Rexroth

SyConPB
System Configurator for PROFIBUS

Application Manual

SYSTEM200

DOK-CONTRL-SYCON****-DP-AW02-EN-P

Rexroth Indramat

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Purpose of Documentation
This documentation describes the functionalities of fieldbus configurator SyConPB in combination with the programming software WinPCL in system 200 of Rexroth Indramat.

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Validity
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Contents

1 Introduction

1.1 Preface

The fieldbus configurator SyConPB is mainly based on the universal fieldbus configurator SyConPB of

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Parts of this manual are extracted from the manual of Hilscher and describe the functionality of SyConPB in combination with the programming software WinPCL in System 200 of Rexroth Indramat. The original tool of Hilscher possibly offers more features that cannot 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 SyConPB and this manual.

1.2 Overview

SyConPB is a Global Fieldbus Configurator.

You configure all devices with one tool. SyConPB checks the dependencies between the devices. SyConPB only allows configurations that make sense. In case of doubt SyConPB will give you a warning.

To Hilscher devices you can make downloads of the configuration data. For other devices, export functions or documentation possibilities are available.

SyConPB Documents Your Fieldbus System.

After the configuration you can print out a detailed documentation of your fieldbus network. The details can be switched on/off. You can print a documentation with details between the bus topology and the details of one device.

SyConPB Uses Standardized Configuration Files.

Some protocols support standardized files containing information about all features and limitations of the slave device. SyConPB uses these files for the configuration.

SyConPB is a Diagnostic Tool.

After the configuration you can switch SyConPB into the diagnostic mode. You can watch all status information of Hilscher devices, see protocol-dependent diagnostic information, e.g. live list or slave diagnostic information on PROFIBUS. In this case a slave not operating correctly will be displayed in a different color.

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 pre-requisites 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

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

- Commissioning of PB devices
- Diagnostics

Note: The fieldbus configurator SyConPB 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 fieldbus configurator SyConPB 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 fieldbus configurator SyConPB 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!

2.3 Delivery Stipulations for Computer Programs

The copyrights, present and future commercial proprietary rights of all kinds, as well as all the rights of exploitation to delivered computer programs – in equipment or separate from it – belong exclusively to the Supplier.

A computer program may only be used in one single piece of equipment. Exceptions are commissioning software, which are marked with the designation -COPY at the end. These can be copied freely within the the context of regular product usage by the customer.

Every act exceeding the minimum use outlined in the proprietary rights requires the consent of the Supplier. If a computer program delivered by the Supplier is not protected by proprietary rights, then the minimum use stated in the proprietary rights law is declared as agreed upon.

If the Orderer transfers a computer program then he must completely surrender the program carrier and all copies in their entirety to the Acquiring Party, or these must be erased. A limitation of use corresponding to these stipulations (1 through 6) must be agreed upon with the Acquiring Party.

The Supplier will eliminate any fault in the computer program either by a circumvention of the fault, which is agreeable to the Orderer, or by delivering a new program.

All documents and information needed to reconstruct a fault must accompany the notification of a fault in the computer program.

Otherwise, the general delivery stipulations outlined by INDRAMAT apply.

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.
- 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.

- Technical data, connections and operational conditions are specified in the product documentation and must be followed at all times.

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 Installation

4.1 System Requirements

- PC with 486-, Pentium processor or higher
- Windows 95, Windows 98, Windows NT 4.0
- Free disk space: 30 - 80 mbytes
- CD ROM drive
- RAM: min. 16 mbytes
- Graphic resolution: min. 800 x 600 pixel
- Windows 95: Service Pack 1
- Windows NT: Service Pack 3
- Keyboard and Mouse

4.2 Software Installation

Close all application programs on the system!

Insert the CD in the local CD ROM drive. The installation program will start by itself (Autostart enabled). Otherwise change into the root directory on the CD and start Autorun.exe (Autostart disabled).

Note: Administrator privileges are required on Windows NT systems for installation!

The installation program asks for the components you want to install. Answer these questions with **Yes** or **No**.

It will install

- System configurator SyConPB (Configuration and diagnostic tool)
- CIF Device Driver (Device Driver for access to the CIF)

4.3 Installation of the System Configurator SyConPB

Follow the instructions of the installation program by selecting the fieldbus system to be installed and answer all the questions with **OK** or **NEXT**.

The installation program offers the following selections:

Selection	Default Settings	Meaning
Directory	C:\Programs\Hilscher\SyCon	Directory for Installation of the system configurator and its components
DeviceNet	Selected	Program DLL and components of the fieldbus system or the protocol
INTERBUS	Selected	
PROFIBUS	Selected	
CIF Device Driver	Selected C:\Programs\CIF Device Driver	CIF Device Driver
Program Menu	SyCon System Configurator	Folder under Start > Programs

Fig. 4-1: Selection during installation

The installation program copies the program files, GSD or EDS files and bitmaps to the PC. Finally,

- system DLLs,
- the application,
- OLE controls

and

- ODBC components

are entered into the registry.

5 Configuration Sequence

5.1 Hardware Configuration

Before you can start-up the DPM_PC104 or the DPS_PC104, you must check if the configured memory areas and interrupts are not assigned to other devices. When using WindowsNT check this under Programs/Management/WindowsNT Diagnostics/Resources to recognize and eliminate errors of this kind.

Select from the following table the communication that you want to use. The configuration steps are described in the given chapter.

Communication	Device	Device	Described in Chapter	Page
PROFIBUS DP	INDRAMAT DP Master	Any DP Slave	Configuration INDRAMAT-Master DPM_104 to any DP Slave	5-2
	Any DP Master	Hilscher DP Slave	Configuration Hilscher DP Slave to any DP Master	5-3
	Hilscher DP Master	Hilscher DP Slave	Configuration Hilscher DP Master to Hilscher DP Slave	5-4

Fig. 5-1: Overview Communication

5.2 Configuration INDRAMAT Master DPM_104 to Any DP Slave

The following table describes the steps to configure an INDRAMAT Master DPM_104 to any DP Slave as it is typical for many cases.

#	Action	Menu in the System Configurator	Detail Information in Chapter	Page
1	Create a new project	**File > New > PROFIBUS**	Setting up the PROFIBUS Configuration	6-1
2	Copy GSD file of the DP Slave, if the slave is not in the selection list	**File > Copy GSD**	GSD Files	6-1
3	Choose Hilscher DP Master and provide bus address	**Insert > Master**	Insert Master	6-2
4	Choose DP Slave and provide bus address	**Insert > Slave**	Insert DP Slave	6-5
5	Assign the input and output modules	Mark the slave (left mouse click), then **Settings > Slave Configuration**	Slave Configuration	6-6
6	Assign the offset addresses			
7	Assign the DP Slave parameter data, if the Slave needs parameter data	Mark the slave (left mouse click), then **Settings > Parameter Data**	Parameter Data	7-18
8	Set the bus parameter	Mark the master (left mouse click), then **Settings > Bus Parameters**	Bus Parameters	7-5
9	Set device assignment if no automatic assignment has occurred	Mark the master (left mouse click), then **Settings > Device Assignment**	Device Assignment	7-1
10	Save project	**File > Save**	Save and Save As	9-1
11	Download	Mark the master (left mouse click), then **Online > Download**	Downloading the Configuration	8-1
12	Live list	Mark the master (left mouse click), then **Online > Live List**	Live List	8-3
13	Start debugger	Mark the master (left mouse click), then **Online > Start Debug Mode**	Debug Mode	8-5
14	Device diagnostic	Mark the slave (left mouse click), then **Online > Device Diagnostic**	Device Diagnostic	8-6
15	Stop debugger	**Online > Stop Debug Mode**	Debug Mode	8-5
16	Global diagnostic	Mark the master (left mouse click), then **Online > Global State Field**	Global State Field	8-10
17	Transfer user data: Write output, read input	Mark the master (left mouse click), then **Online > I/O Monitor**	I/O Monitor Or: I/O Watch	8-48 8-48

Fig. 5-2: Steps for the configuration of the INDRAMAT Master DPM_104 to any DP Slave

5.3 Configuration Hilscher DP Slave to Any DP Master

The following table describes the steps to configure a Hilscher DP Slave to any DP Master as it is typical for many cases.

#	Action	Menu in the System Configurator	Detail Information in Chapter	Page
1	Create a new project	**File > New > PROFIBUS**	Setting up the PROFIBUS Configuration	6-1
2	Choose a Hilscher DP Master and provide bus address	**Insert > Master**	Insert Master	6-2
3	Choose Hilscher DP Slave and provide bus address	**Insert > Slave**	Insert DP Slave	6-5
4	Assign the input and output modules (*1)	Mark the slave (left Mouse click), then **Settings > Slave Configuration**	Slave Configuration	6-6
5	Set device assignment if no automatic assignment has occurred	Mark the slave (left Mouse click), then **Settings > Device Assignment**	Device Assignment	7-1
6	Save project	**File > Save**	Save and Save As	9-1
7	Download	Mark the slave (left Mouse click), then **Online > Download**	Downloading the Configuration	8-1
8	Configuration diagnostic	Mark the slave (left Mouse click), then **Online > Extended Device Diagnostic > SPC3CTRL Slave Config**	Extended Device Diagnostic SPC3CTRL Slave Config	8-11
9	Configuration diagnostic	Mark the slave (left Mouse click), then **Online > Extended Device Diagnostic > SPC3CTRL Master Config**	Extended Device Diagnostic SPC3CTRL Master Config	8-11
10	Transfer user data: Write output, read input	Mark the slave (left Mouse click), then **Online > I/O Monitor**	I/O Monitor (*2)	8-48

Fig. 5-3: Steps for the configuration Hilscher DP Slave to any DP Master

Remark (*1): The offset addresses assigned in the slave configuration are always related to the Hilscher DP Master and have no meaning here.

Remark (*2): Alternatively the CIF Device Driver test program can be used for the test. After Board Select: Data Transfer > I/O Data > DevExchangeIO.

5.4 Configuration Hilscher DP Master to Hilscher DP Slave

The following table describes the steps to configure a Hilscher DP Master to a Hilscher DP Slave as it is typical for many cases.

#	Action	Menu in the System Configurator	Detail Information in Chapter	Page
1	Create a new project	**File > New > PROFIBUS**	Setting up the PROFIBUS Configuration	6-1
2	Choose Hilscher DP Master and provide bus address	**Insert > Master**	Insert Master	6-2
3	Choose Hilscher DP Slave and provide bus address	**Insert > Slave**	Insert DP Slave	6-5
4	Assign the input and output modules (*1)	Mark the slave (left Mouse click), then **Settings > Slave Configuration**	Slave Configuration	6-6
5	Assign the offset addresses			
6	Set the bus parameter	Mark the master (left Mouse click), then **Settings > Bus Parameters**	Bus Parameters	7-5
7	Set device assignment for the master if no automatic assignment has occurred	Mark the master (left Mouse click), then **Settings > Device Assignment**	Device Assignment	7-1
8	Set device assignment for the slave if no automatic assignment has occurred	Mark the slave (left Mouse click), then **Settings > Device Assignment**	Device Assignment	7-1
9	Save project	**File > Save**	Save and Save As	9-1
10	Download to the master	Mark the master (left Mouse click), then **Online > Download**	Downloading the Configuration	8-1
11	Download to the slave	Mark the slave (left Mouse click), then **Online > Download**	Downloading the Configuration	8-1
12	Live list	Mark the master (left Mouse click), then **Online > Live List**	Live List	8-3
13	Start debugger	Mark the master (left Mouse click), then **Online > Start Debug Mode**	Debug Mode	8-5
14	Device diagnostic	Mark the slave (left Mouse click), then **Online > Device Diagnostic**	Device Diagnostic	8-6
15	Stop debugger	**Online > Stop Debug Mode**	Debug Mode	8-5
16	Global diagnostic	Mark the master (left Mouse click), then **Online > Global State Field**	Global State Field	8-10
17	Transfer user data: Write output, read input	Mark the master (left Mouse click), then **Online > I/O Monitor**	I/O Monitor Or: I/O Watch (*2)	8-48 8-48

Fig. 5-4: Steps for Configuration Hilscher DP Master to Hilscher DP Slave

Remark (*1): The offset addresses assigned in the slave configuration are always related to the Hilscher DP Master.

Remark (*2): Alternatively the CIF Device Driver test program can be used for the test. After Board Select: Data Transfer > I/O Data > DevExchangeIO.

6 Configuration of PROFIBUS with SyConPB

6.1 Setting up the PROFIBUS Configuration

To create a new configuration, choose the **File > New** menu. This will offer a selection list of fieldbus systems. Choose the **PROFIBUS**. If only the PROFIBUS fieldbus system is to be installed, then the configuration window will open directly.

The name of the configuration file can be allocated when the configuration is ended or with **File > Save As**.

6.2 GSD Files

GSD (Electronic data sheet of a device) files contain and describe the functions and characteristics of the PROFIBUS devices. The abbreviation GSD means 'Gerätestammdaten' (Device Base Files). All the available GSD files together make up the device database.

When the program is started, the system configurator automatically retrieves all the GSD files stored in the GSD directory. The device names are placed into an internal list. During the configuration, the device-specific data is retrieved directly from the GSD files.

If a DP Slave device does not appear on the selection list, then a corresponding GSD file can be copied into the GSD directory with **File > Copy GSD**. Another possibility is to copy the GSD file into the SyCon GSD directory with Windows Explorer and then retrieve the GSD files into the GSD directory with **Settings > Path** and **OK**.

The GSD files can be viewed with the **Tools > GSD Viewer** menu.

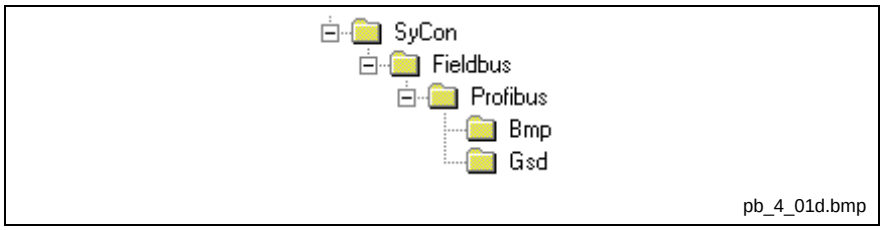


Fig. 6-1: GSD files and bitmap directory

- **INDRAMAT devices:** The GSD files for INDRAMAT devices are already included and are installed.
- **Other devices:** The respective device manufacturer provides the GSD files for other devices.

The GSD files of many vendors are available on the PROFIBUS user organization home page.

http://www.profibus.com

Note: GSD files are only used for PROFIBUS DP!

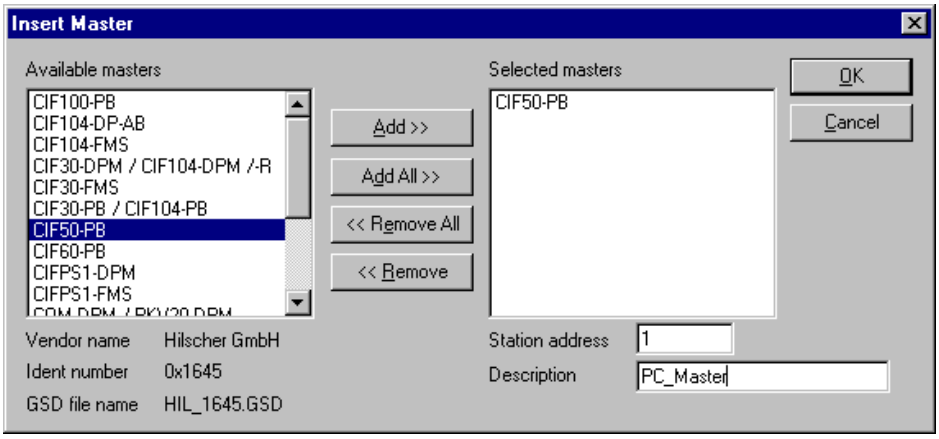
The GSD directory is adjustable. In order to alter the directory from a previous setting in another directory, use the **Settings > Path** menu. All GSD files must be placed in this directory.

6.3 Master

Insert Master

In order to insert a (Hilscher) master into the configuration, choose the **Insert > Master** menu, in order to open the selection window, or click on the symbol:

The mouse pointer automatically changes into the 'Insert Master' pointer. Click on the position where the Master is to be inserted. The dialog box, from which one or more masters can be chosen, opens.



pb_4_04d.bmp

Fig. 6-2: Insert > Master

This example shows a CIF 50-PB that is inserted with the **Station address 1** and the description **PC_Master.** The description must not contain any special characters (blank characters etc.).

Master Configuration

The configuration specific to the master is carried out in the following window.

Set the focus on the master (left mouse click) and then select the **Settings > Master Configuration** menu

or

a double click on the symbol of the master to be configured will open the following window.

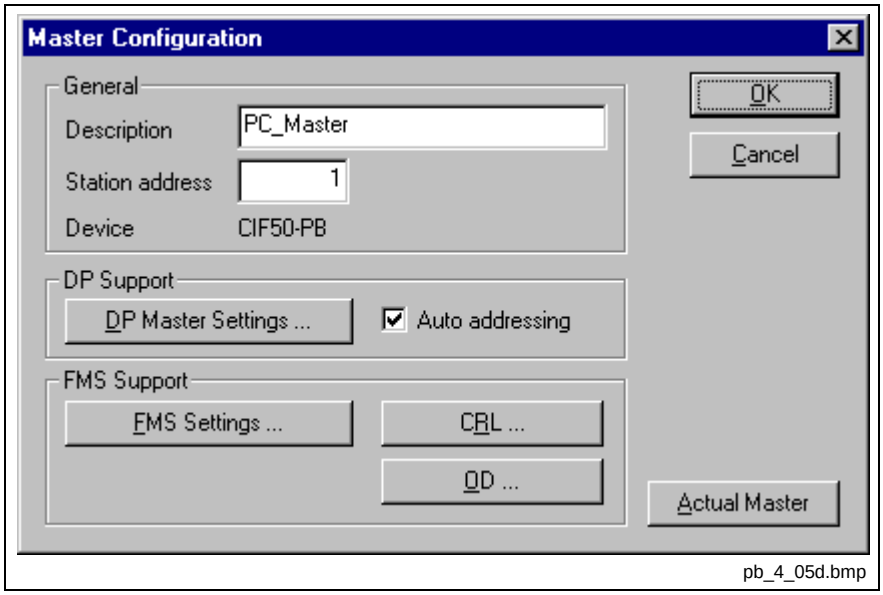


Fig. 6-3: Master configuration

The following can be set in this 'Master Configuration' window:

- The **Station address** of the master
- A (symbolic) **Description** of the master
- Selection of the master as the **Actual Master** (for example, for carrying out a Download)

For PROFIBUS DP one can

- open the **DP Master Settings** window
- activate or deactivate the automatic addressing (**Auto addressing**) for this DP Master.

Auto Configuration (PROFIBUS DP)

The 'Auto Configuration' can be used to configure a slave. The parameter data cannot be retrieved from a PROFIBUS DP Slave. These, if the slave requires parameter data, can only be provided by the user.

The following is the procedure for 'Auto Configuration':

#	Action	Menu in the System Configurator	Detail Information in Chapter	Page
1	Create a new project	**File > New > PROFIBUS**	Setting up the PROFIBUS Configuration	6-1
2	Copy GSD file of the DP Slave, if the slave is not in the selection list	**File > Copy GSD**	GSD Files	6-1
3	Choose Hilscher DP Master and provide Bus address	**Insert > Master**	Insert Master	6-2
4	Choose DP Slave and provide bus address	**Insert > Slave**	Insert DP Slave	6-5
5	Set the bus parameter	Mark the master (left Mouse click), then **Settings > Bus Parameters**	Bus Parameters	7-5
6	Set device assignment if no automatic assignment has occurred	Mark the master (left Mouse click), then **Settings > Device Assignment**	Device Assignment	7-1
7	Save project	**File > Save**	Save and Save As	9-1
8	Download	Mark the master (left Mouse click), then **Online > Download**	Downloading the Configuration	8-1
9	Live list	Mark the master (left Mouse click), then **Online > Live List**	Live List	8-3
10	Start debugger	Mark the master (left Mouse click), then **Online > Start Debug Mode**	Debug Mode	8-5
11	Device diagnostic	Mark the slave (left Mouse click), then **Online > Device Diagnostic**	Device Diagnostic	8-6
12	Compare configuration	**Compare Configuration**	-	
13	Automatic configuration	**Automatic Configuration**	-	
14	Stop debugger	**Online > Stop Debug Mode**	Debug Mode	8-5
15	Save project	**File > Save**	Save and Save As	9-1
16	Download	Mark the master (left Mouse click), then **Online > Download**	Downloading the Configuration	8-1
17	Start debugger	Mark the master (left Mouse click), then **Online > Start Debug Mode**	Debug Mode	8-5
18	Device diagnostic	Mark the slave (left Mouse click), then **Online > Device Diagnostic**	Device Diagnostic	8-6
19	Stop debugger	**Online > Stop Debug Mode**	Debug Mode	8-5
20	Transfer user data: Write output, read input	Mark the master (left Mouse click), then **Online > I/O Monitor**	I/O Monitor Or: I/O Watch	8-48 8-48

Fig. 6-4: Auto configuration (PROFIBUS DP)

6.4 DP Slave

Insert DP Slave

In order to insert a PROFIBUS DP Slave into the configuration, choose the **Insert > Slave** menu to open the selection window, or click on the symbol:

The mouse pointer automatically changes to the Insert Slave pointer. Click on the position where the slave is to be inserted. The dialog box, from which one or more slaves can be selected, is opened.

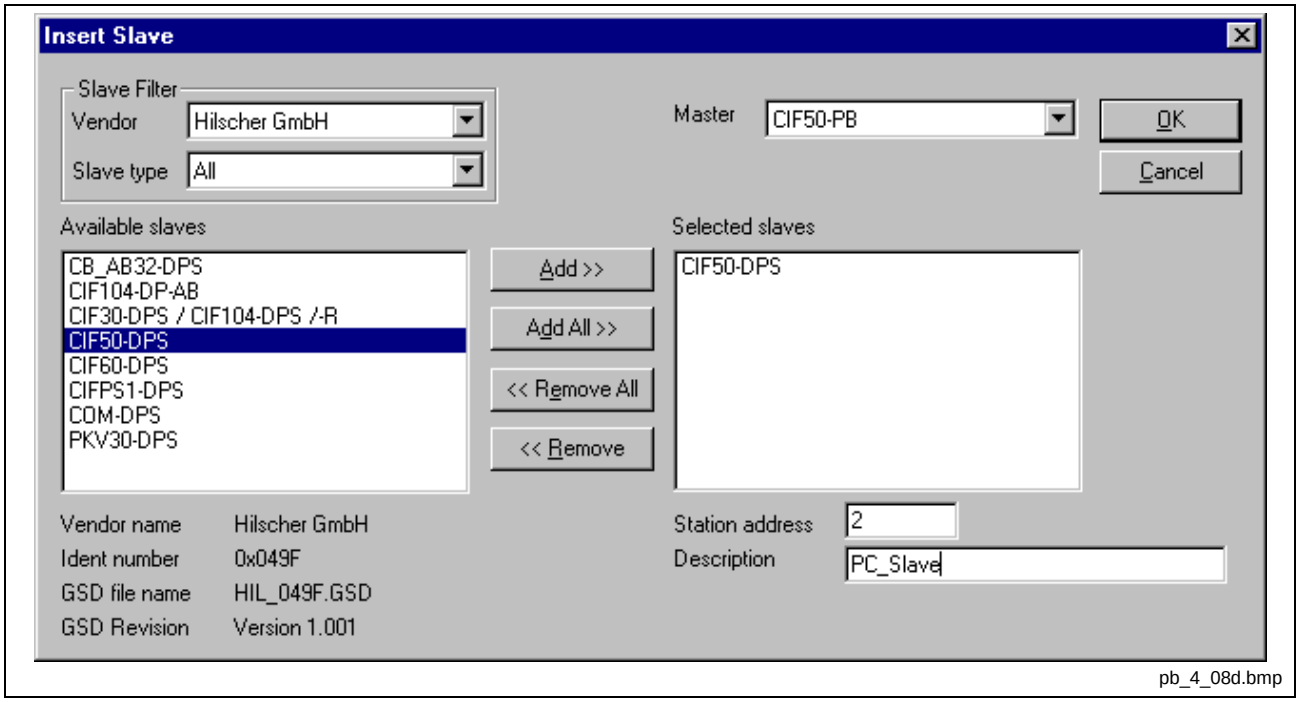


Fig. 6-5: Insert > Slave

The list on the left displays for selection all the slave devices whose GSD files have been put in the GSD directory. A filter can be used to limit the selection list to **Slave type** and **Vendor** (manufacturer). Further information on a Slave is shown below the selection list (**Available Slaves**) when it is selected (a mouse click). The slave appears on the right-hand list with a mouse click or with the **Add** button. All devices in the right-hand list are assigned to the current **Master** that is also shown in this window. If the Slaves in the right-hand list are chosen one after the other (a mouse click), then every slave can be allocated a **Station address** as well as a name in the **Description** field.

For every slave accepted into the right-hand list, the station address count is automatically raised by one but can be overwritten by the user in the **Station address** field.

Note: It is permissible to choose a slave several times. However, each slave must possess its own (unique) station address in order to distinguish it in the network.

Slave Configuration

First click the symbol of the slave with the left mouse button and then choose the **Settings > Slave Configuration** menu

or

open the slave configuration window by means of double clicking on the PROFIBUS DP Slave device.

The slave-specific configuration is carried out in this window. Here, the modules and their addresses are allocated in the process data memory in the Master. Note that the address must agree with that in the PC application.

Note: The information of the offset addresses refers to the addressing of the data in the master! The address information does not refer to the addressing of the data in the slave! The slave organizes its own data addressing.

There are two types of slaves. A **simple slave** possesses a fixed data length. The data length of a **modular slave** (e.g. DPS_PC014) is configurable. A modular slave can be understood to be a combination of simple slave with a station address.

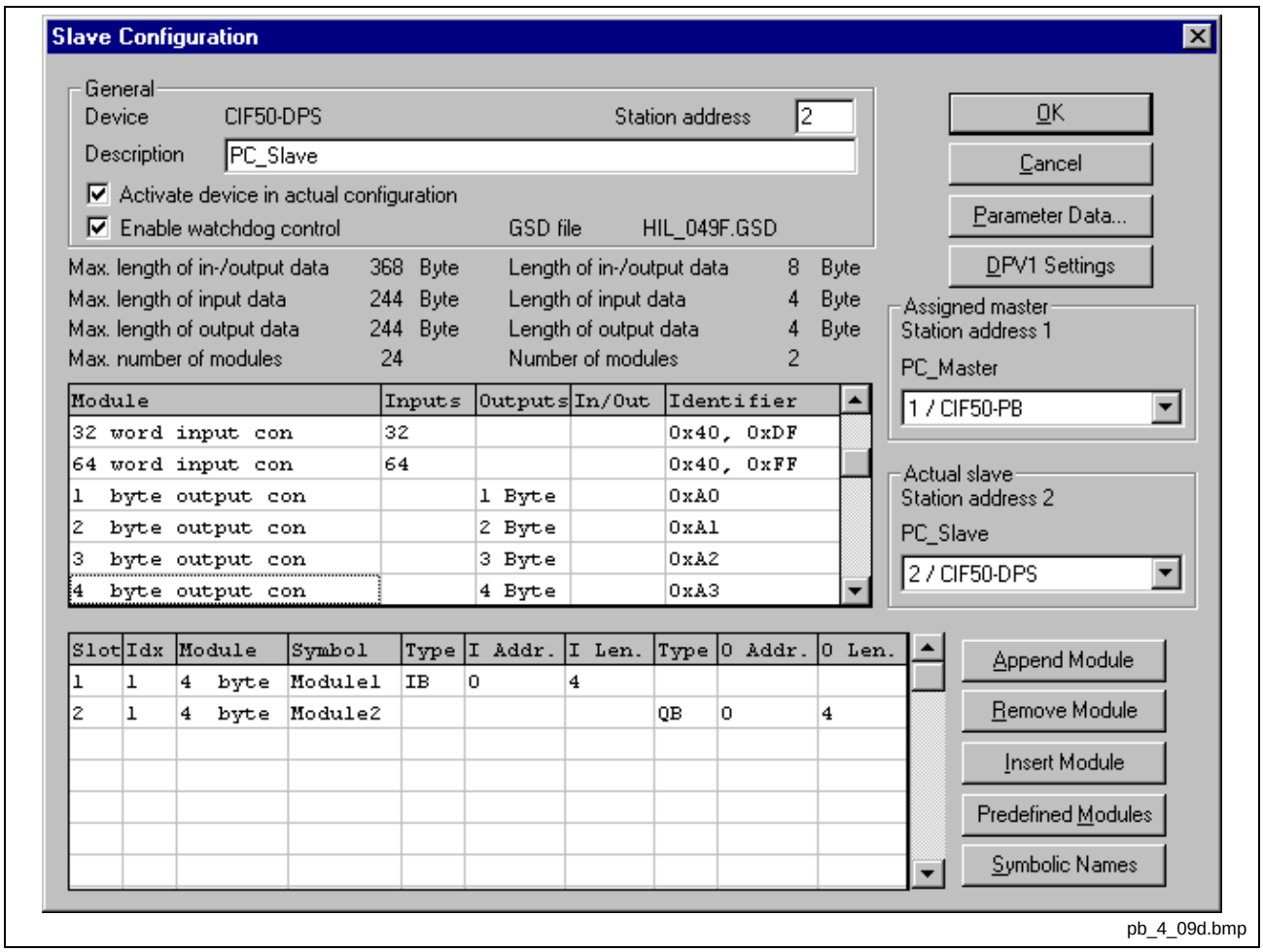


Fig. 6-6: Slave configuration

The selection list (upper list) shows all possible modules of the slave. In the case of a simple slave, one module is shown and this is automatically copied into the configuration list (lower list). In the case of a modular slave, the user must select the required modules and transfer these by means of a double click or transfer it using the **Append Module** button into the configuration list (lower list).

If a module consists of several sub-modules, then each sub-module is depicted in the configuration list (lower list) in a separate row. This is displayed by the number in the **Slot** column. The slot count is started with 1. The **Index** column shows a sequential number for sub-modules.

For configuration of the module (selection of the module) of a slave, proceed as follows:

- Transfer all the required modules from the selection list (upper list) into the configuration list (lower list). The sequence of the modules in the configuration list (lower list) is important and must be in agreement with the slave. Typically, the sequence follows the actual physical sequence. There are slaves to which this rule does not apply and where first analog modules and then digital modules must be entered, independent of their actual sequence.
- In the configuration list (lower list) allocate the address of each module to the process depiction memory. The address is entered separately in the **Type** and **Addr** columns for inputs and outputs.

The I/O addresses can be allocated by the user or can be automatically assigned by SyCon. For this purpose **Auto addressing** must be activated or deactivated in the **Master Configuration** window. When the Auto Addressing is active, then the addresses will be allocated beginning with 0 and incremented in accordance with the entry sequence of the Slaves before downloading and can be viewed and checked in the **View > Address Table**. When the Auto addressing is deactivated, then only the address 0 is shown in the **I Addr** or **O Addr** and must be overwritten by the user.

Depending on the **Addressing mode**, which can be set in the **DP Master Settings**, the addresses are either Byte or Word addresses. For further details of this, see the description in the “Address Mode” chapter.

The DP Slaves utilize the **Watchdog Control** setting in order to detect communication errors to the assigned DP Master. When the DP Slave finds an interruption of an already operational communication, defined by a watchdog time, then the slave carries out an independent 'Reset' and places the outputs into the secure condition.

Caution: When the monitoring by means of the **Watchdog Control** has been deactivated, it is possible that the outputs are not reset by the slave, even though the communication has been interrupted.

If **Activate Device in the Current Configuration** is selected, then the process memory for this slave is occupied in the master and at the bus a data exchange is carried out from the bus to this slave. If this setting is switched off, then the process memory for this slave is occupied in the master and at the bus no data exchange is carried out from the bus to this slave.

Inserting Predefined Device – PDD

In order to insert predefined devices, choose **Insert > PDD**. This function is used for simple copying or re-using already configured devices. Before this function can be used, a PDD export must be carried out as described in chapter PDD Export from page 9-39-2 on.

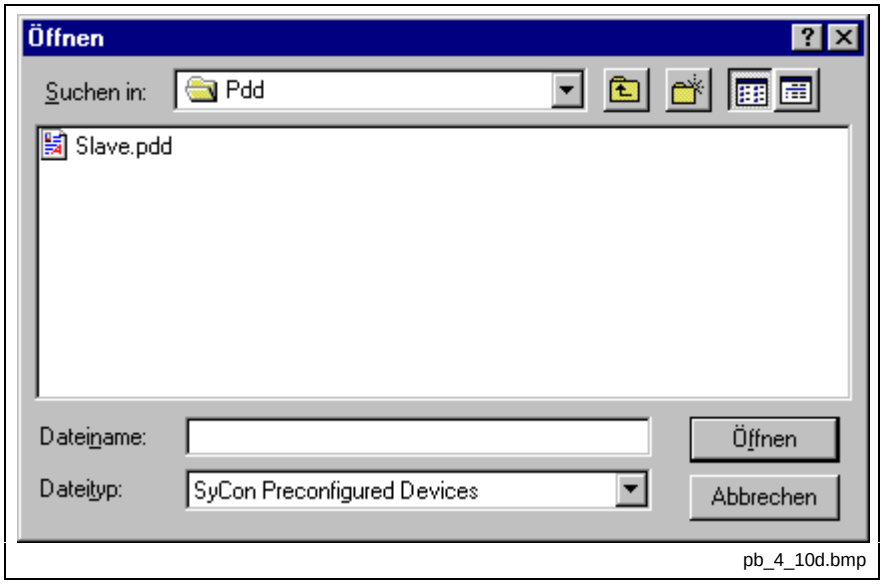


Fig. 6-7: Inserting predefined device – PDD (1)

Select the PDD file and then **Open**. The following window appears.

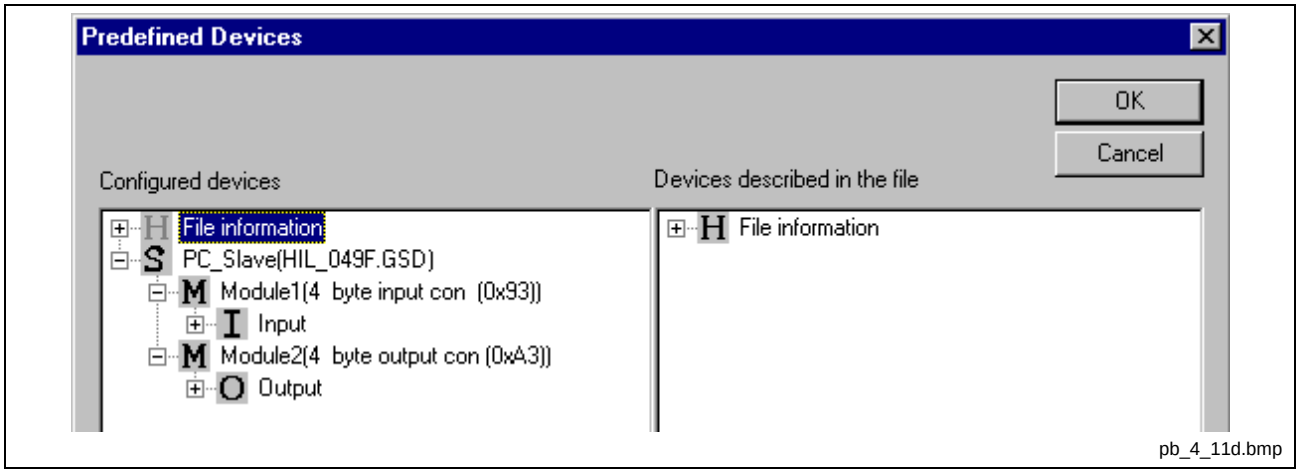


Fig. 6-8: Inserting predefined device – PDD (2)

Select the device or devices of the **Found predefined devices** (left-hand side) and pull this over to the **Selected predefined** devices (right-hand side) and release the left mouse button (drag and drop).

The following picture will appear:

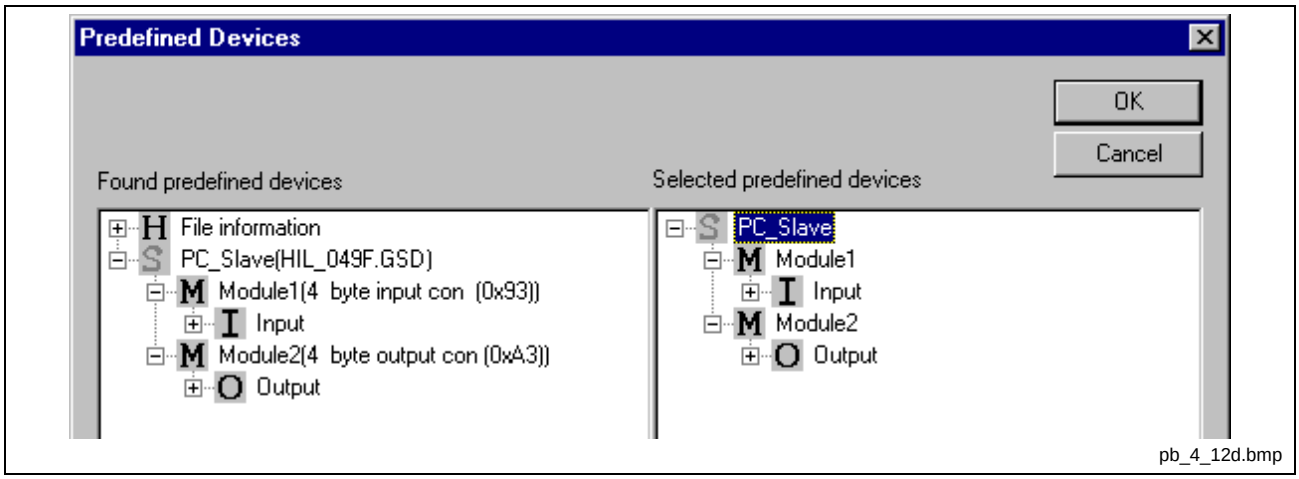


Fig. 6-9: Inserting predefined device – PDD (3)

The figure shows a device with the description Slave2 consisting of two modules with the description Module1 and Module2.

Choose **Ok** in order to insert the device into the configuration.

Subsequently the station address of the device can be altered.

7 Settings

7.1 Device Assignment

The device assignment setting determines how the system configurator communicates with the device. This is set in the device arrangement via the menu **Settings > Device Assignment**.

CIF Serial Driver:

- CIF Serial Driver: The system configurator communicates with master or respectively the slave interface via a serial connection. Thereby, a COM interface of the PC must be connected via a diagnostic interface X74 of the master (DPM01_PC104) or the slave X79 (DPS01_PC104) with the diagnostic cable IKS106.

CIF Device Driver:

- CIF Device Driver: The system configurator communicates with the Hilscher device over the Dual-Port Memory of the device.
- This communication is utilized when the system configurator is used on the same PC on which the Hilscher device (CIF) is installed.
- The CIF Device Driver must have been installed.

CIF Serial Driver

The serial driver supports COM1 to COM 4, in order to communicate over the diagnostic interface with the device.

The device is selected via **Settings > Device Assignment.**

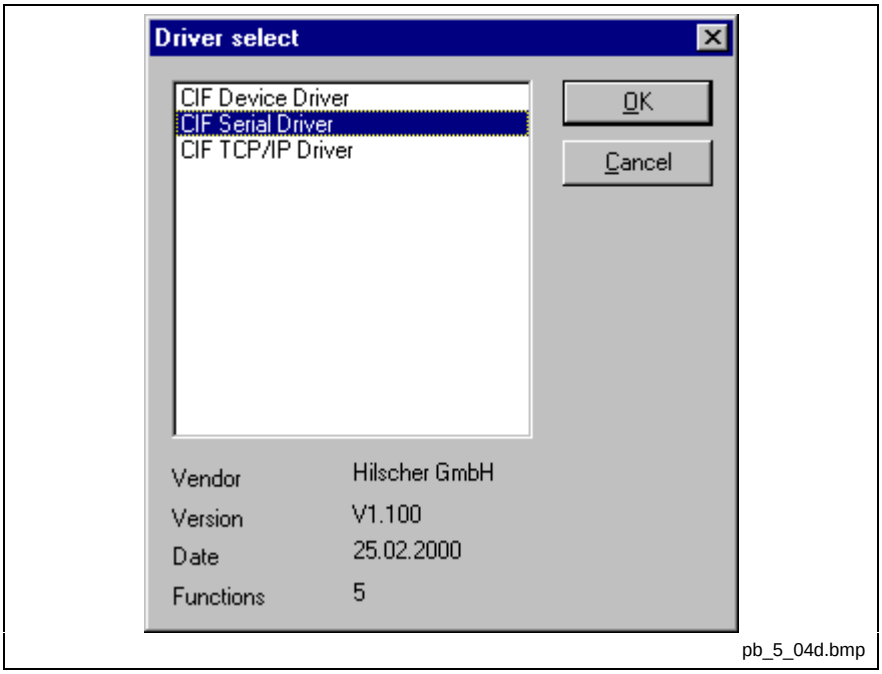


Fig. 7-1: Driver selection – CIF Serial Driver

Choose the **CIF Serial Driver** and then **OK**, in order to select the CIF Serial Driver.

The connection must first be established using the switching surface **Connect COM1** or **Connect COM2** or **Connect COM3** or **Connect COM4**. They can be used depending on which COM interfaces are installed and free on the PC.

The system configurator sends a request to the corresponding COM interface and polls the Firmware of the device. A display of the Firmware will indicate when a device is connected. In the other case, a timeout error (-51) appears, which will state that no device is connected.

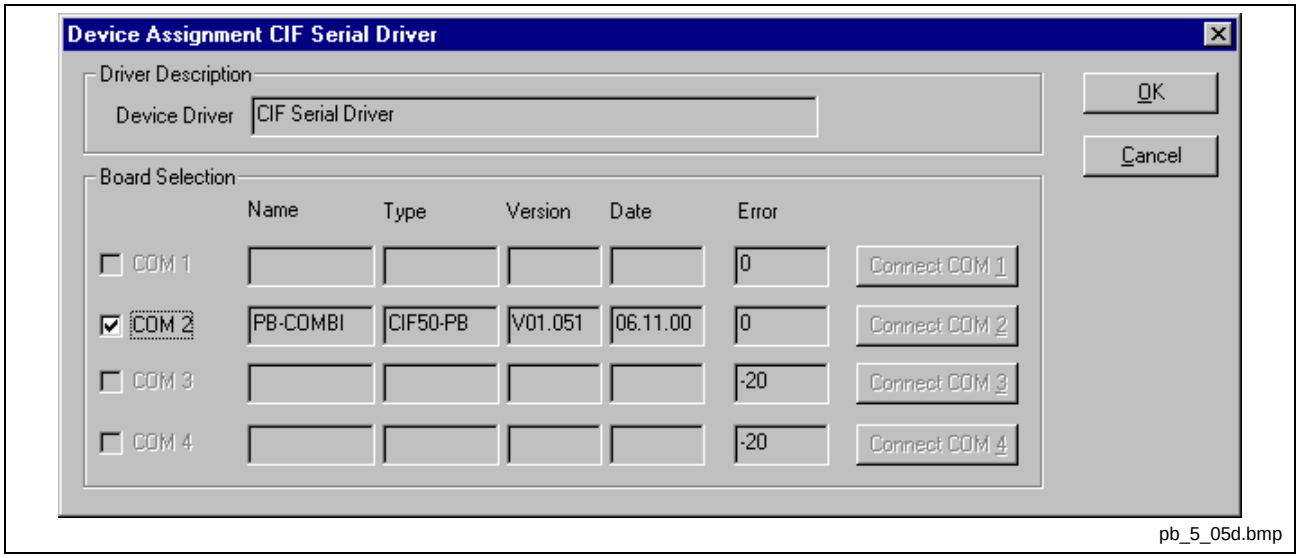


Fig. 7-2: CIF Serial Driver – device assignment

The error number –20 indicates that this COM interface is not available or not free.

CIF Device Driver

The Device driver supports up to four devices in one PC and they are accessed via the Dual-Port Memory.

Note: At the moment, this way of communication is not supported.

The Device driver is selected via **Settings > Device Assignment**.

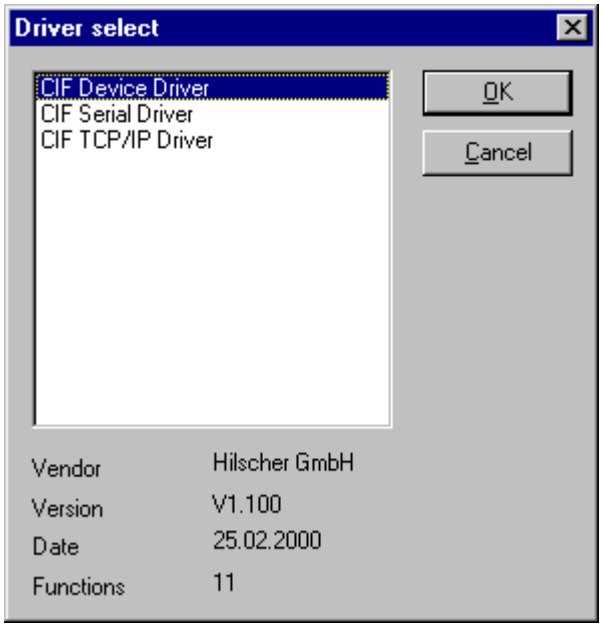


Fig. 7-4: Driver Select – CIF Device Driver

Choose **CIF Device Driver** and then **OK**, in order to select the CIF Device Driver. If the PC has a suitable device, a query will appear asking weather this device is to be assigned now.

Fig. 7-5: Auto Assignment

The device is assigned with **Yes**. With **No**, no assignment is made.

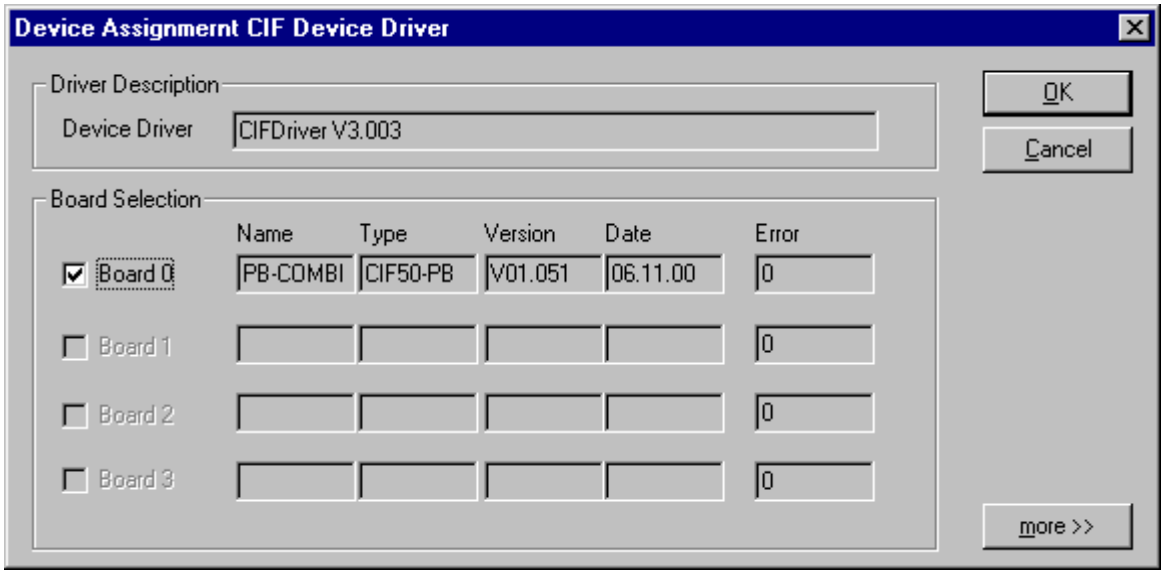


Fig. 7-6: CIF Device driver – device assignment

7.2 Bus Parameters

The bus parameters are the foundations of a functioning data exchange. This section contains information for setting the bus parameters as well as the descriptions of the individual parameters.

Basic Rule: The bus Parameters must be set the same for all devices. The station address, on the other hand, must be different from device to device.

For PROFIBUS Master devices (PROFIBUS DP) the bus parameters are set.

Most of the PROFIBUS DP Slave devices:

- Recognize the baud rate automatically and adapt themselves to it. This is especially the case when the ASIC SPC3 is used.
- However, there are also PROFIBUS DP Slave devices, in which the bus parameters must be set by the user.

Setting the Bus Parameters and Profiles

The baud rate can be set in the **Settings > Bus Parameters** menu. Furthermore, the optimizing or profile can be selected.

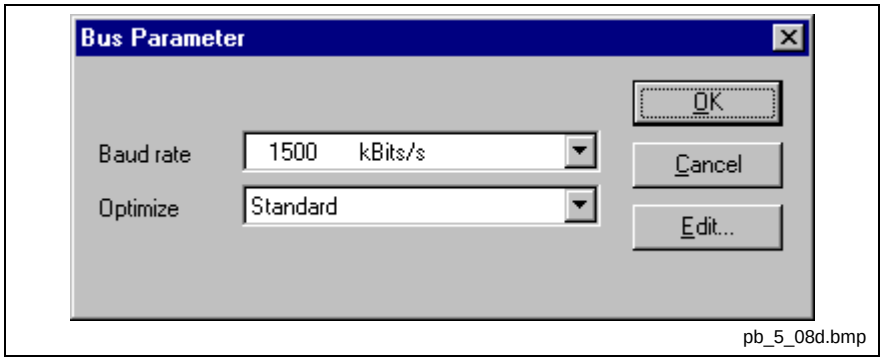


Fig. 7-11: Settings > Bus Parameters

The bus parameters can be viewed with the **Settings > Bus Parameters** menu and can be edited by clicking on the **Edit** button. The Bus parameters are either editable or not editable depending on the optimizing or profile.

The optimizing standard provides each baud rate with default bus parameters for PROFIBUS DP systems.

By changing the settings in the **Optimizing** field from **Standard** to **User defined**, all bus parameters become editable.

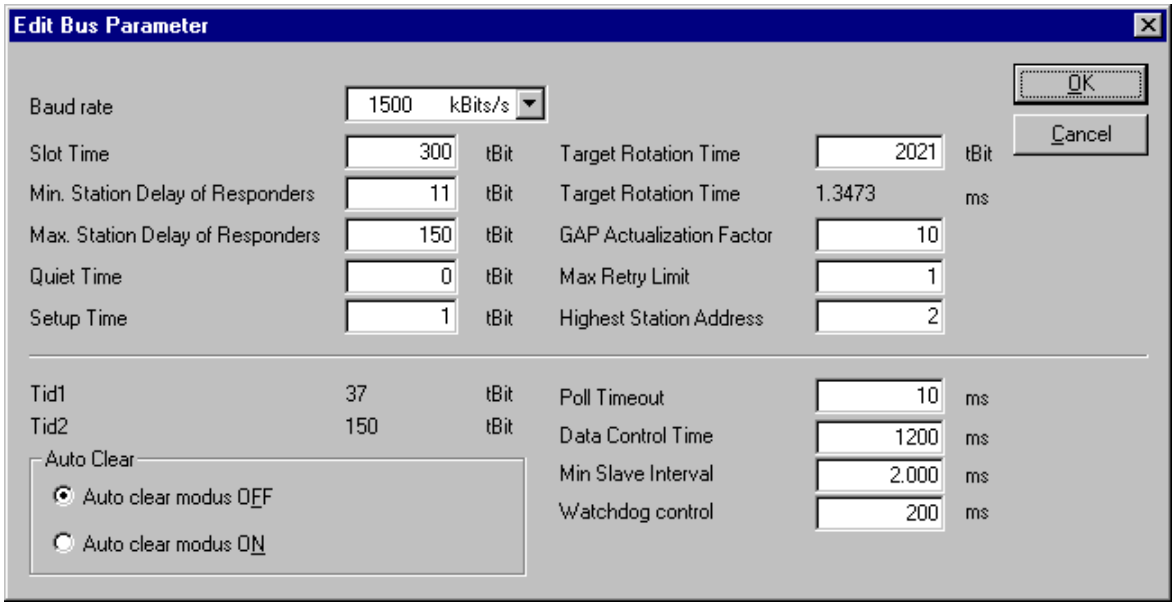


Fig. 7-12: Editing bus parameters

Caution: The changing of bus parameters can cause communication interruptions.

Note: The offline bus parameters are displayed. The bus parameters are only accepted by the Hilscher device after the download of the configuration.

The **Baud rate** must be set to be the same for all devices on the Bus. The result of changing the Baud rate is that all other parameters must be re-calculated. The system configurator tests whether the Baud rate is supported by all configured PROFIBUS DP Slave devices, on the basis of entries in the GSD files. If the system configurator recognizes at least one device that does not support the selected baud rate, then an error message will appear.

The **highest station address** is the highest bus address up to which a master searches for another master at the bus in order to pass on the token. This station address must on no account be smaller than the master station address.

For PROFIBUS DP, the field **Access monitoring time** is used for entry of the monitoring time of the slave. If the time chosen for this is too short for a low baud rate, then it is possible that the slaves will set their outlets to zero. If the time chosen is too long, it is possible that if an interruption occurs, the slaves will take a long time to set their outlets to zero.

For PROFIBUS DP, the **Auto Clear** setting will provide for global error handling. The DP Master monitors the user data exchange (DataExchange) to all DP Slaves by means of a timer. If no data exchange occurs to at least one DP Slave, or an existing data exchange takes place after the expiration of a monitoring time, and the **Auto clear mode** option is **ON**, then the master leaves the DataExchange and sets the outlets of **all** assigned DP Slaves into a secure condition.

Descriptions of the Individual Parameters

All times for the bus parameters are given in bit times.

The bit time t_{Bit} is the result of the reciprocal of the baud rate:

t_{Bit} = 1 / baud rate (baud rate in bit/s)

The conversion from milliseconds into a bit time is shown in the following equation:

bit time = time [milliseconds] * baud rate

The bus parameters and their meanings:

- Baud rate

Transfer speed: number of bits per second.

Baud rate	Bit time (t_{Bit})	Max. cable length (type A)
9,6 kbaud	104,2 us	1200 m
19,2 kbaud	52,1 us	1200 m
93,75 kbaud	10,7 us	1200 m
187,5 kbaud	5,3 us	1000 m
500 kbaud	2 us	400 m
1,5 mbaud	666,7 ns	200 m
3 mbaud	333,3 ns	100 m
6 mbaud	166,7 ns	100 m
12 mbaud	83,3 ns	100 m

Fig. 7-14: Baud rates, bit times and cable lengths

Note: The maximum cable length is dependent on the baud rate.

- Minimum station delay of responders (min T_{SDR})

This is the shortest time period that must elapse before a remote recipient (responder) may send an acknowledgement of a received query telegram. The shortest time period between receipt of the last bit of a telegram to the sending of the first bit of a following telegram.

Value range: 1 .. 65535

- Maximum station delay of responders (max T_{SDR})

This is the longest time period that must elapse before a sender (requestor) may send a further query telegram. Greatest time period between receipt of the last bit of a telegram to the sending of the first bit of a following telegram.

The sender (requestor, master) must wait at least for this time period after the sending of an unacknowledged telegram (e.g. broadcast only) before a new telegram is sent.

Value range: 1 .. 65535

- Slot time (T_{SL})

"Wait for receipt" – monitoring time of the senders (requestor) of telegram for the acknowledgement of the recipient (responder). After expiration, a retry occurs in accordance with the value of "Max. telegram retries".

Value range: 52 .. 65535

- Quiet time (T_{QUI})

This is the time delay that occurs for modulators (modulator-trip time) and repeaters (repeater-switch time) for the change over from sending to receiving.

Value range: 0 .. 255

- Setup time (T_{SET})

Minimum period "reaction time" between the receipt of an acknowledgement to the sending of a new query telegram (reaction) by the sender (requestor).

Value range: 1 .. 255

- Target rotation time (T_{TR})

Pre-set nominal token cycling time within which the sender authorization (token) will cycle around the ring. How much time the master still has available for sending data telegrams to the slaves is dependent on the difference between the nominal and the actual token cycling time.

Value range: 1 .. 16.777.215

- GAP update factor (G)

Factor for determining after how many token cycles an added participant is accepted into the token ring. After expiry of the time period $G*T_{TR}$, the station searches to see whether a further participant wishes to be accepted into the logical ring.

Value range: 1 .. 100

- Max number of telegram retries (Max_Retry_Limit)

Maximum number of repeats in order to reach a station.

Value range: 1 .. 8

- Highest station address (HSA)

Station address of the highest active (master) station.

Value range: 2 .. 126

Further, there are:

- Ready time (T_{RDY})

This is the time period, after the master has sent out a query, during which it must be ready for the respective acknowledgement or answer.

- Synchronization time (T_{SYN})

This is the minimum time that must be available to each device as a rest condition before it is allowed to accept the start of a query. Is defined at 33 bit times.

The following parameters are applicable only for PROFIBUS DP:

- Data control time (Data_Control_Time)

This parameter defines the time within which the Data_Transfer_List is updated at least once. After the expiration of this period, the master (class 1) reports its operating condition automatically via the Global_Control command.

Value range: 1 .. 65535 (time basis 10ms)

- Min slave interval (Min_Slave_Interval)

This parameter defines the minimum time period between two slave list cycles. The maximum value that the active stations require is always given.

Value range: 1 .. 65535 (time basis 100us)

- Access monitoring (T_{WD})

Access monitoring T_{WD} at the slave ensures that when an interruption of the DP Master occurs, the outlets are placed in a secure condition after this time period.

- Poll timeout (Poll_Timeout)

This parameter defines the maximum time period in a master-master relationship within which the answer must be fetched by the requestor.

Value range: 1 .. 65535 (time basis 1ms)

- T_{ID1} and T_{ID2}

This is the time that the sender spends at idle after the receipt of the last Bit of a telegram on the bus, until the first bit of a new telegram is sent on the bus.

Depending on the type of the telegram:

T_{ID1} starts after the initiator has received an acknowledgement, answer or a token telegram.

$$T_{ID1} = \max (T_{QUI} + 2 * T_{SET} + 2 + T_{SYN}, \min T_{SDR}). \quad (*)$$

T_{ID2} starts after the initiator has sent a telegram that is not acknowledged.

$$T_{ID2} = \max (T_{QUI} + 2 * T_{SET} + 2 + T_{SYN}, \max T_{SDR}). \quad (*)$$

These times cannot be set directly, but result from the given calculations.

(*) Depending on the ASIC and baud rate utilized, the T_{ID1} and T_{ID2} can take on somewhat different values due to the ASIC software.

Rules

For min T_{SDR}, max T_{SDR} and T_{SL} the following rule applies:

$$0 < \min T_{SDR} < \max T_{SDR} < T_{SL}$$

For T_{QUI}, T_{RDY} and min T_{SDR} the following rule applies:

$$T_{QUI} < T_{RDY} < \min T_{SDR}.$$

For access monitoring (T_{WD}) and target rotation time (T_{TR}):

$$T_{WD} > T_{TR}$$

For the Data_Control_Time the following rule applies:

$$\text{Data\_Control\_Time} > 6 * T_{WD}$$

7.3 DP Master

Master Settings

To enter the DP Master settings, choose the **Settings > Master Settings** or click with the right mouse button on the corresponding master symbol and select from the list that opens up. The **DP Master Settings** is also available in the **Master Configuration** window.

The DP Master settings contain parameters that determine the behavior of the master device as well as the user interface. These settings are only valid for Hilscher devices and are included in the download of the configuration.

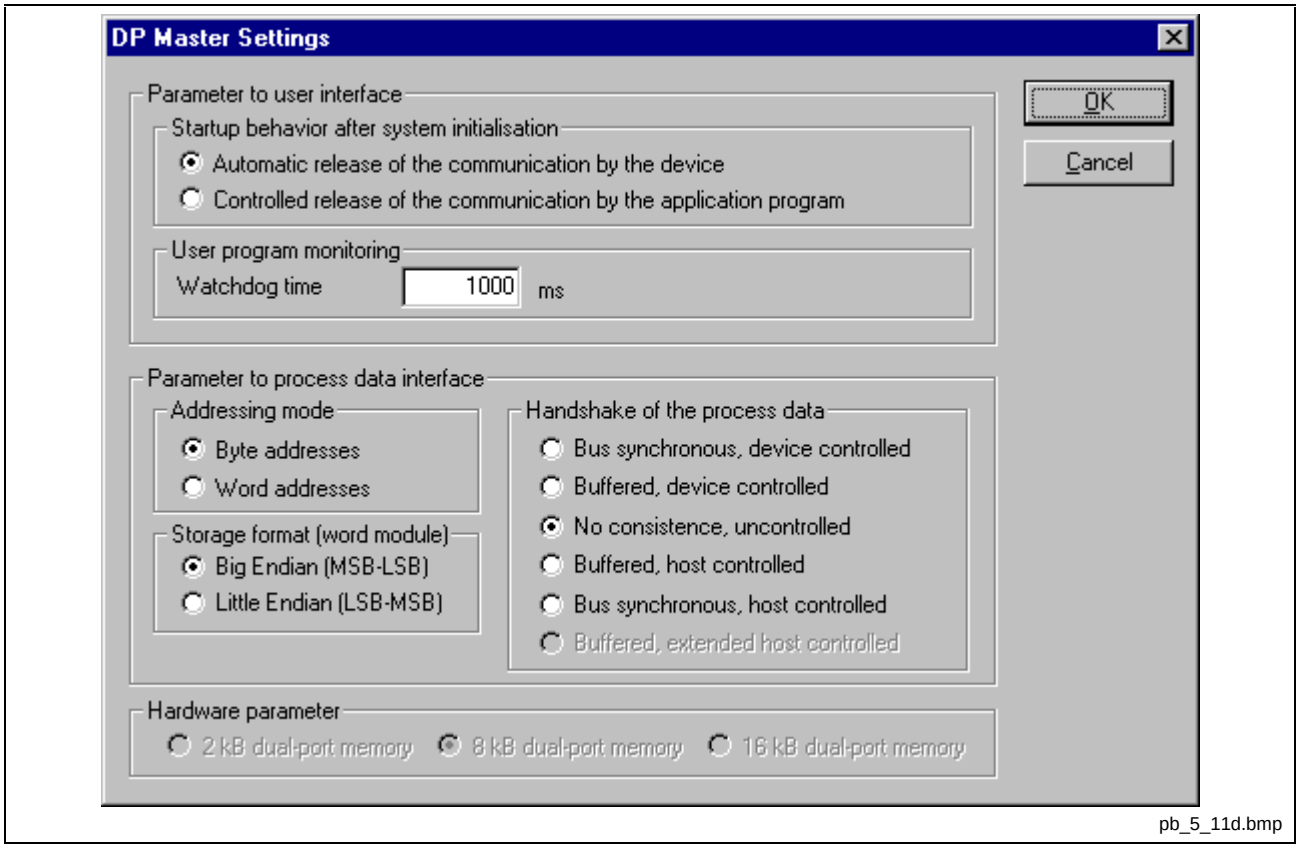


Fig. 7-15: DP Master settings

- **Startup behaviour after system initialisation**

When **Automatic release of the communication by the device** has been set, the master device starts with the data exchange at the Bus after the initializing has been ended. When **Controlled release of communication by the application program** has been set, the application program must activate the data exchange at the Bus.

- **User program monitoring**

The Watchdog time determines how long the device waits for a triggering of the software watchdog by the application program until it sets the outputs of the slave devices to zero. This behavior must be activated by the user program and does not start automatically.

Note: This is not a special PROFIBUS function.

An example of the use of this function can be a SoftPLC.

- **Addressing mode**

The addressing mode of the process data image determines how the addresses (Offsets) of the process data are interpreted. Either of the addressing modes **Byte addresses** or **Word addresses** are possible. See also details on the next page.

- **Storage format (word module)**

The storage format determines how the data words are laid down in the process image. For the word data type it is possible to choose higher/lower value byte or lower/higher value byte.

- **Handshake of the process data**

These various types are used for setting the transfer process of the process data for the master. The choice of which type is used is important for the correct data exchange between the application program and the device. A detailed description is provided in the manual for the toolkit or the manual for the device driver.

- **Hardware parameter**

This parameter displays the size of the Dual-Port Memory. The size for process data is the displayed size less 1 kbyte. E.g. 8 kbyte - 1 kbyte = 7 kbyte for process data.

Addressing Mode

The addresses in the configuration of the nodes define the starting point of the data in the process depiction. This can work in a Word or Byte oriented method by means of the **Addressing mode** parameter.

Byte addresses The process depiction has a byte structure and each byte has its own address.

Word addresses The process depiction has a Word structure and each Word has its own address.

This has nothing to do with the physical size of the Dual-Port Memory – this is always byte-oriented! When the application makes a Word access, it is automatically divided by the PC into two sequential byte accesses.

The following table shows the different storing of the various data types in the Byte- or Word-oriented process image:

IEC address in byte mode	IEC address in Word mode	Offset address in the Dual-Port Memory		Data in the process image	Output to an I/O module
QB 0	QB 0	0	**0000 0000**		
QB 1		1	**0000 0000**		
QB 2	QB 1	2	**1110 0010**	Output of QB2 / QB1 to a single byte module: D7 D6 D5 D4 D3 D2 D1 D0 **1 1 1 0 0 0 1 0**	
QB 3		3	**0000 0000**		
QB 4 QB 5	QB 2	4 5	**1111 1000** **0000 0111**	Output of two bytes beginning from QB4 / QB2 to a module that is defined as a byte module with the data count 2 (no differentiation between the two memory formats as the data are of byte type): D7 D6 D5 D4 D3 D2 D1 D0 D7 D6 D5 D4 D3 D2 D1 D0 **1 1 1 1 1 0 0 0 0 0 0 0 0 1 1 1**	
QW 6	QW 3	6 7	**1111 1111** **0100 0100**	Output of QW6 / QW3 in the data format lower/higher value byte: D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0 **0 1 0 0 0 1 0 0 0 1 1 1 1 1 1 1** Output of QW6 / QW3 in the data format higher/lower value byte: D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0 **1 1 1 1 1 1 1 1 0 1 0 0 0 1 0 0**	

The following table is meant to clarify the method of addressing:

Byte addressing		
Byte 0	IB 0	IW 0
Byte 1	IB 1	
Byte 2	IB 2	IW 2
Byte3	IB 3	
Byte 4	IB 4	IW 4
Byte 5	IB 5	

Word addressing		
Word 0	IB 0	IW 0
	-	
Word 1	IB 1	IW 1
	-	
Word 2	IB 2	IW 2
	-	

Fig. 7-16: Image of the method of addressing for input

Byte addressing		
Byte 0	QB 0	QW 0
Byte 1	QB 1	
Byte 2	QB 2	QW 2
Byte3	QB 3	
Byte 4	QB 4	QW 4
Byte 5	QB 5	

Word addressing		
Word 0	QB 0	QW 0
	-	
Word 1	QB 1	QW 1
	-	
Word 2	QB 2	QW 2
	-	

Fig. 7-17: Image of the method of addressing for output

Master Configuration

The master configuration is described further above in chapter Master Configuration , page 6-3.

Group Membership

After the master has been assigned, the slaves can be assigned to up to eight different groups. These groups can then be assigned here. Choose the **Settings > Group membership** menu. Choose the group that is to support the DP Freeze and DP Sync commands.

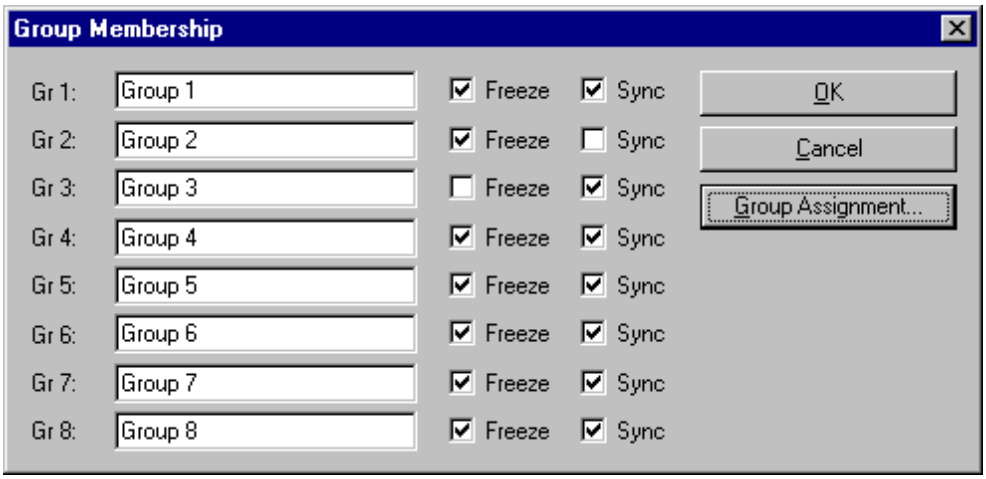


Fig. 7-18: Settings > Group membership (1)

In the **Group Membership** the slaves can be assigned to the groups with the desired characteristics. The table shows all configured slave devices from the main editor window. Here it can be selected to which eight possible groups the slave is to be assigned.

The selected group membership is transferred to the slaves during their start-up sequence. The group membership acts as a filter for the Sync and Freeze global commands. These are output as broadcast telegrams in order to synchronize the input and output data of several slaves. Only those slaves in whose group these commands have been released react on it.

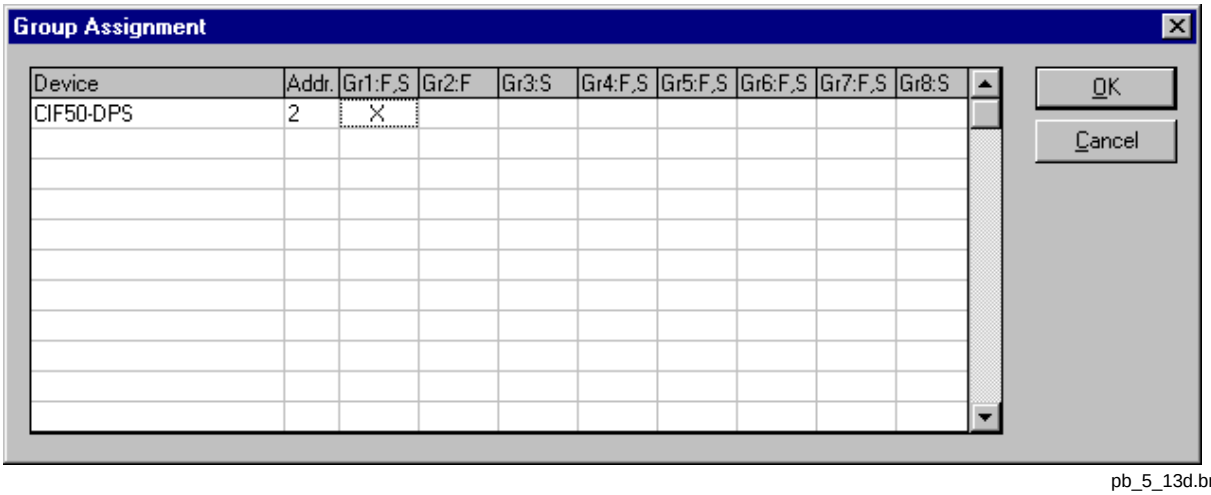


Fig. 7-19: Settings > Group membership (2)

7.4 DP Slave

Slave Settings

The DP Slave settings contain parameters that define the behavior of the device at its user interface, which does not belong to the DP configuration. This menu point is applicable only to Hilscher devices. These settings are transferred with the download of the DP configuration to the device.

In order to open the DP Slave settings menu, first choose the slave and then open the window in the **Settings > DP Slave Settings** menu.

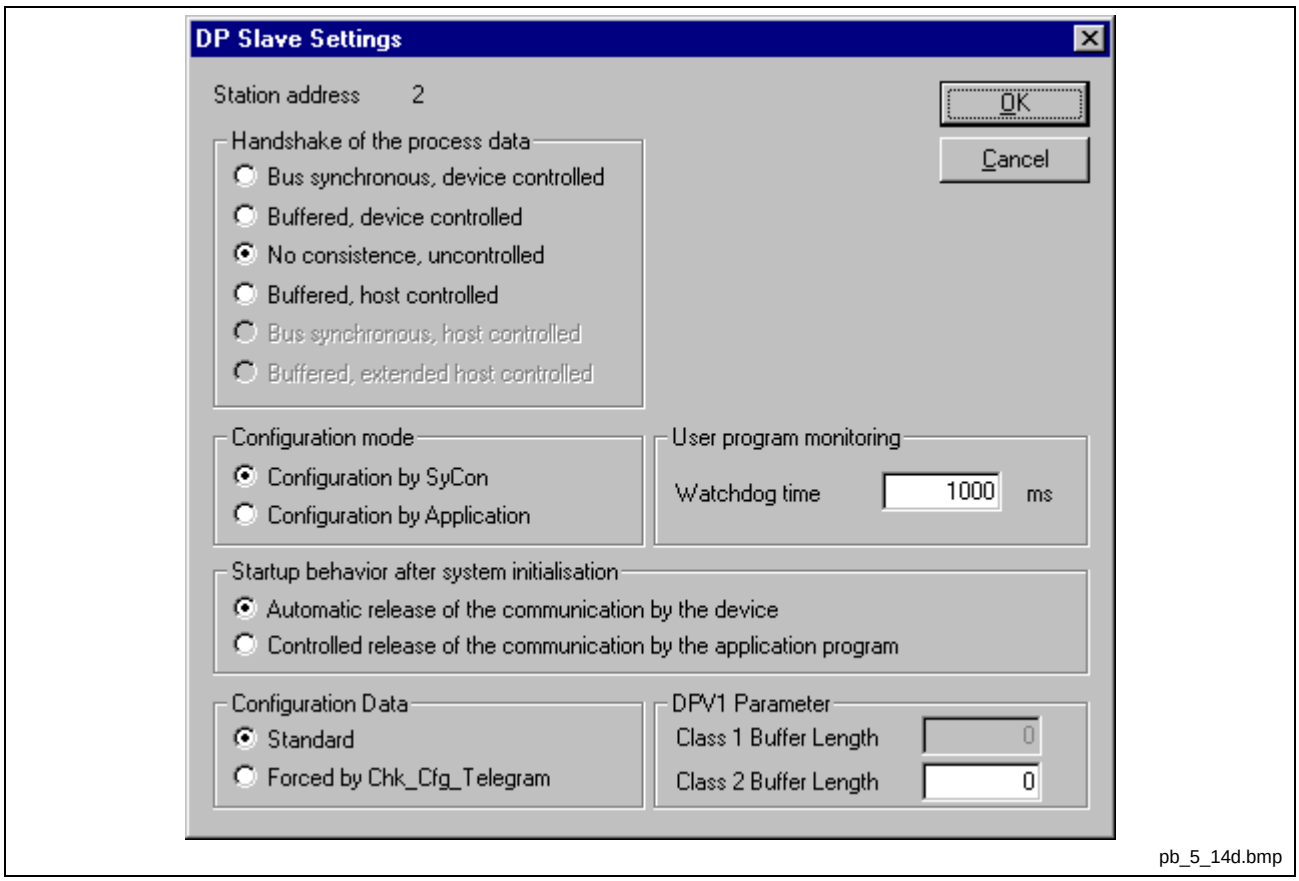


Fig. 7-21: DP Slave settings

- **Handshake of the process data**

These various functions select the handshake of the process data of the slave. The selection of the function is important for the correct data exchange between the application and the device.

- **Configuration mode**

If the slave device is to use the parameters of the configuration that is downloaded from SyCon then the **Configuration by SYstem CONfigurator** mode must be selected for the **Configuration mode**. If the DP configuration is written online from an application into the Dual-Port Memory, then the **Configuration by Application** mode must be selected.

- **User program monitoring**

The monitoring time determines how long the device will wait for an application triggering until it resets all outputs to zero. This must be activated from the application.

- **Start-up behavior after system initialization**

When **Automatic release of the communication by the device** has been chosen, then the slave is ready to communicate with the master. When **Controlled release of the communication by the application program** has been chosen, then the user must release the communication by means of a defined release procedure.

- **Configuration data**

For **Standard**, the configuration of the slave is compared with that from CHK_CFG_TELEGRAM from the master.

For **Forced by CHK_CFG_TELEGRAM**, the configuration of the slave is transferred from the master with the CHK_CFG_TELEGRAM to the slave.

- **DPV1 Parameter**

Class 1 Buffer length: This setting defines the size of the buffer for DPV1 class 1 services in the DP Slave. The length determines the maximum data count that can be transferred in a DPV1 class 1 telegram. Of the buffer size set here, 4 bytes are reserved for the transfer of the DPV1 administration data and these are not available for the transfer of user data.

Valid values for the length of the class 1 buffer are in the range of 4 .. 244. Alterations of the size of the buffer can only be undertaken after, in the slave configuration dialog, the DPV1 services for the slave have been activated.

Class 2 Buffer length: The length of the DPV1 class 2 buffer that is to be established must be defined in this field. Analog to the treatment of the class 1 buffer, here, too, 4 bytes of the given buffer length are reserved for the transfer of the DPV1 administration data. The maximum transferable user data count is reduced by these 4 bytes. Values in the range 48 .. 244 can be defined for the DPV1 class 2 buffer length. If the value 0 is entered, then the DP Slave lays down no DPV1 class 2 buffer. In this case the DPV1 class 2 services of the slave are not available.

Note: Please note that the settings of the class 1 and class 2 buffer lengths influence the usable data width in the cyclical I/O region. This limitation is caused by the restricted memory space in the PROFIBUS ASIC (SPC3) of the device.

The purpose of the examples in the following table is to provide the possibility of estimating the usable buffer length and I/O data width.

Example	Cyclic I/O data	DPV1 class 1 buffer	DPV1 class 2 buffer
Maximum I/O data	368	60	0
Maximum DPV1 class 1 buffer	304	244	0
Maximum DPV1 class 2 buffer	296	0	244
Maximum DPV1 class 1 buffer and maximum DPV1 class 2 buffer	200	244	244
128 bytes for DPV1 class 1 buffer	344	128	0
128 bytes for DPV1 class 2 buffer	328	0	128
128 bytes for DPV1 class 1 buffer and 128 bytes for DPV1 class 2 buffer	280	128	128

Fig. 7-22: Buffer length for DPV1

In the case that the given lengths for buffer and I/O data exceeds the memory space available, the DP Slave will report an error after the configuration download. This error message can be seen in the extended device diagnosis of the slave in the ’SPC3’ section under ‘LastError’. If the error code 75 is entered there, then more memory has been requested in the PROFIBUS ASIC than is available. Therefore, the DPV1 buffer length or I/O data width should be reduced and the configuration download should then be carried out again.

Slave Configuration

The slave configuration is described further above in chapter Slave Configuration , page 6-6.

Parameter Data

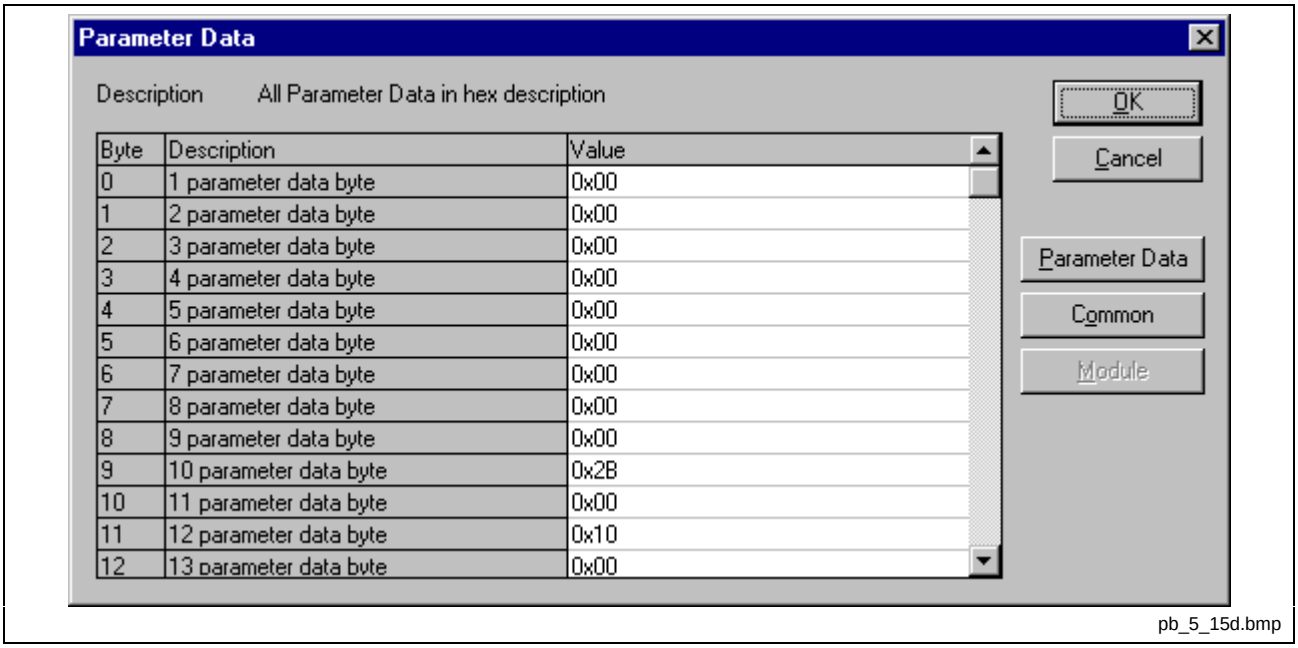
The parameter data can be edited in the **Settings > Parameter data** menu.

If default parameters are configured in the GSD file of the slave, then these are automatically inserted when the menu is called up for the first time.

Some of the DP Slave devices require further parameter data, for instance, in order to change a measuring limit or a value range. This type of data is slave-specific and their functionality cannot be described further here.

The meanings of the parameters are determined by the device manufacturer. The explanations can be taken from the manufacturer's manual.

The window below gives an example of parameter data of a slave:



pb_5_15d.bmp

Fig. 7-23: Parameter data (hexadecimal depiction)

A modular PROFIBUS DP Slave station could require parameter data for one or more modules and for the slave station itself (main station). There are three possibilities:

- Parameter data: all the parameters of a slave station
- Common: parameter data of the main station
- Module: parameter data of a module

After the choice of the text button, there appears the following window with the text parameter data. These parameters are for the main station.

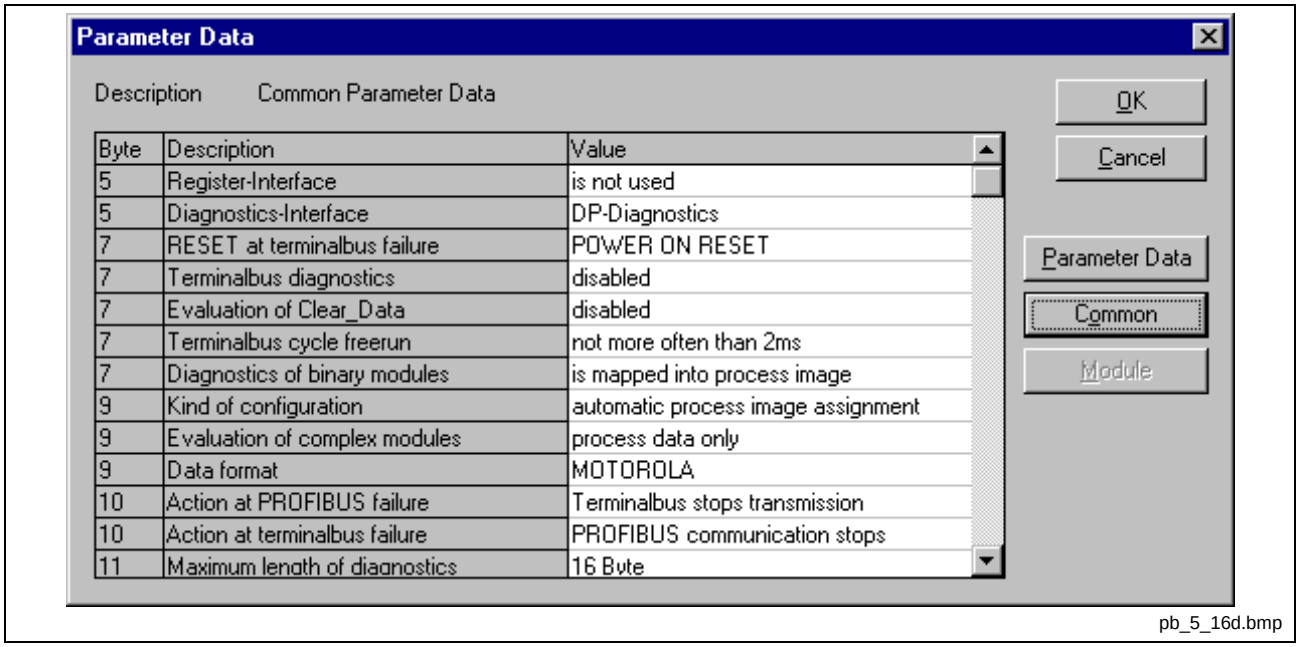


Fig. 7-24: Parameter data (text depiction)

It is possible to return to the **hex depiction** by pressing the hex button.

It is possible to edit the value by means of a double click on a row of parameter data.

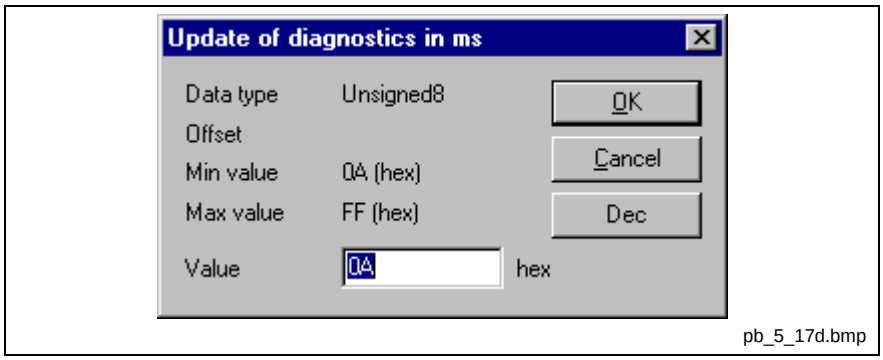


Fig. 7-25: Parameter data (individual depiction)

or to change the description via the text setting.

When several modules in the slave configuration have been selected, then it is also possible to change the module parameters by means of a double click on its associated line.

If more than one module is being configured, then a window appears in which a module must be selected.

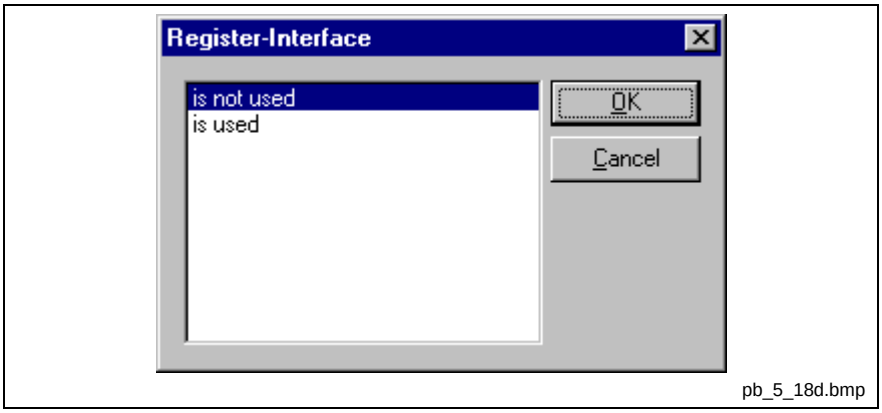


Fig. 7-26: Parameter data

7.5 DPV1 Parameter

DPV1 serves for acyclic data exchange and offers read, write and alarm processing functions.

The following information refer to Hilscher devices.

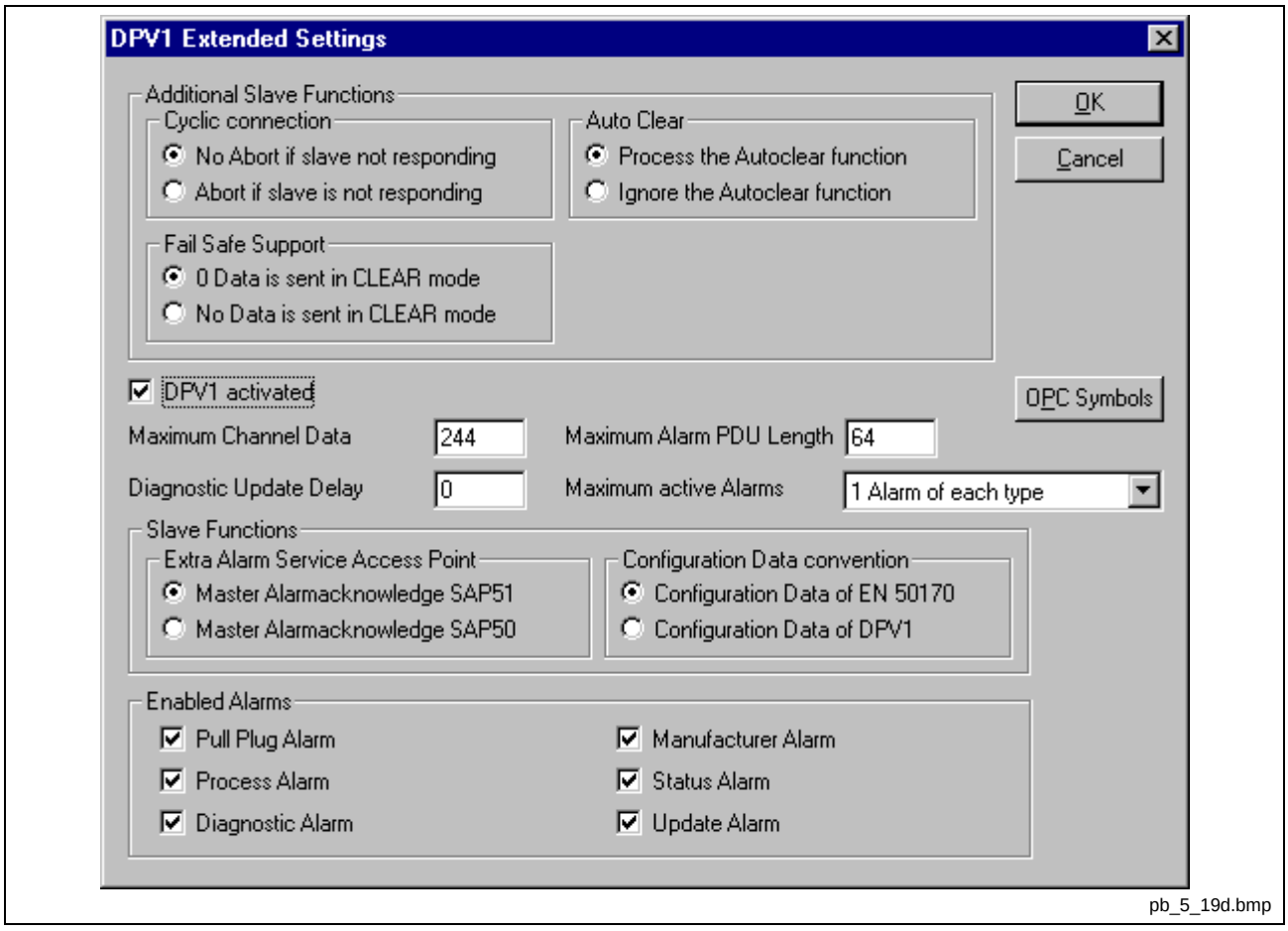


Fig. 7-28: DPV1 settings

Additional slave functions:

- **Abort of cyclic connection**

When this point is chosen, the master does not remain in the DATA_EXCHANGE condition for the affected slave if the slave has been recognized as incorrect, but breaks off the connection to the slave. The slave will in any case delete the outputs even when the connection in the direction of the slave is still functionally correct but the return for the answer telegram to the master is interrupted.

- **Fail Safe Support**

This mode indicates to the master that the affected slave is working in a so-called Fail_Safe mode. If the mode is activated, the master will send in the condition CLEAR instead of the zero output data, output data of length = 0. On the basis of this process, the slave immediately recognizes that the master is in the CLEAR condition even if a previous CLEAR command was destroyed on the bus.

- **Ignore Auto Clear**

The global auto clear function is carried out or ignored when the connection to the slave is interrupted.

DPV1

- **Maximum Channel Data Length**

Defines the maximum length of the DPV1 telegrams. The slave will then adapt its buffer size for the respective data count.

- **Diagnostic Update Delay**

Some slave devices of the newer models require more time for the consistency testing for the processing of the SET_PRM parameterizing telegrams. Often, therefore, a simple diagnosis cycle is insufficient until the participant can inform the master of the release for the DATA_EXHCHANGE. With the diagnostic delay, the number of diagnosis cycles that is the maximum that the master expects in order to obtain this release is increased before it reports an error.

- **Maximum Alarm PDU Length**

Determines the maximum length of the DPV1 alarm telegrams.

- **Maximum Active Alarms**

Determines the maximum quantity of active alarms: one alarm of each type or 2, 4, 8, 12, 16, 24 or 32 alarms in total.

Slave functions

- **Extra Service Access Point for Alarm Acknowledgement**

Determines whether the DPV1 acknowledges an alarm via SAP 51 or 50 at the DPV1 Slave.

- **Configuration Data Convention**

Determines whether the configuration data are interpreted according to EN 50170 or DPV1.

Enabled alarms

Activates or deactivates the alarms **Pull Plug Alarm** (module referenced), **Process Alarm**, **Diagnostic Alarm, Manufacturer Alarm, Status Alarm** and **Update Alarm.**

7.6 Project Information

If the user creates his own project, then the project information can be written into the **Settings > Project Information** menu. Anybody can then read this entry when this menu is called up.

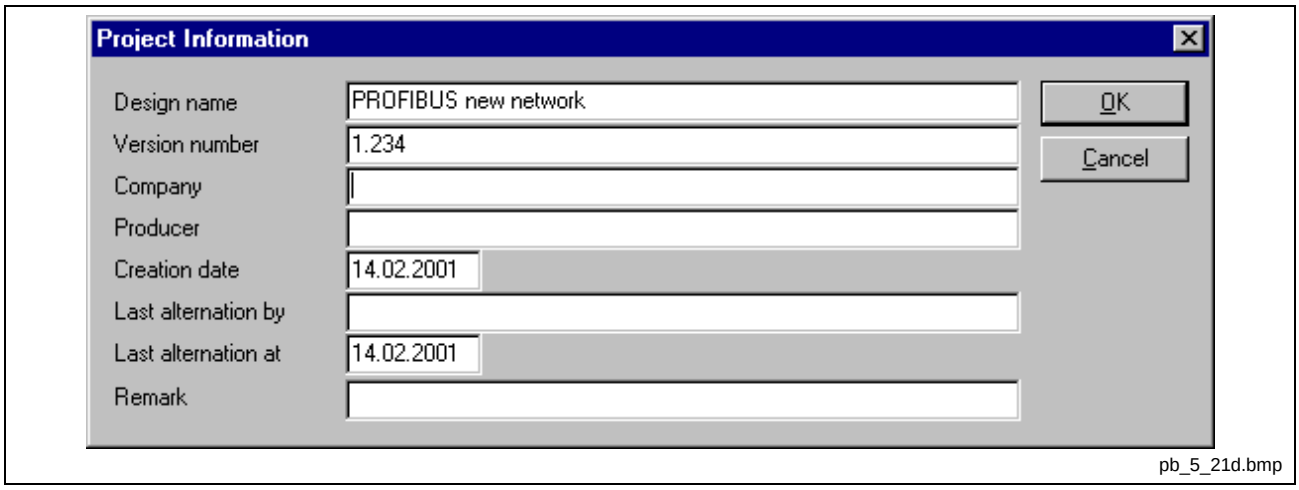


Fig. 7-30: Settings > Project information

7.7 Search Path

When the **Settings > GSD Search Path** menu is selected, then the search path for GSD files is displayed.

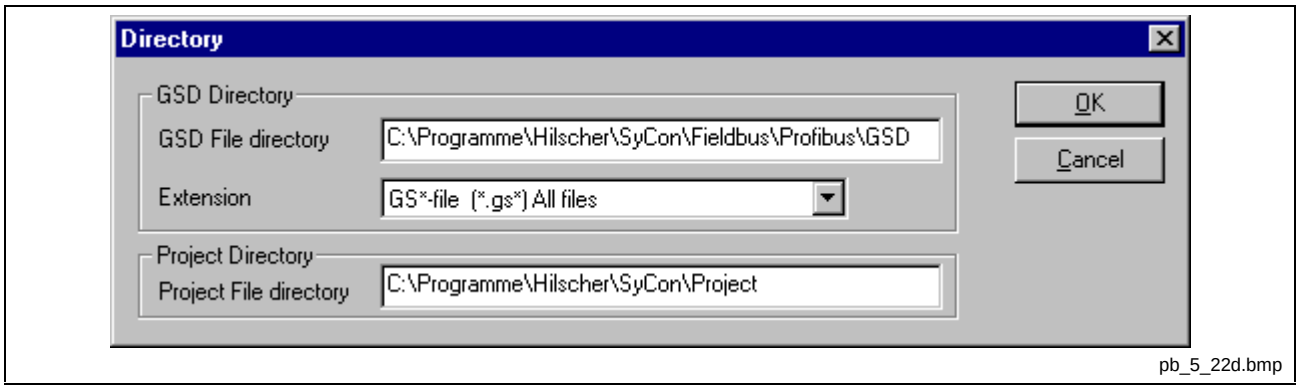


Fig. 7-31: Settings > Search path

7.8 Language

Choose the **Settings > Language** menu and the following window opens:

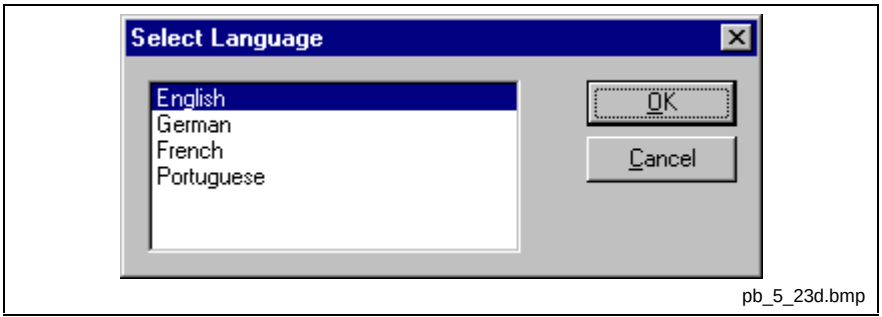


Fig. 7-32: Settings > Language

Here one is in a position of setting the language of the system configurator. Select the desired language and confirm the entry with the **OK** button.

A message appears that the system configurator must be started again in order to activate the selected language. Please carry this out.

After restarting the system configurator, the language will have changed to the one selected.

Note: Up to now not all languages are available for all fieldbusses!

7.9 Start Options

After activating the **Settings > Start Options** menu point in the network mode, the following dialog will appear.

Here it is possible to set the various starting options or modes. Some are of importance only for the OPC server operation.

The important ones are given below.

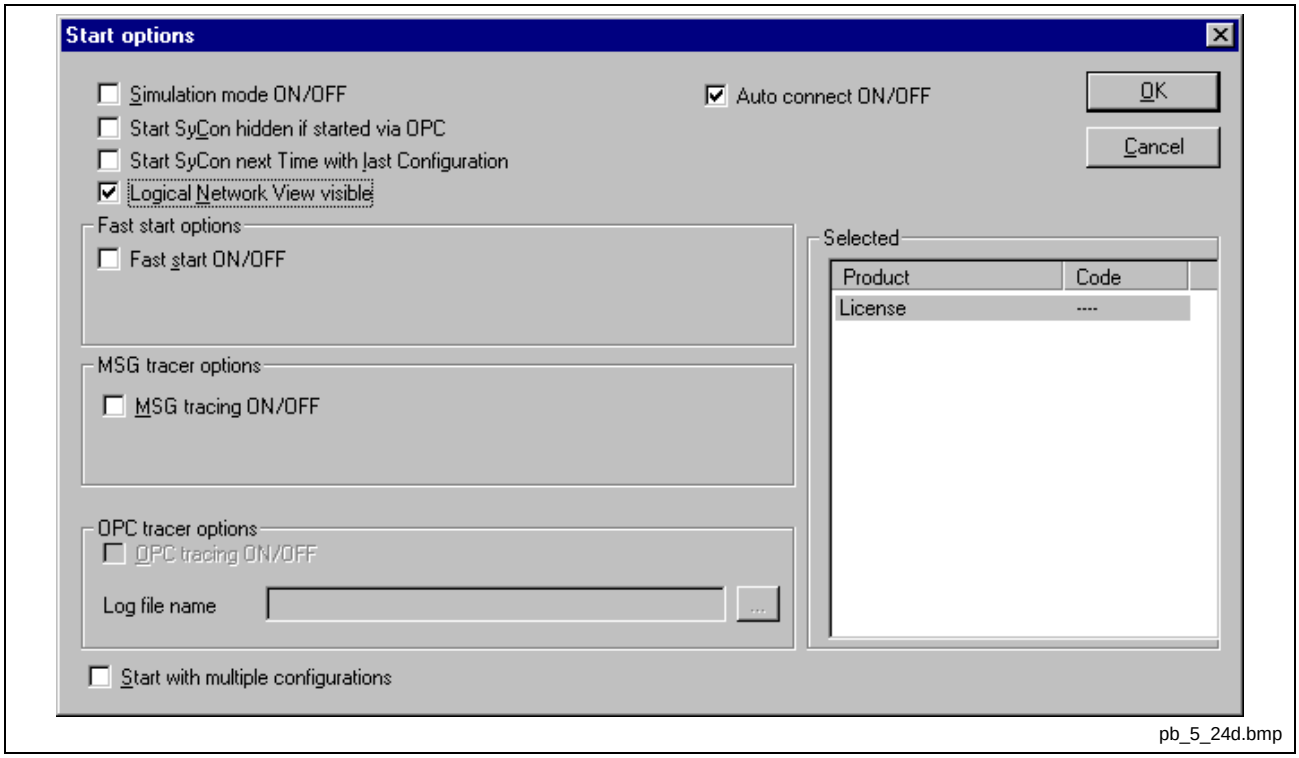


Fig. 7-33: Settings > Start options

- Start SyCon next time with last configuration

  When this is marked the last saved configuration in the SyCon is automatically loaded when the SyCon is started again.

- Logic Network View visible

When this is marked, there is the possibility of diverting to the network mode without having to install the SyCon with OPC. It is also possible to use the watch list from the network mode.

8 Online Functions

In this chapter, all the functions that directly influence Hilscher PROFIBUS devices, e.g. CIF 30-PB, PKV 20-DPM, are presented.

Please note that this also permits an interruption of the running communication or that inlets and outlets can be switched On or Off.

8.1 Online to the CIF

Downloading the Configuration

First, the desired device must be chosen for downloading by a left mouse click on the symbol of the device.

In order to release the configuration and network access, a transfer (Download) to the CIF/COM/PKV devices must be carried out on the **Online > Download** menu. A warning will appear that the communication on the PROFIBUS will be interrupted. This warning must be confirmed.

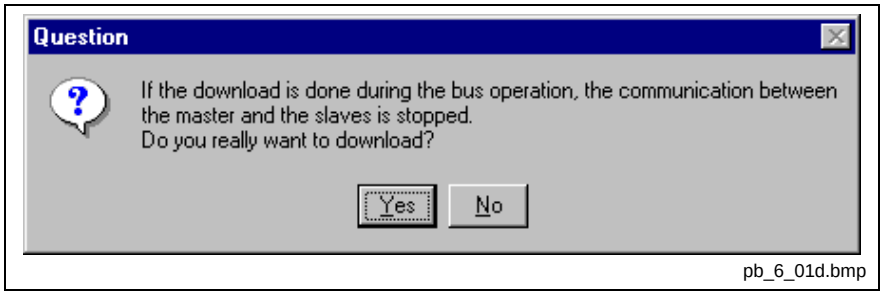


Fig. 8-1: Security query before download

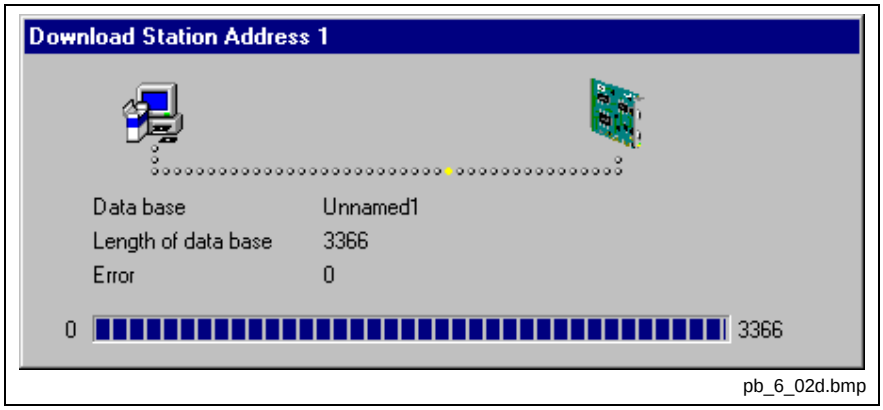


Fig. 8-2: Online > Download

Before the download is carried out, the configuration is tested by the configurator. The most common cause of error is overlapping of addresses in the process data image. This can be checked by calling up the address table with the **View > Address Table** menu point.

If the issue of addresses in the process data image is carried out automatically, then the **Auto addressing** button in the **Master Configuration** window must be activated.

The configuration is transferred into the selected device and is stored there in FLASH memory in a zero voltage manner, so that the configuration is available, when the voltage supply is switched off and on again.

After the download, the device carries out an internal restart and begins with the communication, if in **DP Master Settings** the **Automatic Release of Communication by the Device** menu point has been set.

Firmware Download

If a firmware download is to be carried out, proceed as follows: first the desired device for firmware downloading must be chosen by selecting the symbol of the device with a left mouse click. Then, call up the **Online > Firmware Download** menu. Select the new firmware and retrieve it with **Download** into the device. The firmware is now retrieved.

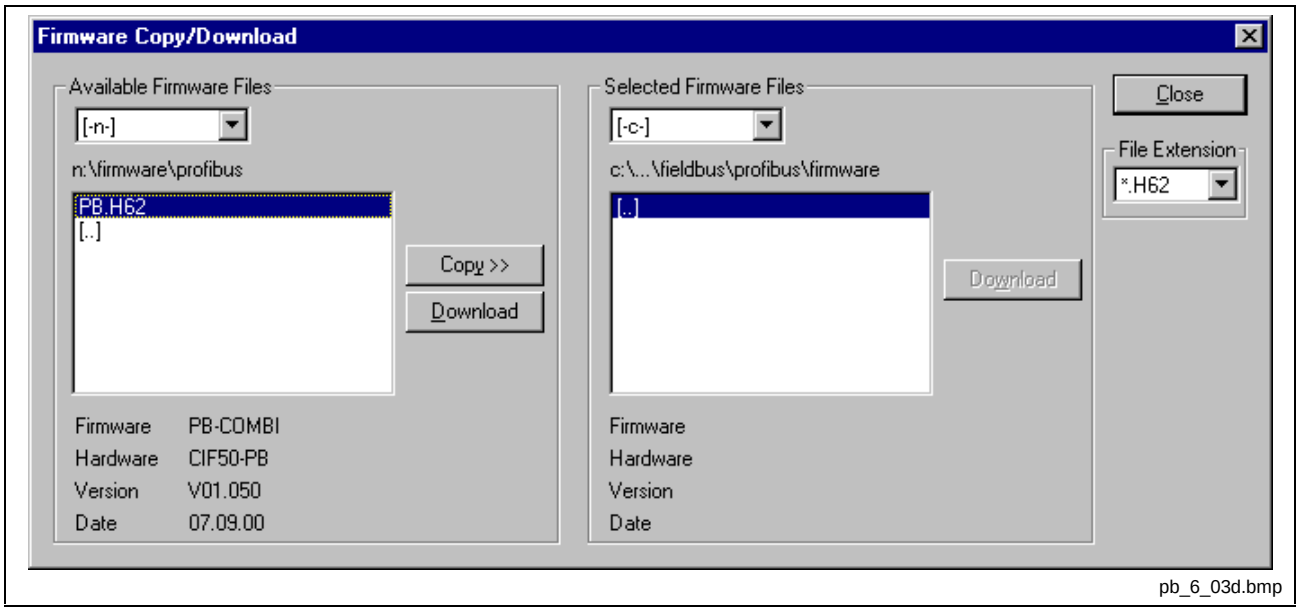


Fig. 8-3: Online > Firmware Download

Firmware / Reset

First the desired device must be chosen with a left mouse click on the symbol of the device. Then the **Online > Firmware / Reset** menu must be called up and the name and the version of the Firmware are displayed.

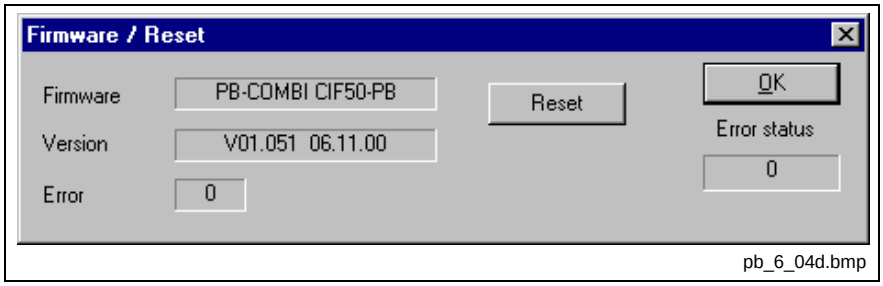


Fig. 8-4: Online > Firmware / Reset

The device is reset with the **Reset** button.

Device Info

First the desired device must be chosen with a left mouse click on the symbol of the device. Then select the **Online > Device Info** menu in order to obtain further information on the selected device.

The manufacturer date, the device number and the serial number of the device is retrieved and shown.

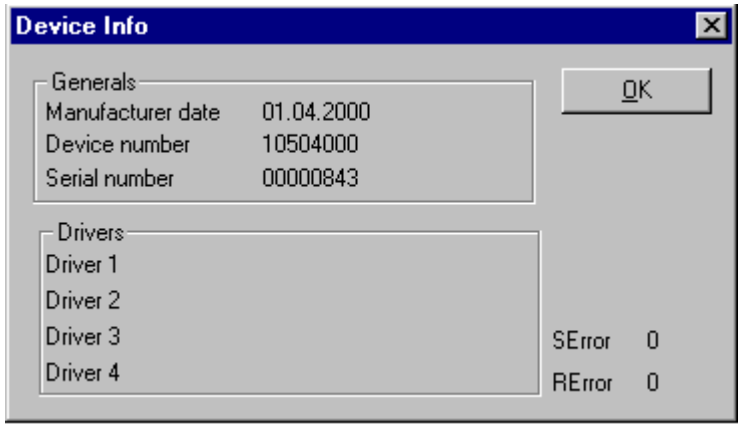


Fig. 8-5: Online > Device Info

8.2 Start/Stop Communication

The communication between PROFIBUS DP Master and PROFIBUS DP Slave can be manually started or stopped.

First the desired device must be chosen with a left mouse click on the symbol of the device. Then select the **Online > Communication start** or **Online > Communication stop** menu.

8.3 Diagnostic Functions

Live List

First the desired device must be chosen with a left mouse click on the symbol of the device. Then select the **Online > Live List** menu and obtain an overview over all active devices at the PROFIBUS network.

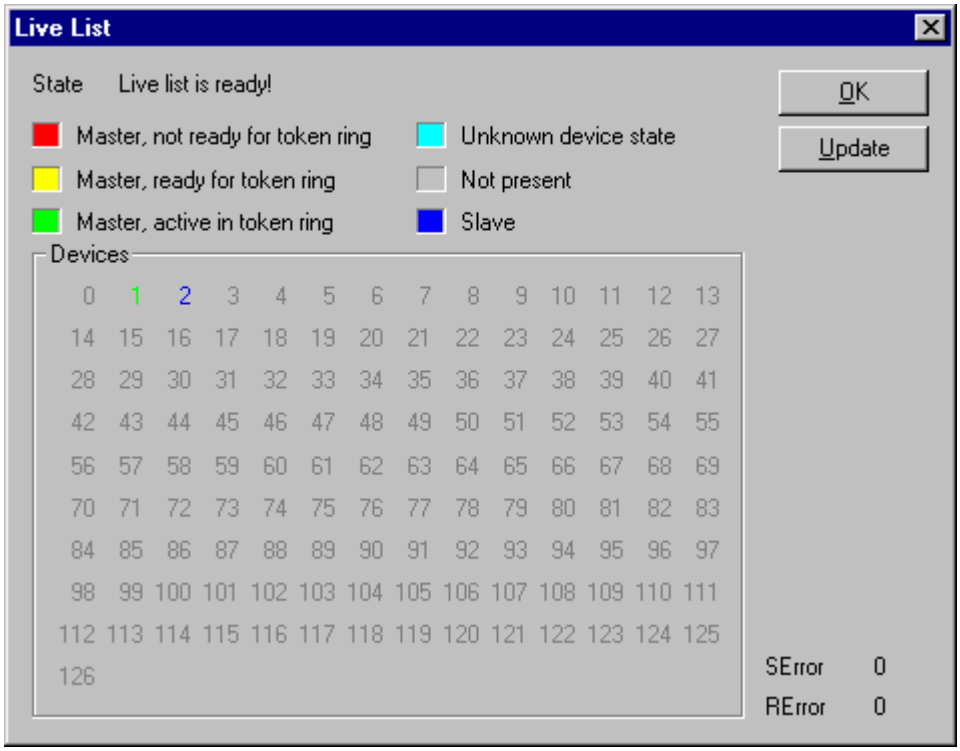


Fig. 8-6: Online > Live List

A green number shows a master and a blue number a slave, whereby the number indicates the station address. The meaning of the other colors is given in the list above the table.

A click on a colored number brings up its device type, and device status of the station.

Fig. 8-7: Device type and device status of a master

Fig. 8-8: Device type and device status of a slave

The display is not automatically updated as this function loads the PROFIBUS network. However, the Live List can be renewed with the **Update** button.

Debug Mode

First the master device must be chosen with a left mouse click on the symbol of the master device. Then select the **Online > Start Debug Mode** menu. The system configurator cyclically interrogates the status of the network communication on the CIF, COM, PKV or KPO and the individual condition of the devices.

To end the debug mode select the menu **Online > Stop Debug Mode**.

Note: The debug mode is only for PROFIBUS DP communication.

The Debug Window

When started the debug session the configuration window changes into the debug window. The devices and the line between them are displayed in green or red color depending on the established network communication.

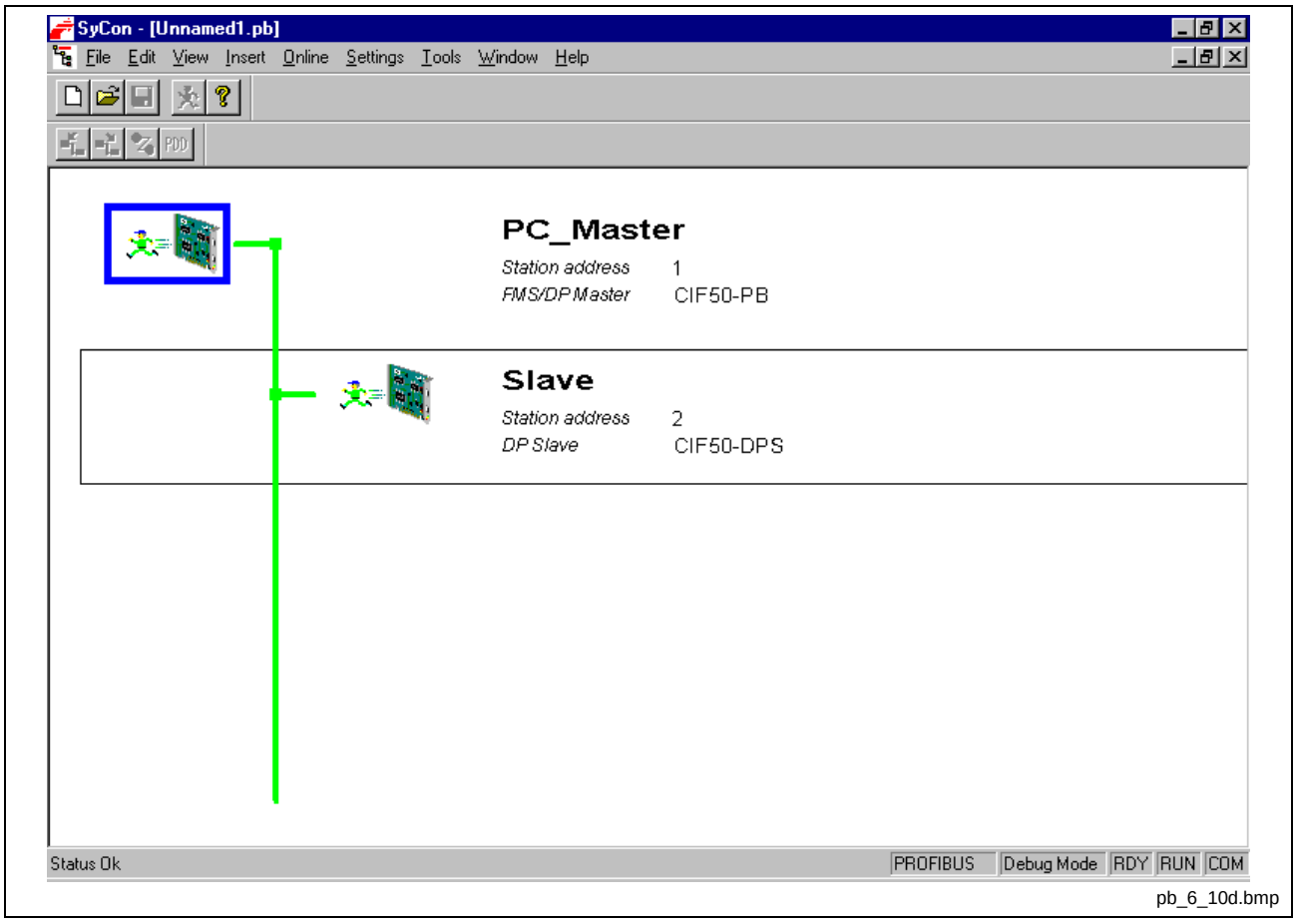


Fig. 8-9: The Debug Window

If a diagnostic information is available for a specific device, next to the device icon the text **Diag** appears in red. To get further device-specific diagnostic information, double-click on the device itself or set the focus to the device and select **Online > Device Diagnostic**.

Device Diagnostic

After the debugger was started, SyCon requests the status of all devices from the master. If there is an error on a device the bus line to this slave is drawn in red color otherwise it is green. SyCon also displays the letters **Diag**, if the device signals a diagnostic information. This information is displayed closer if you click with the mouse onto the corresponding device in debug mode.

To activate the debug mode, select the menu **Online > Start Debug Mode**. The menu **Online > Device Diagnostic** activates the PROFIBUS device diagnostic. To end the Debug Mode, select the menu **Online > Stop Debug Mode**.

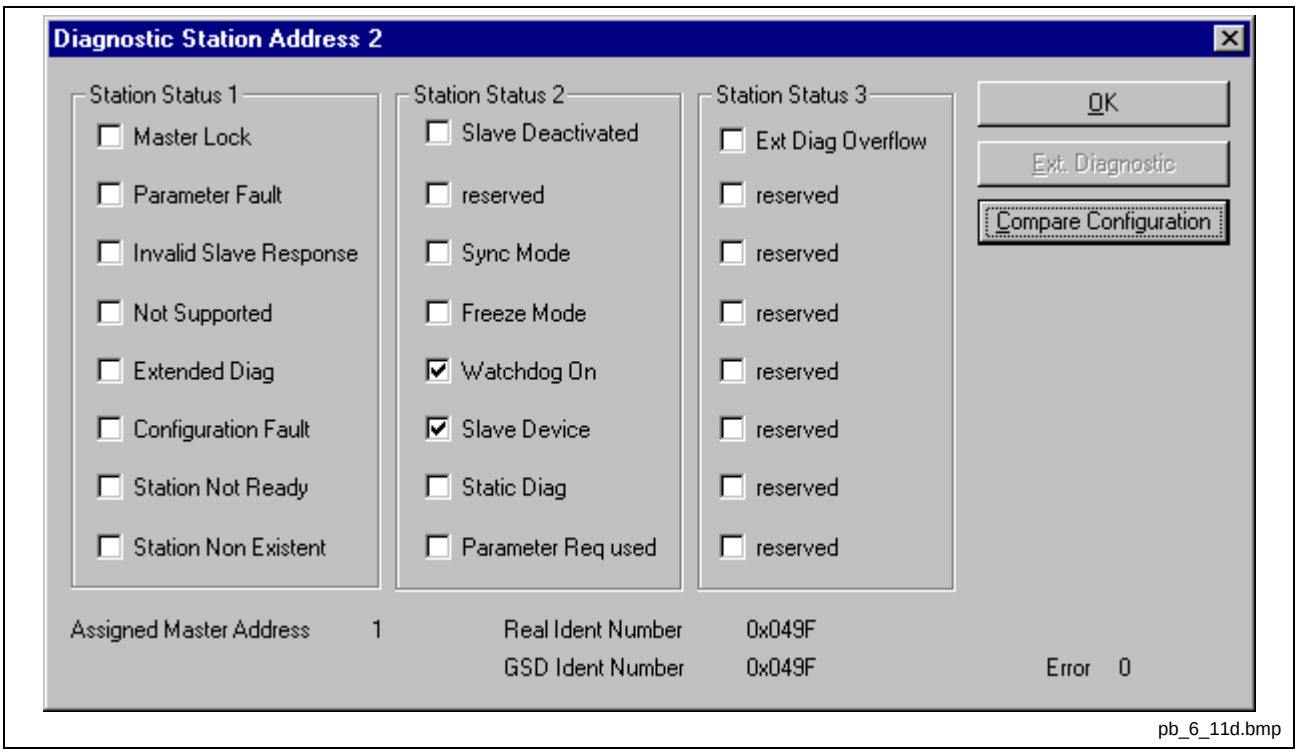


Fig. 8-10: Online > Device Diagnostic (PROFIBUS DP standard diagnostic)

The **Device Diagnostic** and its meaning.

- **Master_Lock**

The slave has already been parameterized by another master and is locked in its access. Check, if another master is present on the network and delete its assignment to this slave station or remove the other assigned master from the network to get the communication with this slave run.

- **Parameter_Fault**

This bit is set by the slave automatically, when the parameters send by the master are containing wrong or insufficient data. On every received parameter telegram the slave executes a check routine on the whole parameter telegram. If the slave detects a faulty parameter value or illegal data during its check, it will report the 'parameterization error'. During the check routine the slave compares its ident_number with the one sent by the master. So, if the slave reports this error, first compare the real ident_number shown in the slave diagnostic field in debugger mode with the one read out of the GSD file. For this, take the menu 'View/Device table'. Another problem can be, that you have entered with SyCon more parameter data than the slave can support. If this is the case, reduce the number of parameter data.

- **Invalid_Slave_Response**

This bit is set by the master, when the master receives an invalid answer from the slave. So the physical contact to the slave works principally, but the logical doesn't or was interrupted. This can for example happen, if a PROFIBUS FMS Slave is connected to the DP Master. So the slave does not understand the DP telegrams and rejects these. It's handled as 'Invalid_Slave_Response'.

- **Not_Supported**

This bit is set by the slave, when a function should be performed which is not supported. Newer releases of slave stations normally support the Sync and Freeze-Mode for I/O data. This is fixed in the GSD file and read out by SyCon and overgiven to the slave in the parameter telegram. If 'Not_Supported' is reported the GSD file declares at least one of these commands as supported, but the slave does not. So ask the manufacturer of the slave device for other GSD file or ask, if the slave reports 'Not_Supported' on other wrong parameter data.

- **Extended_Diag**

This bit is set by the slave, if optional extended diagnostic data are a containment of the slave diagnostic field. Extended diagnostic data is normally used by a slave station, if module specific diagnostic information like for example exceeded analog values or low power should be reported to the master. Click on the button 'Extended Diagnostic' to get a Hex-dump of the reported values.

- **Configuration_Fault**

During the PROFIBUS DP startup procedure the slave compares its internal I/O configuration with the configured one in the master. If the slave detects differences it will report the 'Cfg_Fault' error. That means that the master has an other I/O module constellation than the slave. So, first compare visually all configured I/O modules in the configuration data of SyCon for this slave with its real physical constellation. Note that the order of the module is important and has to be also compared. Some slaves need virtual I/O modules to be configured first or empty slot modules to get an even number of modules to run. This slave specific I/O module behavior can normally be read out in the slave documentation. Last help to get the slave module constellation is to read out its constellation by a PROFIBUS DP command **Compare Configuration**. So click on this button in the diagnostic field and you will get a Hex-Dump of the real slave configuration data and the configured one **(Real Configuration and SyCon Configuration).** Note that the DP configuration data is coded in bit defined byte arrays to hold the I/O information very compressed.

Note, that the DP configuration is coded in a very compact form. The code for the modules is shown in the **Slave configuration**.

- **Station_Not_Ready**

When or at which event the slave sets this bit is not defined in the norm specification. Its meaning 'Not_Ready' can be seen as not ready to do the I/O data exchange. This can have several slave-specific reasons. Usually, this fault occurs in combination with an other fault.

- **Station_Non_Existent**

This bit is set by the master automatically, if this slave is not responding on the bus. If this error occurs, compare the configured station address with the physical one of the slave. Then check, if the slave module supports the configured baud rate. Some old modules support a baud rate up to 1.5 mbaud only. Other modules must be jumpered to DP Norm behavior first, to be operative with a DP Norm master. Then check your bus cable. Only the TX/RX-pins 3<->3 and 8<->8 must be connected to get the contact between two PROFIBUS components.

- **Slave_Deactivated**

This bit is automatically set by the master, if the slave in its parameter set is marked as inactive, so that it is taken out from the cyclic I/O processing.

- **Sync_Mode**

This bit is set by the slave, when it has received the sync-control command.

- **Freeze_Mode**

This bit is set by the slave, when is has received the freeze-control command.

- **Watchdog_ON**

This bit is set by the DP Slave, when its watchdog control is active to supervise its corresponding master connection.

- **Slave Device**

This bit is always set by the slave device.

- **Static_Diag**

The slave sets this bit to indicate the master system to be not operative for I/O because of a general error. In a case of a set static diagnostic bit the master has to collect diagnostic information as long as this bit is active. On which events or at what time this bit can be set by a slave device, is not defined in the norm description and can not be mentioned here.

- **Parameter_Req_used**

The slave sets this bit to force the master system to do a new parameterization. This bit is set as long as new parameterization must be performed.

- **Ext_Diag_Overflow**

This bit is set, if there is more extended diagnostic information to report to the master than can be given to the master in one DP diagnostic telegram. The DP Slave sets this bit for example, if there is more diagnostic channel information than the slave can hold down in its diagnostic buffer.

Extended Device Diagnostic

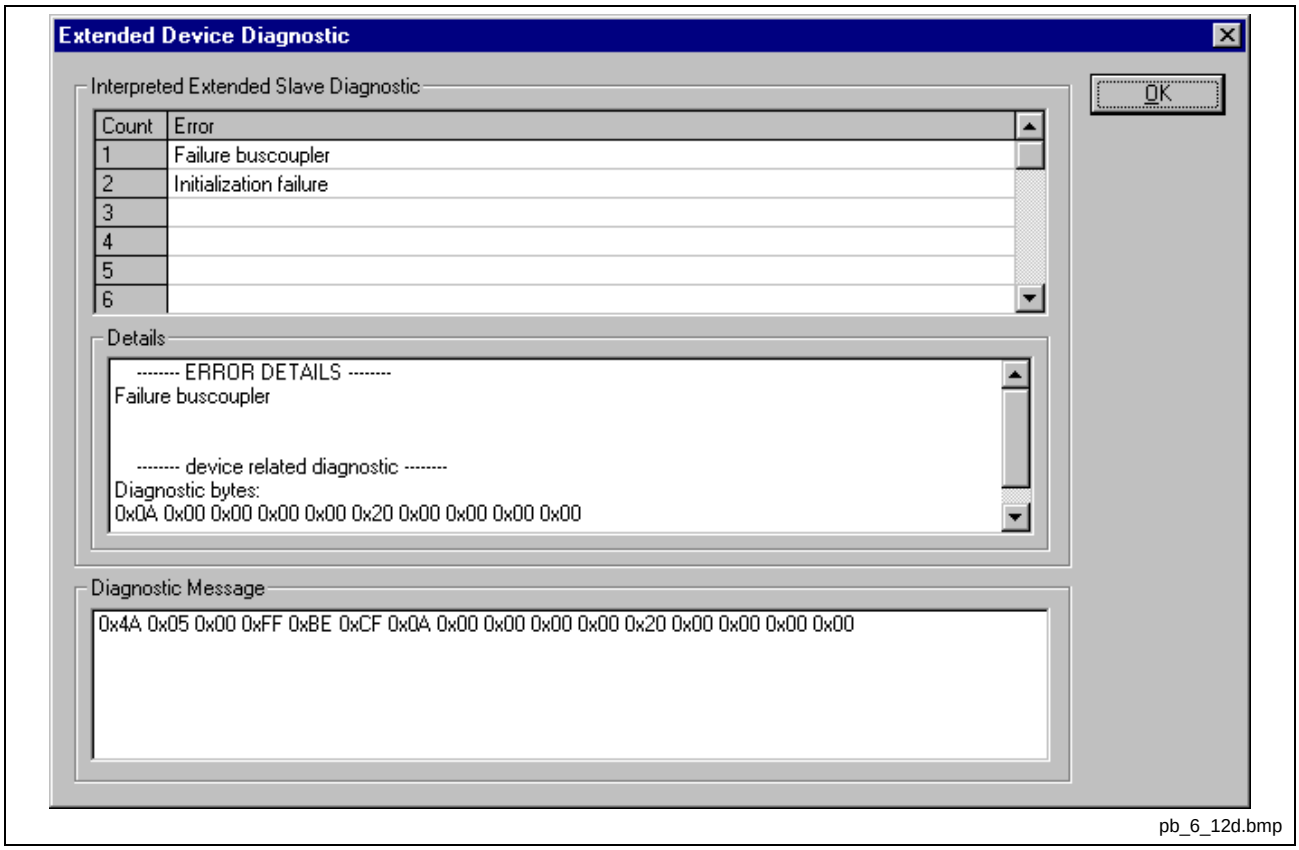


Fig. 8-11: Device diagnostic (PROFIBUS DP extended diagnostic)

In the extended device diagnostic window, the data of the diagnostic telegram are shown as a Hex-dump. Here, the first 6 bytes are the standard diagnostic bytes. The extended device diagnostic starts at the 7th byte.

The box in the middle of the window shows details and the box on the top the diagnostic report in clear text, insofar as these are given in the GSD file.

Global State Field

First chose the desired device with a left mouse click on the symbol of the device. Then select the **Online > Global State Field** menu. A display window opens, in which the cyclic states on the bus condition and the connected devices are shown.

The first row shows the main state of the master. This can have the condition **OPERATE** or **STOP**.

The next row shows individual bus errors. A current error is shown in a red field. The meanings of the individual abbreviations are shown below.

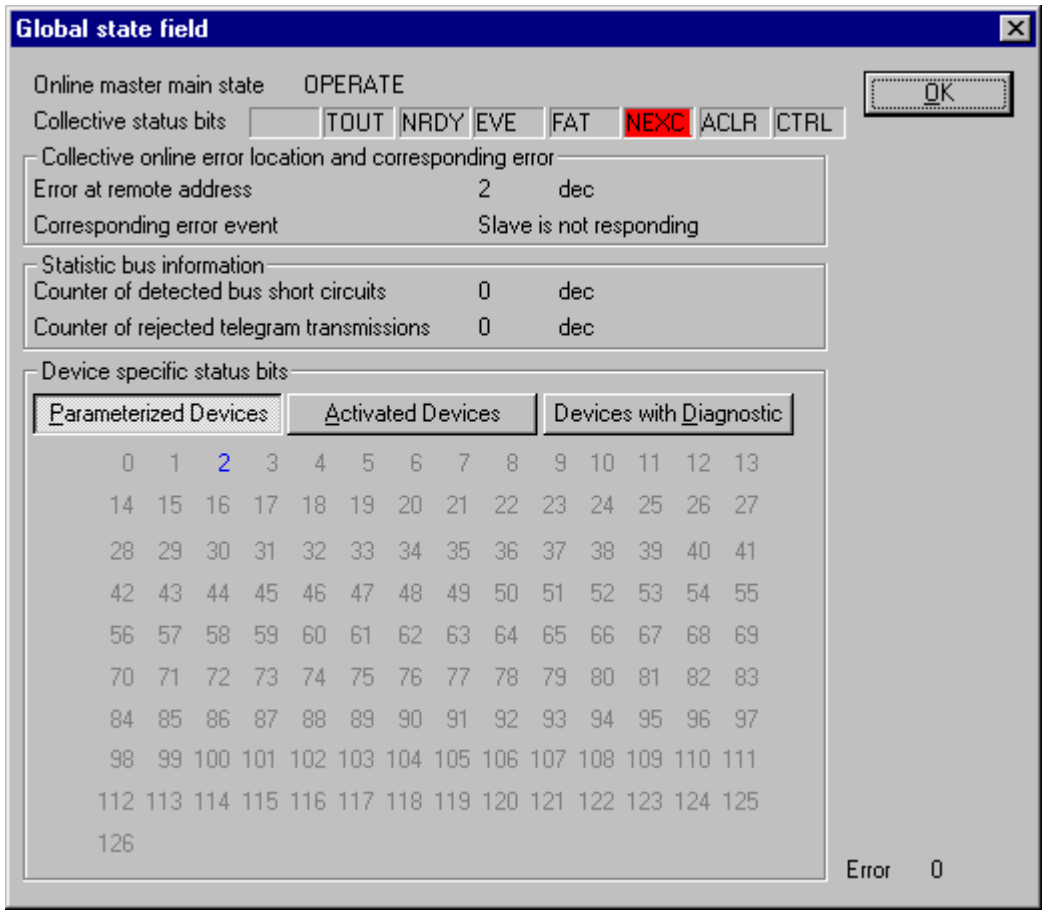


Fig. 8-12: Online > Global state field

Collective status bits

- **TOUT:** TIMEOUT-ERROR, the device has detected a overstepped timeout supervision time, because of rejected PROFIBUS telegrams. It's an indication for bus short circuits, while the master interrupts the communication. The number of detected timeouts are fixed in the statistic bus information variable. The bit will be set, when the first timeout was detected and will not be deleted any more.
- **NRDY:** HOST-NOT-READY-NOTIFICATION indicates, if the host program has set its state to operative or not. If this bit is set, the host program is not ready to communicate.

- **EVE:** EVENT-ERROR, the device has detected bus short circuits. The number of detected events are fixed in the statistic bus information variable. The bit will be set, when the first event was detected and will not be deleted any more.
- **FAT:** FATAL-ERROR because of heavy bus error, no further bus communication is possible.
- **NEXC:** NON-EXCHANGE-ERROR, at least one slave has not reached the data exchange state and there's no process data exchange with the DP Master.
- **ACLR:** AUTO-CLEAR-ERROR, device stopped the communication to all slaves and reached the auto-clear end state.
- **CTRL:** CONTROL-ERROR, parameterization error.

Further contents are given:

Collective online error location and corresponding error indicates the station address and the error text.

Statistic bus information displays the number of the detected bus short circuits and the number of rejected telegrams.

Device specific status bits:

Parameterized Devices, Activated Devices and **Devices with Diagnostic** are shown, if you click at that button. The activated addresses are colored numbers. You can see the diagnostic message by double-clicking at a highlighted station address of a device.

This application updates online the status in the global state field.

Extended Device Diagnostic

The extended device diagnostic assists in finding bus and configuration errors when the SyCon menu functions are of no further help.

First the desired device must be chosen with a left mouse click on the symbol of the device. Then select the **Online > Extended Device Diagnostic** menu.

This menu opens a list of diagnostic structures. These contain online counters, states and parameters:

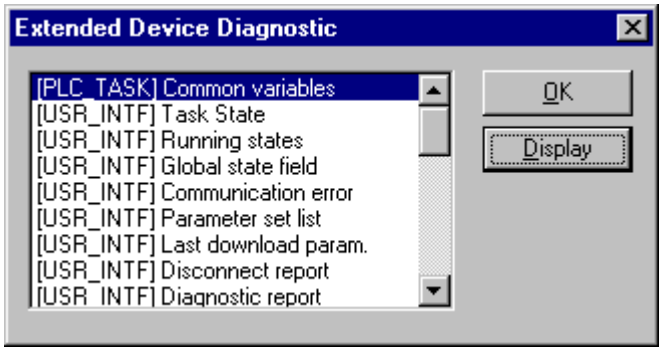


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Fig. 8-13: Extended Task State as and example for the PROFIBUS DP/FMS combimaster

For the PROFIBUS DP

- USR_INTF (User-Interface): DP administration
- FDL_TASK: PROFIBUS Transmission

Task	Task state	Page	PB	DPM
PLC_TASK	Common Variables	8-14	X	X
USR_INTF	Task State	8-15	X	X
	Running States	8-16	X	X
	Global State Field	8-10	X	X
	Communication Error	8-17	X	X
	Parameter Set List	8-18	X	X
	Last Download Param.	8-19	X	X
	Disconnect Report	8-20	X	X
	Diagnostic Report	8-21	X	X
	DPV1 Data	8-22	X	X
FDL_TASK	Task State	8-23	X	X
	Act. Bus parameter	8-24	X	X
	DDLM Requests (Cl. 1)	8-25	X	X
	DDLM Requests (Cl. 2)	8-26	X	X
	FDL Requests	8-27	X	X
	FMA Requests	8-28	X	X
	DP: Retry for Slaves	8-29	X	X
	DP: Activated Slave	8-30	X	X
	DPV1 Requests	8-31	X	X
ALI_TASK	VFD Status	8-32	X	
	FDL Services	8-33	X	
	Error Counter	8-34	X	
	Client Parallel Services	8-35	X	
	Server Parallel Services	8-36	X	
	Status ComReference	8-37		
	Timer ComReference	8-38		

Fig. 8-14: PROFIBUS DP Master Task State

For the PROFIBUS DP Slave

- PLC_TASK
- SPC3CTRL (SPC3 Control)

Task	Task state	Page	DPS
PLC_TASK	Variables	8-39	X
SPC3CTRL	SPC3	8-40	X
	Slave Config	8-41	X
	Master Config	8-42	X
	Param Data	8-43	X
	SPC3 DPM	8-44	X
	DPV1 Class 1	8-45	X
	DPV1 Class 2	8-46	X
	Code Diagnostic	8-47	X

Fig. 8-15: PROFIBUS DP Slave Task State

On the following pages the task state structure of PROFIBUS DP is described.

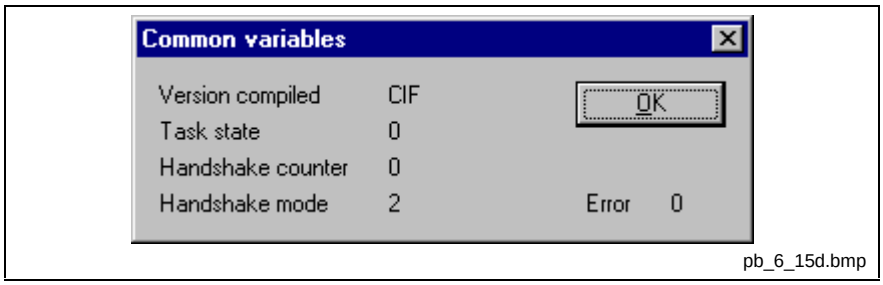

Fig. 8-16: **PLC_TASK Common Variables**

Variable	Meaning
Version Compiled	Hardware
Task State	Task State
Handshake Counter	Counter for the performed process data hand shakes
Handshake Mode	This value represents the actual handshake mode between application and CIF. 0 = Bus synchronous, device-controlled 1 = Buffered, device-controlled 2 = Uncontrolled 3 = Buffered, host-controlled 4 = Bus synchronous, host-controlled

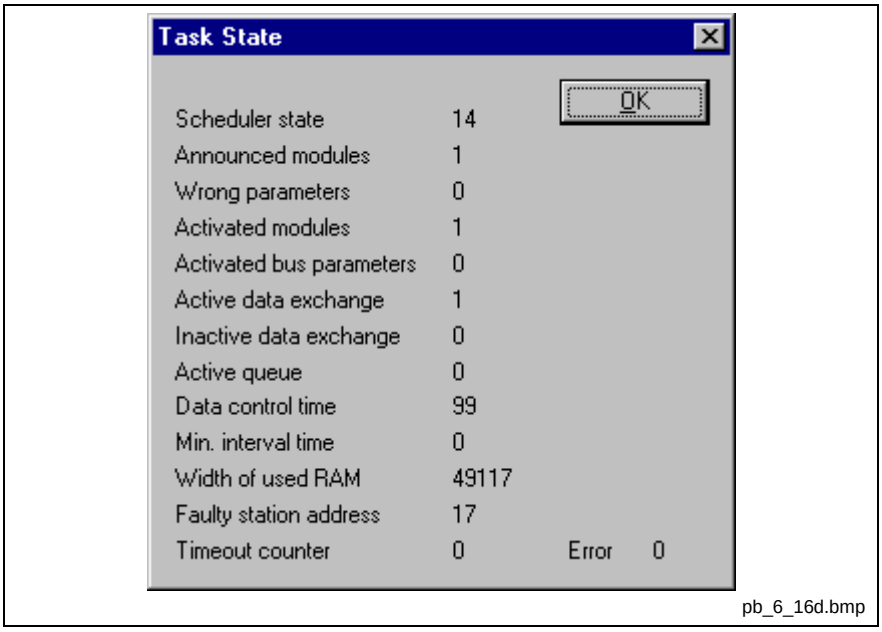

Fig. 8-17: **USR_INTF Task State**

Variable	Meaning
Scheduler State	Status value of the scheduler
Announced Modules	Number of configured slaves
Wrong Parameters	Number of slaves with faulty data sets
Activated Modules	Number of activated slaves
Activated Bus Parameters	0 = Bus parameter active, 255 = Bus parameter inactive
Active Data Exchange	Current active Data_Exchange-Service
Inactive Data Exchange	Number of Stations with that process data exchange is not possible
Active Queue	Number of stored commands
Data Control Time	Counter of Data_Contol_Time
Min. Interval Time	Counter of min.Slave_Intervals
Width of used RAM	
Faulty Station Address	Station address of the faulty station
Timeout Counter	Supervision counter that is activated, when a short-circuit was detected on the bus

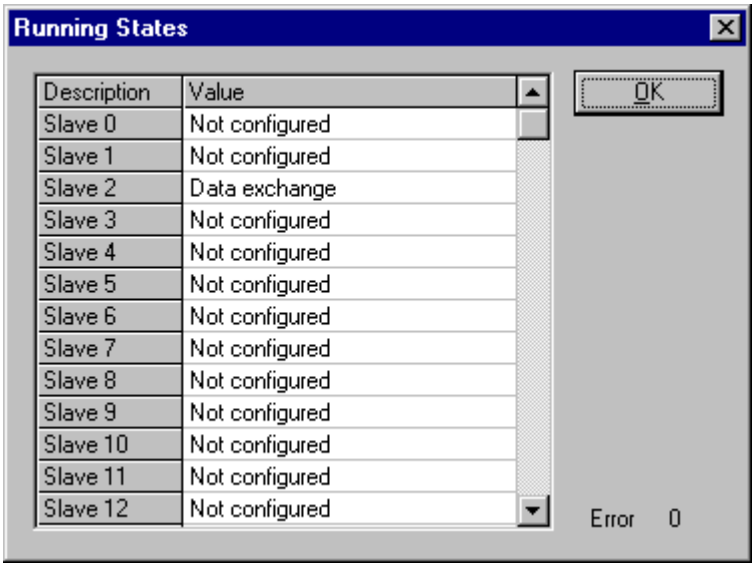

Fig. 8-18: **USR_INTF Running States**

Variable	Meaning
Slave x (x=0 .. 125)	Slave handler-state for Station address x

USR_INTF Global State Field

See chapter Global State Field on page 8-10.

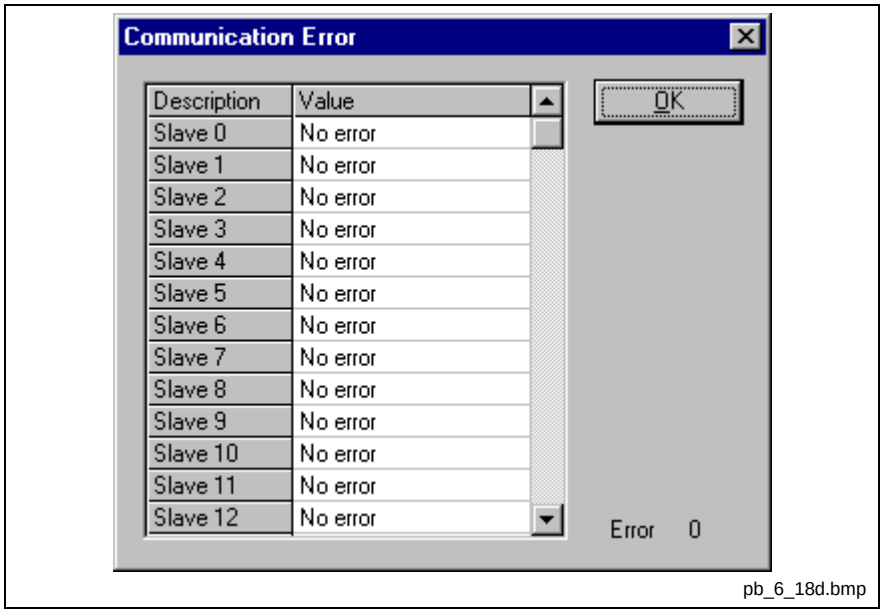

Fig. 8-19: **USR_INTF Communication Error**

Variable	Meaning
Slave x (x=0 .. 125)	Error number to the slave

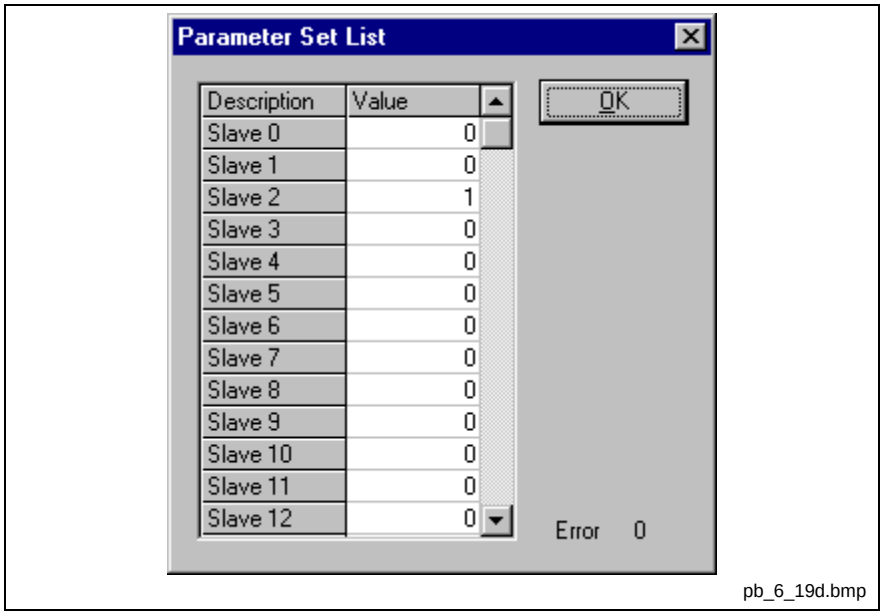

Fig. 8-20: **USR_INTF Parameter Set List**

Variable	Meaning
Slave x (x=0 .. 125)	0 = no or no valid parameter data set 1 = valid parameter data set

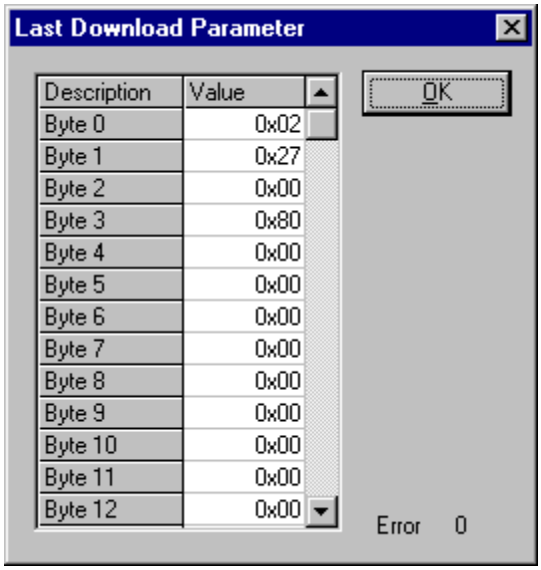

Fig. 8-21: **USR_INTF Last Download Param**

Variable	Meaning
Byte 0 to 119	Last parameter data set

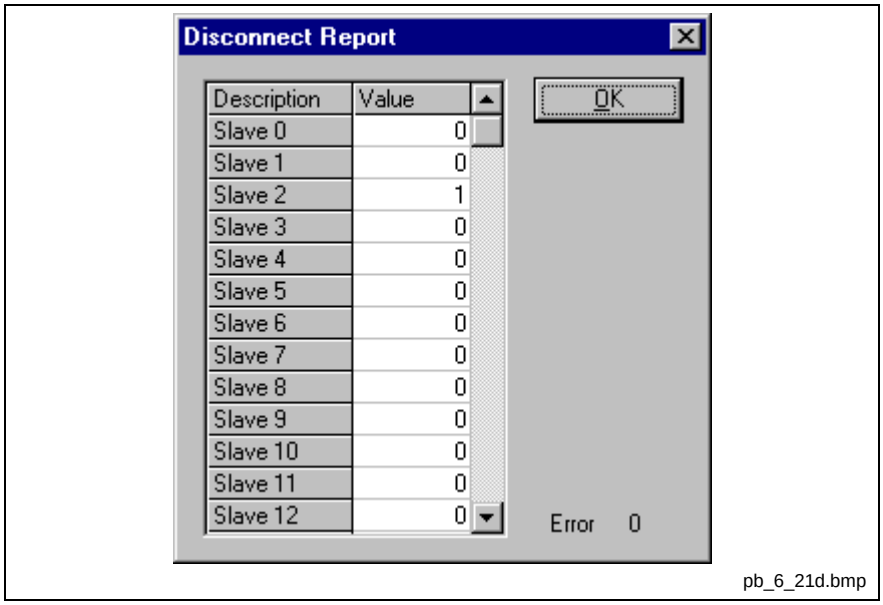

Fig. 8-22: **USR_INTF Disconnect Report**

Variable	Meaning
Slave x (x=0 .. 125)	Counter for disconnection for slave x (x = 0 to 125)

The status table shows the number of communication break downs (disconnections) resulted by a bus communication error for each slave station. The counter is only incremented, when the master has already communicated in the 'Data Exchange All' mode with all slaves. A fatal error is, when the maximum number of retries is reached (given by the max_retry_limit of the DP Norm). See bus parameter max_retry_limit.

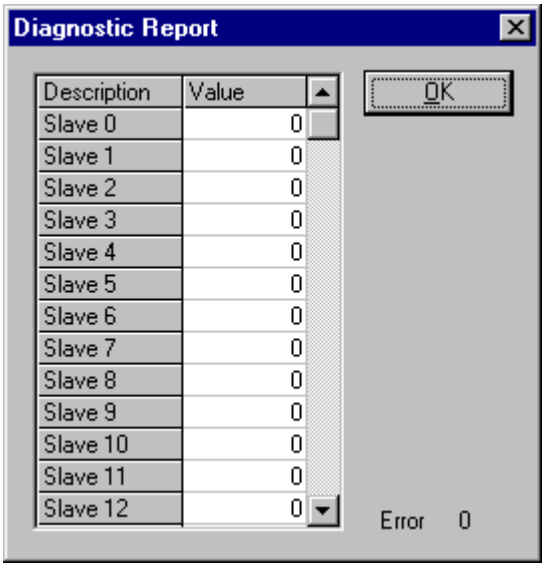

Fig. 8-23: **USR_INTF Diagnostic Report**

Variable	Meaning
Slave x (x=0 .. 125)	Counter for diagnostic reports for slave x (x = 0 .. 125)

The status table shows the number of diagnostic reports for each slave station that has reported to the master. For each received report the data_exchange state to this slave was left for one DP cycle to read out the diagnostic information.

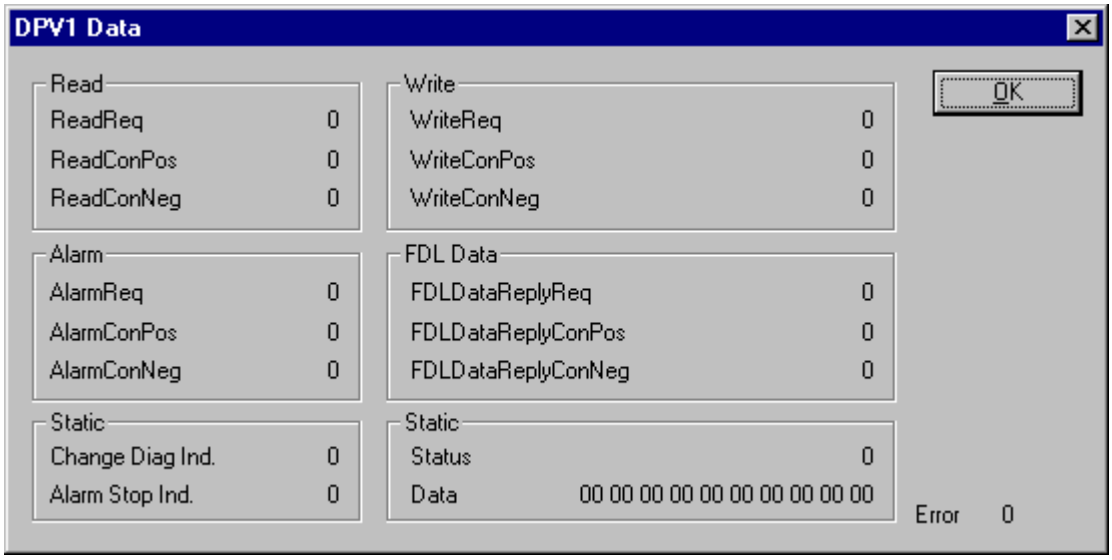

Fig. 8-24: **USR_INTF DPV1 Data**

Variable	Meaning
Read Req	Counter for Read Requests
Read Con Pos	Counter for Read Confirmations Positive
Read Con Neg	Counter for Read Confirmations Negative
Write Req	Counter for Write Requests
Write Con Pos	Counter for Write Confirmations Positive
Write Con Neg	Counter for Write Confirmations Negative
Alarm Req	Counter for Alarm Requests
Alarm Con Pos	Counter for Alarm Confirmations Positive
Alarm Con Neg	Counter for Alarm Confirmations Negative
FDL Data Reply Req	Counter for FDL Data Reply Requests
FDL Data Reply Con Pos	Counter for FDL Data Reply Confirmations Positive
FDL Data Reply Con Neg	Counter for FDL Data Reply Confirmations Negative
Change Diag Ind.	Counter for Change Diag Indication
Alarm Stop Ind.	Counter for Alarm Stop Indication
Stop Line	Counter for Stop Line
Alarm Not Enable	Counter for Alarm Stop Enable
Status	Counter for Status

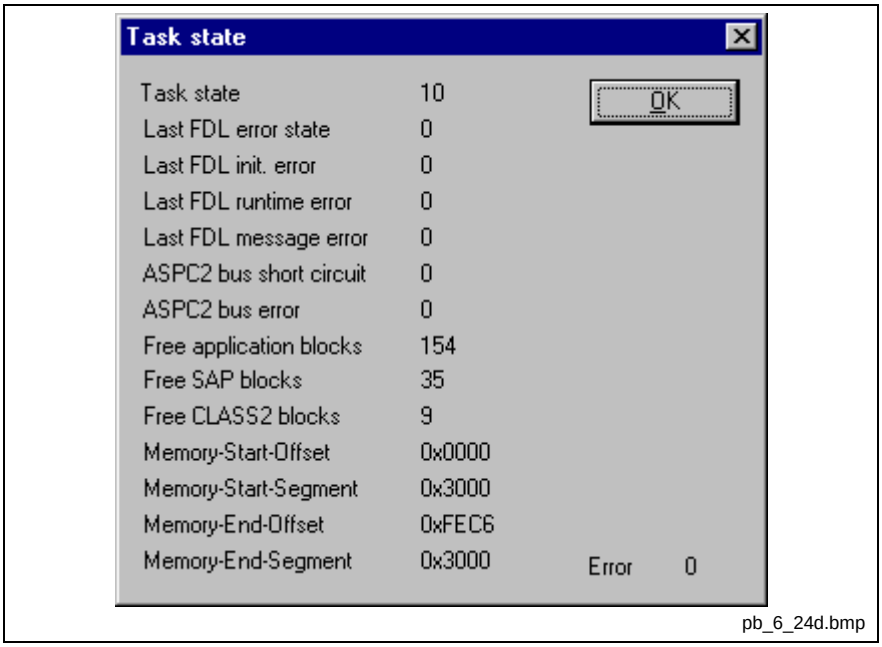

Fig. 8-25: **FDL_TASK Task State**

Variable	Meaning
Task State	Task state number
Last FDL error state	Error state
Last FDL init. Error	Initialization error
Last FDL runtime error	Runtime error
ASPC2 bus short circuit	Counter for occurred bus SyCon error reports or bus short circuits of the ASPC2
ASPC2 bus error	Counter for occurred bus error reports of the ASPC2
Free application blocks	Free application blocks of the software
Free SAP blocks	Free SAP blocks of the software
Free CLASS2 blocks	Free class 2 blocks of the software

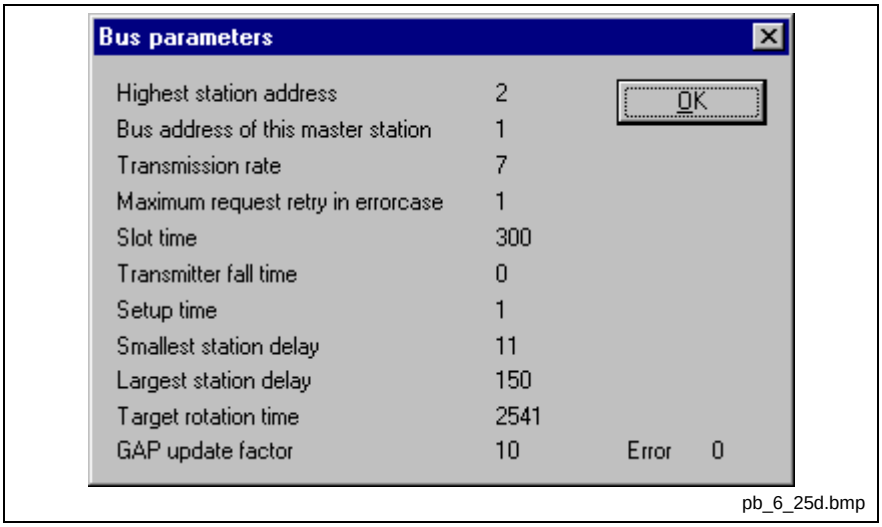

Fig. 8-26: **FDL_TASK Act. Bus parameter**

Display of the bus parameters

Variable	Meaning
Highest station address	HSA Highest Station address
Bus address of this master station	TS (This station) own bus address
Transmission rate	Transmission rate 0 = 9600; 1 = 19200; 2 = 93,75; 3 = 187,5; 4 = 500k; 7 = 1.5M; 8 = 3M; 9 = 6M; 10 = 12M
Maximum request retry in error case	Number of retries for bus errors
Slot time	TSL Slot Time
Transmitter fall time	TQUI Transmitter Fall Time
Setup time	TSET Setup Time
Smallest station delay	MIN TSDR minimum station delay
Largest station delay	MAX TSDR maximum station delay
Target rotation time	TTR Target Rotation Time
GAP update factor	G GAP Update Factor

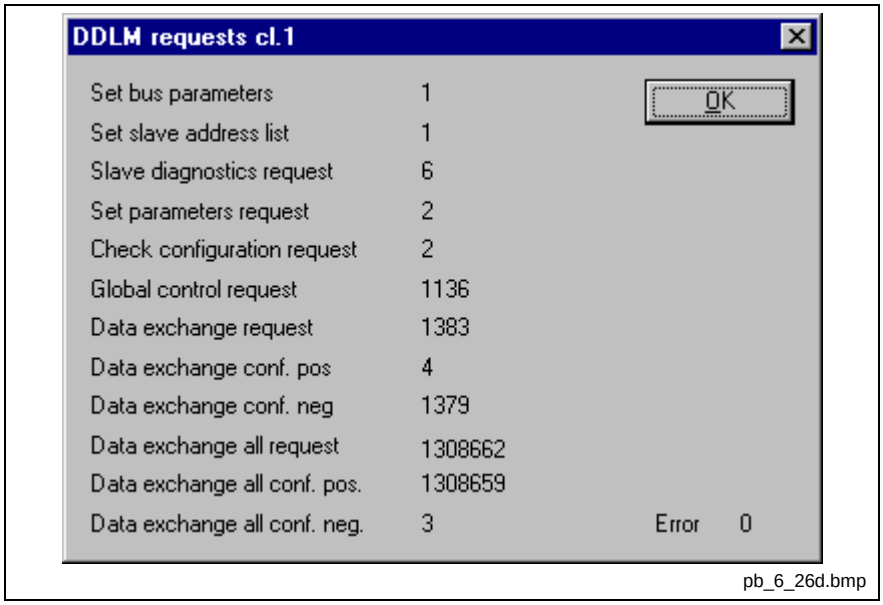

Fig. 8-27: **FDL_TASK DDLM Requests Class 1**

Variable	Meaning
Set bus parameters	Counter for 'Set-Bus-Par' Request
Set Slave address list	Counter for 'Set-Slave-List' Request
Slave diagnostic requests	Counter for 'Slave-Diag' Request
Set parameter request	Counter for 'Set-Prm' Request
Check configuration request	Counter for 'Check-Cfg' Request
Global control request	Counter for 'Global-Control' Request
Data exchange requests	Counter for 'Data-Exchange' Request
Data exchange conf pos	Counter for 'Data-Exchange' Confirmation positive
Data exchange conf neg	Counter for 'Data-Exchange' Confirmation negative
Data exchange all requests	Counter for 'Data-Exchange-All' Request
Data exchange all conf pos	Counter for positive Confirmation of 'Data-Exchange-All'
Data exchange all conf neg	Counter for negative Confirmation of 'Data-Exchange-All'

Services that are activated on the bus according to the PROFIBUS specification are counted in this window. Basically, on an error-free network only the 'data-exchange-all' counter should count up. The services 'set-slave-list', 'set-prm', 'chk-cfg', 'data-exchange' should count 1 for each configured slave device on an error free network start up. If the counter for these services count continuously then this indicates a bus error. If the service 'slavediag' is e.g. sporadically increased, the bus cable could be defective or there's no cable resistor. Another possibility could be a conscious error report of a slave module that activates the service in the master.

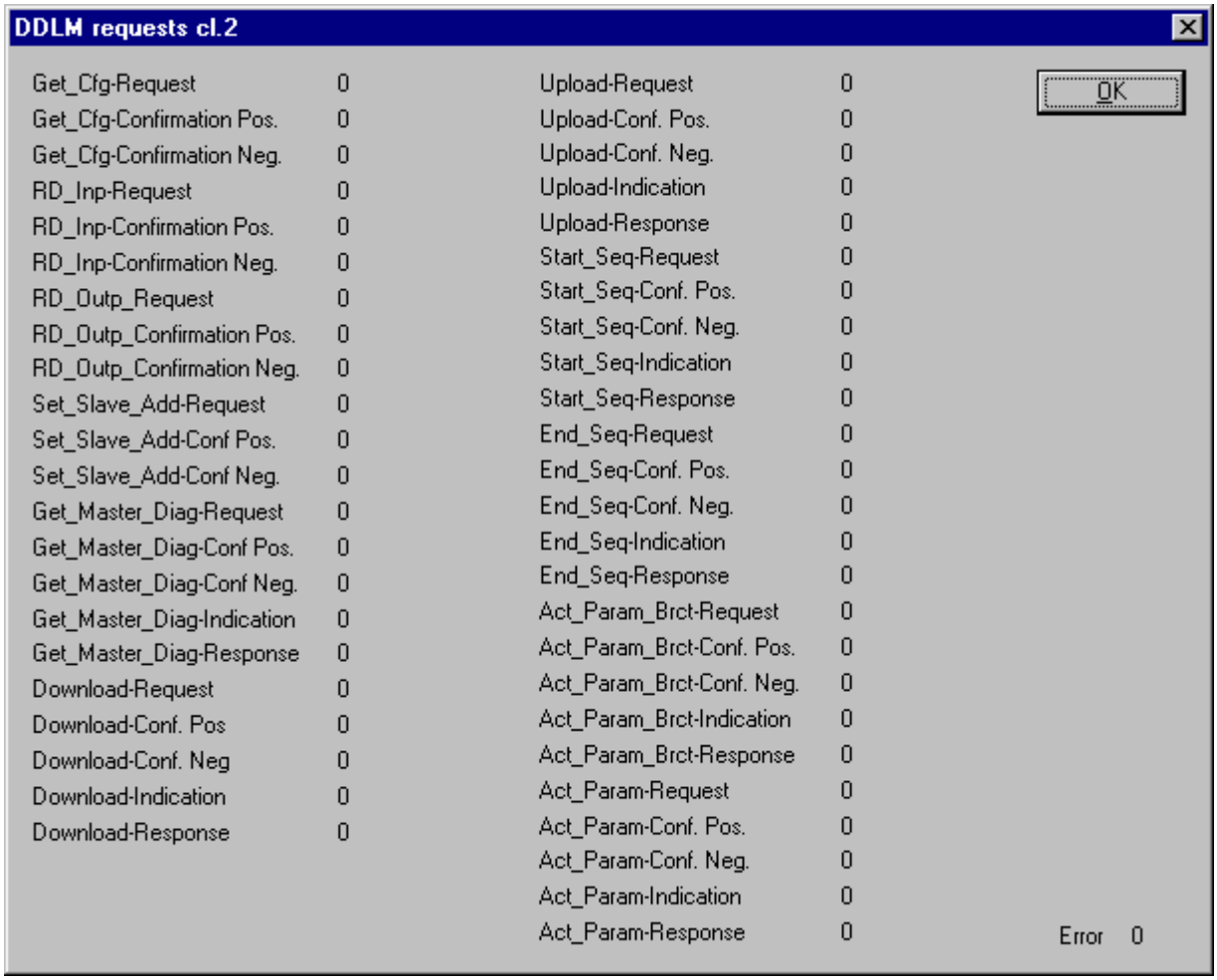

Fig. 8-28: **FDL_TASK DDLM Requests Class 2**

Variable	Meaning
Service/Function	Counter for this service/function

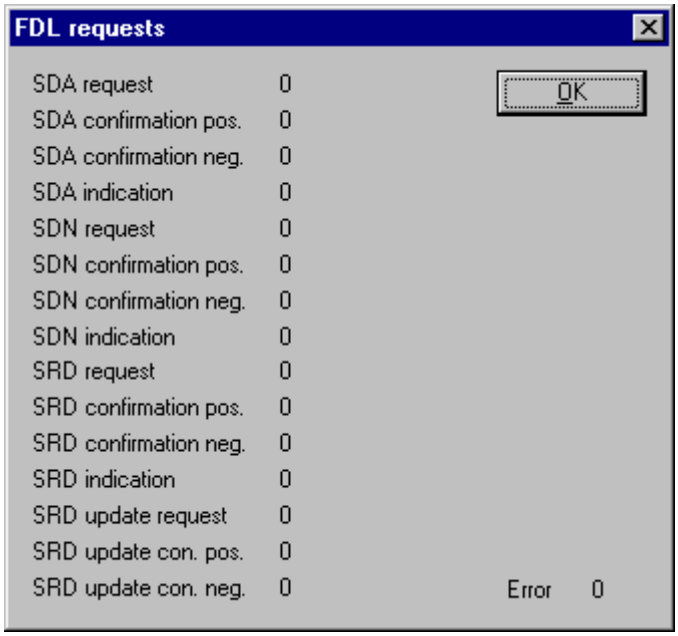

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Fig. 8-29: **FDL_TASK FDL Requests**

Variable	Meaning
SDA request	Counter for 'SDA' Request
SDA confirmation pos	Counter for 'SDA' Confirmation, positive
SDA confirmation neg	Counter for 'SDA' Confirmation, negative
SDA indication	Counter for 'SDA' Indication
SDN request	Counter for 'SDN' Request
SDN confirmation pos	Counter for 'SDN' Confirmation, positive
SDN confirmation neg	Counter for 'SDN' Confirmation, negative
SDN indication	Counter for 'SDN' Indication
SRD request	Counter for 'SRD' Request
SRD confirmation pos	Counter for 'SRD' Confirmation, positive
SRD confirmation neg	Counter for 'SRD' Confirmation, negative
SRD indication	Counter for 'SRD' Indication
SRD update request	Counter for 'SRD' Update Request
SRD update con pos	Counter for 'SRD' Update Confirmation, positive
SRD update con neg	Counter for 'SRD' Update Confirmation, negative

FDL Services that are activated on the bus according to the PROFIBUS specification are counted in this window. The request (send), its confirmation (positive or negative) and the indication (received) are counted.

Not all services/functions are supported by the firmware.

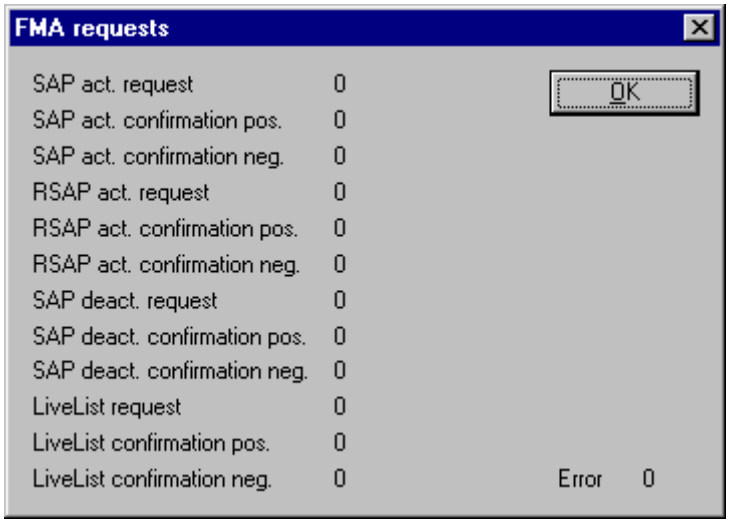


Fig. 8-30: **FDL_TASK FMA Requests**

Variable	Meaning
SAP act. Request	Counter for 'SAP Activate' Request
SAP act. Confirmation pos	Counter for 'SAP Activate' Confirmation, positive
SAP act. Confirmation neg	Counter for 'SAP Activate' Confirmation, negative
RSAP act. Request	Counter for 'RSAP Activate' Request
RSAP act. Confirmation pos	Counter for 'RSAP Activate' Confirmation, positive
RSAP act. Confirmation neg	Counter for 'RSAP Activate' Confirmation, negative
SAP deact. Request	Counter for 'SAP Deactivate' Request
SAP deact. Confirmation pos	Counter for 'SAP Deactivate' Confirmation, positive
SAP deact. Confirmation neg	Counter for 'SAP Deactivate' Confirmation, negative
LiveList request	Counter for 'LiveList' Request
LiveList confirmation pos	Counter for 'LiveList' Confirmation, positive
LiveList confirmation neg	Counter for 'LiveList' Confirmation, negative

FMA Services that are activated on the bus according to the PROFIBUS specification are counted in this window. The request (send) and its confirmation (positive or negative) are counted.

Not all services/functions are supported by the firmware.

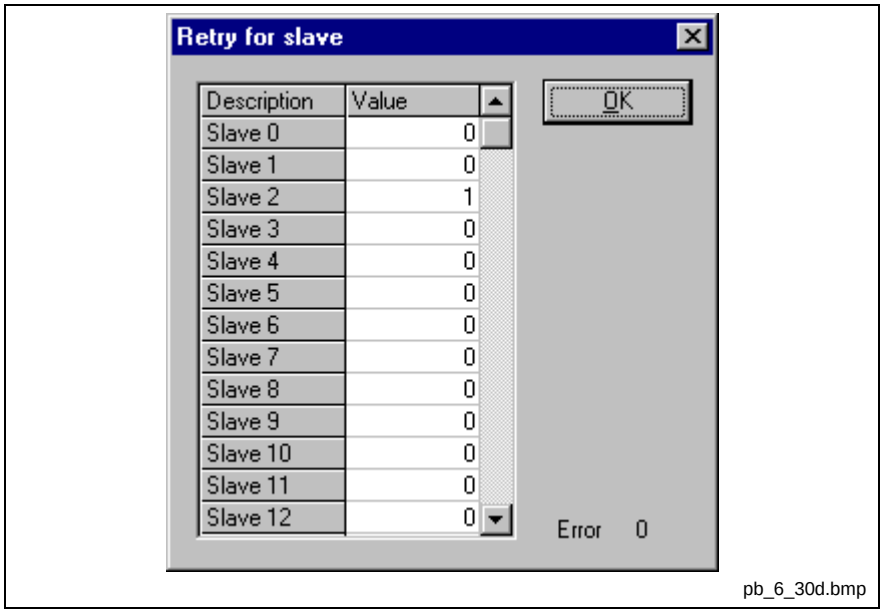


Fig. 8-31: **FDL_TASK DP: Retry for Slave**

Variable	Meaning
Slave x (x=0 .. 125)	Retries for slave x (x=0 .. 125)

If a telegram for a slave had to be send twice or up to 7 times because of a bus error, this is counted for each slave in this window. The single count of retries per telegram can't be read out here.

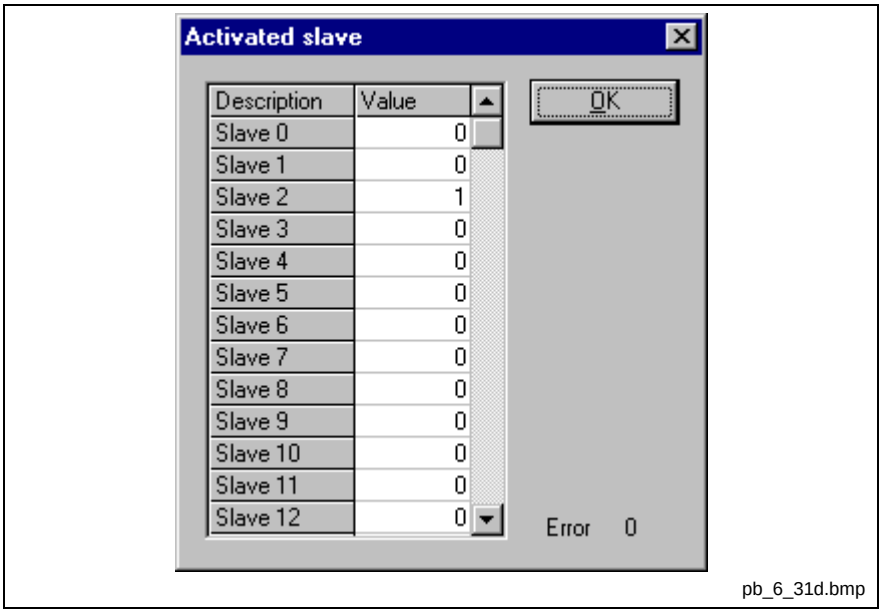


Fig. 8-32: **FDL_TASK DP: Activated Slave**

Variable	Meaning
Slave x (x=0 .. 125)	Inactive (=0) or active (=1) Slave x (x=0 .. 125)

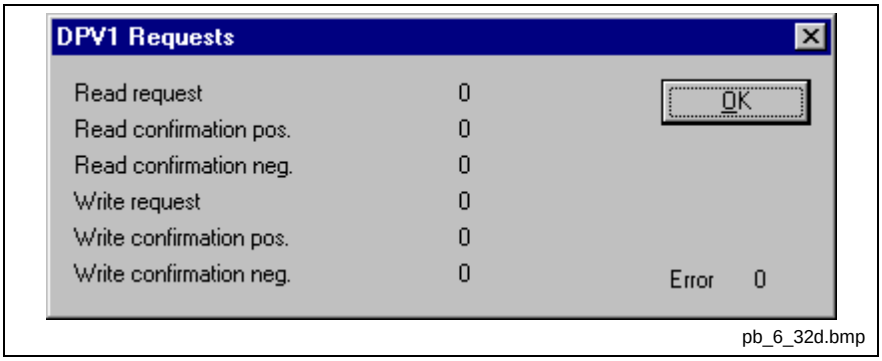


Fig. 8-33: **FDL_TASK DPV1 Requests**

Variable	Meaning
Read request	Counter for DPV1 Read request
Read confirmation pos	Counter for DPV1 Read confirmation positive
Read confirmation neg	Counter for DPV1 Read confirmation negative
Write request	Counter for DPV1 Write request
Write confirmation pos	Counter for DPV1 Write confirmation positive
Write confirmation neg	Counter for DPV1 Write confirmation negative

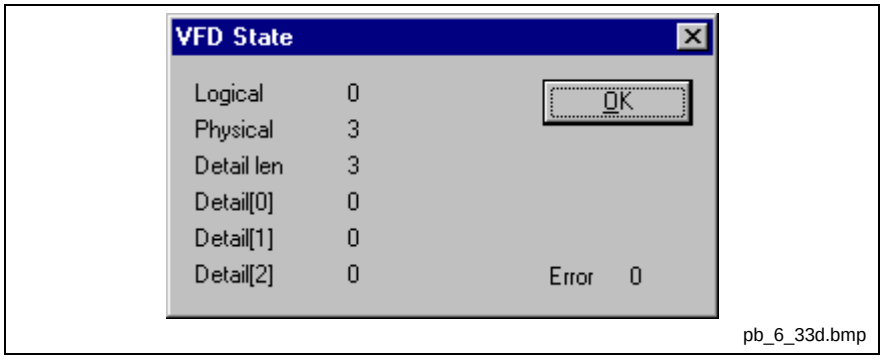


Fig. 8-34: **ALI_TASK VFD Status**

Variable	Meaning
Logical	
Physical	
Detail Len	
Detail[0]	
Detail[1]	
Detail[2]	

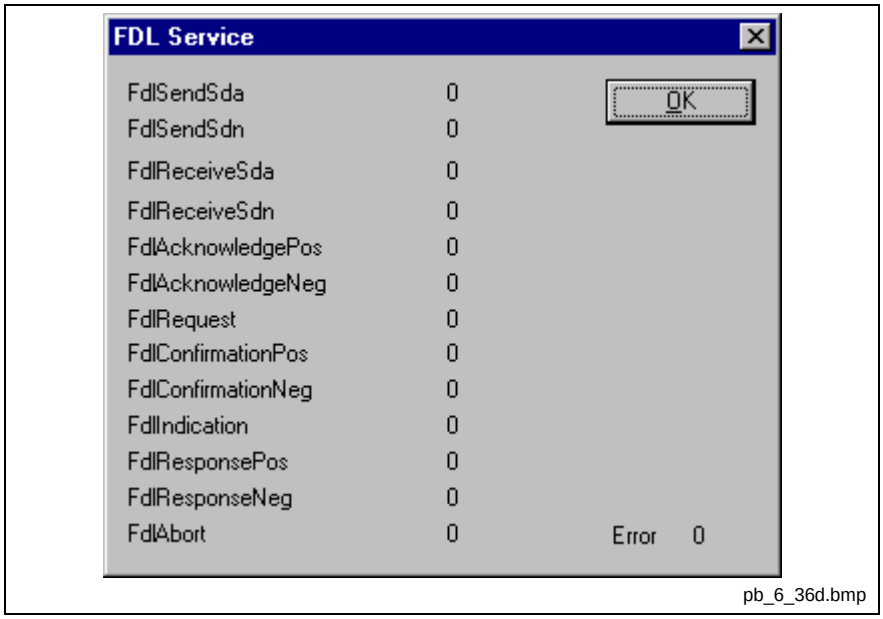


Fig. 8-35: **ALI_TASK FDL Services**

Variable	Meaning
FdlSendSda	Counter for FDL Send SDA
FdlSendSdn	Counter for FDL Send SDN
FdlReceiveSda	Counter for FDL Receive SDA
FdlReceiveSdn	Counter for FDL Receive SDN
FdlAcknowledgePos	Counter for FDL Acknowledge positive
FdlAcknowledgeNeg	Counter for FDL Acknowledge negative
FdlRequest	Counter for FDL Request
FdlConfirmationPos	Counter for FDL Confirmation positive
FdlConfirmationNeg	Counter for FDL Confirmation negative
FdlIndication	Counter for FDL Indication
FdlResponsePos	Counter for FDL Response positive
FdlResponseNeg	Counter for FDL Response negative
FdlAbort	Counter for FDL Abort

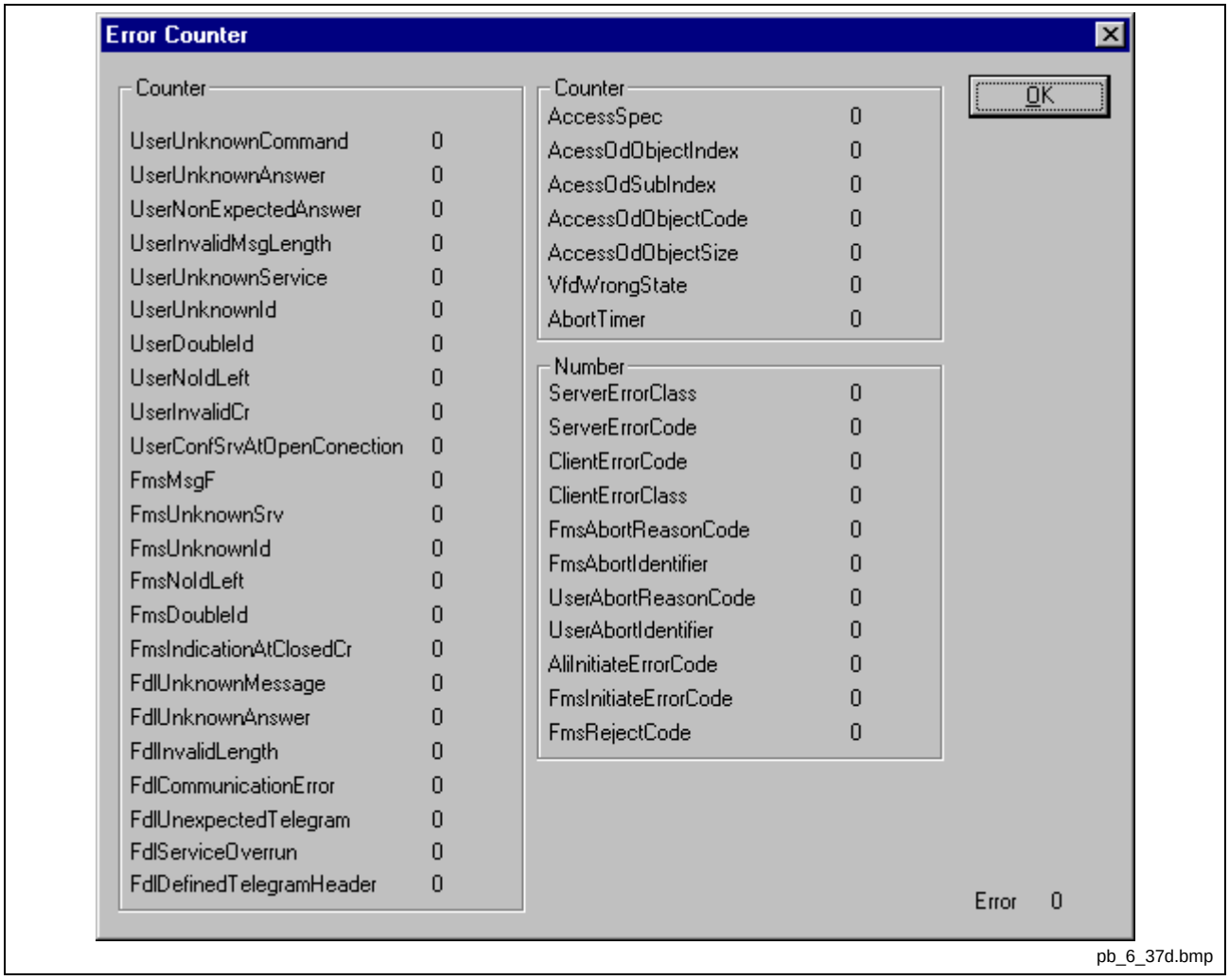


Fig. 8-36: **ALI_TASK Error Counter**

Variable	Meaning
User, FMS, FDL	Counter for errors

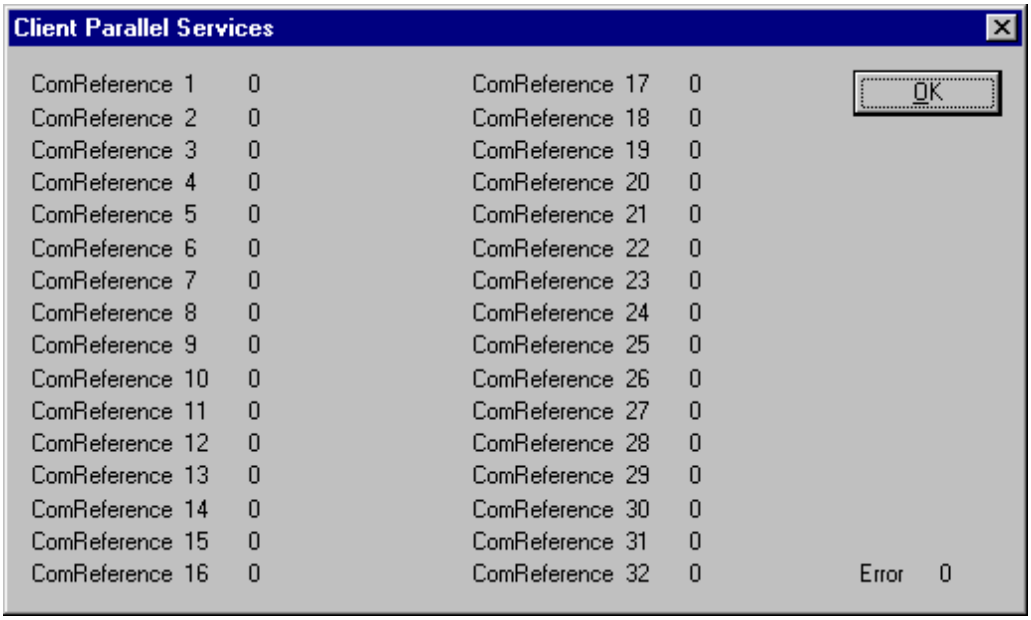


Fig. 8-37: **ALI_TASK Client Parallel Services**

Variable	Meaning
ComReference x (x = 1 ..32)	Counter for active client services

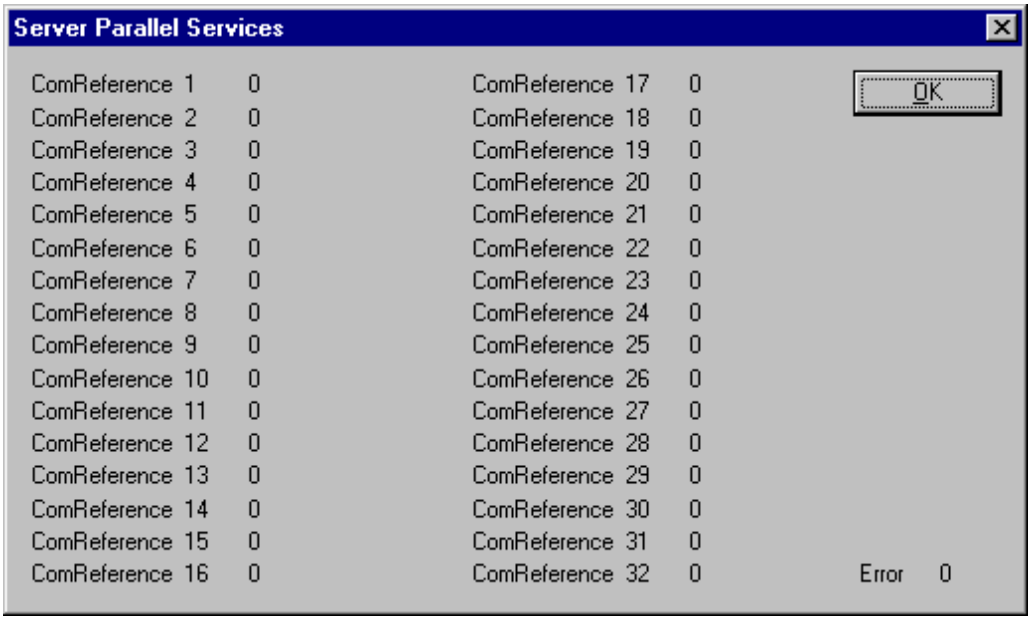


Fig. 8-38: **ALI_TASK Server Parallel Services**

Variable	Meaning
ComReference x (x = 1 ..32)	Counter for active server services

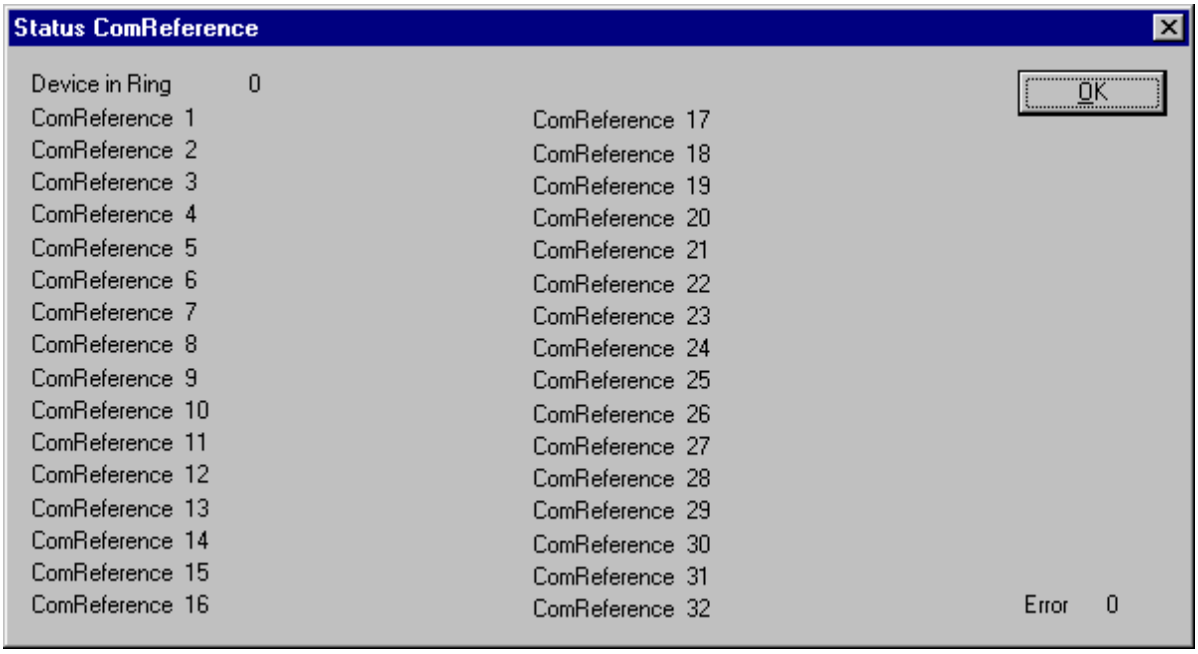


Fig. 8-39: **ALI_TASK Status ComReference**

Variable	Meaning
Device in Ring	Device in the token ring
ComReference x (x = 1 ..32)	State of the communication reference 0 = connection closed 1 = connection is established at the moment 2 = connection established

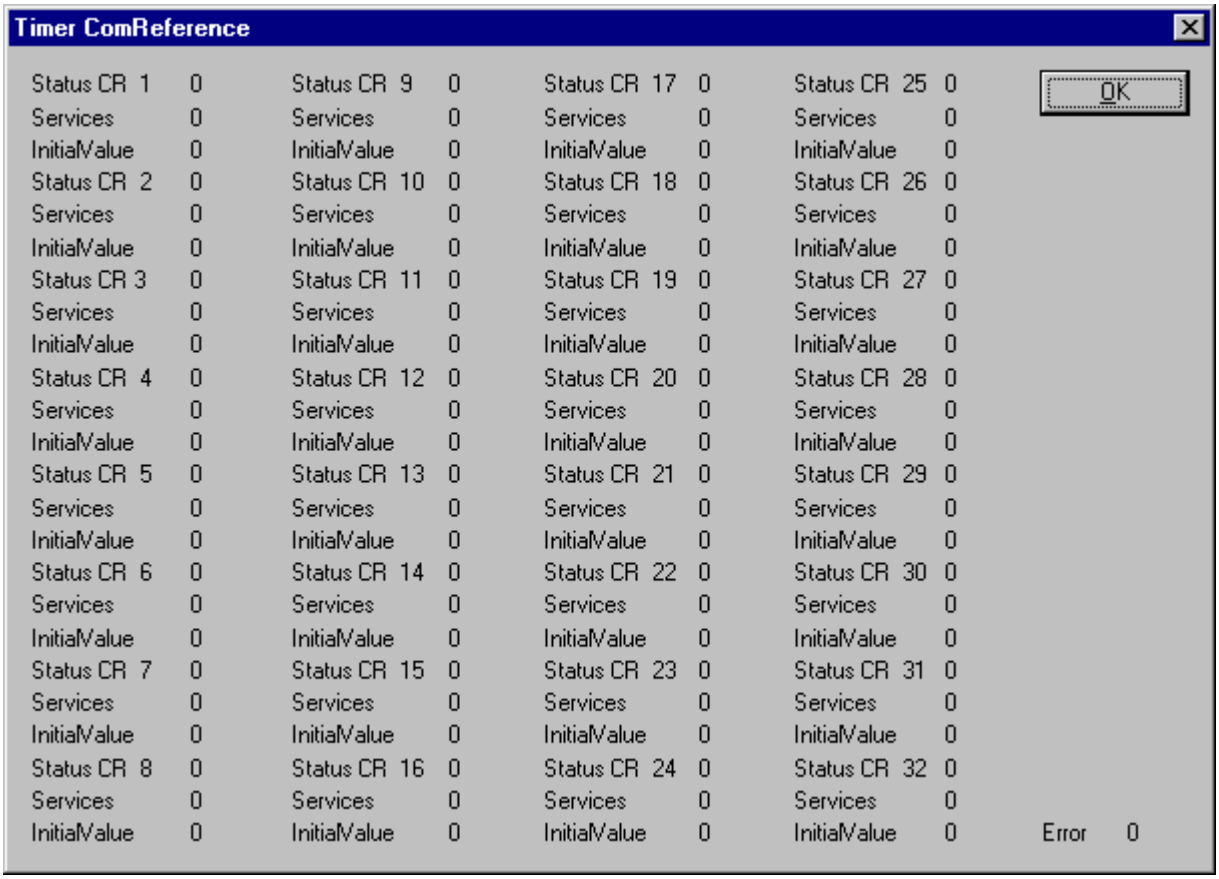


Fig. 8-40: **ALI_TASK Timer ComReference**

Variable	Meaning
Status CR x (x = 1 ..32)	State of the communication reference 0 = connection closed 1 = connection is established at the moment 2 = connection established
Services	
Initial value	

On the following pages the task state structures for PROFIBUS DP Slave are described.

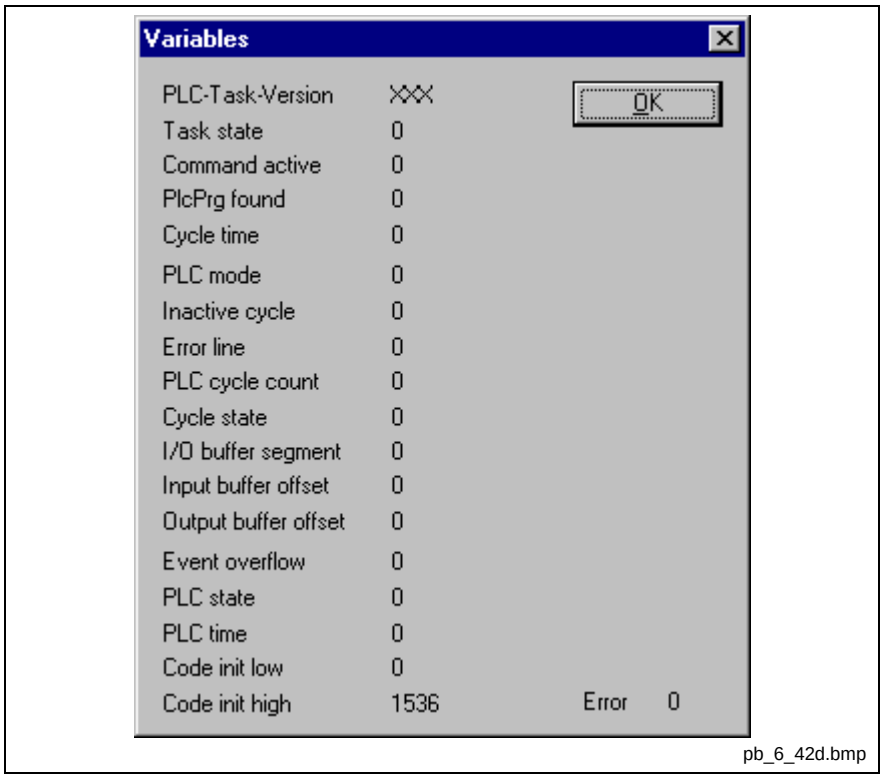
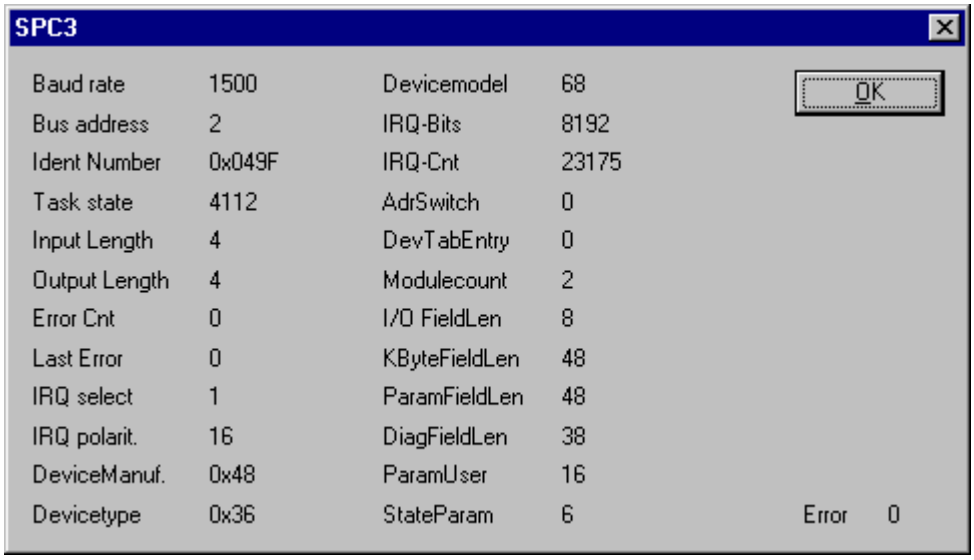


Fig. 8-41: **PLC_TASK Variables**

The variables of the PLC task are not longer supported in newer firmware because of performance reasons.



pb_6_43d.bmp

Fig. 8-42: **SPC3CTRL SPC3**

Variable	Meaning
Baud Rate	Baud rate
Bus Address	Bus address
Ident Number	Ident number
Task State	Task state
Input Length	Length of input bytes for cyclic transfer
Output Length	Length of output bytes for cyclic transfer
Error Cnt	Error counter
Last Error	Error code of the last error
IRQ Select	Number of the SPC3 interrupt line
IRQ Polarit.	Polarity of the SPC3 interrupt line
Device Manuf.	Device manufacturer
Device Type	Device type
Device Model	Device model
IRQ Bits	Type of the last SPC3 interrupts
IRQ Cnt	Counter for SPC3 interrupt requests
Addr Switch	Type of the address switch
DevTabEntry	Internal usage
Module Count	Number of the configured input/output modules on the PROFIBUS
I/O Field Len	Length of the input/output data buffer in the SPC3
Kbyte Field Len	Length of the configuration data buffer in the SPC3
Param Field Len	Length of the parameter data buffer in the SPC3
Diag Field Len	Length of the diagnostic data buffer in the SPC3
Param User	Internal usage
State Param	Internal usage

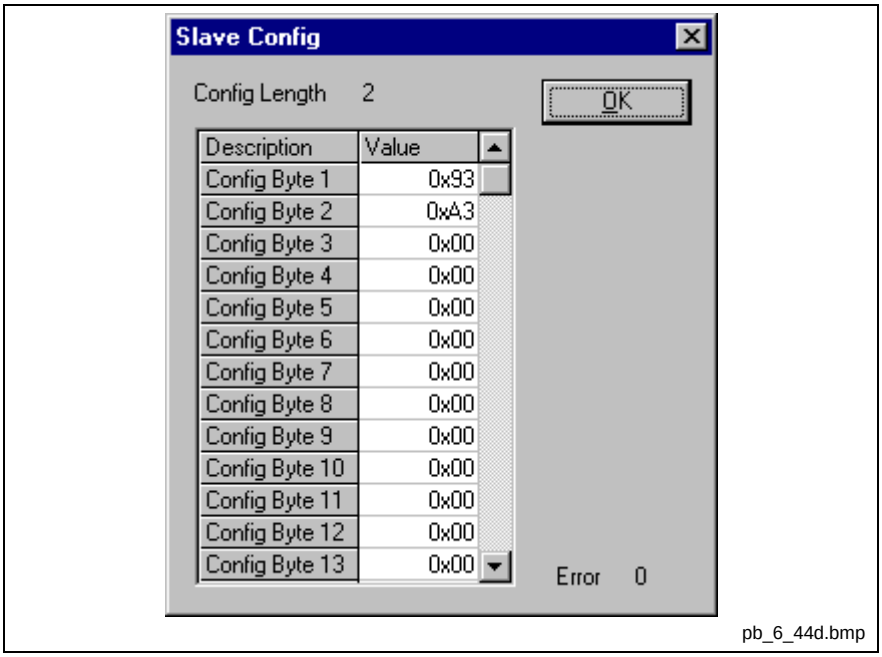


Fig. 8-43: **SPC3CTRL Slave Config**

Variable	Meaning
Config Length	Length of the actual configuration data in the slave
Config Byte 1	Configuration data Byte 1
...	...

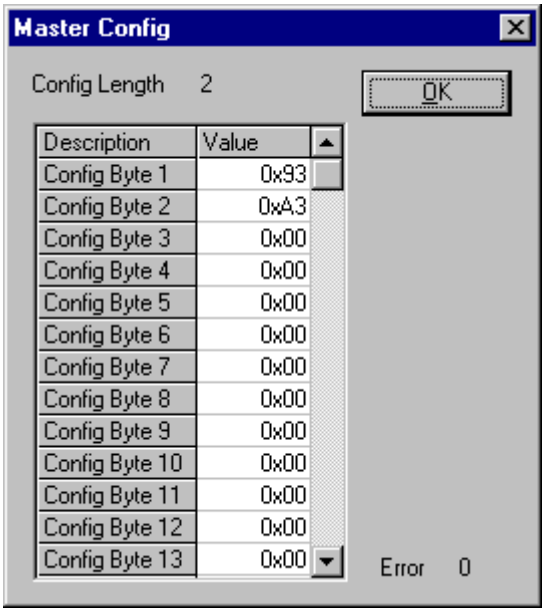


Fig. 8-44: **SPC3CTRL Master Config**

Variable	Meaning
Config Length	Length of the configuration data send by the master
Config Byte 1	Configuration data Byte 1
...	...

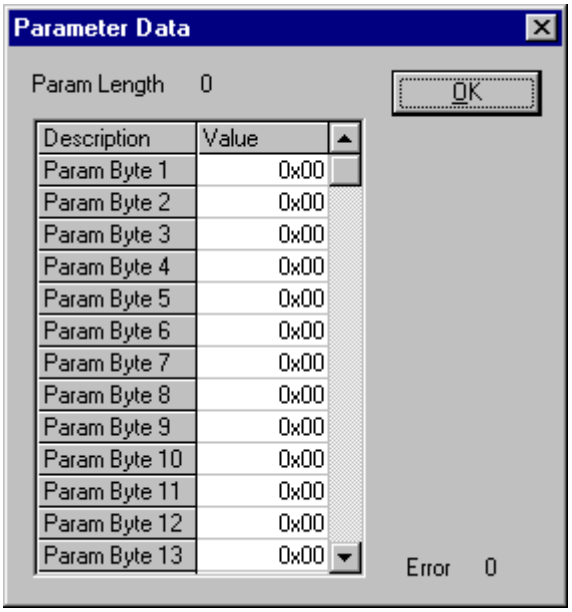


Fig. 8-45: **SPC3CTRL Param Data**

Variable	Meaning
Param Length	Length of the User-Param-Data send by the master
Param Byte	User-Param-Daten-Byte 1
...	...

The standard parameter data bytes are not displayed.

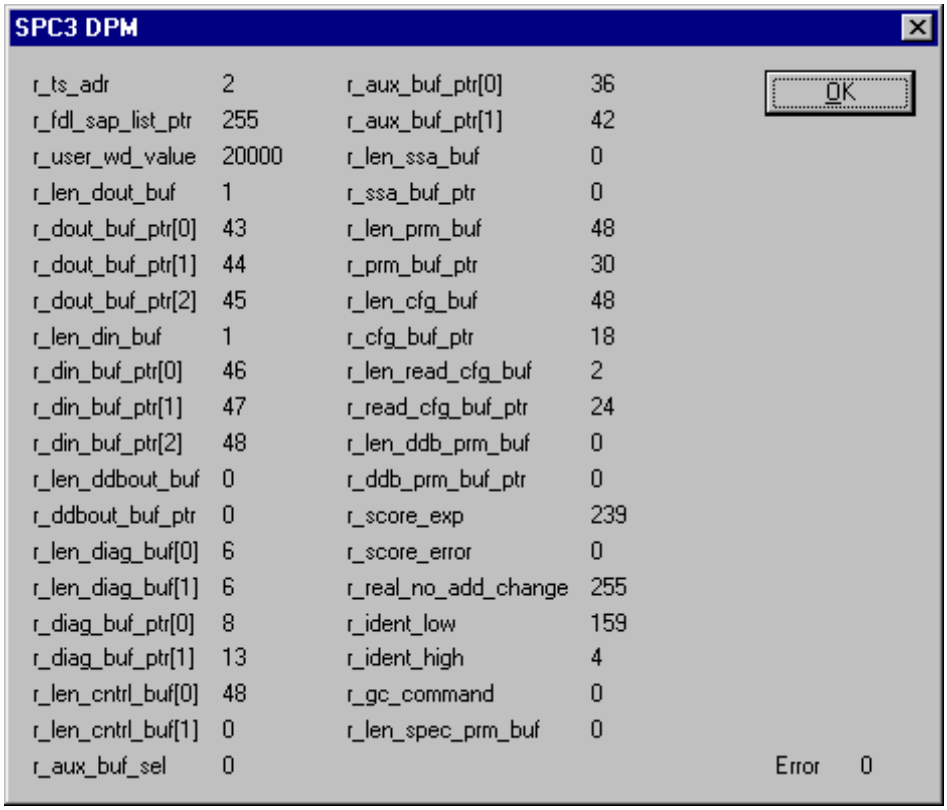


Fig. 8-46: **SPC3CTRL DPM**

Display of the internal variables of the SPC3 PROFIBUS ASIC.

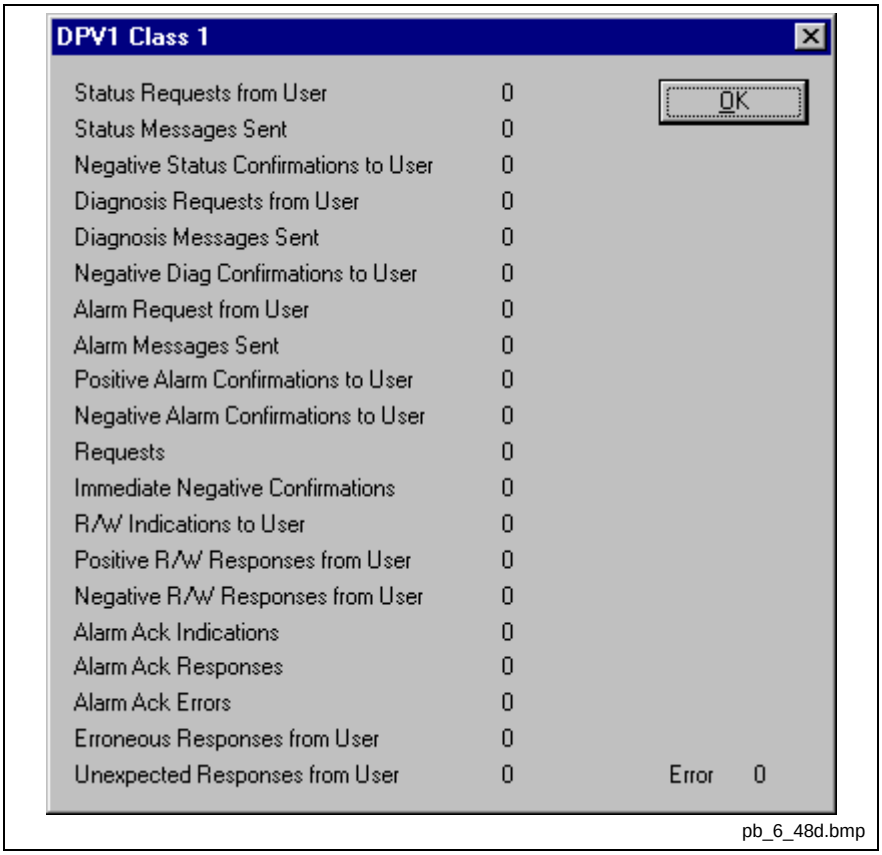


Fig. 8-47: **SPC3CTRL DPV1 Class 1**

Variable	Meaning
Status Requests from User	Status reports by the user
Status Messages Sent	Status reports sent to the PROFIBUS
Negative Status Confirmations to User	Status reports rejected with error by the user
Diagnosis Requests from User	Single diagnostic reports by the user
Diagnosis Messages Sent	Single diagnostic reports sent to the PROFIBUS
Negative Diag Confirmations to User	Single diagnostic reports rejected with error by the user
Alarm Request from User	Alarm reports by the user
Alarm Messages Sent	Alarm reports sent to the PROFIBUS
Positive Alarm Confirmations to User	Alarm reports confirmed by the user
Negative Alarm Confirmations to User	Alarm reports rejected by the user
Requests	DPV1 class 1 requests from PROFIBUS received
Immediate Negative Confirmations	DPV1 class 1 requests rejected with error
R/W Indications to User	Read/Write requests forwarded to the user
Positive R/W Responses from User	Read/Write requests from the user (positive)
Negative R/W Responses from User	Read/Write requests from the user (negative)
Alarm Ack Indications	Alarm acknowledgement from PROFIBUS received
Alarm Ack Responses	Alarm acknowledgement answered
Alarm Ack Errors	Alarm acknowledgement with errors
Erroneous Responses from User	DPV1 class 1 answers from the user with error
Unexpected Responses from User	Unexpected DPV1 class 1 answers from the user

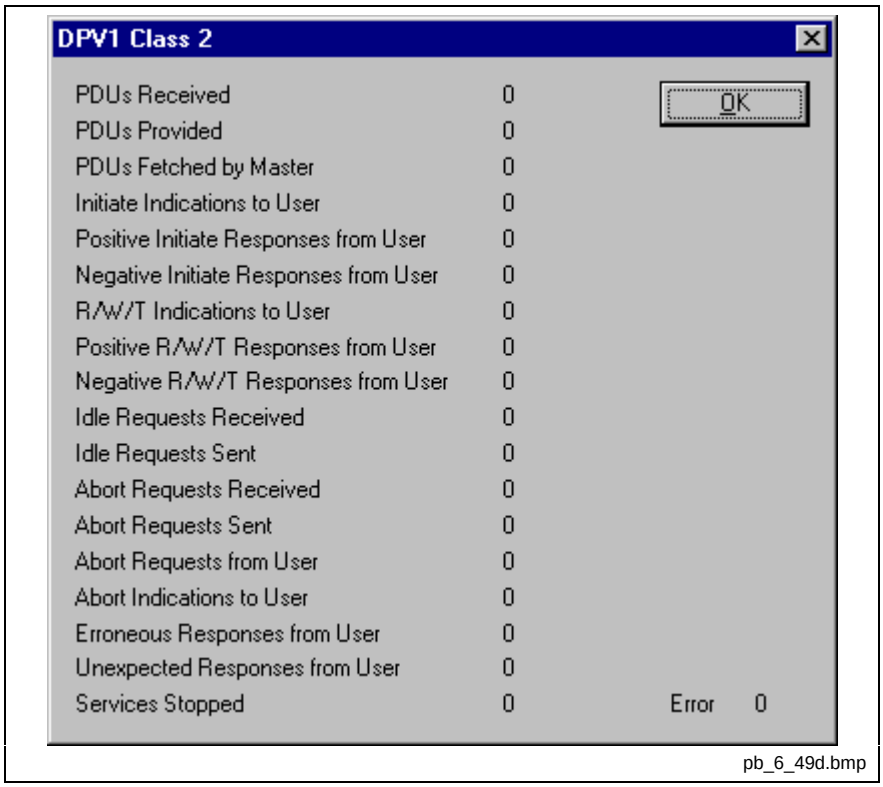


Fig. 8-48: **SPC3CTRL DPV1 Class 2**

Variable	Meaning
PDUs Received	DPV1 class 2 PDUs from PROFIBUS received
PDUs Provided	DPV1 class 2 PDUs given to the PROFIBUS
PDUs Fetched by Master	DPV1 class 2 PDUs taken by the master on the PROFIBUS
Initiate Indications to User	Initiate indication forwarded to the user
Positive Initiate Responses from User	Initiate response of the user (positive)
Negative Initiate Responses from User	Initiate response of the user (negative)
R/W/T Indications to User	Read/Write/Data transport indication forwarded to the user
Positive R/W/T Responses from User	Read/Write/Data transport responses of the user (positive)
Negative R/W/T Responses from User	Read/Write/Data transport responses of the user (negative)
Idle Requests Received	Idle telegrams received from PROFIBUS
Idle Requests Sent	Idle telegrams sent to PROFIBUS
Abort Requests Received	Abort request received from PROFIBUS
Abort Requests Sent	Abort request sent to PROFIBUS
Abort Requests from User	Abort request from user
Abort Indications to User	Abort indication forwarded to user
Erroneous Responses from User	DPV1 class 2 answers of the user with error
Unexpected Responses from User	Unexpected DPV1 class 2 answers of the user
Services Stopped	DPV1 class 2 services stopped

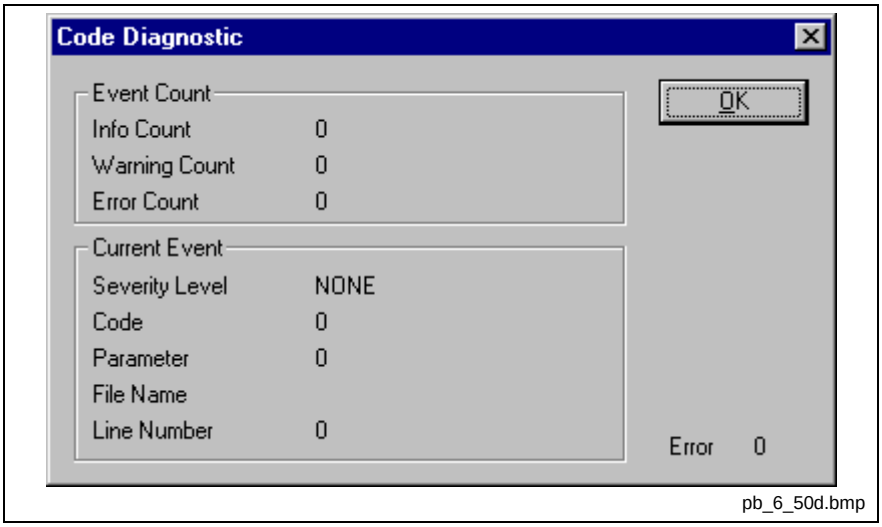


Fig. 8-49: **SPC3CTRL Code Diagnostic**

Display for state and error reports from the firmware.

8.4 User Data

I/O Monitor

This is an easy way of viewing and changing the first 32 bytes of the process data image.

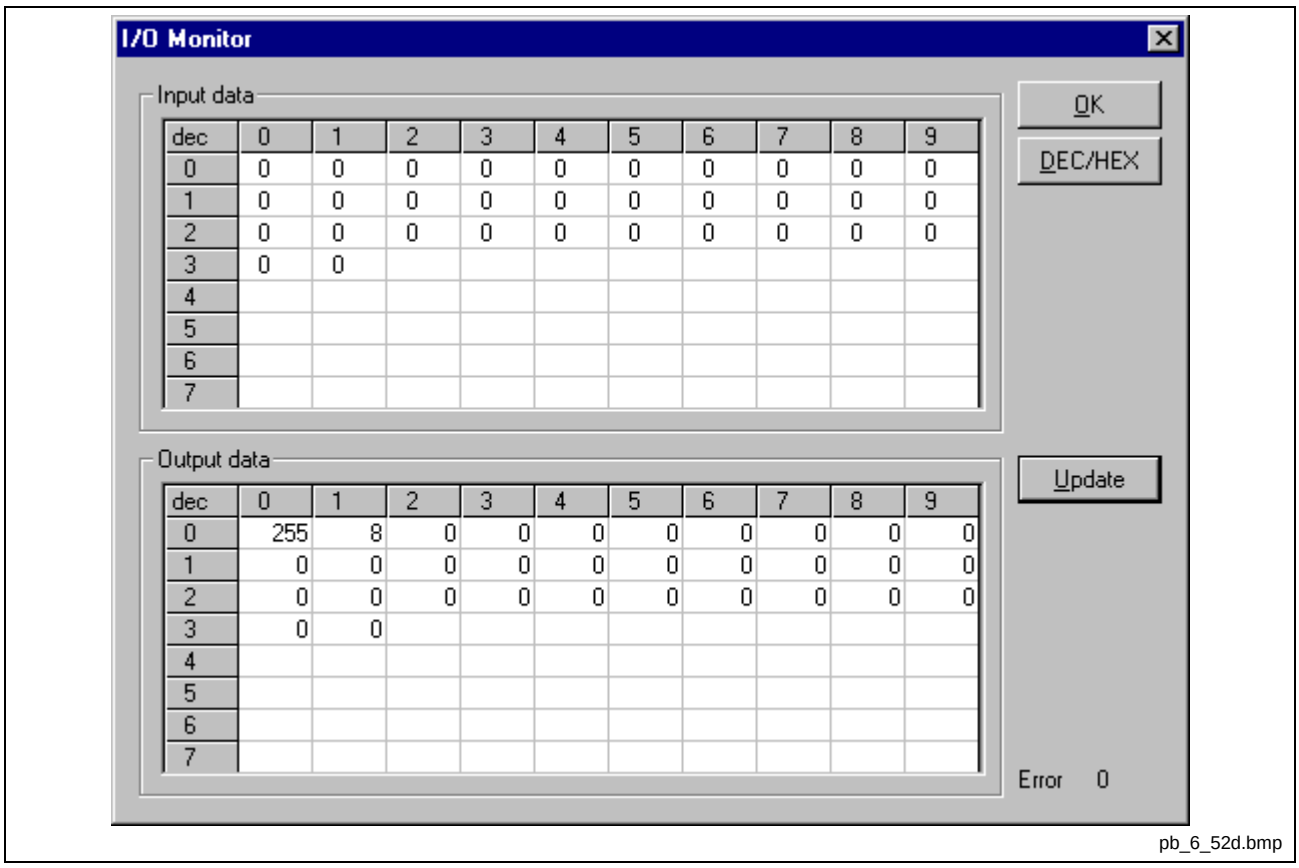


Fig. 8-50: Online > IO Monitor

DEC/HEX converts the display of the input data. The output data are always in the decimal form.

Enter the output value and then press **Update**.

Always the first 32 input and output bytes of the process depiction are shown, also when these bytes have not been occupied by the configuration.

The display is always in a byte manner.

A more comfortable display is offered by the I/O Watch Monitor that is described in the next section.

I/O Watch

The I/O Watch Monitor can be used in place of the I/O Monitor and offers more functionalities.

- Various data formats: Hex, Unsigned Decimal, Signed Decimal, Bit
- The I/O Watch Monitor works symbol oriented
- It is not necessary to know the offset addresses

The I/O Watch Monitor function is supported by PROFIBUS DP Master from version 1.140 upwards.

The following list contains the typical steps to use the I/O Watch Monitor.

Preconditions:

- The project/configuration already exists, containing a PROFIBUS DP Master and the PROFIBUS DP Slave(s) as described in chapter Configuration Sequence on page 5-1.
- The Configuration has been downloaded into the PROFIBUS DP Master using **Online > Download**
- Running bus system

1. Open the existing project using **File > Open**.
2. Open the Windows drop-down menu and select **Window > Logical Network View** to change the window. A window with three sections opens:

Left Window	Center Window	Right Window
Project tree structure	Tag / Symbol	IO Watch

3. Open the tree structure in the left window to reach the I/O module of the device desired:

Project > Master > Slave > Module > (if existing) Sub module

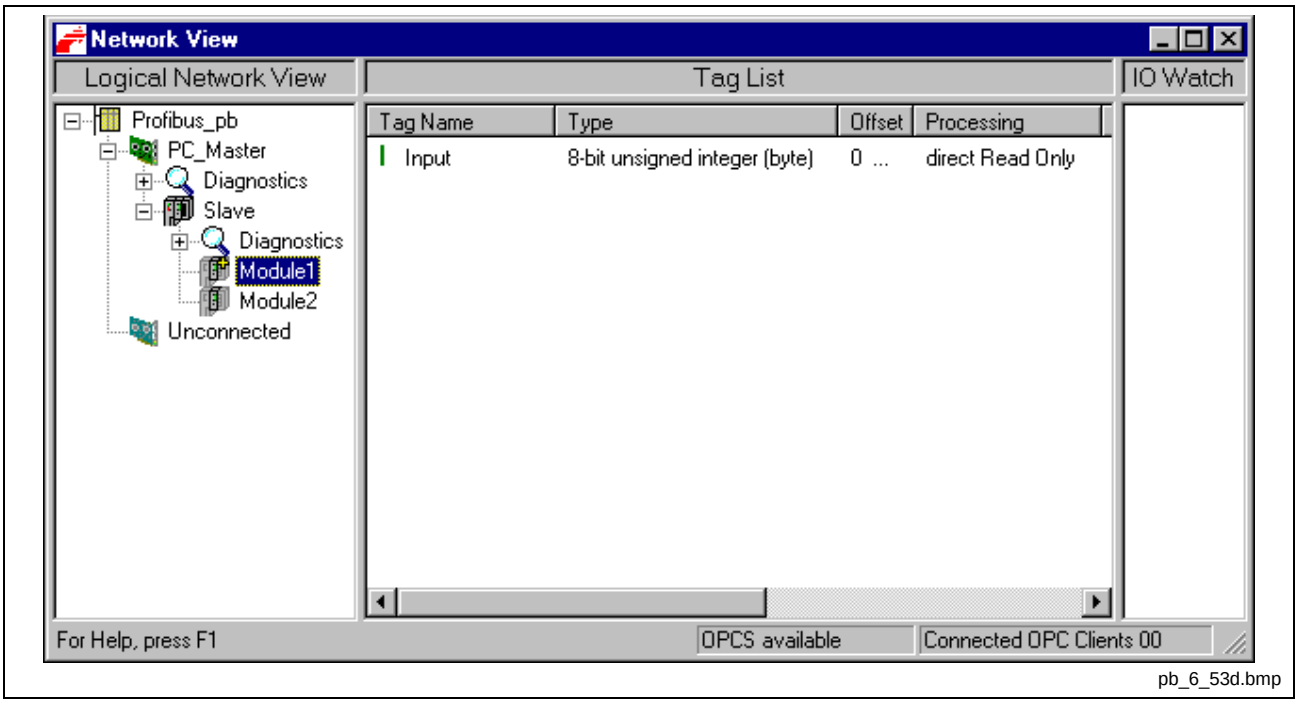


Fig. 8-51: Logical Network View and I/O Watch

4. Left click on the module desired and the tags (I/Os) will be displayed in the center window of the **Logical Network View**.
5. Select with the left mouse button the tag/symbol desired and drag and drop them in the right window of the **Logical Network View**.
6. In the right window select the desired tag with the left mouse click to highlight it then right mouse click to open a menu. Select **Start**. A new window called **I/O Watch** appears.
7. A table shows the Device, Symbolic Name, IEC Address (Offset), Data type Representation and Value. Select the line with the desired information. Click on **Hex** under Representation and select the way the values are to be displayed. Choices are Hex, Decimal unsigned, Decimal signed, Bit pattern.
8. Input data are displayed and can't be changed. Output data can be entered into the value column.

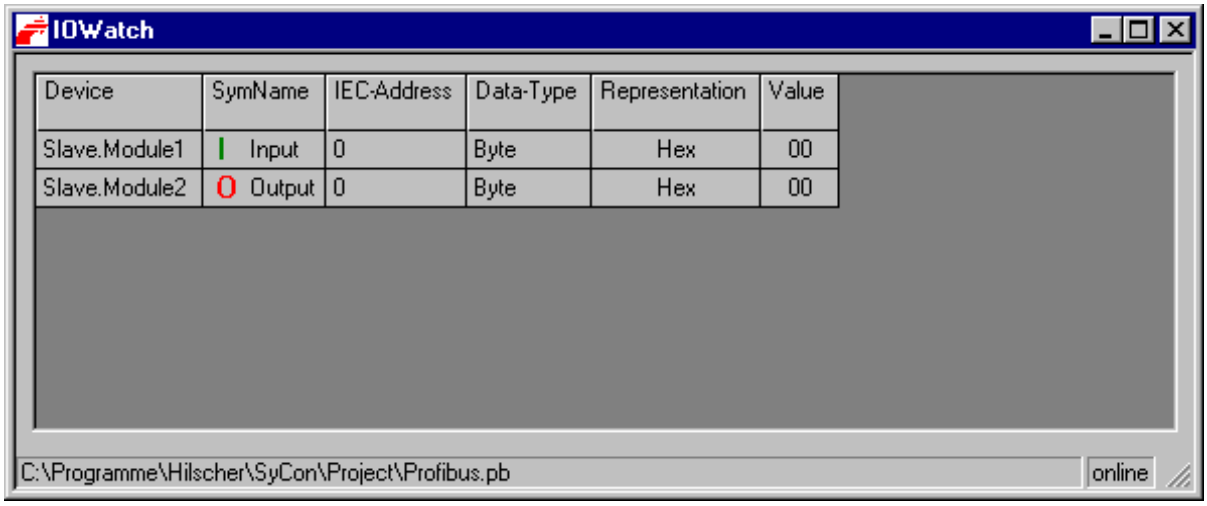


Fig. 8-52: I/O Watch Window

In column "Representation" you can choose the data type: Bit Pattern, Char, Decimal Signed, Decimal Unsigned, Hex.

To close this window use ALT-F4 or click in the upper left corner of the window select Exit.

8.5 PROFIBUS Services

Setting the Slave Address

First the desired slave device must be chosen with a left mouse click on the symbol of the slave. Then set the stations address of a slave at the PROFIBUS with the Online **> Set Slave Address** menu.

Enter the new address into the **New station address** field. If you do not want to allow further alterations to the station address, mark the **No additional changing** field. If required, enter further parameters in hexadecimal format into **Remote Slave parameter** field. Activate the command with the **OK** button.

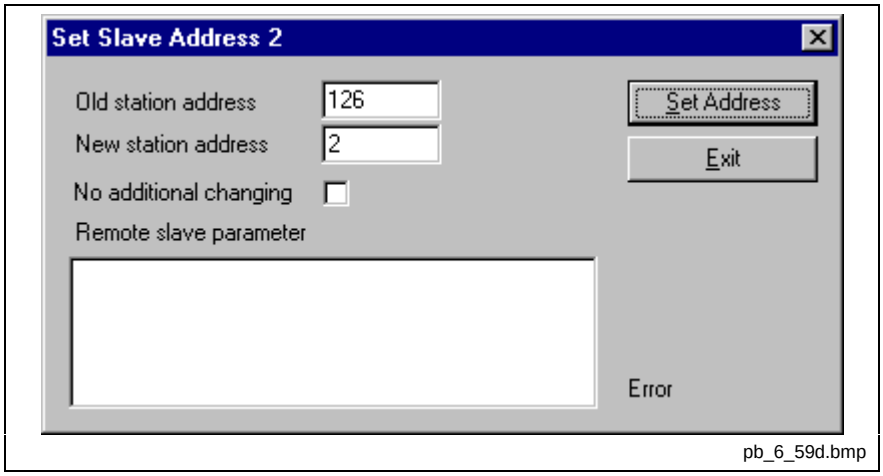


Fig. 8-53: Online > Set Slave address

The setting of the station address is only possible for slaves that support this service.

Message Monitor for Testing of DPV1 (at Master)

In the following, the Message Monitor for reading and writing via DPV1 at the master is described.

The following must be entered in the Message Monitor in order to read data via DPV1 from a slave:

Message header		
Rx = 3 (always)	Tx = 255	
Ln = (calculated)	No = 0 .. 255	
A = 0	F = 0	
B = 17	E = 0	
Telegram header	**Meaning for DPV1**	**Value range**
Device Adr	Station address of the slave	0 .. 126
Data Area	Unused	0
Data Address	Slot	0 .. 254
Data Index	Index	0 .. 255
Data Count	Data Count	1 .. 240
Data Type	Data Type	10
Function	Read	1

Fig. 8-54: Message Monitor – Example DPV 1 Read

The following must be entered in the Message Monitor in order to write data via DPV1 to a slave:

Message header		
Rx = 3 (always)	Tx = 255	
Ln = (calculated)	No = 0 .. 255	
A = 0	F = 0	
B = 17	E = 0	
Telegram header	**Meaning for DPV1**	**Value range**
Device Adr	Station address of the slave	0 .. 126
Data Area	Unused	0
Data Address	Slot	0 .. 254
Data Index	Index	0 .. 255
Data Count	Data Count	1 .. 240
Data Type	Data Type	10
Function	Write	2
Send data		
Fill in as many data as the value in data count		

Fig. 8-55: Message Monitor – Example DPV 1 Write

Message Monitor for Testing of DPV1 (at Slave)

In the following, the Message Monitor for reading and writing via DPV1 at the slave is described.

The following must be entered in the Message Monitor in order to read data via DPV1 from a slave. For this purpose, first a read message must have been sent from the master to the slave. The slave creates an answer as follows:

Message header		
Rx = 3 (always)	Tx = 255	
Ln = (calculated)	No = 0 .. 255 (taken from command message)	
A = 17	F = 0	
B = 0	E = 0	
Telegram header	**Meaning for DPV1**	**Value range**
Device Adr	Station address of the slave	0 .. 126
Data Area	Unused	0
Data Address	Slot	0 .. 254
Data Index	Index	0 .. 255
Data Count	Data Count	1 .. 240
Data Type	Data Type	10
Function	Read	1
Read Data		
Fill in as many data as the value in data count		

Fig. 8-56: Message Monitor – Example DPV 1 Read

The following must be entered in the Message Monitor in order to write data via DPV1 to a slave. For this purpose first a write message must have been sent from the master to the slave. The slave creates an answer as follows:

Message header		
Rx = 3 (always)	Tx = 255	
Ln = (calculated)	No = 0 .. 255 (taken from command message)	
A = 17	F = 0	
B = 0	E = 0	
Telegram header	**Meaning for DPV1**	**Value range**
Device Adr	Station address of the slave	0 .. 126
Data Area	Unused	0
Data Address	Slot	0 .. 254
Data Index	Index	0 .. 255
Data Count	Data Count	1 .. 240
Data Type	Data Type	10
Function	Write	2

Fig. 8-57: Message Monitor – Example DPV 1 Write

9 File, Print, Export and View

9.1 File

Open

An existing project can be opened with **File > open.**

Save and Save As

When the file name is known, then the configuration can be saved under the **File > Save** menu, otherwise the **File > Save As** menu must be selected.

Close

The current project can be closed with **File > Close**.

9.2 Print

After the current printer has been selected in the **File > Printer Setup** menu, the configuration can be printed out under the **File > Print** menu. For a page view, select the **File > Page View** menu.

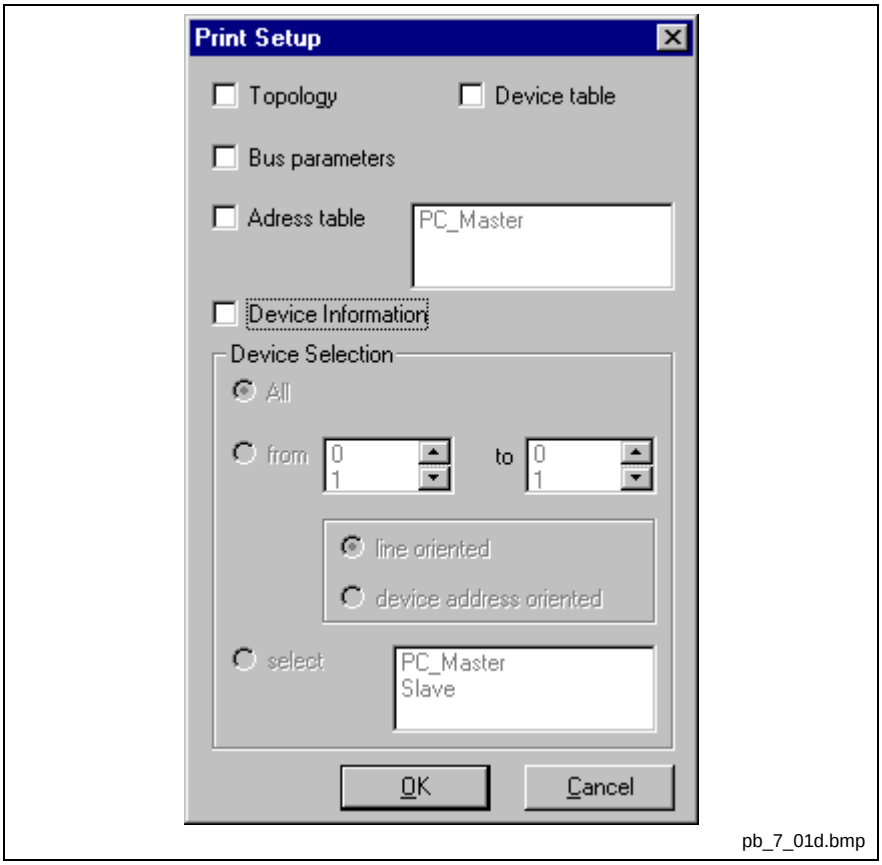


Fig. 9-1: File > Print

The base setting prints information on one sheet only for one device.

Topology prints base information plus the topology of the bus system.

Bus parameters prints also the bus parameters of the bus system.

Address table prints also the address table of the master.

Device table prints also the device table.

The scope can be given with the **Device selection** menu point. The following can be chosen:

- All
- From station address to station address
- Selection of a device by means of its description.

9.3 Export Functions

DBM Export

Select the **File > Export > DBM menu** in order to save the previously saved project file (*.PB Microsoft Access Format) in a DBM file (Hilscher binary format). This DBM file can be retrieved in the DOS Compro program. The configuration is stored in the project directory in the path of the SyCon installation with the name EXPORT.DBM.

PDD Export

The abbreviation PDD stands for **P**re**D**efined **D**evice. The purpose of the PDD export is to export the configured devices to a file in order to insert, or copy, them again.

It is recommended to create a sub-directory with the name PDD in the SyCon directory in order to store the PDD files there.

With the left mouse button, first set the focus (left mouse click) on to the slave to be exported. Alternatively the master can be selected (again a left mouse click) in order to export several slaves at the same time.

Select the **File > Export > PDD**.

Fig. 9-2: PDD Export (1)

Enter the file name. As an example the figure shows the name slave (.PDD).

Now select **Open**. The following figure appears:

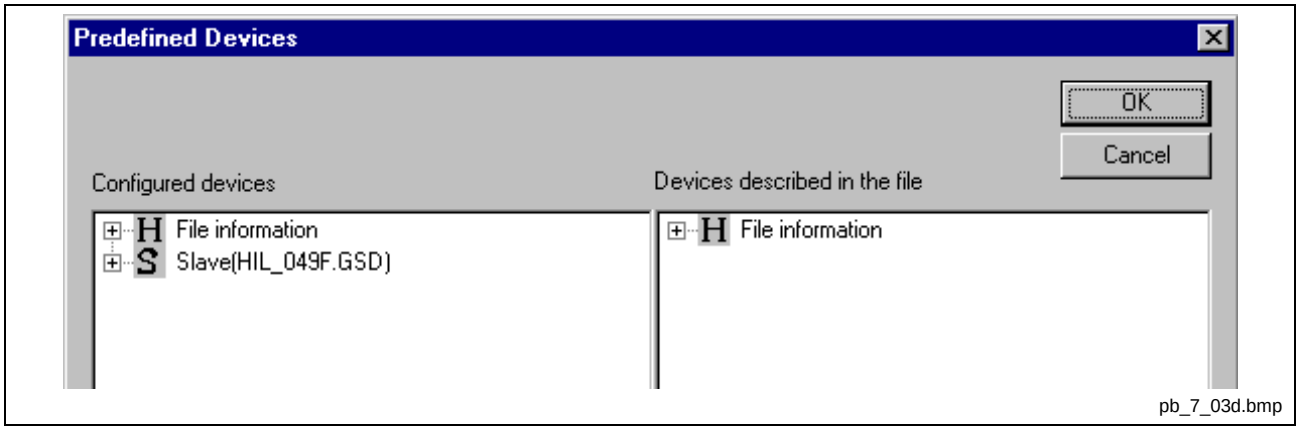


Fig. 9-3: PDD Export (2)

For instance, select the device/s from **Configured devices** (left-hand side) and pull them to the **Devices described in file** side (right-hand side) and release the left mouse button (drag and drop). The following figure appears:

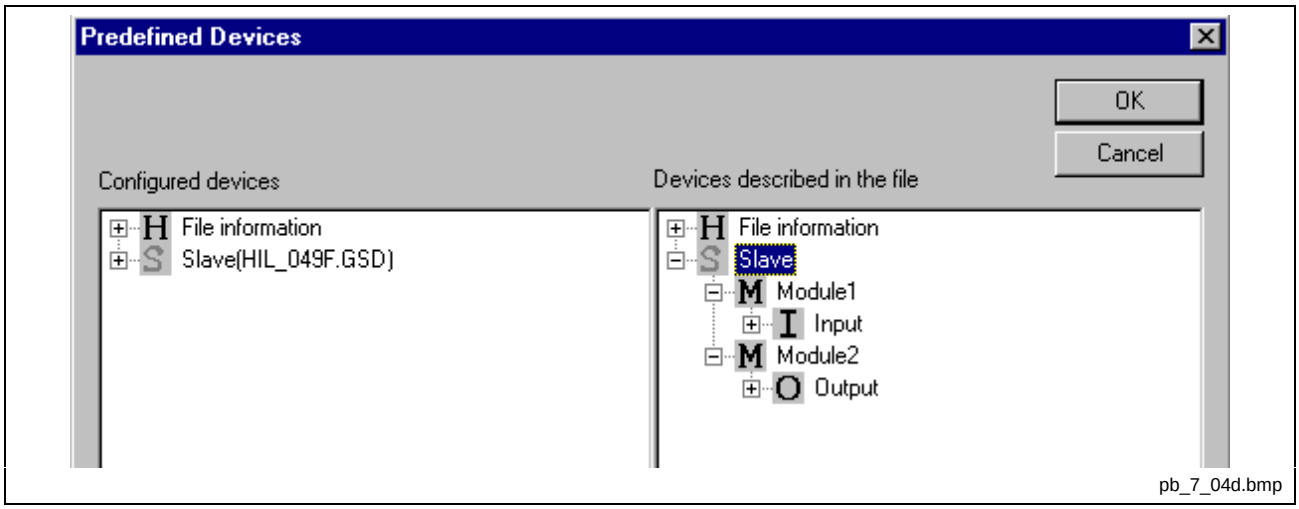


Fig. 9-4: PDD Export (3)

The figure shows a device with the description "Slave2" consisting of two modules with the description "Module1" and "Module2".

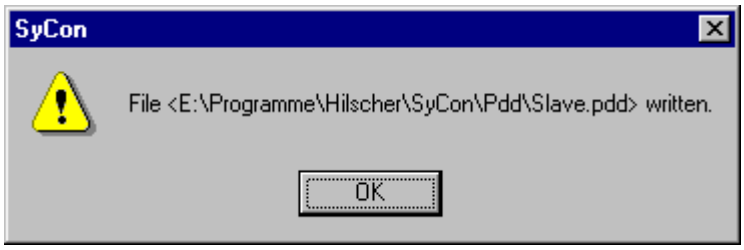
Select **OK** in order to write the PDD export into the file.

The symbols have the following meaning:

Symbol	Meaning
H	Header (file Information)
S	Slave
M	Module
I	Input
O	Output

Fig. 9-5: PDD Symbols

Finally, the path and the file name are given.



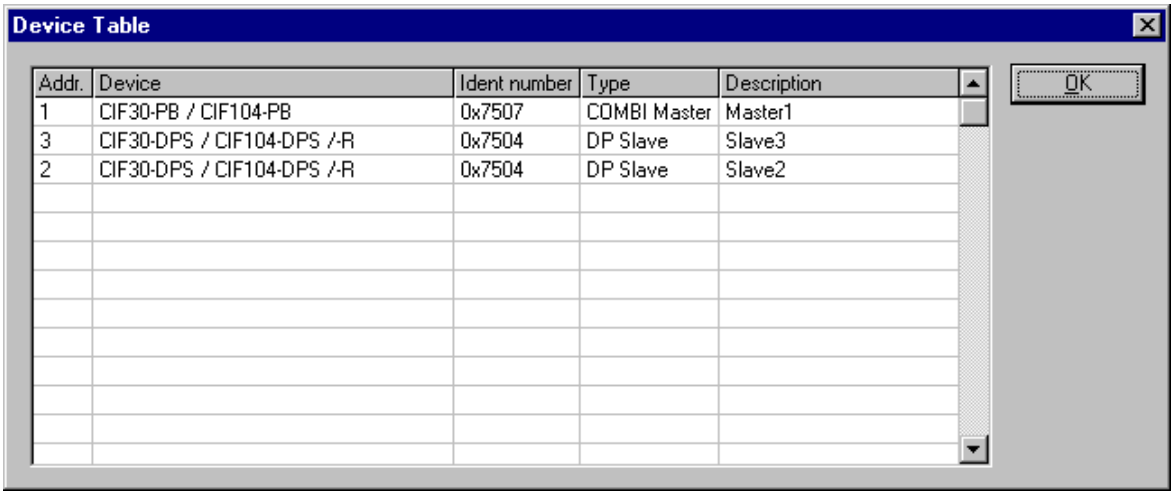
pb_7_05d.bmp

Fig. 9-6: PDD Export (4)

9.4 View of the Configuration

Device Table

The **View > Device table** menu shows the list of all devices that have been inserted.



pb_7_06d.bmp

Fig. 9-7: View > Device Table

Address Table

A list of all addresses used in the process depiction is displayed in the **View > Address table** menu. For this purpose the current master for which the table is to be displayed must be chosen.

Addresses refer to the master.

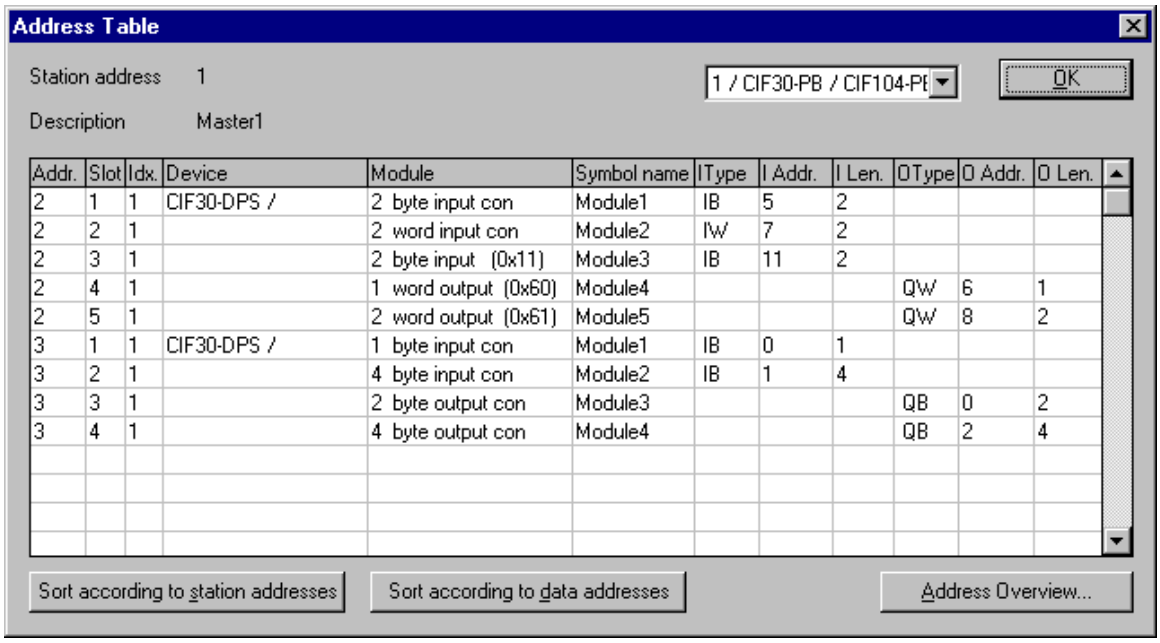


Fig. 9-8: View > Address Table

It is possible to sort the addresses according to station addresses or data addresses.

Select the **Address Overview** button in order to obtain an overview of the addresses in the input or output region.

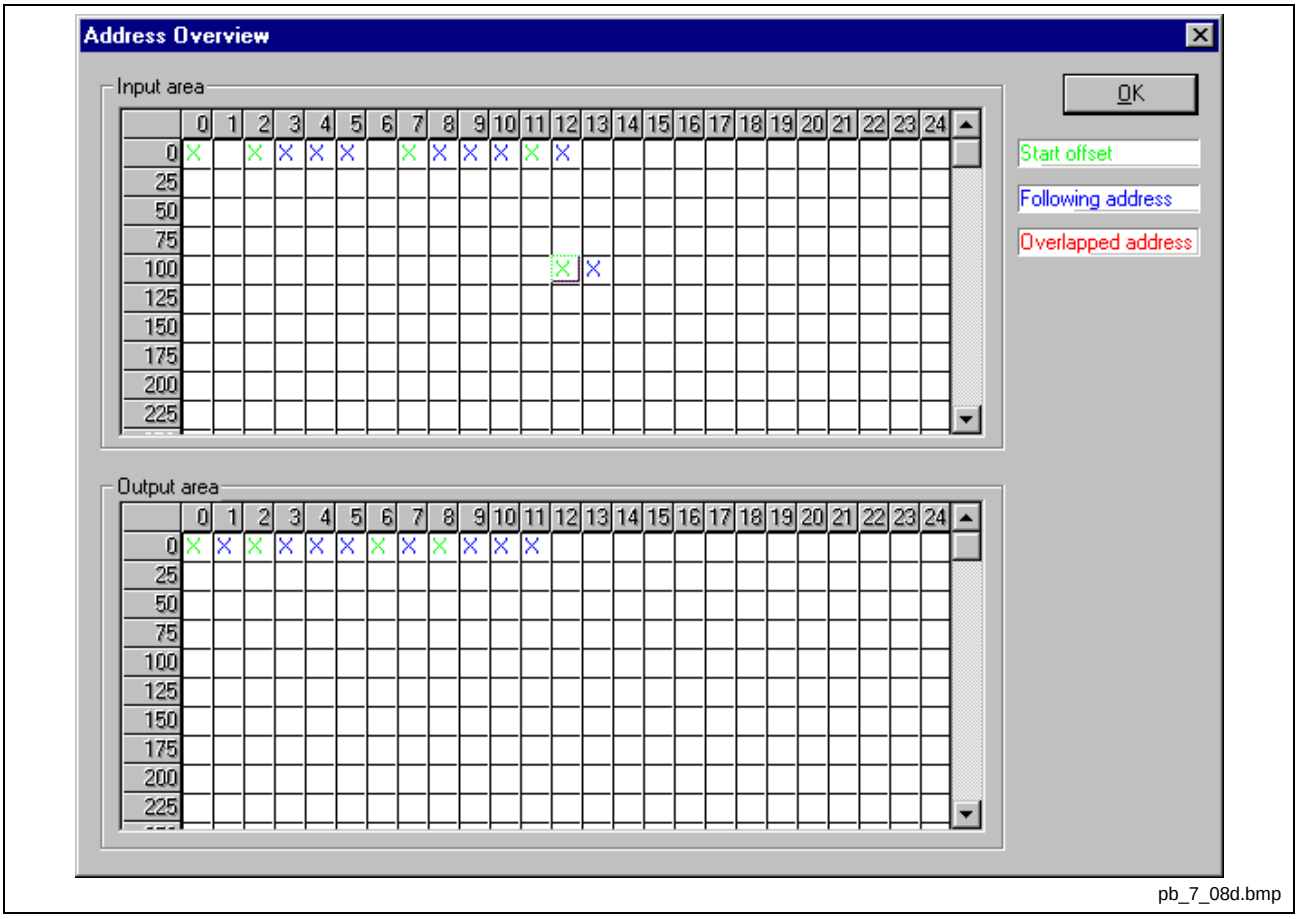


Fig. 9-9: View > Address Table > Address Overview

The assignments can be changed here by making the auto addressing inactive. In order to change the assignment, click with the left mouse button on a cross and keep the mouse button depressed. The mouse button changes to an arrow. Pull the arrow (with depressed mouse button) to the desired (unoccupied) position and release the mouse button. A confirmation query will appear, whether the change is to be carried out or not.

The assignment of the offset address can also be carried out via the slave configuration menu.

The above example shows the moving of a two-byte long module.

Overlapping addresses are shown with a red cross. This means that this address is used by more than one module.

The information of which Slave occupies a particular address can be seen by means of a double click on the corresponding cross. The **Byte information window** opens.

10 Tools

10.1 GSD Viewer

The menu **Tools > GSD Viewer** opens a GSD file to view it.

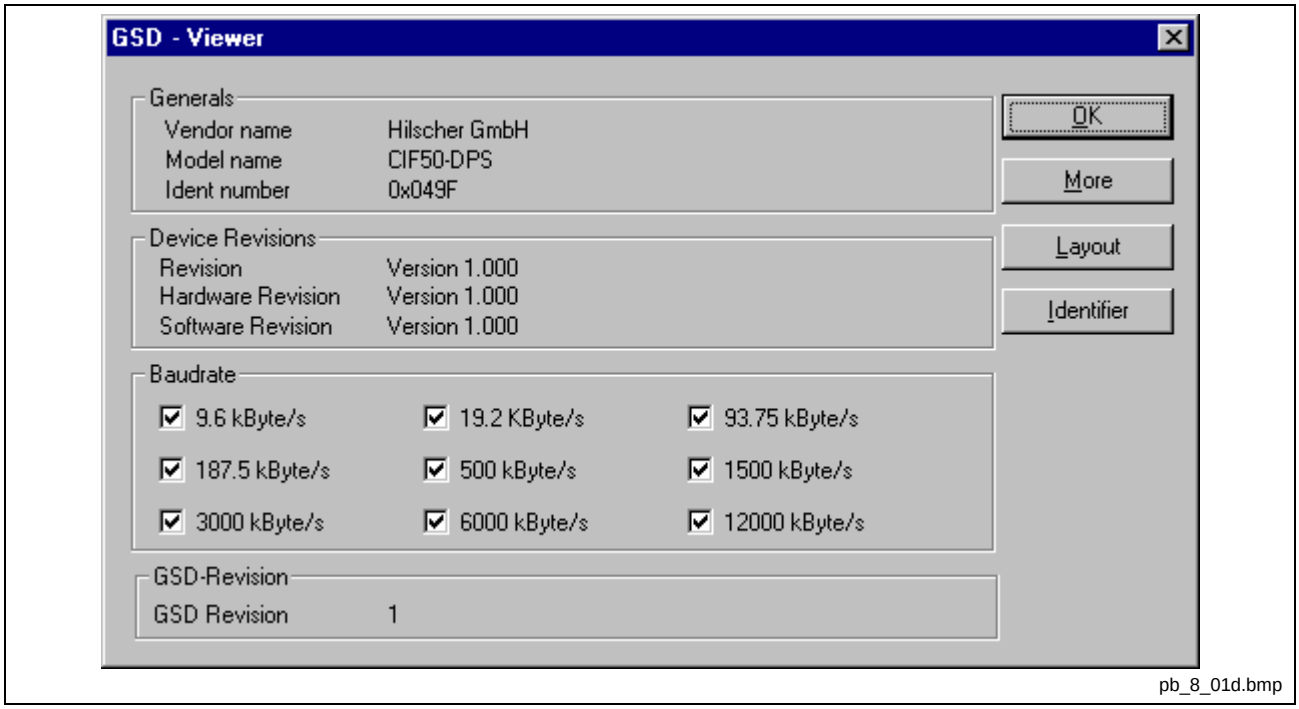


Fig. 10-1: Tools > GSD Viewer

With **More** the information e.g. max. number of modules, max. number of I/O data, max. length of input data and max. length of output data are displayed.

With **Layout** the icons for the slave are displayed for

- configuration phase
- run phase
- diagnostic phase

With **Identifier** the modules of the device and its identifier bytes are displayed.

11 Error Numbers

11.1 CIF Device Driver (Dual-Port Memory) Error Numbers (-1 .. -49)

These is the list of error numbers of Dual-Port Memory access using the CIF Device Driver.

Error Number	Description
-1	Driver: Board not initialized The communication board is not initialized by the driver. No or wrong configuration found for the given board, check the driver configuration. Check the driver function.
-2	Driver: Error in internal ‘Init state‘
-3	Driver: Error in internal ‘Read state‘
-4	Driver: Command on this channel is active
-5	Driver: Unknown parameter in function occurred
-6	Driver: Version is incompatible The device driver version does not correspond to the driver DLL version. From version V1.200 the internal command structure between DLL and driver has changed. Make sure to use the same version of the device driver and the driver DLL.
-10	Device: Dual-Port Memory RAM not accessible (board not found) Dual-ported RAM (DPM) not accessible / no hardware found. This error occurs, when the driver is not able to read or write to the Dual-Port Memory. Check the BIOS setting of the PC memory address conflict with other PC components. Try another memory address, check the driver configuration for this board, check the jumper setting of the board.
-11	Device: Not ready (RDY flag=Ready flag failed) Board is not ready. This could be a hardware malfunction or an other program writes inadmissible to the Dual-Port Memory.
-12	Device: Not running (RUN flag=Rrunning flag failed) The board is ready but not all tasks are running, because of an initialization error. No data base is loaded into the device or a wrong parameter can causes that a task can't initialize.

Fig. 11-1: CIF Device Driver error numbers (-1..-12)

Error Number	Description
-13	Device: Watch dog test failed
-14	Device: Signals wrong operating system version No license code found on the communication board. Device has no license for the used operating system or customer software. No firmware or no data base on the device is loaded.
-15	Device: Error in Dual-Port Memory flags
-16	Device: Send mailbox is full
-17	Device: Function PutMessage timeout No message could be send during the timeout period given in the DevPutMessage() function. If you use an interrupt, then check the interrupt on the device and in driver setup. These settings have to be the same! Is an interrupt on the board set? Is the right interrupt set? The interrupt could already be used by an other PC component, also if the operating system reports it as unused. If you use polling mode, then make sure that no interrupt is set on the board and that polling is set in the driver setup. These settings have to be the same! Device internal segment buffer full and therefore PutMessage() function is not possible, because all segments on the device are in use. This error occurs, when only PutMessage() is used but not GetMessage(). HOST flag is not set for the device. No messages are taken by the device. Use DevSetHostState() to signal a board an application is available.
-18	Device: Function GetMessage timeout No message received during the timeout period given in the DevGetMessage() function. If you use an interrupt, then check the interrupt on the device and in driver setup. These settings have to be the same! Is an interrupt on the board set? Is the right interrupt set? The interrupt could already be used by an other PC component, also if the operating system reports it as unused. If you use polling mode, then make sure that no interrupt is set on the board and that polling is set in the driver setup. These settings have to be the same! The used protocol on the device needs longer than the timeout period given in the DevGetMessage() function.
-19	Device: No message available

Fig. 11-2: CIF Device Driver error numbers (-13..-19)

Error Number	Description
-20	Device: Reset command timeout The board is ready but not all tasks are running, because of an initialization error. No data base is loaded into the device or a wrong parameter can cause that a task can't initialize. The device needs longer than the timeout period given in the DevReset() function. Using device interrupts. The timeout period can differ between fieldbus protocols. If you use an interrupt, then check the interrupt on the device and in driver setup. These settings have to be the same! Is an interrupt on the board set? Is the right interrupt set? The interrupt could already be used by an other PC component, also if the operating system reports it as unused. If you use polling mode, then make sure that no interrupt is set on the board and that polling is set in the driver setup. These settings have to be the same!
-21	Device: COM flag not set The device can not reach communication state. Device not connected to the fieldbus. No station found on the fieldbus. Wrong configuration on the device.
-22	Device: IO data exchange failed
-23	Device: IO data exchange timeout The device needs longer than the timeout period given in the DevExchangeIO() function. If you use an interrupt, then check the interrupt on the device and in driver setup. These settings have to be the same! Is an interrupt on the board set? Is the right interrupt set? The interrupt could already be used by an other PC component, also if the operating system reports it as unused. If you use polling mode, then make sure that no interrupt is set on the board and that polling is set in the driver setup. These settings have to be the same!
-24	Device: IO data mode unknown
-25	Device: Function call failed
-26	Device: Dual-Port Memory size differs from configuration
-27	Device: State mode unknown

Fig. 11-3: CIF Device Driver error numbers (-20..-27)

Error Number	Description
-30	User: Driver not opened (device driver not loaded) The device driver could not be opened. Device driver not installed. Wrong parameters in the driver configuration. If the driver finds invalid parameters for a communication board and no other boards with valid parameters are available, the driver will not be loaded.
-31	User: Can't connect with device board
-32	User: Board not initialized (DevInitBoard not called)
-33	User: IOCTRL function failed A driver function could not be called. This is an internal error between the device driver and the DLL. Make sure to use a device driver and a DLL with the same version. An incompatible old driver DLL is used.
-34	User: Parameter DeviceNumber invalid
-35	User: Parameter InfoArea unknown
-36	User: Parameter number invalid
-37	User: Parameter mode invalid
-38	User: NULL pointer assignment
-39	User: Messagebuffer too short
-40	User: Size parameter invalid
-42	User: Size parameter with zero length
-43	User: Size parameter too long
-44	User: Device address null pointer
-45	User: Pointer to buffer is a null pointer
-46	User: SendSize parameter too long
-47	User: ReceiveSize parameter too long
-48	User: Pointer to send buffer is a null pointer
-49	User: Pointer to receive buffer is a null pointer

Fig. 11-4: CIF Device Driver error numbers (-30..-49)

1.000	If the operating system of the device reports an initialization error, then a value of 1000 will be add to the error number and shown to the user

11.2 CIF Serial Driver Error Numbers (-20 .. -71)

These is the list of error numbers using the serial driver.

Error Number	Description
-20	Driver: No COM port found or COM port already in use.
-21	Driver: COM port already opened
-22	Driver: Function call into driver has failed
-23	Driver: Internal driver error
-24	Driver: Could not create read thread
-25	Driver: Could not create read event
-26	Driver: Could not create write event
-27	Driver: Could not create timer event
-28	Driver: Error by writing data
-29	Driver: Wrong COM state
-30	Driver: COM state error is set
-31	Driver: COM buffer setup failed
-32	Driver: COM set timeout failed
-33	Driver: Receive buffer overrun
-34	Driver: Receive buffer full
-35	Driver: Send busy
-36	Driver: Error during close driver
-40	User: COM port not opened
-41	User: Invalid handle value
-42	User: Invalid COM number
-43	User: Size parameter invalid
-44	User: Size parameter zero
-45	User: Buffer pointer is NULL
-46	User: Buffer too short
-47	User: Setup error

Fig. 11-5: CIF Serial Driver error numbers (-20..-47)

Error Number	Description
-50	User: Send message, timeout error
-51	User: Could not send a message Cable not connected. Wrong cable. Device does not respond.
-52	User: Send message, no device connected
-53	User: Error by send message, message receiving
-54	User: Telegram collision
-55	User: Telegram, no acknowledgement received
-56	User: Telegram, noise
-57	User: Telegram, data overrun
-58	User: Telegram, parity error
-59	User: Telegram, framing error
-60	User: Telegram, unknown error
-70	User: Timeout by receive a message
-71	User: No message received

Fig. 11-6: CIF Serial Driver error numbers (-50..-71)

11.3 RCS Error Numbers (4 .. 93)

This is the list of error numbers returned by the RCS (**R**ealtime **C**ommunication **S**ystem), that is the operating system of Hilscher devices. The error number is returned in an answer message. Command messages and answer messages are used to communicate between the application (e.g. the system configurator) and the Hilscher device. An example of this communication is the download of a configuration.

Error Number	Description
4	Task does not exist
5	Task is not initialized
6	The MCL is locked
7	The MCL rejects a send command because of an error
20	The user will download a database into the device that is not valid for this device type.
21	Data base segment not configured or not existent
22	Number for message wrong during download
23	Received number of data during download does not match to that in the command message
24	Sequence identifier wrong during download
25	Checksum after download and checksum in command message do not match
26	Write/Read access of data base segment
27	Download/Upload or erase of configured data base type is not allowed
28	The state of the data base segment indicated an error. Upload not possible
29	The access to the data base segment needs the bootstraploader. The bootstraploader is not present
30	Trace buffer overflow
31	Entry into trace buffer too long
37	No or wrong license. The OEM license of the system configurator allows only communication to devices that have the same license inside
38	The data base created by the system configurator and the data base expected by the firmware is not compatible
39	DBM module missing

Fig. 11-7: RCS error numbers (answer message) (4..39)

Error Number	Description
40	No command free
41	Command unknown
42	Command mode unknown
43	Wrong parameter in the command
44	Message length does not match to the parameters of the command
45	Only a MCL does use this command to the RCS
50	FLASH occupied at the moment
51	Error deleting the FLASH
52	Error writing the FLASH
53	FLASH not configured
54	FLASH timeout error
55	Access protection error while deleting the FLASH
56	FLASH size does not match or not enough FLASH memory
60	Wrong structure type
61	Wrong length of structure
62	Structure does not exist
70	No clock on the device
80	Wrong handle for the table (table does not exist)
81	Data length does not match the structure of this table
82	The data set of this number does not exist
83	This table name does not exist
84	Table full. No more entries allowed
85	Other error from DBM
90	The device info (serial number, device number and date) does already exist
91	License code invalid
92	License code does already exist
93	All memory locations for license codes already in use

Fig. 11-8: RCS error numbers (answer message) (40..93)

11.4 Database Access Error Numbers (100 .. 130)

The following table lists the error numbers of the database access errors.

Error Number	Description
100	Database already opened
101	Dataset could not be opened
103	Error while opening database occurred
104	No valid path name
105	No connection to data base. Call function DbOpen().
106	Error in parameter
107	Error during opening a table
108	Nullpointer occurred
109	Table not opened. Call function OpenTable() first.
110	The first record is reached
111	The last record is reached
112	Unknown type in the record found
113	Data has to be truncated
114	No access driver installed on the system
115	Exception received
116	This table is set to read only
117	There is no data set in the table
118	The requested table could not be edit
119	An operation could not be completed
120	User gives an unexpected length in WritsDs().
121	An assertion failed
122	DLL not found
123	DLL couldn't be freed
124	Specified function not found in the DLL
125	ODBC function returns an error
126	Count of data bytes in the record exceeds 1938
127	DBM32 DLL is not loaded
128	Field with the given index was not found
129	This table contains no records
130	Invalid character (' ') found in a table or column

Fig. 11-9: Database access error numbers (100..130)

11.5 Online Data Manager Error Numbers

Online Data Manager Error Numbers (1000 .. 1018)

The following table lists the error numbers of the online data manager.

Error Number	Description
1000	Driver OnlineDataManager not opened
1001	Initialization of the OnlineDataManager has failed
1002	No DriverObject found. OnlineDataManager Sub DLL not found.
1003	No DeviveObject found. Device not found.
1004	Application not found
1010	Application has requested an unknown event
1011	Application has requested an unknown function mode, operating mode. Known function modes, operating modes are Reset, Download, Register Server, Unregister Server.
1012	Application has requested an unknown command
1013	Message server already exists
1014	Message server not registered
1015	Device already in use
1016	Device not assigned
1017	Device has changed
1018	Command active

Fig. 11-10: Online data manager error numbers (1000..1018)

Message Handler Error Numbers (2010 .. 2027)

The following table lists the error numbers of the message handler of the online data manager.

Error Number	Description
2010	Message handler: Message buffer empty
2011	Message handler: Message buffer full
2021	Message handler: Invalid Message ID (msg.nr)
2022	Message handler: No entry
2023	Message handler: Message already active
2024	Message handler: Wrong application
2025	Message handler: Message timeout
2026	Message handler: Wait for delete
2027	Message handler: No cyclic message

Fig. 11-11: Message handler error numbers of the online data manager (2010..2027)

Driver Functions Error Numbers (2501 .. 2512)

The following table lists the error numbers of the driver functions of the online data manager.

Error Number	Description
2501	OnlineDataManager Sub DLL not found
2502	Function missing
2503	'Read Thread' not created
2504	'Write Thread' not created
2505	'IO Thread' not created
2510	Function failed
2512	Assign reports error. Return neither OK or cancel

Fig. 11-12: Error numbers of the driver functions of the online data manager (2501..2512)

Online Data Manager Subfunctions Error Numbers (8001 .. 8035)

The following table lists the error numbers of the subfunctions of the online data manager.

Error Number	Description
8001	Driver not opened. E.g. CIF Devive Driver
8002	Application has requested an unknown event
8003	Application has requested an unknown command
8004	Command has failed
8005	Command active
8006	Device invalid
8010	No device was assigned
8011	Device was already assigned
8020	Driver not connected
8021	Driver already connected
8030	Faulty 'GetState'
8031	Send error (PutMessage returns error)
8032	Send active (PutMessage active)
8033	Receive error (GetMessage returns error)
8034	Receive active (GetMessage active)
8035	IO Error (ExchangeIO returns error)

Fig. 11-13: Subfunction Error Numbers of the Driver Functions of the Online Data Manager (8001..8035)

11.6 Database Functions Error Numbers (4000 .. 4098)

The following table lists the error numbers of the database functions.

Error Number	Description
4000	File does not exist
4001	Success in comprimizing
4002	Dataset does not exist
4003	Last respectively first entry reached
4004	Not enough memory
4005	File directory full
4006	Max. number of entries reached
4007	No writing to this table possible, because the table is located in the FLASH
4008	Table name does already exist
4009	File name does not exist
4010	Free RAM length from RCS_CNF.P86 is smaller than E_F_INDEX * 2
4011	Parameter ‘next’ wrong
4012	Not enough free space to copy data set
4013	Set is deleted
4014	Value for index is wrong
4015	Access not allowed
4016	open_file used before init_file
4017	Drive is not ready
4018	Not enough drive memory
4019	File name or path does not exist
4020	Cannot create path
4021	Wrong path
4022	Wrong flag
4023	The delete path is the root path
4024	Path file exists
4025	Write error during write a file
4026	Error during create a file
4027	Error during close a file
4028	No DBM file
4029	Length of the read data is unequal of the file length

Fig. 11-14: Error numbers of the database functions (4000..4029)

Error Number	Description
4030	Path too long
4031	Directory changed
4032	Directory created
4034	Length of converting stream is 0
4035	Non equal data set found
4036	Non equal data set found
4037	Non equal data set found
4038	Data set has length 0
4039	The function DbmInit has assigned a Zero pointer during RCS initialization
4040	Printer not ready
4041	The data base is used from an other function
4042	New length of data base is smaller than used
4043	Unknown access mode
4044	Old data base has to be converted
4045	Error while converting. Function not known
4046	Unknown type in set 0 found
4047	No float function available
4048	Function not in RCS module
4049	Check failed
4050	Checksum check failed
4051	More segments are existing in file, than in the structure FILE_INFO_T in wMax entries
4052	SegLen in structure FILE_INFO_T is smaller then the length in the file. Return of function dbm_restore_data
4053	The header file holds an other information for a length than in the segment itself
4054	Not enough memory for allocation on the PC
4055	No index for file handle in structure FLASH_DIR of RCS found
4056	
4057	File type 2 can not be printed because of too many definitions
4058	The definitions need too many lines to display them, than in the program available
4059	An unknown format for the parameter. Valid is U, H, or S
4060	Unknown parameter type

Fig. 11-15: Error numbers of the database functions (4030..4060)

Error Number	Description
4061	The data base was transmitted into the FLASH
4062	Set 0 contains no structure definition
4063	Set 0 can not be deleted
4064	Error during execution of a ODBC data base access
4065	Initializing of DBM through RCS had no success
4066	Passed data length incorrect
4067	Sorting function not linked
4068	Error in function parameter
4069	Error from ODBC table
4070	No free handle available. Too many data base links are already opened
4071	Unknown data type found in the table
4072	Structure of table GLOBAL not correct or no such table existing
4073	No name of an ACCESS data base
4074	Download window can’t be created
4075	Download not fully performable

Fig. 11-16: Error numbers of the database functions (4061..4075)

Error Number	Description
4082	More than 32 tables should be created
4083	No entry in element szSourceFile
4084	ODBC connection initialization not possible. This could happen when in file ODBCINST.INI in section [Microsoft Access Driver (*.mdb)] is no valid path to ODBCJT16/32.DLL.
4085	Error in structure in the ACCESS data base that is in DBM format
4086	Error in structure in the ACCESS data base that is in DBM format
4087	No data in a ODBC table
4088	No entry
4089	ODBC set length not valid
4090	Not enough data sets in ODBC table
4091	Table CreateTab not found
4092	Error in structure of table CreateTab
4093	No entry in element szSourceTable
4094	No entry in element szDestTable
4095	Entry in iSourceType of table CreateTab is wrong
4096	Entry in iTranslate of table CreateTab is wrong
4097	Function SQLAllocStmt reports an error
4098	ODBC source table not found
4099	ODBC data truncated
4100	Download timeout
4101	Library load error
4102	Library function error
4103	Error in description ’toggle’
1104	Error in description ’KB’
4105	Column does not exist
4106	ODBC structure different
4107	ODBC address error
4108	No CRC sum exists (table GLOBAL exists or old)
4109	Table GLOBAL is old
4110	Calculated CRC different to CRC in table GLOBAL
4199	Programming error

Fig. 11-17: Error numbers of the database functions (4082..4199)

11.7 Converting Functions Error Numbers (5001 .. 5008)

The following table lists the error numbers of converting functions.

Error Number	Description
5000	Function PackLongToByteShort: Not enough space in pvD (number of elements greater than reserved memory)
5001	Function PackLongToByteShort: Not enough space in pvD. Detected during converting of pvS
5002	Function PackLongToByteShort: Not enough space in pvD
5003	Function StringToByte: Not enough space in pvD
5004	Function IntToByte: Not enough space in pvD
5005	Function LongToShort: Not enough space in pvD
5006	Function PackStringDumpToByteArray: Not enough space in pvD
5007	Function PackStringBumpToByteArray: A character was found, which is not convertible into a HEX value
5008	Function PackStringDumpToByteArray: Number of character odd
5009	Function PackStringDumpToByteArray: Not enough space in pvD
5010	Function PackStringDumpToByteArray: The current data set needs to be appended the previous one
5011	Function PackStringDumpToByteArray: No corresponding function to the given number exist
5012	Converting error

Fig. 11-18: Error numbers of converting functions (5000..5012)

12 Description of the Dual-Port Memory DPM

12.1 General Information

For data exchange between the PLC and the PROFIBUS connection a **D**ual-**P**ort **M**emory of size 8 kbyte is available on the controller board. It is divided up as follows:

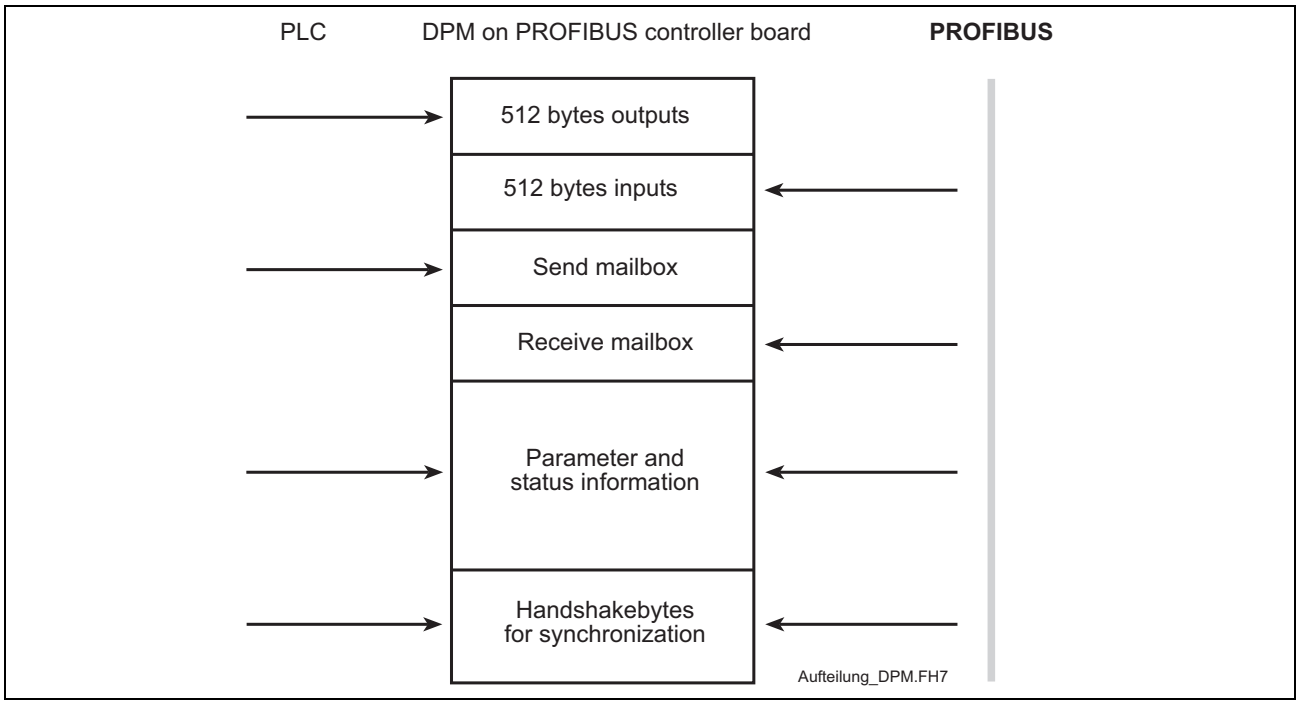


Fig. 12-1: Overview Dual-Port Memory

12.2 Memory Distribution DPM

In the PLC programming interface there is the possibility to access all memory areas of the DPM via absolute addressing. The corresponding variables have to be entered in the VAR area of the declaration editor (e.g.: variable AT %PB*.*). The following tables specify the addresses of the single memory areas.

Address area (decimal)	Address area (hexadecimal)	Size	Designation
0 - 511	0000 - 01FF	512 bytes	SndPd Process output data PLC → PROFIBUS
512 - 3583	0200 - 00DFF	3 kbyte	Free
3584 - 4095	0E00 - 0FFF	512 bytes	RecvPd Process input data PROFIBUS → PLC
4096 - 7167	1000H - 1BFF	3 kbyte	Free

Fig. 12-2: Addresses of DP Master input and output data

Address area (decimal)	Address area (hexadecimal)	Size	Designation
0 - 6143	0000 - 17FF	6 kbyte	Free
6144 - 6655	1800 -19FF	512 bytes	SndPd Process output data PLC → PROFIBUS
6656 - 7167	1A00 -1BFF	512 bytes	RecvPd Process input data PROFIBUS → PLC

Fig. 12-3: Addresses of DP Slave input and output data

Address area (hexadecimal)	Size	Designation
1C00H -1D1FH	288 bytes	DevMailbox[288] Message Buffer HOST → DEVICE
1D20H-1D23H	4 bytes	Date[4] Information Device
1D24H-1D27H	4 bytes	DeviceNumber[4]
1D28H-1D2BH	4 bytes	SerialNumber[4]
1D2CH-1D2FH	4 bytes	reserved[4]
1D30H-1D33H	4 bytes	PcOsName0[4] Information Driver
1D34H-1D37H	4 bytes	PcOsName1[4]
1D38H-1D3BH	4 bytes	PcOsName2[4]
1D3CH-1D3FH	4 bytes	OemIdentifier[4]
1D40H-1E5FH	288 bytes	HostMailbox[288] Message Buffer DEVICE → HOST
1E60H-1E6FH	16 bytes	FirmwareName[16] Information Firmware
1E70H-1E7FH	16 bytes	FirmwareVersion[16]
1E80H-1EBFH	64 bytes	Task1Parameter[64] Parameters of Task 1, 2
1EC0H-1EFFH	64 bytes	Task2Parameter[64]
1F00H-1F3FH	64 bytes	Task1State[64] States of Task 1, 2
1F40H-1F7FH	64 bytes	Task2State[64]
1F80H-1F87H	8 bytes	Task1Name[8] Information Task 1
1F88H	integer	Task1Version
1F8AH	byte	Task1State
1F8BH-1F8FH	bytes	reserved5
1F90H-1F97H	bytes	Task2Name[8] 8 Information Task 2
1F98H	integer	Task2Version
1F9AH	byte	Task2Condition
1F9BH-1F9FH	bytes	reserved5
1FA0H-1FA7H	8 bytes	Task3Name[8] Information Task 3
1FA8H	integer	Task3Version
1FAAH	byte	Task3Condition

1FABH-1FAFH	bytes	reserved5
1FB0H-1FB7H	8 bytes	Task4Name[8] Information Task 4
1FB8H	integer	Task4Version
1FBAH	byte	Task4Condition
1FBBH-1FBFH	bytes	reserved5
1FC0H-1FC7H	8 bytes	Task5Name[8] Information Task 5
1FC8H	integer	Task5Version
1FCAH	byte	Task5Condition
1FCBH-1FCFH	bytes	reserved5
1FD0H-1FD7H	bytes	Task6Name[8] 8 Information Task 6
1FD8H	integer	Task6Version
1FDAH	byte	Task6Condition
1FDBH-1FDFH	bytes	reserved5
1FE0H-1FE7H	8 bytes	Task7Name[8] Information Task 7
1FE8H	integer	Task7Version
1FEAH	byte	Task7Condition
1FEBH-1FEFH	bytes	reserved5
1FF0H	integer	RcsVersion Information Operating System
1FF2H	byte	RcsError
1FF3H	byte	HostWatchDog
1FF4H	byte	DevWatchDog
1FF5H	byte	SegmentCount
1FF7H	byte	DriverType
1FF8H	byte	DpmSize Information of the Device
1FF9H	byte	DevType
1FFAH	byte	DevModel
1FFBH-7FDH	3 bytes	DevIdentifier[3]
1FFEH	byte	HostFlags Command and Acknowledge Location DEVICE → HOST
1FFFH	byte	DevFlags Command and Acknowledge Location HOST → DEVICE

Fig. 12-4: Addresses DP Master/Slave

The memory areas have the following function:

SndPd: In this area you will find the process data to be send.

RecvPd: In this area you will find the received process data.

DevMailbox: The data to be send to the controller board are written in this memory area.

HostMailbox: In this memory area the messages send from the controller board are available in a defined message format.

HostWatchDog/DevWatchDog: This two memory areas allow the mutual monitoring between the PLC user program (HOST) and the controller board (DEVICE). For this, the controller board reads out the value of the DevWatchDog, increments this value and writes the increased value back in the HostWatchDog. A value of 255 is not incremented to 0, but to 1. The operation incrementing and writting back is executed within 20ms. The monitoring is only active when the value in the DevWatchDog is unequal to 0. After initializing the controller board the value in the DevWatchDog area is 0 so that the monitoring function is deactivated. Thus, the user can switch on or off this monitoring via the PLC program.

SegmentCount: Number of still available memory segments to receive buffered messages. This value is entered by the controller board.

HostFlags/DevFlags: Monitoring of data exchange between host and controller board. The controller board describes the HostFlags; the Host reads out only the HostFlags. The Host describes the DevFlags; the controller board reads out the DevFlags.

13 Firmware Functions and Function Blocks

Note: With the change to the PLC programming interface, Version 21, the interfaces as well as the designations of functions and function blocks have been changed:
All FKs/FBs have no longer an input 'MODUL' (type: USINT)
The naming changes from DP_xx to DPM_xx.

The following description of the FKs/FBs and the program example refer to versions prior than version 21.

The description and the program example are also valid for versions developed later than version 21, when the above mentioned changes are considered.

13.1 Firmware Data Types

The following data types are available:

- Status information of PROFIBUS: DPGLOBAL
- Status bits of a PROFIBUS Slave: DPSLDIAG

Status Information of PROFIBUS DPGLOBAL

The Firmware data type DPGLOBAL is an Array of BOOL that indicates the status bits of the PROFIBUS. The array consists of the following elements:

CTRL: Control Error: error in parameterization

ACLR: Autoclear Error: master has stopped communication with all slaves.

NEXC: Non Exchange Error: at least one slave has not reached the data exchange status. There's no process data exchange with this slave.

FAT: Fatal Error: no bus communication available because of a fatal bus error (e.g. bus short circuit). An unplug of the bus cable is not recognized.

EVE: Event Error: master recognized bus short circuits. The number of short circuits is saved in variable "bus_error_cnt". This bit won't be self-deleted.

NRDY: Host Not Ready Notification: user program indicates "not ready".

TOUT: Timeout Error: master detects timeout because of refused telegrams. This bit won't be self-deleted.

Slave Status Bits DPSLDIAG

The firmware data type DPSLDIAG is an array that indicates the status bits of a PROFIBUS Slave. The array consists of the following elements:

StaNonEx:	DP Slave does not respond
StaNotRd:	DP Slave not ready
CfgFault:	DP Slave incorrectly parameterized
ExtDiag:	DP Slave indicates extended diagnosis
NotSupp:	DP Slave indicates invalid command
InvSlRes:	Invalid DP Slave response
PrmFault:	Last parameter telegram incorrect
MastLock:	DP Slave parameterized by another master
PrmReq:	DP Slave not yet parameterized
StatDiag:	DP Slave diagnosis available
S2_D2:	Reserved
WDOn:	Watchdog of DP Slave activated
FreezeMd:	Freeze command active
SyncMd:	Sync command active
S2_D6:	Reserved
Deaktiv:	DP Slave not projected
S3_D0:	Reserved
S3_D1:	Reserved
S3_D2:	Reserved
S3_D3:	Reserved
S3_D4:	Reserved
S3_D5:	Reserved
S3_D6:	Reserved
ExtDiag0:	'Data area overflow' extended diagnosis
MastAdd:	Address of parameterized DP Master
IdentNo:	Ident number of DP Slave

13.2 Functions

The following functions are available:

- Start bus communication: DP_START
- Stop bus communication: DP_STOP
- Status information via PROFIBUS process data exchange: DP_EXCHG

Start Bus Communication DP_START

With this function the PROFIBUS is switched in operating mode OPERATE and the communication between master and slaves is started.

Note: System configurator SyCon allows to set the starting behavior of the PROFIBUS after the system initialization. If "Automatic enable of the communication by the system" is set, the bus communication is automatically started after each PLC program download (CTRL-F9) or after each configuration download by the SyCon. However, the setting "Controlled enable of the communication by the user program" causes that the bus communication has to be started explicitly with block DP_START. For further information refer to DP Master Settings on page 7-10 and DP Slave Settings on page 7-15.

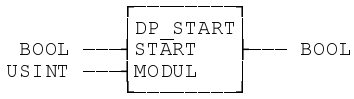
The slot number of the PC104 PROFIBUS connection is applied to the input 'MODUL'. If input 'START' becomes TRUE, the bus communication is started. If the start is successful, the function result is TRUE.

Error Variables

If an invalid value (0 or ≥5) is applied to input 'MODUL', the error variables are set as follows:

ErrorFlg:	TRUE
ErrorNr:	1
ErrorTyp:	-244

If a wrong slot number is indicated or there's no PROFIBUS connection the ErrorNo is set on 235; the other error variables are set as specified above.




```
START  (BOOL):    Activates the operating mode OPERATE
MODUL (USINT):    Module number (slot number of PROFIBUS PC104
                  connection)
```

Stop Bus Communication DP_STOP

With this function the PROFIBUS is switched in the operating mode STOP and the communication between master and slaves is stopped.

The slot number of the PC104 PROFIBUS connection is applied to input 'MODUL'. If input 'STOP' becomes TRUE, the bus communication is stopped. If the function is successfully executed, the function result becomes TRUE.

Error Variables

If an invalid value (0 or ≥5) is applied to input 'MODUL' the error variables are set as follows:

ErrorFlg:	TRUE
ErrorNr:	1
ErrorTyp:	-243

If a wrong slot number is indicated or there's no PROFIBUS connection, the ErrorNr is set on 235; the other error variables are set as specified above.


```
STOP  (BOOL):     Activates operating mode STOP
MODUL (USINT):    Module number (Slot number of PROFIBUS PC104
                  connection)
```

Status Information on Process Data Exchange DP_EXCHG

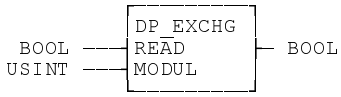
This function provides the status information about the PROFIBUS process data exchange. If the data exchange is active with at least one slave, the function result is TRUE.

Error Variables

If an invalid value (0 or ≥5) is applied to input 'MODUL' the error variables are set as follows:

ErrorFlg:	TRUE
ErrorNr:	1
ErrorTyp:	-245

If a wrong slot number is indicated or there's no PROFIBUS connection the ErrorNr is set on 235; the other error variables are set as specified above.




```
READ   (BOOL):    Read status
MODUL (USINT):    Module number (slot number of PROFIBUS PC104
                  connection)
```

13.3 Function Blocks

The following function blocks are available:

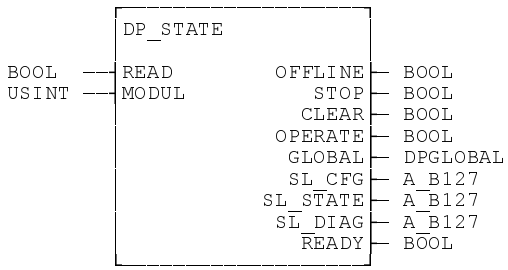
- Status information of PROFIBUS Master: DP_STATE
- Single diagnosis of a PROFIBUS Slave: DP_SLDIAG

Status Information of PROFIBUS Master DP_STATE

This function block provides the status information of the PROFIBUS DP Master, if the Boolean input 'READ' is assigned to TRUE. Furthermore, the slot number of the PC104 PROFIBUS connection has to be assigned to the input 'MODUL'.

The outputs contain the following information:

OFFLINE:	The PROFIBUS is in operating mode OFFLINE
STOP:	The PROFIBUS is in operating mode STOP
CLEAR:	The PROFIBUS is in operating mode CLEAR
OPERATE:	The PROFIBUS is in operating mode OPERATE
GLOBAL:	Global status information of the PROFIBUS
SL_CFG:	List of the configured slaves
SL_STATE:	List of the active slaves
SL_DIAG:	List of the slaves for diagnosis (deleting the entries occurs by prompting the slave single diagnosis (see 0: Single Diagnosis of PROFIBUS Slave DP_SLDIAG).
READY:	Function block is processed




```
READ (BOOL):          Read status
MODUL (USINT):        PC104 slot number of the PROFIBUS connection
OFFLINE (BOOL):       Operating mode OFFLINE
STOP (BOOL):          Operating mode STOP
CLEAR (BOOL):         Operating mode CLEAR
OPERATE (BOOL):       Operating mode OPERATE
GLOBAL (DPGLOBAL):    Global status bits
SL_CFG (A_B127):      Table of configured slaves
SL_STATE (A_B127):    Table of active slaves
SL_DIAG (A_B127):     Table of slaves with diagnosis
READY (BOOL):         Function block is processed
```

Error Variables

If an invalid value (0 or ≥5) is applied to input 'MODUL' the error variables are set as follows:

ErrorFlg:	TRUE
ErrorNr:	1
ErrorTyp:	-242

If a wrong slot number is indicated or there's no PROFIBUS connection the ErrorNr is set on 235; the other error variables are set as specified above.

Single Diagnosis of PROFIBUS Slave DP_SLDIAG

The diagnostic information of a DP Slave consist of standard diagnostic information and (if available) user-specific diagnostic information. This function block provides the standard diagnosis of the slave addressed via input 'SLV_ADR' at output 'DIAG'. If the master is in operating mode OPERATE, user-specific diagnostic information are provided at output 'EX_DIAG'. The length (in byte) of this information is specified at output 'EX_LEN'.

Note: The bus should not be unnecessarily charged. For this reason, the diagnosis should only be requested when the corresponding bit in the diagnostic array has been set by function block DP_State (see chapter 13.4: Program Example). By reading the diagnosis this bit is deleted again in the diagnostic array.

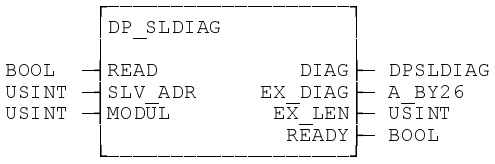
Furthermore, this function block is to implement only in controls with DP Master configuration.

Error Variables

If an invalid value (0 or ≥5) is applied to input 'MODUL' the error variables are set as follows:

ErrorFlg:	TRUE
ErrorNr:	1
ErrorTyp:	-239

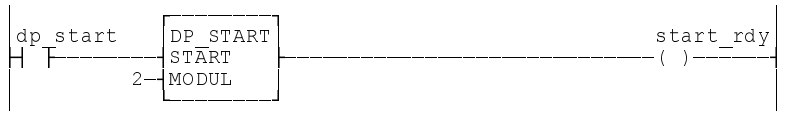
If a wrong slot number is indicated or there's no PROFIBUS connection the ErrorNr is set on 235; the other error variables are set as specified above.



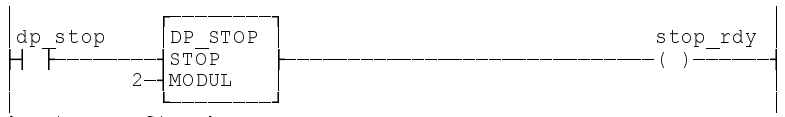

```
READ     (BOOL):     Read diagnosis
SLV_ADR (USINT):     Slave address
MODUL   (USINT):     PC104 slot number of the PROFIBUS connection
DIAG (DPSLDIAG):     Diagnosis of the addressed slaves
EX_DIAG A_BY26):     Extended diagnosis data
EX_LEN  (USINT):     Length of the extended diagnosis data
READY    (BOOL):     Function block is processed
```

13.4 Program Example

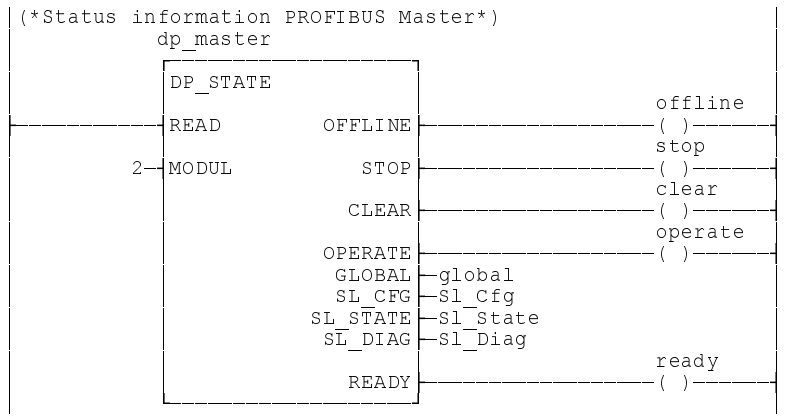
In this program example the single diagnosis of the slave is read with address 15. The PC104 PROFIBUS connection is located on slot 2. The bus can be started with variable dp_start and stopped with variable dp_stop. If the master recognizes a diagnosis of the slave, the bit Sl_Diag[15] is set. With variable read_diag the status bits of the diagnosis set in array diag15 can be read. By reading the diagnosis bit SL_Diag[15] is deleted again.



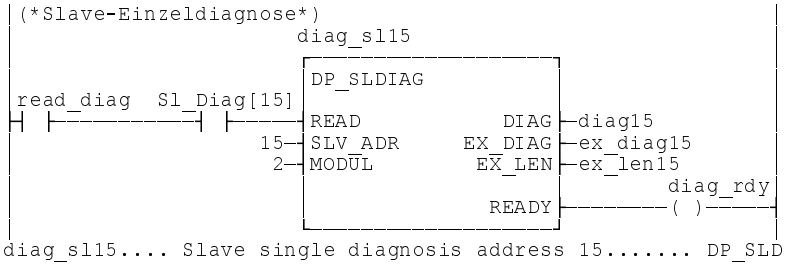

```
dp_start... Start bus....  ................. ........ BOOL
DP_START... ................................ ........ DP_START
start_rdy.. Bus started..................... ........ BOOL
2.......... PC104 slot number of PROFIBUS DP.......... USINT
```




```
dp_stop... Stop bus ................................ BOOL
DP_STOP... ......................................... DP_STOP
stop_rdy.. Bus stopped ............................. BOOL
2......... PC104 slot number of PROFIBUS DP........... USINT
```




```
dp_master.. Status information DP Master............ DP_STA
offline.... Operating state OFFLINE................. BOOL
2.......... PC104 slot number of PROFIBUS DP........ USINT
stop....... Operating state STOP.................... BOOL
clear...... Operating state CLEAR................... BOOL
operate.... Operating state OPERATE................. BOOL
global..... Global status bits...................... DPGLOB
Sl_Cfg..... List of configured slaves. ............. A_B127
Sl_State... List of active slaves...... ............. A_B127
Sl_Diag.... List of slaves with diagnosis........... A_B127
ready...... ........................................ BOOL
```




```
diag_sl15.... Slave single diagnosis address 15....... DP_SLDIAG
read_diag.... Read diagnosis.......................... BOOL
Sl_Diag[15].. Diagnosis of slave 15 recognized........ BOOL
diag15....... Status bits of diagnosis................ DPSLDIAG
15........... Address of slave ANY IN to be diagnosed. ANY_IN
ex_diag15.... Extended diagnosis data address 15...... A_BY26
2............ PC104 slot number of PROFIBUS DP........ USINT
ex_len15..... Length of extended diagosis data........ USINT
diag_rdy..... Diagnosis has been read................. BOOL
```

14 List of Figures

15 Service & Support

15.1 Helpdesk

Unser Kundendienst-Helpdesk im Hauptwerk Lohr am Main steht Ihnen mit Rat und Tat zur Seite. Sie erreichen uns

- telefonisch: **+49 (0) 9352 40 50 60**
  über Service Call Entry Center Mo-Fr 07:00-18:00
- per Fax: **+49 (0) 9352 40 49 41**
- per e-Mail: **service@indramat.de**

Our service helpdesk at our headquarters in Lohr am Main, Germany can assist you in all kinds of inquiries. Contact us

- by phone: **+49 (0) 9352 40 50 60**
  via Service Call Entry Center Mo-Fr 7:00 am - 6:00 pm
- by fax: **+49 (0) 9352 40 49 41**
- by e-mail: **service@indramat.de**

15.2 Service-Hotline

Außerhalb der Helpdesk-Zeiten ist der Service direkt ansprechbar unter

+49 (0) 171 333 88 26
oder **+49 (0) 172 660 04 06**

After helpdesk hours, contact our service department directly at

+49 (0) 171 333 88 26
or **+49 (0) 172 660 04 06**

15.3 Internet

Unter **www.indramat.de** finden Sie ergänzende Hinweise zu Service, Reparatur und Training sowie die **aktuellen** Adressen *) unserer auf den folgenden Seiten aufgeführten Vertriebs- und Servicebüros.

☐ Verkaufsniederlassungen
☒ Niederlassungen mit Kundendienst

Außerhalb Deutschlands nehmen Sie bitte zuerst Kontakt mit unserem für Sie nächstgelegenen Ansprechpartner auf.

*) http://www.indramat.de/de/kontakt/adressen
Die Angaben in der vorliegenden Dokumentation können seit Drucklegung überholt sein.

At **www.indramat.de** you may find additional notes about service, repairs and training in the Internet, as well as the **actual** addresses *) of our sales- and service facilities figuring on the following pages.

☐ sales agencies
☒ offices providing service

Please contact our sales / service office in your area first.

*) http://www.indramat.de/en/kontakt/adressen
Data in the present documentation may have become obsolete since printing.

15.4 Vor der Kontaktaufnahme... - Before contacting us...

Wir können Ihnen schnell und effizient helfen wenn Sie folgende Informationen bereithalten:

1. detaillierte Beschreibung der Störung und der Umstände.
2. Angaben auf dem Typenschild der betreffenden Produkte, insbesondere Typenschlüssel und Seriennummern.
3. Tel.-/Faxnummern und e-Mail-Adresse, unter denen Sie für Rückfragen zu erreichen sind.

For quick and efficient help, please have the following information ready:

1. Detailed description of the failure and circumstances.
2. Information on the type plate of the affected products, especially type codes and serial numbers.
3. Your phone/fax numbers and e-mail address, so we can contact you in case of questions.

15.5 Kundenbetreuungsstellen - Sales & Service Facilities

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