, you will see the process data descriptions of **all** devices in the current INTERBUS project. If you open the "Process Data" dialog box from a device, you will only see the process data descriptions of that device.

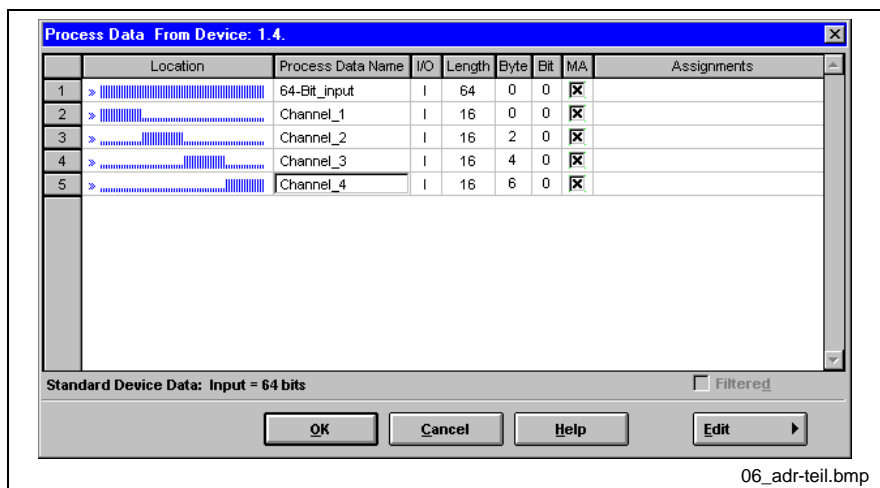


Fig. 6-126: Process data dialog box of a device

Columns in the process data dialog box:

Location Marks the position of the process data within a standard process data description (entire process data channel length) of the device.

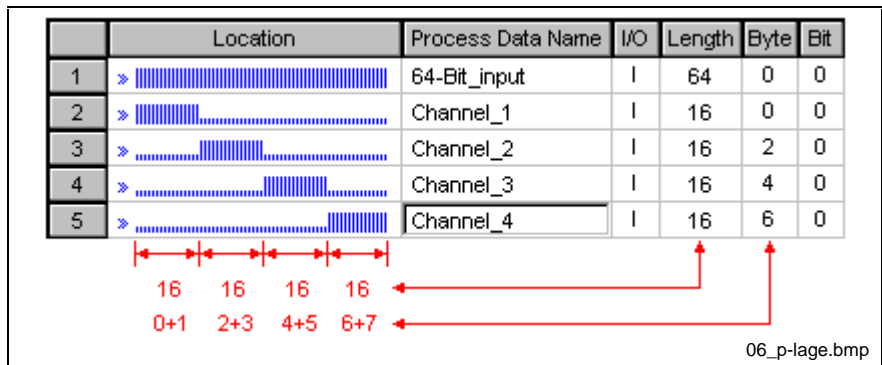


Fig. 6-127: Location of process data

The position of data is represented by vertical bars. Every bar represents one bit. Long bars mark the bits used in this process data description, small bars mark the unused bits.

Process Data Name The process data name clearly designates the selected process data description.

I/O This is a display specifying whether this is input (I) or output (O) data.

Length Enter the process data length in bit in this input box.

Byte Enter here the byte number of the standard process data description at which the selected process data description has to be started.

Bit For process data descriptions < 8 bit you can specify here at which the bit of the specified byte the process data description is to be started.

MA If you want to assign several addresses or variables to a process data description, you have to activate the option box "MA" = Multiple Assignment.

Assignments This column serves to enter the assignments. These are variables, addresses or also other process data descriptions. Use the context menu to select the assignments or enter the assignment directly.

Display:

Standard Device Data This display shows the whole process data channel length that is assigned by one device in the INTERBUS process data channel. Thereby, the process data channel length of the device's process data description you have selected is displayed.

Buttons:

Edit When you press this button, the context menu of the dialog box opens. The commands of this menu allow you to edit the process data descriptions in the dialog box.

Option box:

Filtered If you have restricted the representation of the process data descriptions in the "Filter" dialog box, you can activate or deactivate the filter function with this option box.

6.5 Menu "Options ..."

Add-on Programs IBS CMD G4 enables add-on programs to be linked. The add-on programs include monitors, parameterization and diagnostics programs that are supplied by device manufactures in connection with their device descriptions.

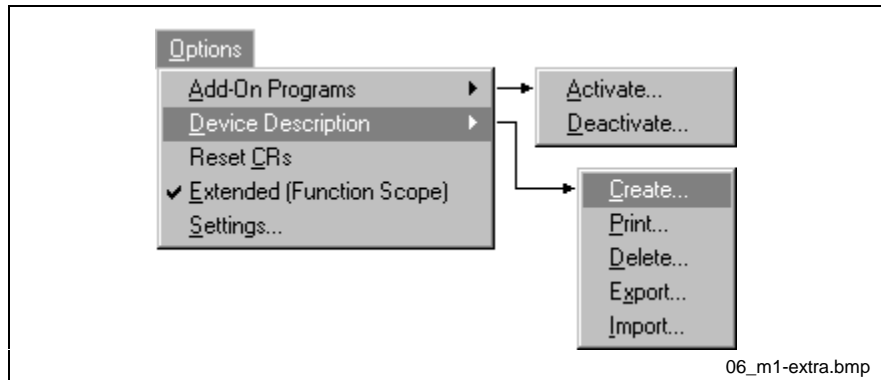


Fig. 6-128: Menu "Options ..."

Menu "Options ... Add-on Programs ... Activate ..."

An add-on program is activated by this menu item. The activated program extensions are listed as additional menu items in the "Edit", "Configuration", "Monitor", and "Diagnostics" menus. The context menus are also adapted in accordance with the activated add-on programs.

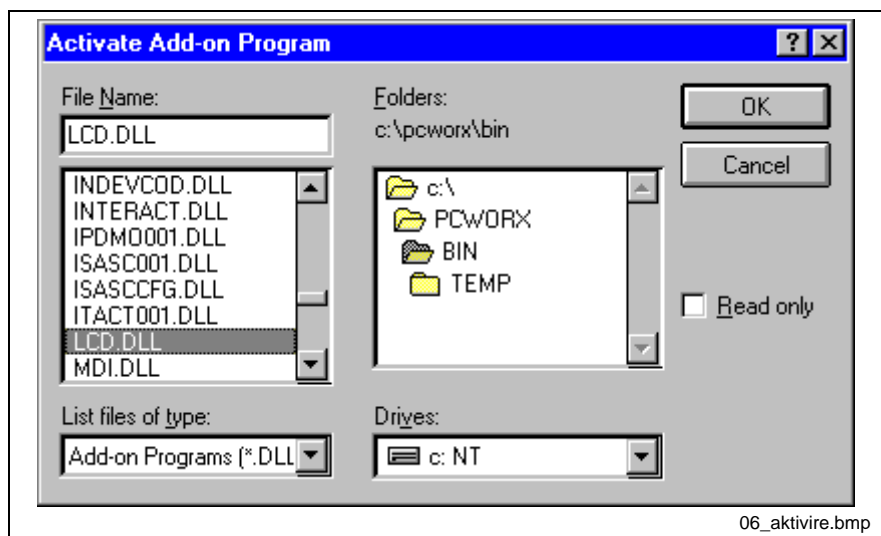


Fig. 6-129: Activate add-on programs

The add-on program is available as a DLL (Dynamic Link Library). You can select the desired DLL using a file selection dialog box (Windows standard).

Menu "Options ... Add-on Programs ... Deactivate"

Use this command to deactivate add-on programs and remove them from the menu.

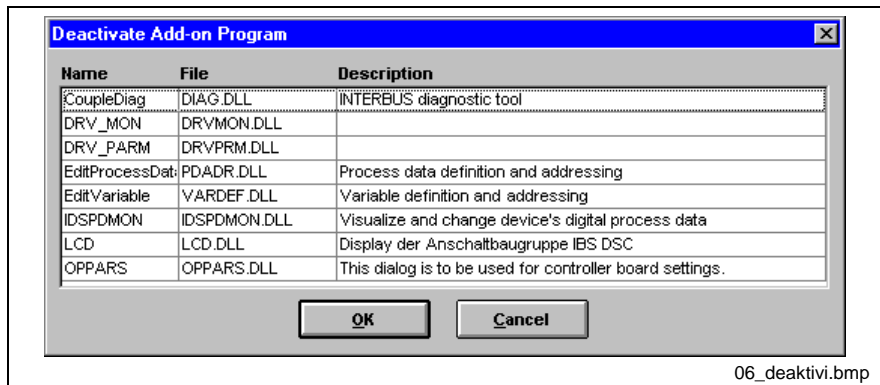


Fig. 6-130: Deactivate add-on programs

Click on the add-on program to be removed and confirm with "OK". Deactivation of add-on programs may be useful when you want to replace an add-on program with an add-on program with a similar function or if your system resources are insufficient for all add-on programs.

Menu "Options ... Device Description ... Create"

Preconditions: To create a device description for the IBS CMD G4 database, you must first have inserted a device in the bus topology or have marked a device from the bus configuration. Insert a new device with "Insert with ID code".

Function: Starting with the inserted and/or marked device you generate a new device description for the IBS CMD G4 database with this menu item.

The following dialog boxes are **not** transferred or filled out in the new device description:

- Station name
- Device name

This two entries are only displayed in the bus configuration and not transferred to the device database.

Fig. 6-131: Create device description

Device description

Device Group Here you specify in which device group you want to insert the new device description. You can assign the device description, for example, to the device groups Phoenix, MMICOM, DRIVECOM, etc., or create your own device group by entering a new name for this group in the "Device Group" input box.

Manufacturer Name Here you enter the name of device manufacturer (e.g. Phoenix Contact).

Device Type Here you enter the product designation of the device (e.g. IB ST 24 BK-T).

Profile Number The profile number codes a certain device function within a device specification, such as DRIVECOM, ENCOM or MMICOM. A device is clearly assigned to a specification by the profile number.

With the buttons

- Interface Type ...
- Icon ...
- Parameter Channel ...

you make further setting.

After you have confirmed the dialog box with "OK", the device description is inserted in the database and is available for other projects.

Menu "Options ... Device Description ... Print"

You can print the device description with this menu item. Select a device from the device database by making an appropriate preselection in the boxes "Group", "Manufacturer", "Type", or "ID Code".

A description of the with the most important data is printed.

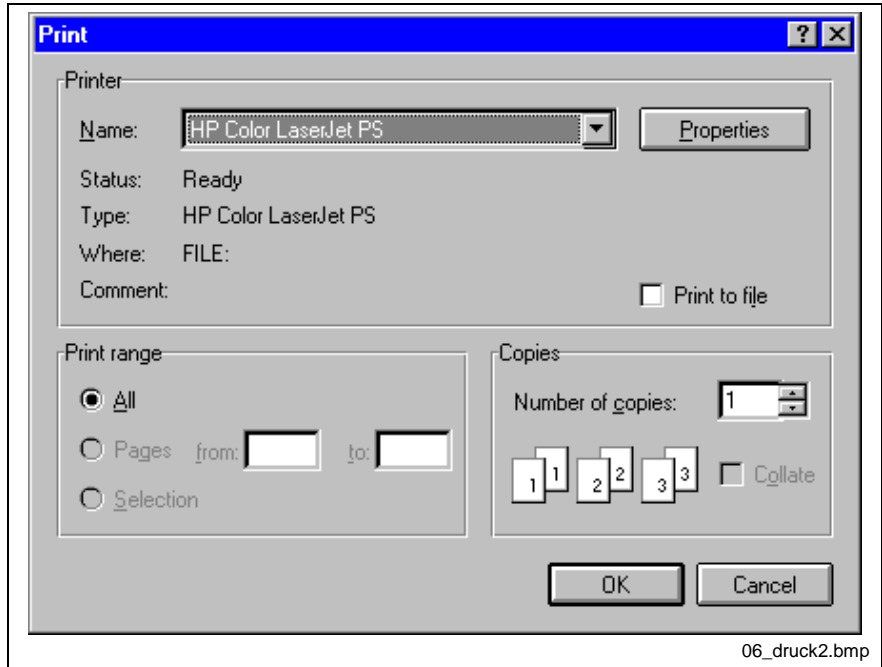


Fig. 6-132: Print device description

Menu "Options ... Device Description ... Delete"

A device description can be deleted from the device database with this menu item.

Menu "Options ... Device Description ... Import"

An import function permits to use the device database and self-created device descriptions from older IBS CMD versions (Version 1.x). With this command you can import specific device descriptions available in the IBS CMD 1.x format.

If the device description already exists in the IBS CMD 4.x database, an appropriate message is output.

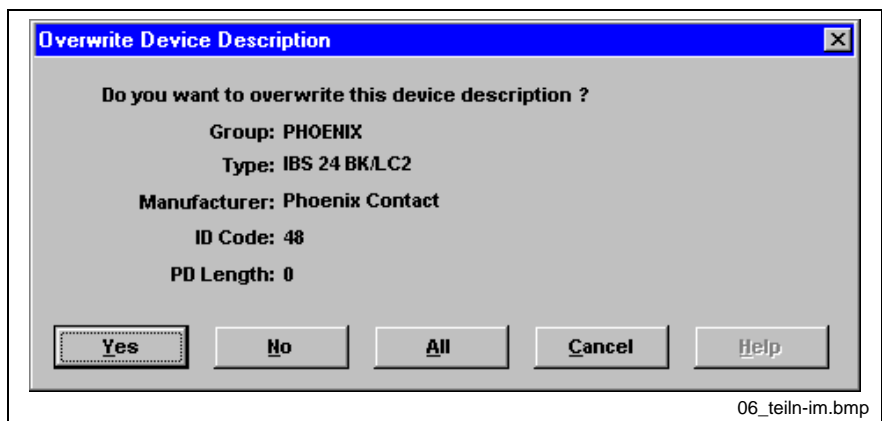


Fig. 6-133: Import device description

Menu "Options ... Device Description ... Export"

The export function has the function to provide the device database of IBS CMD Version 4.x for older IBD CMD versions (Version 1.x). With this command you can convert individual device descriptions specifically into the DHS format (file name: *.DSH) of the older CMD version.

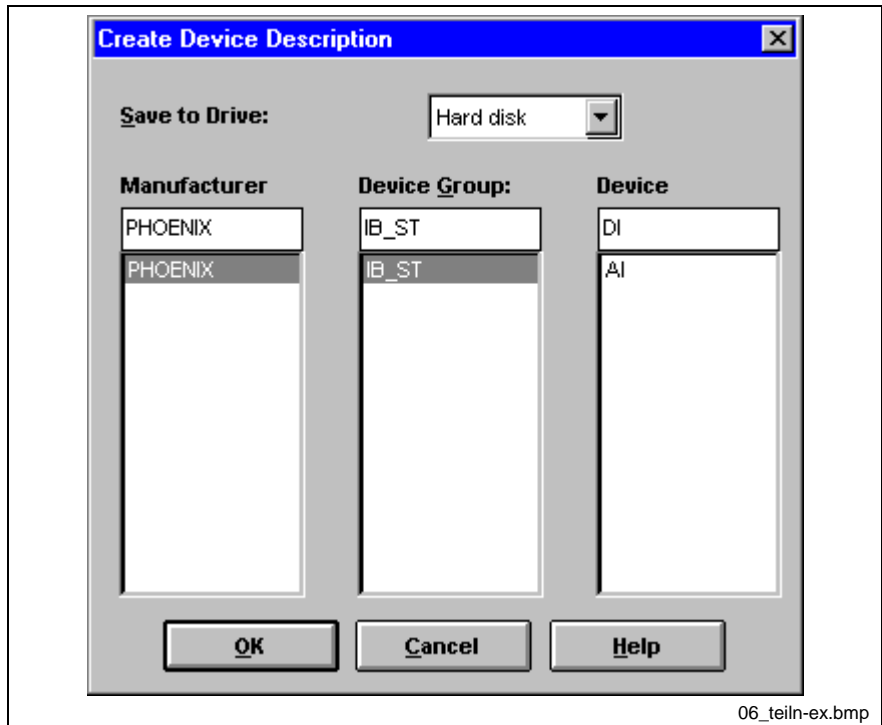


Fig. 6-134: Export device description

You can save the device previously selected in the IBS CMD 4.x device database in a dialog box (as you are used to from IBS CMD 1.x) in the database.

To do this, enter "Manufacturer Name", "Device Group", and "Device Type" or select the desired entries from the existing entries.

Note: When making new entries, make sure that the MS-DOS file name conventions are observed. Blank, * ? . and other special characters are not allowed in file name entries.

Menu "Options ... Reset CRs"

With this command you establish the standard counting order for the communication references (CR) for all PCP-capable devices. This order determines that the first PCP node in the bus configuration (seen from the controller board) is assigned CR=2 (the 2nd PCP node is assigned CR=3, etc.).

Basically, you can determine the counting order yourself as long as one PCP node is assigned CR=2 and all following CRs are assigned consistently, i.e. without gaps (until every PCP node has a CR). The CR of a device is assigned in the device description. Accordingly to that, the references in the application program are assigned to the devices, i.e. memory addresses.

If you suspect or determine that the manual CR assignment is inconsistent and manual checking appears too complex, use this command to quickly and reliably assign the CRs automatically in the way described above.

Your application program must be changed accordingly!

PCP With the aid of the **PCP** (**P**eripherals **C**ommunication **P**rotocol) data is transmitted via the parameter data channel. This data is used, for example, for configuration and parameterization of PCP nodes such as counters, frequency inverters, operator interfaces, etc.

Menu "Options ... Extended Scope of Functions"

This menu item is password protected.

The extended scope of functions is available when you enter the correct password.

Only actions which cause a change in the configuration data are permissible and marked as editable in the extended scope of functions.



Fig. 6-135: Password request

A password is only requested if you have assigned one. Otherwise, you reach the extended scope of functions without being asked to enter a password.

In the menu "Options ... Settings" you can assign a password at any time if you know the old password.

Menu "Options ... Settings"

With this menu item you go to a dialog box in which you can make global settings for IBS CMD G4.

The dialog box consists of several "file cards". When you click-on a file card in the top section, the dialog part of this card is displayed.

The "Settings" consists of the following file cards:

- Driver
- Device Database
- General
- Process Data
- Database (general)
- Password

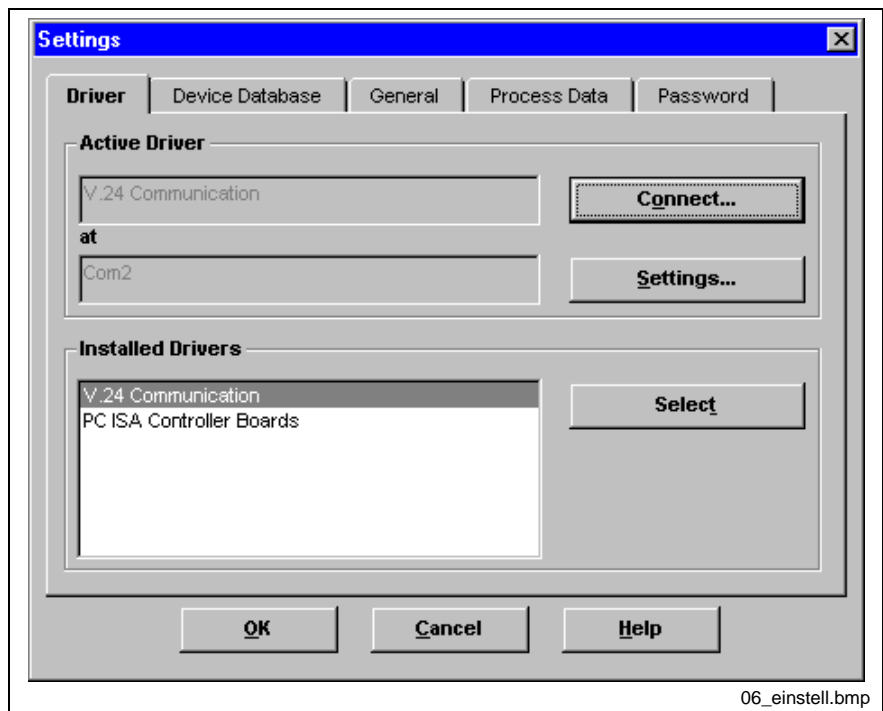


Fig. 6-136: Settings

Menu "Options ... Settings ... Driver"

In this dialog box you select the communication path between IBS CMD G4 and the controller board.

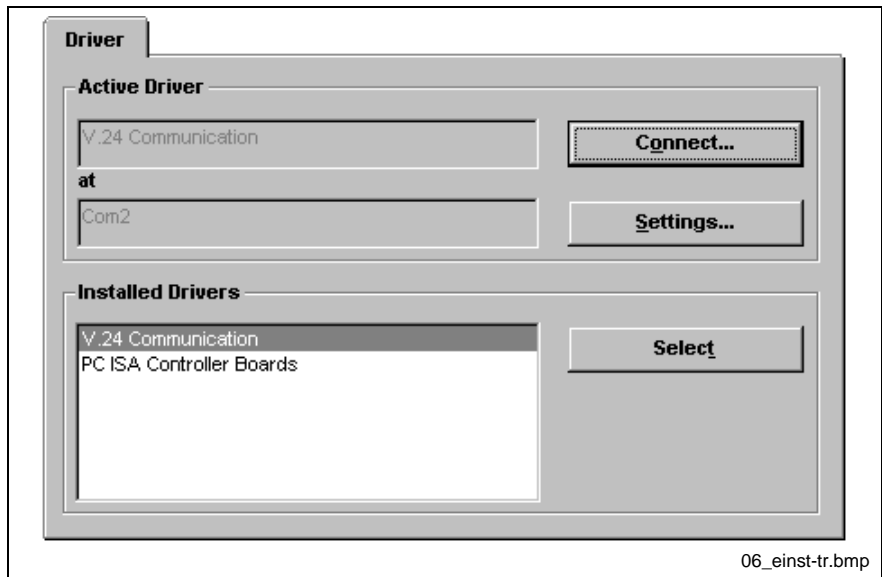


Fig. 6-137: Settings "Driver"

Communication between IBS CMD G4 and controller board:

The PC (on which IBS CMD is running) and the controller board communicate via a serial connection. Connect one of the serial ports of your PC (COM1 to COM4) with the diagnostic interface on the front panel of the host controller board. The connection is realized by a serial connecting cable. This communication path is available in PLC controller boards. Concerning PLC controller boards only one communication path is available.

Driver selection and parameterization

To select a driver, first click-on the driver in the "Installed Drivers" selection box. Confirm your selection the "Select" button.

In order to specify the communication path in more detail click-on the "Connect" button. Here you will get different dialog boxes depending on the selected driver.

Installed Drivers Here you can see the drivers available on your PC.

- DriverIBSISASC – driver for communicating via the data bus (IBS PC ISA SC/I-T)
- RS-232 driver for communicating via the serial interfaces.

To activate a driver, click-on one of the drivers and confirm the selection with the "Select" button.

Active Driver The selected active driver is displayed in this info box.

At This info box shows you to which communication path (COM1, COM2 ...) or to which controller board (PC card1, PC card2 ...) the driver is set at present.

Buttons

- Select** With this button you confirm the selection made in the "Installed drivers" box.
- Connect ...** With this button you call a dialog box to select the communication connection. You can select a free serial interface of your PC for communication via the serial interfaces. For communication via the data bus of the PC you can select the desired controller board if there are several controller boards in a PC.
- Settings ...** You can change the driver parameters with this button. The first time you open the dialog box you will see the standard values for the selected driver.

Dialog Box "Select Connection" for the "RS-232" Driver

Select the serial interface with which you have connected the controller board here.

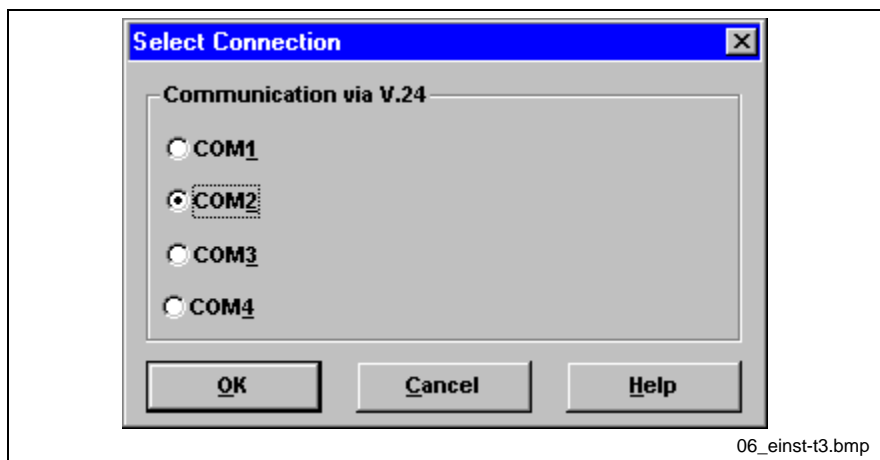


Fig. 6-138: Select serial interface

Dialog Box "Driver settings" for the "RS-232" Driver

In this dialog box you set the communication parameters of the serial interface.

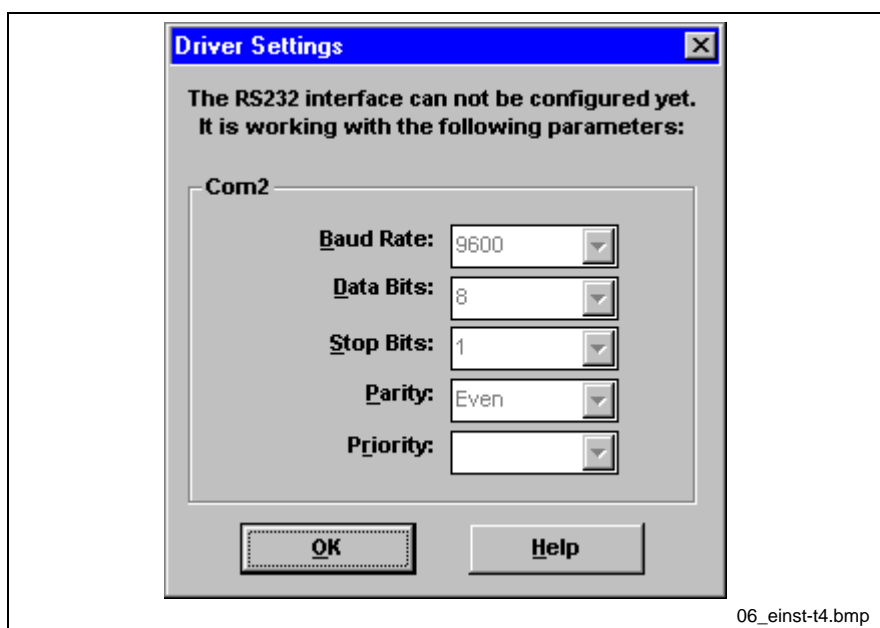


Fig. 6-139: Setting the serial interface

Menu "Options ... Settings ... Device Database"

You can set messages and search criteria of the device database in this dialog box.

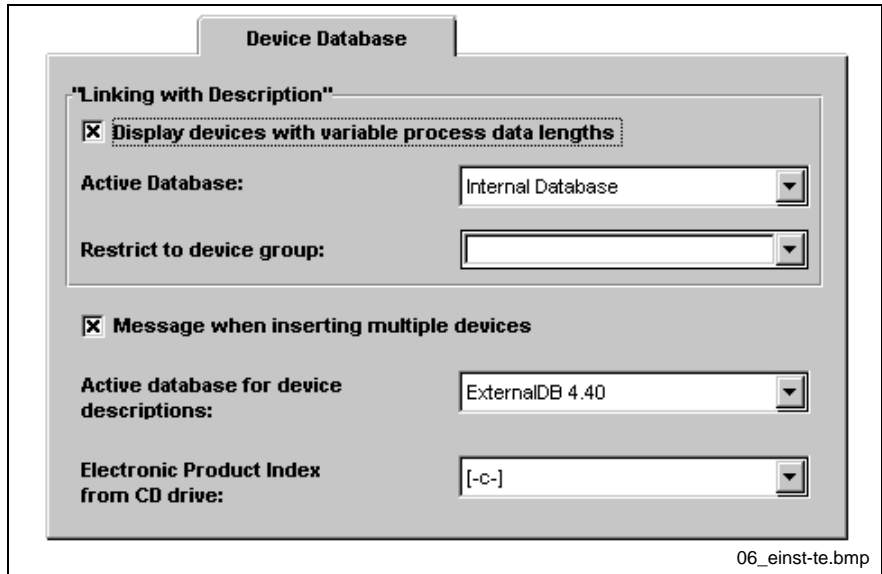


Fig. 6-140: Settings "Device Database"

Link with description"

Display Devices with Variable Process Data Length

After you have read in the physical bus topology with the command "Read Again" you can link the read in devices with descriptions from the device database. If a device with variable process data length is available for linking, a message is displayed indicating this. You can display these messages by marking the option box.

Active Database

You can use one of the installed databases as the basis for the "Link With Description" command.

You can select the database you want to use for linking devices in this selection box.

Restrict to Device Group

After you have read in the physical bus topology with the command "Read Again" you can link the read in devices with descriptions from the device database. You can restrict these links to a certain device group by specifying this here.

Message when Inserting Multiple Devices

If you insert a multiple device via "Insert with Description" in your bus topology you can have a message displayed in this option box. A multiple device is a device with more than one ID code which cannot be understood as **one** device within the bus system.

Active Database for Device Descriptions

In this selection box you can specify the device database you want to use for creating and importing device descriptions.

Electronic Product Directory From CD-ROM:

Here you select the drive which represents your CD-ROM drive. This specification is used to enable the software to get access to the electronic product directory which lists product data of various manufacturers.

Menu "Options ... Settings ... General"

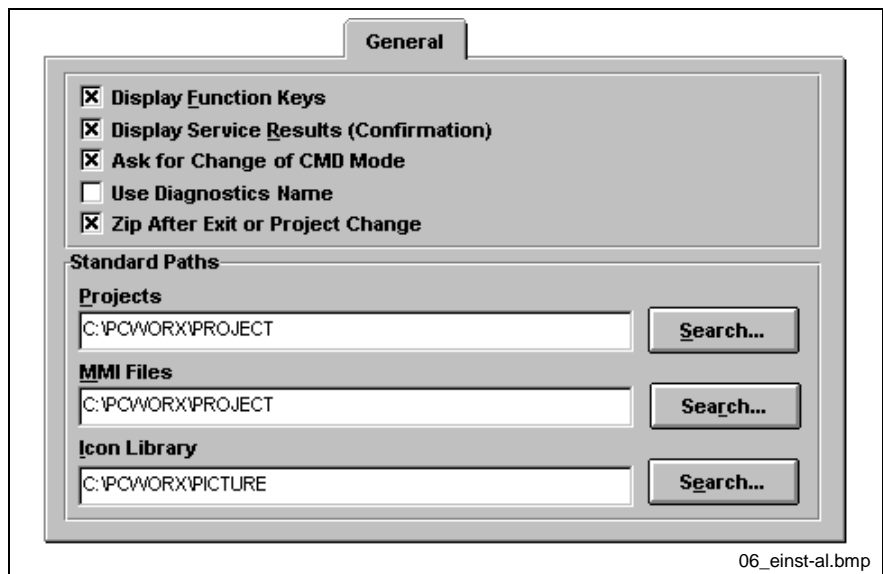


Fig. 6-141: Settings "General"

Display function keys

Use this option to switch the function key bar on and off. If the option is selected, the function key bar is visible.



Fig. 6-142: Function key bar

Display Service Results (Confirmation)

With this option you can set whether an action or service result is to be displayed or not. If the option is selected, the service results are displayed. After you have activated the option "Display Service Results (Confirmation)", you have to execute the parameterization again to activate the option.

Actions are services assigned with parameters which have been defined with a fixed name under IBS CMD G4.

You can see the service results with code, name and parameters in the following dialog box.

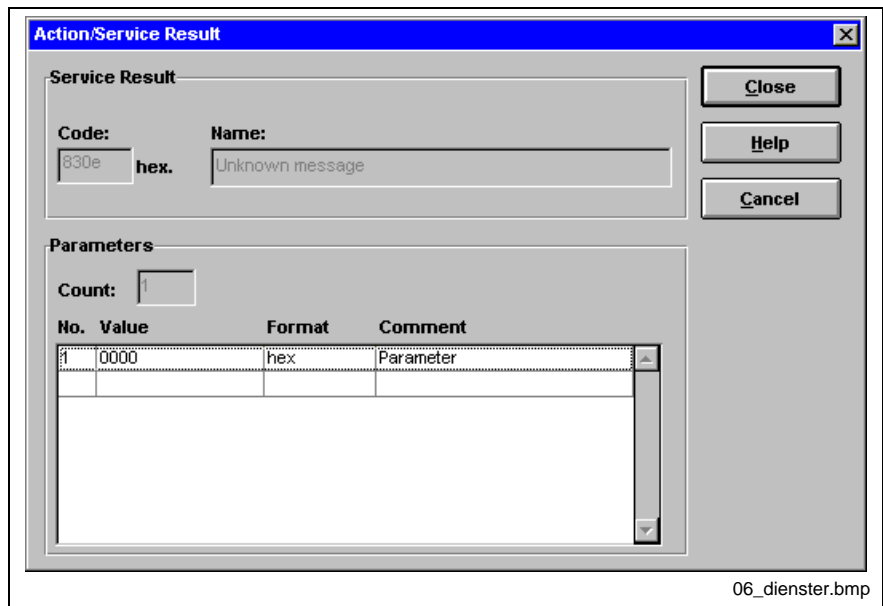


Fig. 6-143: Show service results

If the service is a confirmed service (Request), the request for a service is followed by a service result (Confirmation). Activate this option, if you want to see this service result.

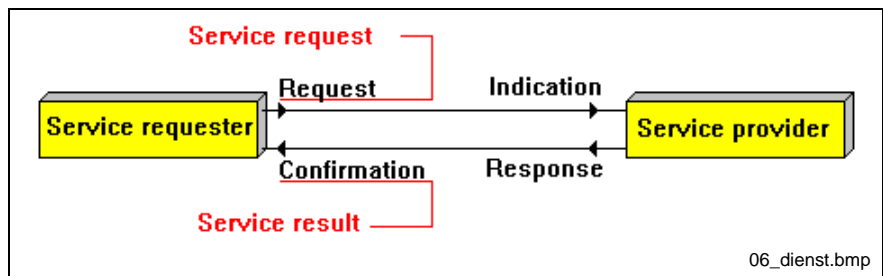


Fig. 6-144: Service primitives

Ask for Change of CMD Mode

Mark this option box, if you want a request from IBS CMD G4 when changing the operating states.

IBS CMD G4 has the operating states:

- Configuration (Offline)
- Configuration (Online)
- Diagnostics
- Monitoring

Use Service Info

Mark this option to use the Service Info. The Service Info is assigned to the INTERBUS devices in order to identify these clearly and quickly in case of a malfunction. You can enter the Service Info for the respective device under "Device Description". After you have activated the option "Use Service Info", you have to execute the parameterization again to activate the option.

Check System Benchmark Figures

When this option is selected, the system benchmark figures are checked, when you choose commands such as "Check Parameterization" and "Run Parameterization". The system benchmark figures contain information on the INTERBUS's hardware specification such as:

- max. number of PCP devices
- max. number of devices in the INTERBUS
- Max. number of devices per bus terminal module (peripheral bus) and so on.

Standard Paths IBS CMD G4 uses standard paths in which projects, user files and icon libraries are searched for or saved. If you want to adapt these standard paths to your requirements, you can set the desired path with the "Search" button in a dialog box or enter it directly in the input box.

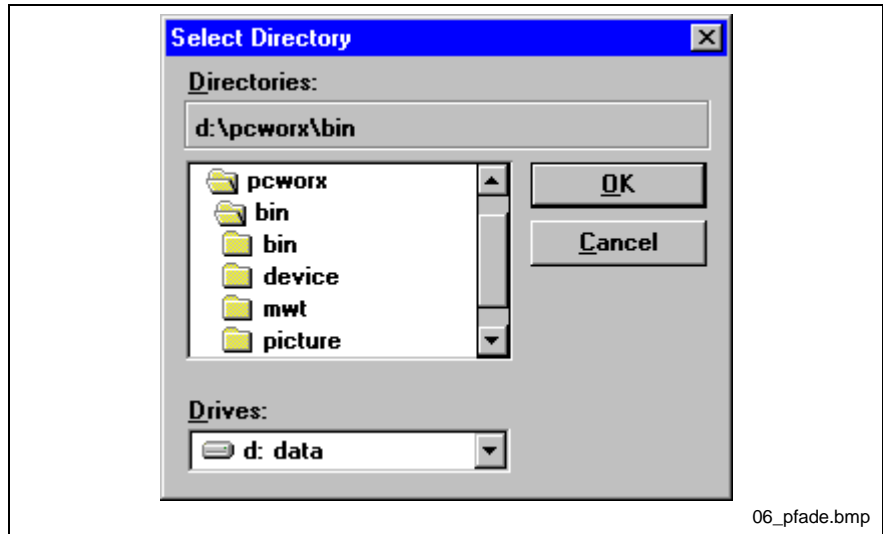


Fig. 6-145: Select directory

- Projects** You can enter the standard path for the project files in this box. If you use the "Save" menu command, the files BG4, MES, STC, INI of your project are saved in the standard path.
- User Files** You can store any (user) files in the controller board's parameterization memory. These files are responsible, for example, for controlling operator interfaces and indication elements. You set the standard path for user files in this box.
- Icon Library** The icons used for representing devices are saved in ICL files (icon libraries). Set the search path for icon collection here.

Menu "Options ... Settings ... Database (general)"

Besides the internal IBS CMD G4 database, you can also use databases from other manufacturers or databases created by yourself for "Link Description" or "Insert With Description". To use additional device databases, you need to declare this in your computer's ODBC environment (Open Database Connectivity). The ODBC environment is located in the Windows Control Panel.

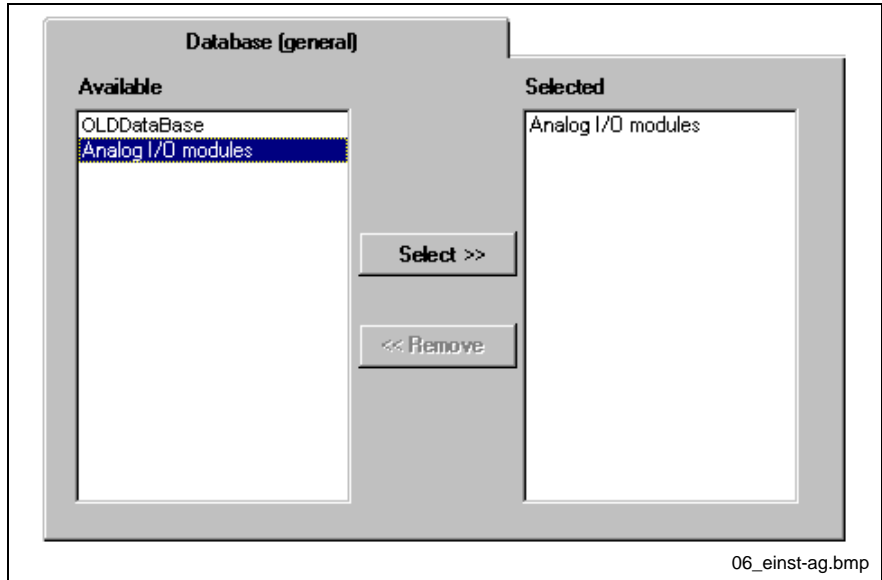


Fig. 6-146: Settings "Database (general)"

All registered databases are displayed as "available". Select only databases when you know that they are device databases.

Menu "Options ... Settings ... Process Data"

Here you specify the address range of the PLC or the PC in which you want to write the INTERBUS data. The address range must be specified in the typical written form for the respective host system.

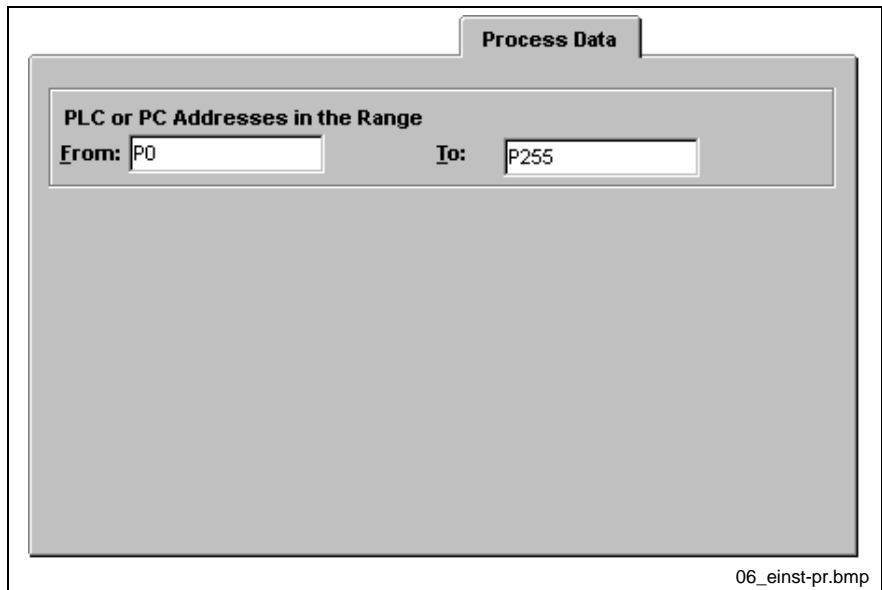


Fig. 6-147: Settings "Process Data"

If you restrict the address range, the program sequence is accelerated in some dialog boxes (e.g. in the assignment of addresses to process data descriptions). For example, you can restrict the address range to P addresses in a S5 controller board, if you do not want to use the Q and E addresses or if these addresses are not available.

Menu "Options ... Settings ... Password"

In this dialog box you can assign a password or change an existing password. This password is requested when changing to the extended scope of functions. The length of the password is a maximum of ten characters. The entered password does not appear on the screen, but is represented by a row of stars ("*").

Fig. 6-148: Settings "Password"

Old Password	Enter an existing password here. When you create a password for the first time, this entry remains empty. You can only create a new password, if you know the old password.
New Password	Enter the new password here.
Enter New Password Again	Enter the password a second time to confirm it.

6.6 Menu "? ..."



Fig. 6-149: Menu "? ..."

Menu "? ... Contents"

Use this command to go to the table of contents of the help file. Here you will get help for all menu items, dialog boxes, and for operating IBS CMD G4.

Note: With the "Help" button in the dialog boxes, you can go directly to the help page available for the dialog box. You can also call up context-sensitive help at any time using the "F1" function key.

Menu "? ... Operating Instructions"

Use this menu item to get help for:

- Operation and display elements,
- Selection of menus and menu entries or
- Operation of dialog boxes.

Menu "? ... Firmware Library"

The firmware library gives you an overview and detailed explanations of services and error messages of the Generation 4 firmware and of PCP services.

Menu "? ... First Steps"

This menu item contains a guide to help you through the most important functions of IBS CMD G4. The most frequently used commands are explained by examples and diagrams.

Menu "? ... Using Help"

Use this command to start the standard Windows help.

This will give you general information about working with Help systems under MS Windows.

Menu "? ... About"

In this dialog box you get information about the version, serial number, product designation, an date of creation of your IBS CMD G4 version.

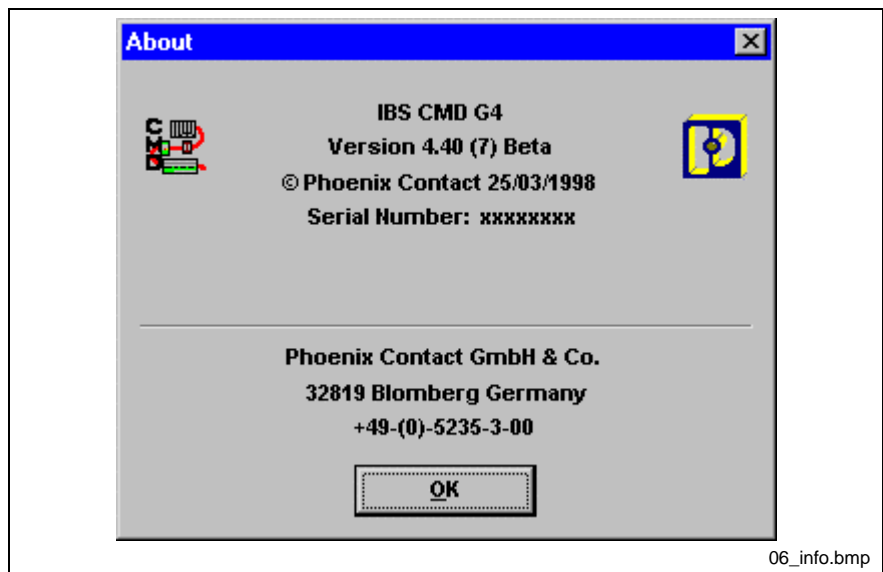


Fig. 6-150: About

7 Diagnostics

7.1 General Information

The "Diagnostics" mode offers you fast and effective help during start-up, error localization and elimination in the system. Defective bus devices, defective connections or errors in the sensors and actuators can then be processed and eliminated with the easy-to-use editing features of IBS CMD G4.

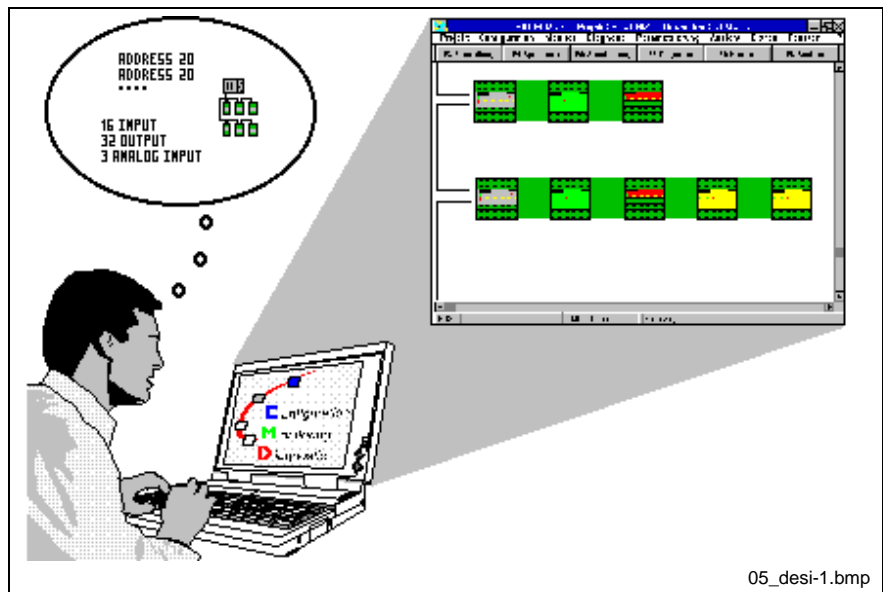


Fig. 7-1: Diagnostics

A special feature of this program is the statistical error evaluation running in the background, which gives you information on the error resistance of the system (e.g. to electromagnetic interference) as messages (e.g. module errors) and transmission errors are automatically recorded.

Messages and statistic data are only recorded, if there is a connection to the controller board and IBS CMD G4 is in the "Diagnostics" operating state.

7.2 Main Window "Diagnostics"

From the diagnostics main window you can call messages and statistics of the INTERBUS system and set options of the diagnostics program.

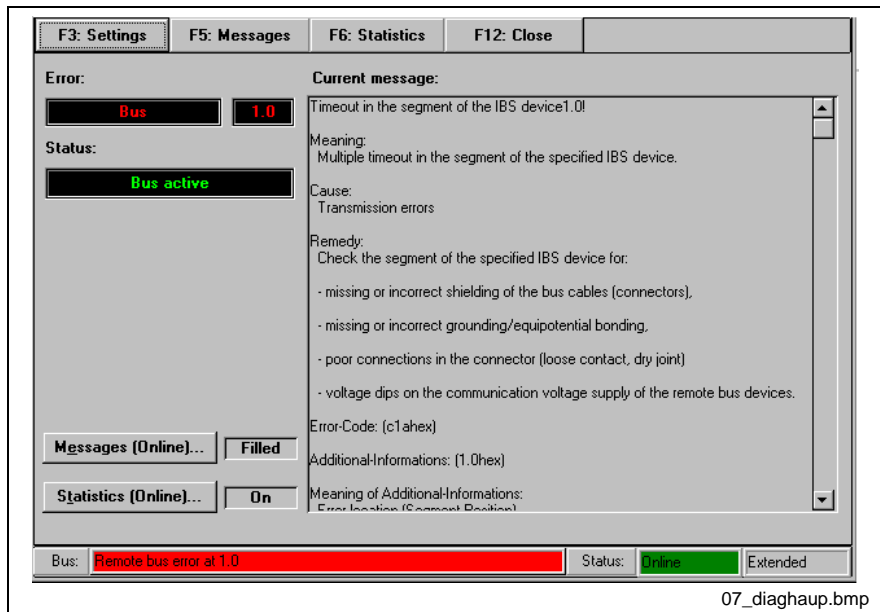


Fig. 7-2: Main window "Diagnostics"

Function key bar:

The function key bar has the task to enable a faster program operation. The most important menu commands are included in the function key bar as buttons.

Current message displays in the main window:

Note: The contents of the display in the "Error" and "State" boxes are read from the "Diagnostics status register". The display of the device number on the right of the "Error" box is derived from the "Diagnostics parameter register".

Error	This box displays the last device, where an error occurred.
Status	This displays, for example, whether the bus is running or whether data transmission was stopped.
Current Message	The last incoming message is described in detail in this info box.
Buttons	
Messages (Online)	The message history can be called with this button. The current state is displayed in the following box. If messages exist, the area contains the display Filled , otherwise the message Empty .
Statistics (Online)	The transmission statistics can be switched on or off with this button. The current state is displayed in the following box.

7.3 Menu "Commands Diagnostics"



Fig. 7-3: Main window "Diagnostics"

- Diagnostics** Settings ...
- Close

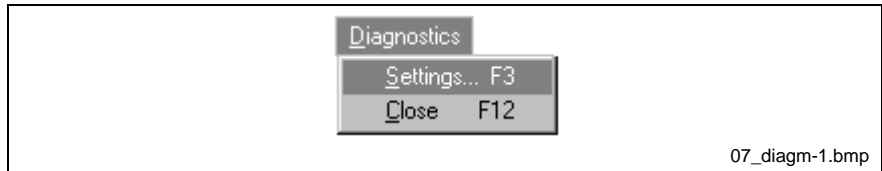


Fig. 7-4: Menu "Diagnostics"

- Messages:** Message History ...
- Evaluate Message File ...
- Message Types



Fig. 7-5: Menu "Messages"

- Statistics:** Record Statistics (Online) ...
- Evaluate Statistics File ...
- Top Ten ...
- Last Peripheral Error ...
- Reset Statistics Counter

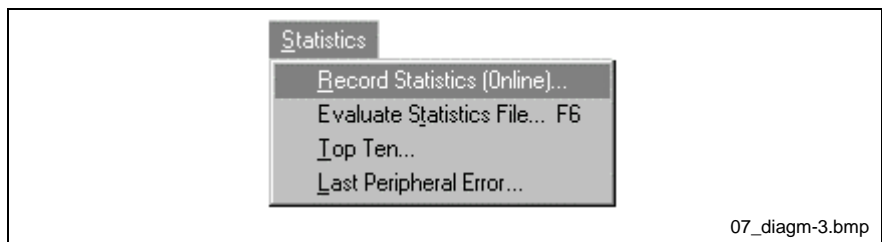


Fig. 7-6: Menu "Statistics"

- Window** Bus System Messages

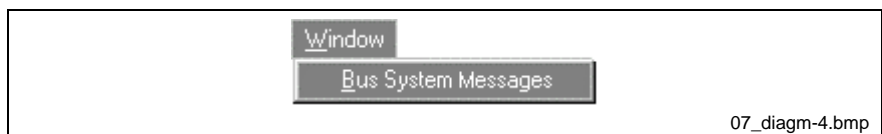


Fig. 7-7: Menu "Window"

- ? Contents
- Using Help



Fig. 7-8: Menu "? ..."

Menu "Diagnostics ... Settings ..."

You can make the basic diagnostics settings in this dialog box.

The add-on program "Diagnostics" stores the data in two data types. These are the statistics file with the file extension *.STC and the message file with the extension *.MES. You can analyze the contents of these files under the menu items "Evaluate Message File" or "Evaluate Statistics File".

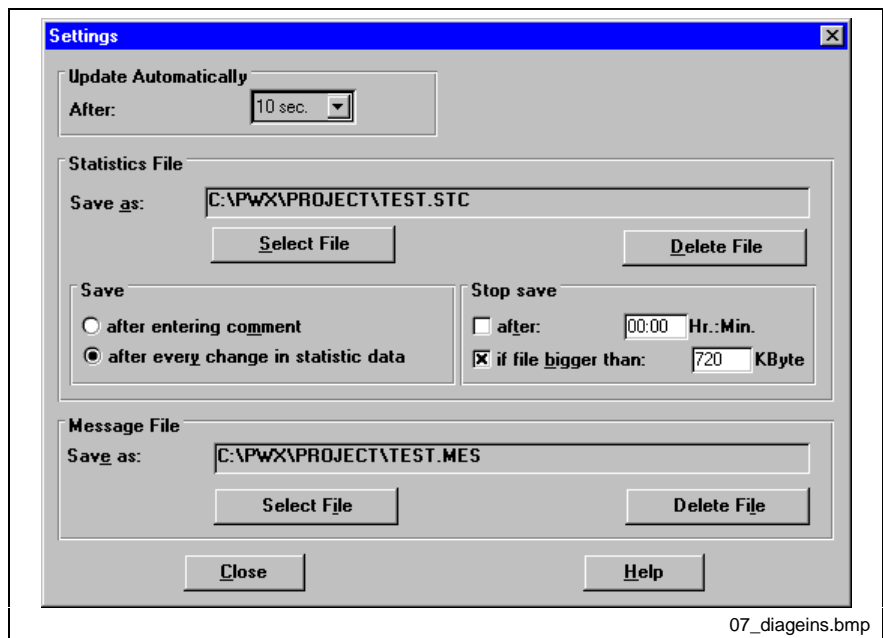


Fig. 7-9: Settings

Update Automatically After

Here you can enter the seconds after which the statistic data is read out cyclically of the controller board. Only the number of individual cycles is read out in cyclic reading. If the number of defective cycles has changed and a message is output, the data is entered in the statistic file.

Statistics file

- Save As:** Here you see the drive, the path and the name of the current statistics file.
- Select File** With this button you get a file selection dialog box from which you select an existing file or in which you can create a new statistics file. The file name extension *.STC is defined for the statistic files and cannot be changed.

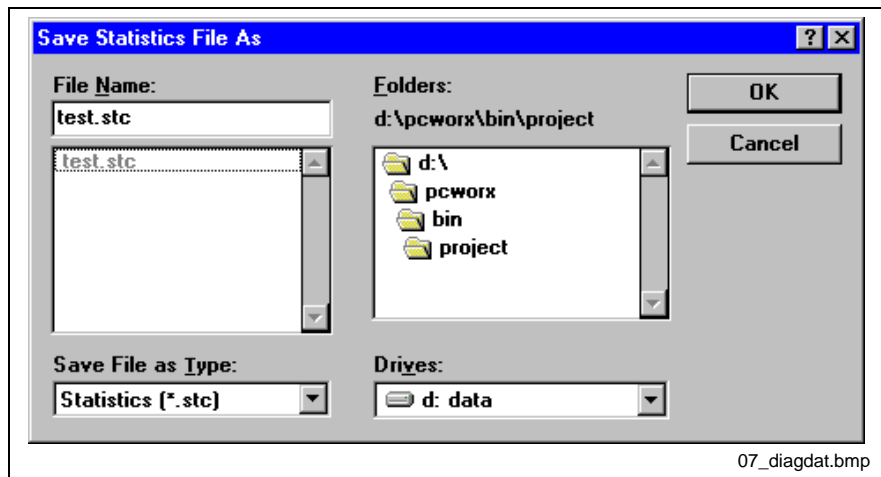


Fig. 7-10: Save statistic file

Delete File With this button you delete the current statistics file after a security prompt.

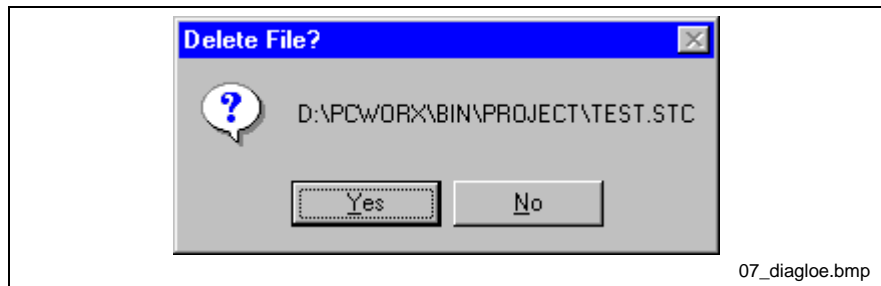


Fig. 7-11: Delete STC file?

Save after Entering Comment Is this option active, the current statistic data is only saved after it was commented.

Save after Every Change in Statistic Data If this option is active, the statistic data is saved after every change. Only a change in the number of defective cycles causes the statistic data to be saved. Every occurring malfunction generates a further entry with date/time stamp in the statistic file.

Stop Saving You can cancel saving the statistic data after a certain time and/or if the statistics file has reached a certain size.

Message file:

Save As: Here you see the drive, the path and the name of the current message file.

Select File With this button you get a file selection dialog box from which you select an existing message file or in which you can create a new message file.

Delete File With this button you delete the current message file after a security prompt.

Menu "Diagnostics ... Close"

With this menu item, you return to the main program of IBS CMD G4. The diagnostics program is not terminated by this menu command, but remains resident on the background memory.

Menu "Messages ... Messages (Online) ..."

In this dialog box you see the messages that are received during the current online session. In addition, these messages are sent and stored in the message file. If there is already a message file with the same name, the data is appended to the existing file. The message histories of the current and previous online sessions can be viewed in the "Evaluate Message File" dialog box.

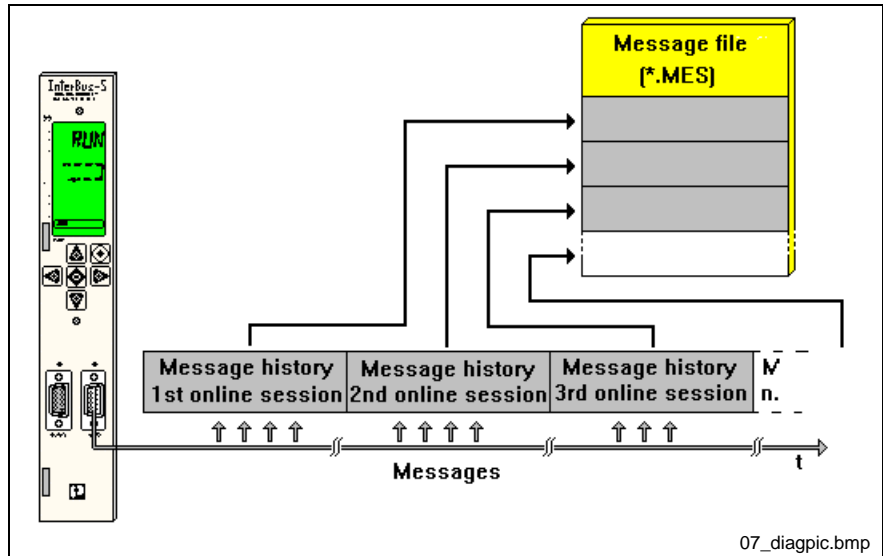


Fig. 7-12: Structure of the message file

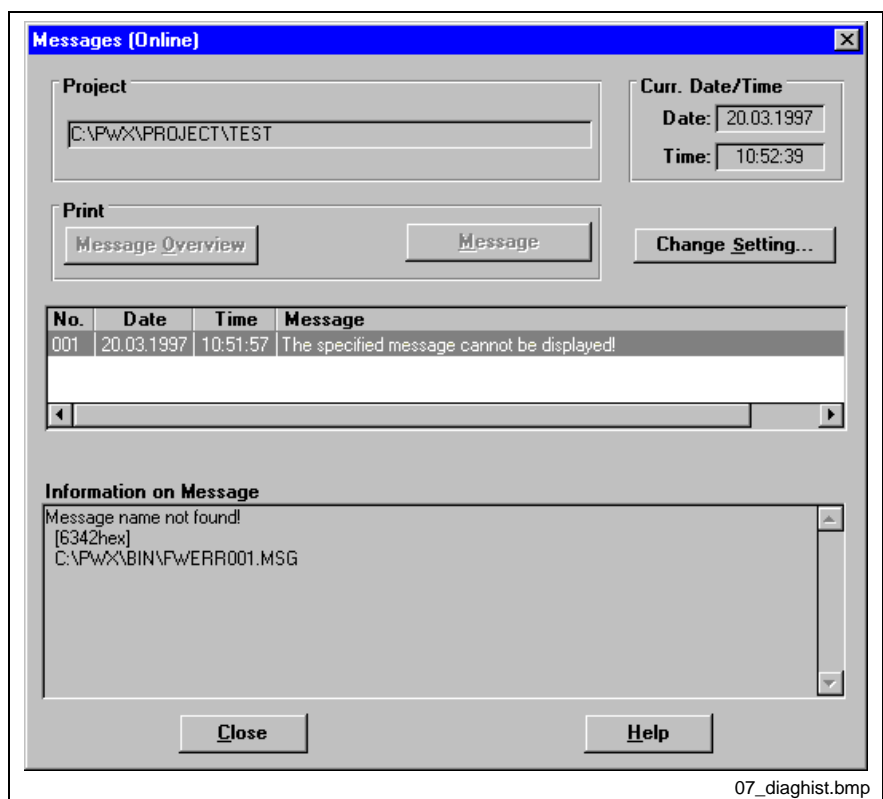


Fig. 7-13: Messages (Online)

- Project** Here you see the drive, the path and the name of the current project file.
- Curr. Date/time** The current system date and time are shown in these two info boxes.

- Print** With these two buttons you can print either a message overview or individual detailed messages.
- Change Setting** With this button you go to the "Settings" dialog box. You can determine the memory options of the diagnostics in this dialog boxes.
- No./Date/Time/Message** The occurring messages are listed in this table. All incoming messages are saved in the message file with a consecutive number (No.), a date (Date) and time stamp (Time). Every message is tagged with a name that characterizes the type of message. If you select a message entry with the mouse, detailed information about the message appears in the "Information on Message" info box.
- Information On Message** In the "Information On message" dialog box the message selected in the display box above is represented in detail. You get detailed information about the meaning, error code and cause of the message, as well as any remedy hints and further information.

Menu "Messages ... Evaluate Message File ..."

All incoming messages of the controller board are saved in a message file (*.MES). With the "Evaluate Messages" dialog box you can view and analyze any message file.

Messages are controller board messages to IBS CMD G4. Messages can only be received during an online session, i.e. not in "Configuration (Offline)" mode. For example, the controller board sends a message in case of a reconfiguration request or in the event of an error.

An error is an event that disturbs the normal bus operation. An error need not necessarily lead to a bus stoppage.

Example: The failure of a peripheral power supply leads to an error, but not to a bus stoppage.

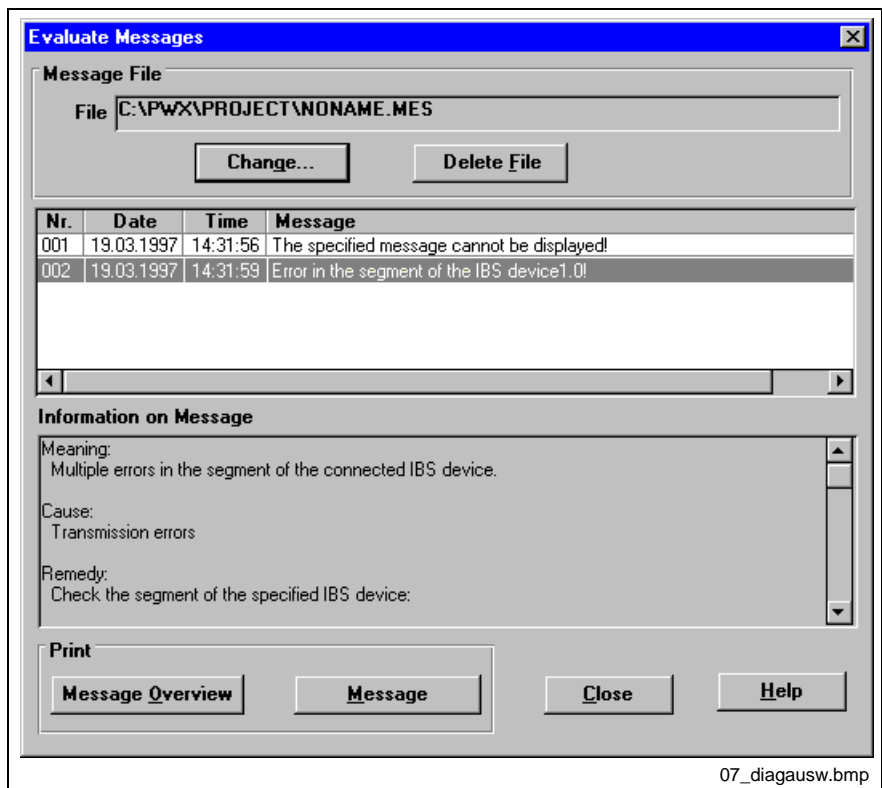


Fig. 7-14: Evaluate message files

Message file

- File** Here you see the drive, the path and the name of the current message file. The message file of the current project is selected as default.
- Change ...** With this button you get a file selection dialog box from which you can select an existing message file or in which is displayed in the "Evaluate Message" dialog box.
- Delete File** With this button the current message file is deleted after a security prompt.

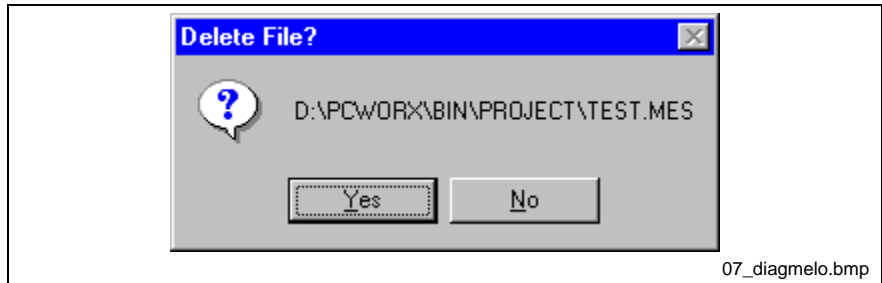


Fig. 7-15: Delete file?

- Message Display Box** Here you see the list of incoming messages in the current message file. The messages are consecutively numbered and include the date and time of their occurrence. The last column shows the message type. If you select a message entry with the mouse, detailed information about the message appears in the "Information on Message" info box.
- Information On Message** If you have selected a message in the list above, you get detailed information about the meaning, error code and cause of the selected message, as well as any remedy hints and further information.
- Print** With these two buttons you can print either a message overview or individual detailed messages.

Menu "Messages ... Message Types ..."

In this dialog box you can select which message types are taken into account and reported by the diagnostics.

If certain message types are unimportant for you, remove the corresponding 'x' in the option box.



Fig. 7-16: Message types

Messages of the bus system

- Module Status** This message is generated, if a device reports an error. This is the case, for example, when the power supply fails on a local bus module.
- PCP Abort** This message is generated, if an error occurs in transmission of a PCP service. The "Abort" service leads to a break in the connection to the concerned PCP node.
- PCP Reject** This message is generated, if Reject_Indication occurs. An illegal service that cannot be transmitted is internally rejected with a "Reject_Indication". A Reject_Indication does **not** lead to a break in the connection to a PCP node.

Messages of the Diagnostic Status Register

- Bus Status (RUN/STOP)** This message is generated, when the bus cycles are started or stopped.
- Bus Segment Disabled (BSA)** This message is generated, when a bus segment is switched on or off. For example, a bus segment (local bus) can be switched off after an error. The rest of the INTERBUS system remains operable.
- Bus Warning Time Expired** This message is generated, when the "Warn" bit (bit 5) is set in the diagnostic status register. The bit is set, if no INTERBUS cycles could be executed successfully beyond the bus warning time.

Bus Quality Bit This message is generated, when the "Warn" bit (bit 6) is set in the diagnostic status register. The bit is set, if the INTERBUS transmission quality deteriorates more than a certain degree.

Operating status

Display Changes This message is generated, if the operating state of the IBS CMD G4 changes. There are the operating states "Configuration (online)", "Monitoring" and "Diagnostics".

Menu "Statistics ... Record Statistics ..."

In this dialog box you can trace the record of the statistic data. The number of individual cycle types is updated at regular intervals and occurring errors/messages are assigned to bus segments and devices.

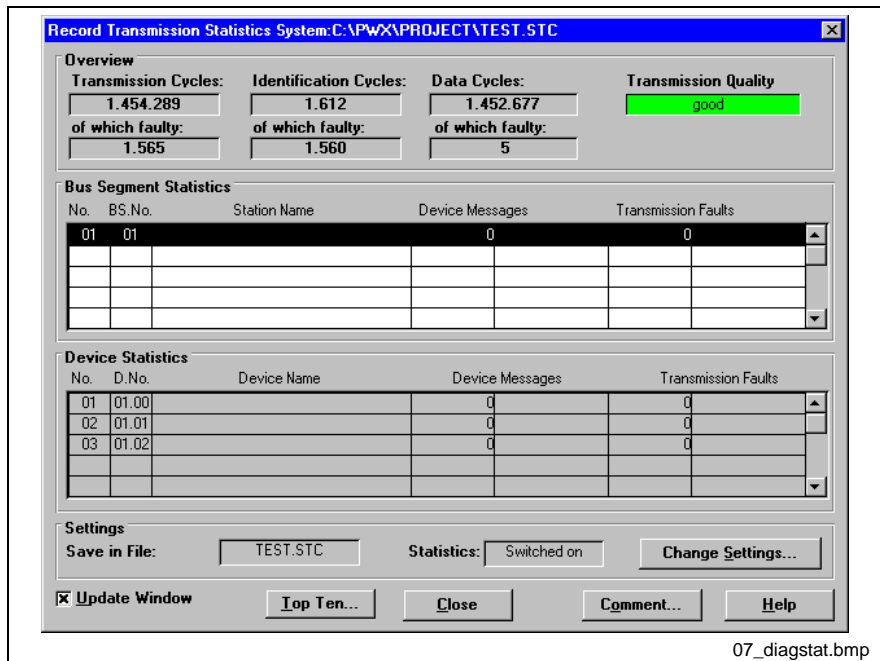


Fig. 7-17: Record statistics

Overview

The number of INTERBUS cycles is displayed here in six info boxes. At the top you see the total number of cycle types and below the number of defective cycles.

The types of cycle are next to each other:

Transmission Cycles: Transmission cycles = identification cycles + data cycles.

Identification Cycles: Cycles required to identify the bus system. The physical process image is available in the controller board memory after an identification system and after certain errors. Identification cycles are executed during start-up the INTERBUS system and after certain errors.

Data Cycles: Process data, parameter data and some data for handling the protocol are transmitted in data cycles. In **one** data cycle, not only the data of the devices is transmitted to the controller board (input data), but also the data of the controller board to the devices (output data).

Transmission Quality Here the ratio of defective to error-free cycles is evaluated by a defined (non-linear) algorithm and graphically displayed.

Bus Segment Statistics

In this info box you can select individual bus segments with the mouse. The devices in the bus segment in question (e.g. the local bus devices on one bus terminal) are then displayed in the "Device Statistics" info box.

The number of messages and errors is displayed numerically as well as graphically. The bus segment containing the most errors is marked with a bar that fills out the entire box. The bus segments with fewer errors are marked with bars of proportionately smaller size.

Device statistics

Depending on the selected bus segment in the info box "Bus Segment Statistics", you see the devices in this bus segment.

The number of messages and errors is displayed numerically as well as graphically. The device with the most errors is marked with a bar that fills out the entire box. The devices with fewer errors are marked with bars of proportionately smaller size.

Settings

Save In File You see the name of the statistics file in the "Save In File" info box.

Statistics The "Statistics" info box shows you whether the statistics functions are active.

Change Setting With this button you go to the "Settings" dialog box.

Update Window With this option box, you can set, whether the entries in the info boxes are to be cyclically updated.

Top Ten ... In this dialog box the ten devices with the most errors are displayed. These devices are determined by the controller board and read out when calling the dialog box. The function is only available in the "Diagnostics" operating state.

Comment ... Please use this button to enter a comment at any time. Each time a comment is entered, a new entry is written into the statistics file. The entries can be analyzed using the command "Evaluate Statistics File".

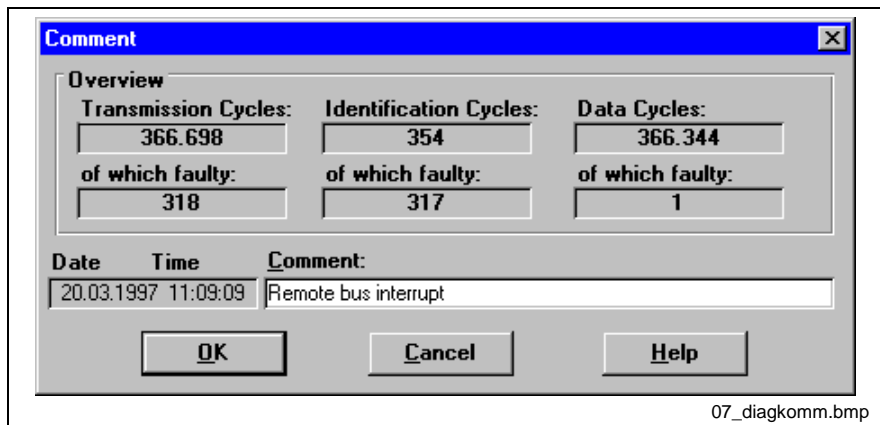


Fig. 7-18: Comment statistic entry

Menu "Statistics ... Evaluate Statistics ..."

In this dialog you can select individual entries from the statistics file and determine the errors that have occurred, the transmission quality, the number of cycles, and possible error locations.

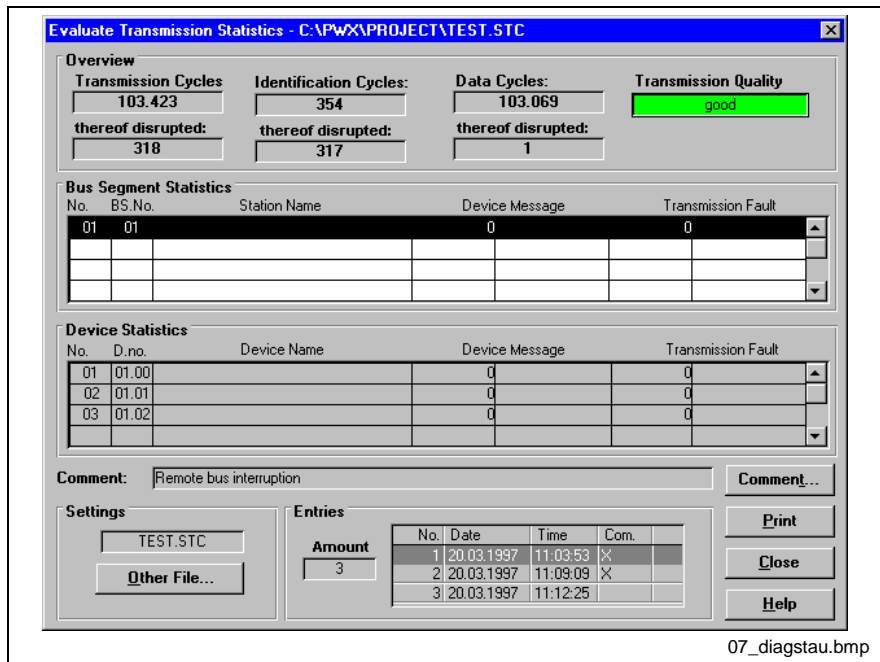


Fig. 7-19: Evaluate statistics

Note: All displayed statistical data from the current statistics file refers to the line selected in the "Entries" box. Every entry has a date and time stamp and may optionally include a comment.

Note: The display is not updated because an existing file is evaluated in this dialog box.

Overview

The number of individual INTERBUS cycles is displayed here in six info boxes.

At the top you see the total number of cycle types and below the number of defective cycles. The types of cycle are next to each other:

Transmission Cycles: Transmission cycles = identification cycles + data cycles.

Cycles required to identify the bus system. The physical process image is available in the controller board memory after an identification cycle. Identification cycles are executed during the start-up of the INTERBUS system and after certain errors.

Data Cycles: Process data, parameter data and some data for handling the protocol are transmitted in the data cycles. In **one** data cycle, not only the data of the devices is transmitted to the controller board (input data), but also the data of the controller board to the devices (output data).

Transmission Quality Here the ratio of disruptive cycles to error-free cycles is evaluated by a defined (non-linear) algorithm and graphically displayed. The display refers to the last entry in the statistics file, and therefore, always shows the current transmission quality.

Bus Segment Statistics

In this info box you can select individual bus segments with the mouse. The devices in the bus segment in question (e.g. the local bus devices on one bus terminal) are then displayed in the "Device Statistics" info box.

The number of messages and errors is displayed numerically as well as graphically. The bus segment with the most errors is marked with a bar that fills out the entire box. The bus segments with fewer errors are marked with bars of proportionately smaller size.

Device statistics

Depending on which bus segment you have selected in the upper info box "Bus Segment Statistics", you can see the devices in the selected bus segment.

The number of messages and errors is displayed numerically as well as graphically. The device with the most errors is marked with a bar that fills out the entire box. The devices with fewer errors are marked with bars of proportionately smaller size.

Comment: In this info box you can see the comment of the selected entry in the statistics file.

Comment ... To modify and create a comment on any statistics file entry, please use this button.

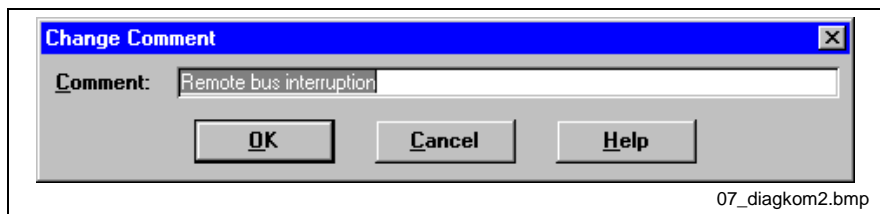


Fig. 7-20: Change comment

Settings

Other File You can also evaluate other statistics files by calling a file selection dialog box with this button. The info box above this button shows the currently selected file.

Entries Every time the statistic data is changed (error or comment) another entry is generated in the statistics file. You can mark these entries in this selection box. The entry's data is then displayed in the appropriate info boxes above the entry.

Amount This info box shows you how many entries there are in the statistics file.

Menu "Statistics ... Last Peripheral Error ..."

In this dialog box the last occurred local bus errors are displayed. For example, a local bus error is caused by a defective fuse or a missing local supply voltage.

The function is only available in the "Diagnostics" operating state.

Menu "Statistics ... Top Ten ..."

In this dialog box the ten devices with the most errors are displayed. These devices are determined by the controller board and read out when calling the dialog box. The function is only available in the "Diagnostics" operating state.

Menu "Statistics ... Reset Statistics Counter"

You can use this menu item to delete all the statistical data like TOP Ten and Peripheral Bus Malfunctions stored on the controller board. You can access the command on the controller board's context menu under "Control".

Menu "Window ... Bus System Messages"

As soon as a message arrives from the controller board, the following message window is displayed.

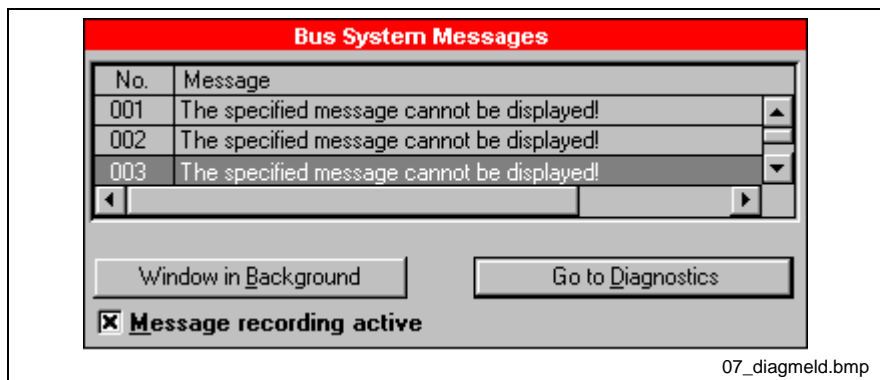


Fig. 7-21: Bus system messages"

This message window shows all messages of the bus system from the current message. If there are more than four entries, you can view the previous messages by means of the scroll bar.

Buttons

Window in Background

If you do not need diagnostics immediately for the current error, you can switch the message dialog box into the background with this button. The incoming messages can be viewed and evaluated later at any time.

Do to Diagnostics

This button changes to the "Diagnostics" add-on program.






Message Recording Active

With this option box you can activate or deactivate the recording of the messages. Messages occurring when the message recording is switched off are not saved.

Menu "? ... Using Help"

Use this command to start the standard Windows help. This will give you general information about working with Help systems under MS Windows.

7.4 Keyboard Assignment "Diagnostics"

	Help (in the "?" menu)
	Settings ... (in the "Diagnostics" menu)
	Evaluate Message File ... (in the "Messages" menu)
	Evaluate Statistics File ... (in the "Statistics" menu)
	Close (in the "Diagnostic" menu)

8 Monitor

Note: The monitors "Address Monitor" and "Display IBS DSC" are in the context menu of the controller board. The preprocessing monitor is in the next context menu of the "Preprocessing" element and is only available in the "IBS CMD G4" software.

8.1 Address Monitor

With the address monitor you can visualize data which was assigned to the addresses of the PLC or PC. In addition to the INTERBUS process data all register contents can be displayed and written which were assigned to addresses.

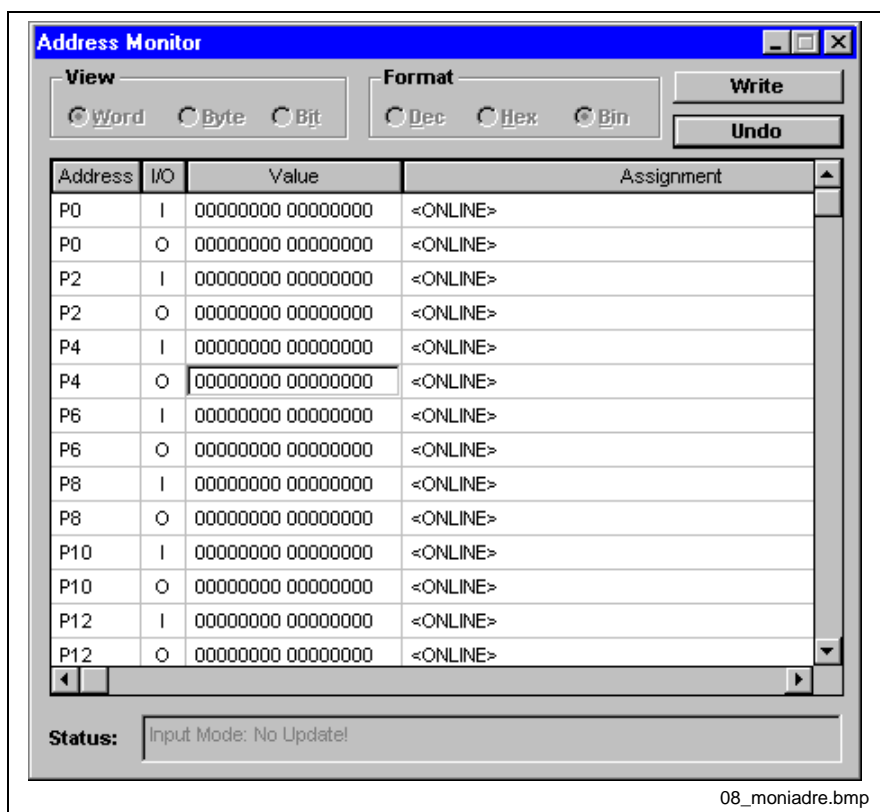


Fig. 8-1: Address monitor

View Here you determine with which data width the addresses of the PLC or PC are to be displayed.

You have the choice between:

- Word = 16 bit display
- Byte = 8 bit display
- Bit = 1 bit display

Note: Data can only be transmitted to the controller board in the "Word" view.

Format Here you select the representation format of the data. You have the choice between:

- Dec = decimal number format
- Hex = hexadecimal number format
- Bin = binary number format

Buttons

Write The data that you enter or change in the "Value" column is transmitted to the controller board by this button. It is only possible to write data in the "Word" view.

Undo The data that you enter or change in the "Value" column is transmitted to the controller board by this button. The last state of the data is displayed again.

Display Box

Status Depending on the operating state different display and input facilities are available in the address monitor. The current restrictions are shown in this display box. You can use all input and display options when you change to the "Monitoring" operating state.

Display area

Address Here the PLC and PC address is displayed. The bit number is added to the address in the "Bit" display.

I/O This display identifies whether it is input (I) or output (O) data.

Value In this column you can see the data (usually process data) at the respective PLC or PC address. The data is displayed in the number format set in the dialog box "Format".

Assignment

Here you see with which data the respective address is assigned. Unassigned addresses are assigned as "<FREE>". Data which are longer than the respective address are marked with <CONTAINS>. Furthermore, a multiple assignment is indicated by the display "<MULTIPLE ASSIGNMENT>".

You can filter the displayed addresses. You can, for example, just have displayed the input data addresses or only the addresses of the user displayed, depending on the assignment of the addresses. To filter the addresses select the "Address Selection" command in the system menu of the address monitor.

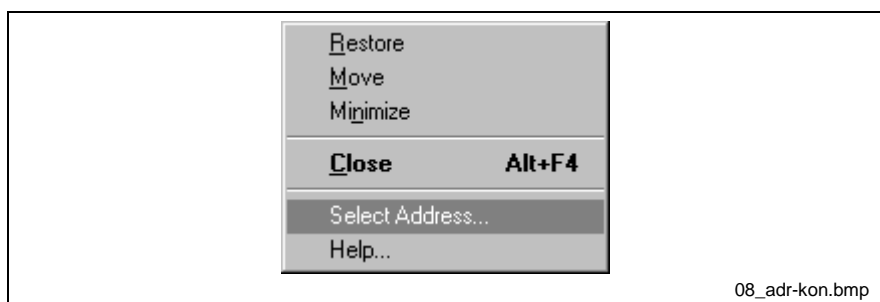


Fig. 8-2: System menu "Address Monitor"

Address Selection

You can filter the displayed addresses. You can, for example, just have displayed the input data addresses or only the addresses of the user displayed, depending on the assignment of the addresses. Mark the option boxes that you want to see in the address monitor.



Fig. 8-3: Address selection

1. Input Process Data

Process data that transmitted by the INTERBUS network to the controller board.

2. Output Process Data

Process data transmitted by the INTERBUS network to the controller board.

3. Standard Register"

If you select this option, the addresses that are assigned with standard function registers are displayed.

4. User Functions"

The start, status and result bits of all user functions are displayed with this option.

5. Function Parameters (input)

Select this option to display addresses that are assigned with input parameters of a user function. You can assign single parameters of a user function specifically to addresses in order to change these parameters dynamically.

6. Function Parameters (output)

Select this option to display addresses that are assigned with input parameters of a user function.

7. Events"

With this option the addresses of the indication and the confirmation bit of all results are displayed.

8. Event Parameters (input)

Select this option to display addresses that are assigned with input parameters of an event. You can assign single parameters of an event specifically in order to change parameters dynamically.

9. Event Parameters (output)

Select this option to display addresses that are assigned with input parameters of an event.

8.2 Digital Process Data Monitor

This monitor can be accessed from the context menu of any INTERBUS device with process data. The device's process data is displayed digitally as yellow and gray squares. You can open a separate monitor for every process data description.

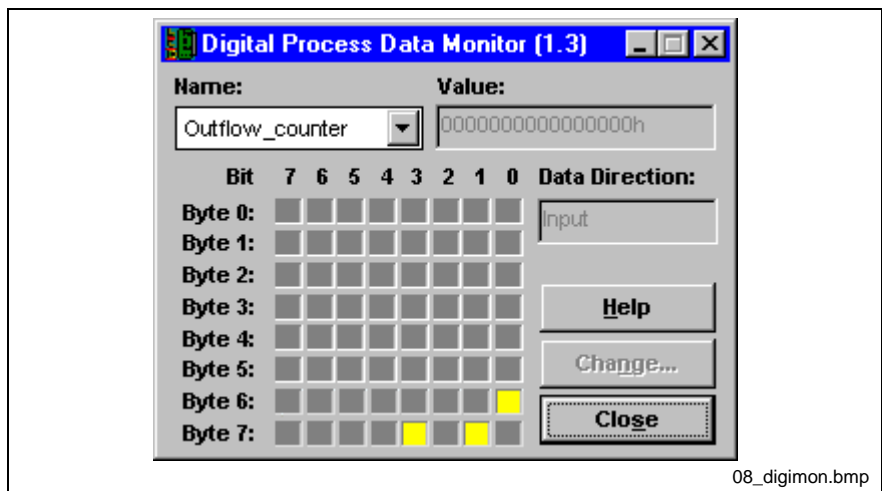


Fig. 8-4: Digital process data monitor

- Title Bar** The monitor's title bar indicates the device the device for which the monitor is open. The device number is displayed.
- Name** Here you can select the desired process data description on this device. Open the select box to see a list of the process data names available for the device in question.
- Value** This input box displays the process data value as hexadecimal value.
- Data Direction** This input box indicates whether the process data is input or output data.
- Display Area** The process data display area is divided up into rows and columns. Rows represent bytes, columns represent bits. The size of the monitor is based on the default process data length of the device for which the monitor has been opened. Thus, all process data boxes are always displayed. Process data that match the selected process data description are displayed in gray when the bit is not set, and in yellow when the bit is set. Process data beyond the selected process data description is displayed in black.
- Depending on the selected process data description, the entire input or output range of devices with input **and** output data is displayed.

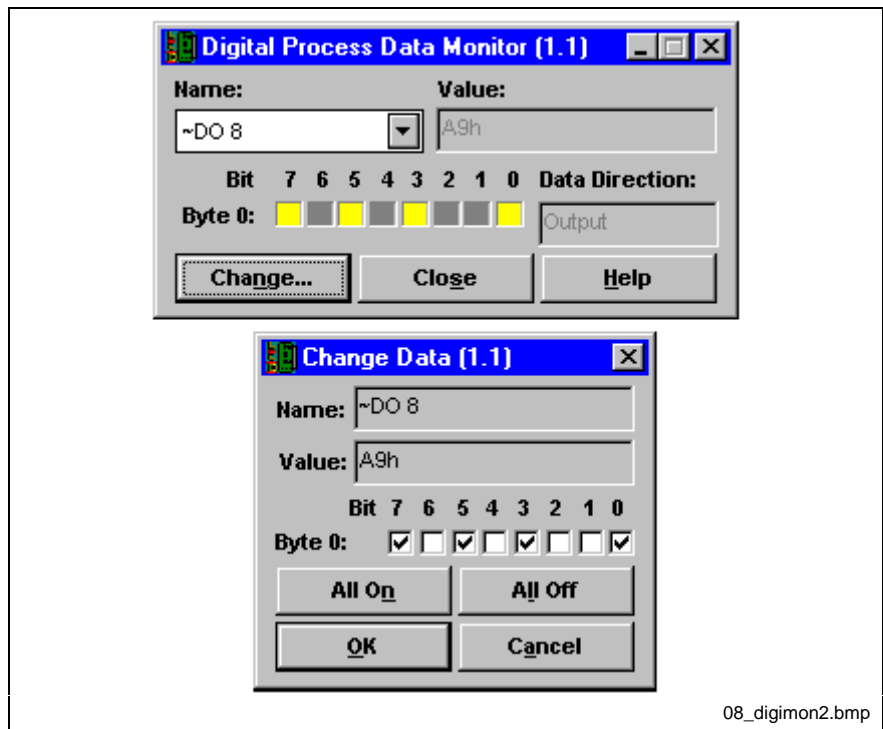


Fig. 8-5: Change output process data description

Change ... If you have set an output process data description on a control or computer address, the "Change ..." button will become active as soon as the process data description in question is set in the monitor. Then, you can change the output process data in a further dialog box.

Note: Note that the bits set in the monitor may be overwritten in the next bus cycle, if a preprocessing or application program is running.

Change data

- Name** This dialog box indicates the names of the process data description for which the "Change" dialog box has been opened.
- Value** This input box displays the set process data value as hexadecimal value.
- Set Area** Like the Display Area, the Set Area is divided up into rows and columns. You can set and reset bits by clicking on them. The changes in the process data will only apply when you press "OK" to confirm. Device process data that are beyond the selected process data description are displayed as black squares.
- All On** This button sets all bits to "1".
- All Off** This button sets all bits to "0".

8.3 Device States

This monitor allows you to (de)activate and jumper individual devices and local bus winding.

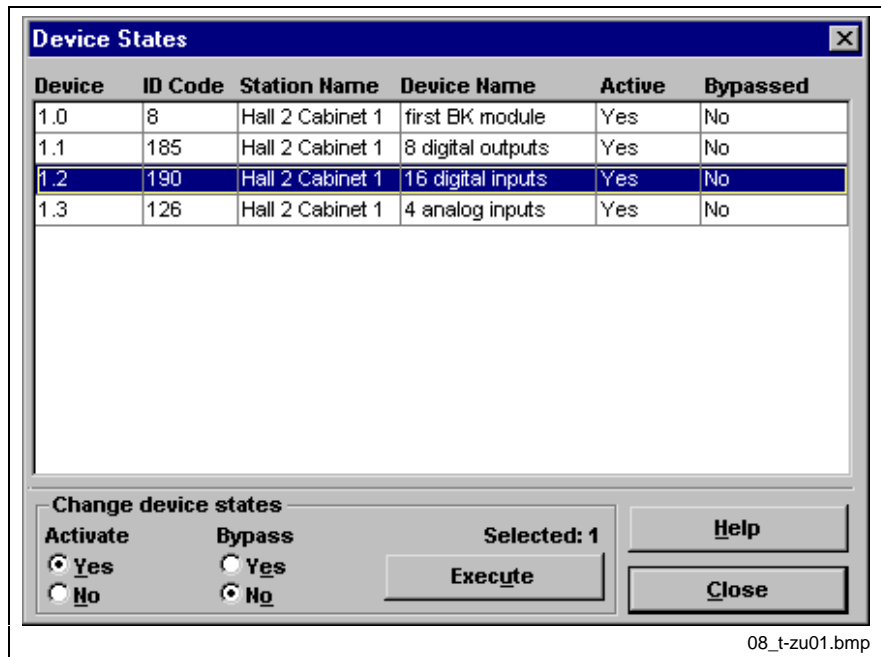


Fig. 8-6: Device states

- Device #:** The device's logical number is displayed here. The sequence in which the devices are displayed in the dialog box corresponds to the logical sequence in the bus configuration.
- ID Code, Station Name, Device Name** The device's "ID Code", "Station Name" and "Device Name" data are displayed in these columns.
- Activated** The device is taken into account in the configuration frame and transfers data to the controller board. A deactivated device is logically jumpered and physically integrated in the bus configuration. You can activate and deactivate a device as you require. Thereby, all local bus devices depending on this device will be activated and deactivated.
- Jumpered** Select this option box to exclude the device from the configuration frame. A bus configuration with jumpered devices can only be set back into full operation after the device has been physically removed. When a device is jumpered, all local bus devices depending on this device are deactivated and can be only re-activated after the jumpered device has been removed.

Note: You can select a device in the bus configuration by double-clicking on its entry in the "Device States" dialog box.

Edit device states

- Activate, Jumper** Select these option fields to specify which state the devices marked in the list should have. You can also select several devices in the device list by pressing the <CTRL>-key while clicking on the devices.
- Selected** This option displays how many devices you have selected at the moment.

Execute / (Undo) After selecting the required devices and the device states in the option boxes, you can apply your selection by pressing this button. As long as you don't select other device entries or don't change these options in the meantime, you can restore the last state by pressing the "Undo" button.

Possible device states

Activated:	Yes	This state is not possible. An active device can not be jumpered.
Jumpered:	Yes	
Activated:	Yes	The device is actively integrated in the bus configuration and transfers its data to the controller board.
Jumpered:	No	
Activated:	No	The device is not active and does not transfer data to the controller board. The device has been removed from the configuration frame and thus, has been physically deactivated. If a local bus device is set in this state, all the other devices in the local bus winding automatically assume the state "Activate: No". These deactivated (not jumpered) devices can only be re-activated after the jumpered device has been physically removed.
Jumpered:	Yes	
Activated:	No	The device and all its local bus devices are logically deactivated. The device and all its local bus devices are logically deactivated.
Jumpered:	No	

8.4 Preprocessing / Monitoring

With this monitor the states of the individual inputs and outputs at the used function blocks are displayed within the graphical editor of the (process data) preprocessing.

The user interface of this monitor is identical with the programming environment of the preprocessing. However, only the menu commands appropriate to change the display and variables are active.

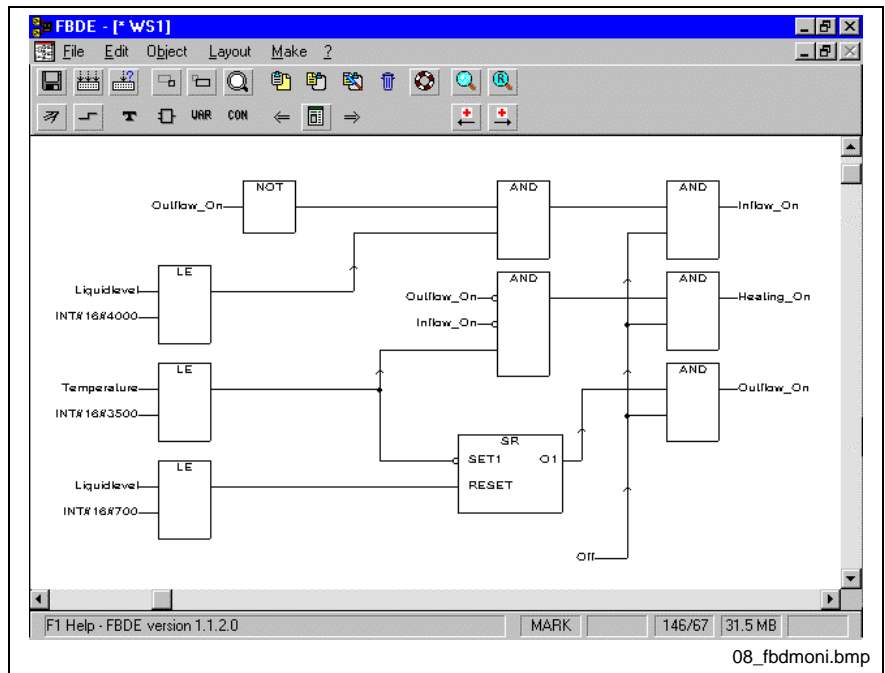


Fig. 8-7: Preprocessing / Monitoring

9 Preprocessing

9.1 General Information

You have the possibility of linking INTERBUS process data using the "Preprocessing" (process data preprocessing) tool. To do so, process data is available via variable names in this add-on program. These variables can be interlinked by numerous logic blocks. The output variables are then re-assigned to a process data item or several process data.

The add-on "Preprocessing" generates a ZWT-file from the worksheets created here. The data stored in this file is transferred by IBS CMD G4 to the controller board (when writing the configuration) together with bus configuration. Addressing, etc.

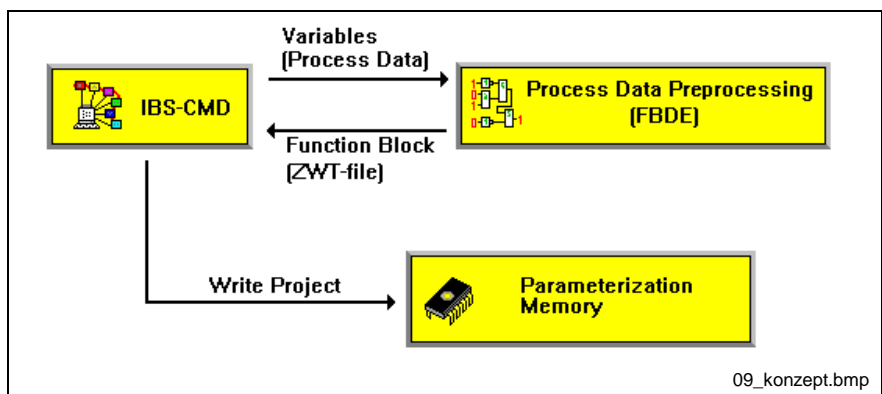


Fig. 9-1: Overview

Example:

For this example, a simple link of four input bits (A,B,C,D), three function blocks (2* AND, 1* OR) and one output bit is used.

The four input bits may come from a device with digital inputs. The output bit linked via these four input bits could then be connected with digital outputs.

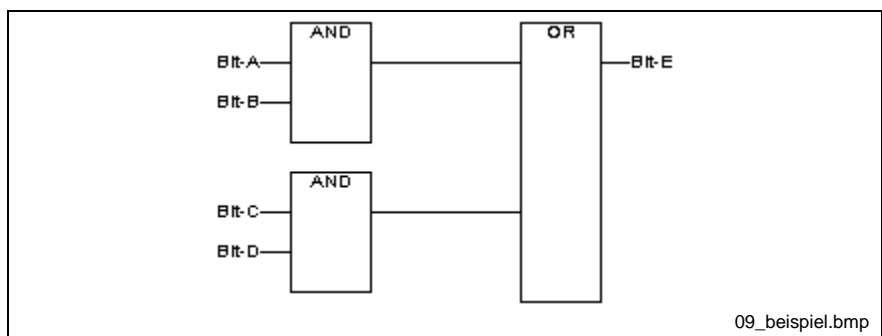


Fig. 9-2: Simple programming example



⇒ With increasing size of the preprocessing program the bus cycle time is getting longer. The programmed functions are executed between two INTERBUS cycles. So, after programming check the bus cycle time and optimize – if necessary – the preprocessing program or shift some functions in your application program.

9.2 Main Window

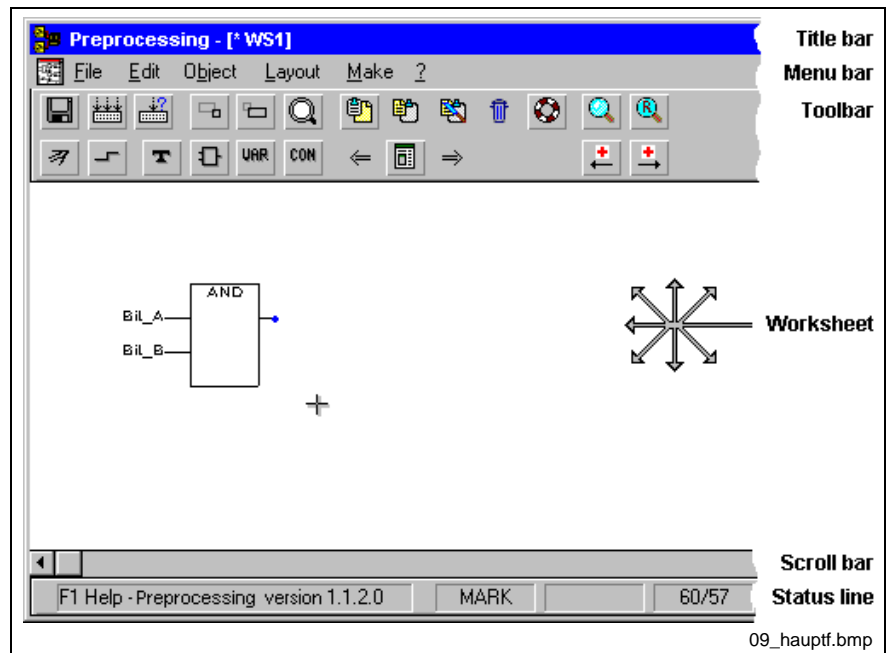


Fig. 9-3: Main window "Preprocessing"

The main window "Preprocessing" basically consists of:

- Menu bar
- Toolbar
- Status line

Other areas are the worksheet and the scroll bar areas.

9.3 Menu structure

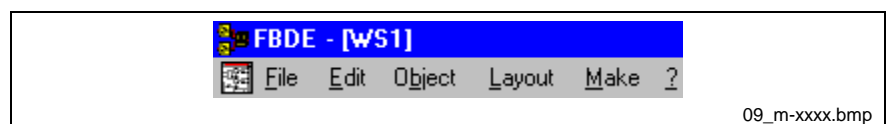


Fig. 9-4: Menu bar

9.4 Menu "File ..."

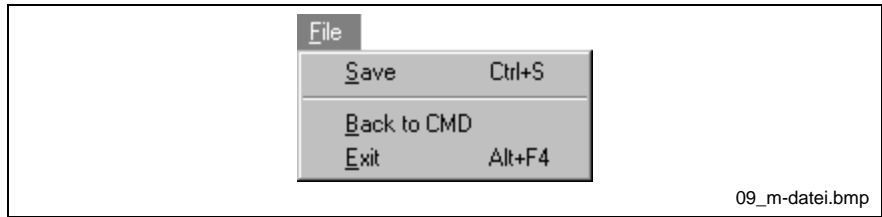


Fig. 9-5: Menu "File"

Menu "File ... Save"



With this menu command you can save the worksheets of the current session.

The menu bar of the preprocessing indicates if the worksheets have been modified. If the title bar contains a "*", the worksheets were changed. The command "Save" is only available after a modification of the worksheet.

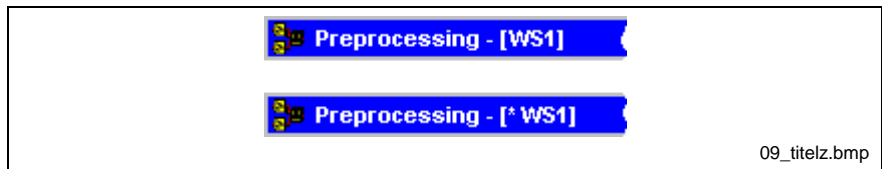


Fig. 9-6: Modified worksheet

Menu "File ... Back to CMD"

This command exits "Preprocessing" and returns to the main IBS CMD G4 program. "Preprocessing" **is not** removed from the working storage.

Note: Use this command to switch between IBS CMD G4 and "Preprocessing".

Menu "File ... Exit"

This command exits "Preprocessing" and returns to the main IBS CMD G4 program. "Preprocessing" **is** removed from the working storage.

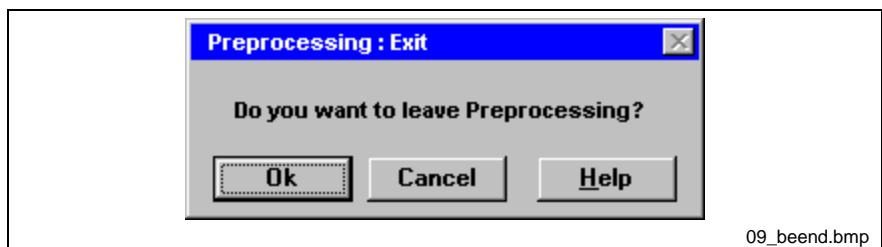


Fig. 9-7: Exit "Preprocessing"

If one of the worksheets was changed, you will receive a warning.

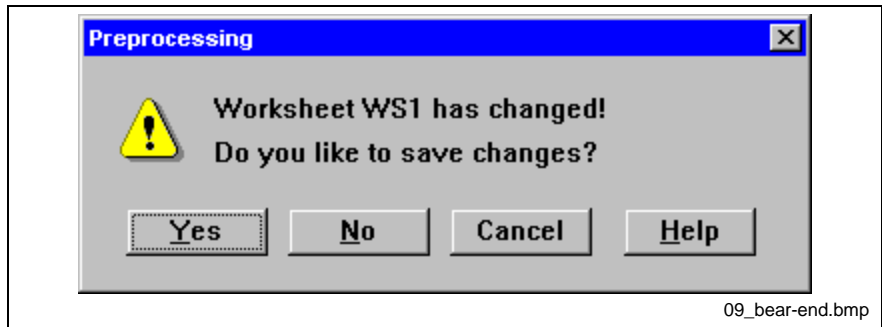


Fig. 9-8: Save changes?

9.5 Menu "Edit ..."

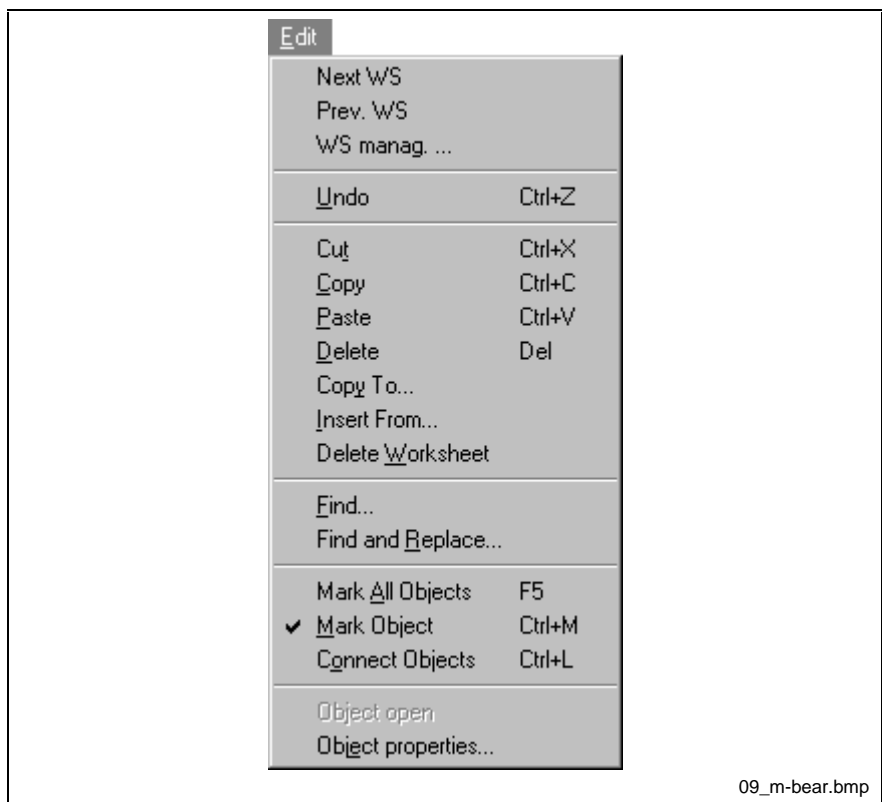


Fig. 9-9: Menu "Edit"

Menu "Edit ... Next WS"



This command changes to the next worksheet, if one exists.

You can create and manage worksheets with the "WS manag." command.

Menu "Edit ... Prev. WS"



This command changes to the next worksheet, if one exists.

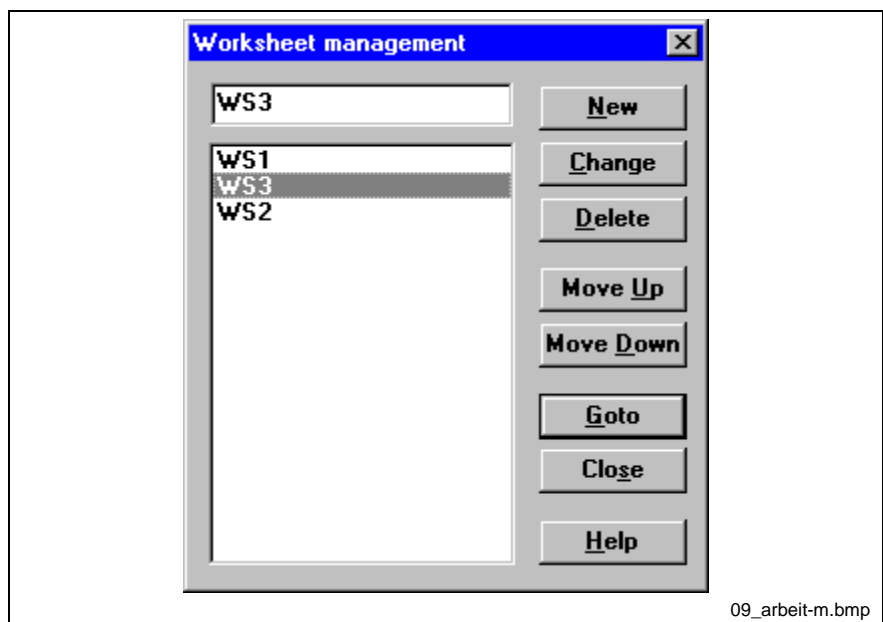
You can create and manage worksheets with the "WS manag." command.

Menu "Edit ... WS manag."



In every project you can create several worksheets, where you split your function blocks, for example, into functional groups. You can move easily between the individual pages with "Next WS" and "Prev. WS".

With this dialog box you can create, rename, delete and remove worksheets.



09_arbeit-m.bmp

Fig. 9-10: Worksheet management

Input Box Here you can change the name of the selected worksheet or enter a new name. The name may not exceed 8 characters and has to adhere to MS DOS file name conventions. It must also start with an alphabetic character.

Display Box Here the existing worksheets are listed.

Buttons:

New Creates a new worksheet. First, enter the name of the new worksheet in the input box and then press this button. If a worksheet of the same name already exists, this command cannot be executed.

Change Changes the name of the selected worksheet. The currently visible worksheet cannot be renamed.

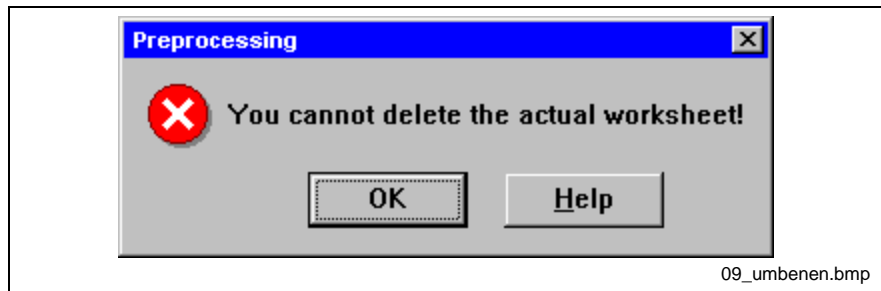


Fig. 9-11: "Delete" not possible

- Delete** Deletes the selected worksheet. The currently visible worksheet cannot be deleted.
- Move Up** Moves the selected worksheet up in the order of worksheets. The command is inactive, if the selected worksheet is at the top.
- Move Down** Moves the selected worksheet down in the order of worksheets. The command is inactive, if the selected worksheet is at the bottom.
- Go to** Moves directly to the selected worksheet. This exits the dialog.

Menu "Edit ... Undo"



This command cancels the last action or command.

Menu "Edit ... Cut"



This command cuts out the selected objects and puts them into the clipboard. The command can only be selected, if objects are marked.

Use this command, if you want to remove objects and replace them somewhere else. To copy/duplicate objects, use the commands "Copy".

Menu "Edit ... Copy"



This command copies/duplicates the selected objects. After copying the object, it can be placed in the marked position with the "Paste" command.

Menu "Edit ... Paste"



If objects were stored in the clipboard with "Copy" and "Cut", they can be inserted in the marked position with the "Paste" command.

Menu "Edit ... Delete"



This command deletes the selected objects. The objects are not into the clipboard. If you want to re-use the removed objects somewhere else, select the command "Cut".

The command can only be selected, if objects are marked.

Menu "Edit ... Copy To"

You can save individual worksheets and their contents into a file. The files have file name extension*.GP and can be saved in any directory with a standard Windows dialog box.

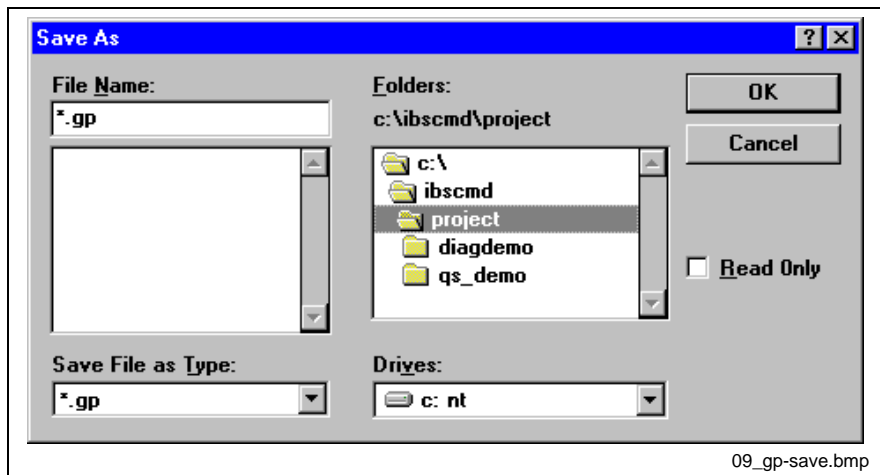


Fig. 9-12: Save as GP file ...

Menu "Edit ... Insert From"

This command inserts a saved GP file into an empty worksheet. GP files (*.GP) hold the contents of any single worksheet. You can save process data links as a file with the "Copy" command.

Menu "Edit ... Delete Worksheet"

This command deletes all objects on the worksheet. After executing this command you have an empty worksheet.

Note: Only the contents of the worksheet are deleted and not the worksheet itself. To delete the worksheet, use the "Delete" button in the "WS manag." dialog box.

Menu "Edit ... Find"



With this command you can search for texts, variable names, or constants on the current worksheet.



Fig. 9-13: Find

Match Whole Word Only Matches are only displayed, if the whole word was found. The word "OUT" in "OUTput" is not displayed, if this option box is marked.

Match Case Lower and upper case letters are distinguished, if this option box is marked. If no matches or no other matches were found, the following message is displayed:

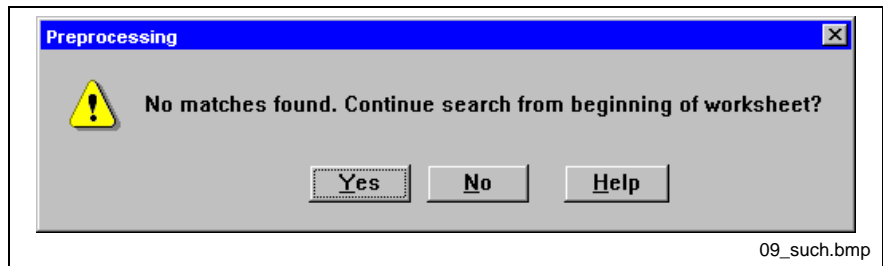


Fig. 9-14: No matches found

Menu "Edit ... Find and Replace"



With this command you can search for texts, variable names, or constants on the current worksheet and replace them with another term.

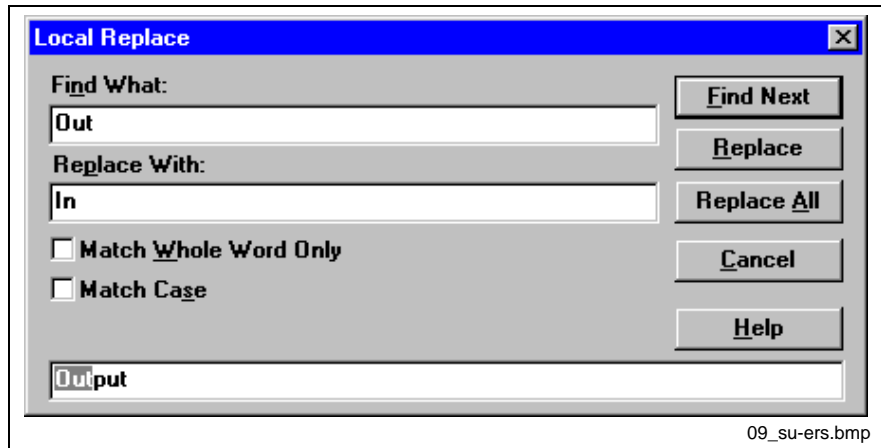


Fig. 9-15: Find and Replace

Match Whole Word Only

Matches are only displayed, if the whole word was found. The word "OUT" in "OUTput" is not displayed, if this option box is marked.

Match Case

Lower and upper case letters are distinguished, if this option box is marked.

If no matches or no other matches were found, the following message appears:

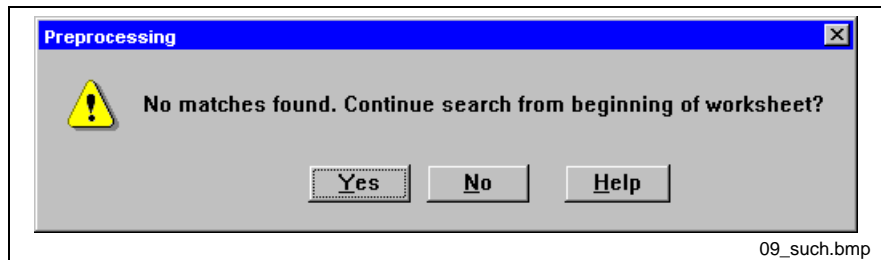


Fig. 9-16: No matches found

Menu "Edit ... Mark All Objects"

The command selects all objects (blocks, text, links, variables, etc.), so that these can be edited as a group, i.e. moved, copied or deleted.

Menu "Edit ... Mark Objects"



This command enables you to select, place and move objects with the mouse. As long as this command is active, a corresponding entry is displayed in the status line (MARK) and the corresponding button in the toolbar is framed in red.

If you want to select several objects, hold down the <Shift> key and click on the desired objects with the mouse.

You can also select several objects by moving the mouse with the pressed left mouse button over the desired objects, thus drawing a frame around the objects.

The insertion point is displayed as a cross:

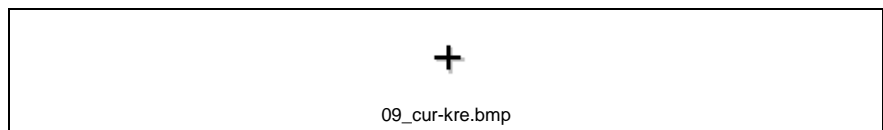


Fig. 9-17: Cursor: Insert point

Menu "Edit ... Link Objects"



With this command you connect the inputs and outputs of the (function) blocks to each other. Click-on an input or output and drag then the mouse in the desired direction. If you have to or want to run connecting lines around other blocks, click-on the desired branching point and then change by 90°

As long as the command is active, a corresponding entry is displayed in the status line (LINK) and the corresponding button in the toolbar is framed in red.

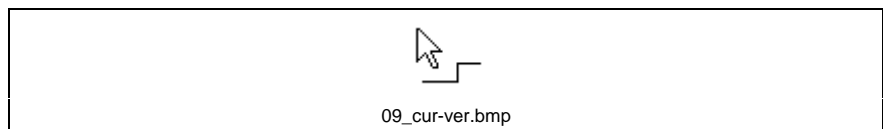


Fig. 9-18: Cursor representation when command is activated

Menu "Edit ... Open Object"

As yet, this command has no function.

Menu "Edit ... Object Properties"

This dialog box shows the properties of an object. If a block is marked, the "Function/Function Block" dialog box appears, if an input or output is marked, the "Formal Parameter" dialog box appears.

The "Formal Parameter" indicates an input or output of a block.

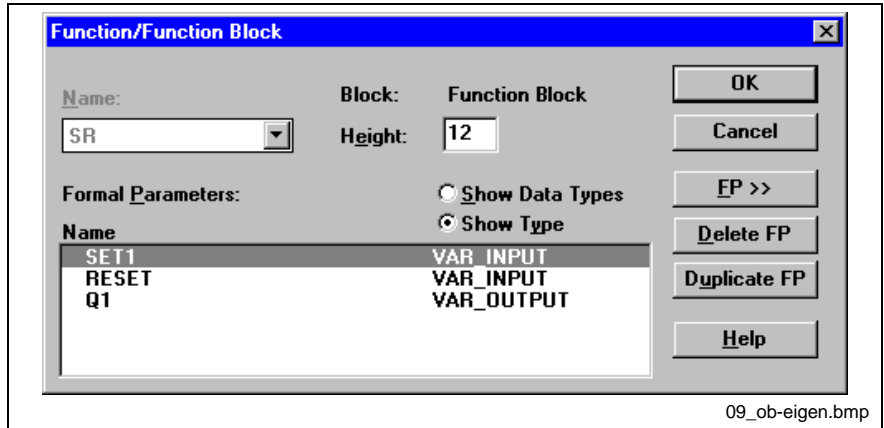


Fig. 9-19: Properties "Function Block"

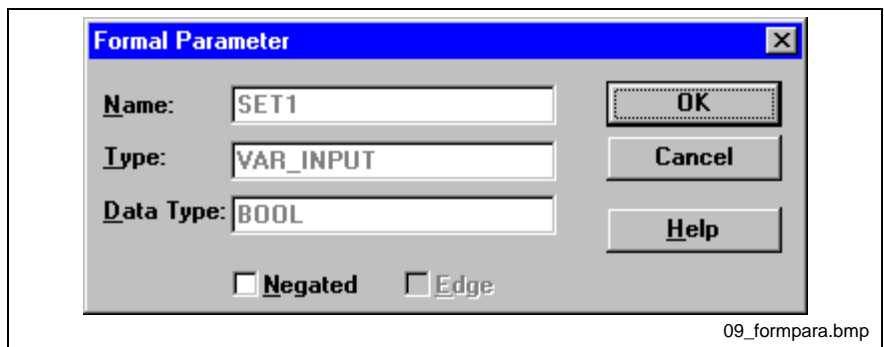


Fig. 9-20: Formal parameter

9.6 Menu "Object ..."

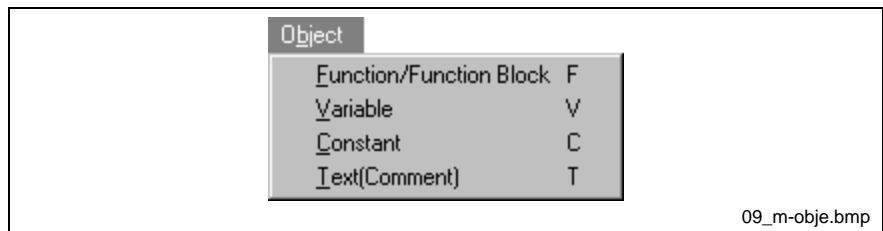


Fig. 9-21: Menu "Object"

Menu "Object ... Function/Function Block"



With this dialog box you can select a function or function block from the block database. The block is inserted at the previously marked position after confirming the dialog box with "OK".

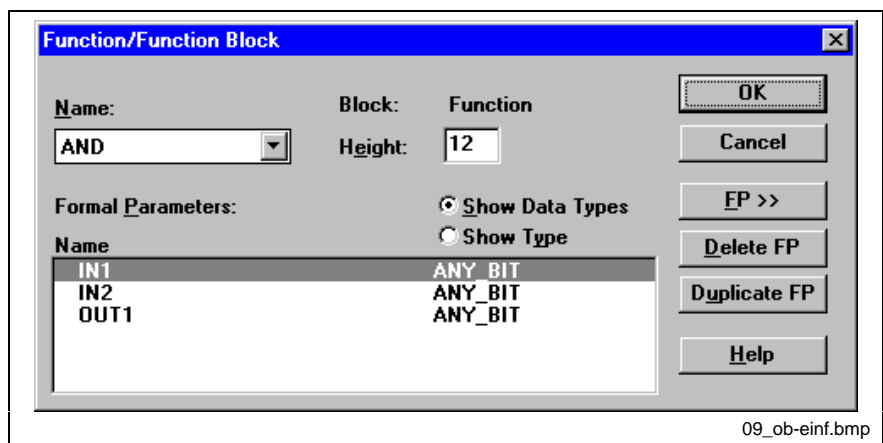


Fig. 9-22: Paste object

Name With this dialog box you can select the desired block.

Height Here you enter the graphic size of the block. Blocks with several inputs (e.g. AND) are automatically enlarged, if you increase the number of inputs.

Show Data Type Set this option, if you want to see the data type of the individual inputs and outputs (e.g. BOOL, ANY_NUM, etc.) in the "Formal Parameters" info box.

Show Type Set this option, if you want to see the type of the individual inputs and outputs (e.g. VAR_INPUT or VAR_OUTPUT) in the "Formal Parameters" info box.

Formal Parameter The inputs and outputs of the block selected under "Name" are displayed here. In addition, the type or data type is displayed depending on the setting.

Buttons:

FP>> In this dialog box the name, type and data type of the formal parameter are displayed. In addition, you can negate the inputs/outputs in some blocks or determine whether the formal parameters are to react to an edge.

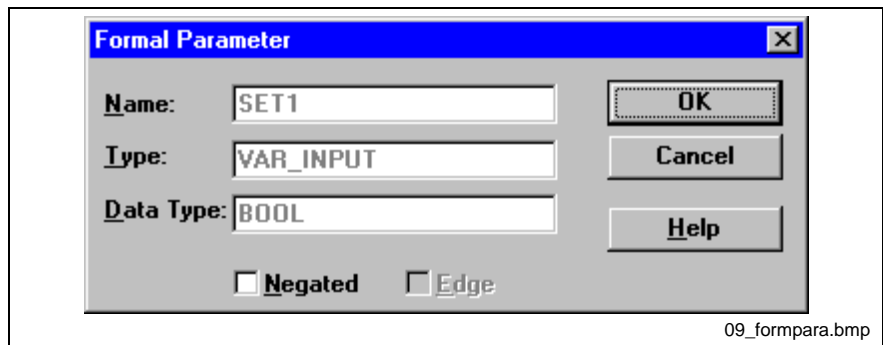


Fig. 9-23: Formal parameter

- Delete FP** Deletes an input or output.
- Double FP** Duplicates the selected input or output of the current block. This function is not available in all blocks.

Menu "Object ... Variable"



In this dialog box you get the variables defined in IBS CMD G4. Process data descriptions that you have defined in IBS CMD G4 for "Preprocessing" are here contained in a selection list.

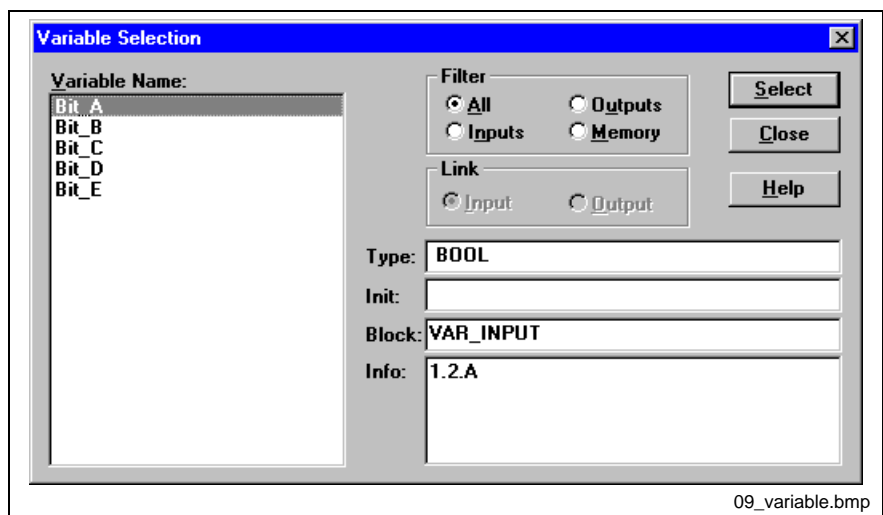


Fig. 9-24: Variable selection

- Variable Name** The selection box contains the variables defined in IBS CMD G4 which are available to "Preprocessing".
- Filter** Set which variable type is to be displayed in the "Variable Name" box here.
- Link** Here you select whether you want to link the variable to an input or an output. The variable name is displayed to the left or right of the connection point depending on the selection.
- Type** The data type is displayed here.
- Init** You can assign start values to variables and memories set when starting the INTERBUS network.
- Block** This specifies an input or output variable.
- Info** Here you can see whether the variable is linked and with which process data item.

Menu "Object ... Constant"



With this command you can define constants. You must specify the constant in a dialog box according to the syntax: **Data Type#Value**

Furthermore, you must determine whether the constant is to be linked with an input or an output.

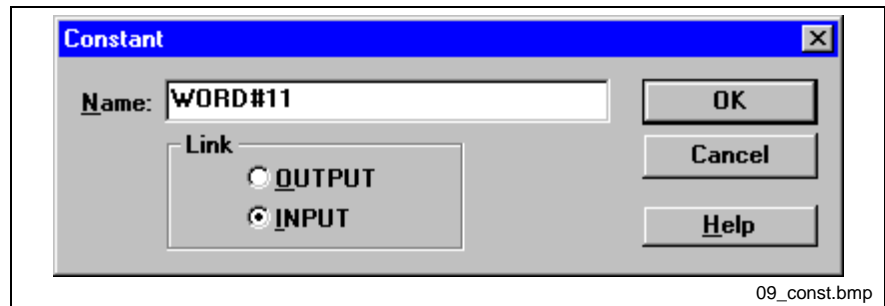


Fig. 9-25: Constant

You can use BOOL, BYTE, WORD and DWORD.

Menu "Object ... Text (Comment)"



With this command you can create a comment text line which is inserted at the marked position (with the cross).

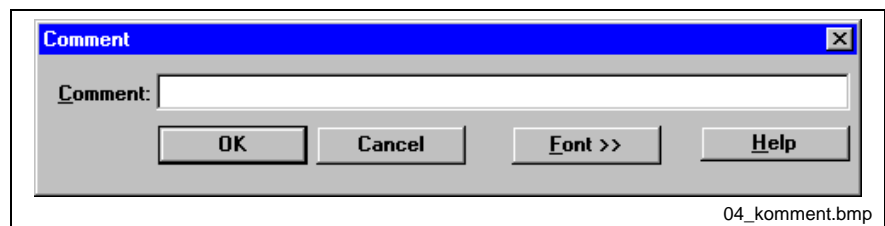


Fig. 9-26: Comment

With the "Font>>" button, you can select the desired font from a standard dialog box with which the comment is to be created. All fonts installed under Windows are available here.

Menu "Layout"

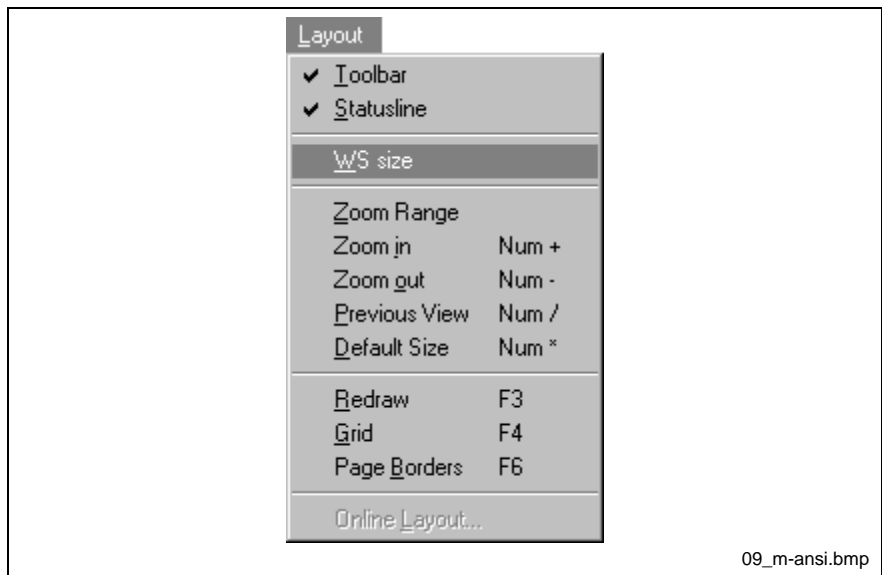


Fig. 9-27: Menu "View ..."

Menu "Layout ... Toolbar"

This command displays or hides the toolbar. If the menu command is selected, the toolbar is displayed.



Fig. 9-28: Toolbar

Not all commands are available all the time. The execution of some commands is subject to certain factors (e.g. that a block is marked). Those buttons that are **not** available are displayed in a two-dimensional form.



Fig. 9-29: Representation of buttons

Menu "Layout ... Status Line"



Fig. 9-30: Status line

The status line is at the bottom of the screen.

The status line gives you the following information:

- Error messages and other information
- Selected tool
"MARK" to place the marking cross "LINK" to select the linking tool
- Mouse pointer coordinates
at present 104/59
- Available working storage

Menu "Layout ... WS Size"

In this dialog box you can enter the size of the current worksheet. Depending on the size, the pages will be divided into several pages by margins. You can display and hide the margins as required.

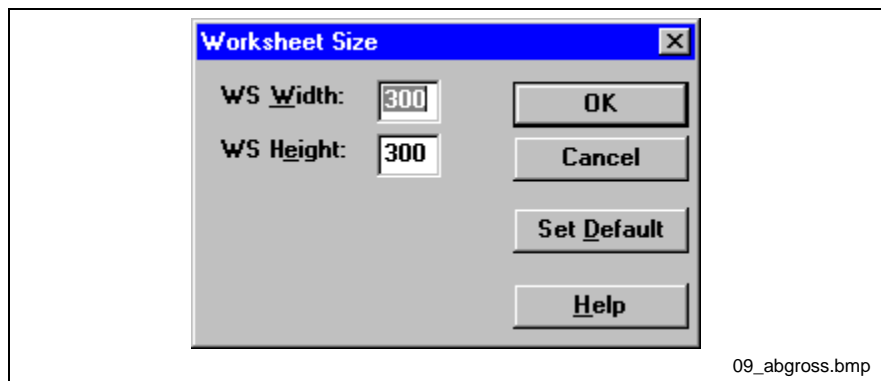


Fig. 9-31: Worksheet size

Menu "Layout ... Zoom Range"



Select this command to enlarge a defined area.

After selecting the command, the cursor changes its appearance. Select a corner of the desired section of the image you want to enlarge and pull the mouse with the left mouse button pressed to the opposite corner of the desired image section. The marked area is displayed, when you release the mouse button.

Cursor representation for this command:

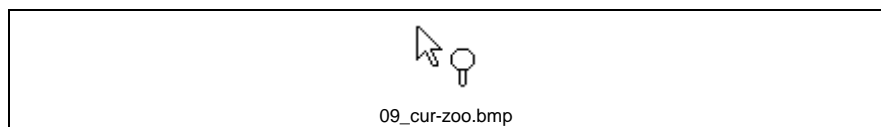


Fig. 9-32: Cursor: Zooming

Menu "Layout ... Zoom In"



You can enlarge the display of the worksheet step by step with this command.

This command operates in a fixed zoom range. If you try to exceed the boundaries of this zoom range, the following message appears:

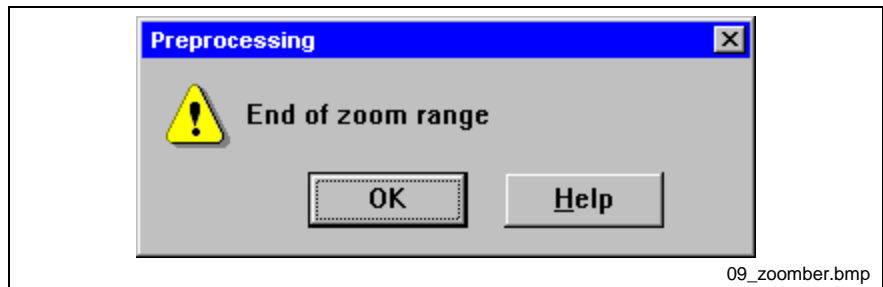


Fig. 9-33: End of zoom range

Menu "Layout ... Zoom Out"



You can reduce the display of the worksheet step by step with this command.

This command operates in a fixed zoom range. If you try to exceed the boundaries of this zoom range, the following message appears:

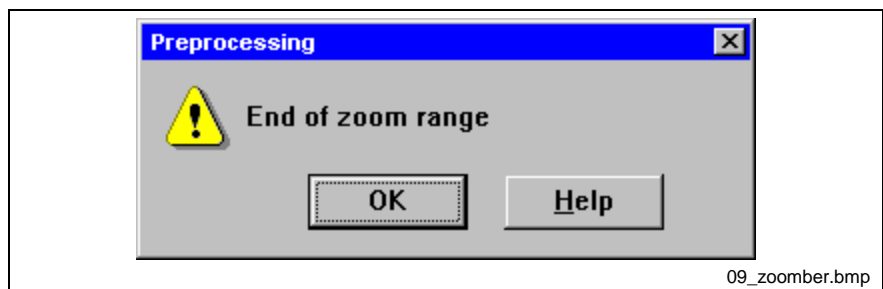


Fig. 9-34: End of zoom range

Menu "Layout ... Previous View"

This command takes you back to the last zoom range. If you have selected an overview representation (small zoom range) and a detail representation (large zoom range), you can conveniently change between the two representations with this command.

Menu "Layout ... Default Size"

This command zooms the worksheet to default size. From the default size you can zoom in the worksheet five times or zoom out four times, before reaching the end of the zoom range.

Menu "Layout ... Redraw"

When drawing connecting lines and placing function blocks, it may be necessary to refresh the representation area. Use the following menu item: When this command is executed, the worksheet is redrawn on the screen with all the current settings.

Menu "Layout ... Grid"

With this menu command you can display a dot matrix (grid) as a positioning and drawing aid. The mouse cursor snaps directly to these grid points or intermediate values depending on the zoom factor.

Menu "Layout ... Page Borders"

The dimensions set under "Worksheet Size" is divided into the appropriate number of 190x227 boxes outlining the margins. This division is merely for better structuring of the worksheet and has no influence on the functions.

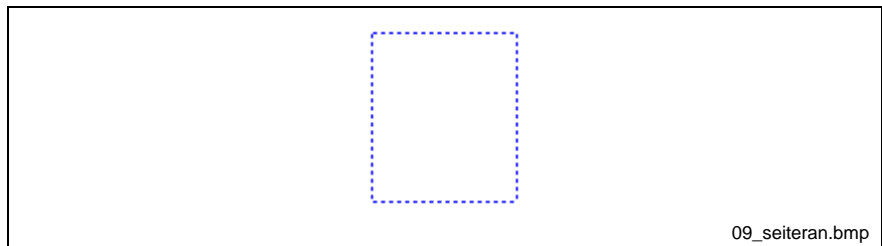


Fig. 9-35: Page borders

Menu "Layout ... Online Layout"

This command is only active, if you start the add-on program with the monitor functions of IBS CMD G4.



In this dialog box, you can configure, how variables are displayed in the preprocessing monitor.

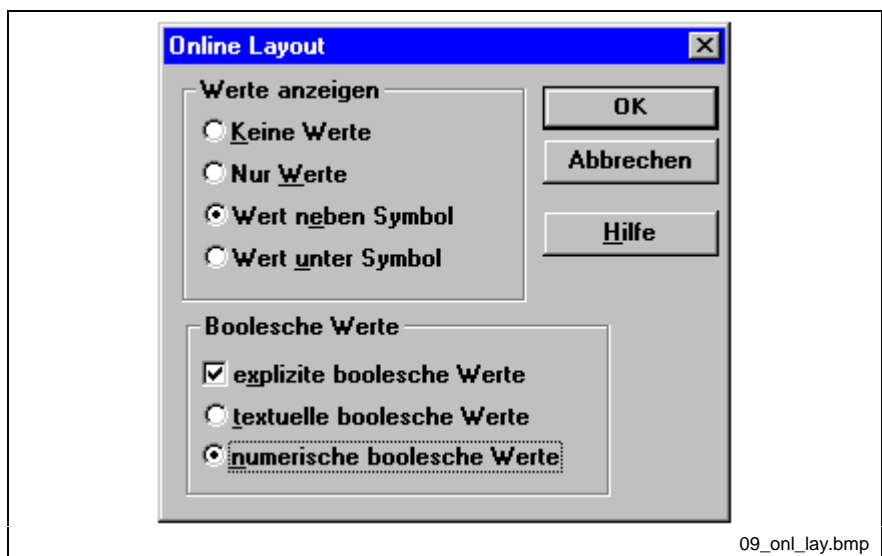


Fig. 9-36: Online layout

Show values

- No Values** Select this option to hide the value of the variables. When "No Values" is selected, the options under "Boolean Values" are unavailable.
 - Only Values** If you select this option, only the values and not the names of the variables are displayed.
 - Value Beside Symbol** Select this option box, if you want to display the value of the variables besides the variable names.
 - Value Below Symbol** Select this option box, if you want to display the value of the variables under the variable name.
- Boolean values**
- Explicit Boolean Values** Selecting this option box will enable the "Text-Type Boolean Values" and "Numeric Boolean Values". When this option is **not** checked, Boolean variables are not displayed explicitly; they are merely represented by the colors "red" = "1" = "TRUE" and "blue" = "0" = "FALSE".
 - Text-Type Boolean Values** The value of the Boolean variables is displayed as text – "TRUE" or "FALSE".
 - Numeric Boolean Values** The value of the Boolean variables is displayed numerically as "0" or "1".

9.7 Menu "Make ..."

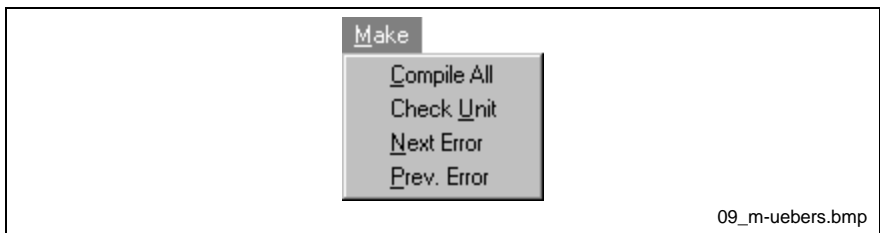


Fig. 9-37: Menu "Make"

Menu "Make ... Compile All"



The command compiles **all** worksheets and checks their contents for errors.

If errors occur in the compiling process, these are stored in an error file. You can view the error file with the "Prev. Error" and "Next Error" commands.

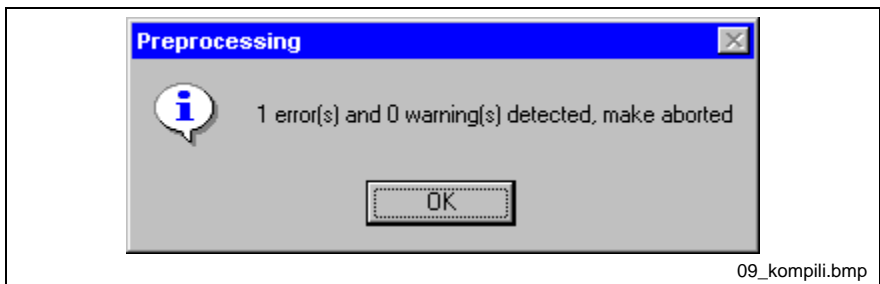


Fig. 9-38: Compiler message

Menu "Make ... Check Unit"

The command compiles the current worksheets and checks its contents for errors. Possible errors are false or missing variables and constants, defective or unwired inputs/outputs, etc.

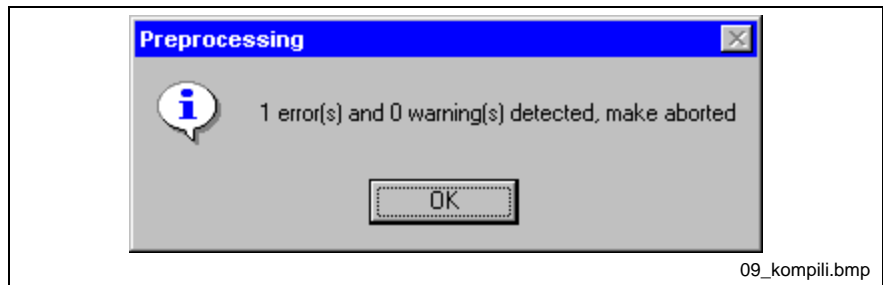


Fig. 9-39: Compiler message

Menu "Make ... Next Error"



The errors found during the compiling process are saved in an error file. This command shows you the next error in the error file.

The errors are displayed in the status line. At the same time, the mouse arrow points to the object in which the error has occurred. Start and end of the error file are shown accordingly.



Fig. 9-40: Text display in the status line

Menu "Make ... Prev. Error"



The errors found during the compiling process are saved in an error file. This command shows you the previous error in the error file.

The errors are displayed in the status line. At the same time, the mouse arrow points to the object in which the error has occurred. Start and end of the error file are shown accordingly.

9.8 Menu "? ..."



Fig. 9-41: Menu "? ..."

Menu "? ... Contents"

Use this command to go to the table of contents of the help file. Here you will find help on all menu items and dialog boxes as well as on the operation of "Preprocessing".

Note: With the "Help" button in the dialog boxes, you can go directly to the help pages available for the respective dialog box. You can also call up context-sensitive help at any time using the "F1" function key.

Menu "? ... Use Help"

Use this command to start the standard Windows help. This will give you general information about working with Help systems under MS Windows.

Menu "? ... About"

In this dialog box you get information about the current version of your add-on program "Preprocessing".

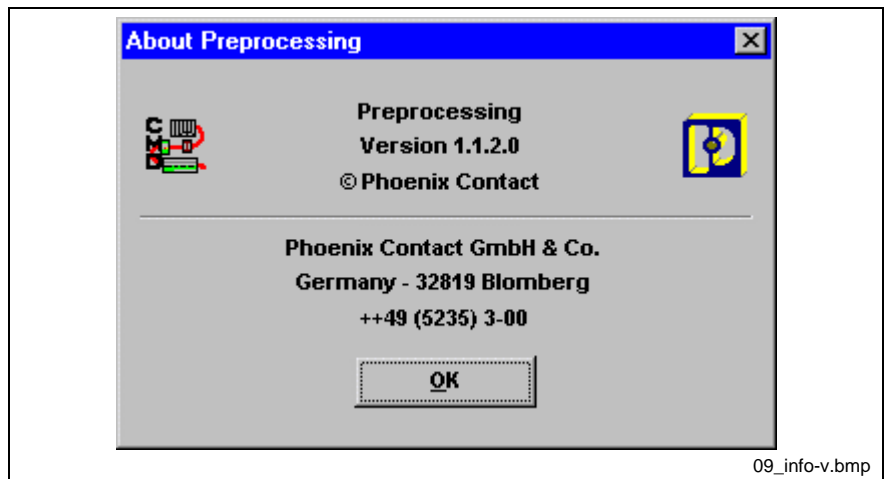


Fig. 9-42: Program and manufacturer information

9.9 Overwrite Variables

You can use the following dialog boxes to simulate different system states by overwriting variables in the preprocessing monitor. To access the preprocessing monitor, click-on "Monitoring" in the "Preprocessing" context menu.

Your preprocessing program is displayed in the open preprocessing monitor using the graphic configuration you defined.

To overwrite a variable open the dialog box by double-clicking on it with the right mouse button. Depending on whether the selected variable is a Boolean or an alphanumeric variable one of the following dialog boxes will appear:

Dialog box to force (overwrite) Boolean variables:

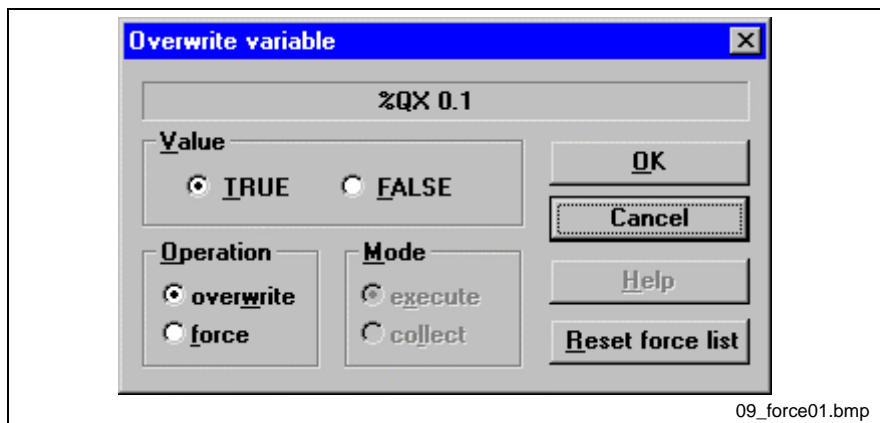


Fig. 9-43: Overwrite Boolean variables

Dialog box to force (overwrite) numeric variables:

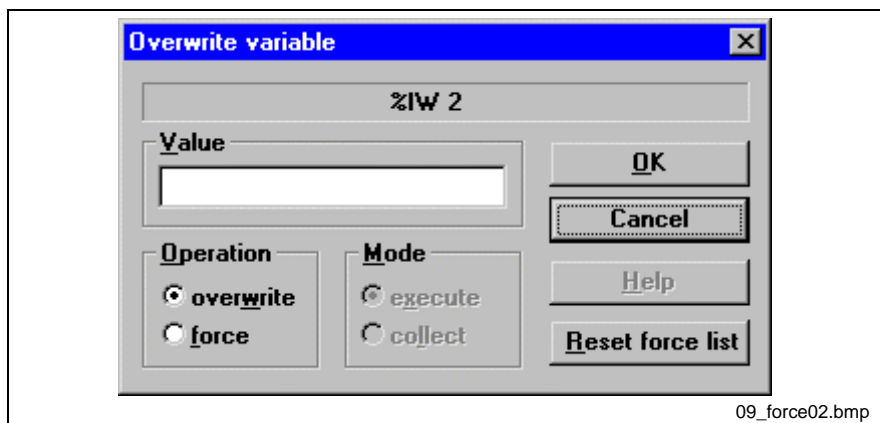


Fig. 9-44: Overwrite numeric variables

- Value** You can enter the variable's value in this edit box (alphanumeric variables only). Enter numeric values in decimal format.
- Operation**
- Overwrite** The variable to be forced is only one time overwritten to the bus system. The value of the forced variable is only valid for a single bus cycle as it is overwritten by value from the process image in the next cycle.
- Fix** Select this option box to prevent the forced variable from being overwritten by the preprocessing program.
- Reset** Press this button to reset the forced variables to the their original values or to reset them to the current values in the preprocessing image.

9.10 Data Types

The data types "ANY_INT" and "ANY_REAL" are summarized under "ANY_NUM".

ANY_BIT - Group

Type	Length (bits)		
BOOL	1	0 or 1	
BYTE	8	Bit pattern	No number
WORD	16	Bit pattern	No number
DWORD	32	Bit pattern	No number

ANY_INT - Group

Type	Length (bits)		Example
SINT	8	Integer	-123.0 or -123
INT	16		2#101111 (dual)
DINT	32		16#2F (hex)

ANY_REAL - Group

Type	Length (bits)		Example
REAL	32	Floating point	12.7 or 1.27E1

9.11 Blocks

Bit-by-Bit Boolean Link:

AND	(and)
OR	(or)
NOT	(not)
XOR	(exclusive or)

Arithmetic Operators:

ADD	(addition)
MUL	(multiplication)
SUB	(subtraction)
DIV	(division)
MOVE	(assignment)
MOD	(modulo; remainder of an integer division)

Arithmetic Comparisons:

GT	(greater than)
GE	(greater than or equal to)
EQ	(equal to)
LE	(lower than or equal to)
LT	(lower than)
NE	(not equal to)

Type Conversions

BCD_TO_*	Type conversion from BCD code
BOOL_TO_*	Type conversion from BOOL
BYTE_TO_*	Type conversion from BYTE
DINT_TO_*	Type conversion from DINT
DWORD_TO_*	Type conversion from DWORD
INT_TO_*	Type conversion from INT
REAL_TO_*	Type conversion from REAL
SINT_TO_*	Type conversion from SINT
WORD_TO_*	Type conversion from WORD
TRUNC_*	Deletion of decimal places

Bit Manipulation:

SHL	Shift left
SHR	Shift right
ROL	Rotate left
ROR	Rotate right

Numeric Functions:

SQRT	Square root
ABS	Absolute value
NEG	Negation

Selection Functions:

MAX_*	Maximum input value
MIN_*	Minimum input value
LIMIT_*	Maximum or minimum input value
SEL	Selection of two input values (general)
SEL_*	Selection of two input values (special)

Bistable Elements:

SR	SR flip-flop
RS	RS flip-flop

Edge Recognition:

R_TRIG	Recognizes rising edge
F_TRIG	Recognizes falling edge

Counter:

CTD	Down counter
CTU	Up counter
CTUD	Up/down counter

G3 Functions:

RESET_OUT_IN01
RESET_OUT_IN10
RESET_OUT_IN01_SW
RESET_OUT_IN10_SW

Bit-by-Bit Boolean Link

These are the four standard blocks of the Boolean Logic.

AND

AND logic

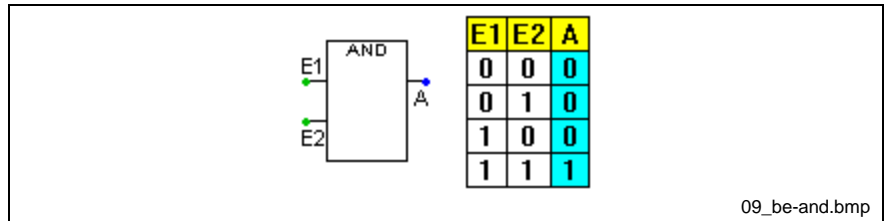


Fig. 9-45: AND block

OR

OR logic

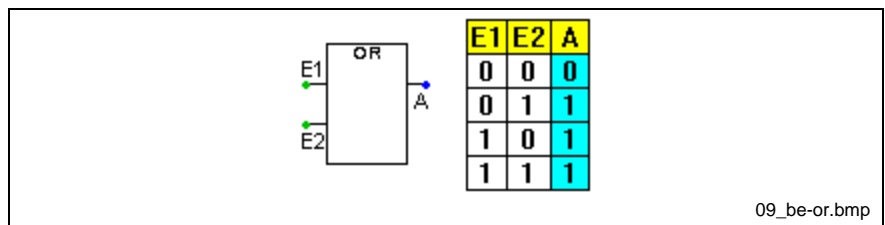


Fig. 9-46: OR block

NOT

NOT logic

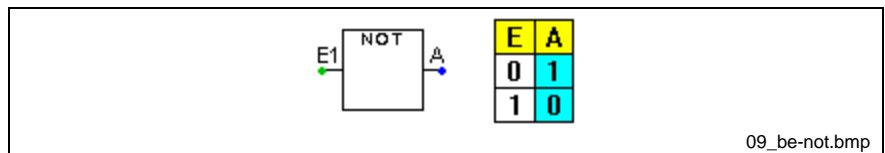


Fig. 9-47: NOT block

XOR

EXCLUSIVE OR logic

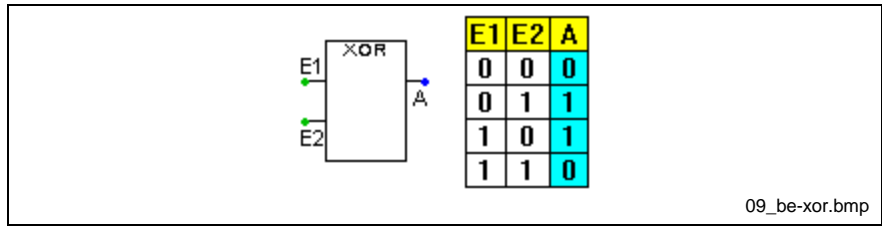


Fig. 9-48: XOR block

All input and output parameters are of "ANY_BIT" type.

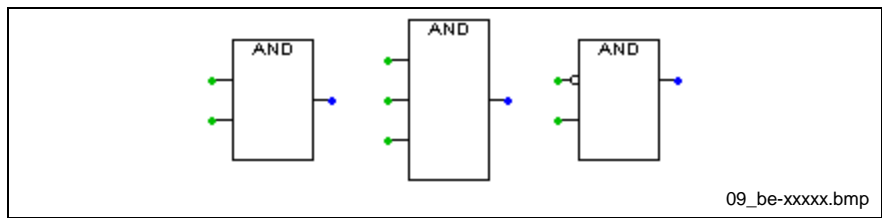


Fig. 9-49: Number and type of inputs

You can also adapt the individual blocks to your requirements by varying the number of inputs and/or negating individual inputs.

Arithmetic Operators:

ADD

Addition

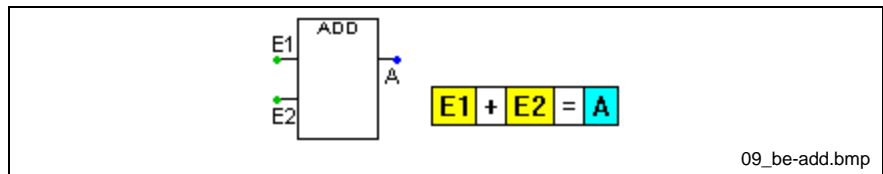


Fig. 9-50: ADD block

Input parameter:

ANY_NUM

Output parameter:

ANY_NUM

MUL

Multiplication

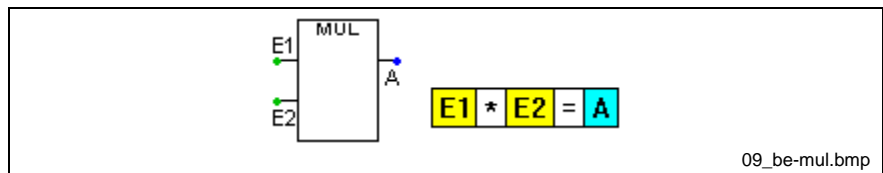


Fig. 9-51: MUL block

Input parameter:

ANY_NUM

Output parameter:

ANY_NUM

SUB

Subtraction

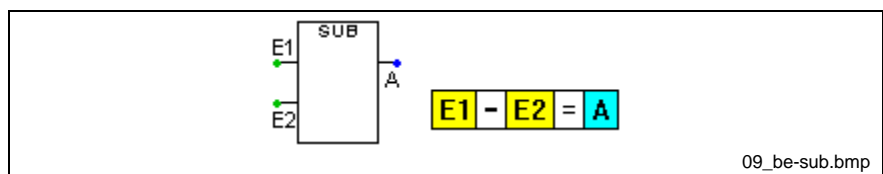


Fig. 9-52: SUB block

Input parameter:

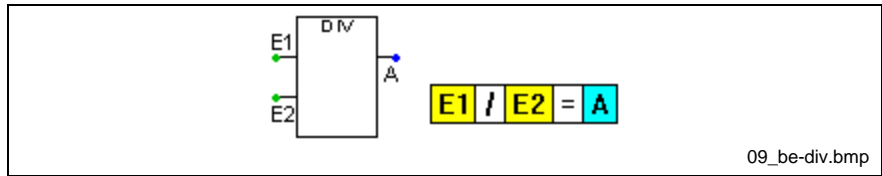
ANY_NUM

Output parameter:

ANY_NUM

DIV

Division



09_be-div.bmp

Fig. 9-53: DIV block

Input parameter:

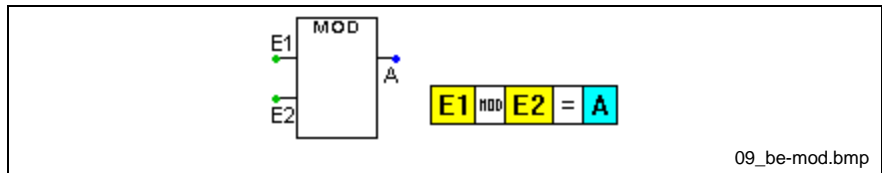
ANY_NUM

Output parameter:

ANY_NUM

MOD

Modulo; remainder of an integer division



09_be-mod.bmp

Fig. 9-54: MOD block

Input parameter:

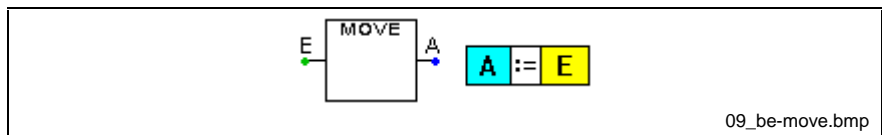
ANY_NUM

Output parameter:

ANY_NUM

MOVE

Assignment; A gets the value of E.



09_be-move.bmp

Fig. 9-55: MOVE block

Input parameter:

ANY_NUM, ANY_BIT

Output parameter:

ANY_NUM, ANY_BIT

Arithmetic Comparison

GT

Greater than

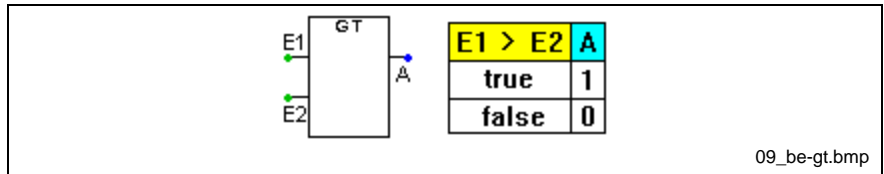


Fig. 9-56: GT block

Input parameter:

ANY_NUM

Output parameter:

BOOL

GE

Greater than or equal to

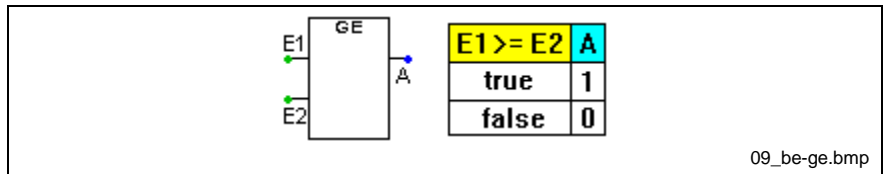


Fig. 9-57: GE block

Input parameter:

ANY_NUM

Output parameter:

BOOL

EQ

Equal to

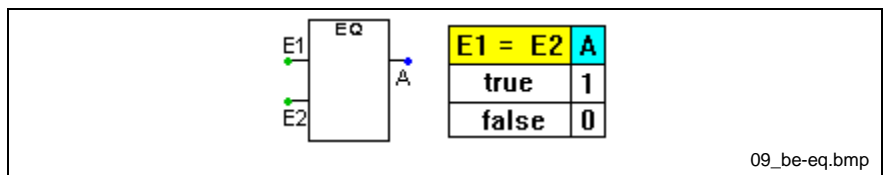


Fig. 9-58: EQ block

Input parameter:

ANY_NUM

Output parameter:

BOOL

LE

Lower than or equal to

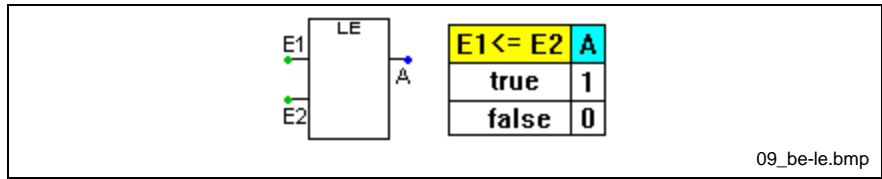


Fig. 9-59: LE block

Input parameter:

ANY_NUM

Output parameter:

BOOL

LT

Lower than

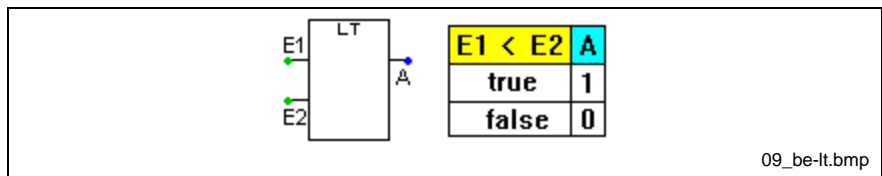


Fig. 9-60: LT block

Input parameter:

ANY_NUM

Output parameter:

BOOL

NE

Not equal to

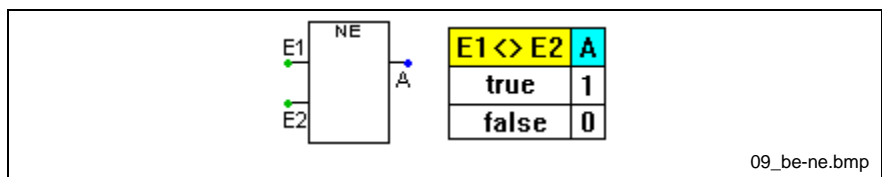


Fig. 9-61: NE block

Input parameter:

ANY_NUM

Output parameter:

BOOL

Type Conversion

TO

The type conversion functions convert the data types:

- BOOL
- BYTE
- INT
- SINT
- DINT
- WORD
- DWORD
- REAL

from one to the other.

The block designation is then:

Source data type_TO_destination data type

For example, the conversion of INT to BYTE

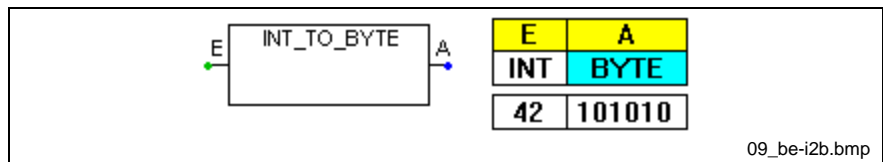


Fig. 9-62: INT_TO_BYTE block

BCD_TO_DINT

Type conversion from BCD code to DINT

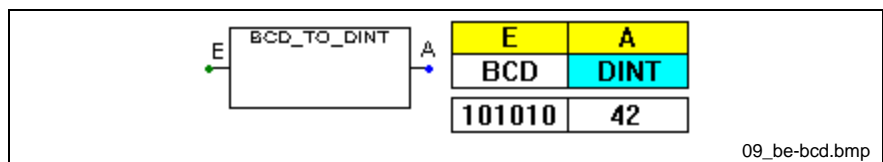


Fig. 9-63: BCD_TO_DINT block

Input parameter:

DWORD

Output parameter:

DINT

TRUNC_*

Truncation

The functions

- TRUNC_DINT
- TRUNC_INT
- TRUNC_SINT

are available.

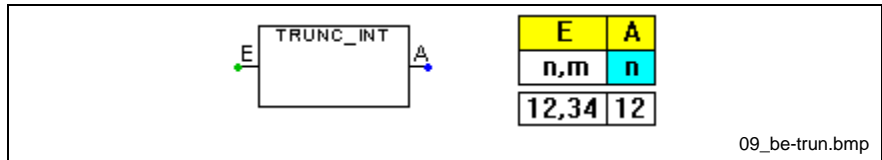


Fig. 9-64: TRUNC_INT block

Input parameter:

ANY_REAL

Output parameter:

DINT, INT, SINT (depending on the selected block)

Bit Manipulation

SHL

Shift left

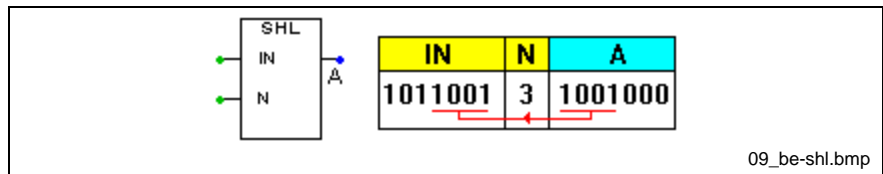


Fig. 9-65: SHL block

Input parameter IN:

ANY_BIT

Input parameter N:

ANY_INT

Output parameter A:

ANY_BIT

SHR

Shift right

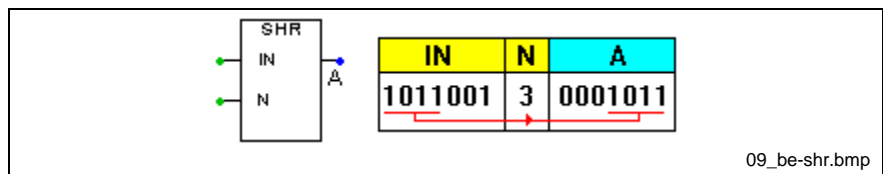


Fig. 9-66: SHR block

Input parameter IN:

ANY_BIT

Input parameter N:

ANY_INT

Output parameter A:

ANY_BIT

ROR

Rotate right

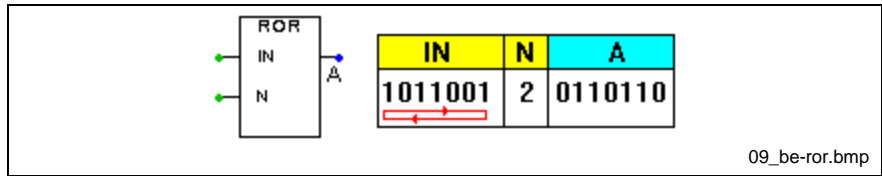


Fig. 9-67: ROR block

Input parameter IN:

ANY_BIT

Input parameter N:

ANY_INT

Output parameter A:

ANY_BIT

ROL

Rotate left

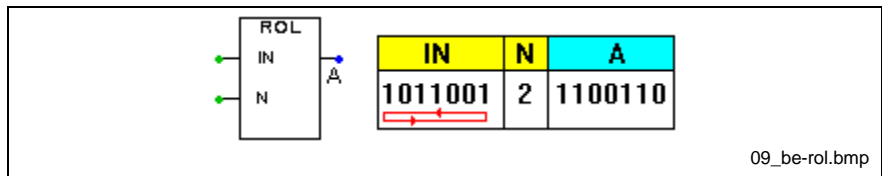


Fig. 9-68: ROL block

Input parameter IN:

ANY_BIT

Input parameter N:

ANY_INT

Output parameter A:

ANY_BIT

Numeric Functions

ABS

Absolute value

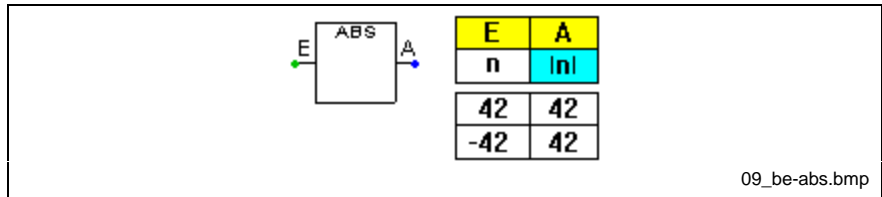


Fig. 9-69: ABS block

Input parameter E:

REAL

Output parameter A:

REAL

NEG

Negation

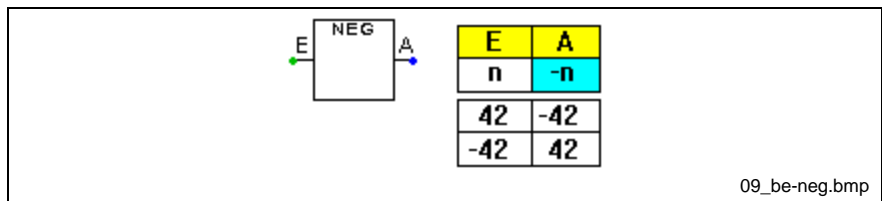


Fig. 9-70: NEG block

Input parameter E:

ANY_NUM

Output parameter A:

ANY_NUM

SQRT

Square root

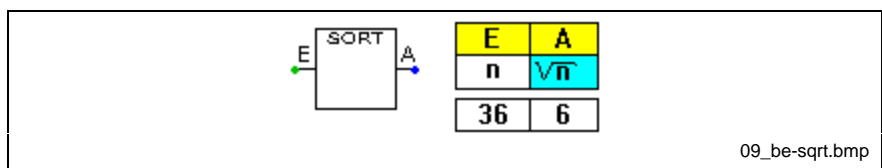


Fig. 9-71: SQRT block

Input parameter E:

REAL

Output parameter A:

REAL

Blocks Selection Functions

Connection designations:

MN	Default 'Minimum value'
MX	Default 'Maximum value'
A	Output
IN	Input value
E1	Input value 1
E2	Input value 2

The functions MIN, MAX, LIMIT are available for the following data types:
DINT, INT, REAL, SINT

For INT e. g. MAX_INT, MIN_INT and LIMIT_INT

MAX_*

Maximum input value

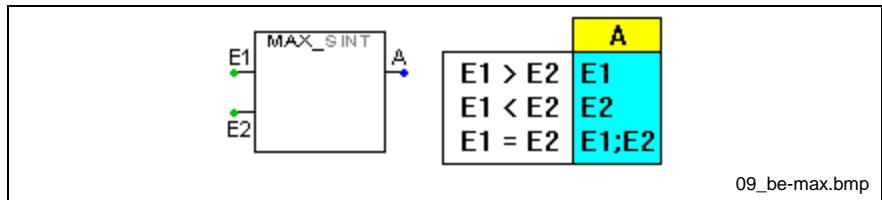


Fig. 9-72: MAX_* block

MIN_*

Minimum input value

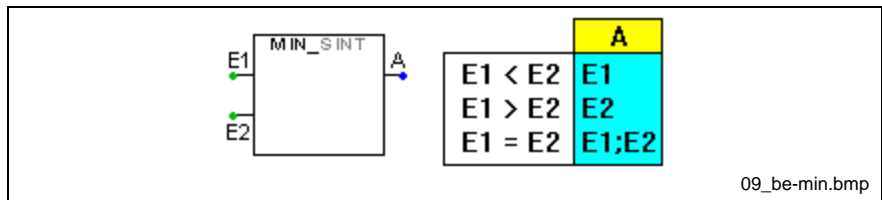


Fig. 9-73: MIN_* block

LIMIT_*

Maximum or minimum input value

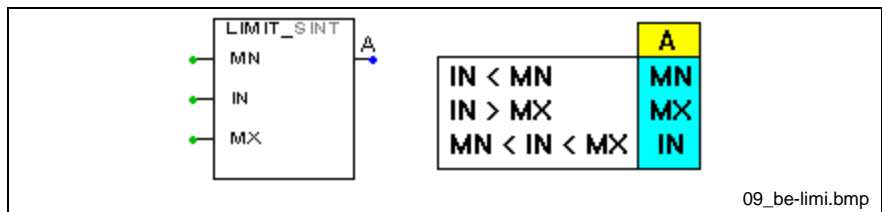


Fig. 9-74: LIMIT_* block

SEL

Select an input value from two input values by using the "G" bit. This block can be utilized for all ANY_NUM data types.

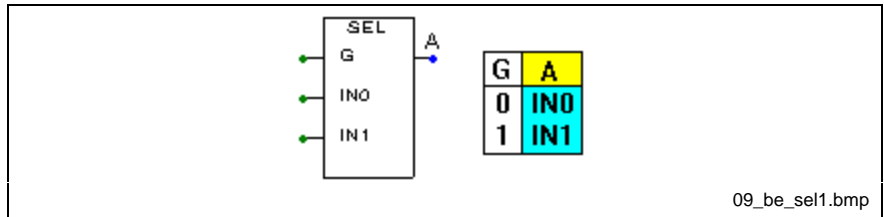


Fig. 9-75: SEL block

Input parameter G:

BOOL

Input parameter IN0, IN1:

ANY_NUM

Output parameter A:

ANY_NUM

SEL_*

Select an input value from two input values by using the "G" bit.

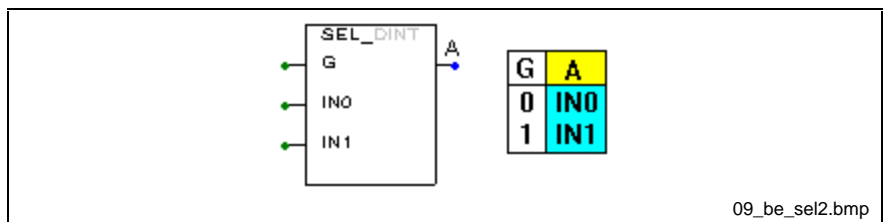


Fig. 9-76: SEL_* block

Input parameter G:

BOOL

Input parameter IN0, IN1, output parameter A:

DINT, REAL, SINT depending on the selected block.

Bistable Elements:

SR

Memory block (flip-flop)
prior setting

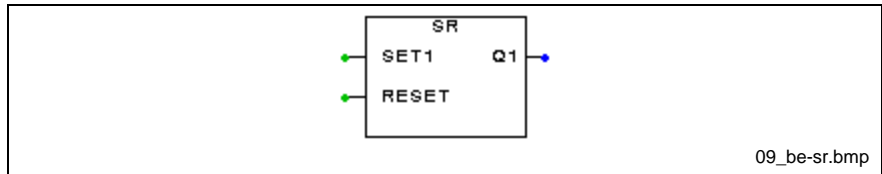


Fig. 9-77: SR flip-flop

Input parameter SET1:

BOOL

Input parameter RESET:

BOOL

Output parameter Q1:

BOOL

RS

Memory block (flip-flop)
prior resetting

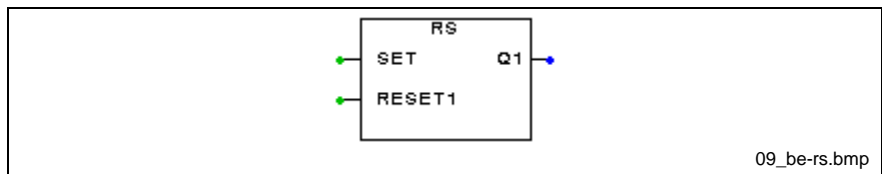


Fig. 9-78: RS flip-flop

Input parameter SET:

BOOL

Input parameter RESET1:

BOOL

Output parameter Q1:

BOOL

Edge Recognition:

R_TRIG

Recognition of a rising edge

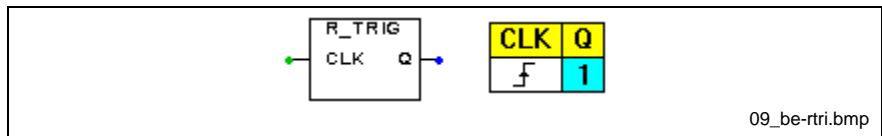


Fig. 9-79: R_TRIG block

Input parameter CLK:

BOOL

Output parameter Q:

BOOL

F_TRIG

Recognition of a falling edge

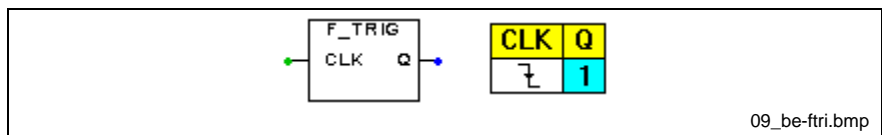


Fig. 9-80: F_TRIG block

Input parameter CLK:

BOOL

Output parameter Q:

BOOL

Counters

Connection designations:

CV	Current counter value
PV	Maximum/minimum value
Q	TRUE, if CV has reached the maximum/minimum value PV.
RESET	Sets CV to 0
LOAD	Sets CV to PV
QU	TRUE, when CV has reached the maximum value.
QD	TRUE, when CV has reached the minimum value.
CU	Starts up counter.
CD	Starts down counter.

CTU

Up counter (from 0 to PV)

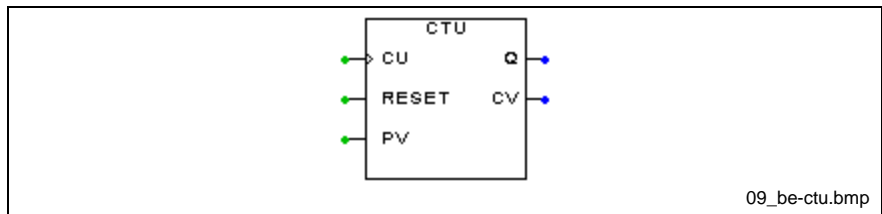


Fig. 9-81: CTU block

Input parameter CU, RESET:

BOOL

Input parameter PV:

INT

Output parameter Q:

BOOL

Output parameter CV:

INT

CTD

Down counter (from PV to 0)

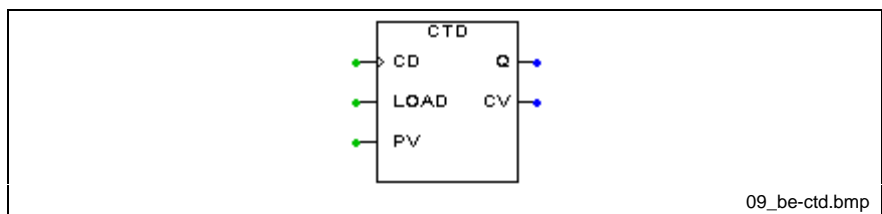


Fig. 9-82: CTD block

Input parameter CD, LOAD:

BOOL

Input parameter PV:

INT

Output parameter Q:

BOOL

Output parameter CV:

INT

CTUD

Up/down counter (between 0 and PV)

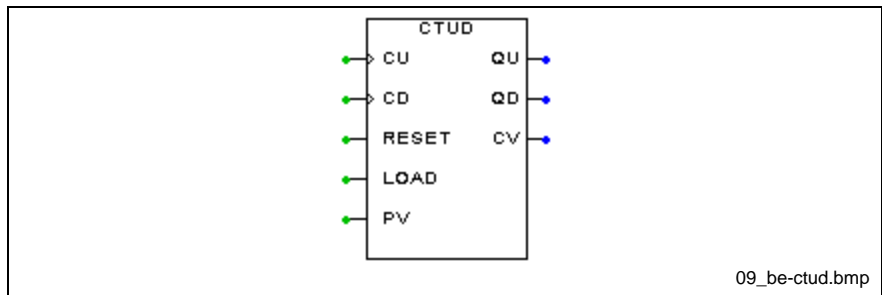


Fig. 9-83: CTUD block

Input parameter CU, CD, RESET, LOAD:

BOOL

Input parameter PV:

INT

Output parameter QU, QD:

BOOL

Output parameter CV:

INT

G3 Functions:

Generally, process data from the PLC or the PC (HOST_IN) and to the bus (BUS_OUT) cannot be influenced in a buffered instance. To provide this possibility of additional influence, the reset functions were formerly developed as part of the firmware (Generation 3) and are now available as function blocks in the "Preprocessing" add-on program.

Function:

The bit at HOST_IN is passed directly to BUS_OUT. This is the normal connection between the host system and the INTERBUS system. You can influence this direct connection with the RESET input because the RESET input has a higher priority than the HOST_IN. The HOST_IN bit is only routed to BUS_OUT with a rising edge.

This block exists respectively for a rising edge (Reset_OUT_IN01 and Reset_OUT_IN01_SW) and for a falling edge (Reset_OUT_IN10 and Reset_OUT_IN10_SW) of the RESET input.

RESET_OUT_IN01

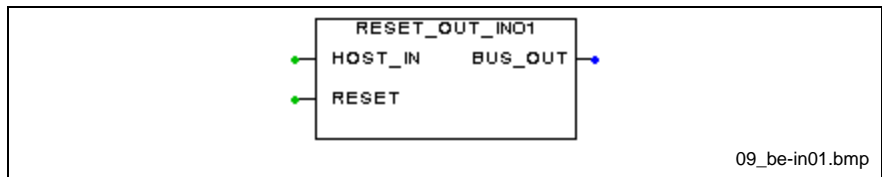


Fig. 9-84: RESET_OUT_IN01 block

Discrete structure:

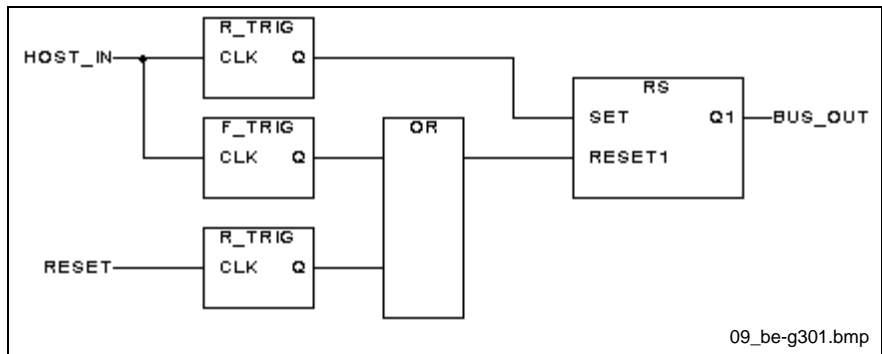


Fig. 9-85: Discrete structure of the RESET_OUT_IN01

RESET_OUT_IN10

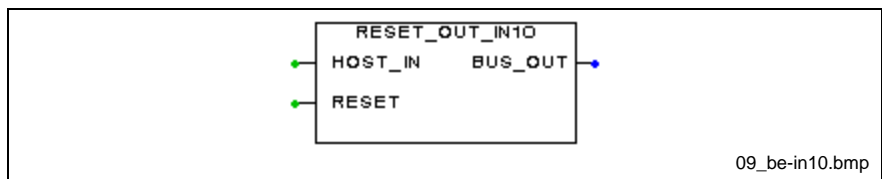


Fig. 9-86: RESET_OUT_IN10 block

Discrete structure:

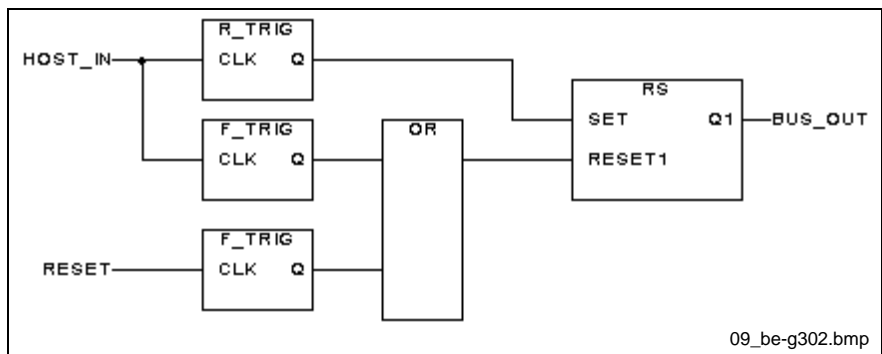
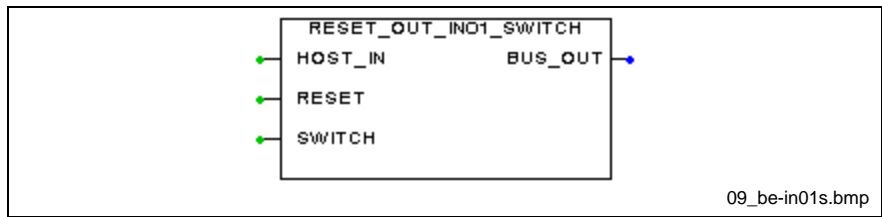


Fig. 9-87: Discrete structure of the RESET_OUT_IN10

The two following blocks have an additional enable input. This input has to be set for the RESET bit to be effective.

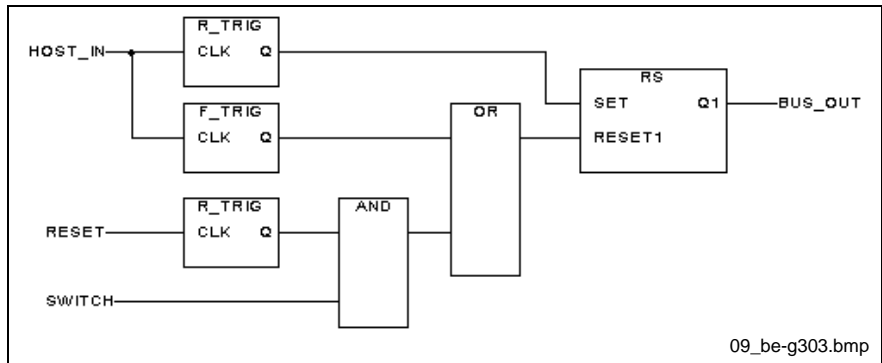
RESET_OUT_IN01_SW



09_be-in01s.bmp

Fig. 9-88: RESET_OUT_IN01_SW block

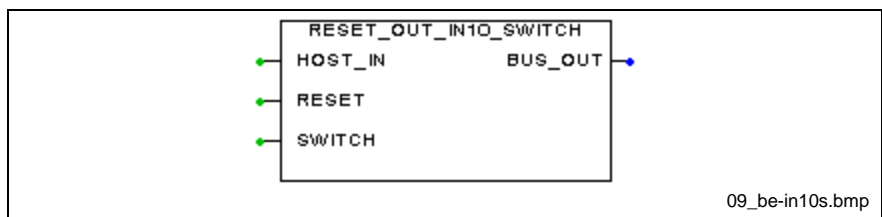
Discrete structure:



09_be-g303.bmp

Fig. 9-89: Discrete structure of the RESET_OUT_IN01_SW

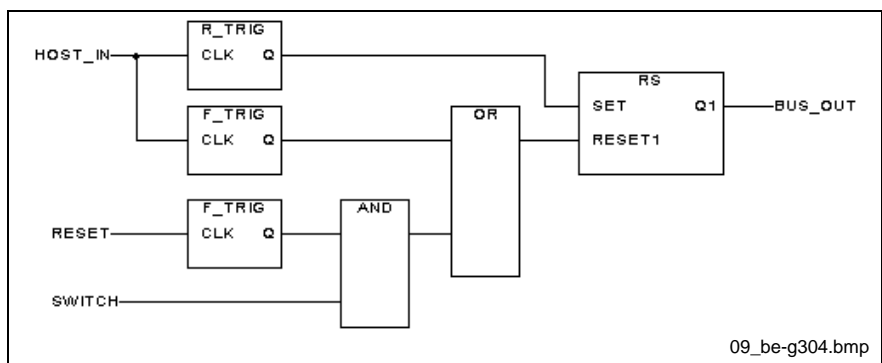
Reset_OUT_IN10_SW



09_be-in10s.bmp

Fig. 9-90: RESET_OUT_IN10_SW block

























Discrete structure:




































09_be-g304.bmp

Fig. 9-91: Discrete structure of the RESET_OUT_IN10_SW

Toolbar "Preprocessing"

	Save File
	Compile All
	Compile Worksheet
	Zoom Out
	Zoom In
	Zoom Area
	Paste Object
	Copy Object
	Cut Object
	Delete Object
	Undo
	Mark Object
	Create Connection Lines With this button you can connect individual blocks with each other.
	Add Text With this button you can add describing text to your worksheet.
	Insert Block
	Assign Input/Output Variables
	Define Constant
	Previous Worksheet
	Worksheet Management
	Next Worksheet
	Previous Error
	Next Error
	Find
	Find and Replace

9.12 Keyboard Assignment

	Help (in the "?" menu)	
	Redraw (in the "Layout" menu)	
	Grid (in the "Layout" menu)	
	Mark All Objects (in the "Edit" menu)	
	Page Borders (in the "Layout" menu)	
	Delete (in the "Edit" menu)	
		Exit (in the "File" menu)
		Copy (in the "Edit" menu)
		Link Object (in the "Edit" menu)
		Select Object (in the "Edit" menu)
		Save (in the "File" menu)
		Paste (in the "Edit" menu)
		Cut (in the "Edit" menu)
		Undo (in the "Edit" menu)
		Previous View (in the "Layout" menu)
		Default Size (in the "Layout" menu)
		Zoom Out (in the "Layout" menu)
		Zoom In (in the "Layout" menu)
		Function/Function Block (in the "Object" menu)
		Text (in the "Object" menu)
		Variable (in the "Object" menu)

10 Miscellaneous

10.1 Message Dialog

The message dialog provides you with information on type and origin

- of an event,
- a malfunction, or
- an error.

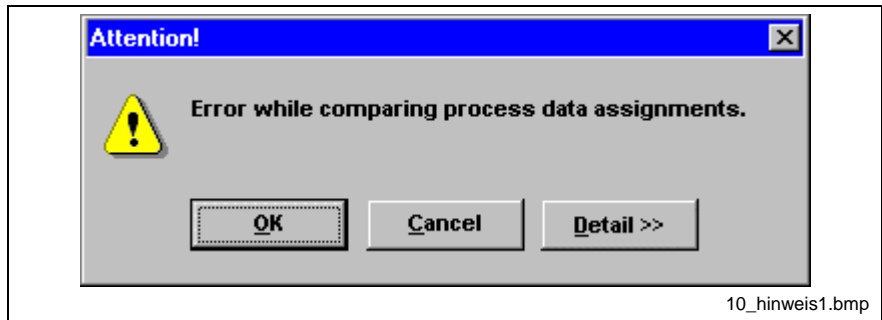


Fig. 10-1: Message dialog without details

You can close the message dialog with "OK" or have detailed information displayed with the "Detail" button.

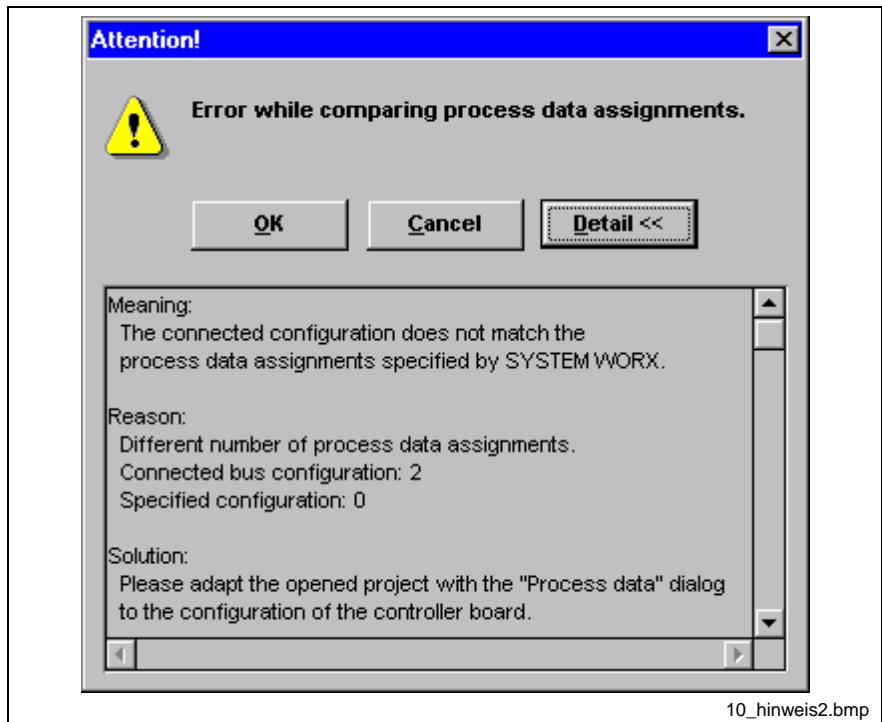


Fig. 10-2: Message dialog with details

Message Code, Message File Double-click on the picture icon in the dialog box to see the message codes and the name of the file in which it is stored.

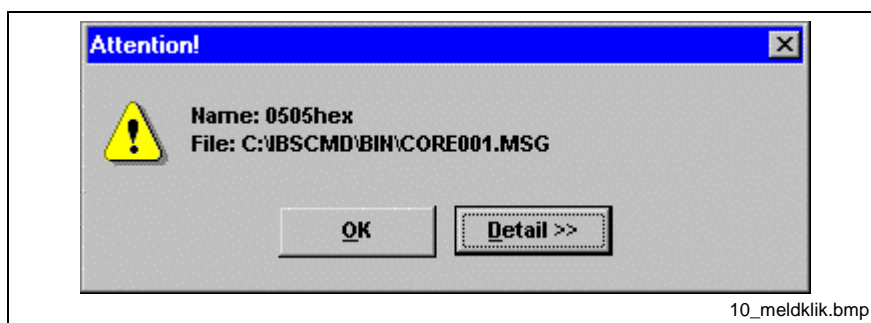


Fig. 10-3: Message code and file

10.2 Bus Editor

Using Keyboard Shortcuts to Cut, Copy and Paste

<CTRL>+<x> Cuts the selected device
 <CTRL>+<c> Copies the selected device
 <CTRL>+<v> Pastes the selected device

Pasting in Other Applications

You can also paste a device from the Windows Clipboard into another text-based application. You don't paste the device data as device icon, but as text.

Example:

Bus terminal	No
Device	Local bus
ID Code	126
Process data channel length	64 [bit]
Parameter channel length	0 [bit]
Profile number	0h
Incoming interface (IN1)	ST local bus
Outgoing interface (OUT1)	ST local bus
Branching interface (OUT1)	None
Manufacturer name	Phoenix Contact
Device type	IB ST 24 AI 4/SF
Group	PHOENIX
Icon library	PHOENIX.ICL

Selecting Multiple Devices

You can select several devices simultaneously and move, copy and delete them.

When a device is moved, it may be attached to an interface of the same type. If the device cannot be inserted at the interface in question, the system will search for another, acceptable interface (e.g. on a double bus terminal like the IBS ST 24 BK RB-T).

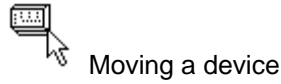
To Select a Range of Devices

To select a range of consecutive devices, click the first device in the range and press the <SHIFT>-key. Without releasing the <SHIFT>-key, click on the last device in the range. This will select all the devices between the first and the last one.

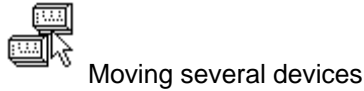
To Select a Specific Device To select specific devices in your bus configuration, press the <CTRL>-key, click on the desired device without releasing the <CTRL>-key. To move the selected item, drag it to its new location in the bus configuration.

Drag and Drop To move or copy devices you can move the mouse to drag and drop them to the desired location in the bus configuration. To do this, click on the marked device with the left mouse button and drag the device to its new location without releasing the mouse button. The device will be inserted at the point where you release the left mouse button.

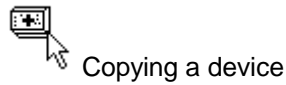
Appearance of the cursor during Drag and Drop



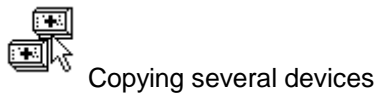
Moving a device



Moving several devices



Copying a device



Copying several devices

Setting the Display Width You can configure and set the width of the bus display. For example, you might set a maximum width, when working at a lower resolution or for a clear print-out. If the display width for the loaded bus configuration is not sufficient, the bus display will be re-formatted as shown below. You can set the display width in the "Settings" dialog box of the "View" menu.

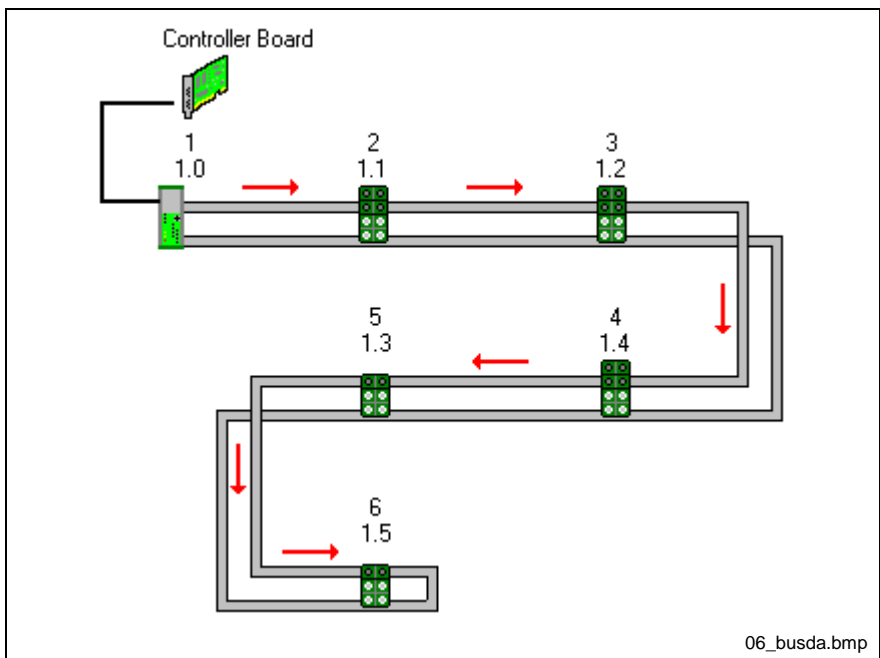


Fig. 10-4: Bus representation

10.3 Bus Representation in Case of an Error



This yellow symbol indicates failure messages of a device and is displayed on the device that caused the message.



This red symbol indicates that an error was found during the configuration frame check and/or the parameterization. The detected device has, for example, a different ID code or a different process data channel length. The symbol is placed directly on the device causing the error.



This red symbol signals an error that has led to the bus being switched off. If the fault is localized, the bus terminal of the affected bus segment is covered by this symbol. In addition to that, the bus line to the incoming interface of the bus terminal is displayed in a different color. Since the bus can no longer run from this position, all subsequent devices are represented as inactive (device icon in gray and text in italics).



This representation indicates that the device is inactive. If a specific device is hidden, it is also represented in this way.

In the case of operation errors of IBS CMD G4 and messages of the controller board you will be provided with information in a message box.

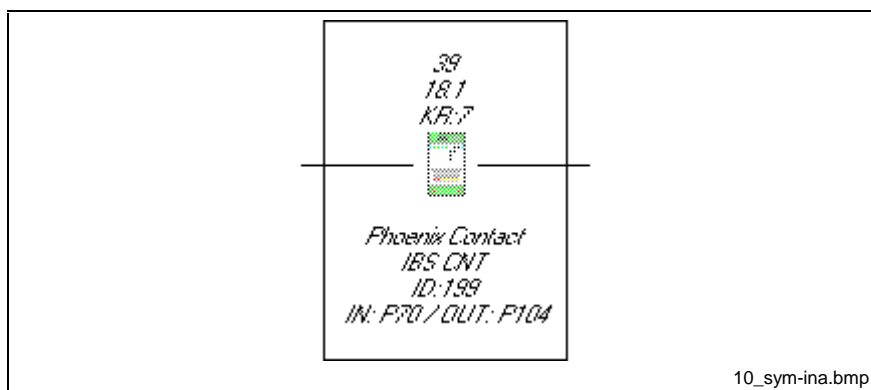


Fig. 10-5: Inactive device

In the case of operation errors of IBS CMD G4 and messages of the controller board you will be provided with information in a message box.

Error display in the box display.

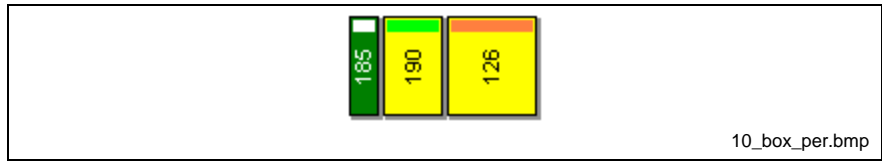


Fig. 10-6: Peripheral error

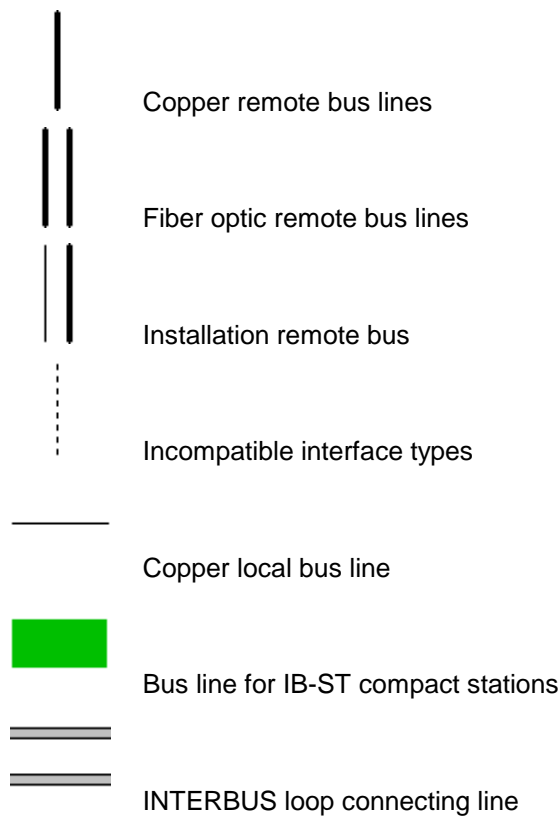
The device appears yellow when a peripheral error occurred (e.g. error in the peripheral power supply). This error does not result in a bus stop.



Fig. 10-7: Bus error

The device appears red when a bus error has occurred that results in a bus stop.

10.4 Connecting Lines of the Bus Lines



In the operating states "Configuration (offline)", Configuration (online)", and "Monitoring" the bus lines are displayed in black. Among other things, you will recognize the "Diagnostics" operating state by the green remote bus lines.

10.5 Mouse menu / Context menu

With the left mouse button you can select (focus) an element (project, PLC/PC, controller board, parameterization memory, configuration frame, device). If you press the right mouse button on the marked element, a context menu appears containing the commands available for this element.

The context menu is divided into up to four areas which are also displayed in the menu bar.

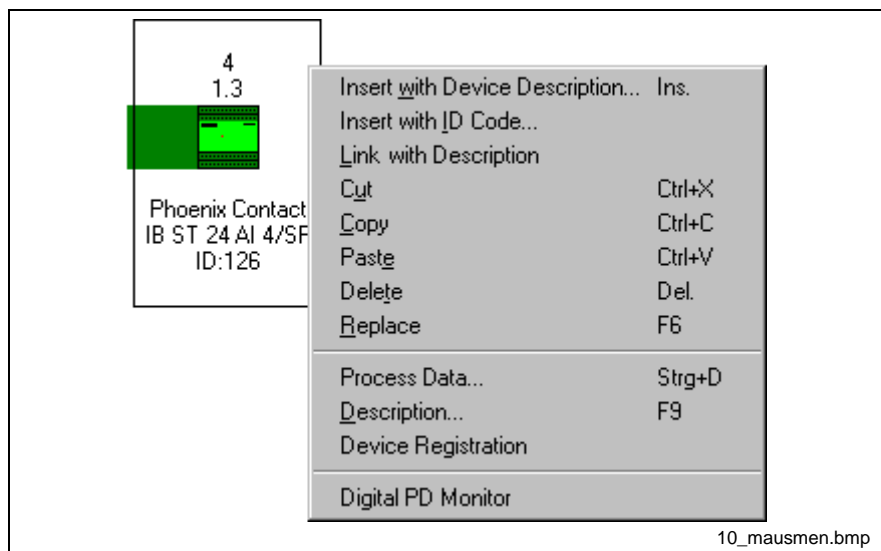


Fig. 10-8: Mouse menu / context menu

Edit	Context menu items such as: Cut, Copy, Paste, Delete
Configuration	Context menu items such as: Process Data, Description
Monitoring	Context menu items such as: Address Monitor, Display IBS DSC
Diagnostics	Context menu items such as: Bus Diagnostics

10.6 Explanation of the Product Designations

Product designations for INTERBUS products from Phoenix Contact are structured according to an uniform scheme.

You can derive the following information from the module designations:

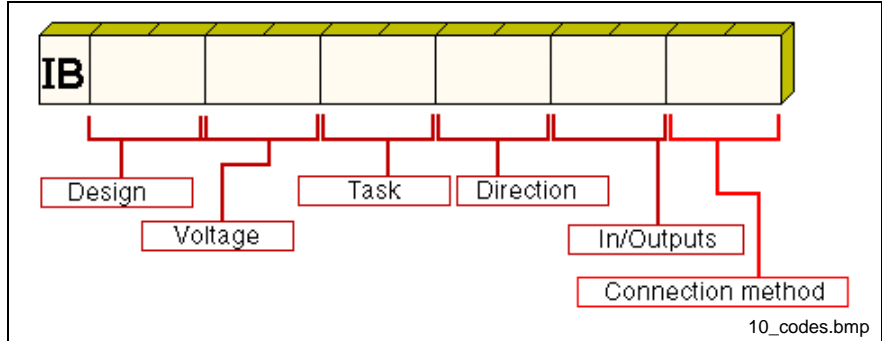


Fig. 10-9: Product designations

Design

SL	INTERBUS installation local bus
RT	RemoteTerminal
ST	SmartTerminal
CB	ControllerBoard
IP	Degree of protection IP65
IPKIS	Degree of protection IP67 KIS
IPKES	Degree of protection IP67 KES
SAB	Sensor/actuator box

Voltage

24	24 V
120	120 V

etc.

Task

D	Digital device
A	Analog device
BK	Bus terminal
CBK	Installation remote bus terminal
PT	Resistance thermometer
UTH	Thermocouples
V24	Serial connection V24/RS232
CNT	Counter
RELS	Relay outputs

Direction

I	Input
O	Output
IO	In-/Output

Number of inputs/outputs

8	8 inputs or outputs
32	32 inputs or outputs

etc.

Connection method

/2	2-wire connection
/4	4-wire connection






















etc.

Example:

IB ST 24 DO 32/2

Bus type:	SmartTerminal
Voltage:	24 V
Signal form:	Digital
Direction:	Output
Outputs:	32
Connection method:	2-wire

10.7 Keyboard Assignment

	Main Program
	Print ... (in the "File" menu)
	Operating State ... (in the "File" menu)
	Save (in the "File" menu)
	Open (in the "File" menu)
	Replace (in the "Edit" menu)
	Compressed Representation (in the "View" menu)
	Search ... (in the "Edit" menu)
	Description (in the "Configuration" menu)
	Exit (in the "File" menu)
	Insert with Description (in the "Edit" menu)
	Delete (in the "Edit" menu)
	Cut (in the "Edit" menu)
	Copy (in the "Edit" menu)
	Paste (in the "Edit" menu)
	Undo (in the "Edit" menu)
	Process Data/Variables (in the "Configuration" menu)
	Address Monitor (in the "Monitor" menu)
	Exit (in the "File" menu)
 	Call up context menu

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13 Service & Support

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