User Manual for

Profibus DP

HE800PBM650/HEPBM650 & HE800PBS600/HEPBS600

Master and Slave SmartStack Modules

PREFACE

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List of Revisions

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CHAPTER 1: INTRODUCTION

1.1 Scope

This manual shows how to connect and configure the Profibus Master or Slave Smartstack Modules. *HSyCon*, is an easy-to-use ‘ Windows™’-based configuration package for use with the SmartStack COM range of fieldbus modules and Cscape or Cbreeze a windows based configuration package for use with the OCS/ TIU product range. The software user’s guide is contained in this manual.

A basic level of understanding of Microsoft Windows technology and operation is assumed. The manual assumes that the user is familiar with Windows 95™, Windows 98™, Windows NT™, Windows 2000™ or XP™.

1.2 Introduction

The Smartstack Fieldbus module range require only three stages to become operational, these are:

1. Physical installation and connection.
2. Configuration of the fieldbus interface.
3. Configuration of Cscape / Cbreeze to map the fieldbus data.

The system is comprised of two separate software functions; the fieldbus interface software running independently in the COM module and the OCS/TIU firmware running in the main module. Data and commands are exchanged via a dual port ram interface. The configuration of the COM module is via the RS232 serial port on the module. For correct operation, the number of registers assigned in the OCS must match the number required by the Master or Slave module configuration.

The Smartstack module should be configured with the OCS/TIU first as otherwise it will be held in reset and cannot be configured.

1.3 Installing and Removing a SmartStack Module

The following section describes how to install and remove a SmartStack Module.

Caution: To function properly and avoid possible damage, do not install more than four Smart Stack™ Modules per OCS, RCS, NX, QX, FOX base/hub or TIU. Do not attempt to install or remove a SmartStack module with the units powered on.

Installing SmartStack Modules

10 Hook the tabs. Each SmartStack Module has two tabs that fit into slots located on the OCS, RCS, FOX base or TIU. (The slots on the OCS are located on the back cover.)

11 Press the SmartStack Module into the “locked” position, making sure to align the SmartStack Module fasteners or clip with the SmartStack receptacles on the main housing.

Removing SmartStack Modules

1. In the case of a metal Smartstack module using a flathead screwdriver, lever up the end of the SmartStack Module (opposite end to tabs) and swing the module out. In the case of a plastic Smartstack module press the button in the end of the module and swing the module out.
2. Lift out the tabs of the module.

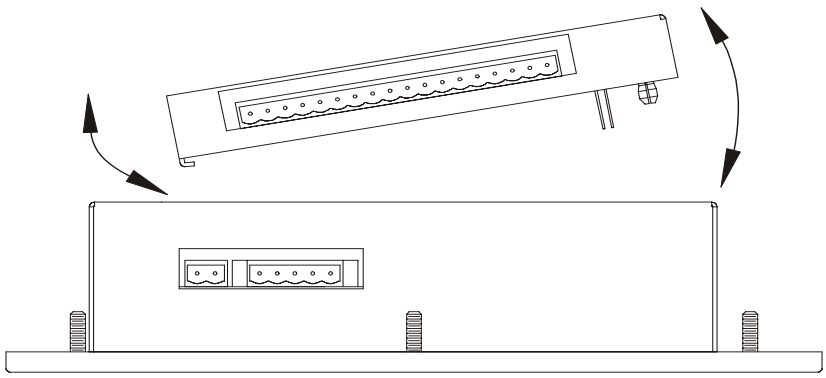


Figure 1.1 – Installing a SmartStack Module in an OCS

1.4 Main Functions

The main functions of the HsyCon System Configurator are:

- Configuration of the complete Fieldbus range with one package.
- Standardised configuration files – allows use of protocol specific standardised configuration files.
- Diagnostic tool – upon configuration download the software may be switched into diagnostic mode.

Signal	LED Colour	State	Definition
RDY	Yellow	On	COM Ready
		Cyclical flashing	Bootstrap loader active
		Non cyclical flashing	Hardware or system error.
		Off	Hardware error.
RUN	Green	On	Communication running.
		Non cyclical flashing	Parameter error.
		Off	Communications stopped.
ERR	Red	On	Error on communications line.
		Off	No error.
STA	Yellow	On	Master: Hold Token. Slave: Data Exchange
		Off	Master: No Hold Token. Slave: No Data Exchange

Figure 1.1

Figure 1.1 shows the onboard LED Status definitions for the PBM650/PBS600

CHAPTER 2: SOFTWARE INSTALLATION INSTRUCTIONS

2.1 System Requirements

PC with 486-, Pentium processor or higher.

Windows 95/98/ME, Windows NT/2000/XP.

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 or higher.

Windows NT: Service Pack 3 or higher.

Keyboard and Mouse.

2.2 System Installation

It is recommended that all application programs on the system be closed before installation begins.
Change to the Hscon/SYCON directory on the disk and start set-up

Note: Administrator privileges are required on Windows NT/2000/XP systems for installation!

Select the required language version for installation.

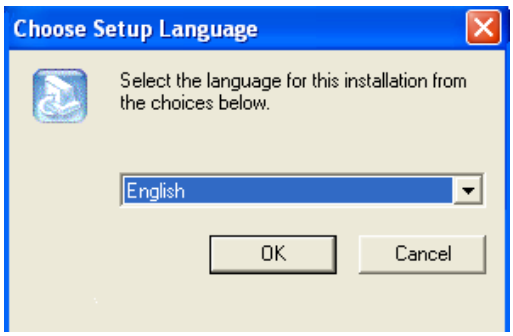


Figure 2.1 – language selection

Select the desired Fieldbus components to install. Click Next and the required components will be installed in the chosen destination folder.

The installation program copies the program files, GSD or EDS files and Bitmaps to the PC. Finally, the following files are entered in the system Registry.

System Dynamic Link Library's (DLL's)

The application

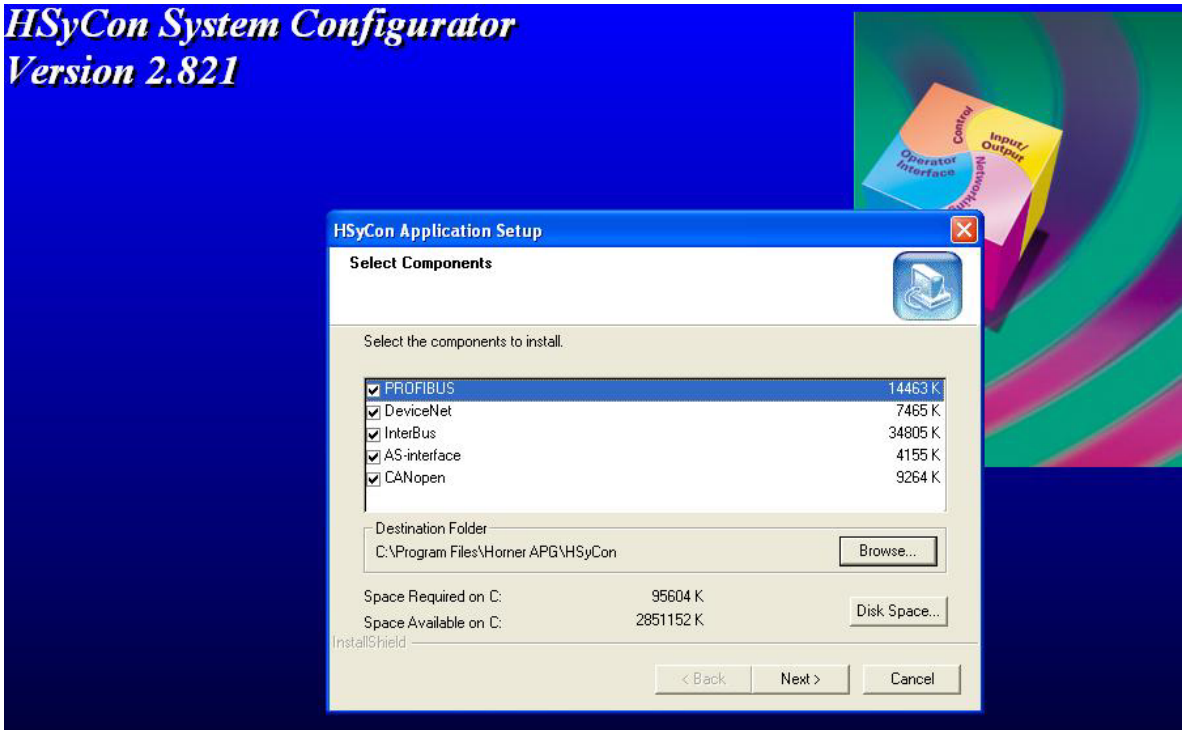


Figure 2.2 – Component Selection

CHAPTER 3: GETTING STARTED – CSCAPE CONFIGURATION

3.1 Scope

This chapter describes the procedure for configuring the DP Master and slaves. This includes configuring the Cscape section, loading GSD files, saving, downloading and assigning I/O.

3.2 Configuring Cscape.

The following describes the steps involved to setup Cscape. Attach the communications module to the appropriate OCS unit. Open Cscape. All I/O is setup through the I/O Configure Menu in Cscape:

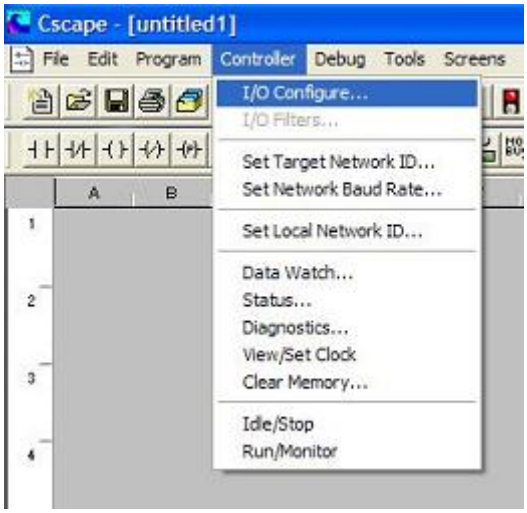


Figure 3.1

The following window is displayed. Select the CONFIG button adjacent to the first empty slot (nearest the main unit).

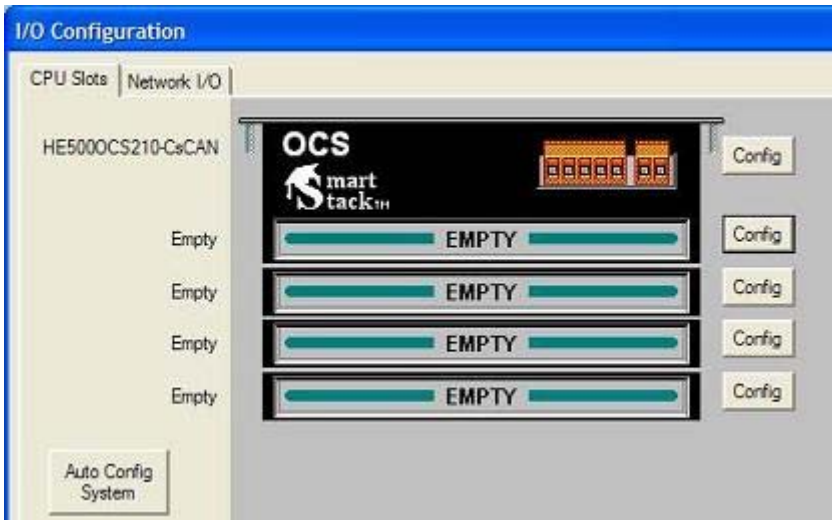


Figure 3.2

Select the COMM Tab. From here select the appropriate Profibus Module and click OK.

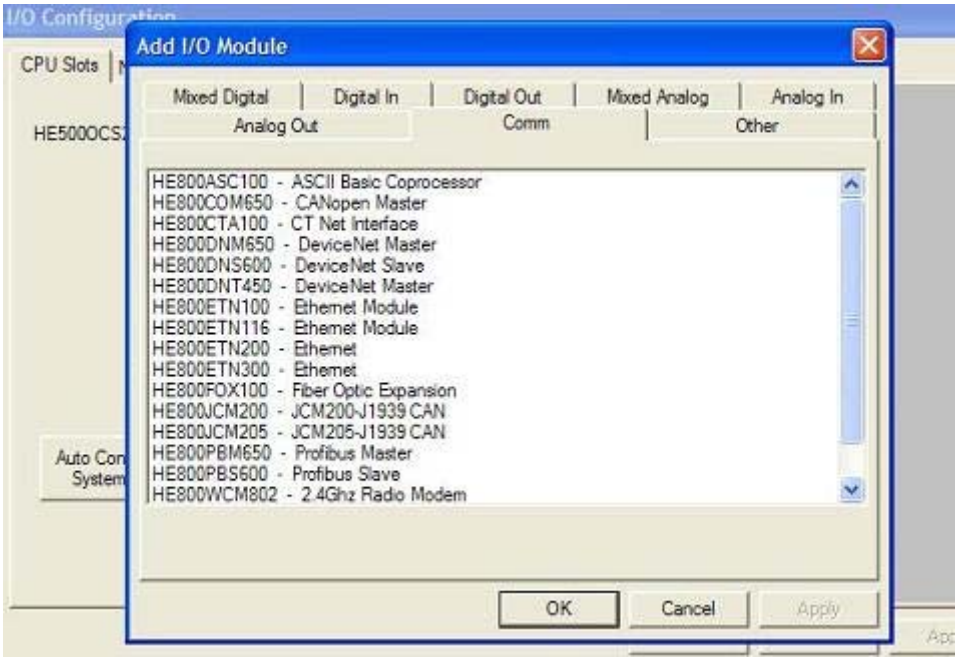


Figure 3.3

The selected module is now visibly attached to the main unit and can be configured.

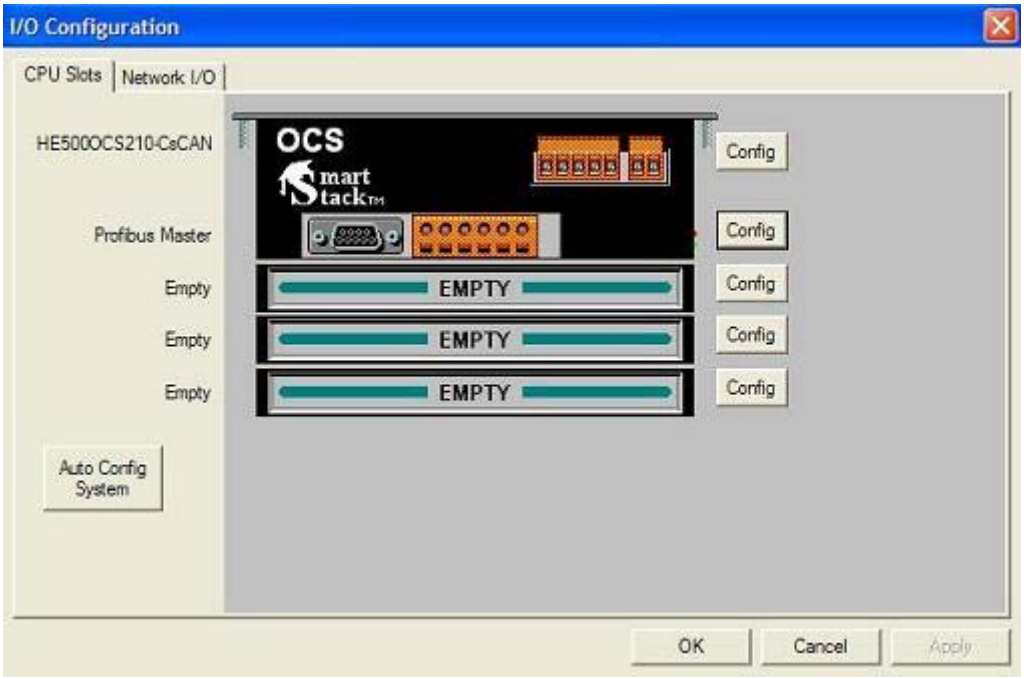


Figure 3.4

Select the CONFIG button adjacent to the module. Then select the MODULE SETUP tab.

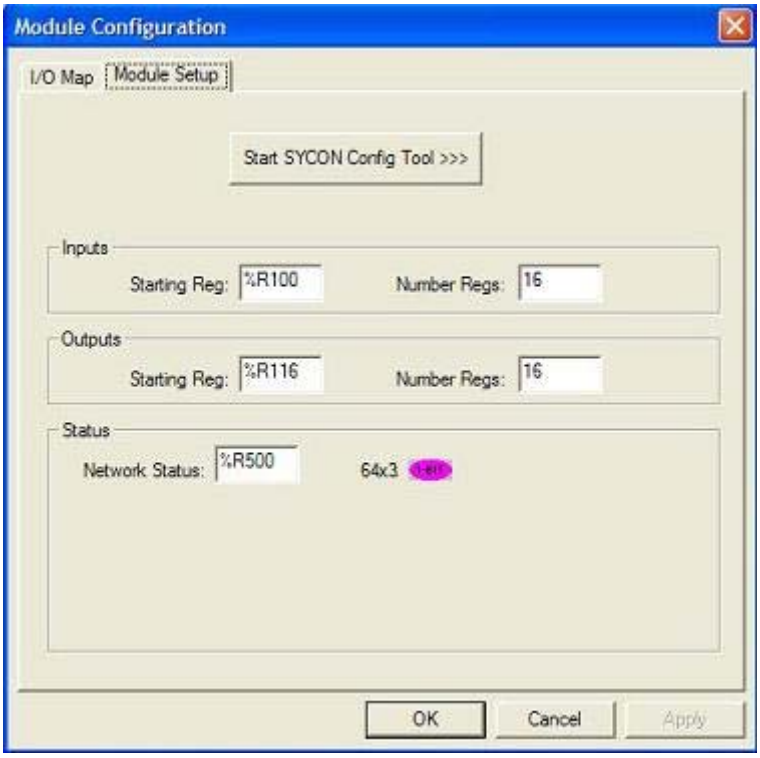


Figure 3.5

Configure the Inputs and Outputs.

NOTE:

INPUTS: means data coming FROM the Network VIA the PBM/PBS Module to the OCS Registers.

OUTPUTS: means data going TO the NETWORK VIA the PBM/PBS Module from the OCS Registers.

In Figure 3.5 above, For both Inputs and Outputs, 16 %R registers are used. The OCS %R registers are retentive, general purpose, 16 bit registers.

It is VERY important that the number of registers used for both Inputs and Outputs in Cscape is identical to the number setup in the Hsycon software when setting up the PBM650 and PBS600 modules. See Figure 3.6 below.

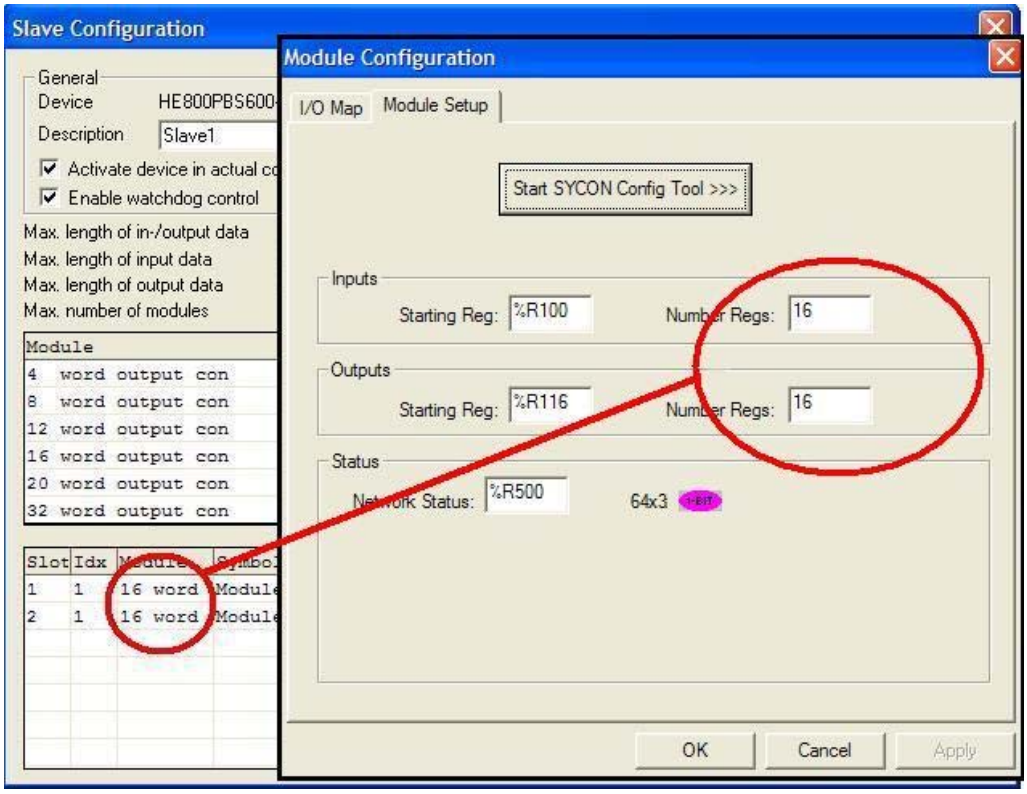


Figure 3.6

The Network Status is a block of registers 64 bits x 3 tables give status' of each slave station.

Table 1 indicates the the configured state of the corresponding slave.

1 or On means the Slave is configured in the Master
0 or Off means the Slave is not configured in the Master

Table 2 indicates the state of each slave.

1 or On means the Slave and Master are exchanging their I/O data.
0 or Off means the Slave and Master are not exchanging their I/O data.

Table 3 indicates the diagnostic bit of each slave. (Can only be viewed in Hsycon)

1 or On means the latest received slave diagnostic data are available in the internal diagnostic buffer.
0 or Off means since the last diagnostic buffer read access of the host, no values were changed in this buffer.

3.3 Configuration of a SmartStack Profibus DP Master to any Profibus DP Slave

The following describes the steps to configure a SmartStack Profibus DP Master to any Profibus DP Slave:

	Action	Menu in the System Configurator
•	Create a new project	**File > New > PROFIBUS**
•	Copy GSD file of the DP Slave, if the Slave is not in the selection list. Horner module GSD's loaded by default.	**File > Copy GSD**
•	Choose Horner DP Master and provide bus address	**Insert > Master**
•	Choose DP Slave and provide bus address	**Insert > Slave**
•	Assign the input and output modules **(*1)**	Mark the Slave (left Mouse click), then
•	Assign the offset addresses	**Settings > Slave Configuration**
•	Assign the DP Slave Parameter data, if the Slave needs Parameter data	Mark the Slave (left Mouse click), then **Settings > Parameter Data**
•	Set the bus parameter	Mark the Master (left Mouse click), then **Settings > Bus Parameters**
•	Set device assignment if no automatic assignment has occurred	Mark the Master (left Mouse click), then **Settings > Device Assignment**
•	Save project	**File > Save**
•	Download to the Master.	Mark the Master (left Mouse click), then **Online > Download**
•	Download to the Slave (if a Horner DP Slave).	Mark the Slave (left Mouse click), then **Online > Download**
•	Live List	Mark the Master (left Mouse click), then **Online > Live List**
•	Start Debugger	Mark the Master (left Mouse click), then **Online > Start Debug Mode**
•	Device diagnostic	Mark the Slave (left Mouse click), then **Online > Device Diagnostic**
•	Stop Debugger	**Online > Stop Debug Mode**
•	Global Diagnostic	Mark the Master (left Mouse click), then **Online > Global State Field**
•	Transfer user data: Write output, read input	Mark the Master (left Mouse click), then **Online > I/O Monitor**

Figure 3.2. Steps for Configuration of a SmartStack Profibus DP Master to any Profibus DP Slave

Note (*1): The Offset addresses assigned in the Slave configuration are always related to the DP Master.

3.4 Configuration of a SmartStack Profibus DP Slave to any Profibus DP Master

The following table describes the steps to configure a SmartStack DP Slave to any DP Master:

	Action	**Menu in the System Configurator**
•	Create a new project	**File > New > PROFIBUS**
•	Choose Horner DP Master and provide bus address **(*1)**	**Insert > Master**
•	Choose Horner DP Slave and provide bus address	**Insert > Slave**
•	Assign the input and output modules **(*2)**	Mark the Slave (left Mouse click), then **Settings > Slave Configuration**
•	Set device assignment if no automatic assignment has occurred	Mark the Slave (left Mouse click), then **Settings > Device Assignment**
•	Save project	**File > Save**
•	Download	Mark the Slave (left Mouse click), then **Online > Download**
•	Configuration diagnostic	Mark the Slave (left Mouse click), then **Online > Extended Device Diagnostic > SPC3CTRL Slave Config**
•	Configuration diagnostic	Mark the Slave (left Mouse click), then **Online > Extended Device Diagnostic > SPC3CTRL Master Config**
•	Transfer user data: Write output, read input	Mark the Slave (left Mouse click), then **Online > I/O Monitor**

Figure 3.3. Steps for Configuration of a SmartStack Profibus DP Slave to any Profibus DP Master

Note (*1): Insert a SmartStack DP Master. This Master is a placeholder and it is not necessary to match the connected Master.

Note (*2): The Offset addresses assigned in the Slave configuration are always related to the DP Master.

3.5 Configuration of a SmartStack DPV1 Master to any DPV1 Slave

The following describes the steps to configure a SmartStack Profibus DPV1 Master to any Profibus DPV1 Slave :

	Action	Menu in the System Configurator
•	Create a new project	**File > New > PROFIBUS**
•	Choose Horner DPV1 Master and provide bus address	**Insert > Master**
•	Choose Horner DPV1 Slave and provide bus address	**Insert > Slave**
•	Set DPV1 parameter	Mark the Slave (left Mouse click), then **Settings > Slave Configuration** **DPV1 Parameter data**
•	Set DPV1 buffer size (if connecting to Horner DPV1 Slave.	Mark the Slave (left Mouse click), then **Settings > Slave Settings**
•	Set the bus parameter	Mark the Master (left Mouse click), then **Settings > Bus Parameters**
•	Set device assignment for the Master if no automatic assignment has occurred	Mark the Master (left Mouse click), then **Settings > Device Assignment**
•	Set device assignment for the Slave if no automatic assignment has occurred (if connecting to a Horner Slave).	Mark the Slave (left Mouse click), then **Settings > Device Assignment**
•	Save project	**File > Save**
•	Download to the Master	Mark the Master (left Mouse click), then **Online > Download**
•	Download to the Slave	Mark the Slave (left Mouse click), then **Online > Download**
•	Live List	Mark the Master (left Mouse click), then **Online > Live List**
•	Transfer user data: Read and write data	Mark the Master (left Mouse click), then **Online > Message Monitor** Mark the Slave (left Mouse click), then **Online > Message Monitor**

Table 1: Steps for Configuration of Profibus DPV1 Master to any Profibus DPV1 Slave.

Note (*1): If connecting to anything other than a Horner Slave then see the Slave manual for configuration help.

3.6 Configuration a SmartStack Profibus DPV1 Slave to any Profibus DPV1 Master

The following table describes the steps to configure a SmartStack Profibus DPV1 Slave to any Profibus DPV1 Master:

	Action	Menu in the System Configurator
•	Create a new project	**File > New > PROFIBUS**
•	Choose Horner DPV1 Master and provide bus address **(*1)**	**Insert > Master**
•	Choose Horner DPV1 Slave and provide bus address	**Insert > Slave**
•	Set DPV1 parameter	Mark the Slave (left Mouse click), then **Settings > Slave Configuration DPV1 Parameter data**
•	Set DPV1 buffer size	Mark the Slave (left Mouse click), then **Settings > Slave Settings**
•	Set device assignment if no automatic assignment has occurred	Mark the Slave (left Mouse click), then **Settings > Device Assignment**
•	Save project	**File > Save**
•	Download	Mark the Slave (left Mouse click), then **Online > Download**
•	Transfer user data: Read and write data	Mark the Slave (left Mouse click), then **Online > Message Monitor**

Figure 3.5. Steps for Configuration a SmartStack Profibus DPV1 Slave to any Profibus DPV1 Master

Note (*1): Insert a SmartStack Profibus DPV1 Master. This Master is a placeholder and it is not necessary to match the connected Master.

3.7 Verifying a Project

The following describes the steps to configure a SmartStack Profibus DP Master as a class 2 Master:

	Action	Menu in the System Configurator
•	Create a new project	**File > New > PROFIBUS**
•	Choose Horner DP Master and provide bus address	**Insert > Master**
•	Set the bus parameter	Mark the Master (left Mouse click), then **Settings > Bus Parameters**
•	Set device assignment if no automatic assignment has occurred	Mark the Master (left Mouse click), then **Settings > Device Assignment**
•	Save project	**File > Save**
•	Download	Mark the Master (left Mouse click), then **Online > Download**
•	Live List	Mark the Master (left Mouse click), then **Online > Live List**
•	Call DP class 2 function	Mark the Hilscher Master (left Mouse click), then **Online > Message Monitor**

Table 3.6: Steps for Configuration as a Class 2 Master.

Note (*1): The functions for Profibus DP class 2 are activated by messages or by the application program.

CHAPTER 4: CONFIGURATION OF PROFIBUS WITH HSYCON

4.1 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 **PROFIBUS**. If only the PROFIBUS fieldbus system is installed, the configuration window will open directly. The name of the configuration file can be allocated when the configuration is finished or with **File > Save As**.

4.2 GSD Files

GSD (Electronic data sheet of a device) files contain and describe the functions and characteristics of PROFIBUS devices. The abbreviation GSD means 'Gerätestammdaten' (Device Base Files). All the available GSD files together form the device database.
When the program is started, the System Configurator automatically retrieves all of the GSD files stored in the GSD directory. The device names are placed into an internal list. During configuration, the device-specific data is retrieved directly from the GSD files.
If a DP Slave device does not appear in the selection list, the required GSD file can be copied into the GSD directory with **File > Copy GSD**. Another way is to copy the GSD file into the SyCon GSD directory using 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.

Figure 4.2: GSD files and bitmaps directory

SmartStack Devices: The GSD files for the SmartStack devices are included and 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 organisation 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.

4.3 Master

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

Symbol **Insert > Master**


Table 2: Symbol Insert > Master

The mouse pointer automatically changes into the Insert Master pointer.

Mouse pointer **Insert Master**


Table 3: Mouse pointer insert Master

Click on the position where the Master is to be inserted. The dialog box, from which one or more Masters can be chosen, opens. The following types of Masters may be selected:

PROFIBUS Combi Master (PROFIBUS-FMS and PROFIBUS-DP)	PB
PROFIBUS-DP Master	DPM

Table 4: Selectable Master types

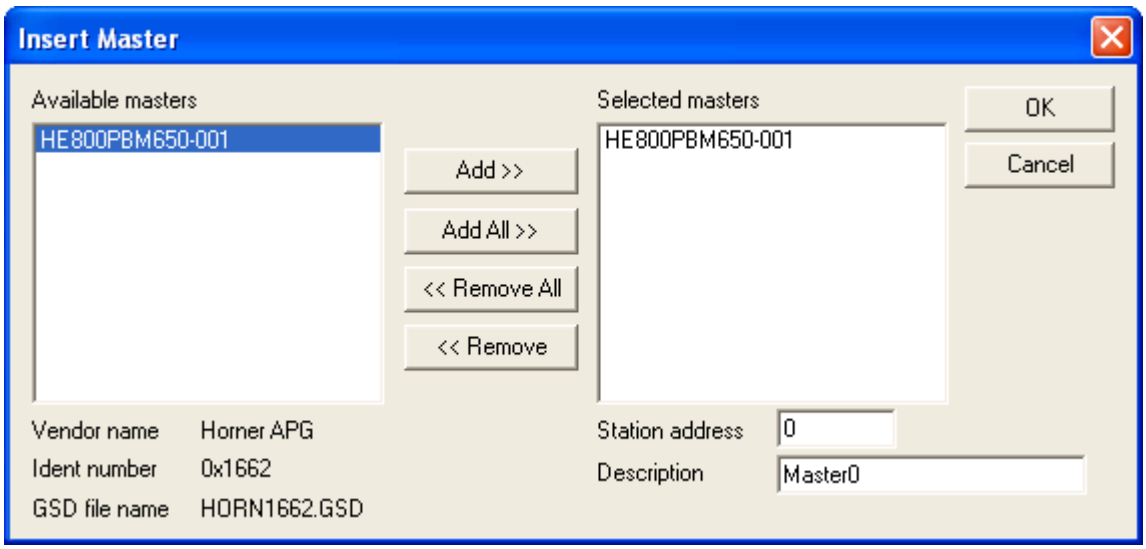


Figure 1: Insert > Master

In this window select the required Master by clicking on it in the **Available Masters** list and then click the **Add** button to put the Master to **Selected Masters**. With **OK** confirm the selection and the Master will be insert. This example shows a HE800PBM650-001 that is inserted with the **Station address 0** and the **Master0.** Note for SmartStack masters only COMDPM and COMPB are valid.

4.4 Master Configuration

The Master-specific configuration 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 double click on the symbol of the Master to be configured, the following window will open.

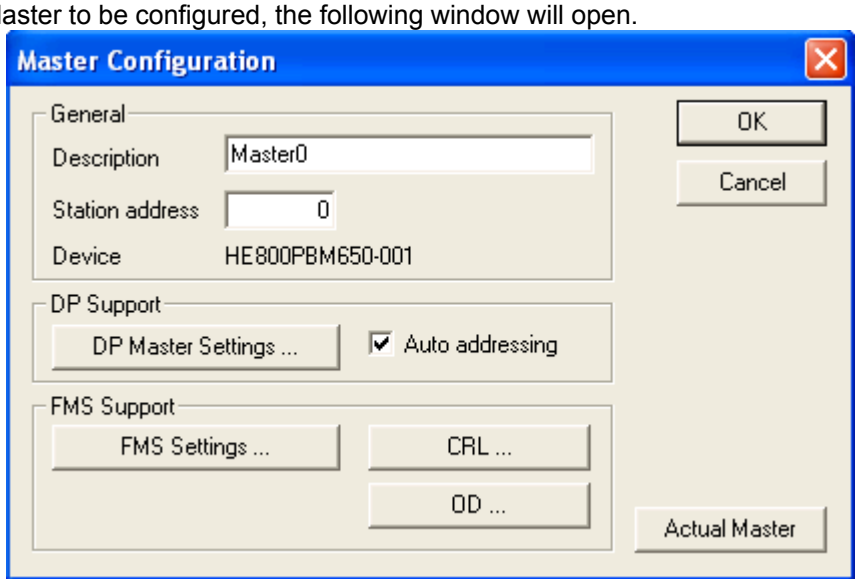


Figure 2: Settings > Master Configuration

The following can be set in this Master Configuration window:

- A (symbolic) **Description** of the Master
- The **Station address** of the Master
- Selection of the Master as the **Actual Master** (for example as the download target)

The following parameters may be set for PROFIBUS-DP:
- Open the DP Master Settings window
- Activate or deactivate the automatic addressing (Auto addressing) for this DP Master.

4.5 PROFIBUS-DP Auto Configuration

The Auto Configuration can be used to configure a Slave. The parameter data cannot be retrieved from a PROFIBUS-DP Slave. Thus, if the Slave requires parameter data, it must be provided by the user. The following is the procedure for Auto Configuration:

Action	Menu in the System Configurator
• Create a new project	**File > New > PROFIBUS**
• Copy GSD file of the DP Slave, if the Slave is not in the selection list	**File > Copy GSD**
• Choose Horner DP Master and provide bus address	**Insert > Master**
• Choose DP Slave and provide bus address	**Insert > Slave**
• Set the bus parameter	Mark the Master (left Mouse click), then **Settings > Bus Parameters**
• Set device assignment if no automatic assignment has occurred	Mark the Master (left Mouse click), then **Settings > Device Assignment**
• Save project	**File > Save**
• Download	Mark the Master (left Mouse click), then **Online > Download**
• Live List	Mark the Master (left Mouse click), then **Online > Live List**
• Start Debugger	Mark the Master (left Mouse click), then **Online > Start Debug Mode**
• Device diagnostic	Mark the Slave (left Mouse click), then **Online > Device Diagnostic**
• Compare Configuration	**Compare Configuration**
• Automatic configuration	**Automatic Configuration**
• Stop Debugger	**Online > Stop Debug Mode**
• Save project	**File > Save**
• Download	Mark the Master (left Mouse click), then **Online > Download**
• Start Debugger	Mark the Master (left Mouse click), then **Online > Start Debug Mode**
• Device diagnostic	Mark the Slave (left Mouse click), then **Online > Device Diagnostic**
• Stop Debugger	**Online > Stop Debug Mode**
• Transfer user data: Write output, read input	Mark the Master (left Mouse click), then **Online > I/O Monitor**

Figure 4.5. Auto Configuration (PROFIBUS-DP)

4.6 Replace Master

If a Master already exists in the configuration and should be replaced for another Master, first set the focus on the Master (left mouse click on the Master) and then choose the menu **Edit > Replace** or

Right mouse click on the Master and select **Replace**. In the newly opened window, the question appears asking if the Master should be replaced.

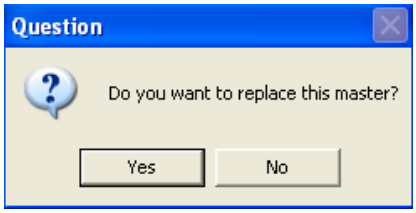
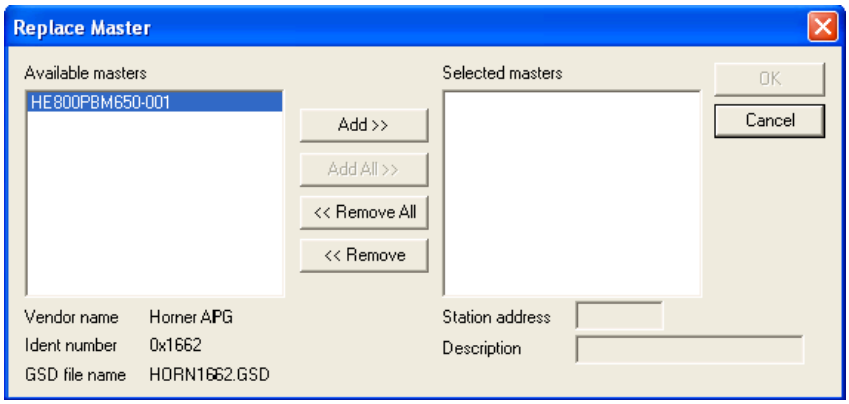


Figure 3: Security question replace Master

Click the **Yes** button, a new window opens. Replace the Master for the required one.

Figure 4: Edit > Replace Master



Select the required Master by clicking on it in the **Available Masters** list. Click the **Add** button to put the Master in the **Selected Masters** list. Confirm the selection by with **OK** and the Master will be replaced.

4.7 Insert DP Slave

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

Symbol **Insert > Slave**


Table 5: Symbol Insert > Slave

The mouse pointer automatically changes to the Insert Slave pointer:

Mouse pointer insert Slave


Table 6: Mouse pointer insert Slave

Click on the position where the Slave is to be inserted. The dialog box, from which one or more Slaves can be selected, opens:

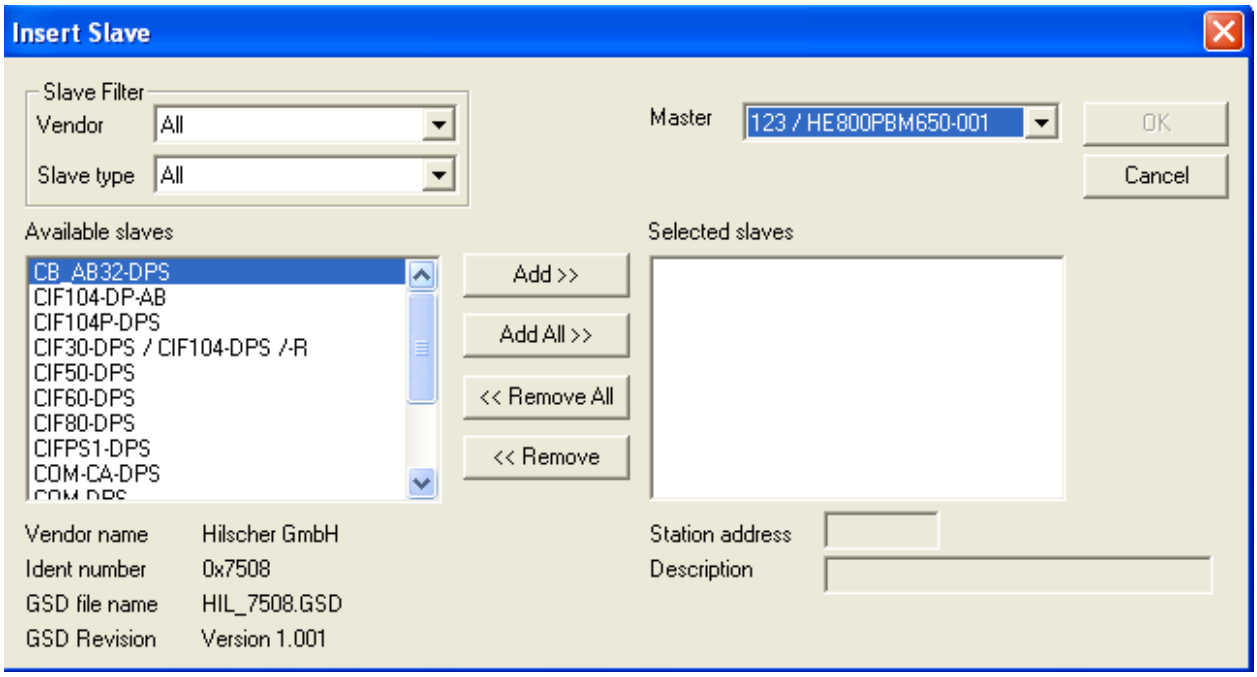


Figure 5: Insert > Slave

The list on the left displays all the available 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 in the list **Selected Slaves** with a double 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 on the network.

4.8 Slave Configuration

First click on 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 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 program.

Note 1: 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 organises its own data addressing.

Note 2: With the SmartStack Slave, the input or output data at the bus are taken directly into the Dual-port memory. The offset addresses refer to the Master.
There are two types of Slaves. A **simple Slave** has a fixed data length. The data length of a **modular Slave** is configurable. A modular Slave can be understood as a combination of a simple Slave with a Station address.

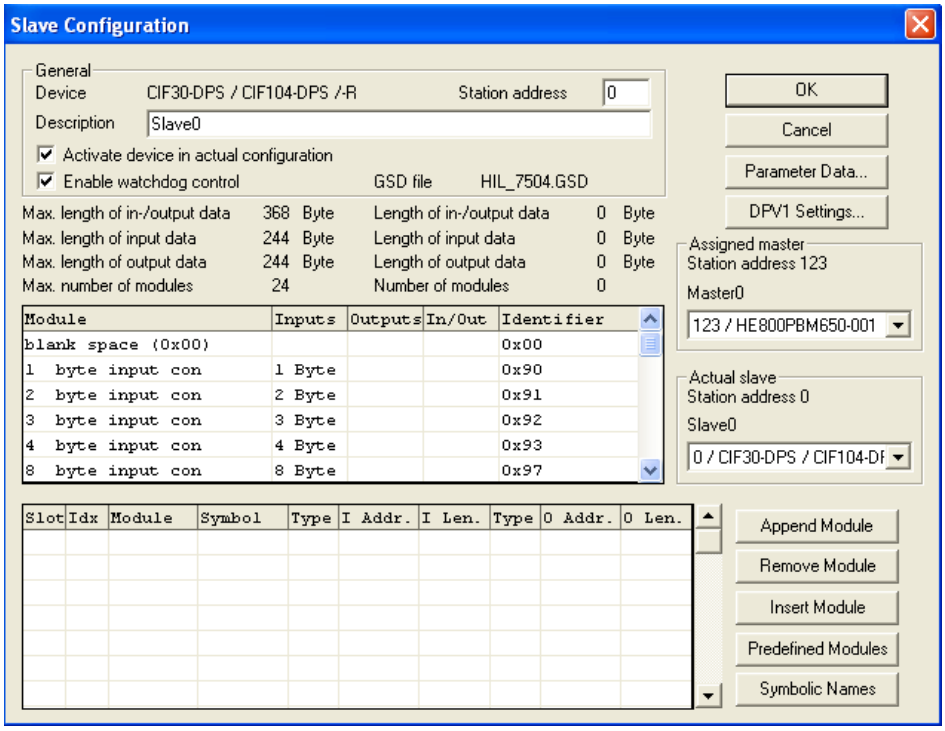


Figure 6: Settings > Slave Configuration

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 shown in the configuration list (lower list) in a separate row. This is displayed by the number in the **Slot** column. The **Index** column shows a sequential number for sub-modules.
For configuration of the modules (selection of the modules) 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 analogue 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:

Auto addressing activated	**Auto addressing deactivated**
Auto addressing (by SyCon)	Manually addressing (by the user)
The addresses will be allocated beginning	The address 0 is shown in the **I Addr** or **O**

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**.	**Addr** and must be overwritten by the user.

Table 7: Auto addressing activated / deactivated

Depending on the **Addressing mode**, which can be set in the **DP Master Settings**, the addresses are either Byte or Word addresses. The DP Slaves utilise 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, the process memory for this Slave is occupied in the Master and data is exchanged. If this setting is switched off, the process memory for this Slave is occupied in the Master and no data is exchanged.

4.9 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 section ***PDD Export***.

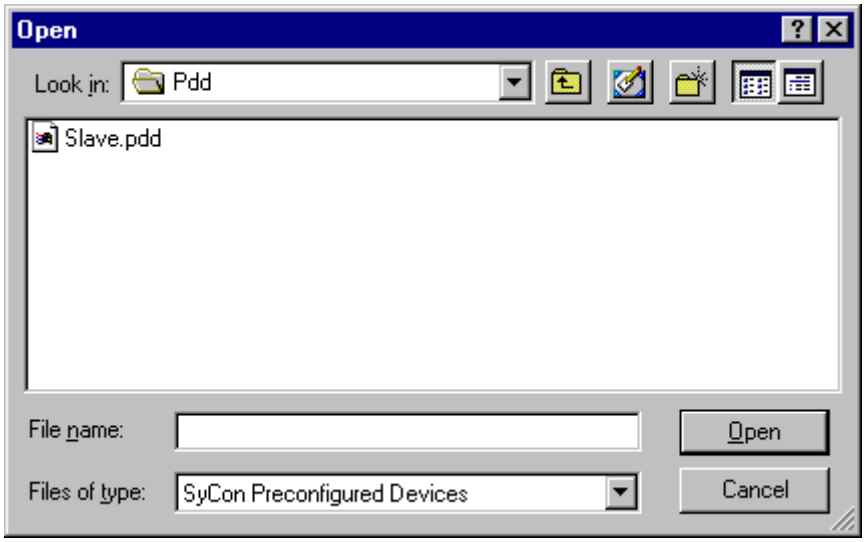


Figure 7: Inserting predefined device – PDD (1)

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

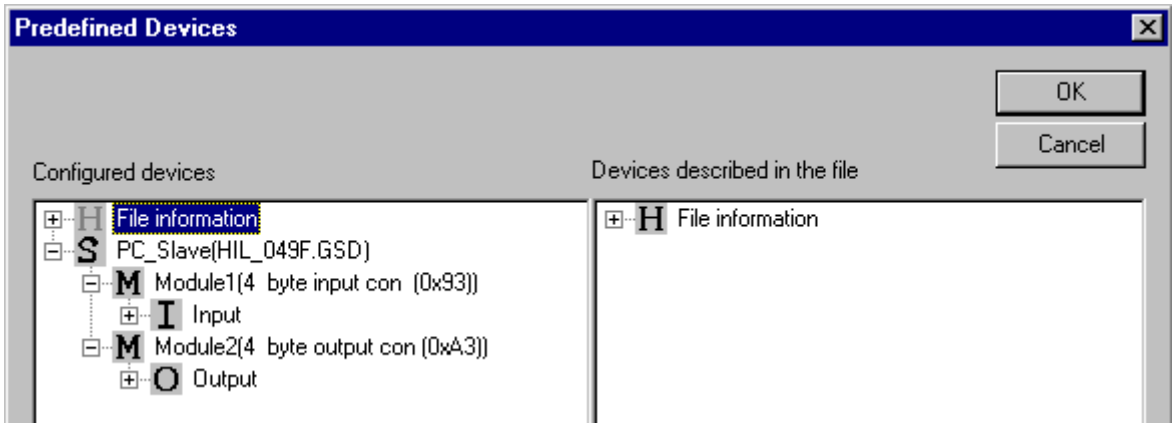


Figure 8: Inserting predefined device – PDD (2)

Select the device or devices of the **Found predefined devices** (left-hand side), 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:

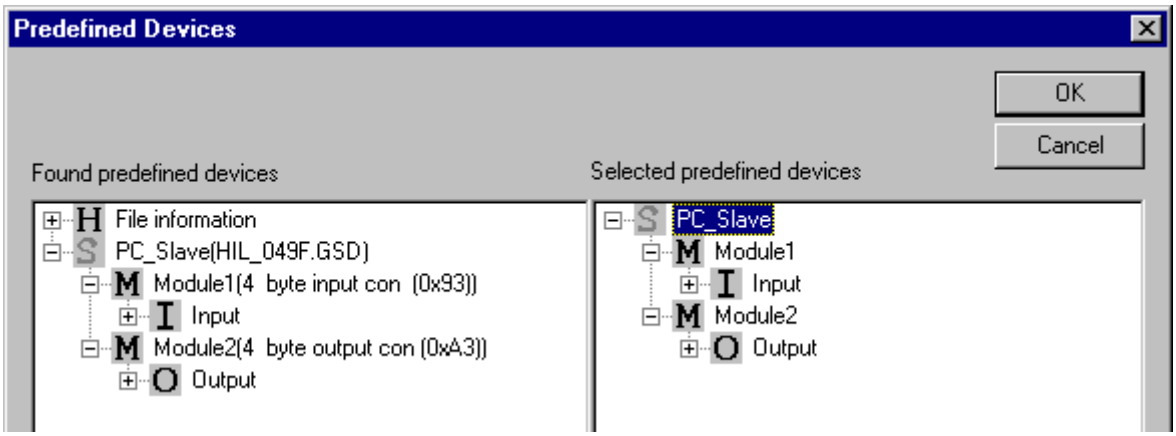


Figure 9: Inserting predefined device – PDD (3)

The figure shows a device with the description PC_Slave consisting of two modules with the description Module1 and Module2. Choose **Ok** in order to insert the device into the configuration. The station address of the device can be altered subsequently.

4.10 Replace Slave

If a Slave already exists in the configuration and should be replaced with another Slave, first set the focus on the Slave (left mouse click at the Slave) and then choose the menu **Edit > Replace** or right click the on the Slave and select **Replace**. In the new window, the question appears asking if the Slave should be replaced.

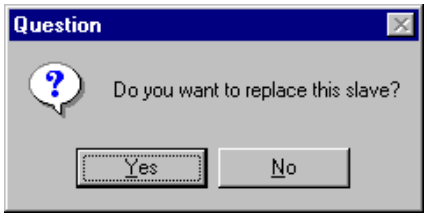


Figure 10: Security question replace Slave

Click the **Yes** button a new window opens, allowing the replacement of the current Slave with another one.

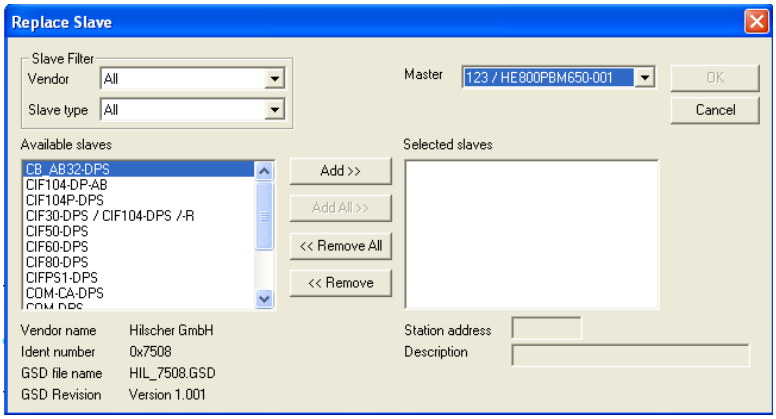


Figure 11: Edit > Replace Slave

In this window, select the required Slave by clicking on it in the **Available Slaves** list. Clicking the **Add** button puts the Slave in the list **Selected Slaves**. With **OK** confirm the selection and the Slave will be replaced.

CHAPTER 5: SETTINGS

5.1 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**. The following possibilities are available:

----------	**CIF Serial Driver**	----------

Figure 12: Driver selection – CIF Serial Driver

CIF Serial Driver:

CIF Serial Driver: The HSystem Configurator communicates with the SmartStack device over a serial connection. The serial interface of the PC must be connected via a cable (straight) with the diagnostic interface of the SmartStack device. The cable is standard straight through Programming cable.

Choose the **CIF Serial Driver** and then **OK**, in order to select the CIF Serial Driver. The connection must first be established using the relevant COM port checkbox. The ports available will depend upon the number of ports installed in the PC. and free.
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 event that no device is connected a Timeout error (-51) appears.

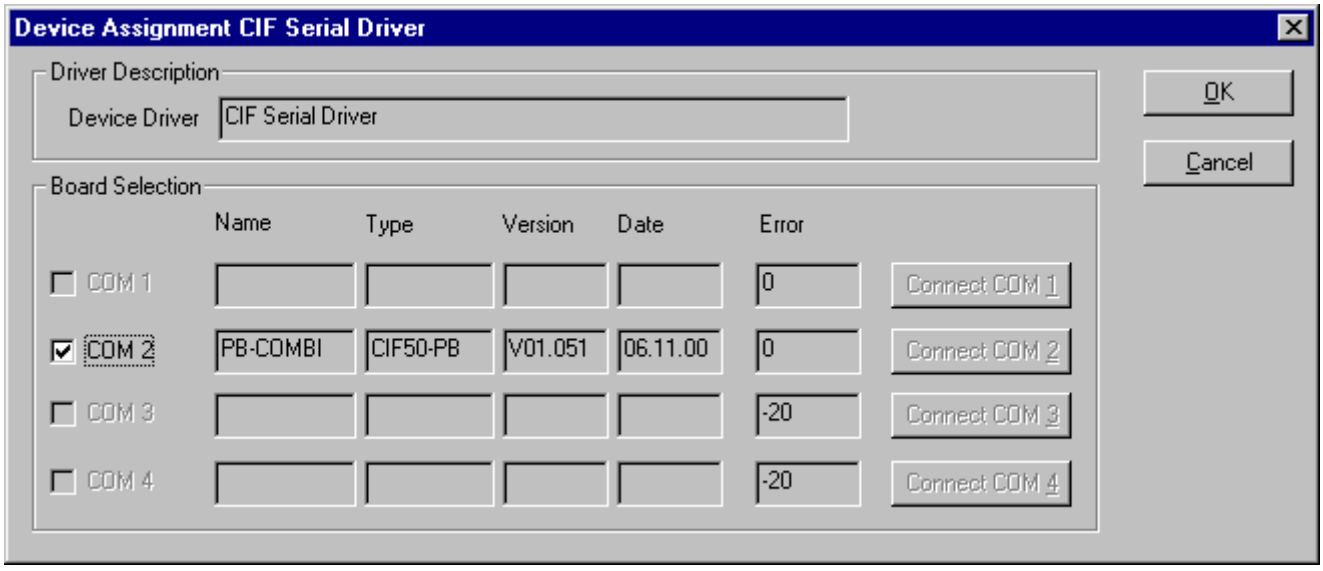


Figure 13: CIF Serial Driver – Device Assignment

The error number –20 indicates that this COM interface is not available or already in use.

5.2 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 to it. This is especially the case when the ASIC SPC3 is used.

There are also PROFIBUS-DP Slave devices, in which the Bus Parameters must be set by the user.

5.3 Setting the Bus Parameters and Profiles

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

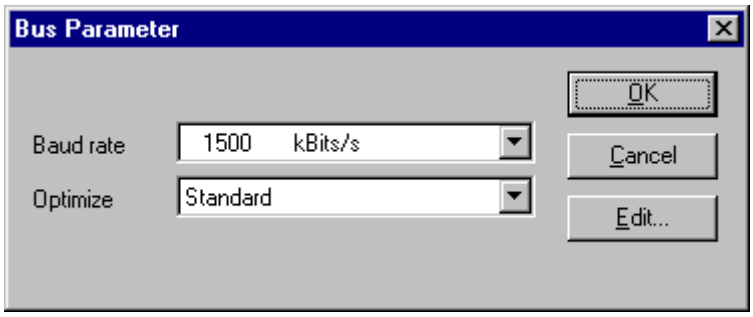


Figure 14: Settings > Bus Parameters

The Bus Parameters may be viewed with the **Settings > Bus Parameters** menu and may be edited by clicking on the **Edit** button. The Bus Parameters may or may not be edited depending upon the optimising or profile selected. The optimising standard provides each Baud rate with default Bus Parameters for PROFIBUS-DP systems. By changing the settings in the **Optimising** field from **Standard** to **User defined**, all Bus Parameters may be edited.

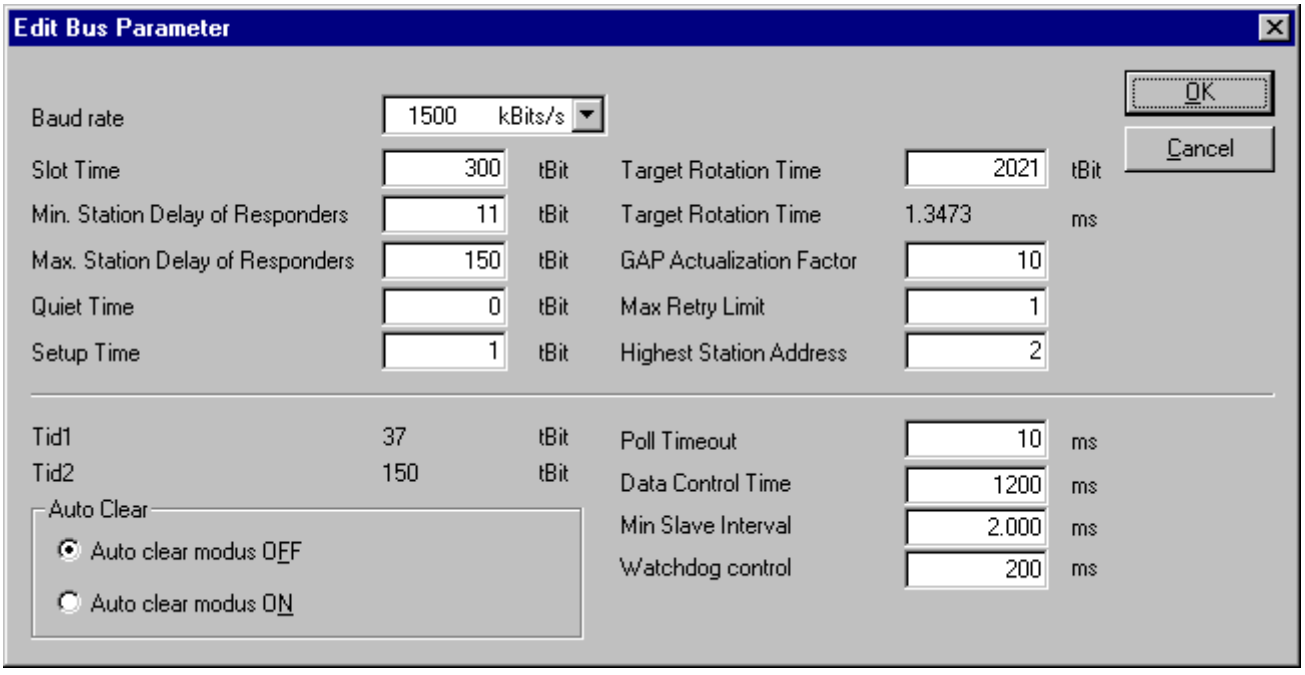


Figure 15: Editing Bus Parameters

Caution: Changing the Bus Parameters can cause communication interruptions.

Note: The offline Bus Parameters are displayed. The Bus Parameters are only accepted by the device upon 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 based on 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 on 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 the 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 is provided for global error handling. The DP Master monitors the user data exchange (Data Exchange) 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 Data Exchange and sets the outlets of **all** assigned DP Slaves into a secure condition*.

5.4 Description 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)

Formula 1: Bit time t_{Bit}

The conversion from milliseconds into a Bit time is shown in the following formula:

Bit time = Time [milliseconds] * Baud rate,

Formula 2: Conversion into Bit time t_{Bit}

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

Table 8: 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 the 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 the following telegram.
The Sender (Requestor, Master) must wait at least for this time period upon sending 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 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. It 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 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.

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

Formula 3: T_{ID1}

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

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

Formula 4: T_{ID2}

These times cannot be set directly, they 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.

5.5 Rules

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

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

Formula 5: Min T_{SDR}, Max T_{SDR} and T_{SL}

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

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

Formula 6: T_{QUI}, T_{RDY} and min T_{SDR}

For access monitoring (T_{WD}) and Target Rotation Time (T_{TR}):

$T_{WD} > T_{TR}$

Formula 7: T_{WD} and T_{TR}

For the Data_Control_Time the following rule applies:

Data_Control_Time > 6 * T_{WD}

Formula 8: Data_Control_Time

If the devices used have different values for min T_{SDR} then the greatest of these values is used for all devices.

Min T_{SDR} = max (min $T_{SDR\ device\ 1}$, min $T_{SDR\ device\ 2}$, ..., min $T_{SDR\ device\ N}$)

Formula 9: Min T_{SDR}

Example: If for device 1 the value for min T_{SDR} 200, for device 2 the values 75 and for device 3 the value 125, then the value of 200 must be used for all devices.
The same applies also for the Bus parameters max T_{SDR}, T_{SL}, T_{QUI}, T_{SET} and T_{TR}.

CHAPTER 6: DP MASTER

6.1 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 **Master Settings** from the list that opens. The **DP Master Settings** are also available in the **Master Configuration** window.
The DP Master settings contain parameters that determine the behaviour of the Master device as well as the user interface. These settings are only valid for Horner devices and are included in the download of the configuration.

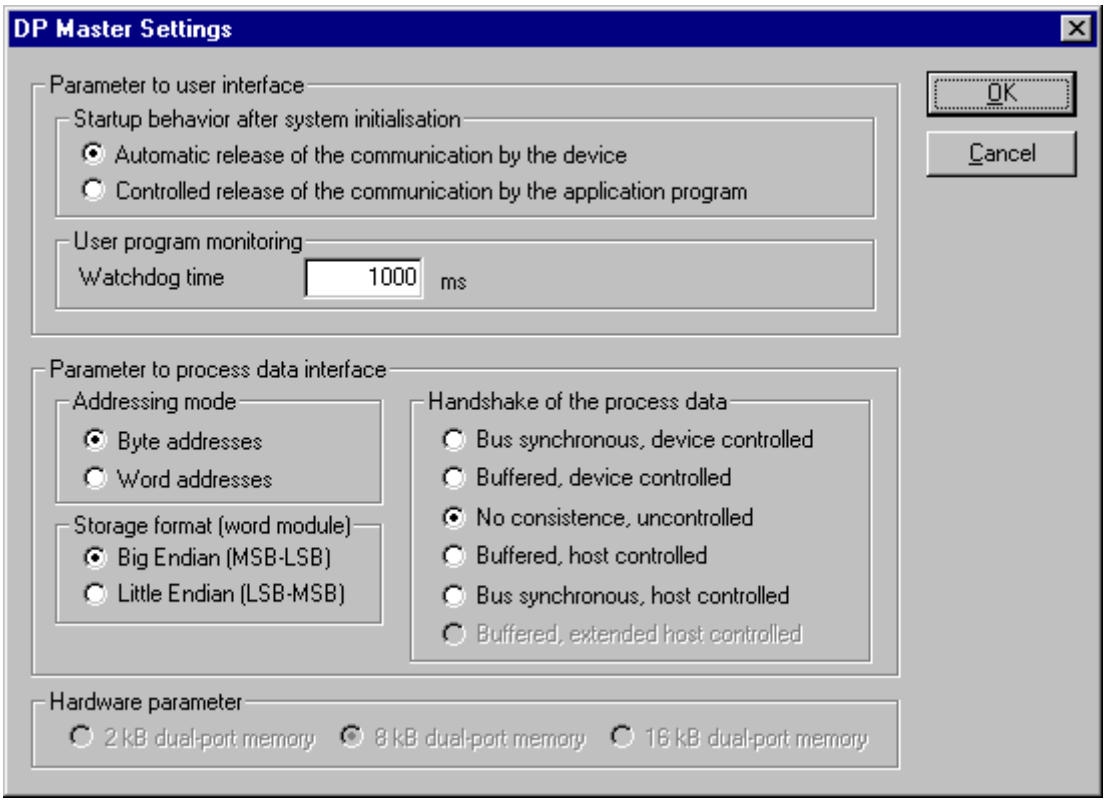


Figure 16: DP Master Settings

Startup behaviour after system initialisation

When **Automatic release of the communication by the device** has been set, the Master device starts to exchange data on the Bus once initialisation is complete. When **Controlled release of communication by the application program** has been set, the application program must activate the data exchange on 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 function must be activated by the user program and does not start automatically. The value must be set to zero on current Horner modules.

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.

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 high/low (big Endian) value Byte or low/high value Byte (little Endian).

Handshake of the process data

These various types are used for setting the handshake of the process data of the Master. The choice of used type is important for the correct data exchange between the application program and the device. The chosen handshake of the process data must be supported by the application program. For all Horner modules select the buffered, host controlled handshake.

Hardware parameter

This parameter displays the size of the dual-port memory. The value enlarges or reduces the permissible address area for the process data addresses.
For the Horner Profibus master the size of the dual-port memory is 8K.
For the Horner DP Slave the size of the dual-port memory is 2K.

6.2 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.

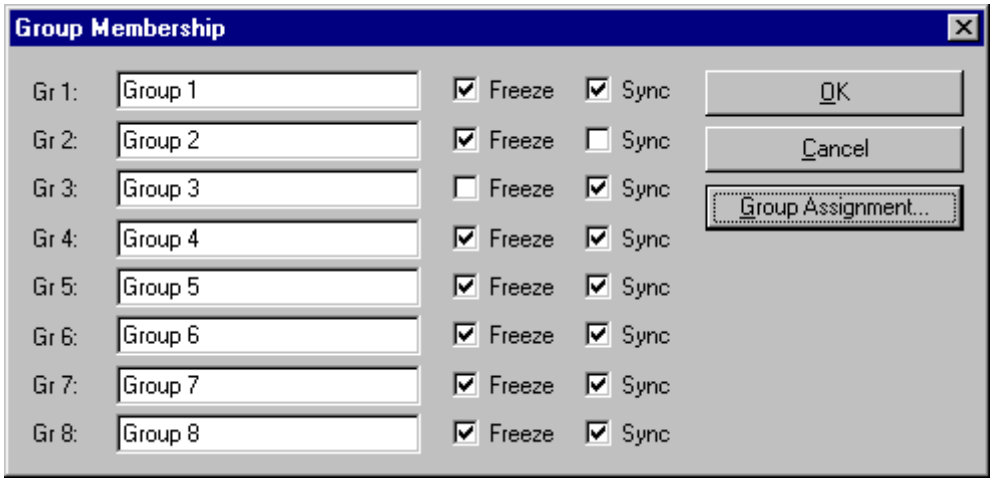


Figure 17: Settings > Group Membership (1)

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 is possible to select which of up to eight possible groups the Slave is 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 to it.

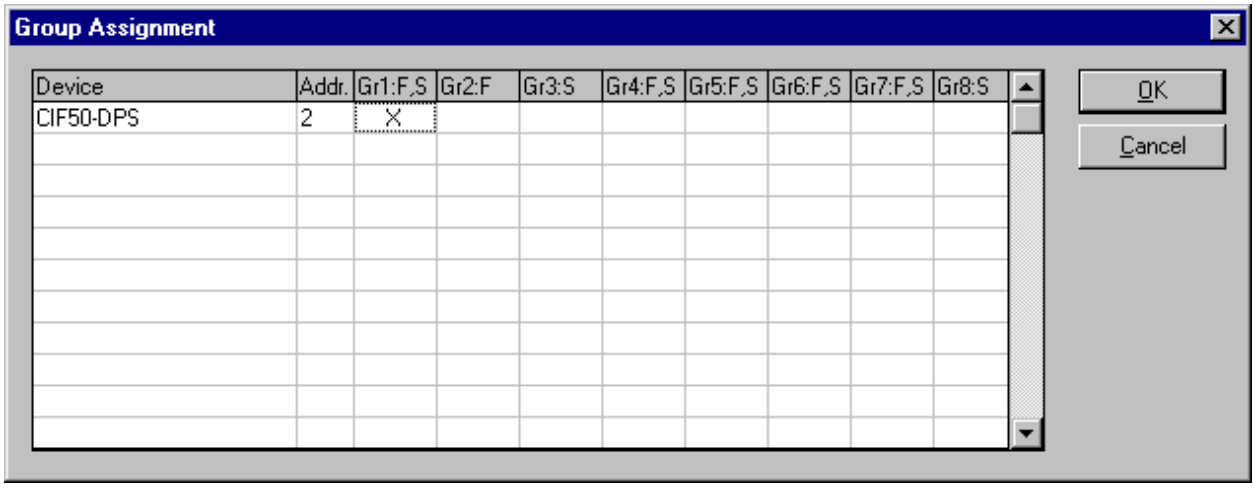


Figure 18: Settings > Group Membership (2)

CHAPTER 7: DP SLAVE

7.1 Slave Settings

The DP Slave Settings contain parameters that define the behaviour of the device at the user interface, which do not belong to the DP configuration. This menu point is applicable only to Horner 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 by clicking on it and then open the window in the **Settings > DP Slave Settings** menu.

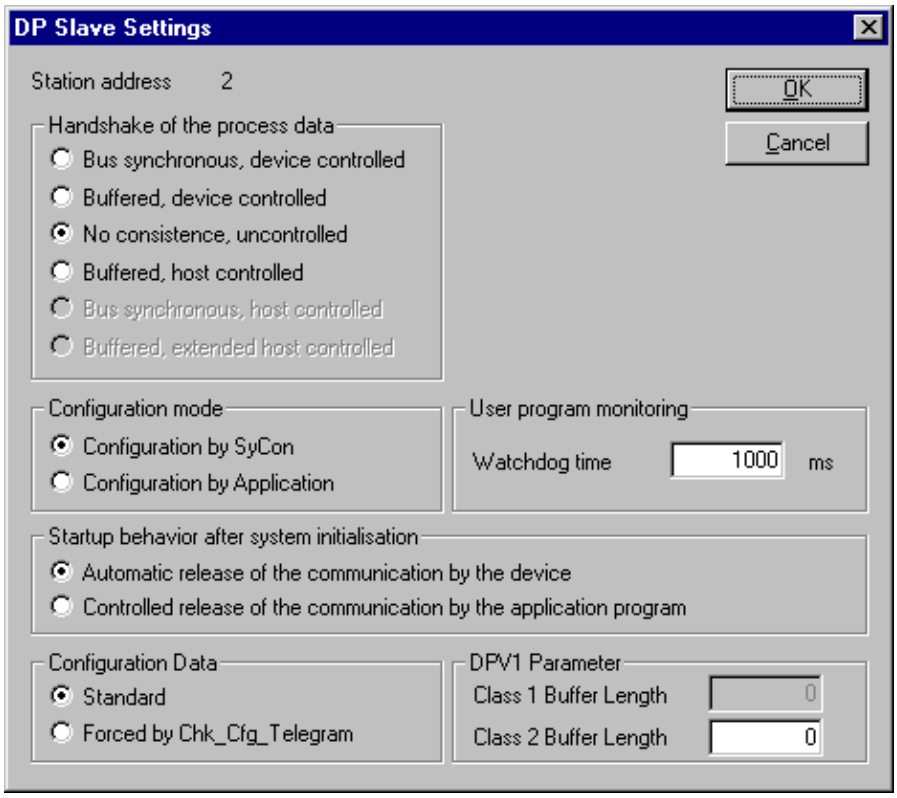


Figure 19: DP Slave Settings

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. Select 'Buffered Host Controlled' for all Horner Slave modules.

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 **Watchdog time** determines how long the device will wait for an application triggering until it resets all outputs to zero. For current firmware versions, this must be set to zero.

Start-up behaviour after system initialisation

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. The current firmware version expects the 'Automatic release' option to be chosen.

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 to the Slave with the CHK_CFG_TELEGRAM. The normal (default) is 'Standard'.

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. From the buffer size set here, 4 Bytes are reserved for the transfer of the DPV1 administration data and these are not available for transfer of user data.
Valid values for the length of class 1 buffer are in the range of 4 .. 244. Alterations of the size of the buffer can only be set in the Slave configuration dialog, if 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. Similar to the configuration of the class 1 buffer, here, 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 lengths. 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 slave device. The purpose of the examples in the following table is to show how to estimate the usable buffer length and I/O data width.

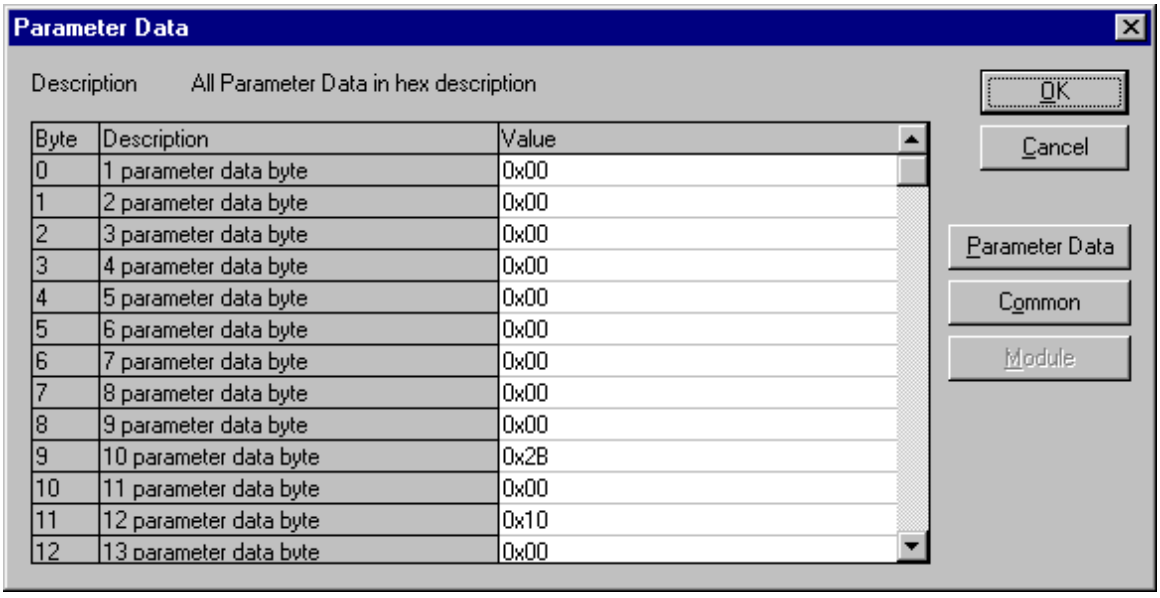
Example	Cyclic I/O data	DPV1 class 1 buffer	DPV1 class 2 buffer
Maximum I/O data	368	60	0
Maximum DPV1 class 1 buffer	304	244	0
Maximum DPV1 class 2 buffer	296	0	244
Maximum DPV1 class 1 buffer and Maximum DPV1 class 2 buffer	200	244	244
128 Bytes for DPV1 class 1 buffer	344	128	0
128 Bytes for DPV1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

Table 9: 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 diagnostic of the Slave in the 'SPC3' section under 'Last Error'. If the error code 75 is entered there, 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.

7.2 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 opened 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 here. The window below gives an example of parameter data of a Slave.



Byte	Description	Value
0	1 parameter data byte	0x00
1	2 parameter data byte	0x00
2	3 parameter data byte	0x00
3	4 parameter data byte	0x00
4	5 parameter data byte	0x00
5	6 parameter data byte	0x00
6	7 parameter data byte	0x00
7	8 parameter data byte	0x00
8	9 parameter data byte	0x00
9	10 parameter data byte	0x2B
10	11 parameter data byte	0x00
11	12 parameter data byte	0x10
12	13 parameter data byte	0x00

Figure 20: Parameter Data (Hexadecimal depiction)

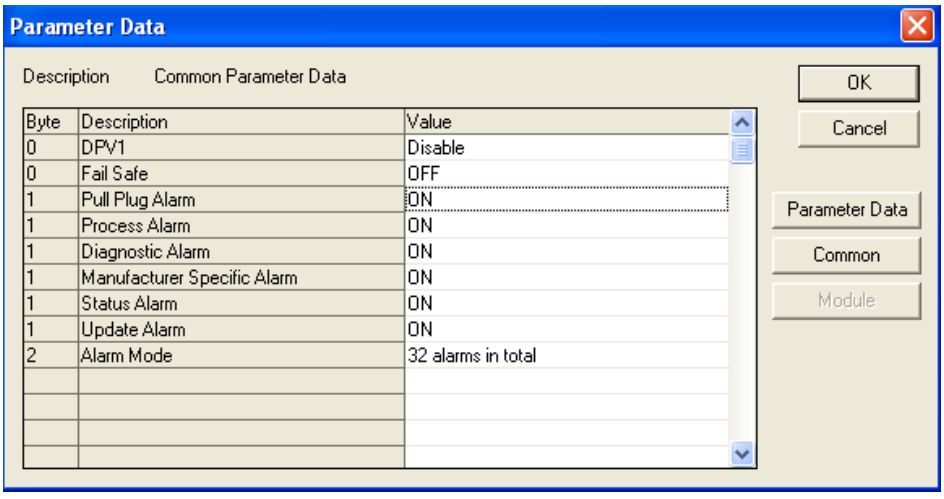
A modular PROFIBUS-DP Slave station could require parameter data for one or more modules and for the Slave station itself (main station). There are three options:

Parameter data - These are all the parameters of a Slave station.

Common - Parameter Data of the main station.

Module - Parameter Data for one of the modules.

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



Byte	Description	Value
0	DPV1	Disable
0	Fail Safe	OFF
1	Pull Plug Alarm	ON
1	Process Alarm	ON
1	Diagnostic Alarm	ON
1	Manufacturer Specific Alarm	ON
1	Status Alarm	ON
1	Update Alarm	ON
2	Alarm Mode	32 alarms in total

To edit the value double click on a row of parameter data.

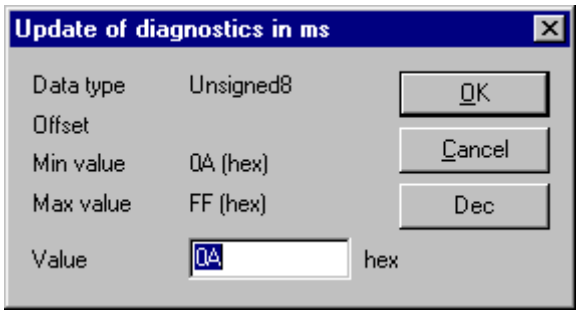


Figure 22: Parameter Data (individual depiction)

Or to change the DPV1 description via the text setting.

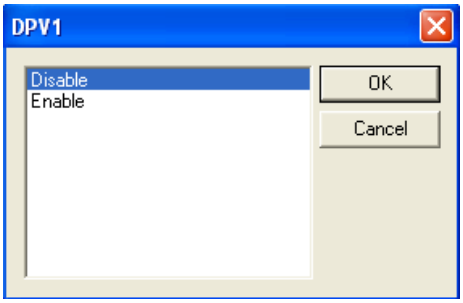


Figure 23: Parameter Data

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.

7.3 DPV1 Parameter

DPV1 serves for a cyclic data exchange and offers read, write and alarm processing functions. The following information refers to Horner devices.

Figure 24: DPV1 Settings

Additional Slave Functions

Cyclic Connection

When **Abort if Slave is not responding** is chosen, the Master does not remain in the DATA_EXCHANGE condition for the faulty Slave if the Slave has been recognized as faulty, 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. Based on 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 adapt its buffer size for the respective data count.

Diagnostic Update Delay

Some newer Slave devices require more time for the consistency testing for the processing of the SET_PRM parameterising telegrams. Often, therefore, a simple diagnostic cycle is insufficient time for the participant to inform the Master of the release for the DATA_EXCHANGE. With the diagnostic delay, the number of diagnostic 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

Determine whether the DPV1 Master receipts an alarm to the DPV1 Slave via SAP 51 or 50.

Configuration Data convention

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

Enabled Alarms

Activates or deactivates the alarms (Module pulled), Process Alarm, Diagnostic Alarm, Manufacturer Alarm, Status Alarm and Update Alarm.

7.4 Project Information

If the user creates a project, the project information can be typed in the **Settings > Project Information** menu. The information may be viewed at any time by opening the window again.

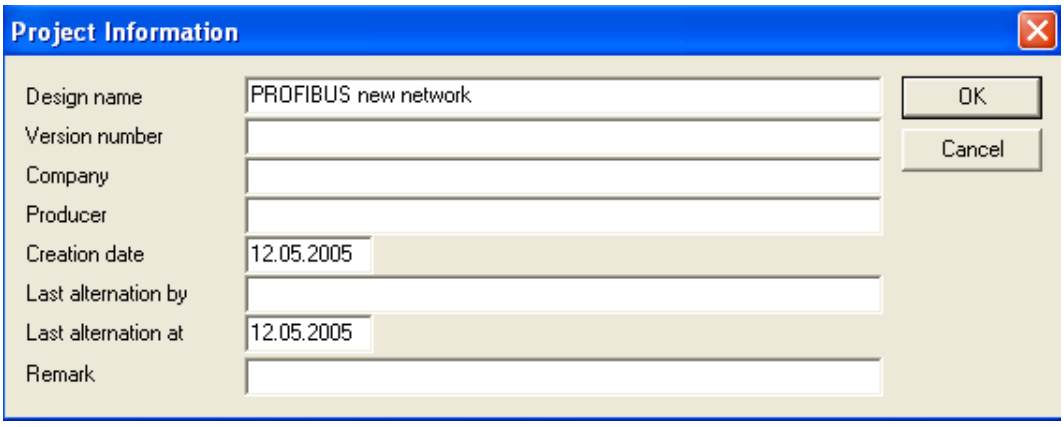


Figure 25: Settings > Project Information

7.5 Path

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

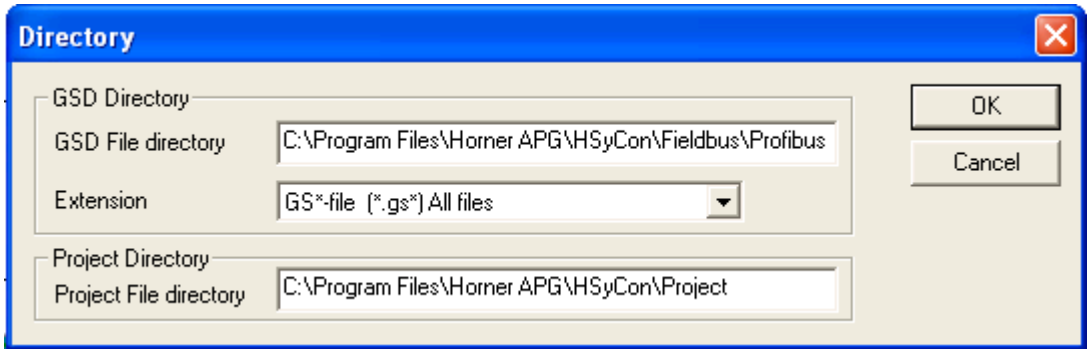


Figure 26: Settings > Path

Once the **OK** button is clicked, all GSD files are read in.

7.6 Language

To set the language option select: **Settings > Language** menu and the following window opens:

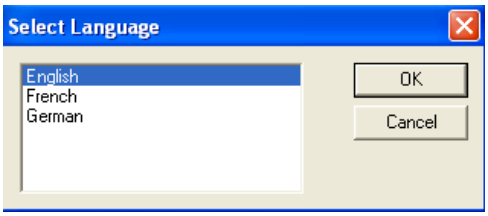


Figure 27: Settings > Language

Once the language option has been selected, the software must be closed and re-opened before the new settings take effect.

Note: Not all languages are available for all fieldbuses!

7.7 Start Options

Starting from the window Network View (menu **Window > Network View**) the menu **Setting > Start...** opens the window **Start Options**. The different start options or modes can be set. Some of these settings are only for the OPC server and are not applicable to Horner modules.

Note: The Start Options menu is only displayed in the selection Settings, if a project is loaded.

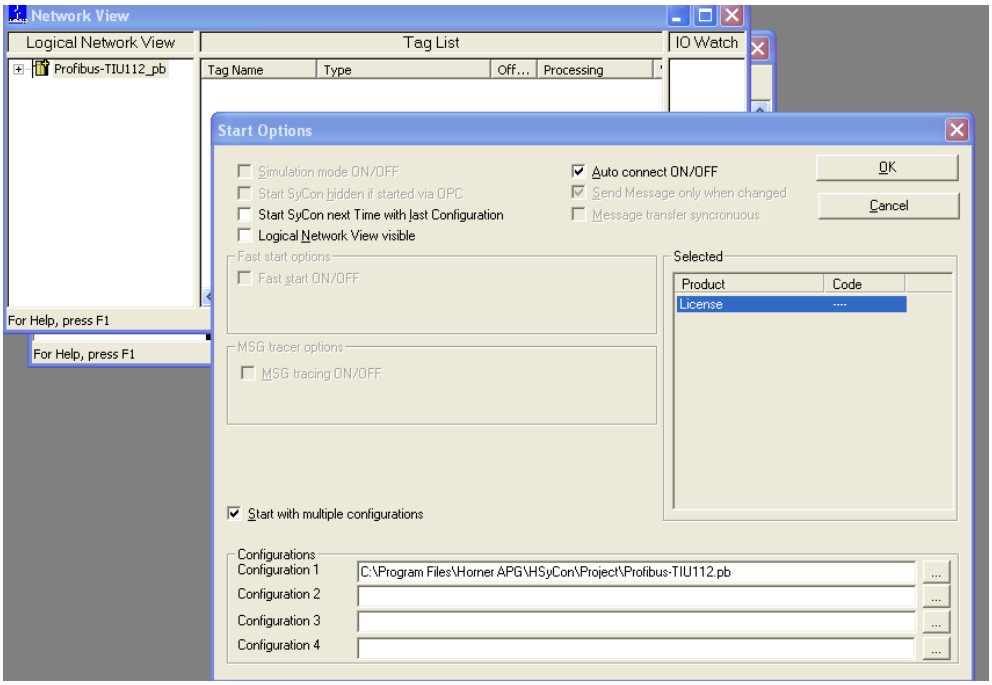


Figure 28: Settings > Start Options

Simulation mode ON/OFF

Not applicable for Horner modules.

Start SyCon hidden if started via OPC

Not applicable for Horner modules.

Start SyCon next time with last Configuration

This option automatically loads the last saved configuration when the SyCon is started again.

Logic Network View visible

This option allows the use of network mode. It is also possible to use the Watch List from the network mode.

Fast start ON/OFF

Not applicable for Horner modules.

TAG tracing ON/OFF

Not applicable for Horner modules.

OPC tracing ON/OFF

Not applicable for Horner modules.

Auto connect ON/OFF

This option allows automatic connection to the device listed in the configuration file.

Start with multiple configurations

This option allows HSyCon to start with up to four configurations simultaneously. The paths are shown in the window and are changeable.

CHAPTER 8: ONLINE FUNCTIONS

8.1 Downloading the Configuration

First, the required 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 COM device 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:

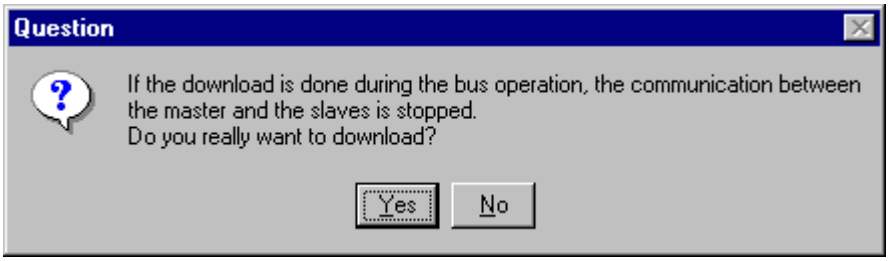


Figure 29: Security question before Download

Attention: The download overwrites the configuration in the device and the connection with the connected devices is interrupted.

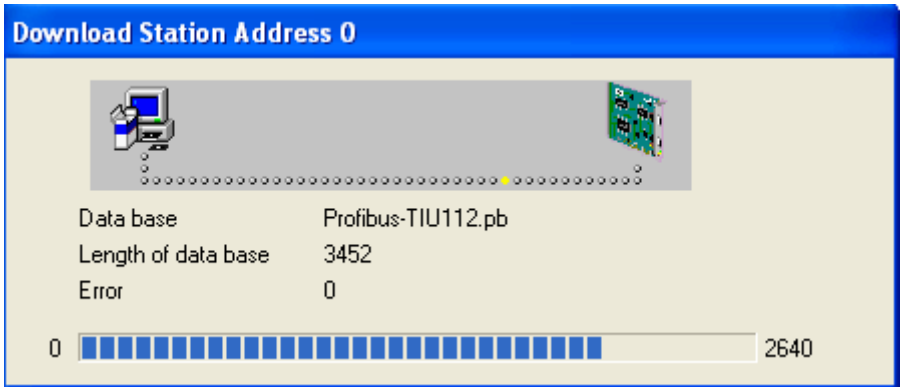


Figure 30: Online > Download

Before the Download is executed, the configuration is checked 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.
If automatic address assignment is required then the **Auto Addressing** button in the **Master Configuration** window must be activated.
The configuration is transferred to the selected device and stored there in FLASH memory. After the download, the device carries out an internal restart and begins communication if in **DP Master Settings** the **Automatic Release of Communication by the Device** menu point has been set.

8.2 Firmware Download

If a Firmware update is required, proceed as follows: first choose the desired device for Firmware downloading. Then, call up the **Online > Firmware Download** menu. Select the new Firmware and send it to the device with **Download**.

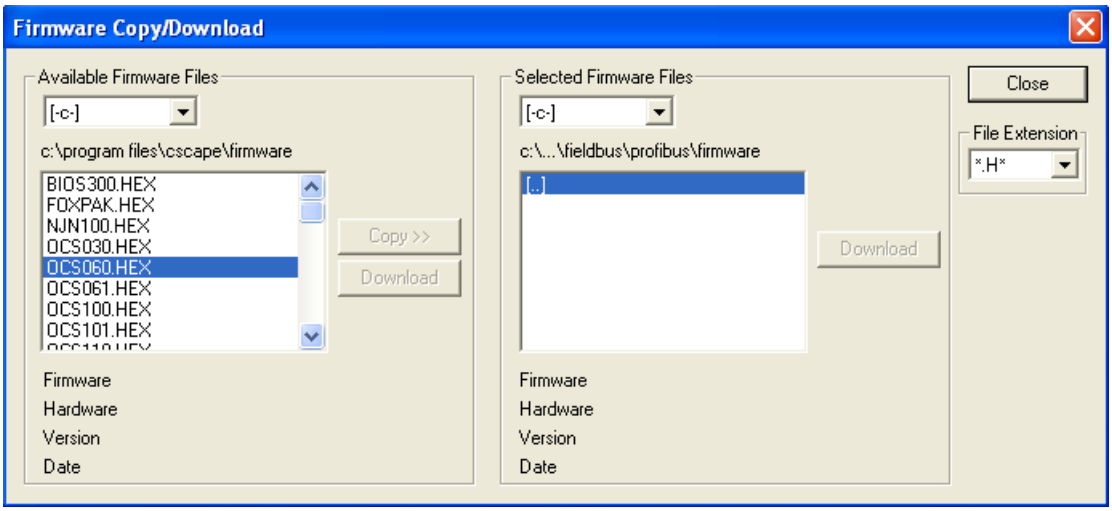


Figure 31: Online > Firmware Download

8.3 Firmware / Reset

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

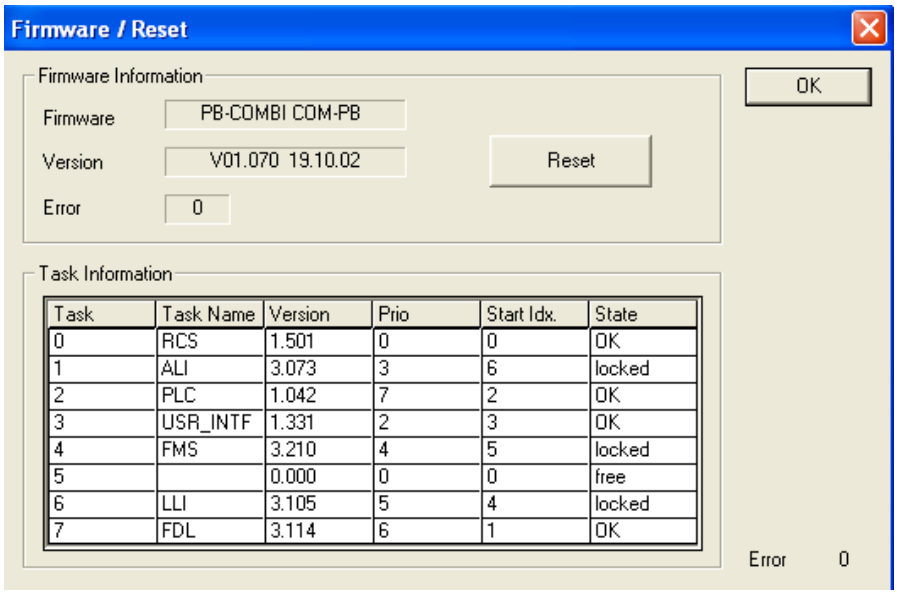


Figure 32: Online > Firmware / Reset

The device can be reset with the **Reset** button.

8.4 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.

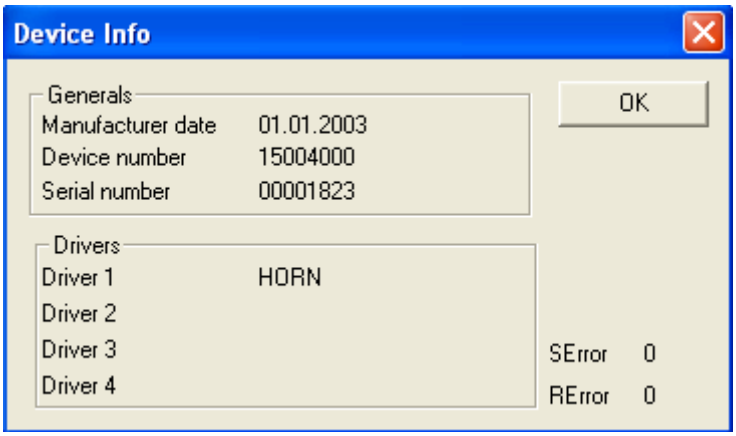


Figure 33: Online > Device Info

8.5 Automatic Network Scan

This function scans the network structure. The scan will detect what devices are connected to this PROFIBUS network and how these devices are configured. The following steps are necessary before the scan can be performed:

Create a new project: Select the menu File > New and PROFIBUS.

Select the Master: Select the Master from the menu Insert > Master.

Set the Baud rate: Select the menu Settings > Bus parameter and set the Baud rate.

Load these settings to the Master: Select the menu Online > Download.

Save: Select File > Save to save the settings.

Scan the network: Select the menu Online > Automatic Network Scan.

Note: This function detects the devices on the PROFIBUS network and can read out how these devices are configured. It cannot read out the parameters, as this is not specified in the PROFIBUS protocol. Parameter data must be set by the user through the Master, which transfers the parameter data to the Slaves.

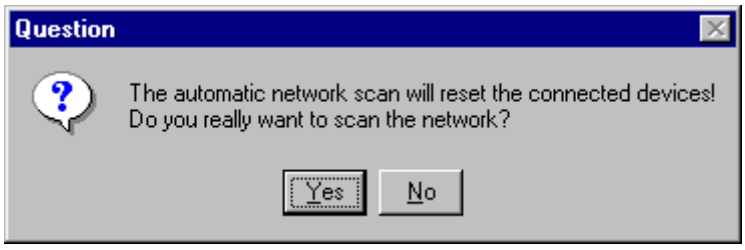


Figure 34: Online > Automatic Network Scan (security question)

Click **Yes** if the connected PROFIBUS network should be scanned. Click **No**, if these functions should not be performed.

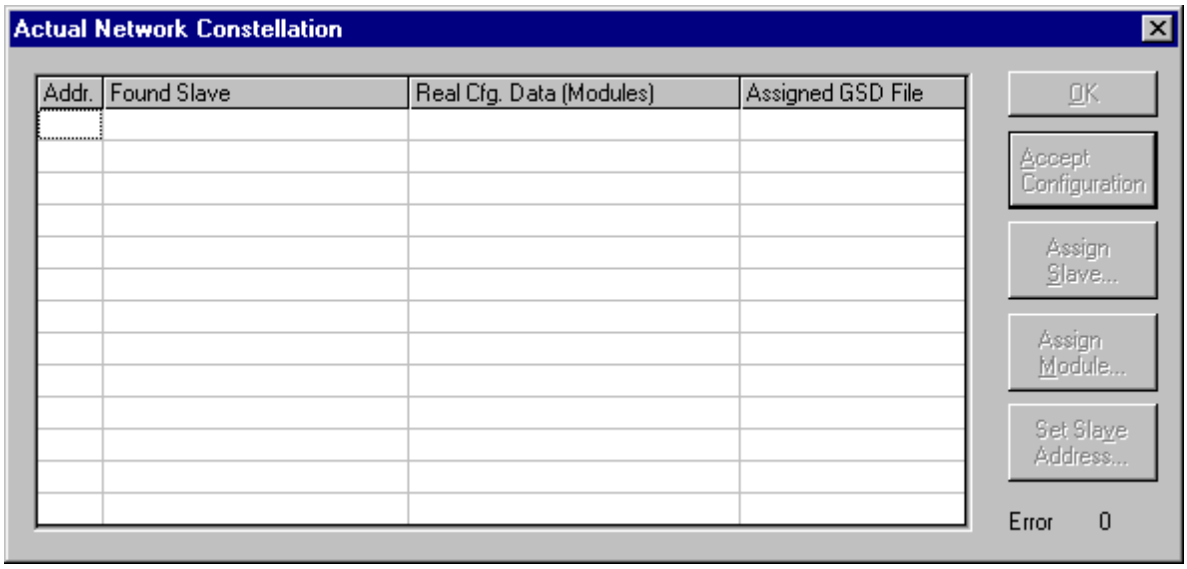


Figure 35: Online > Automatic Network Scan (During the Scan)

All buttons are grey during the network scan.
The System Configurator first detects what devices are connected to the PROFIBUS network. Next, the identcode from each Slave is read. The configuration data (identifier bytes) is read from each Slave and searched for in the corresponding GSD file (if GSD file is available), the module is displayed in the column **Real Cfg. Dat (Modules)**.

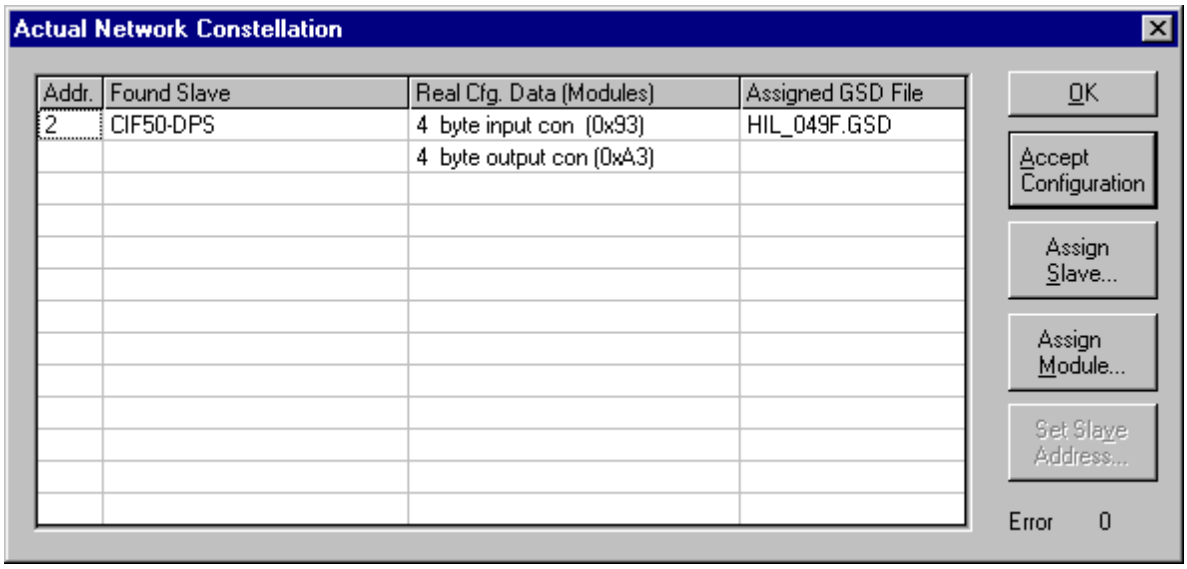


Figure 36: Online > Automatic Network Scan (After the Scan)

Note: Some Slave devices only allow the default configuration to be read.

In the window **Actual Network Constellation** the text in the columns **Found Slave** and **Real Configuration Data** can be displayed in the following colours:

	Colour	Found Slave	Real Configuration Data
0	Orange	For this device no suitable GSD file was found	No suitable modul was found in the GSD file
1	Black	For this device exactly one suitable GSD file was found	Exactly one modul was found in the GSD file
≥2	Blue	For this device more than one suitable GSD file was found	More than one modul was found in the GSD file

Table 10: Network scan - Description of the displayed window

If a device is coloured, **red** in the **Actual Network Constellation** an error has occurred. For example, a Slave with the Station Address 126 was detected. In this case, the Ident number cannot be read out.
Upon exiting the window **Actual Network Constellation,** the System Configurator provides the option as too whether the constellation should be taken into the configuration or not.

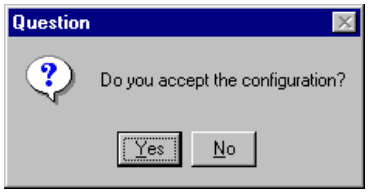


Figure 37: Online > Automatic Network Scan > Accept Configuration

Example:
This example shows a scanned Network Constellation with more than one suitable module for the GSD file. The modules (**Real Cfg. Data**) are coloured blue, which means, that the assignment can be changed by clicking the **Assign Module** button:

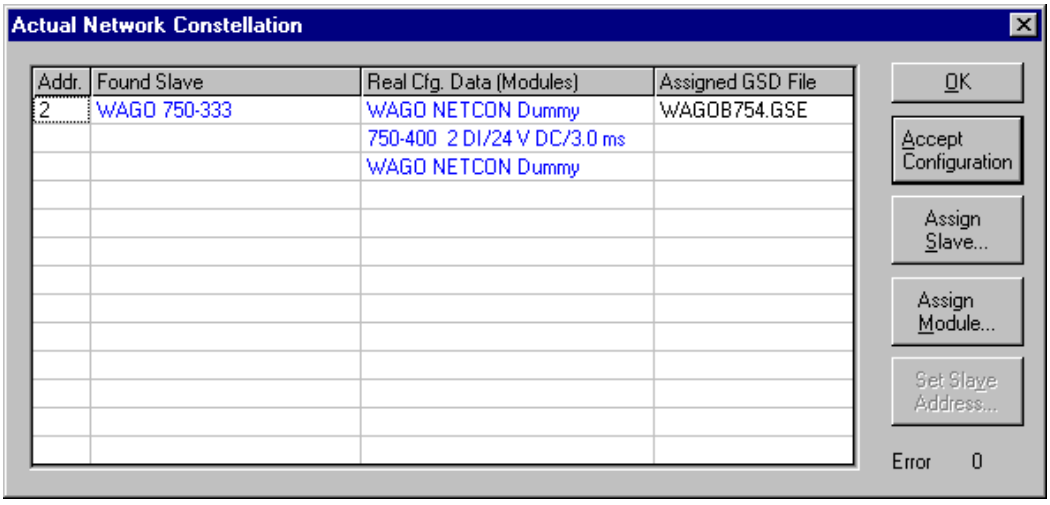


Figure 38: Online > Automatic Network Scan - Example for Assignment

8.6 Assign Slave

The identnumber is read from the Slave device during the network scan. If more than one GSD file is available with this identnumber in the window **Assign Slave**, a list is displayed and the correct Slave device may be selected.

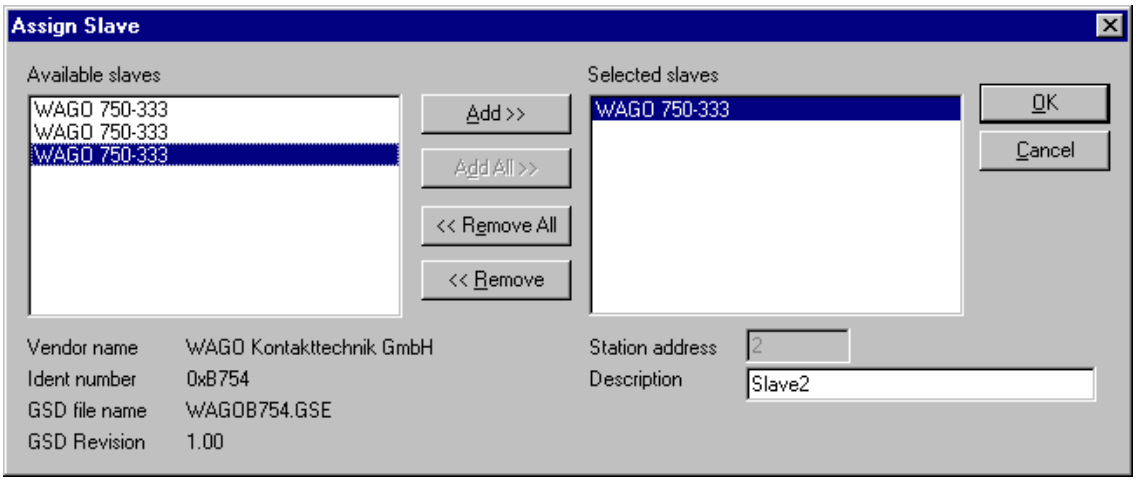


Figure 39: Online > Automatic Network Scan > Assign Slave

All devices found during the Automatic Network Scan appear in the **Selected Slaves**. By clicking the **Remove** button a device may be removed and another device may be insert in the Actual Network Configuration.
For this select a device by clicking on it. Click the **Add** button to put it into the right list. By pressing the **OK** button the device is assigned to the Actual Network Configuration:

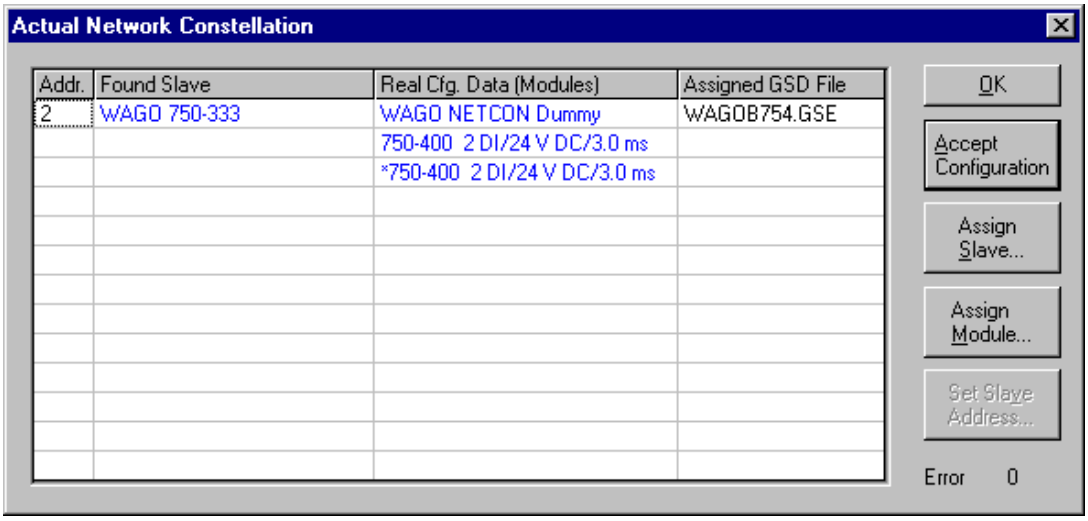


Figure 40: Change of the GSD against a GSE file

This picture shows a change of the WAGOB754.GSD for the WAGOB754.GSE.

8.7 Assign Module

It may be that more than one Configuration Data for a device was found during the network scan. Clicking the button **Assign Module** in the Network Scan window allows the selection of suitable modules for the assigned GSD file.

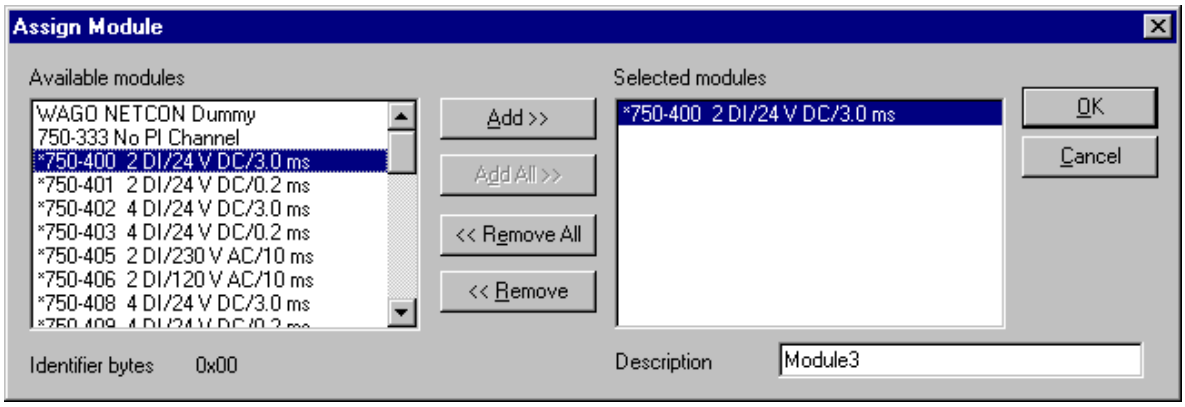


Figure 41: Online > Automatic Network Scan > Assign Module

The modules found during the Automatic Network Scan are shown in the **Selected modules** list. By clicking the **Remove** button a module may be removed and another insert in the Actual Network Configuration.
Select a module by clicking on it and press the button **Add** to put it into the right list. The module is assigned by clicking the **OK** button.

8.8 Slave with Station Address 126

The identnumber from Slave devices with station address 126 cannot be read out via the PROFIBUS. Therefore either

Select the GSD file from the list of Slave devices.

Enter the ident number manually.

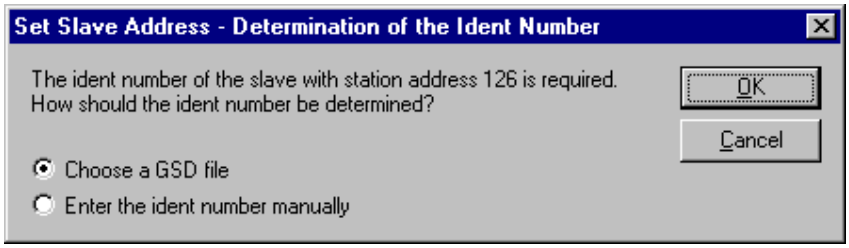


Figure 42: Online > Automatic Network Scan > Set Slave Address

Select GSD File. Click OK. A window opens where a Slave device may be selected. Enter
A station address between 0 and 125 with **Set Slave Address** and then scan the network again.

Ident Number
Enter the ident number manually. The ident number has to be entered in hexadecimal format.

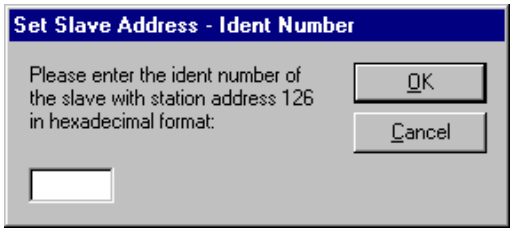


Figure 43: Online > Automatic Network Scan > Enter Ident Number

Enter a station address between 0 and 125 with **Set Slave Address** and scan the network again.

8.9 Start/Stop Communication

The communication between PROFIBUS-DP Master and PROFIBUS-DP Slave may 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.

CHAPTER 9 : DIAGNOSTIC FUNCTIONS

9.1 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 to get an overview over all active devices at the PROFIBUS network.

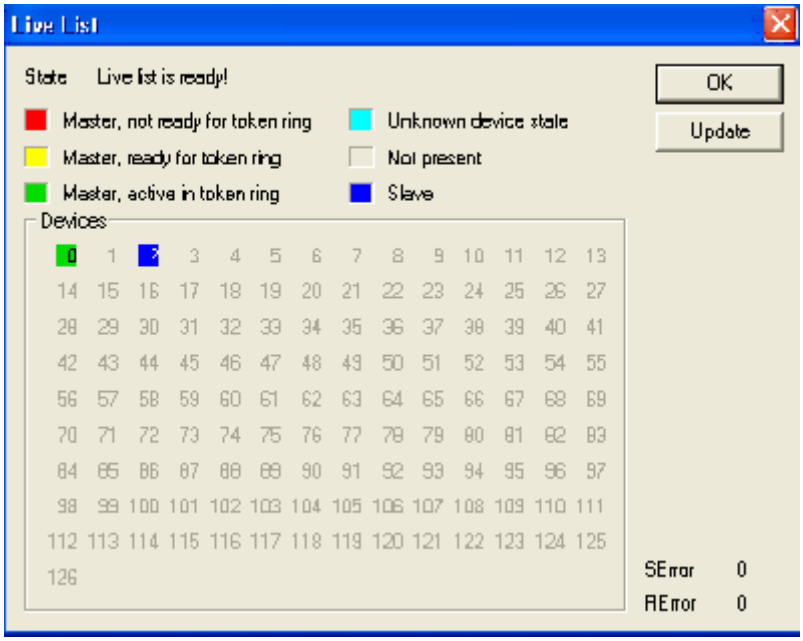


Figure 44: Online > Live List

A green number shows a Master and a blue number a Slave, whereby the number indicates the Station address. The meaning of the other colours is given in the list above the table.
A click on a coloured number brings up its device type and status of the station.

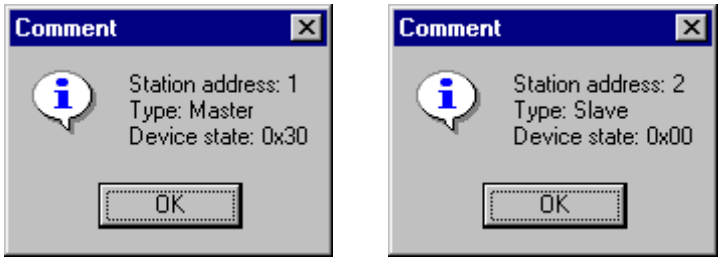


Figure 45: Device type and device status of a Master and a Slave

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

9.2 Debug Mode (PROFIBUS-DP)

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 module and the individual condition of the device.
To end the Debug Mode select the menu **Online > Stop Debug Mode**.
When the debug session is started, the configuration window changes into the debug window. The devices and the line between them are displayed in green or red colour depending on the established network communication.

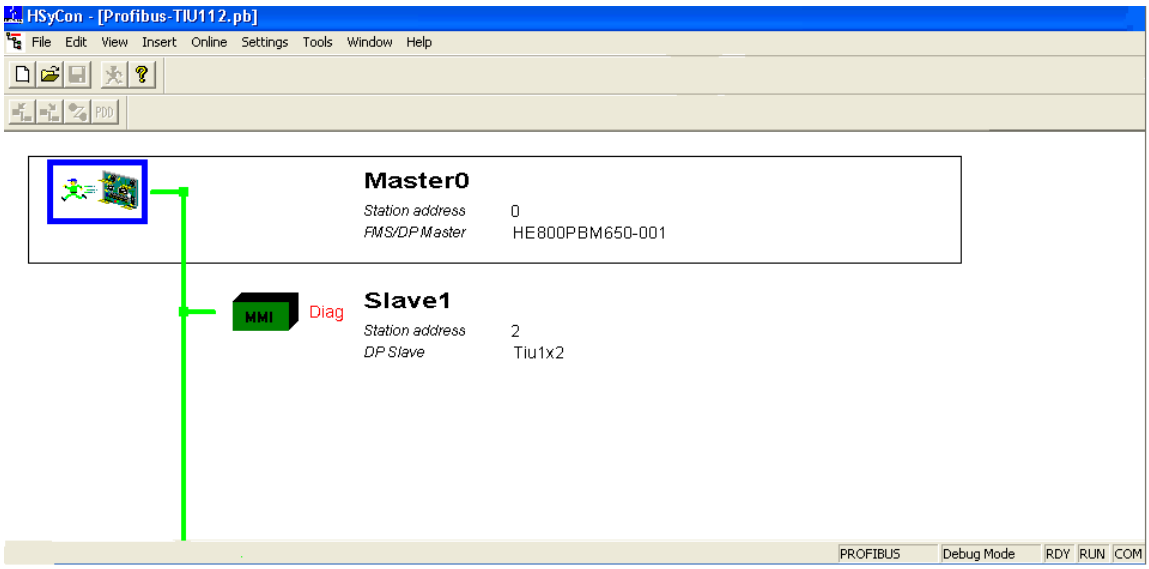


Figure 46: The Debug Window

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

The Master icon has the  sign to show the stop mode.

In run mode the Master icon has the sign  .

9.3 PROFIBUS DP Device Diagnostic

To activate the Debug Mode select the menu **Online > Start Debug Mode**. Then, mark a Slave (left mouse click) and then the menu **Online > Device Diagnostic** to open the diagnostic window for this Slave. Alternatively, double click on the symbol of the device to open this window. To end the Debug Mode select the menu **Online > Stop Debug Mode**.

After the debugger has started HSyCon requests the state of all devices from the Master. If there is an error on a device, the bus line to this Slave is displayed in red, otherwise it is green. HSyCon also displays the letters **Diag**, if the device signals diagnostic information or the master holds diagnostic information in its internal diagnostic buffer. This information is displayed in more detail if the corresponding device in Debug Mode is selected with the mouse.

The diagnostic information of a DP Slave can be 6 to 100 (max. 244) bytes. The first 6 bytes are standard diagnostic information (specification). The meaning of these 6 bytes is according to the PROFIBUS specification and contains the **Station Status 1**, **2** , **3**, the **assigned master address** and the **ident number** of the Slave.

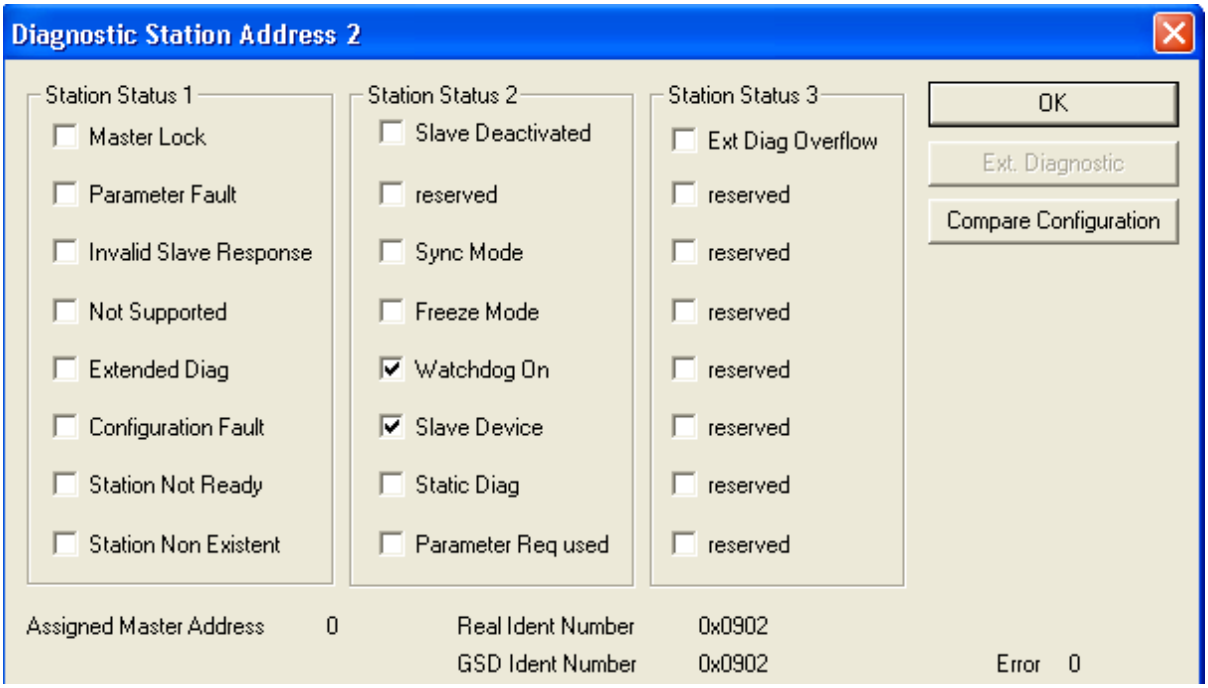


Figure 47: Online > Device Diagnostic

Station Status 1, 2 and 3 is described on the next page.
The **Assigned Master Address** is the address of the master, which has parameterised and configured this Slave. If the value 255 is displayed, it means that the Slave reports that either

It is not parameterised or configured yet

That the received parameter information and configuration information have been rejected because of an error.

The **Real Ident Number** is the ident number from the DP Slave connected. The **GSD Ident Number** is the ident number from the GSD file read by the HSystem Configurator. Both ident numbers must be the same. If they are different, the reason may be either:

The wrong GSD file has been read.

The DP Slave connected is the wrong one.

When the **Real Ident Number** is 0000, then the master has no connection via the PROFIBUS to the DP Slave.

The meaning of **Station Status 1**:

Station-Status 1	Set by	Meaning and Remedy
Master Lock (Bit 7)	Master	**Meaning:** The Slave has already been parameterised by another Master and is locked in its access. **Remedy:** This is a security mechanism of PROFIBUS-DP. First, clarify which master should have access to this Slave. Then add this Slave to the configuration of the master that should have access to this Slave and remove this Slave from the configuration of the other master.
Parameter Fault (Bit 6)	Slave	**Meaning:** This bit is set by the Slave automatically, when the parameters sent by the Master contain incorrect or insufficient data. 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 **parameter fault**. During the check, routine the Slave compares its identnumber with the one sent by Master. **Remedy:** If the Slave reports this error, first compare the **Real Ident Number** shown in the Slave diagnostic field in debugger mode with the one shown at **GSD Ident Number**. If these two Ident numbers are the same, check the parameter data. If they are different, either the wrong GSD file has been used or the wrong device connected to the bus.
Invalid Slave Response (Bit 5)	Master	**Meaning:** This bit is set by the Master, when the bit receives an invalid answer from the Slave. The physical contact to the Slave works, but the logical answer was not understood. **Remedy:** An error on the physical transmission line caused by a twisted cable, missing bus termination or missing shield connection. Use standardized DP Slave.
Function not supported (Bit 4)	Slave	**Meaning:** 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, read out by HSyCon, and sent to the Slave in the parameter telegram. **Remedy:** If this error occurs the GSD-File declares at least one of these commands as supported, but the Slave does not. In this case, contact the manufacturer of the Slave device for the right GSD-File for the used Slave.
Extended Diag (Bit 3)	Slave	**Meaning:** This bit is set by the Slave, if extended diagnostic data is read out. Extended diagnostic data is optional and normally used by a Slave to hand out manufacturer specific diagnostic information. **Remedy:** Click on the button **Extended Diagnostic** to get a Hex-dump of the diagnostic data and read about their meaning in the manual of the manufacturer. If the GSD-File contains information about the Extended Device Diagnostic, it can be analysed with the HSystem Configurator.
Configuration Fault (Bit 2)	Slave	**Meaning:** During the start-up procedure the Slave compares its internal I/O configuration with the configuration of the Master. If the Slave detects differences, it will report a configuration error. This means that the Master has another I/O module configuration for the Slave. **Remedy:** First visually compare all configured I/O modules in the configuration data of HSyCon for this Slave with its real physical configuration. Note that the order of the module must agree. Some Slaves need virtual I/O modules to be configured first or empty slot modules to get an even number of modules to run. The Slave specific I/O module behaviour is not is in the GSD file. Please read the configuration notes of the slave manufacturer. Another way to get the Slave module configuration is to read it by using the Compare **Configuration** command. Click on this button in the diagnostic field and a Hex-Dump of the real Slave configuration data and the configured one (**Real Configuration and SyCon Configuration**) will be displayed. Note that the DP configuration is coded in a very compact form. The code for the modules is shown in the **Slave Configuration**.

Station-Status 1	Set by	Meaning and Remedy
Station Not Ready (Bit 1)	Slave	**Meaning:** The DP Slave is still not ready for the data exchange. **Remedy:** When or at which event the Slave sets this bit is not defined in the specification. That means it can have several Slave specific reasons. Usually the bit is set in combination with one of the other fault bits. Check the parameter and the configuration. Often the report 'Station not Ready' results in the case of a parameter fault or configuration fault. It is possible that the supply voltage at the Slave was just first switched on. Wait until the device is initialised.
Station not existent (Bit 0)	Master	**Meaning:** This bit is set by the Master automatically, if this Slave does not answer or is not reachable on the bus. **Remedy:** Check the PROFIBUS cable. Both signal wires need to be connected correctly between all devices. In addition, the connectors at the end of the cable need to be provided with termination resistors. Check that the device is connected to the bus cable. Check the power supply at the Slave device. Compare the station address at the Slave with the configuration of the Master. With the menu **Online > Live List,** check which Slaves are available to the PROFIBUS. Check, if the Slave supports the configured baud rate. Some Slaves only work up to 1.5 Mbaud or need to be set for PROFIBUS-DP conform behaviour.

Table 11: PROFIBUS-DP Diagnostic Station state 1 (Bit 7 to 0)

The meaning of **Station State 2**:

Station-Status 2	**Set by DP**	**Meaning**
Slave Deactivated (Bit 7)	Master	This bit is 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 exchange.
Reserved (Bit 6)	-	-
Sync Mode (Bit 5)	Slave	This bit is set by the Slave, when it has received the sync control command.
Freeze Mode (Bit 4)	Slave	This bit is set by the Slave, when is has received the freeze control command.
Watchdog ON (Bit 3)	Slave	This bit is set by the DP-Slave, when its Watchdog control is active to supervise its corresponding Master connection.
Slave Device (Bit 2)	Slave	This bit is always set by the Slave.
Static Diag (Bit 1)	Slave	The Slave sets this bit to indicate the Master to be not operative because of a general error. Typically, the DP Slave is not ready for I/O data transfer. In the 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 (Bit 0)	Slave	The Slave sets this bit to force the Master system to do a new parameterisation. It remains set until the parameterisation is complete. In case of this error, compare the **real ident number** with the **GSD ident number** in this window. This numbers must be the same

Table 12: PROFIBUS-DP Diagnostic Station state 2

The meaning of **Station State 3**:

Station-Status 3	**Set by**	**Meaning**
Ext Diag Overflow (Bit 7)	Master Slave	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 diagnostic telegram. The DP-Slave sets this bit for example if there is more diagnostic channel information than the Slave can hold in its diagnostic buffer.
Reserved (Bit 6 to 0)	-	-

Table 13: PROFIBUS-DP Diagnostic Stations status 3

9.4 Compare Configuration

The configuration can be read from the DP Slave via the PROFIBUS in debug mode. This information is displayed in the upper part of the window **Compare Configuration**.
In the lower part of the window, the configuration is displayed and compared as set in the HSystem Configurator.

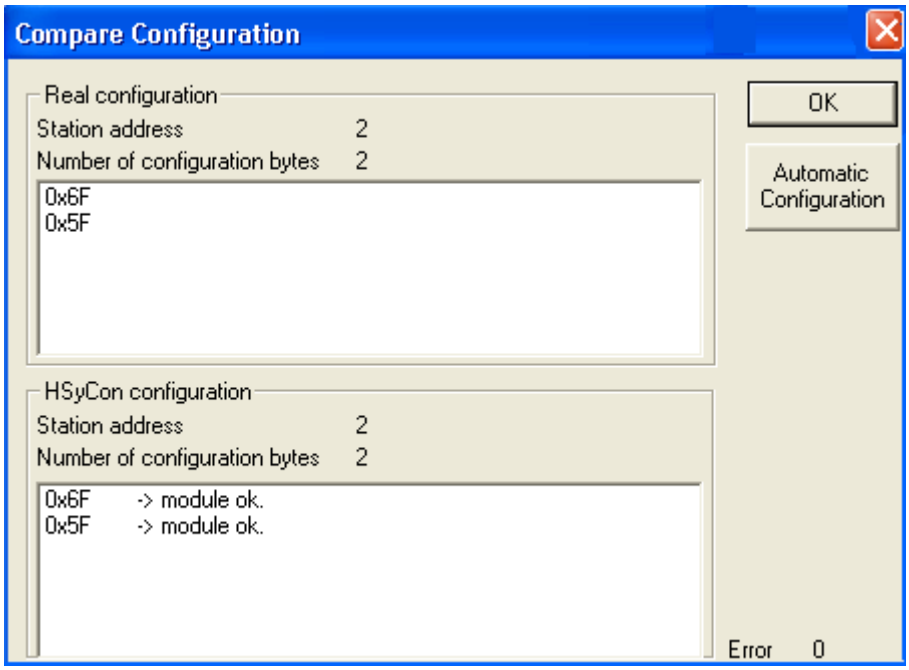


Figure 48: Online > Device Diagnostic > Compare Configuration

Note: Some DP Slaves only give default configuration when read out via the PROFIBUS. To use this function the DP Slave must support it.

9.5 Extended DP Slave Diagnostic

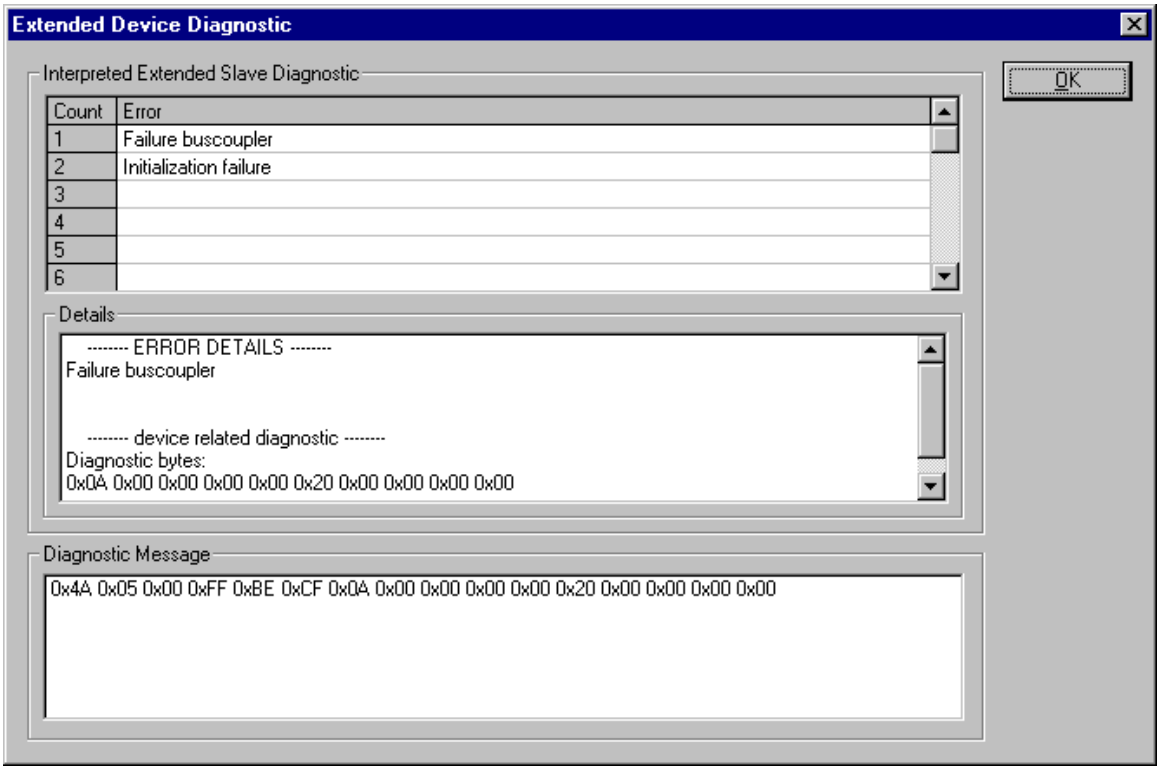


Figure 49: Device Diagnostic (PROFIBUS-DP extended diagnostic)

The **Extended Device Diagnostic** window shows a diagnostic telegram as a Hex dump. Here, the first 6 Bytes are the standard diagnostic Bytes as described in section *PROFIBUS DP Device Diagnostic*.
The Extended Device Diagnostic starts at the 7th Byte. This is manufacturer specific and can contain

Station related diagnostic.

Modul related diagnostic.

Channel related diagnostic.

The middle region of the window shows details and the top region the diagnostic report in clear text to the extent given in the GSD file.

Note: To evaluate the extended (manufacturer specific) diagnostic read the device description of the manufacturer.

9.6 Global State Field

First, the desired device must be chosen with a left mouse click on the symbol of the device. Next, select the **Online > Global State Field** menu. A display window opens in which the cyclic status of the Bus condition and the connected devices is shown:

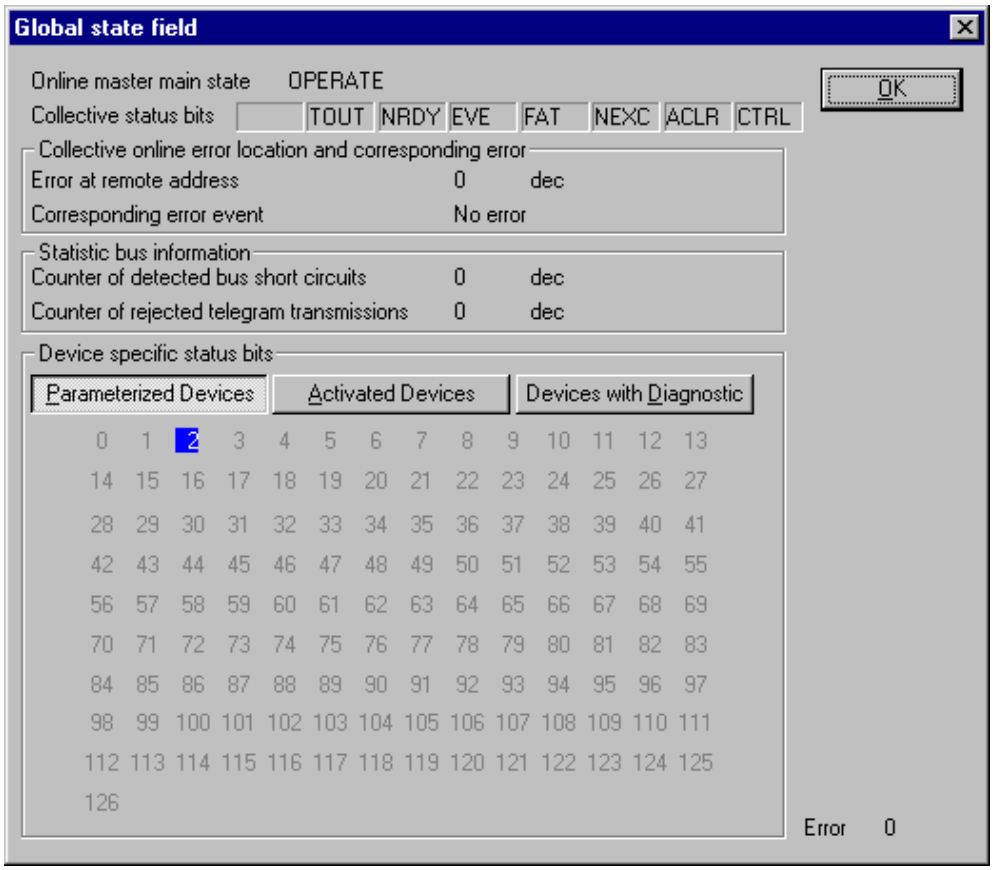


Figure 50: Online > Global State Field

The first row displays the main state of the Master. It can have the status **OPERATE**, **STOP**, **OFFLINE** or **AUTO CLEAR**.
The next row displays individual bus errors. A pending error is displayed in a red field. The meanings of the individual abbreviations are shown in the following:

Status Bits	Meaning
TOUT	TIMEOUT-ERROR the device has detected a skipped timeout supervision time because of rejected PROFIBUS telegrams. It's an indication of bus short circuits while the Master interrupts the communication. The numbers 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.
NRDY	HOST-NOT-READY-NOTIFICATION shows if the application is ready or not. If this bit is set, the application is not ready to receive data.
EVE	EVENT-ERROR the device has detected bus short circuits. The numbers 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.
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 no process data exchange is done.
ACLR	AUTO-CLEAR-ERROR device stopped the communication to all Slaves and reached the auto-clear end state.
CTRL	CONTROL-ERROR parameterisation error.

Table 14: Meaning of collecting status bits in the Global State Field

Further displays are:
Collective online error location and corresponding error gives 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:
Parameterised Devices, Activated Devices and **Devices with Diagnostic** are shown the buttons are clicked. The activated addresses are coloured numbers. This application updates online the status in the global state field. The diagnostic may be seen by double-clicking on a highlighted station address of a device.

9.7 Extended Device Diagnostic

The Extended Device Diagnostic helps to find bus and configuration errors when the HSyCon 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 parameter information:

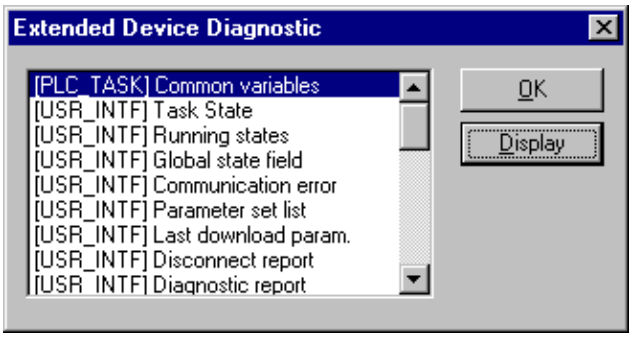


Figure 51: Extended Device Diagnostic as and example for the PROFIBUS-DP.

9.8 I/O Monitor

This is an easy way of viewing and changing the first 32 Bytes of the process data image. To open the I/O Monitor select the **menu Online > I/O Monitor**.

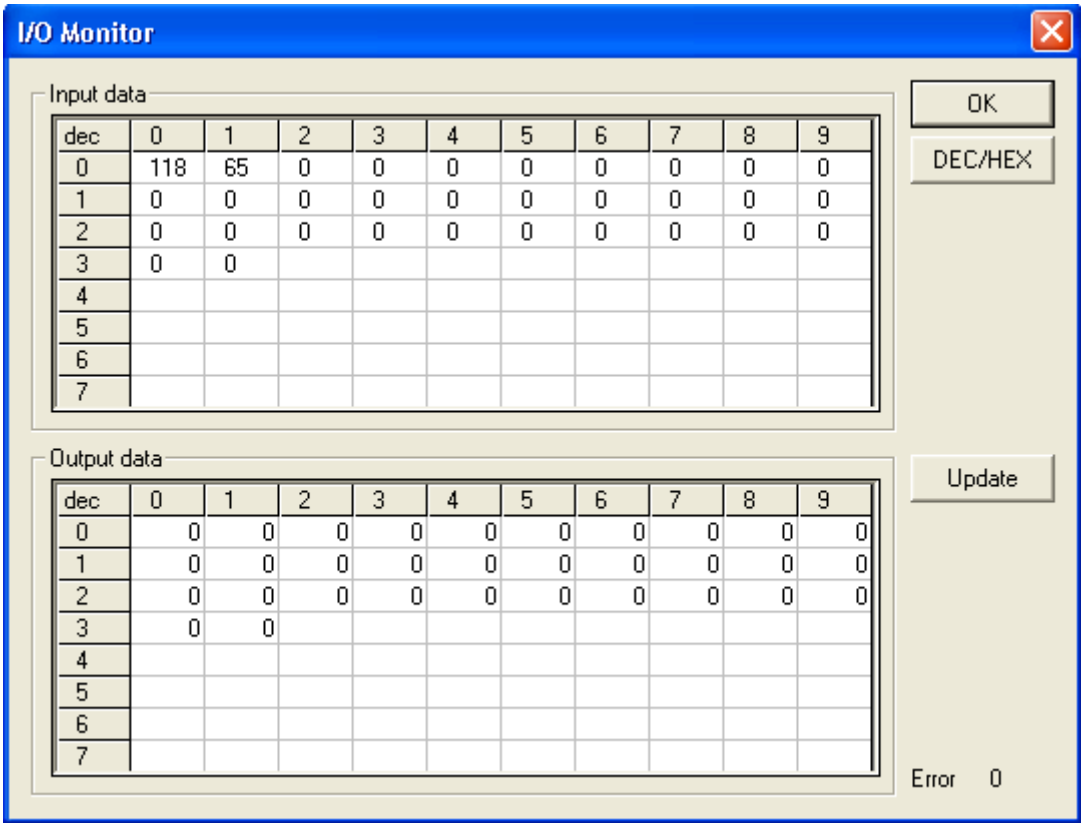


Figure 52: Online > I/O Monitor

DEC/HEX sets the representation of the input data. The output data is always in the decimal form. Enter the output value and then press **Update**. Only the first 32 input and output Bytes of the process depiction are shown, even when these Bytes have not been set by the configuration. The display is always in a Byte manner.

9.9 I/O Watch

The I/O Watch monitor can be used in place of the I/O Monitor and offers more functionality including:

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 following firmware supports the I/O Watch monitor function:

Fieldbus	From Version
PROFIBUS-DP Master	1.040 (Combimaster) resp. 1.140 (DP-Master)
InterBus Master	2.040
CANopen Master	1.040
DeviceNet Master	1.058
AS-Interface Master	1.010

Table 15: Firmware for I/O Watch function

The following table lists 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 section *Getting Started – CscaPe* Configuration..

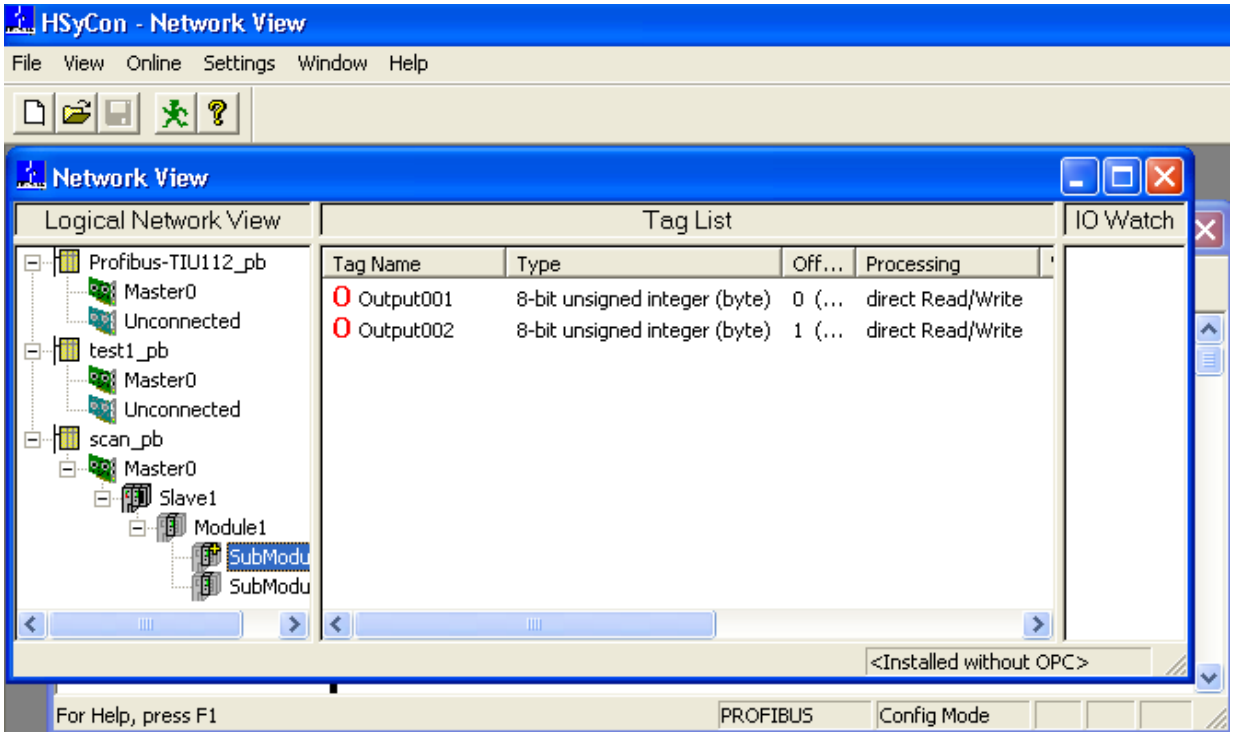
The Configuration has been downloaded to the PROFIBUS-DP Master using Online > Download

Running bus system.

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

Left Window	Centre Window	Right Window
Project Tree structure	Tag / Symbol	IO Watch

Open the tree structure in the left window to reach the I/O module of the desired device:
Project > Master > Slave > Modul > (possible) Submodul



Left click on the module desired and the tags (I/Os) will be displayed in the centre window of the Logical Network View.
Select with the left mouse button the tag/symbol desired and drag and drop them in the right window of the Logical Network View.
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 IO Watch appears.
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. Input data is displayed and can't be changed. Output data may be entered into the value

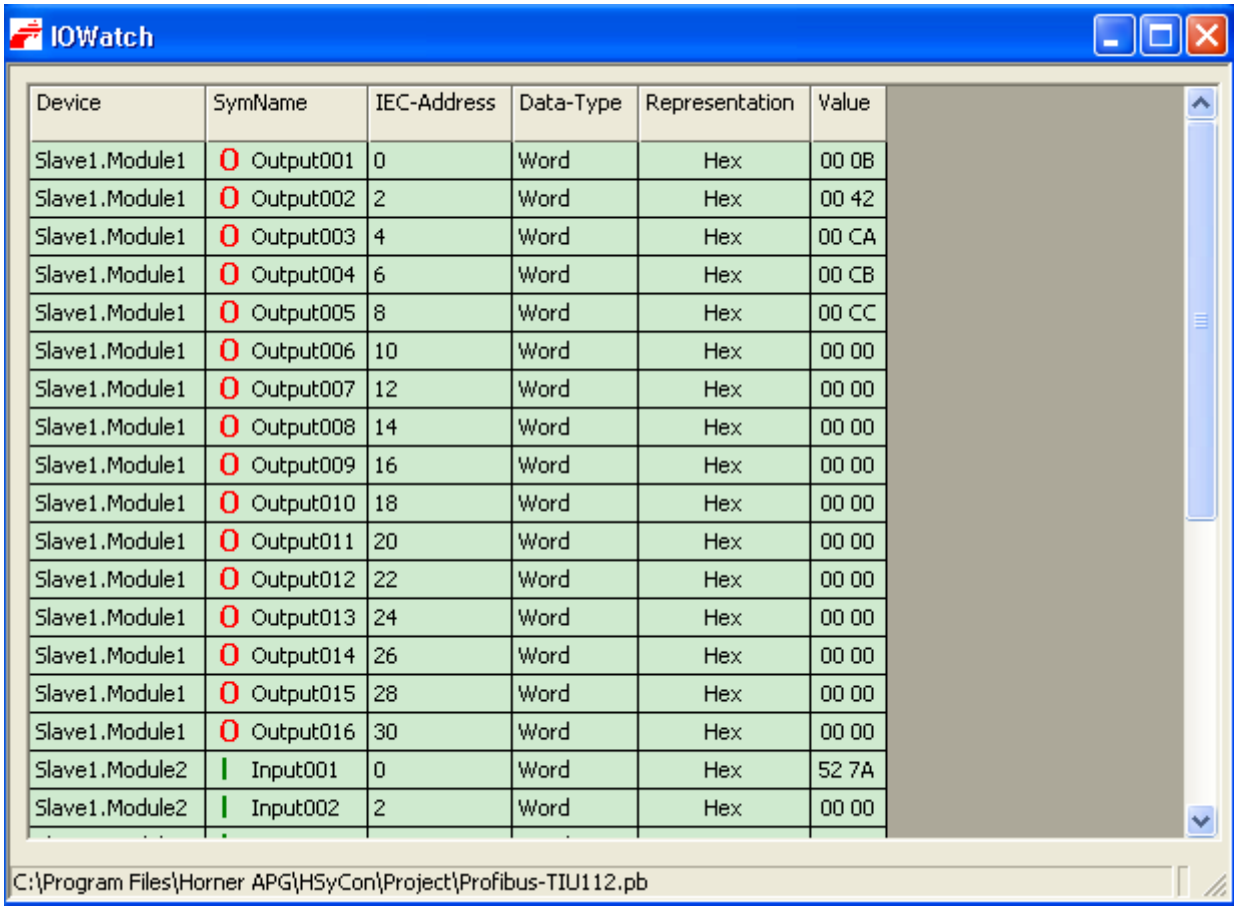


Figure 53: I/O Watch Window

CHAPTER 10: PROFIBUS SERVICES

10.1 Setting the Slave Address

The desired Slave device must first be chosen with a left mouse click on the symbol of the Slave. Next set the Station address of a Slave on the PROFIBUS with the Online **> Set Slave Address** menu.

Enter the new address into the **new station address** field. If no further alterations to the Station address are to be allowed then mark the **No additional changing** field. If required, enter further parameters in hexadecimal format in the **Remote Slave parameter** field. Activate the command with the **Set Address** button.

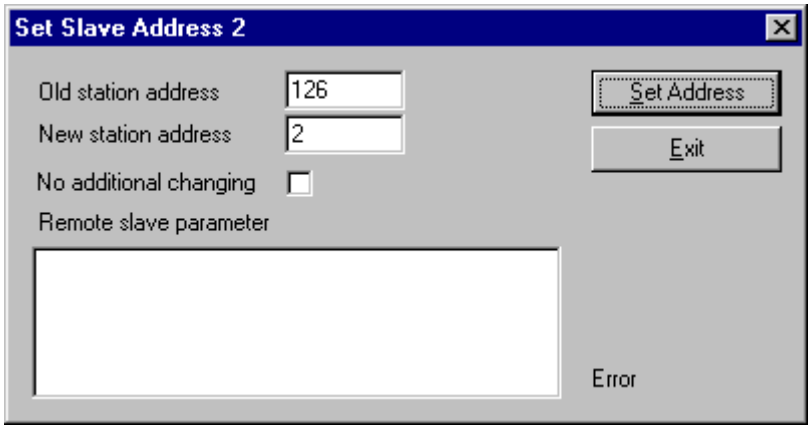


Figure 54: Online > Set Slave Address

Note: The setting of the Station address is only possible for Slaves that support this service.

10.2 Message Monitor

The Message Monitor permits access to the Mailbox of the Module.

Note: The usage of the Message Monitor assumes advanced knowledge from the user.

First, the Hilscher device must be chosen with a left mouse click on the symbol of the Hilscher device. Then, call up the **Online > Message Monitor** menu.

.

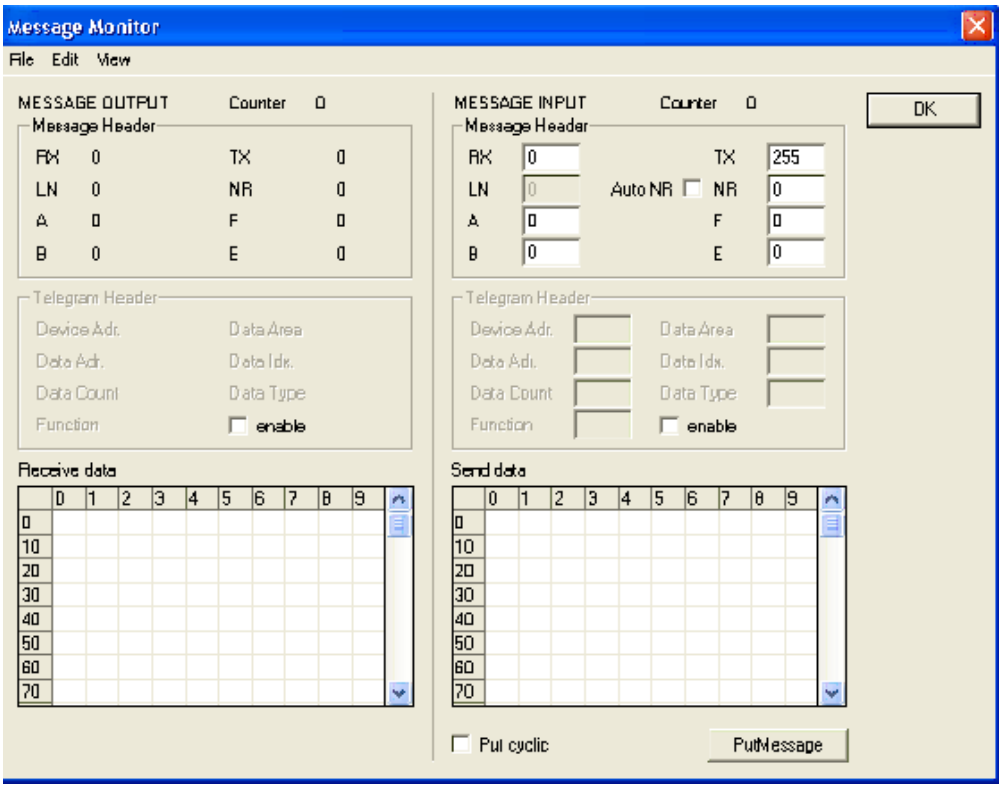


Figure 55: Online > Message Monitor

A Message can be saved and retrieved and has the file suffix *.MSG.
File > New: clears the window
File > Open: opens a Message (Message can be retrieved)
File > Save or **File > Save As**: saves a Message
File > Exit: ends the Message Monitor and returns to the SyCon.

Edit > Create answer: creates an answer Message
Edit > Reset counter: resets the Message counter

View > Review the received data: all received data is shown
View > Review the send data: all the send data is shown
View > Number of receipt errors: the number of the receipt errors is shown
View > Decimal/Hexadecimal: Switch the display format

It is recommend that a sub-directory MSG is created and messages are stored there.

Figure 56: Save a Message

10.3 Message Monitor for Testing of DPV1 (Master)

The following steps show how to configure the Message Monitor for reading and writing via DPV1 from the Master:
Enter the following in the Message Monitor in order to read data via DPV1 from a Slave:

Message for Read via DPV1		
Message header		
Rx = 3 (always)	Tx = 255	
Ln = (calculated)	Nr = 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

Table 16: 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 for Write via DPV1	
Message header	
Rx = 3 (always)	Tx = 255
Ln = (calculated)	Nr = 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		

Table 17: Message Monitor – Example DPV 1 Write

10.4 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 for Read via DPV1		
Message header		
Rx = 3 (always)	Tx = 255	
Ln = (calculated)	Nr = 0 .. 255	
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		

Table 18: 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 for Write via DPV1		
Message header		
Rx = 3 (always)	Tx = 255	
Ln = (calculated)	Nr = 0 .. 255	
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

Table 19: Message Monitor – Example DPV 1 Write

CHAPTER 11: FILE, PRINT, EXPORT, EDIT AND VIEW

11.1 File Open

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

11.2 File Save and Save As

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

11.3 File Close

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

11.4 Print

Once the required printer has been selected in the **File > Printer Set-up** menu, the configuration can be printed out under the **File > Print** menu. For a page view, select the **File > Page View** menu.

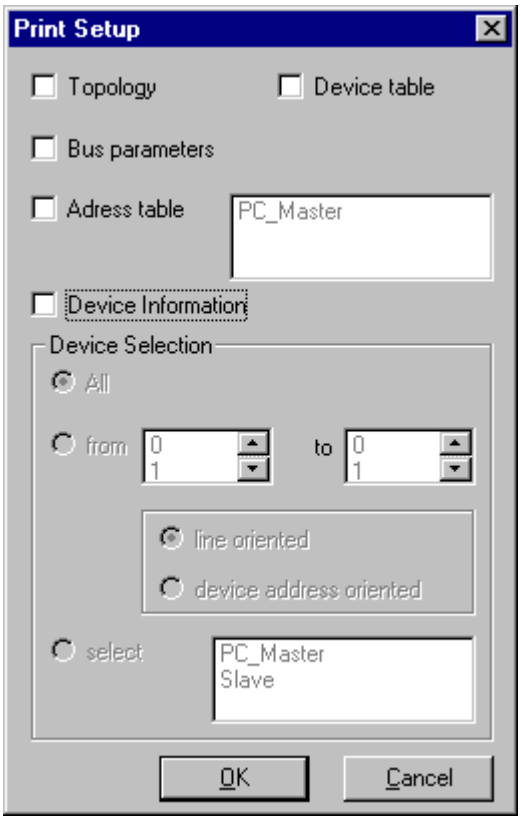


Figure 57: File > Print

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

Topology prints the topology of the bus system.
Bus parameters print the bus parameters of the bus system.
Address table prints the address table of the Master.
Device table prints 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.

If no option is selected and the **OK** button is pressed, nothing will be printed out. It is like clicking the **Cancel** button.

11.5 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 (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 HSyCon Installation with the extension *.DBM.

Attention: The file name can have max. 8 characters.

11.6 CSV Export

With the menu, **File > Export > CSV** the configuration data of the connected Slaves can be exported into a table. The file must be saved before the export is executed. The exported file has the ending .csv (comma separated value) and is put in the same directory as the configuration, but with the ending *.csv.
The CSV file can be read with a table program e.g. Excel.
The CSV Export saves only the text and the values of the configured Slaves. The meaning of the individual values can be shown in the table:

Parameter	Meaning
Stationaddress	The Stationaddress is the unique device address of the Slave on the bus.
RecordType	The RecordType defines the version of the following structure and is always 2.
IdentNumber	This number is the unique device number of the Slave.
VendorNumber	The VendorNumber is the clear number of the vendor (if available).
VendorName	Here the name of the vendor is shown (max. 32 characters).
Device	Name of the device (max. 32 characters).
Description	This is the description of the device, which is set by the user (max. 32 characters).
MasterAddress	This is the number of the Master Address.
Settings	Contains information about the addressing mode and the storage format of the process data (words, double words and floats) see section *Description of the Parameter* Settings.
Reserved	Reserved
ModulCount	Number of the modules of the device. For each modul the parameters data type, data size, data position and offsetaddress are given. It can be follow max 60 modules. The parameters for modul 1 are marked with ..._0 and of the modul 60 are marked with ..._59.
DataSize_0	Number of bytes, which were used by the module.
DataType_0	The Data Type, which is used in the configuration. The codes for this you find below this table in section *Description of the Parameter .*
DataPosition_0	The byte Data Position, which is used in the configuration. The codes for this you find below this table in section *Description* of the Parameter *.*
Address_0	Offset Address in the Dual-port memory
...	...
DataSize_59	See above.
DataType_59	See above.
DataPosition_59	See above.
Address_59	See above.

Table 20: CSV Export - Meaning of the values

Description of the Parameter Settings

D7	D6	D5	D4	D3	D2	D1	D0
Reserved Area						Format	Address Mode
							0 byte Address 1 word Address
						1 little endian (LSB/MSB) 0 big endian (MSB/LSB)	
Reserved							

Table 21: CSV-Export - Description of the Byte Settings

Description of the Parameter Data Type

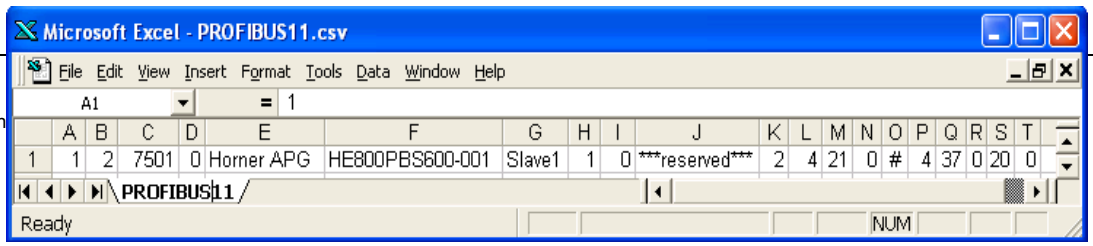
D7	D6	D5	D4	D3	D2	D1	D0
SubFlag	Data Direction			Data Format			
				According EN standard 0 blank space 1 Boolean 2 Integer 8 3 Integer 16 4 Integer 32 5 Unsigned Integer 8 6 Unsigned Integer 16 7 Unsigned Integer 32 8 Float 9 ASCII 10 String 14 Bit		
	0 emty space 1 input 2 output						
0 start of a module 1 submodule							

Table 22: CSV Export > Data Type Code

Description of the Parameter Data Position

D7	D6	D5	D4	D3	D2	D1	D0
Reserved Area				Bit Position			
				Bit Position of the Offset Address			
Reserved							

Table 23: CSV Export > Data Position Code



Example of a CSV file, which was exported to Excel:

Cell	Parameter	Value	Meaning
A1	Station Address	1	Station address of the PROFIBUS Slave device.
B1	Record Type	2	The Record Type is always 2.
C1	IdentNumber	7501 (0x049F)	IdentNumber of the Slaves.
D1	VendorNumber	0	No Vendor number is available.
E1	VendorName	Horner APG	Vendor name of the device.
F1	Device	HE800PBS600-001	Description of the device.
G1	Description	PC_Slave	Description of the device, which is also shown in SyCon as the name of the device.
H1	MasterAddress	1	Address of the related Master.
I1	Settings	0	The addressing mode (byte- or word addressing) and the data format of the process data are shown. The descriptions you see in section *Description of the Parameter* Settings.
J1	Reserved	Reserved	Reserved
K1	ModulCount	2	Number of the modules of the device. For each modul the information with data type, data size, data position and the offset address follow. The information for modul 1 you find in the cells L1, M1, N1, O1 and for modul 2 in the cells P1, Q1, R1, S1.
L1	Data Size	4	The size of the modul is 4 bytes.
M1	Data Type	21	Input; Data type unsigned Integer 8
N1	Data Position	0	Output; Data type unsigned Integer 8
O1	Offset address	10	4 Byte-Modul starting with the offset address 10.
P1	Data Size	4	The size of the modul is 4 bytes.
Q1	Data Type	37	Output; Data type unsigned Integer 8
R1	Data Position	0	Data position of the second modul.
S1	Offset address	20	4 Byte-Modul starting with the offset address 10.
T1...IQ1	...	0	The modules 3 till 59 are not used for this device and so a 0 is shown.

Figure 58: Example of a CSV File in Excel

If two or more Slave devices are connected to the Master, these are displayed in the next lines of the table.

11.7 PDD Export

The abbreviation PDD stands for Predefined Device. 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 that a sub-directory with the name PDD in the SyCon directory be created in order to store the PDD files.
With the left mouse button, first set the focus on the Slave (left mouse click) 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**.

Figure 59: PDD Export (1)

Enter the file name. As an example, the figure shows the name Slave (.PDD).
Now select **Open**. The following figure appears:

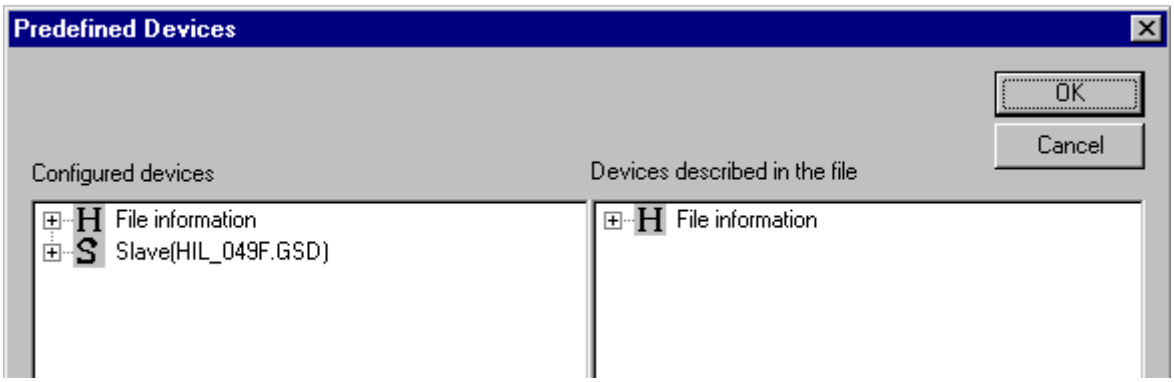


Figure 60: PDD Export (2)

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:

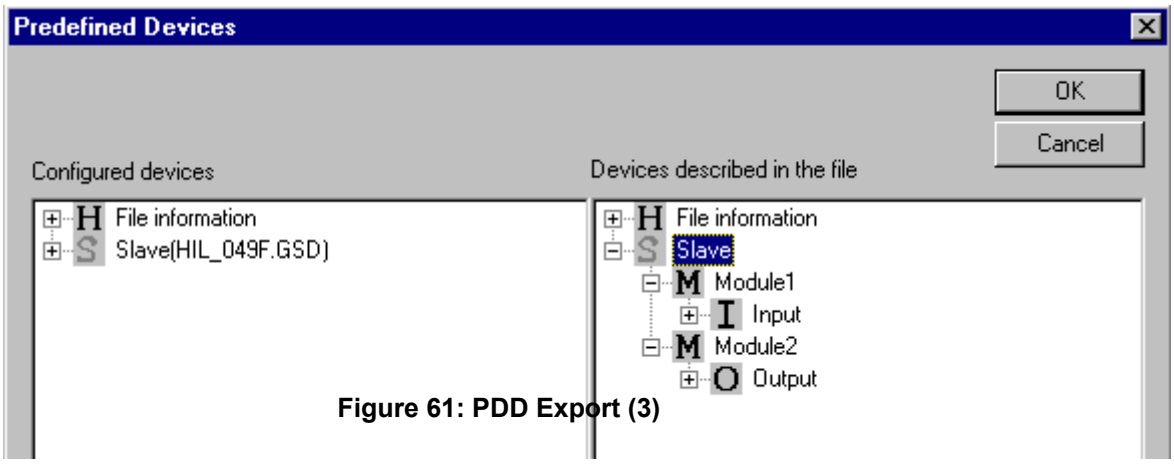


Figure 61: PDD Export (3)

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 to the file. The symbols have the following meaning:

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

Table 24: PDD Symbols

Finally, the path and the file name are displayed:

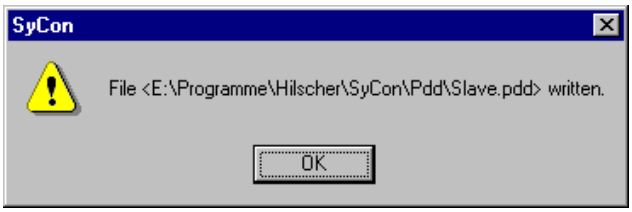


Figure 62: PDD Export (4)

11.8 Cut, Copy and Paste (Master)

With the menus **Edit > Cut** and **Edit > Copy,** it is possible to put the cut/copied Master with its settings and configuration (not the description of the Master) on the Clipboard and with **Edit > Paste,** it can be inserted.
The difference between **Cut** and **Copy** is:
With the menu option **Edit > Cut,** a Master is moved from one point in the configuration to another.
With the menu option, **Edit > Copy** a duplicate of an existing Master is made.
Upon selection of **Edit > Cut** a security question appears.

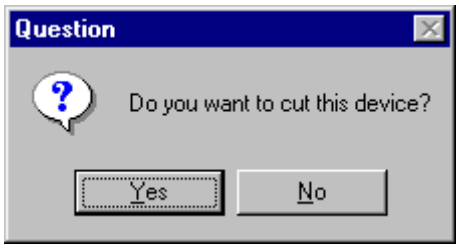


Figure 63: Security question cut device (Master)

The answer **Yes** cuts the Master to the clipboard.
With the menu **Edit > Insert** and clicking at the position where the Master should be inserted, a window opens where the cut/copied Master can be selected.

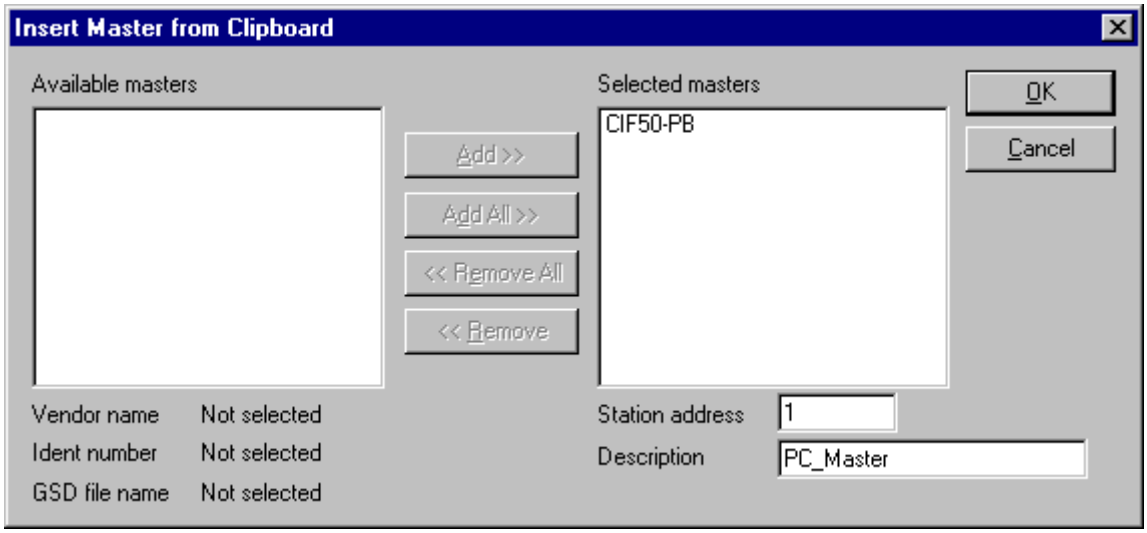


Figure 64: Insert a cut/copied Master

Clicking on the **OK** button inserts the Master in to the configuration.

11.9 Cut, Copy and Paste (Slave)

With the menus **Edit > Cut** and **Edit > Copy,** it is possible to cut/copied device with its settings and configuration (not the description of the device) to the Clipboard and with **Edit > Paste** it can be inserted.
The difference between **Cut** and **Copy** is:
With the menu option **Edit > Cut,** it is possible to move a device from one point in the configuration to another. While the menu, option **Edit > Copy** allows the duplication of an existing device.
Upon selection of **Edit > Cut** a security question appears.

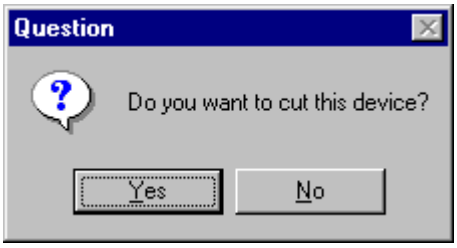


Figure 65: Security question cut device (Slave)

Clicking **Yes** cuts the device to the clipboard.

With the menu **Edit > Insert** and clicking at the position where the device should be inserted, a window opens where the cut/copied device can be selected.

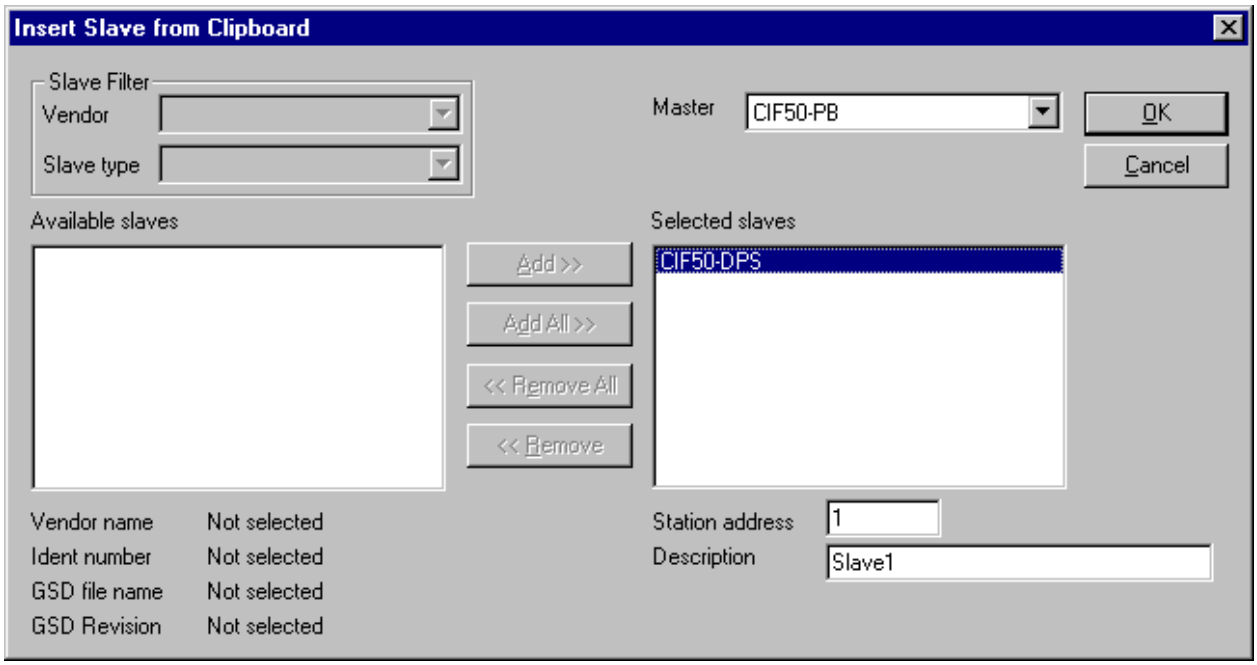


Figure 66: Insert a cut/copied device

Clicking the **OK** button inserts the device in the configuration.

11.10 Delete

To delete a Master or Slave device first mark the device and then select the menu **Edit > Delete**. Before HSyCon deletes the Master or Slave, a security question appears.

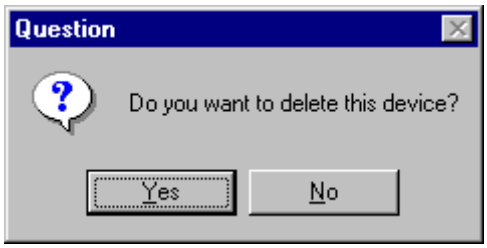


Figure 67: Security question delete device

Note: When a device is deleted the settings and configuration of this device are lost.

11.11 Replace

With the menu, **Edit > Replace** a Master or Slave device can be replaced. For details of how to replace the Master, see section, *Replace Master.* For details of how to replace a Slave device see, section *Replace Slave*.

11.12 View the Configuration

The configuration can be displayed in several tables. The following tables are available:

Device Table

Address Table (Occupation of the process image memory in the Horner PROFIBUS-DP Master)

Selecting the menu **View > Address Table**, **View > CRL Table** or **View > OD Table** the following windows may appear to select the Master device.

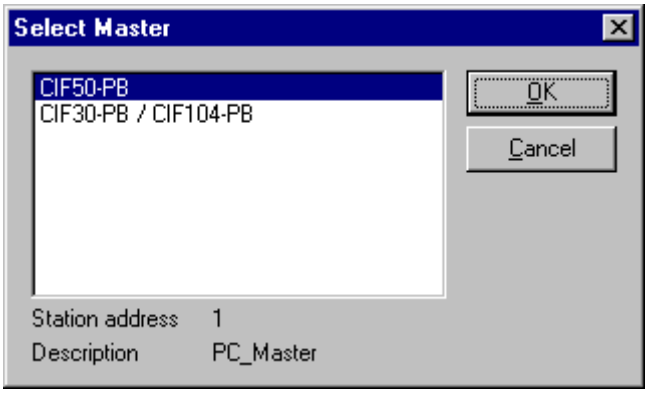


Figure 68: View and Select Master

11.13 Device Table

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

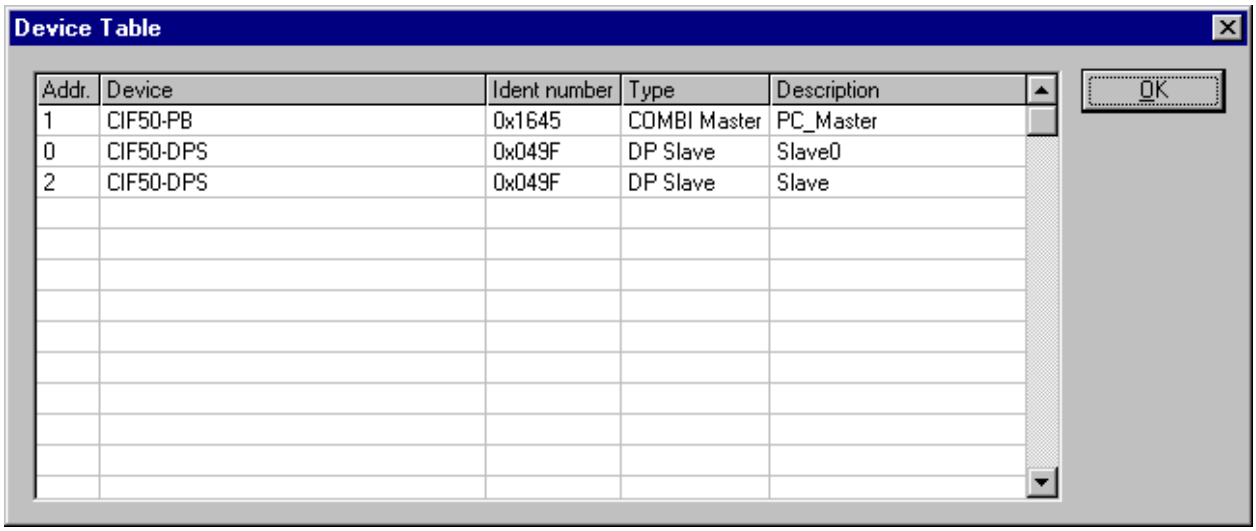
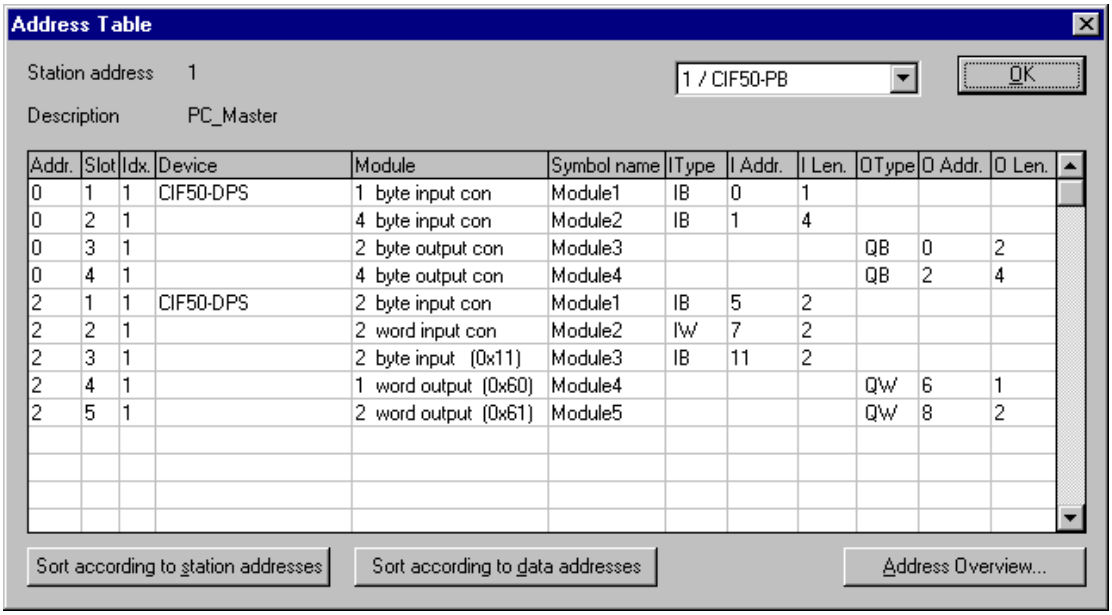


Figure 69: View > Device Table

11.14 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 must be chosen for which the table is displayed. Addresses refer to the Master.



Addr.	Slot	Idx.	Device	Module	Symbol name	IType	I Addr.	I Len.	OType	O Addr.	O Len.
0	1	1	CIF50-DPS	1 byte input con	Module1	IB	0	1			
0	2	1		4 byte input con	Module2	IB	1	4			
0	3	1		2 byte output con	Module3				QB	0	2
0	4	1		4 byte output con	Module4				QB	2	4
2	1	1	CIF50-DPS	2 byte input con	Module1	IB	5	2			
2	2	1		2 word input con	Module2	IW	7	2			
2	3	1		2 byte input (0x11)	Module3	IB	11	2			
2	4	1		1 word output (0x60)	Module4				QW	6	1
2	5	1		2 word output (0x61)	Module5				QW	8	2

Figure 70: View > Address Table

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

11.15 Address Overview

Starting from **View > Address Table** and then **Address Overview** opens the window with the overview of the assigned addresses in the input and output process images.

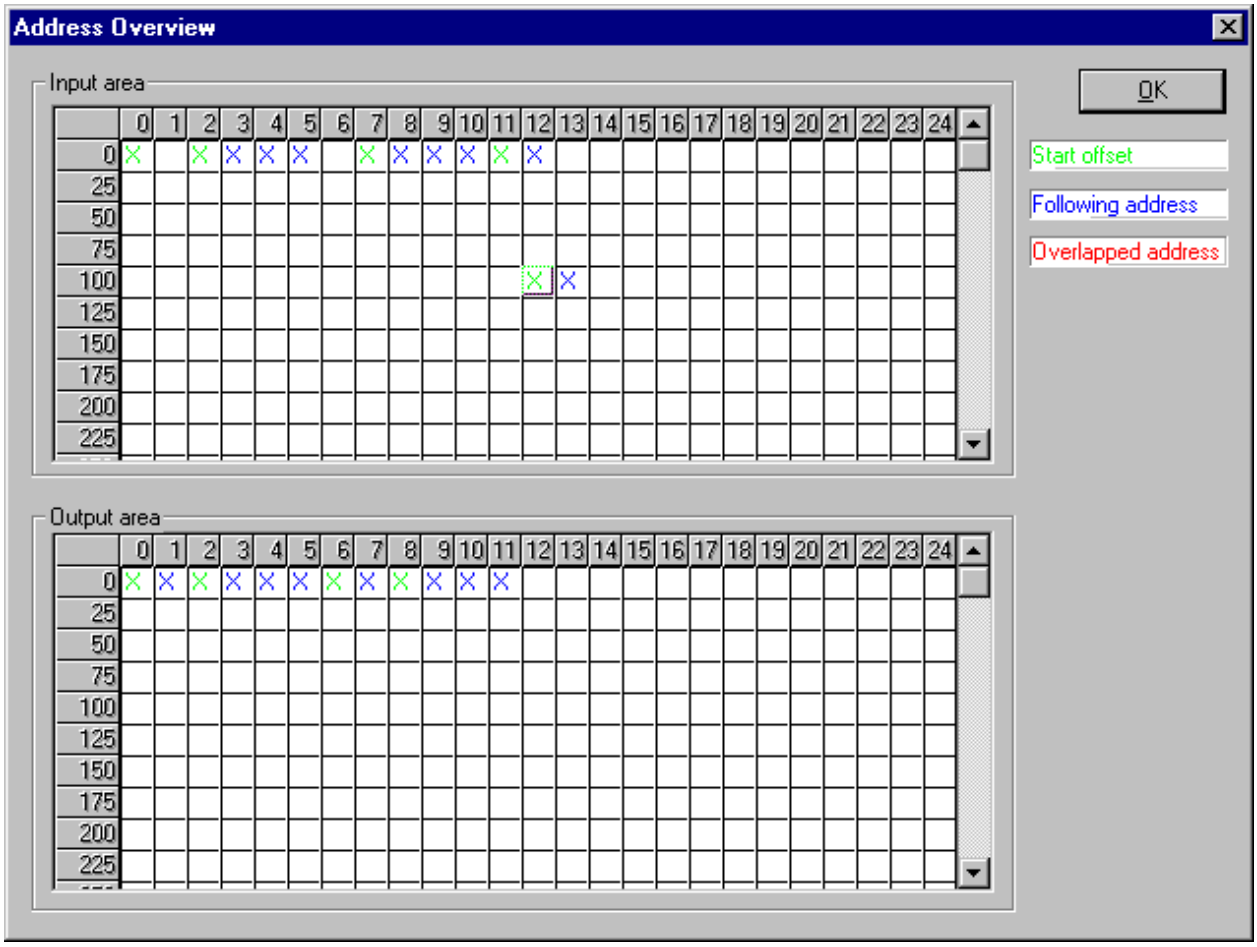


Figure 71: View > Address Table > Address Overview

Note: To change the offset addresses here the auto-addressing mode has to be disabled.

The assignments can be changed here by disabling the auto addressing. In order to change the assignment, click with the left mouse button on a cross and keep the mouse button pressed. 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 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 two- Byte modules.
Overlapping addresses are shown with a red cross. This means that this address is used by more than one module.

11.16 Byte information Window

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

CHAPTER 12: TOOLS

12.1 GSD Viewer

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

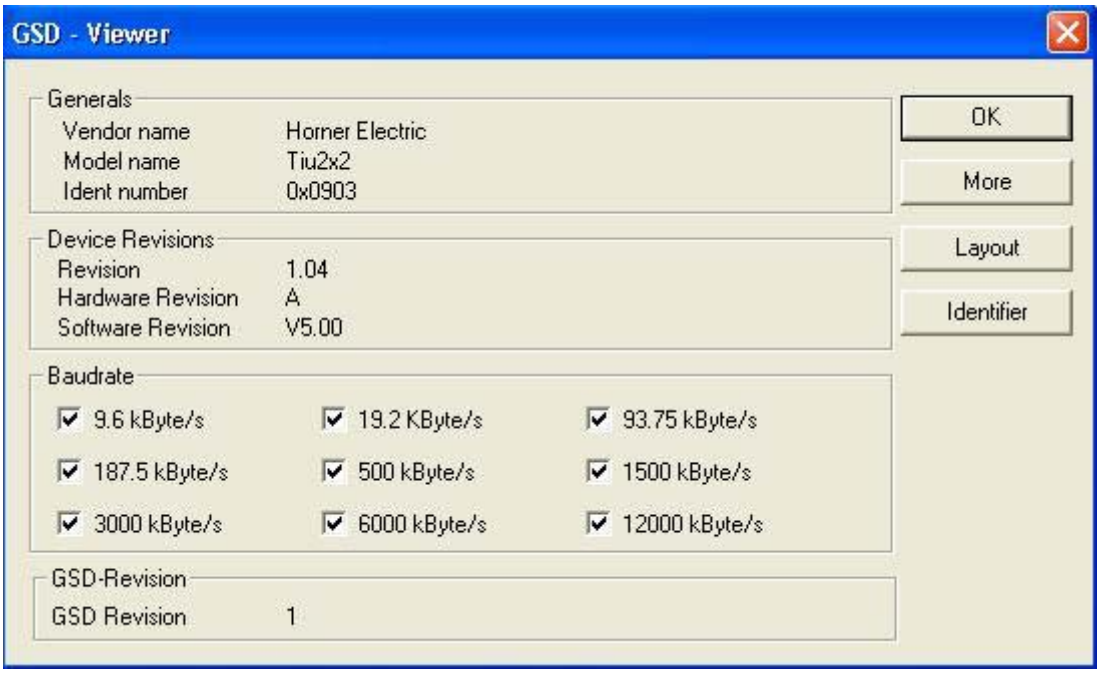


Figure 72: Tools > GSD Viewer

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 is 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.

CHAPTER 13: ERROR CODES

13.1 Serial Driver Error Numbers (-20… -71)

This 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 set-up 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: Set-up error
-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.

Table 25: Serial Driver Error Numbers

13.2 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 WriteDs().
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

Table 26: Database Access Error Numbers (100..130)

13.3 Online Data Manager Error Numbers

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 DeviceObject 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

Table 27: Online Data Manager Error numbers (1000..1018)

13.4 Message Handler Error Numbers (2010….,2017)

The following table lists the error numbers of the Message handler of the Online Data Manager.

Error Number	Description
2010	Message handler: Messagebuffer empty
2011	Message handler: Messagebuffer 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 No message received. **Possible Error Cause:** Different reasons. **(1)** The selected interrupt is not free or used also from another PC component (shared interrupt). **(2)** CIF is not initialised. This is shown by a acyclic flashing RUN LED. **(3)** CIF is in bootstraploader mode. This is indicated by a flashing RDY LED. **(4)** Another application program is accessing to the CIF the same time as SyCon. **Remedy:** **(1A)** Use polling mode instead of interrupt mode. Shared interrupts are not supported from the CIF device driver under Windows 95/98/ME/NT. **(1B)** Use a free interrupt. **(2)** Download the configuration. If necessary create a new configuration. **(3)** First download the firmware and then download the configuration. **(4)** Close all other application programs that communicates to the CIF.
2026	Message handler: Wait for Delete
2027	Message handler: No cyclic Message

Table 28: Error Numbers of the Message Handler of the Online Data Manager (2010..2027)

13.5 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

Table 29: Error Numbers of the Driver Functions of the Online Data Manager (2501..2512)

13.6 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 Device 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)

Table 30: Subfunction Error Numbers of the Driver Functions of the Online Data Manager (8001..8035)

13.7 Data Base Functions Error Numbers (4000 .. 4098)

The following table lists the error numbers of the converting 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

Table 31: Error numbers of converting 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 initialisation
4040	Printer not ready
4041	The data base is used from another 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 wMaxEntries
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
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

Table 32: Error numbers of converting 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	Initialization 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

Table 33: Error numbers of converting functions (4061..4075)

Error Number	Description
4082	More than 32 tables should be created
4083	No entry in element szSourceFile
4084	ODBC connection initialisation 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'
4104	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

Table 34: Error numbers of converting functions (4082..4199)