System Description

Advant Controller 31

Intelligent Decentralized Automation System

Fieldbus Configurator 907 FB 1131

In order to easier find the different descriptions, they are separated by coloured paper sheets.

Fieldbus Configurator	**Colour of paper sheet at the beginning**
PROFIBUS	red
DeviceNet	green
Interbus	blue
CANopen	orange
Ethernet	yellow

Operating Instruction Manual

907 FB 1131

Fieldbus Configurator PROFIBUS

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1 Overview FB 1131

1.1 Main Functions

The main functions of the PROFIBUS Fieldbus Configurator are:

Function	Section	Short Description
Configuration	*Overview Communication Types*	Overview communication types and description of the configuration steps
	Automatic Network Scan	Scans the network
Diagnostic	*Diagnostic Functions*	Diagnostic functions, e.g. Life List, Debugger, Global State Field etc.
Documentation	*Project Information*	Set the project information
	Print	Print out the configuration

Table 1: FB 1131 Main Functions

1.2 Properties

FB 1131 is an universal Fieldbus Configurator

This means you can configure the most important Fieldbus systems like PROFIBUS, InterBus and DeviceNet with the same configuration tool.

FB 1131 is a global Fieldbus Configurator

You configure all devices with one tool. FB 1131 checks the dependencies between the devices. FB 1131 only allows configurations that make sense. In case of doubt FB 1131 will give you a warning.

FB 1131 documents your Fieldbus system

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

FB 1131 uses standardised configuration files

Some protocols support standardised files containing information about all features and limitations of the Slave device. FB 1131 uses these files for the configuration.

FB 1131 is a diagnostic tool

After the configuration you can switch FB 1131 into the diagnostic mode. You can watch all status information of ABB devices, see protocol dependent diagnostic information, e.g. live list or Slave diagnostic information on PROFIBUS. In this case a Slave not operating correctly will be displayed in a different colour.

2 Installation and Licensing

2.1 System Requirements

- PC with 486-, Pentium processor or higher
- Windows 95/98/ME, Windows NT/2000/XP
- Free disk space: 30 - 80 MByte
- CD ROM drive
- RAM: min. 16 MByte
- 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 Software Installation

Close all application programs on the system!

Insert the 907 AC 1131 CD in the local CD ROM drive. If "Autorun" is enabled on the PC the CD menu will start automatically. Otherwise it is started by starting the file "CD_Menu_Vxx.exe" in the root directory of the CD. For example by the menu **Start > Run** and entering "[X:]\CD_Menu_Vxx.exe" ([X] is the CD rom drive and Vxx stands for the version number).

You reach the Installation menu of the CD by operating the **Installation 907 AC 1131 Vxx** button.

With the menu Notes for Installation you get a description of the innstallation and the components of the 907 AC 1131, the programming software, the Fieldbus Configurator 907 FB 1131, OPC Server.

Note: Administrator privileges are required on Windows NT/2000/XP systems for installation of the Fieldbus Configurator 907 FB 1131!

3 Getting Started – Configuration Steps

3.1 Overview Communication Types

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

3.1.1 PROFIBUS-DP

Communication	**Device**	**Device**	**Described in section**	**Page**
PROFIBUS-DP (Class 1)	DP Master	DP Slave	*Configuration DP Master to a DP Slave*	*12*
PROFIBUS-DP (Class 1)	DP Slave	DP Master	*Configuration DP Slave to any DP Master*	*13*

Table 2: Overview Communication Types PROFIBUS-DP

3.2 PROFIBUS-DP

3.2.1 Configuration DP Master to a DP Slave

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

#	Action	Menu in the Fieldbus Configurator	Detail information in section	Page
1	Create a new project	**File > New > PROFIBUS**	*Setting up the PROFIBUS Configuration*	*15*
2	Copy GSD file of the DP Slave, if the Slave is not in the selection list	**File > Copy GSD**	*GSD Files*	*15*
3	Choose DP Master and provide bus address	**Insert > Master**	*Insert Master*	*17*
4	Choose DP Slave and provide bus address	**Insert > Slave**	*Insert DP Slave*	*21*
5	Assign the input and output modules	Mark the Slave (left mouse click), then **Settings > Slave Configuration**	*Slave Configuration*	*23*
6	Assign the offset addresses			
7	Assign the DP Slave Parameter data, if the Slave needs Parameter data	Mark the Slave (left mouse click), then **Settings > Parameter Data**	*Parameter Data*	*39*
8	Set the bus parameter	Mark the Master (left mouse click), then **Settings > Bus Parameters**	*Bus Parameters*	*31*
9	Set device assignment, if no assignment has occured	Mark the Master (left mouse click), then **Settings > Device Assignment**	*Gateway Driver*	*29*
10	Save project	**File > Save**	*Save and Save As*	*67*
11	Download	Mark the Master (left mouse click), then **Online > Download**	*Downloading the Configuration*	*43*
12	Live List	Mark the Master (left mouse click), then **Online > Live List**	*Live List*	*54*
13	Start Debugger	Mark the Master (left mouse click), then **Online > Start Debug Mode**	*Debug Mode (PROFIBUS-DP)*	*55*
14	Device diagnostic	Mark the Slave (left mouse click), then **Online > Device Diagnostic**	*PROFIBUS DP Device Diagnostic*	*56*
15	Stop Debugger	**Online > Stop Debug Mode**	*Debug Mode (PROFIBUS-DP)*	*55*
16	Global Diagnostic	Mark the Master (left mouse click), then **Online > Global State Field**	*Global State Field*	*62*

Table 3: Steps for Configuration DP Master to a DP Slave

3.2.2 Configuration DP Slave to any DP Master

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

#	Action	Menu in the Fieldbus Configurator	Detail information in section	Page
1	Create a new project	**File > New > PROFIBUS**	*Setting up the PROFIBUS Configuration*	*15*
2	Choose DP Master and provide bus address	**Insert > Master**	*Insert Master*	*17*
3	Choose DP Slave and provide bus address	**Insert > Slave**	*Insert DP Slave*	*21*
4	Assign the input and output modules	Mark the Slave (left mouse click), then **Settings > Slave Configuration**	*Slave Configuration*	*23*
5	Set device assignment, if no assignment has occured	Mark the Master (left mouse click), then **Settings > Device Assignment**	*Gateway Driver*	*29*
6	Save project	**File > Save**	*Save and Save As*	*67*
7	Download	Mark the Master (left mouse click), then **Online > Download**	*Downloading the Configuration*	*43*
8	Configuration diagnostic	Mark the Slave (left mouse click), then **Online > Extended Device Diagnostic > SPC3CTRL Slave Config**	*SPC3CTRL Slave Config*	*110*
9	Configuration diagnostic	Mark the Slave (left mouse click), then **Online > Extended Device Diagnostic > SPC3CTRL Slave Config**	*SPC3CTRL Master Config*	*111*

Table 4: Configuration DP Slave to any DP Master

4 Configuration of PROFIBUS with FB 1131

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 the **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 Fieldbus Configurator automatically retrieves all the GSD files stored in the GSD directory. The device names are placed into an internal list. During the configuration, the device-specific data is retrieved directly from the GSD files.

If a DP Slave device does not appear in the selection list, a corresponding GSD file can be copied into the GSD directory with **File > Copy GSD**. Another possibility is to copy the GSD file into the FB 1131 GSD directory with the Windows Explore 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.

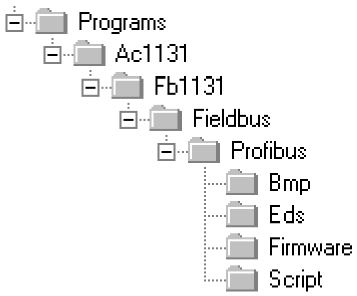

Figure 1: GSD files and bitmaps directory

- **ABB Devices:** The GSD files for ABB devices are already 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

4.3.1 Insert Master

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

Symbol **Insert > Master**


Table 5: Symbol Insert > Master

The mouse pointer automatically changes into the Insert Master pointer.

Mousepointer **insert Master**


Table 6: Mousepointer 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.

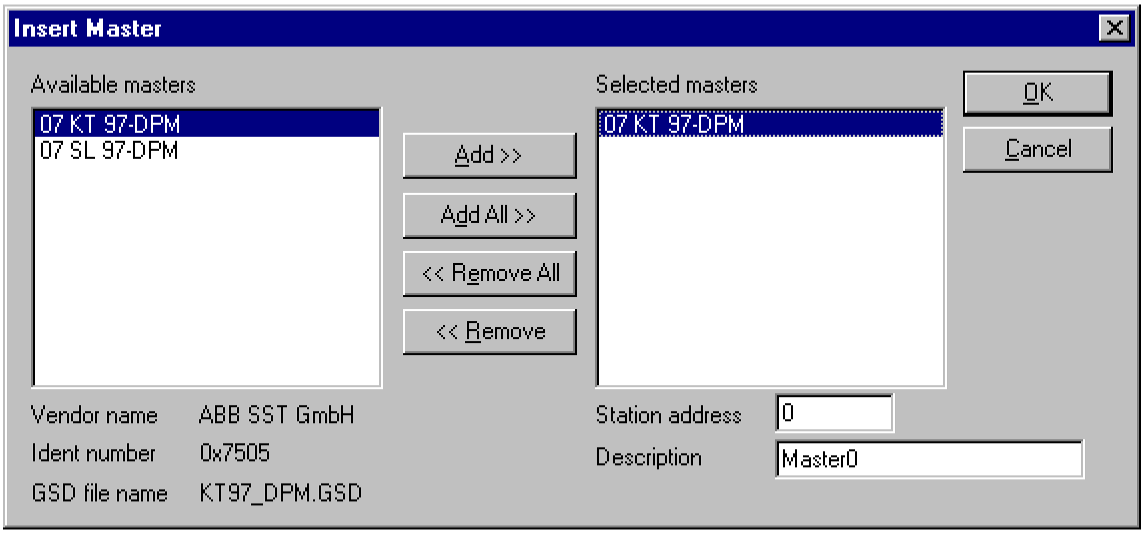

Figure 2: Insert > Master

In this window you select the Master you want by clicking on it in the list **Available Masters** and then click the **Add** button to put the Master to **Selected Masters**. With **OK** you confirm the selection and the Master will be insert.

This example shows a 07 KT 97-DPM that is inserted with the **Station address 1** and the **Description Master0.**

4.3.2 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

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

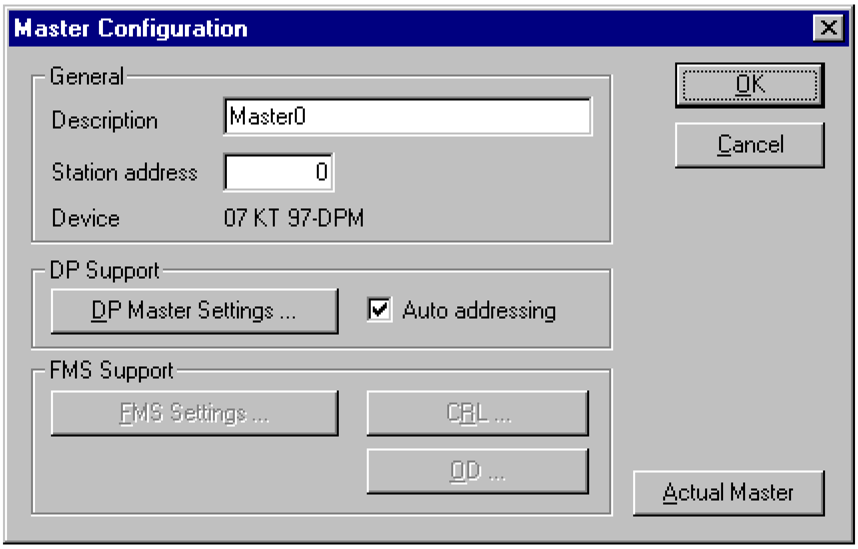

Figure 3: Settings > Master Configuration

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, for carrying out a Download)

For PROFIBUS-DP can be set

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

4.3.3 Auto Configuration (PROFIBUS-DP)

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

The following is the procedure for Auto Configuration:

#	Action	Menu in the Fieldbus Configurator	Detail information in section	Page
1	Create a new project	**File > New > PROFIBUS**	*Setting up the PROFIBUS Configuration*	*15*
2	Copy GSD file of the DP Slave, if the Slave is not in the selection list	**File > Copy GSD**	*GSD Files*	*15*
3	Choose ABB DP Master and provide bus address	**Insert > Master**	*Insert Master*	*17*
4	Choose DP Slave and provide bus address	**Insert > Slave**	*Insert DP Slave*	*21*
5	Set the bus parameter	Mark the Master (left Mouse click), then **Settings > Bus Parameters**	*Bus Parameters*	*31*
6	Save project	**File > Save**	*Save and Save As*	*67*
7	Download	Mark the Master (left Mouse click), then **Online > Download**	*Downloading the Configuration*	*43*
8	Live List	Mark the Master (left Mouse click), then **Online > Live List**	*Live List*	*54*
9	Start Debugger	Mark the Master (left Mouse click), then **Online > Start Debug Mode**	*Debug Mode (PROFIBUS-DP)*	*55*
10	Device diagnostic	Mark the Slave (left Mouse click), then **Online > Device Diagnostic**	*PROFIBUS DP Device Diagnostic*	*56*
11	Compare Configuration	**Compare Configuration**	-	-
12	Automatic configuration	**Automatic Configuration**	-	-
13	Stop Debugger	**Online > Stop Debug Mode**	*Debug Mode (PROFIBUS-DP)*	*55*
14	Set device assignment, if no assignment has occured	Mark the Master (left mouse click), then **Settings > Device Assignment**	*Gateway Driver*	*29*
15	Save project	**File > Save**	*Save and Save As*	*67*
16	Download	Mark the Master (left Mouse click), then **Online > Download**	*Downloading the Configuration*	*43*
17	Start Debugger	Mark the Master (left Mouse click), then **Online > Start Debug Mode**	*Debug Mode (PROFIBUS-DP)*	*55*
18	Device diagnostic	Mark the Slave (left Mouse click), then **Online > Device Diagnostic**	*PROFIBUS DP Device Diagnostic*	*56*
19	Stop Debugger	**Online > Stop Debug Mode**	*Debug Mode (PROFIBUS-DP)*	*55*

Table 7: Auto Configuration (PROFIBUS-DP)

4.3.4 Replace Master

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

or

make a right mouse click at the Master and select **Replace**.

In the now opened window the question appears if the Master should be replaced.

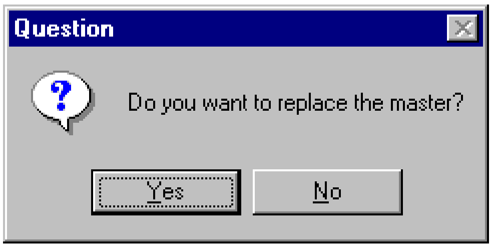

Figure 4: Security question replace Master

If you click the **Yes** button a new window opens, where you can replace the Master against another one.

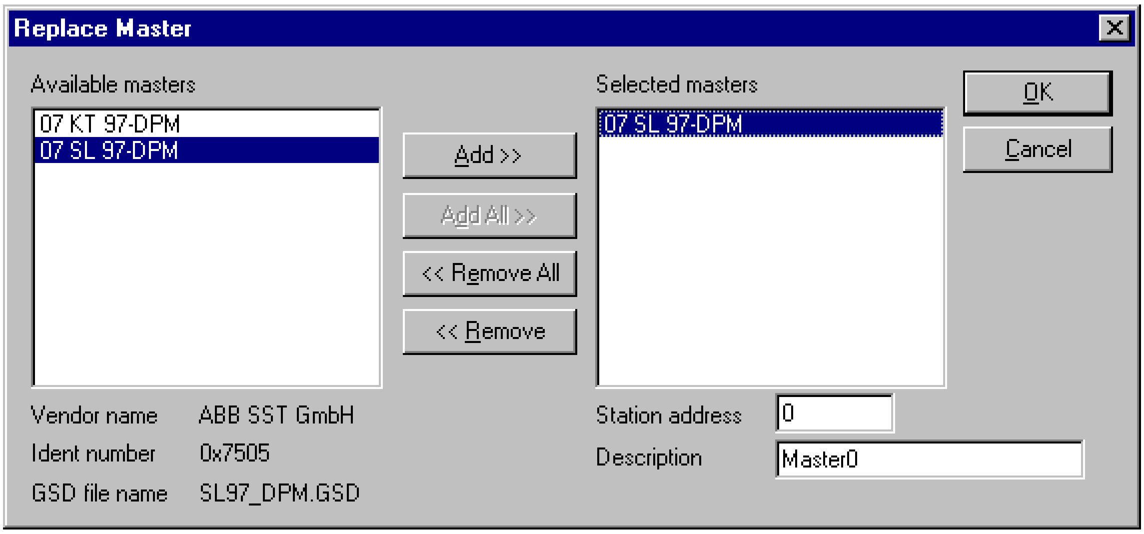

Figure 5: Edit > Replace Master

In this window you select the Master you want by clicking on it in the list **Available Masters**. By clicking the **Add** button you put the Master in the list **Selected Masters**. With **OK** you confirm the selection and the Master will be replaced.

4.4 DP Slave

4.4.1 Insert DP Slave

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

Symbol **Insert > Slave**


Table 8: Symbol Insert > Slave

The mouse pointer automatically changes to the Insert Slave pointer.

Mousepointer insert Slave


Table 9: Mousepointer 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.

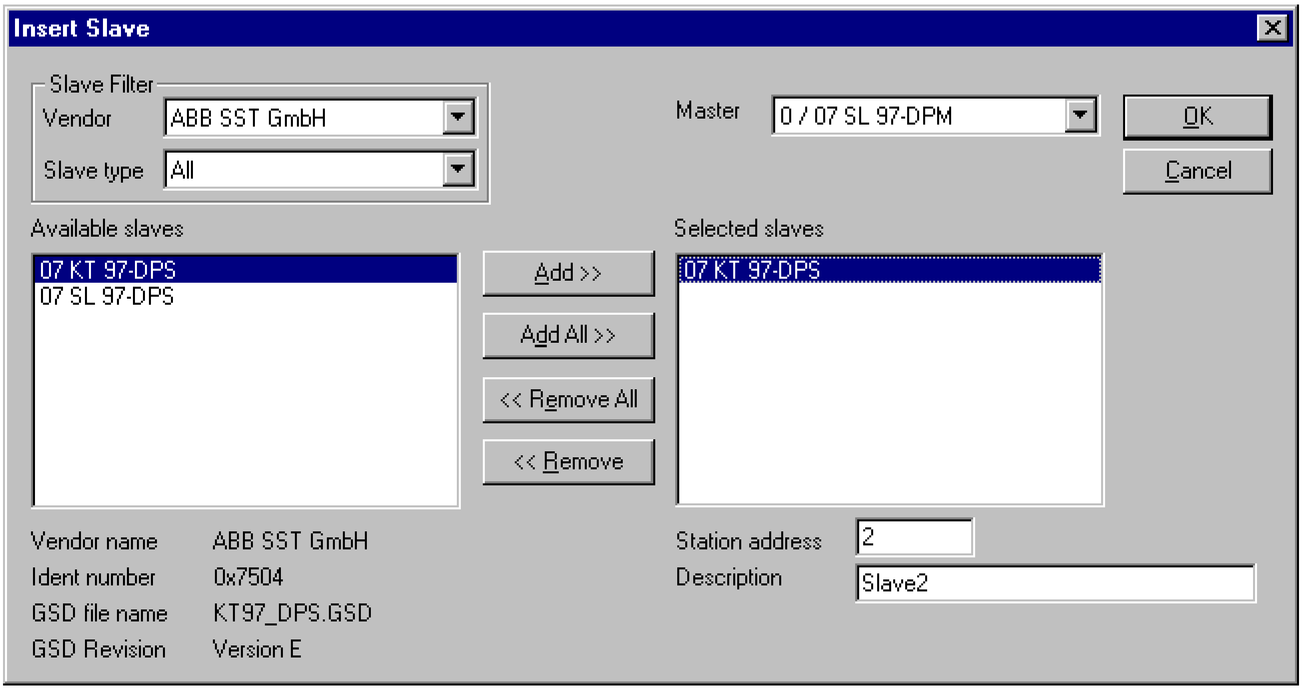

Figure 6: Insert > Slave

The list on the left displays for selection all the Slave devices whose GSD files have been put in the GSD directory. A filter can be used to limit the selection list to **Slave type** and **Vendor** (manufacturer). Further information on a Slave is shown below the selection list (**Available Slaves**) when it is selected (a mouse click). The Slave appears 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 in the network.

4.4.2 Slave Configuration

First click at 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.

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.

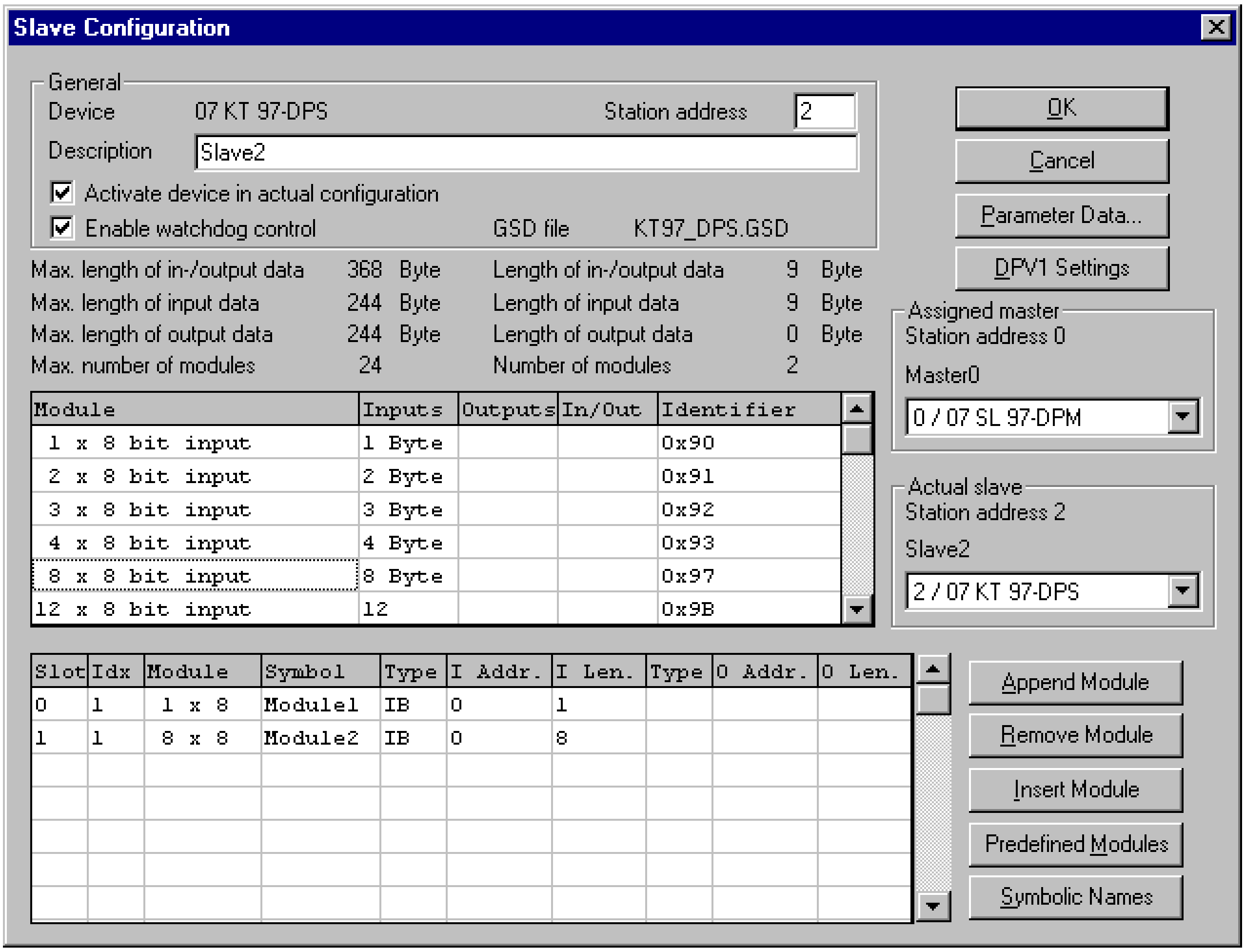

Figure 7: Settings > Slave Configuration

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 FB 1131. For this purpose **Auto addressing** must be activated or deactivated in the **Master Configuration** window.

Auto addressing activated	**Auto addressing deactivated**
Auto addressing (by FB 1131)	Manually addressing (by the user)
The addresses will be allocated beginning with 0 and incremented in accordance with the entry sequence of the Slaves before downloading and can be viewed and checked in the **View > Address Table**.	The address 0 is shown in the **I Addr** or **O Addr** and must be overwritten by the user.

Table 10: 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 at the bus a data exchange is carried out from the bus to this Slave. If this setting is switched off, the process memory for this Slave is occupied in the Master and at the bus no data exchange is carried out from the bus to this Slave.

4.4.3 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 with the menu **File > Export > PDD Export**.

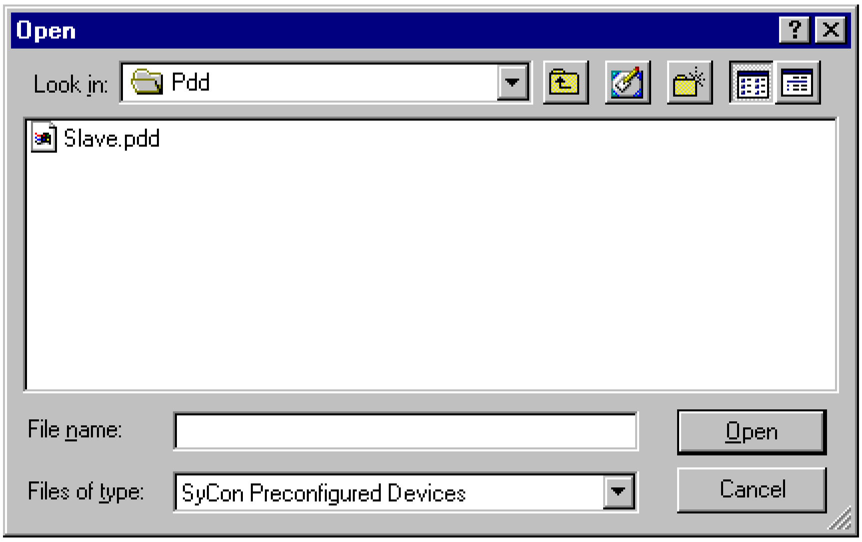

Figure 8: Inserting predefined device – PDD (1)

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

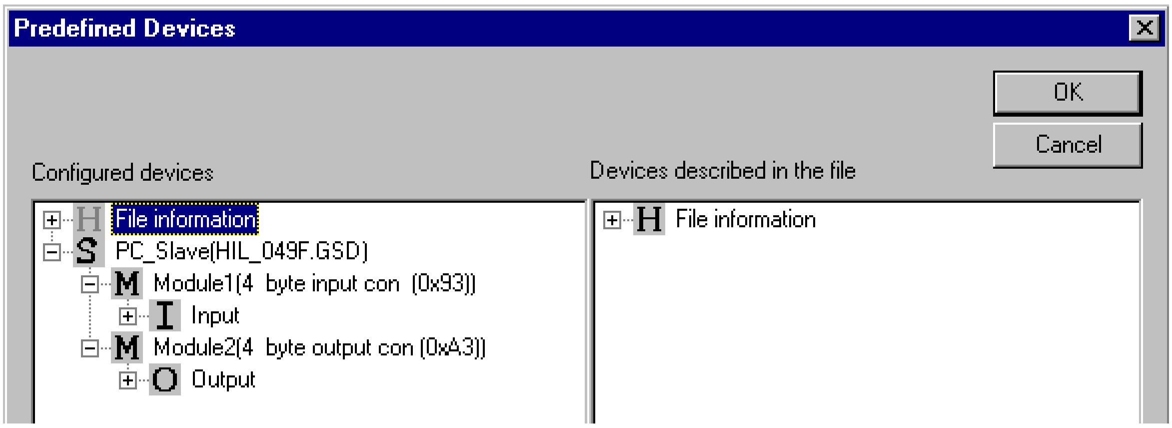

Figure 9: Inserting predefined device – PDD (2)

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

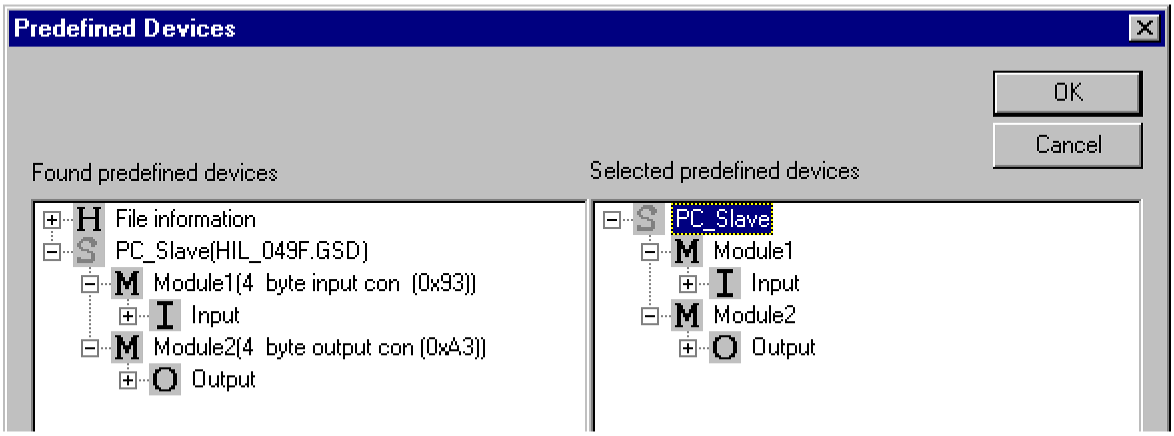

Figure 10: Inserting predefined device – PDD (3)

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.

Subsequently the station address of the device can be altered.

4.4.4 Replace Slave

If a Slave already exists in the configuration and should be replaced against another Slave, you first have to set the focus on the Slave (left mouse click at the Slave) and then choose the menu **Edit > Replace**

or

make a right mouse click at the Slave and select **Replace**.

In the now opened window the question appears if the Slave should be replaced.

Figure 11: Security question replace Slave

If you click the **Yes** button a new window opens, where you can replace the Slave against another one.

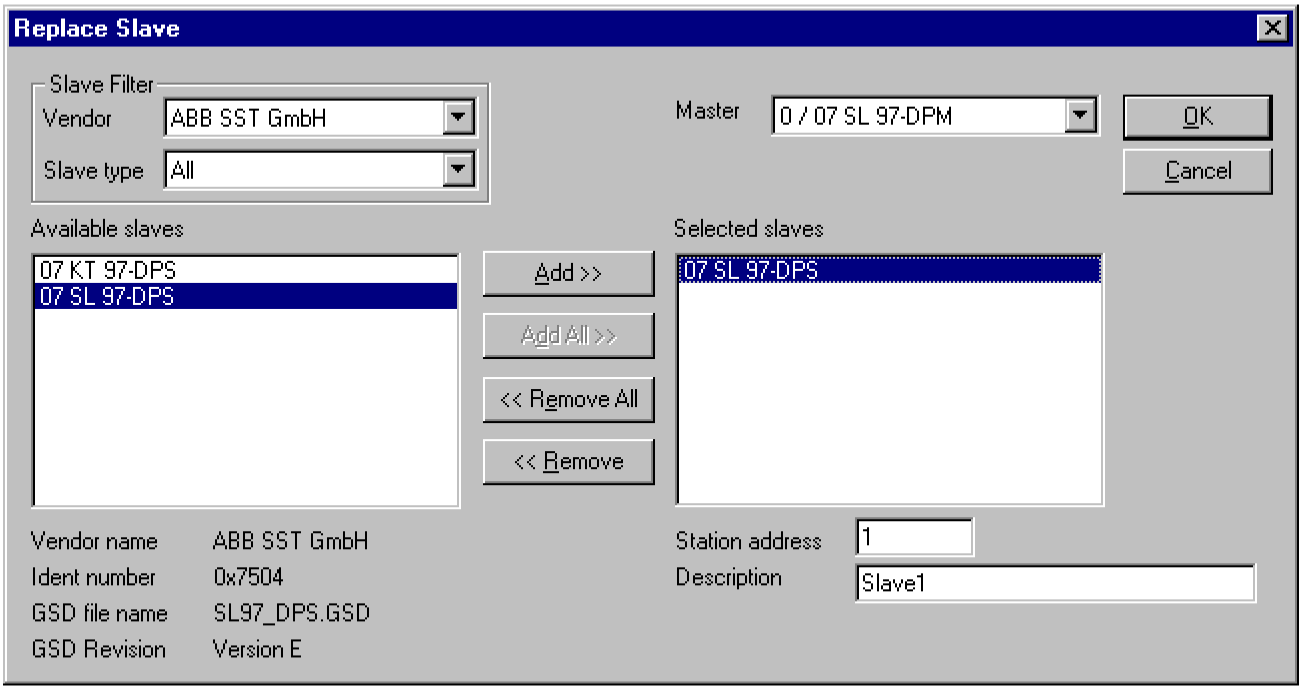

Figure 12: Edit > Replace Slave

In this window you select the Slave you want by clicking on it in the list **Available Slaves**. By clicking the **Add** button you put the Slave in the list **Selected Slaves**. With **OK** you confirm the selection and the Slave will be replaced.

5 Settings

5.1 Gateway Driver

The Gateway Driver determines how the Fieldbus Configurator communicates with the device. This is set in the Device Assignment via the menu **Settings > Device Assignment**.

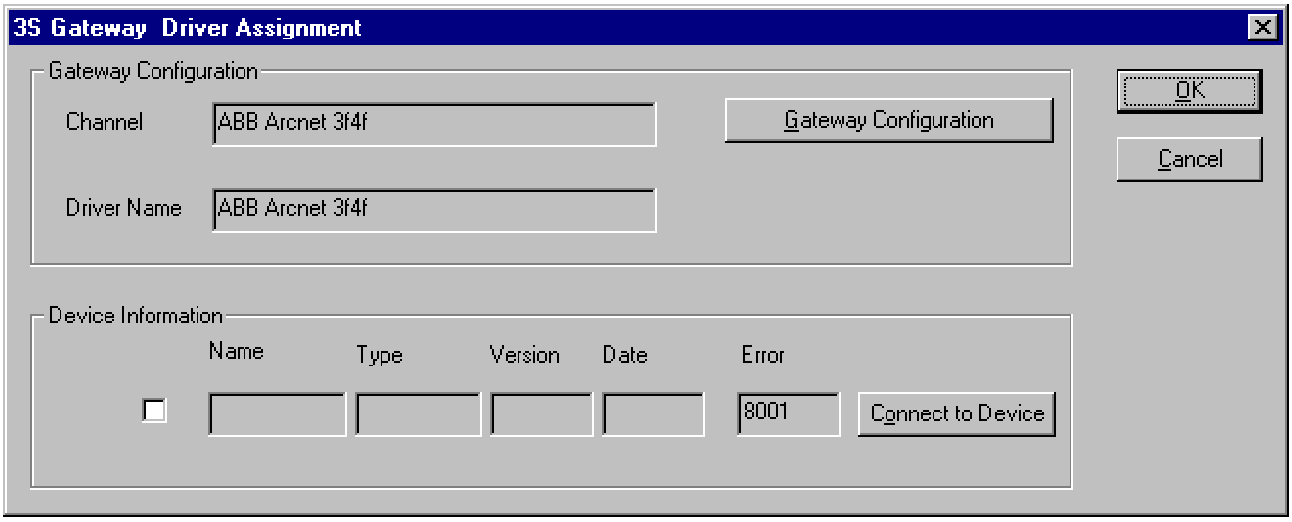

Figure 13: Settings > Device Assingment

After the selection of the Gateway channel or clicking the **Connect** button FB 1131 tries to set up a connection to the selected controller. If the connection was successful the configurable couplers are shown in the field **Device Information**. The desired coupler is selected by clicking on the field next to the name of the coupler and confirming with the **OK** button.

By clicking at the **Gateway Configuration** button a new window appears where the Gateway channel can be selected or a new Gateway channel can be configured.

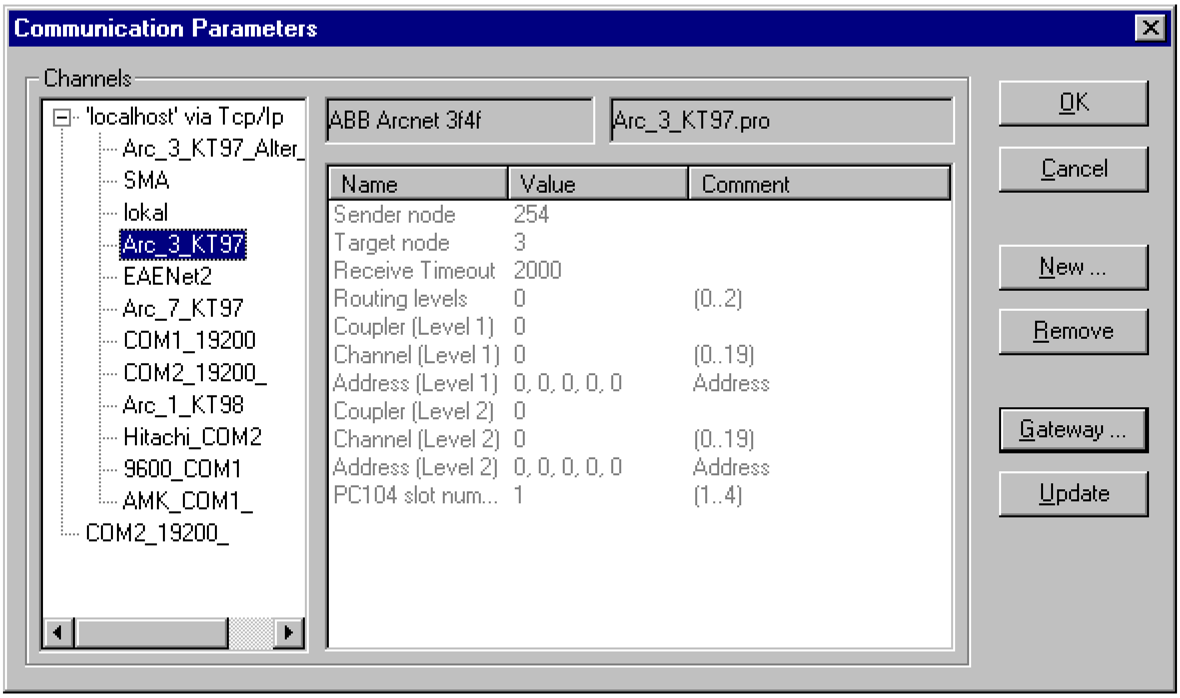

Figure 14: Configure Gateway

To confirm the Channel selection click at the **OK** button.

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 the Bus Parameters are set.

Most of the PROFIBUS-DP Slave devices

- recognize the Baud rate automatically and adapt themselves to it. This is especially the case when the ASIC SPC3 is used.
- however, there are also PROFIBUS-DP Slave devices, in which the Bus Parameters must be set by the user.

5.2.1 Setting the Bus Parameters and Profiles

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

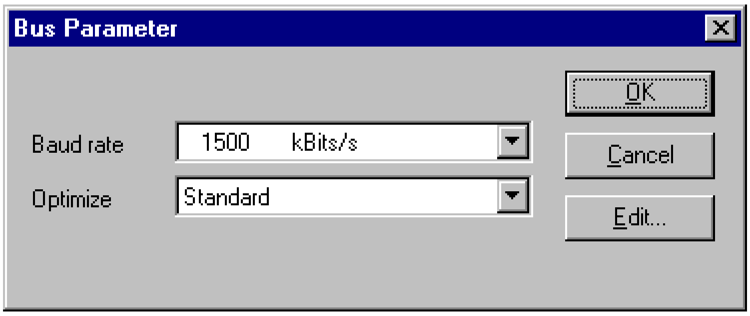

Figure 15: Settings > Bus Parameters

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

The optimizing standard provides each Baud rate with default Bus Parameters for PROFIBUS-DP systems.

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

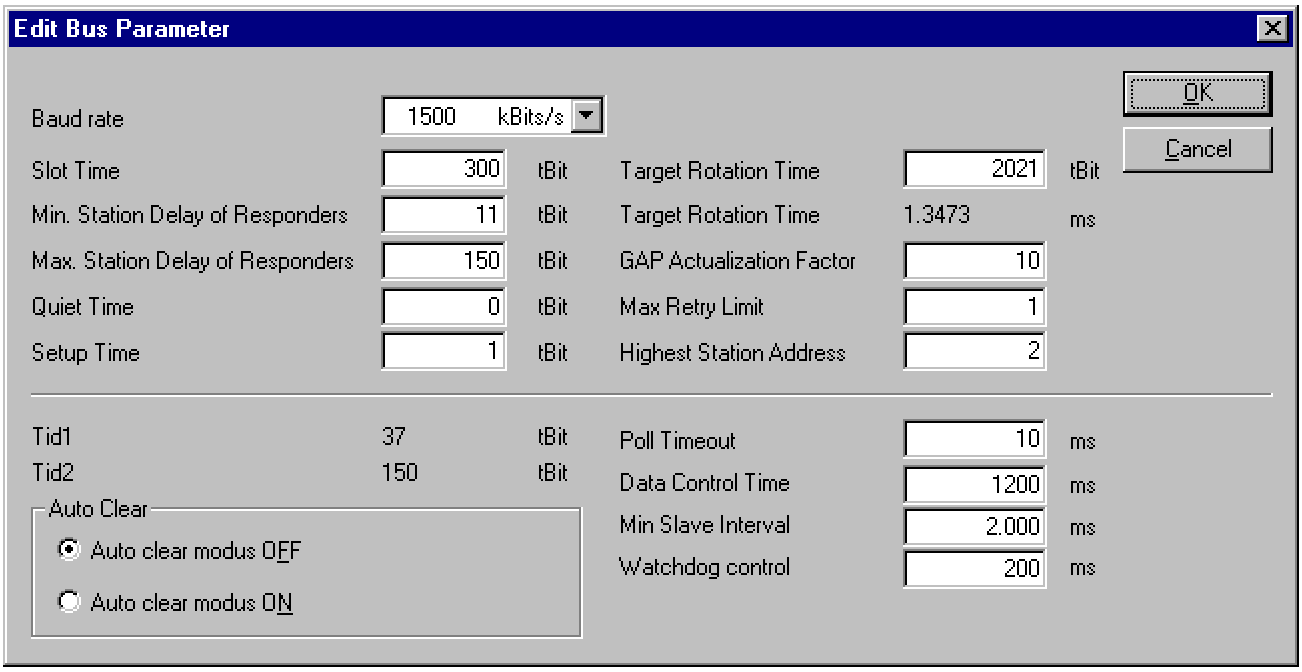

Figure 16: Editing Bus Parameters

Caution: The changing of Bus Parameters can cause communication interruptions.

Note: The offline Bus Parameters are displayed. The Bus Parameters are only accepted by the device after the download of the configuration.

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

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

For PROFIBUS-DP, the field **Access monitoring time** is used for 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 (DataExchange) to all DP Slaves by means of a timer. If no data exchange occurs to at least one DP Slave, or an existing data exchange takes place after the expiration of a monitoring time, and the **Auto clear mode** option is **ON**, then the Master leaves the DataExchange and sets the outlets of **all** assigned DP Slaves into a secure condition.

5.2.2 Descriptions of the Individual Parameters

All times for the Bus parameters are given in Bit times.

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

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

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.

Baudrate	**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 11: Baud rates, Bit times and cable lengths

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

- Minimum Station Delay of Responders (min T_{SDR})

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

  Value range: 1 .. 65535

- Maximum Station Delay of Responders (max T_{SDR})

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

The Sender (Requestor, Master) must wait at least for this time period after the sending of an unacknowledged telegram (e.g. Broadcast only) before a new telegram is sent.

Value range: 1 .. 65535

- Slot Time (T_{SL})

  'Wait for receipt' – monitoring time of the Senders (Requestor) of telegram for the acknowledgement of the recipient (Responder). After expiration, a retry occurs in accordance with the value of 'Max. telegram retries'.

  Value range: 52 .. 65535

- Quiet Time (T_{QUI})

  This is the time delay that occurs for modulators (Modulator-trip time) and Repeaters (Repeater-switch time) for the change over from sending to receiving.

  Value range: 0 .. 255

- Setup Time (T_{SET})

  Minimum period “reaction time” between the receipt of an acknowledgement to the sending of a new query telegram (Reaction) by the Sender (Requestor).

  Value range: 1 .. 255

- Target Rotation Time (T_{TR})

  Pre-set nominal Token cycling time within 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}). (*)

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}). (*)

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.

5.2.3 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

5.3 DP Master

5.3.1 Master Configuration

The Master configuration is described further above in section *Master Configuration* on page *18*.

5.3.2 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.

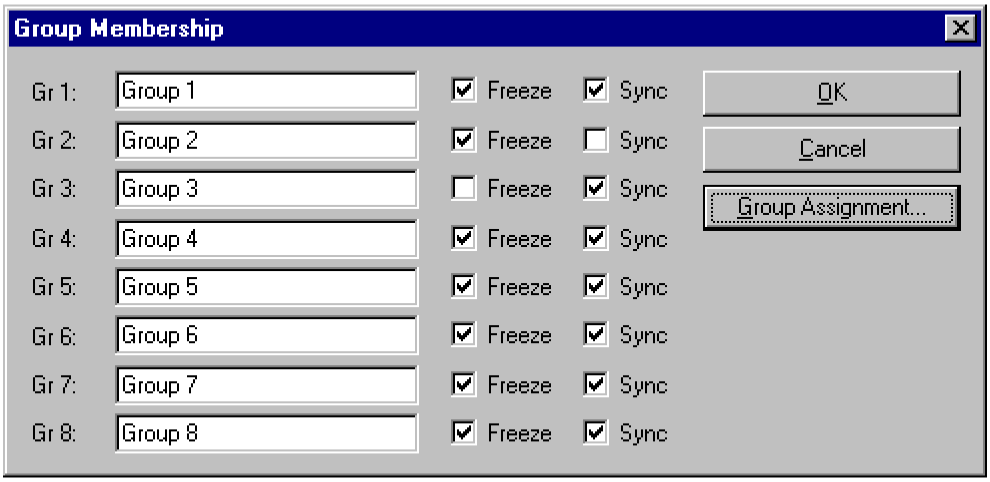

Figure 17: Settings > Group Membership (1)

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 can be selected to which 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 on it.

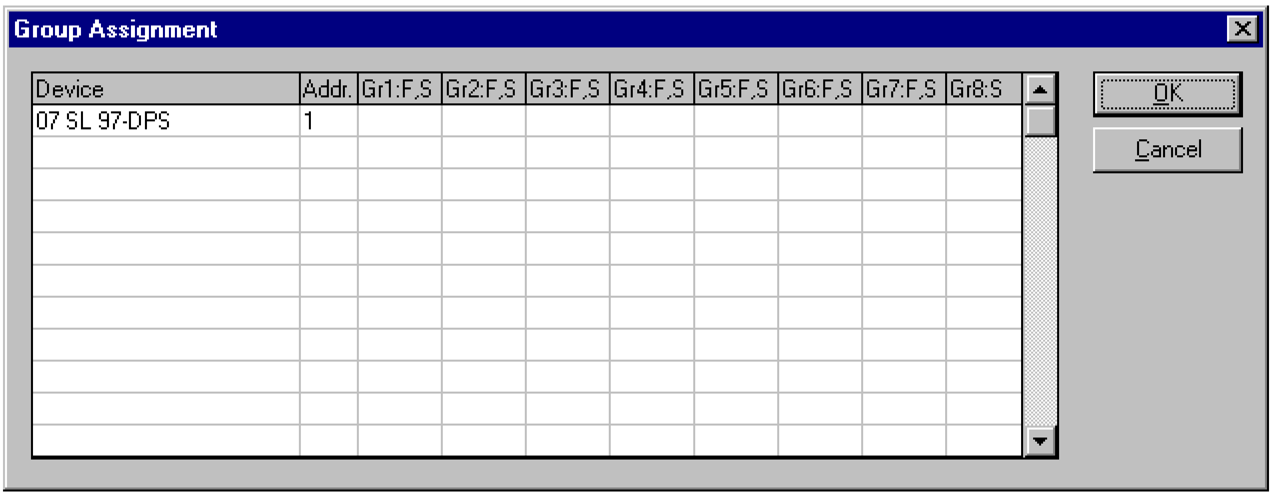

Figure 18: Settings > Group Membership (2)

5.4 DP Slave

5.4.1 DP Slave Configuration

The Slave Configuration is described further above in section *Slave Configuration* on page *23*.

5.4.2 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 called up for the first time.

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

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

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

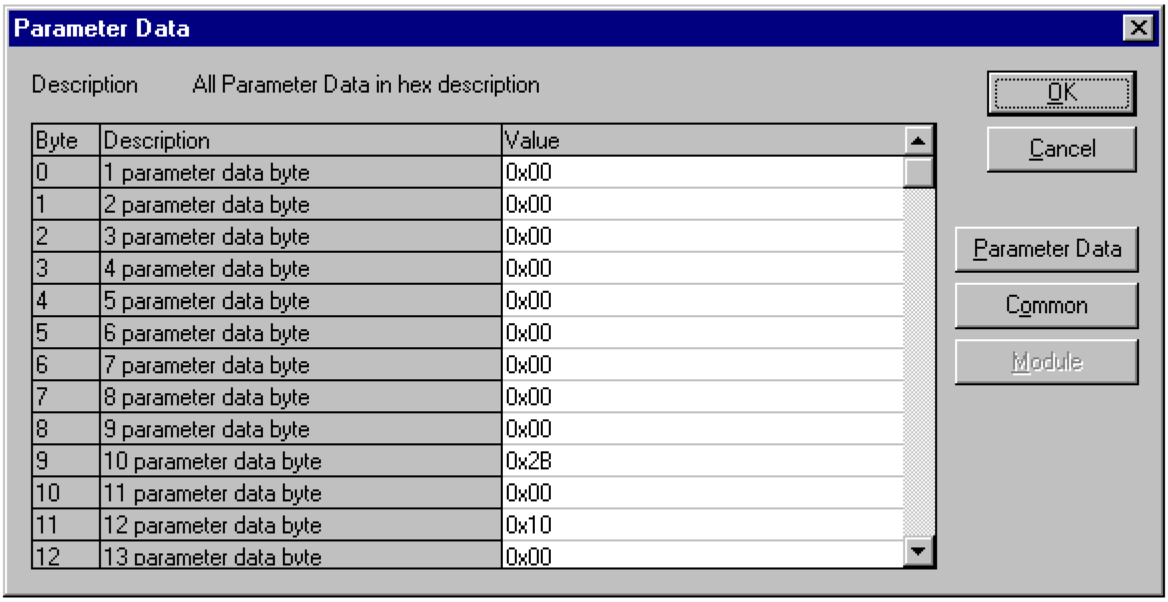

Figure 19: Parameter Data (Hexadecimal depiction)

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

- Parameter data. These are all the parameters of a Slave station
- Common. Parameter Data of the main station
- Modul. Parameter Data form on 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:

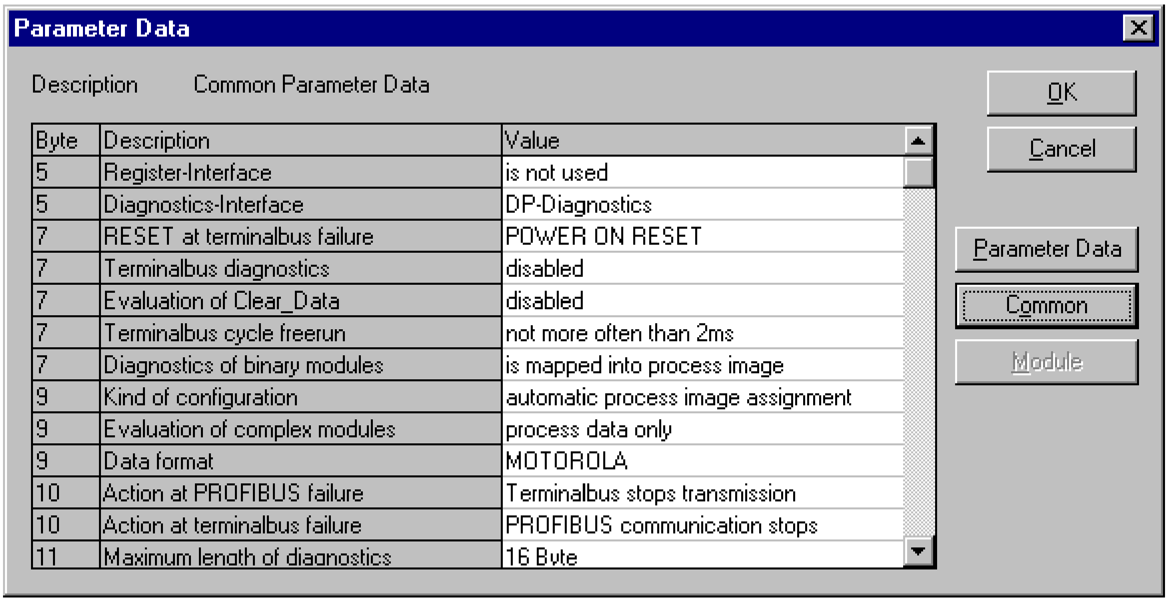

Figure 20: Parameter Data (Text depiction)

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

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

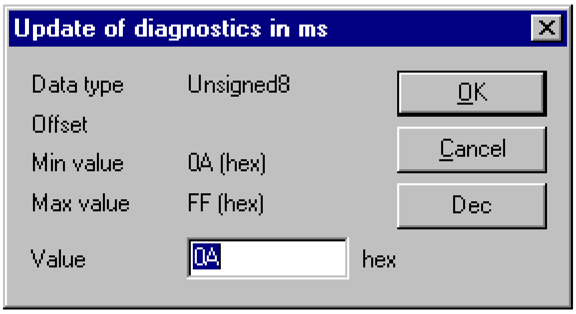

Figure 21: Parameter Data (individual depiction)

or to change the description via the text setting.

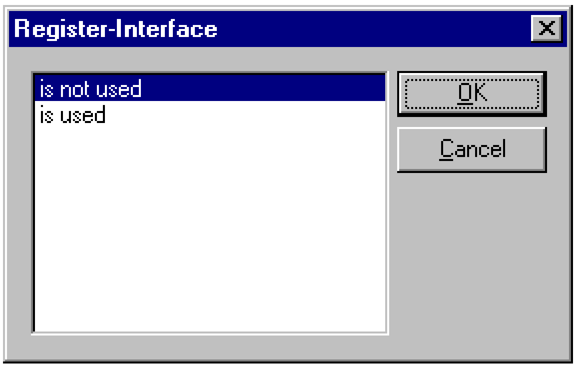

Figure 22: Parameter Data

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.

5.5 Project Information

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

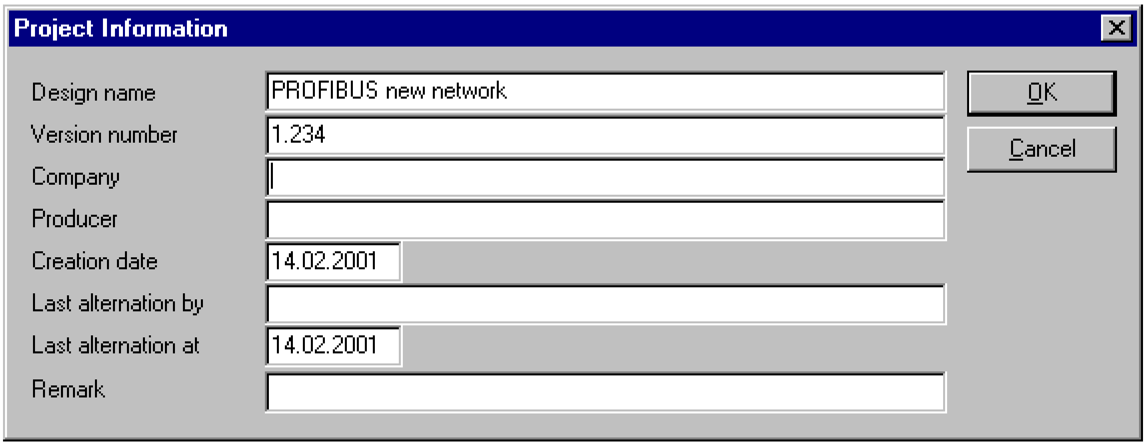

Figure 23: Settings > Project Information

5.6 Path

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

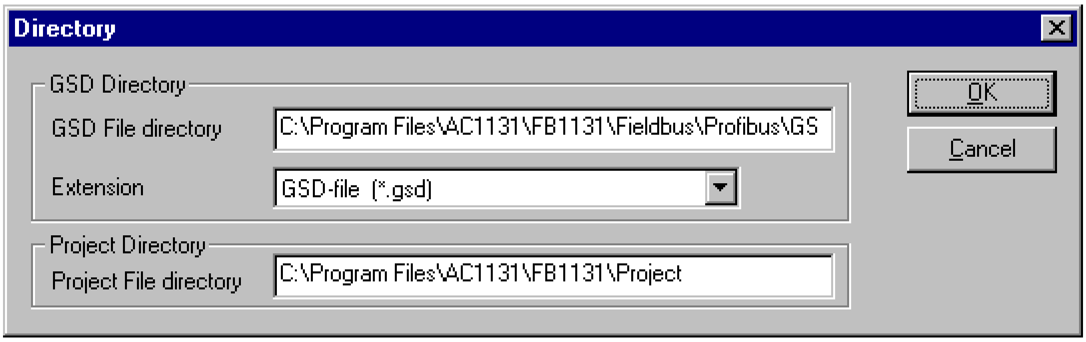

Figure 24: Settings > Path

If you click the **OK** button all GSD files are read in.

5.7 Language

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

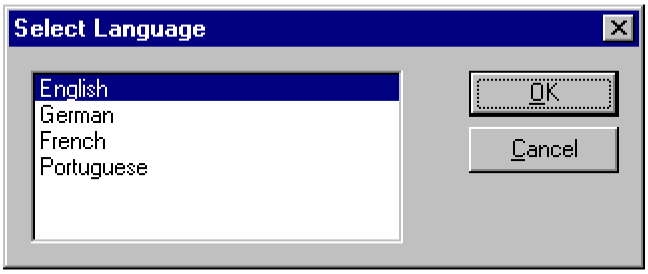

Figure 25: Settings > Language

Here can be set the language of the Fieldbus Configurator. Select the desired language and confirm with the **OK** button.

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

After restarting the Fieldbus Configurator, the language will have changed to the one selected.

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

6 Online Functions

6.1 Introduction

In this section, all the functions that directly influence PROFIBUS devices, are presented.

Note: Please note that this also permits an interruption of the running communication or that input and output can be switched On or Off.

6.2 Online to the Coupler

6.2.1 Downloading the Configuration

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

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

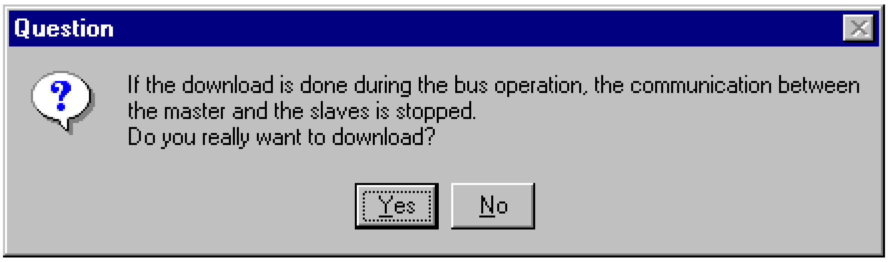

Figure 26: Security question before Download

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

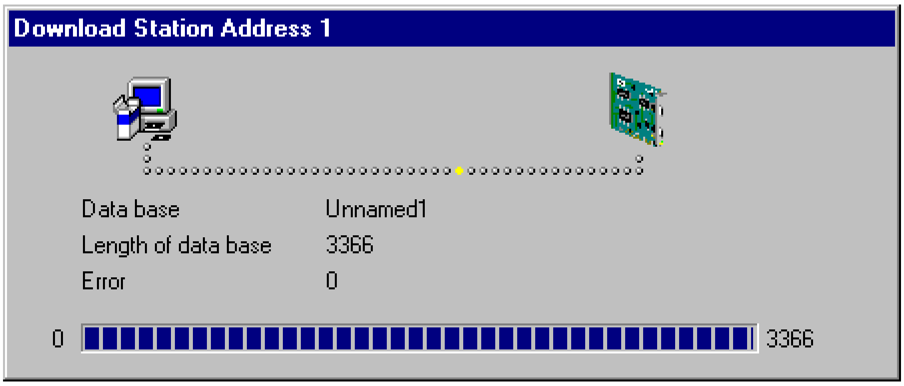

Figure 27: Online > Download

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 point.

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

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

6.2.2 Firmware Download

If a Firmware download is to be carried out, proceed as follows: first choose the desired device for Firmware downloading. Then, call up the **Online > Firmware Download** menu. Select the new Firmware and retrieve it with **Download** into the device. The Firmware is now retrieved.

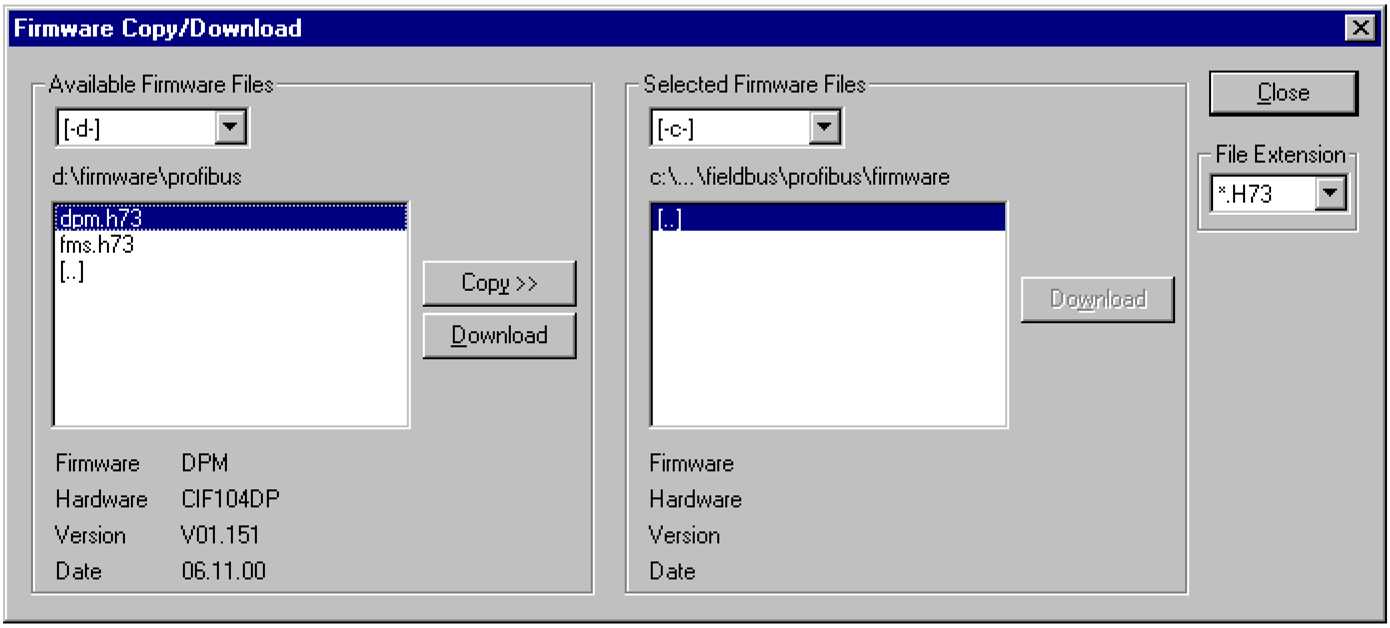

Figure 28: Online > Firmware Download

6.2.3 Firmware / Reset

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

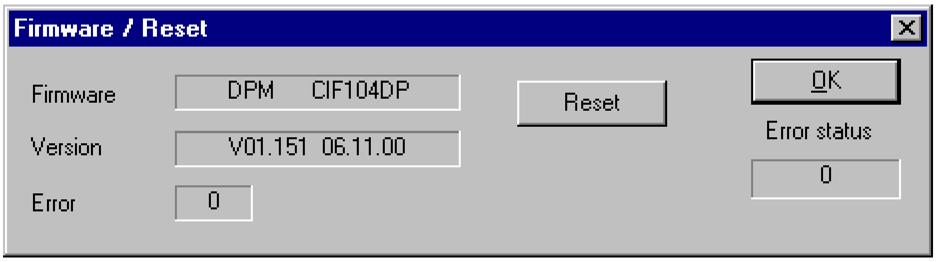

Figure 29: Online > Firmware / Reset

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

6.2.4 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.

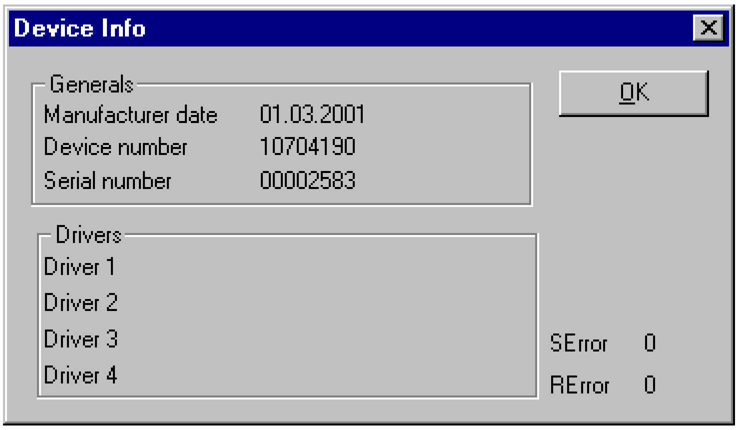

Figure 30: Online > Device Info

6.3 Automatic Network Scan

This function scans the network structure. During the scan it will be detected which devices are connected to this PROFIBUS network and how these devices are configured. Therefore the following steps are necessary:

- Create a new project: Select the menu **File > New** and PROFIBUS.
- Select the Master: Select the Master from the menu **Insert > Master**.
- Set the Baudrate: Select the menu **Settings > Bus parameter** and set the Baudrate.
- Load these settings to the Master: Select the menu **Online > Download** to download these settings into the Master device.
- Save: Select **File > Save** to save the settings.
- Scan the network: Select the menu **Online > Automatic Network Scan**.

Note: This function detects the connected devices on the PROFIBUS network and can read out how these devices are configured. This function can not read out the parameters, because this is not possible from the PROFIBUS principle. Parameter data have always to be set by the user to the Master device and the Master devices transfer the parameter data to the Slave device.

Figure 31: Online > Automatic Network Scan (security question)

Answer this question with **Yes**, if the connected PROFIBUS network should be scanned. Answer this question with **No**, if this functions should not be performed.

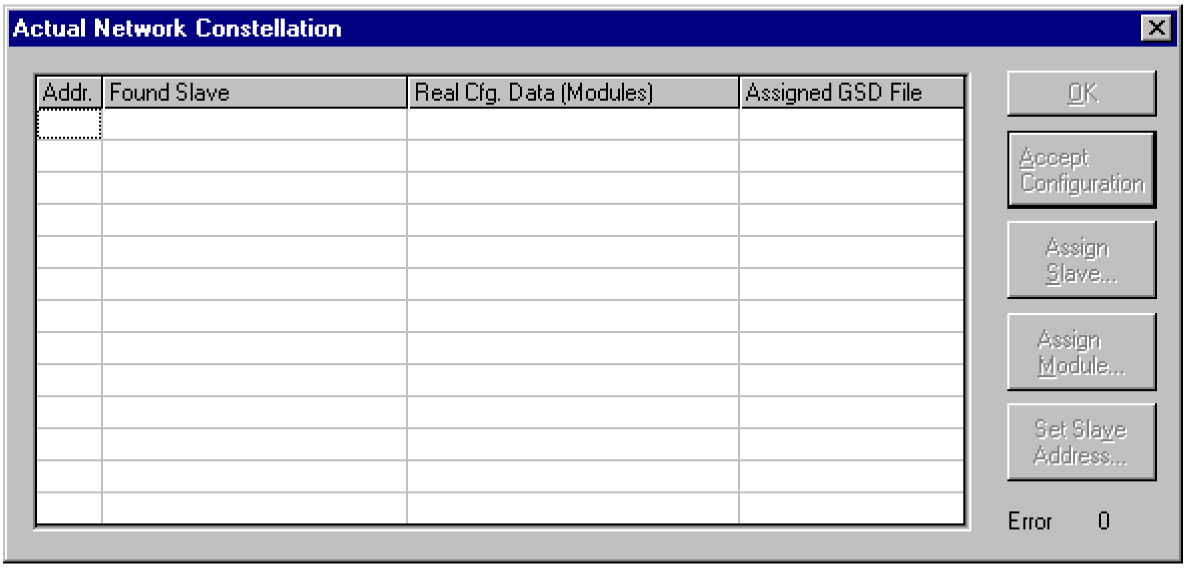

Figure 32: Online > Automatic Network Scan (During the Scan)

All buttons are grey during the network scan.

The Fieldbus Configurator detects in the first step which devices are connected to the PROFIBUS network. The Fieldbus Configurator then reads the identcode from each Slave. The configuration data (identifier bytes) is read out from each Slave and these configuration data is searched in the corresponding GSD file (if GSD file is available) and the module is displayed in the column **Real Cfg. Dat (Modules)**.

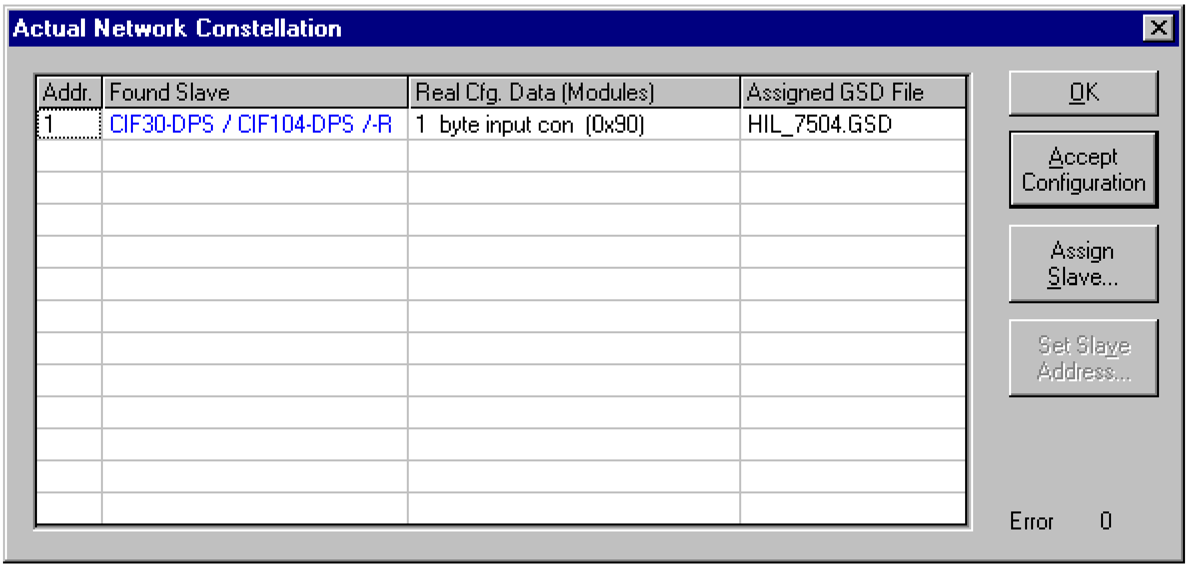

Figure 33: Online > Automatic Network Scan (After the Scan)

Note: Some Slave devices only allows to read out the default configuration.

In the window **Actual Network Constellation** the texts 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 12: 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 can not be read out. Further information you find in section *Slave with Station Address 126* on page *51*.

When you exit the window **Actual Network Constellation** the Fieldbus Configurator asks if this constellation should be taken into the configuration or not.

Figure 34: Online > Automatic Network Scan > Accept Configuration

<u>Example:</u>

This example shows a scanned Network Constellation with more than one suitable modules for the GSD file. The modules (**Real Cfg. Data**) are coloured blue, which means, that you can assign or change an assignment of the modules by clicking the **Assign Module** button.

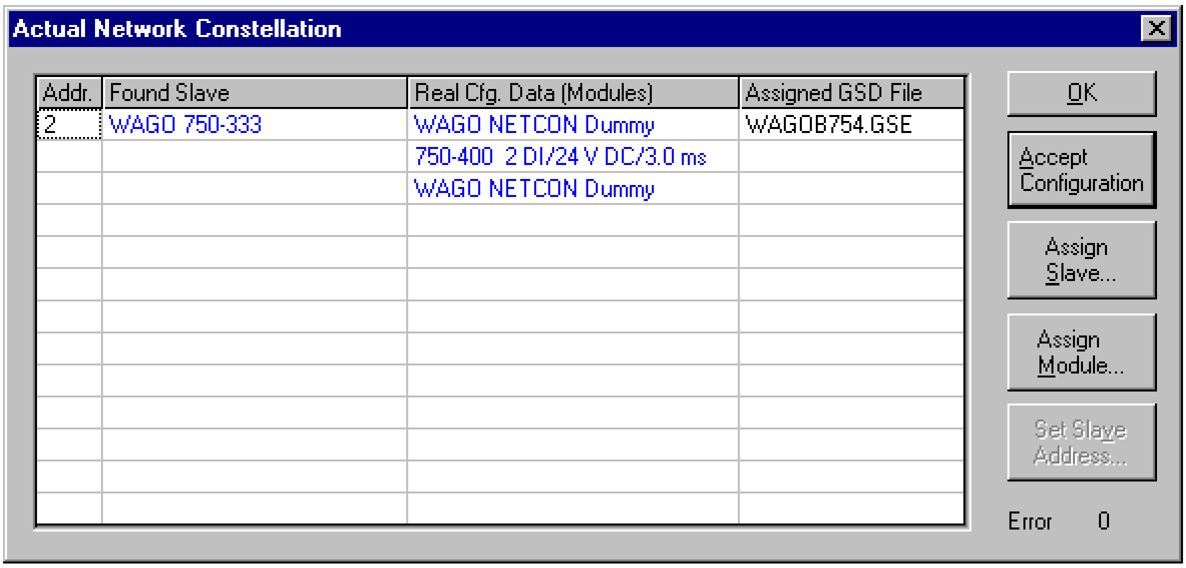

Figure 35: Online > Automatic Network Scan - Example for Assignment

6.3.1 Assign Slave

The identnumber is read out 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 user can select the correct Slave device from this list.

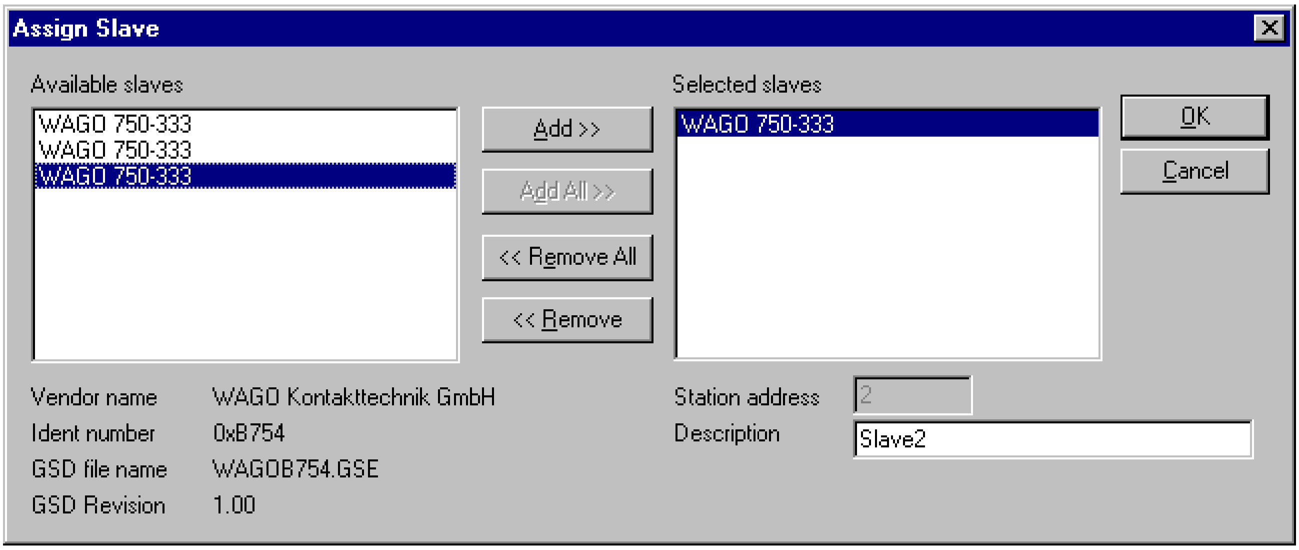

Figure 36: Online > Automatic Network Scan > Assign Slave

In the list **Selected Slaves** the device which was found during the Automatic Network Scan is selected. By clicking the **Remove** button the device is removed and another device can be insert in the Actual Network Constellation.

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 Constellation.

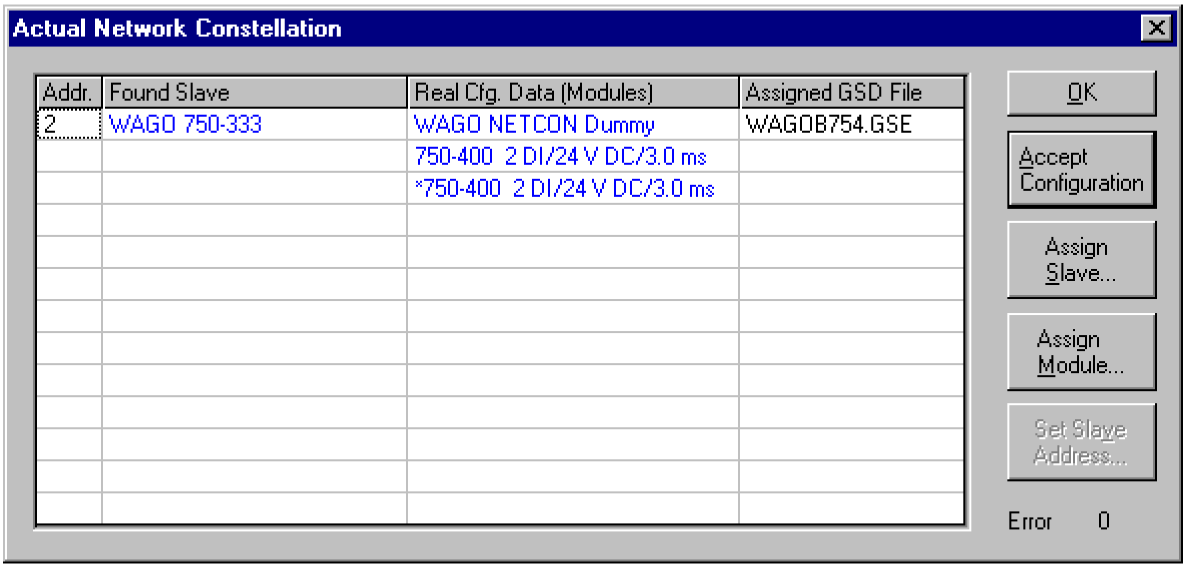

Figure 37: Change of the GSD against a GSE file

This picture shows a change of the WAGOB754.GSD against the WACOB754.GSE.

6.3.2 Assign Module

It can be that more than one similar Configuration Data for a device was found during the network scan. By clicking the button **Assign Module** in the Network Scan window you get a selection of suitable modules for the assigned EDS file which you can assign here.

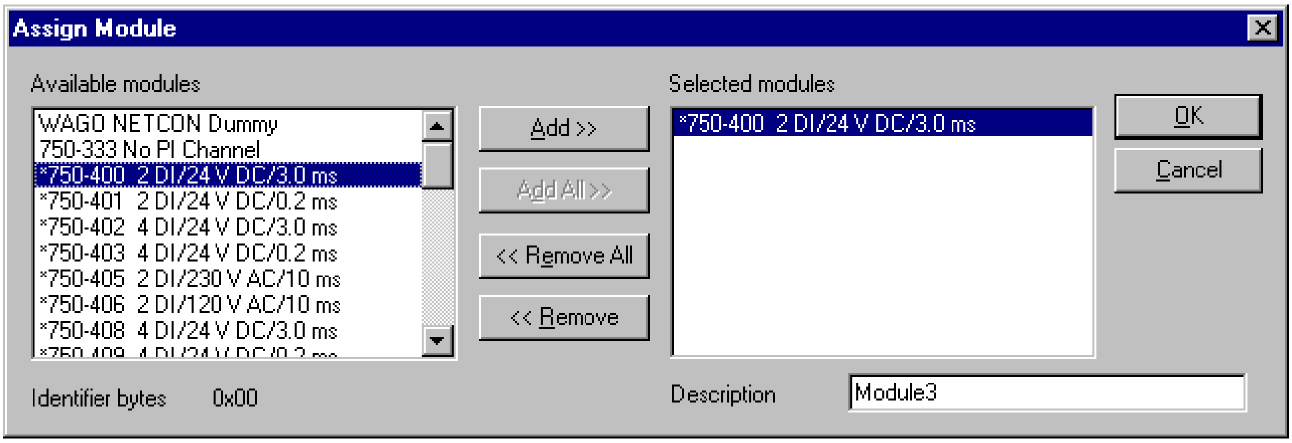

Figure 38: Online > Automatic Network Scan > Assign Module

In the list **Available modules** the modul which was found during the Automatic Network Scan is selected. By clicking the **Remove** button the modul is removed and another modul can be insert in the Actual Network Constellation.

Select a modul 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.

Note: The available modules all have the identifier byte 0x00.

6.3.3 Slave with Station Address 126 - Determination of the Ident Number

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

- select the GSD file from the list of Slave devices or
- enter the ident number manually.

6.3.3.1 Select GSD File

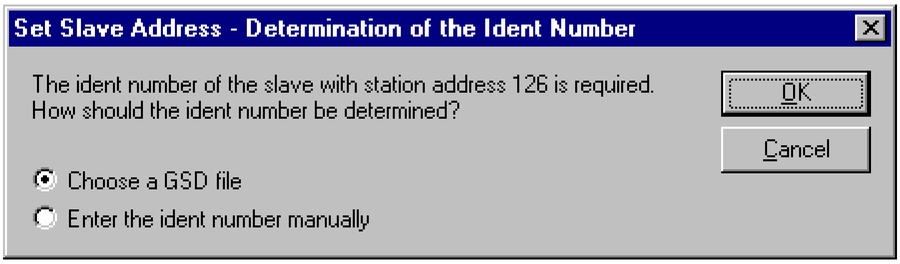

Figure 39: Online > Automatic Network Scan > Set Slave Address

A window opens where a Slave device can be selected. There you have to select one.

Then a station address between 0 and 125 is assigned with **Set Slave Address** and then you have to scan the network again.

6.3.3.2 Ident Number

If you enter the ident number manually the following window appears. The ident number has to be entered in hexadecimal format.

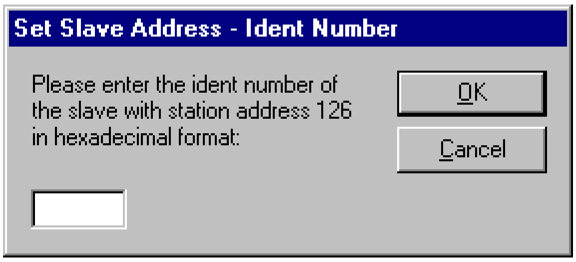

Figure 40: Online > Automatic Network Scan > Enter Ident Number

Then a station address between 0 and 125 is assigned with **Set Slave Address** and then you have to scan the network again.

6.4 Start/Stop Communication

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

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

6.5 Diagnostic Functions

The following table shows diagnostic functions and the usability for

- ABB PROFIBUS-DP Master devices
- ABB PROFIBUS-DP Slave devices.

Diagnostic function	**Usage**	**Usable with PROFIBUS-DP Master devices**	**Usable with PROFIBUS-DP Slave devices**
Debug Mode (PROFIBUS-DP)	Detect, to which PROFIBUS-DP Slave devices the DP Master device has communication	Yes	No, only at DP Master devices
Global State Field	Status information from the PROFIBUS DP Master	Yes	No, only at DP Master devices
Extended Device Diagnostic	Statistic information and status information from the PROFIBUS device	Yes	Yes

Table 13: Overview Diagnostic Functions

6.5.1 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.

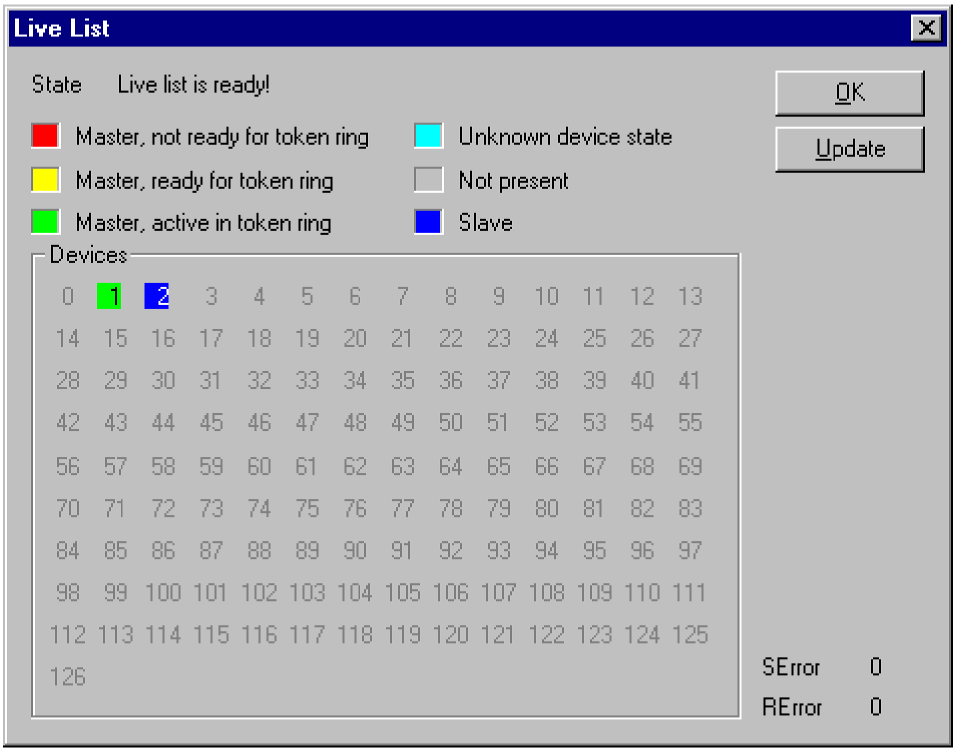

Figure 41: Online > Live List

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.

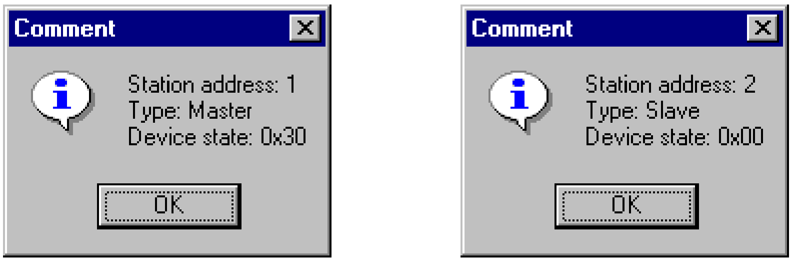

Figure 42: Device type and device status of a Master and a Slave

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

6.5.2 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 Fieldbus Configurator cyclically interrogates the status of the network communication and the individual condition of the devices.

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

6.5.2.1 Debug Window

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.

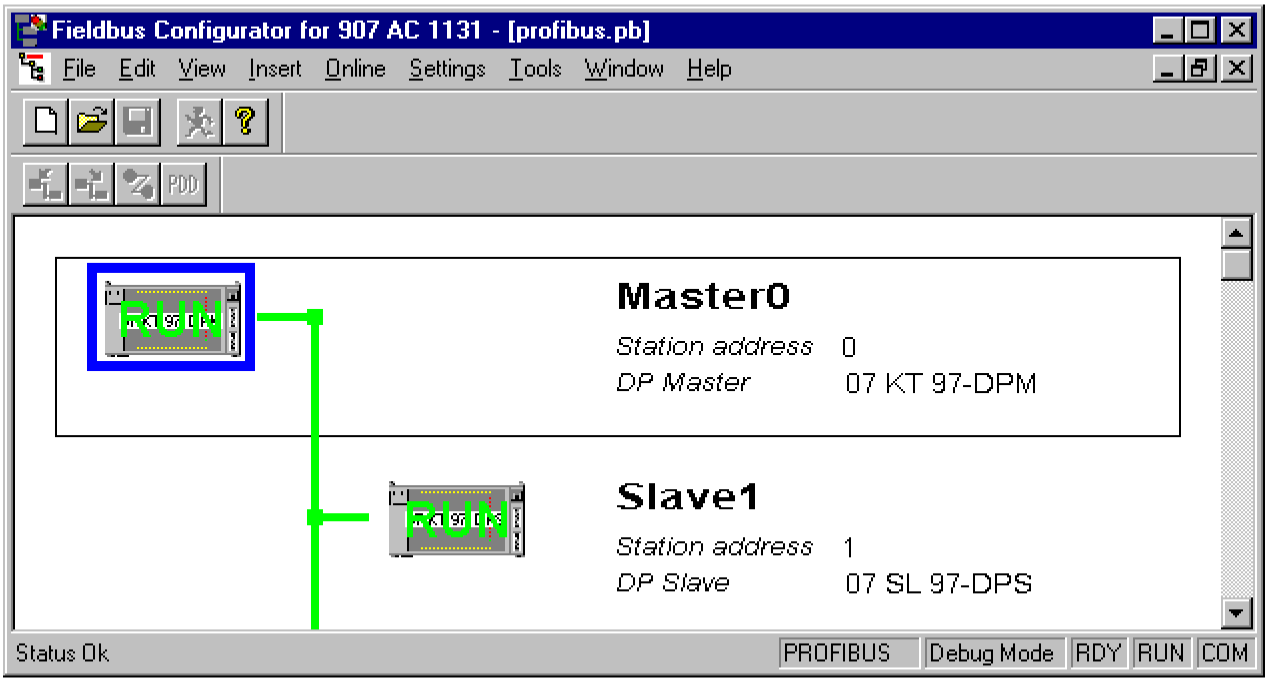

Figure 43: The Debug Window

If a 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 doubleclick on the device itself or set the focus to the device and select **Online > Device Diagnostic**.

6.5.2.2 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 make a double click at the symbol of the device to open this window. To end the Debug Mode select the menu **Online > Stop Debug Mode**.

After the debugger was started FB 1131 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 colour, otherwise it is green. FB 1131 also displays the letters **Diag**, if the device signals a diagnostic information or the master holds a diagnostic information in its internal diagnostic buffer. This information is displayed closer if you click with the mouse onto the corresponding device in Debug Mode.

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.

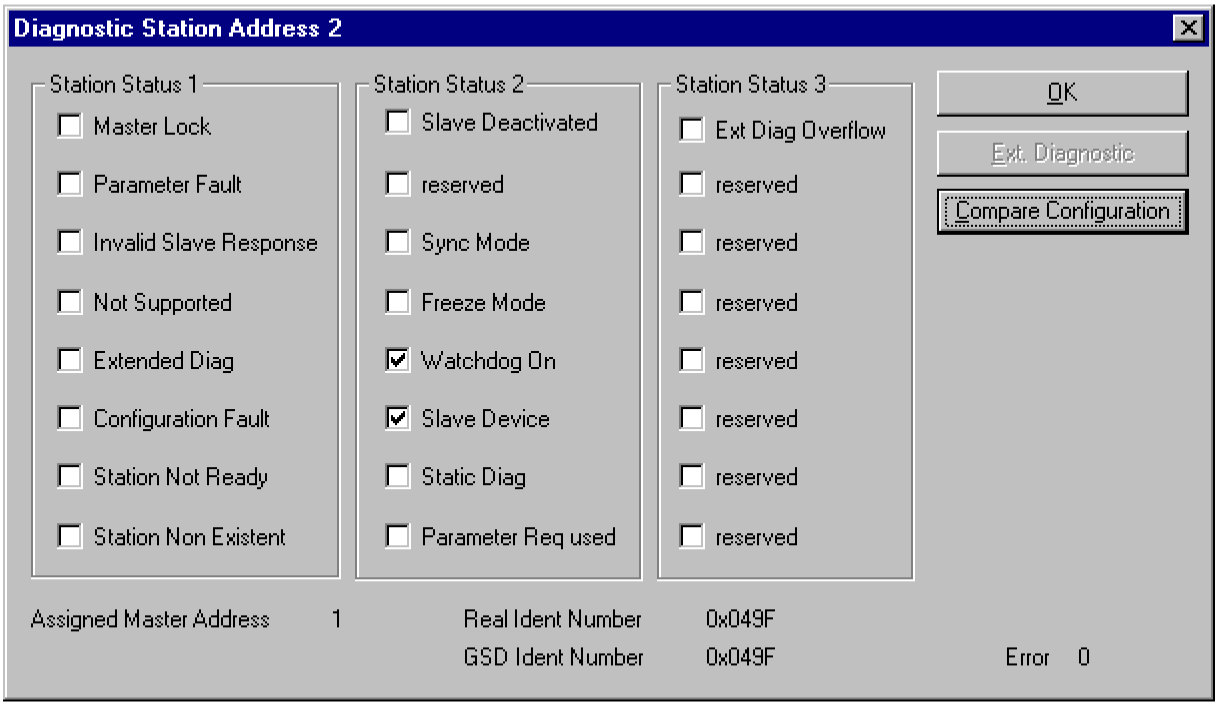

Figure 44: Online > Device Diagnostic

Station Status 1, 2 and 3 is described on the next page.

At **Assigned Master Address** the address of the master is shown, that has parameterised and configured this Slave. If the value 255 is displayed, it means that the Slave reports that

- it is not parameterised or configured yet or
- that the received parameter information and configuration information are rejected because of an error.

At **Real Ident Number** the ident number from the DP Slave is displayed. At **GSD Ident Number** the ident number is displayed, that the Fieldbus Configurator has read out in the used GSD file. Both ident numbers have to agree. When they are different the reason could be

- the wrong GSD file is used or
- a wrong DP Slave was connected to the PROFIBUS.

When the **Real Ident Number** shows 0000, then the master still 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 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 are containing wrong or insufficient data. On every received parameter telegram the Slave executes a check routine on the whole parameter telegram. If the Slave detects a faulty parameter value or illegal data during its check, it will report the **parameter fault**. During the check routine the Slave compares its identnumber with the one sent by Master. **Remedy:** So if the Slave reports this error, first compare the **Real Ident Number** shown in the Slave diagnostic field in debugger mode with the one shown at **GSD Ident Number**. If this two Ident numbers are the same, check the parameter data. If they are different, either a wrong GSD file is used or a wrong device was connected to the bus.
Invalid Slave Response (Bit 5)	Master	**Meaning:** This bit is set by the Master, when the Master receives an invalid answer from the Slave. So the physical contact to the Slave works principally, but the logical answer was not understood. **Remedy:** An error at the physical transmission line could have appeared like twisted cable, missing bus termination or missing shield connection. Use standardized DP Slave. This also can happen, for example if a PROFIBUS-FMS Slave is connected to the DP-Master instead of a DP Slave. So the Slave do not understand the DP-Telegram and rejects it. It's handled as 'Invalid Slave Response'.
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 and read out by FB 1131 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.

Table 14: PROFIBUS-DP Diagnostic Station state 1 (Bit 7 to 4)

Station-Status 1	Set by	Meaning and Remedy
Extended Diag (Bit 3)	Slave	**Meaning:** This bit is set by the Slave, if extended diagnostic data are a read out. Extended diagnostic data is optionally 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 Fieldbus Configurator.
Configuration Fault (Bit 2)	Slave	**Meaning:** During the PROFIBUS-DP startup 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. That means that the Master has another I/O module constellation as the Slave. **Remedy:** So first compare visually all configured I/O modules in the configuration data of FB 1131 for this Slave with its real physical constellation. Note that the order of the module has to 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. This Slave specific I/O module behaviour has to be written down in the Slave documentation because it can not be read out from the GSD file. Please read the configuration notes of the manufacturer. Another possibility to get the Slave module constellation is to read out its constellation by a PROFIBUS-DP command **Compare Configuration**. So click on this button in the diagnostic field and you will get a Hex-Dump of the real Slave configuration data and the configured one (**Real Configuration and FB 1131 Configuration**). Note, that the DP configuration is coded in a very compact form. The code for the modules is shown in the **Slave Configuration**.
Station Not Ready (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 the other fault bits. Check especially the parameter and the configuration. Often the report 'Station not Ready' results in case of parameter fault or configuration faults. It is possible that the supply voltage at the Slave was just first switched on. Wait until the device is initialized.
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:** Please check your 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** you can check which Slaves are available respectively connected to the PROFIBUS. Check, if the Slave supports the configured baud rate. Some Slaves only work with up to 1.5 Mbaud or need to be set for a PROFIBUS-DP conform behaviour. Check the connectors intermediated LWL (optical) converters and repeaters.

Table 15: PROFIBUS-DP Diagnostic Station state 1 (Bit 3 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 an I/O data transfer. In a case of a set static diagnostic bit the Master has to collect diagnostic information as long as this bit is active. On which events or at what time this bit can be set by a Slave device, is not defined in the norm description and can not be mentioned here.
Parameter Req used (Bit 0)	Slave	The Slave sets this bit to force the Master system to do a new parameterisation. This bit is set as long as new parameterization must be performed. In case of this error you should compare firstly the **real ident number** with the **GSD ident number** in this window. This numbers need to be the same. Furthermore you have to check the parameter data.

Table 16: 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 down in its diagnostic buffer.
Reserved (Bit 6 to 0)	-	-

Table 17: PROFIBUS-DP Diagnostic Stations status 3

6.5.2.3 Compare Configuration

The configuration can be read out from the DP Slave via the PROFIBUS in the 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 Fieldbus Configurator.

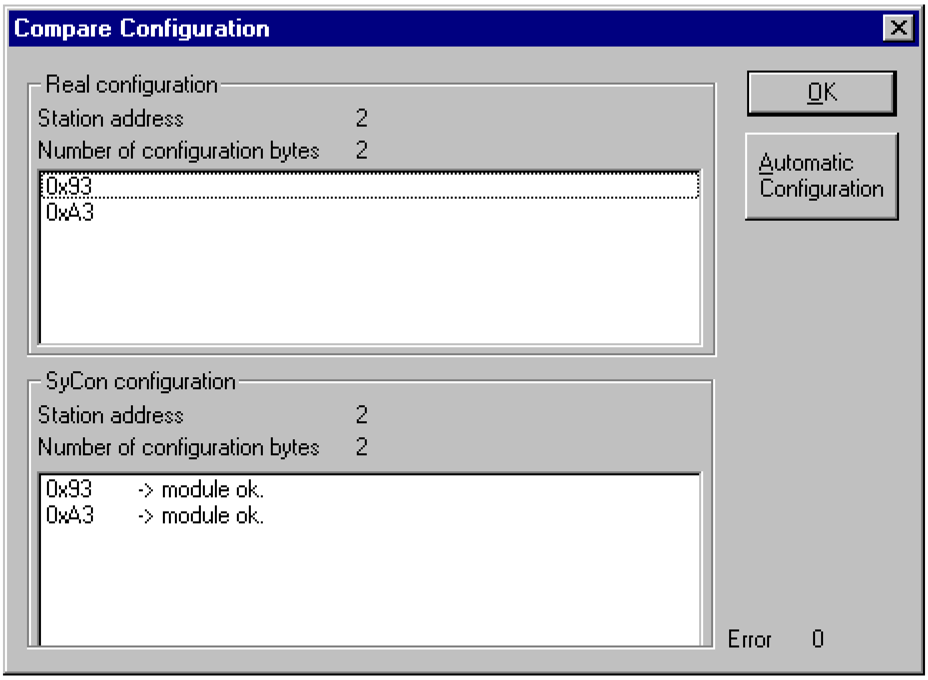

Figure 45: Online > Device Diagnostic > Compare Configuration

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Note: Some DP Slaves only gives their default configuration when reading it out via the PROFIBUS. To use this function the DP Slave has to support it.

The meaning of the identifier bytes is described in chapter *Identifier Bytes* on page *118*.

6.5.2.4 Extended DP Slave Diagnostic

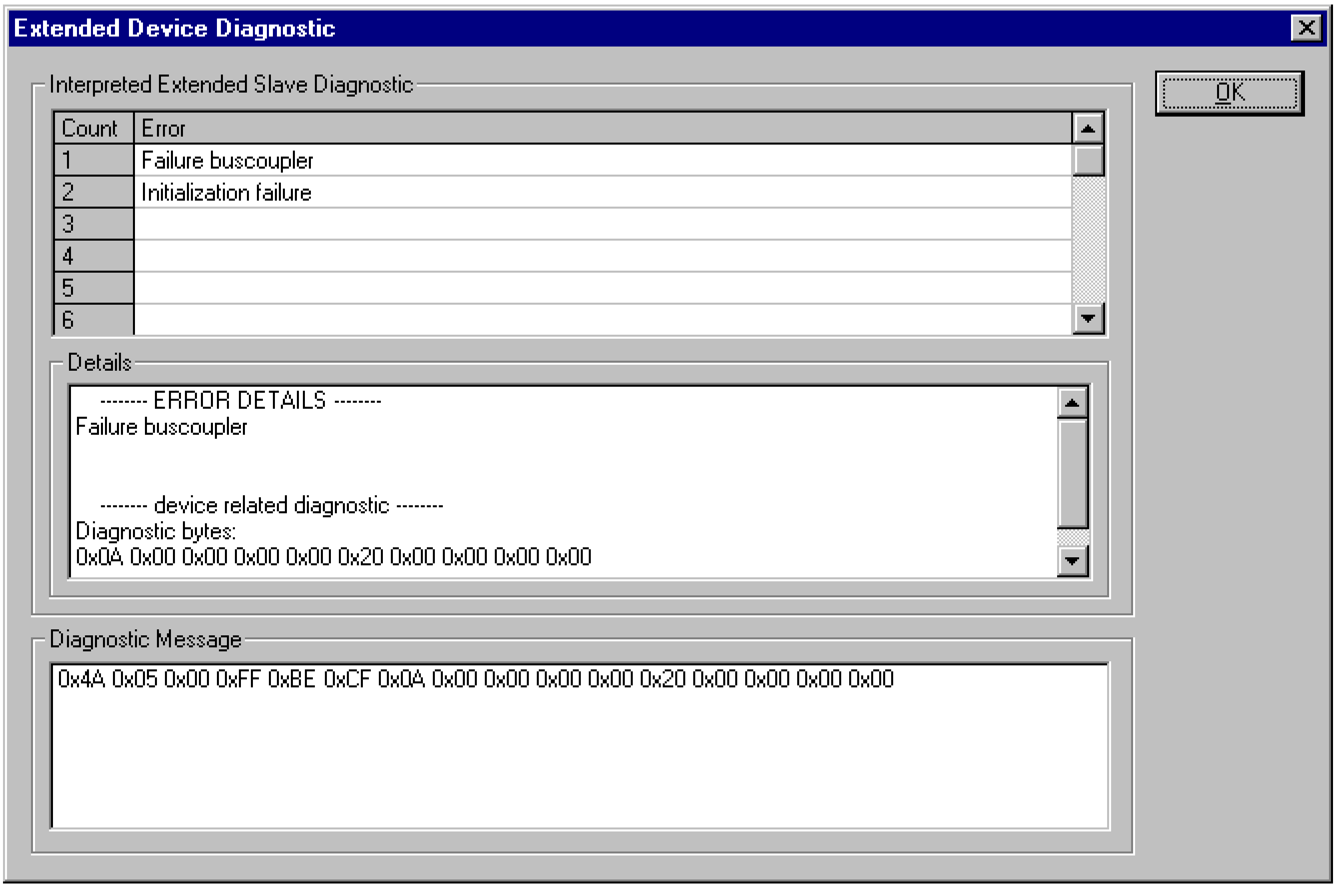


Figure 46: Device Diagnostic (PROFIBUS-DP extended diagnostic)

In the **Extended Device Diagnostic** window, a diagnostic telegram is shown as a Hexdump. Here, the first 6 Bytes are the standard diagnostic Bytes like described in section *PROFIBUS DP Device Diagnostic* at page *56*.

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.

In the middle region of the window you can see details and in the top region the diagnostic report in clear text to this extent as these are given in the GSD file.

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

6.5.3 Global State Field

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

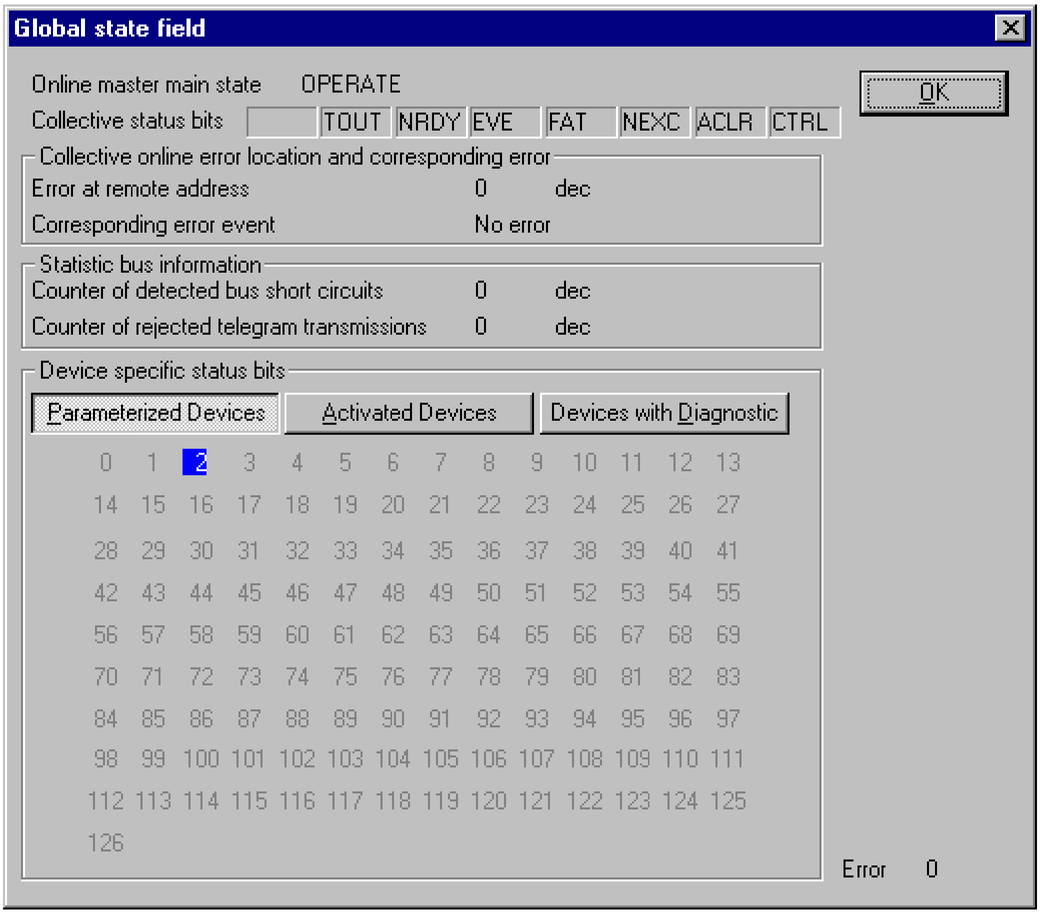


Figure 47: Online > Global State Field

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 for bus short circuits while the Master interrupts the communication. The number of detected timeouts are fixed in the statistic bus information variable. The bit will be set when the first timeout was detected and will not be deleted any more.
NRDY	HOST-NOT-READY-NOTIFICATION 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 number of detected events are fixed in the statistic bus information variable. The bit will be set when the first event was detected and will not be deleted any more.
FAT	FATAL-ERROR because of heavy bus error, no further bus communication is possible.
NEXC	NON-EXCHANGE-ERROR at least one Slave has not reached the data exchange state and 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 parameterization error.

Table 18: 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:

Parameterized Devices, Activated Devices and **Devices with Diagnostic** are shown if you click at that button. The activated addresses are coloured numbers.

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

You can see the diagnostic by double-clicking at a highlighted station address of a device.

6.5.4 Extended Device Diagnostic

The Extended Device Diagnostic helps to find bus and configuration errors when the FB 1131 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:

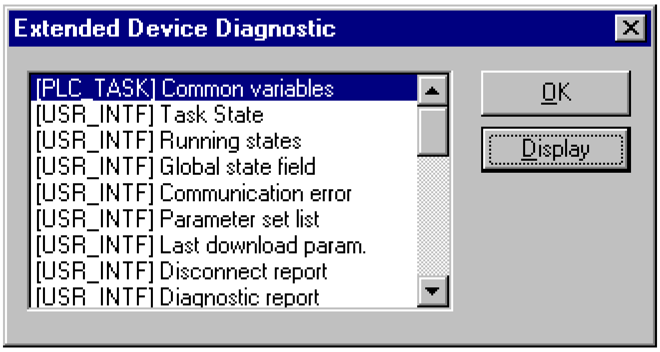


Figure 48: Extended Device Diagnostic as and example for the PROFIBUS-DP Master

6.5.4.1 PROFIBUS-DP Master

USR_INTF (User-Interface): DP administration

No	Task / Task state	Page
1	*PLC_TASK Common Variables*	*91*
2	*USR_INTF Task State*	*92*
3	*USR_INTF Running States*	*93*
4	*USR_INTF*	*93*
5	*USR_INTF Communication Error*	*94*
6	*USR_INTF Parameter Set List*	*95*
7	*USR_INTF Last Download Param*	*96*
8	*USR_INTF Disconnect Report*	*97*
9	*USR_INTF Diagnostic Report*	*98*
10	*USR_INTF DPV1 Data*	*99*
11	*FDL_TASK Task State*	*100*
12	*FDL_TASK Act. Bus* parameter	*101*
13	*FDL_TASK DDLM Requests Class 1*	*102*
14	*FDL_TASK DDLM Requests Class 2*	*103*
15	*FDL_TASK FDL Requests*	*104*
16	*FDL_TASK FMA Requests*	*105*
17	*FDL_TASK DP Retry for Slave*	*106*
18	*FDL_TASK DP Activated Slave*	*107*

Table 19: PROFIBUS-DP Master Task State

6.5.4.2 PROFIBUS-DP Slave

PLC_TASK

SPC3CTRL (SPC3 Control)

No	Task / Task state	Page	DPS
1	*PLC_TASK Variables*	*108*	X
2	*SPC3CTRL SPC3*	*109*	X
3	*SPC3CTRL Slave Config*	*110*	X
4	*SPC3CTRL Master Config*	*111*	X
5	*SPC3CTRL Param Data*	*112*	X
6	*SPC3CTRL DPM*	*113*	X
7	*SPC3CTRL DPV1 Class 1*	*114*	X
8	*SPC3CTRL DPV1 Class 2*	*116*	X
9	*SPC3CTRL Code Diagnostic*	*117*	X

Table 20: PROFIBUS-DP Slave Task State

6.6 PROFIBUS Services

6.6.1 Setting the Slave Address

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

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

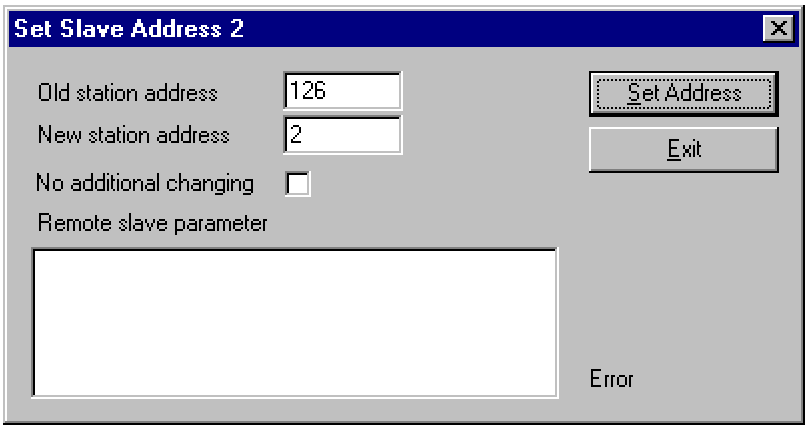


Figure 49: Online > Set Slave Address

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

7 File, Print, Edit and View

7.1 File

7.1.1 Open

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

7.1.2 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.

7.1.3 Close

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

7.2 Print

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

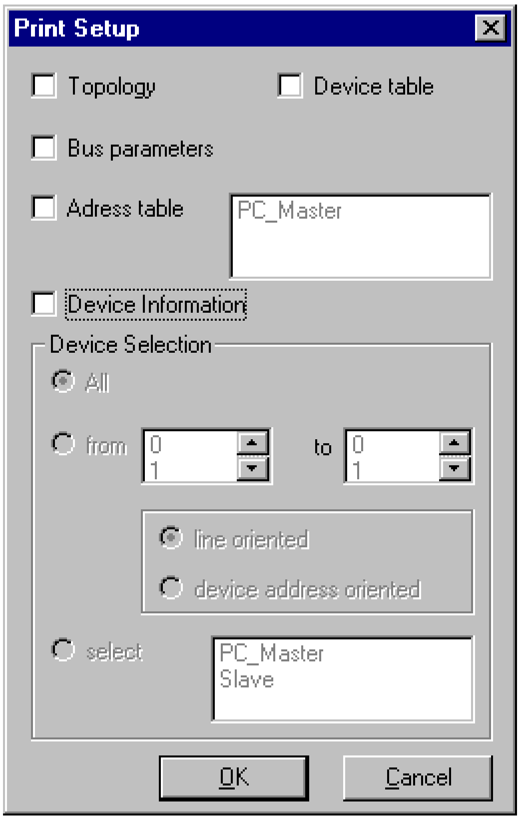


Figure 50: File > Print

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

Topology prints the topology of the bus system.

Bus parameters prints 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.

7.3 Edit

7.3.1 Cut, Copy and Paste (Master)

With the menus **Edit > Cut** and **Edit > Copy** you put the cut/copied Master with its settings and configuration (only not the description of the Master) in the Clipboard and with **Edit > Paste** it can be insert.

The difference between **Cut** and **Copy** is:

With the menu option **Edit > Cut** you move a Master from one point in the configuration to another. With the menu option **Edit > Copy** you duplicate an existing Master.

If you select **Edit > Cut** a security question appears.

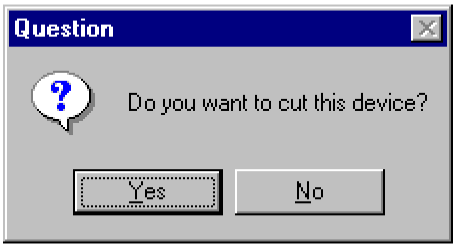


Figure 51: Security question cut device (Master)

If you answer this question with **Yes** the Master is cut and stays in the clipboard.

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

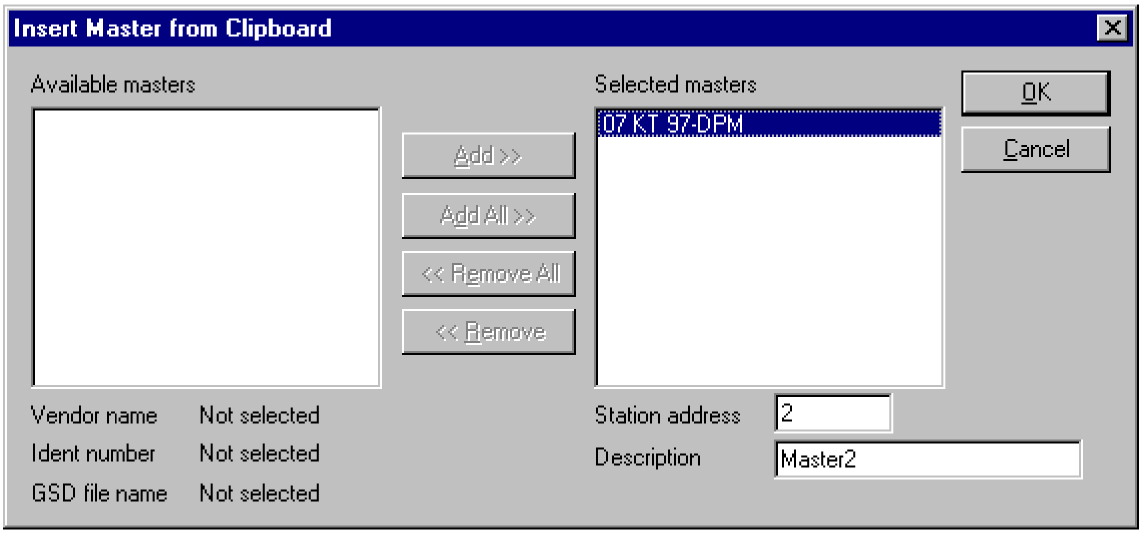


Figure 52: Insert a cut/copied Master

When you click on the **OK** button the Master will be insert in the configuration.

7.3.2 Cut, Copy and Paste (Slave)

With the menus **Edit > Cut** and **Edit > Copy** you put the cut/copied device with its settings and configuration (only not the description of the device) in the Clipboard and with **Edit > Paste** it can be insert.

The difference between **Cut** and **Copy** is:

With the menu option **Edit > Cut** you move a device from one point in the configuration to another. With the menu option **Edit > Copy** you duplicate an existing device.

If you select **Edit > Cut** a security question appears.

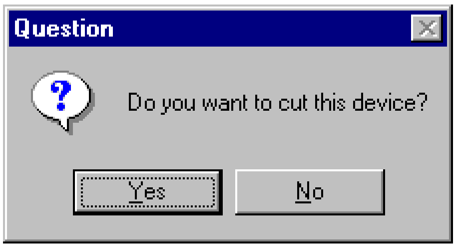


Figure 53: Security question cut device (Slave)

If you answer this question with **Yes** the device is cut and stays in the clipboard.

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

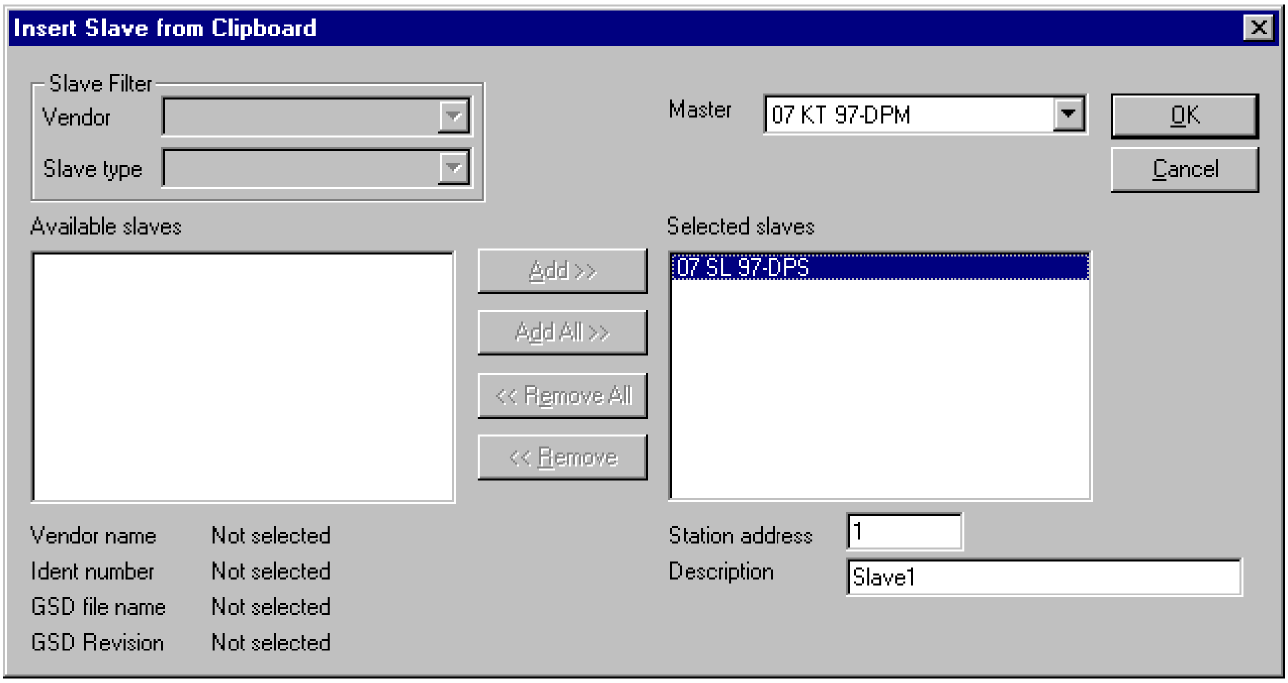


Figure 54: Insert a cut/copied device

When you click on the **OK** button the device will be insert in the configuration.

7.3.3 Delete

To delete a Master or Slave device you first have to mark this device and then select the menu **Edit > Delete**. Before FB 1131 deletes the Master or Slave a security question appears.

Figure 55: Security question delete device

Note: When you delete a device the settings and the configuration of this device get lost.

7.3.4 Replace

With the menu **Edit > Replace** a Master or Slave device can be replaced. How to replace the Master look in section *Replace Master* at page *20*. If you want to replace a Slave device look in section *Replace Slave* at page *28*.

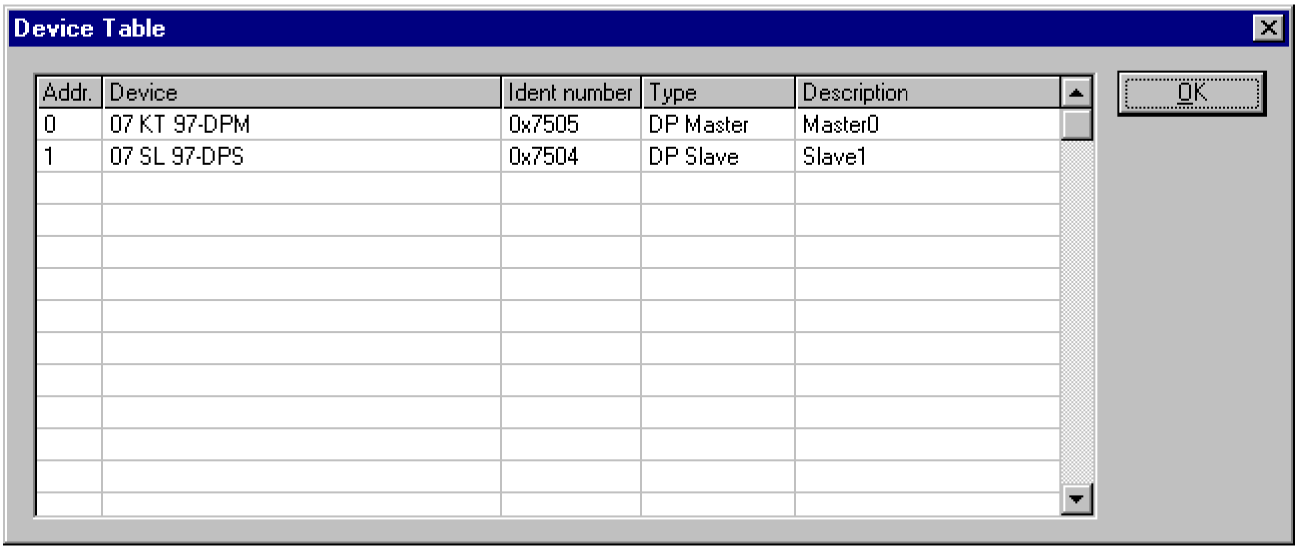
7.4 View of the Configuration

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

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

7.4.1 Device Table

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



Addr.	Device	Ident number	Type	Description
0	07 KT 97-DPM	0x7505	DP Master	Master0
1	07 SL 97-DPS	0x7504	DP Slave	Slave1

Figure 56: View > Device Table

7.4.2 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.

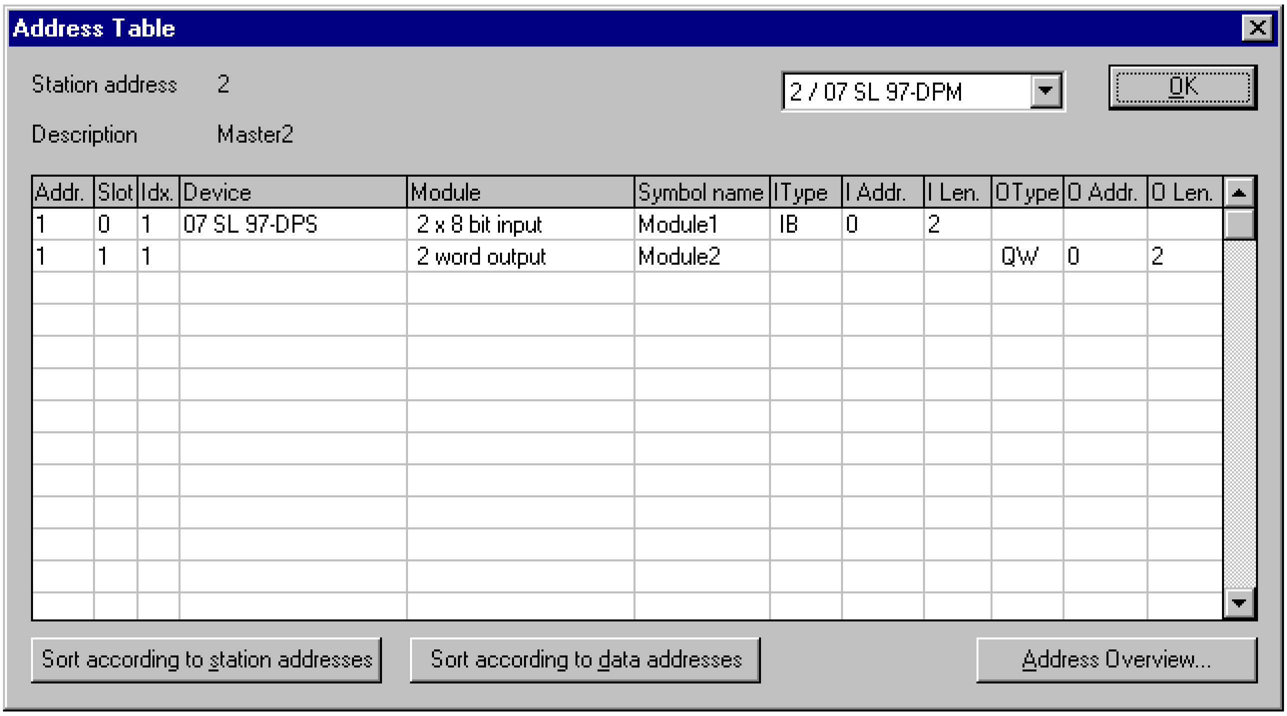


Figure 57: View > Address Table

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

7.4.2.1 Address Overview

Starting from **View > Address Table** and then **Address Overview** opens the window with the overview over the used addresses in the input process image and the output process image.

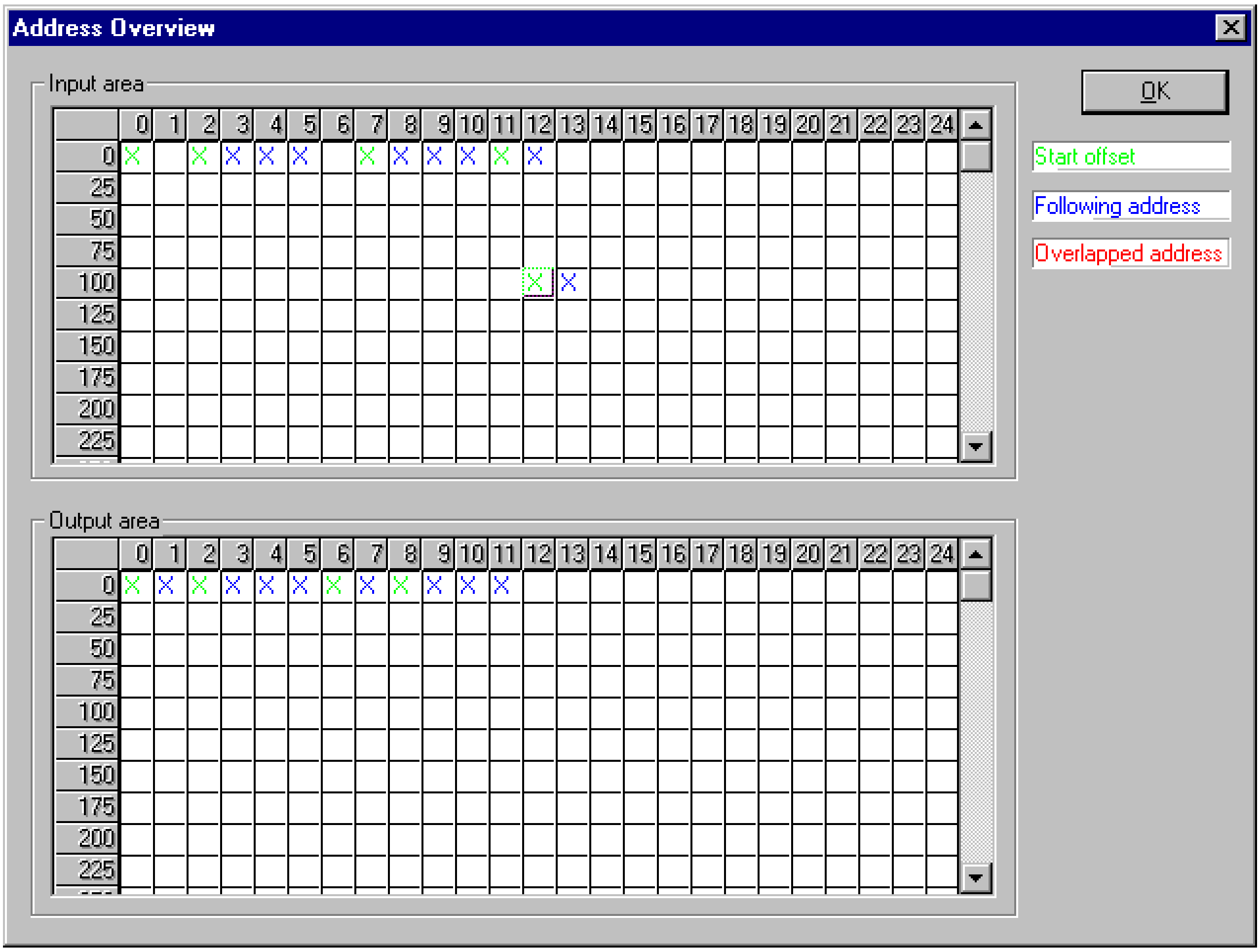


Figure 58: View > Address Table > Address Overview

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

The assignments can be changed here by making the auto addressing disabled. 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 a two- Byte modules.

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

7.4.2.2 Byteinformation Window

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

8 Tools

8.1 GSD Viewer

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

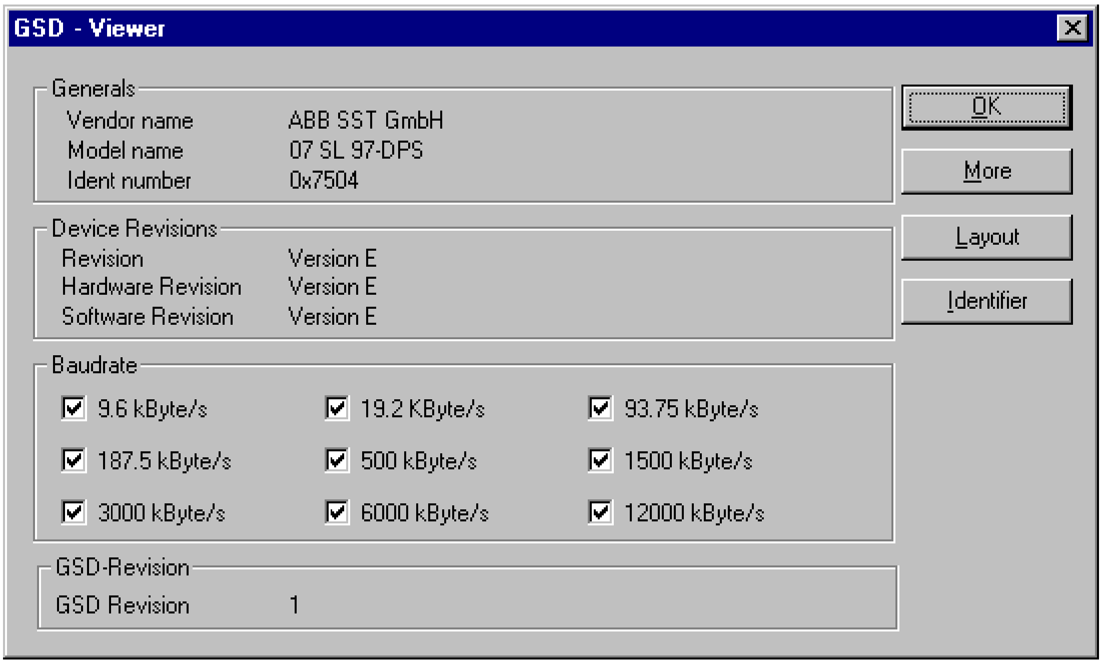


Figure 59: Tools > GSD Viewer

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.

9 Error Numbers

9.1 Possible Control Error Messages to FB1131 Telegrams

Error Number	Description
401	Driver error in the control
402	slot number is not supported by the hardware
403	no coupler at the given slot
404	control not in STOP
405	configuration data invalid
406	coupler still configured by 907 AC 1131-internal PROFIBUS Configurator
407	answer timeout of the coupler

Table 21: Possible Control Error Messages to FB1131 Telegrams

9.2 RCS Error Numbers (4 .. 93)

This is the list of error numbers returned by the RCS (Realtime Communication System), that is the operating system of ABB devices. The error number is returned in an answer message. Command messages and answer messages are used to communicate between the application (e.g. the Fieldbus Configurator) and the ABB device. An example of this communication is the download of a configuration.

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

Table 22: RCS error numbers (answer message) (4..39)

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

Table 23: RCS error numbers (answer message) (40..93)

9.3 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 24: Database Access Error Numbers (100..130)

9.4 Online Data Manager Error Numbers

9.4.1 Online Data Manager Error Numbers (1000 .. 1018)

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

Error Number	Description
1000	Driver OnlineDataManager not opened
1001	Initialization of the OnlineDataManager has failed
1002	No DriverObject found. OnlineDataManager Sub DLL not found.
1003	No 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 25: Online Data Manager Error numbers (1000..1018)

9.4.2 Message Handler Error Numbers (2010 .. 2027)

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

Error Number	Description
2010	Message handler: 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 FB 1131. **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 26: Error Numbers of the Message Handler of the Online Data Manager (2010..2027)

9.4.3 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 27: Error Numbers of the Driver Functions of the Online Data Manager (2501..2512)

9.4.4 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 28: Subfunction Error Numbers of the Driver Functions of the Online Data Manager (8001..8035)

9.5 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 29: 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 30: 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 31: 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 32: Error numbers of converting functions (4082..4199)

9.6 Converting Functions Error Numbers (5001 .. 5008)

The following table lists the error numbers of converting functions.

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

Table 33: Error Numbers of data base functions (5000 .. 5012)

10 Appendix

10.1 Extended Device Diagnostic Master

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

10.1.1 PLC_TASK Common Variables

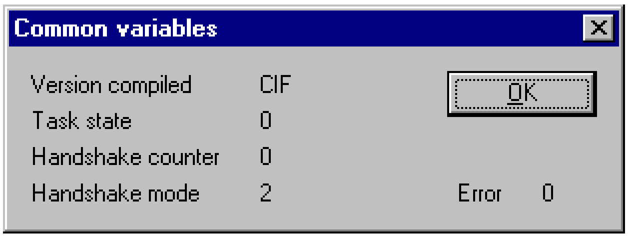


Figure 60: PLC_TASK Common Variables

Variable	Meaning
Version Compiled	Hardware
Task State	Task State
Handshake Counter	Counter for the performed process data handshakes
Handshake Mode	This value represents the actual handshake mode between application and CIF. 0 = Bus synchronous, Device Controlled 1 = Buffered, Device Controlled 2 = Uncontrolled 3 = Buffered, Host Controlled 4 = Bus synchronous, Host Controlled

Table 34: PLC_TASK Common Variables

10.1.2 USR_INTF Task State

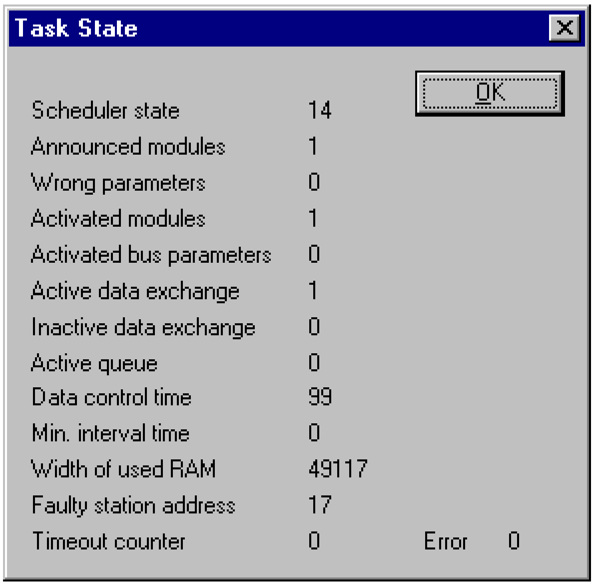


Figure 61: USR_INTF Task State

Variable	**Meaning**
Scheduler State	Status value of the Scheduler
Announced Modules	Number of configured Slaves
Wrong Parameters	Number of Slaves with faulty data sets
Activated Modules	Number of activated Slaves
Activated Bus Parameters	0 = Bus Parameter active, 255 = Bus Parameter inactive
Active Data Exchange	Current active Data_Exchange-Service
Inactive Data Exchange	Number of Stations with that no process data possible is
Active Queue	Number of stored Commands
Data Control Time	Counter of Data_Contol_Time
Min. Interval Time	Counter of min.Slave_Intervals
Width of used RAM	Number of used bytes in the upper RAM
Faulty Station Address	Station address of the faulty Station
Timeout Counter	Supervision counter that is activated when a short circuit was detected on the bus

Table 35: USR_INTF Task State

10.1.3 USR_INTF Running States

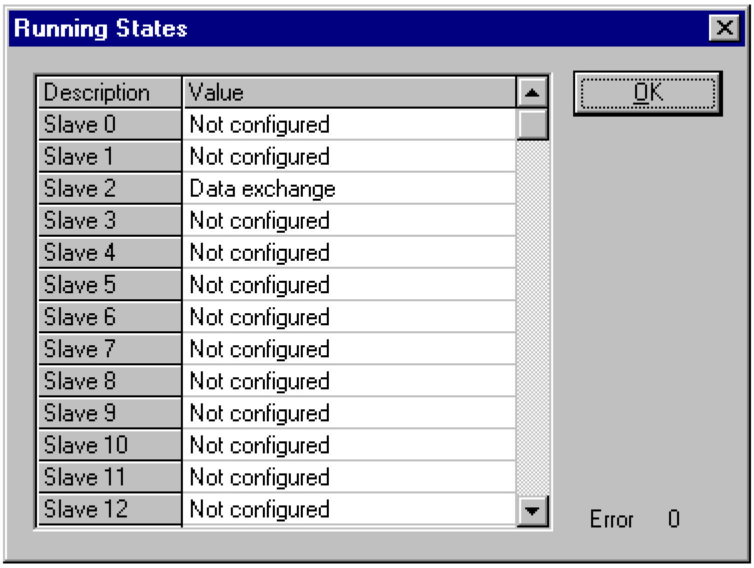


Figure 62: USR_INTF Running States

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

Table 36: USR_INTF Running States

10.1.4 USR_INTF Global State Field

See section *Global State Field* on page *62*.

10.1.5 USR_INTF Communication Error

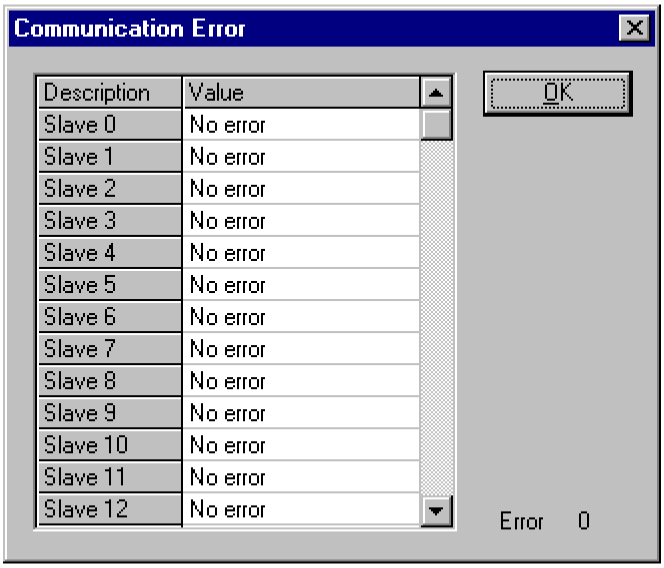


Figure 63: USR_INTF Communication Error

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

Table 37: USR_INTF Communication Error

10.1.6 USR_INTF Parameter Set List

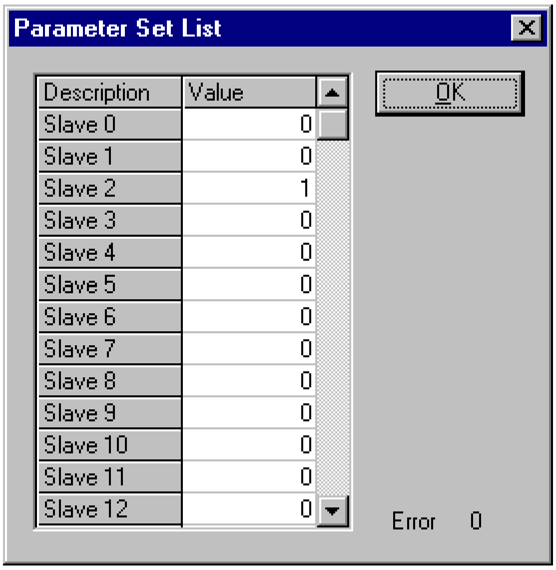


Figure 64: USR_INTF Parameter Set List

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

Table 38: USR_INTF Parameter Set List

10.1.7 USR_INTF Last Download Parameter

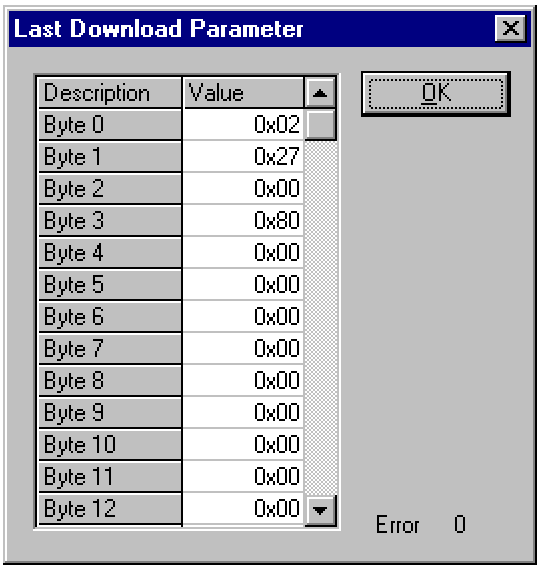


Figure 65: USR_INTF Last Download Parameter

Variable	Meaning
Byte 0 to 119	Last parameter data set

Table 39: USR_INTF Last Download Parameter

10.1.8 USR_INTF Disconnect Report

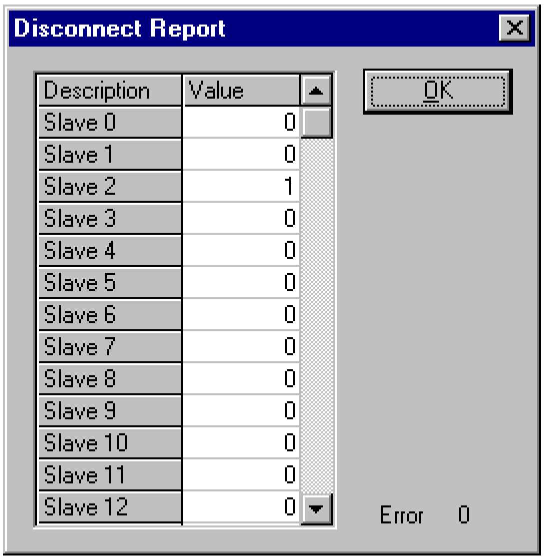


Figure 66: USR_INTF Disconnect Report

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

Table 40: USR_INTF Disconnect Report

The status table shows the number of communication break downs (disconnections) resulted by a bus communication errors for each Slave station. The counter is incremented only when the Master was communicating in the 'Data Exchange All' mode with all Slaves before. A hard error is when the max retries were reached (given by the max_retry_limit). See bus parameter max_retry_limit.

10.1.9 USR_INTF Diagnostic Report

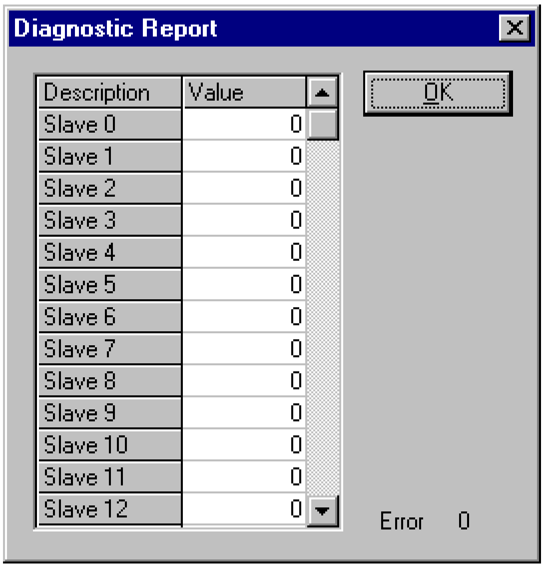


Figure 67: USR_INTF Diagnostic Report

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

Table 41: USR_INTF Diagnostic Report

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

10.1.10 USR_INTF DPV1 Data

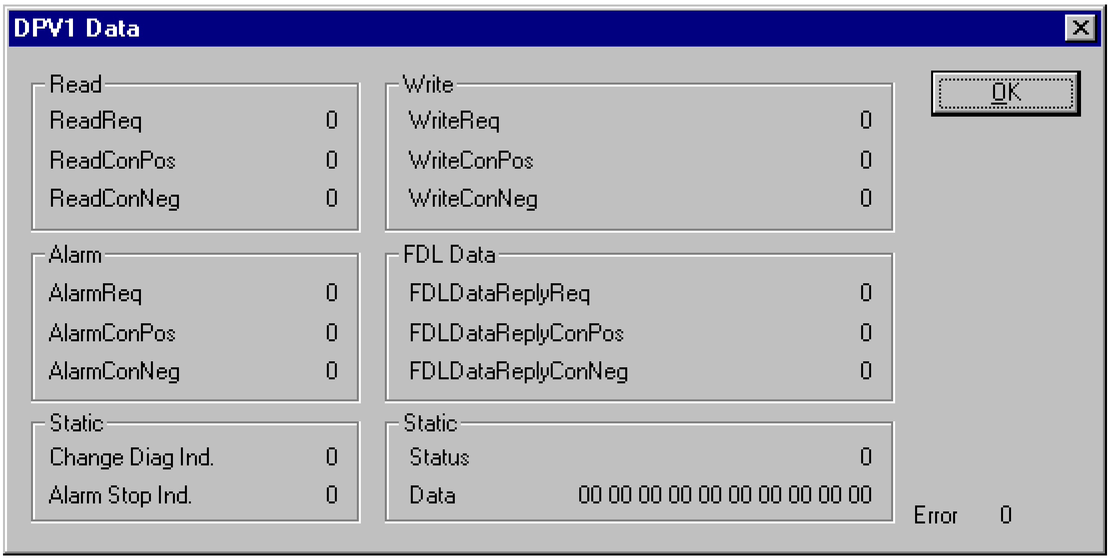


Figure 68: USR_INTF DPV1 Data

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

Table 42: USR_INTF DPV1 Data

10.1.11 FDL_TASK Task State

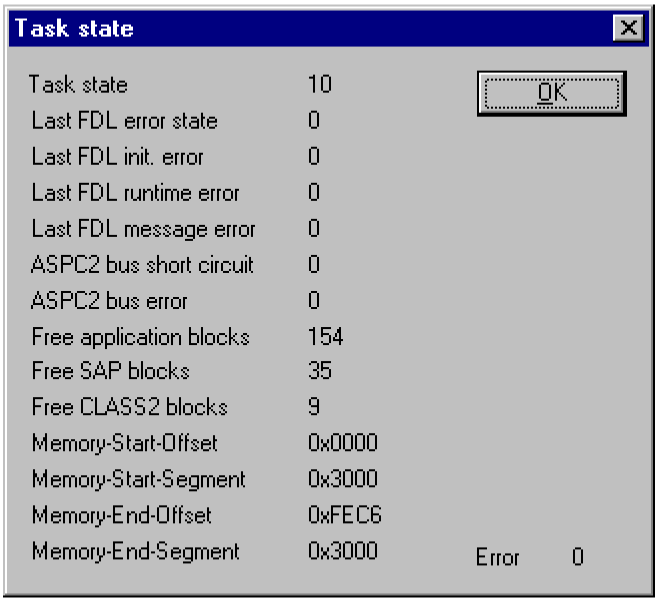


Figure 69: FDL_TASK Task State

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

Table 43: FDL_TASK Task State

10.1.12 FDL_TASK Act. Bus parameter

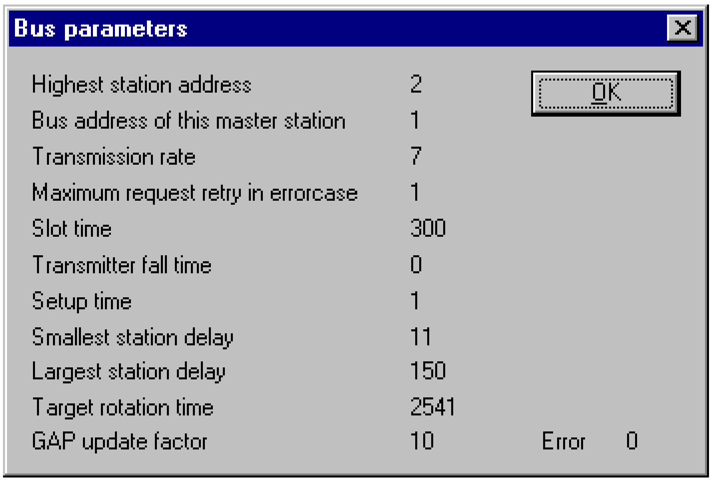


Figure 70: FDL_TASK Act. Bus parameter

Display of the bus parameters

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

Table 44: FDL_TASK Act. Bus parameter

10.1.13 FDL_TASK DDLM Requests Class 1

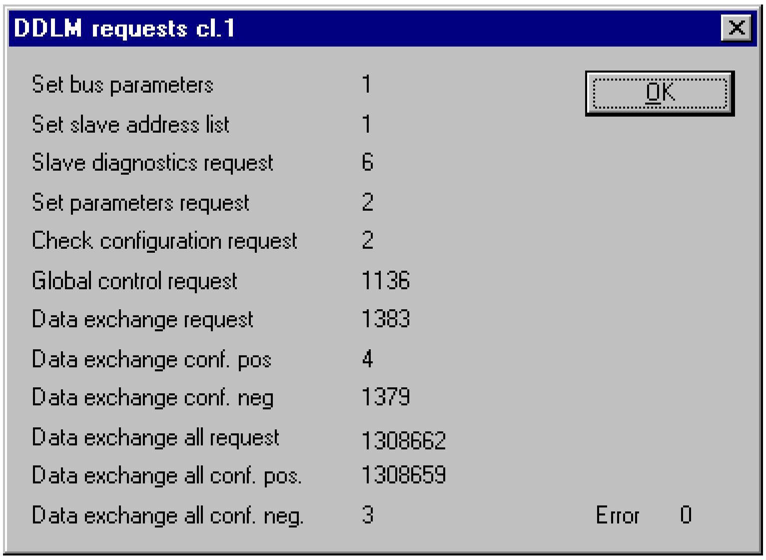


Figure 71: FDL_TASK DDLM Requests Class 1

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

Table 45: FDL_TASK DDLM Requests Class 1

Services which were send continued to the according to the PROFIBUS-DP standard are counted in this table. Fundamental only the 'data-exchange-all' should be count in a faultless network. The services 'set-slave-list', 'set-prm', 'chk-cfg', 'data-exchange' permits in case of faultless course for each configured Slave module to be activated only one time. If the count changes continuously in case of this services, a bus error has occurred. If for example the service 'slave-diag' changes sporadically the bus cable can have an defect or the terminating resistor is missing in the cable. It is also possible that a conscious error report of a Slave module that activates the service in the Master.

10.1.14 FDL_TASK DDLM Requests Class 2

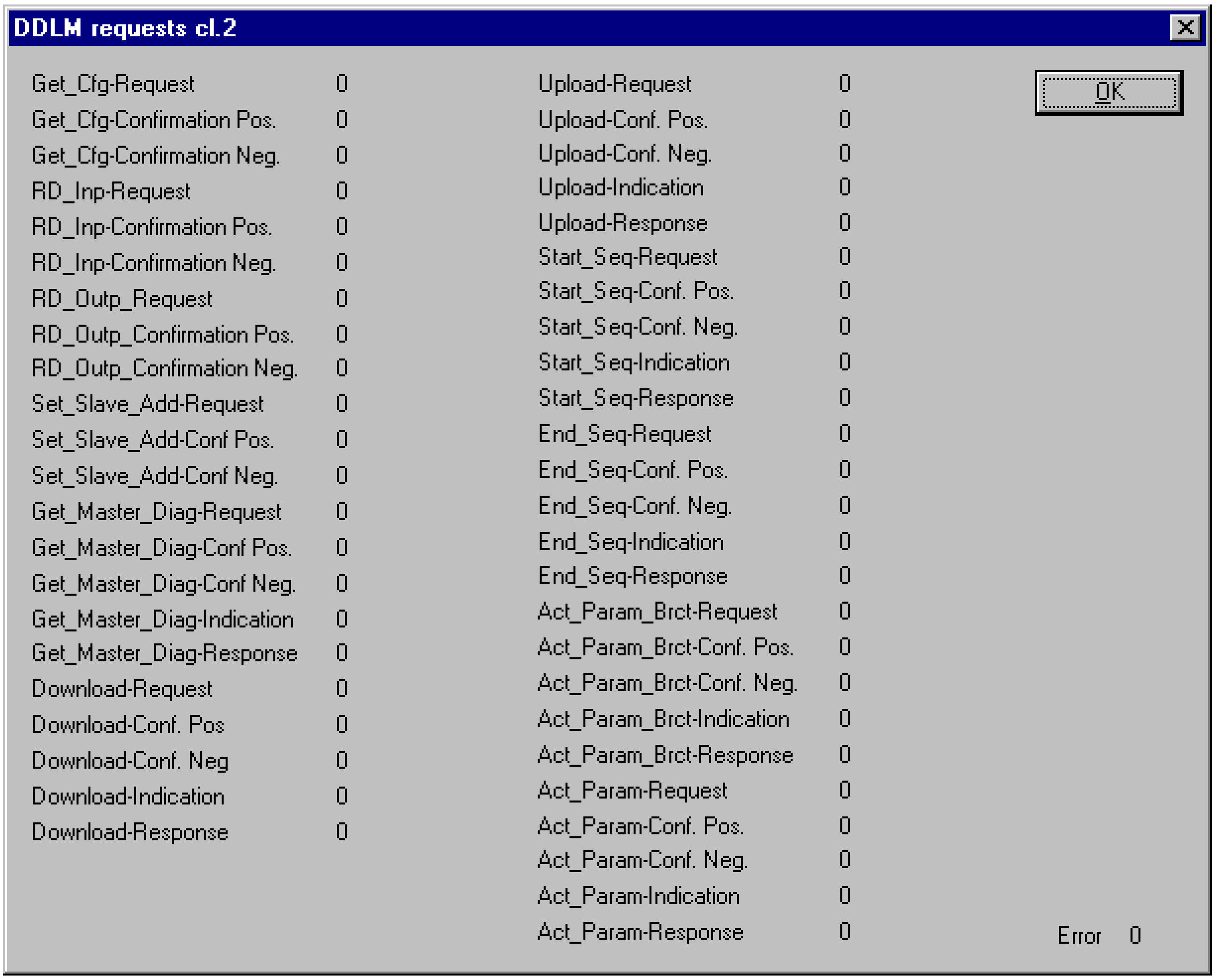


Figure 72: FDL_TASK DDLM Requests Class 2

Variable	Meaning
Service/Function	Counter for this Service/Function

Table 46: FDL_TASK DDLM Requests Class 2

10.1.15 FDL_TASK FDL Requests

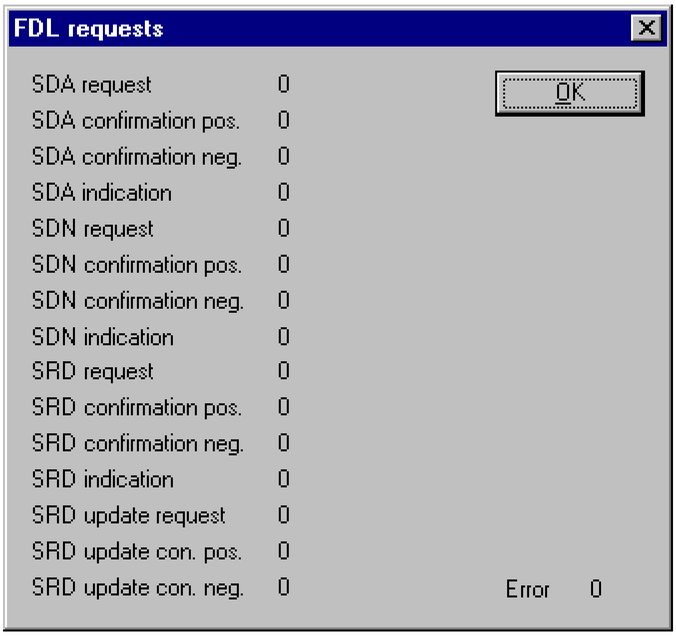


Figure 73: FDL_TASK FDL Requests

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

Table 47: FDL_TASK FDL Requests

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

Not all services/functions are supported by the firmware.

10.1.16 FDL_TASK FMA Requests

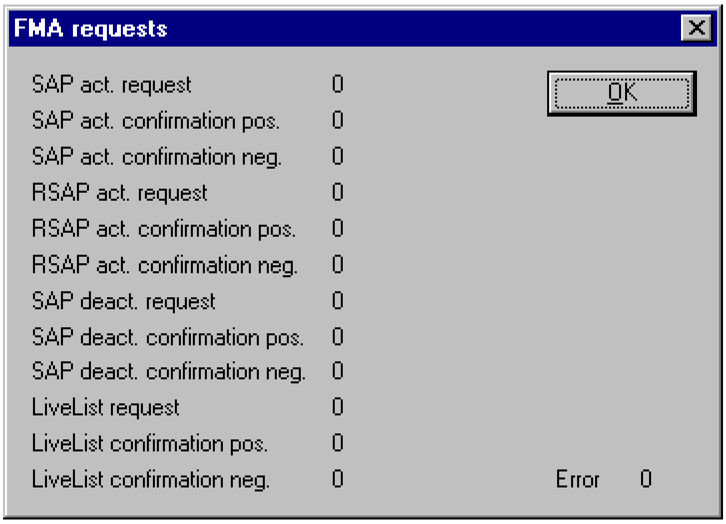


Figure 74: FDL_TASK FMA Requests

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

Table 48: FDL_TASK FMA Requests

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

Not all services/functions are supported by the firmware.

10.1.17 FDL_TASK DP Retry for Slave

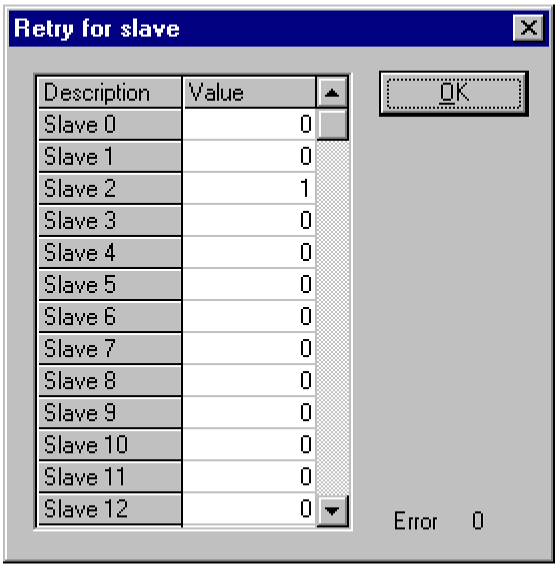


Figure 75: FDL_TASK DP Retry for Slave

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

Table 49: FDL_TASK DP Retry for Slave

If based on an bus error a telegram to a Slave is repeated this is counted in this window. The single count of retries per telegram can’t be read out here.

10.1.18 FDL_TASK DP Activated Slave

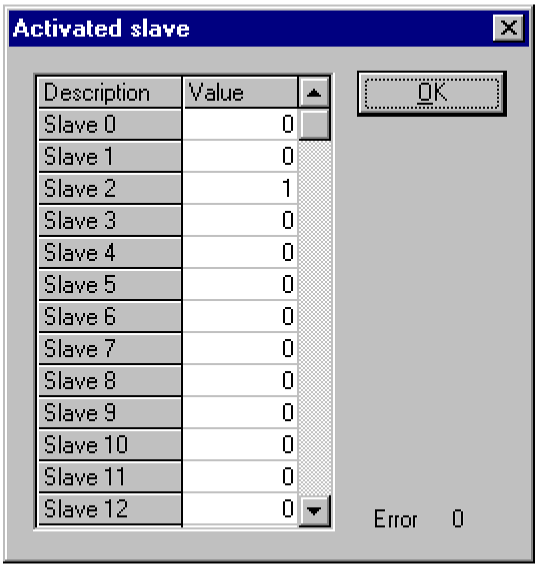


Figure 76: FDL_TASK DP Activated Slave

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

Table 50: FDL_TASK DP Activated Slave

10.2 Extended Device Diagnostic DP Slave

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

10.2.1 PLC_TASK Variables

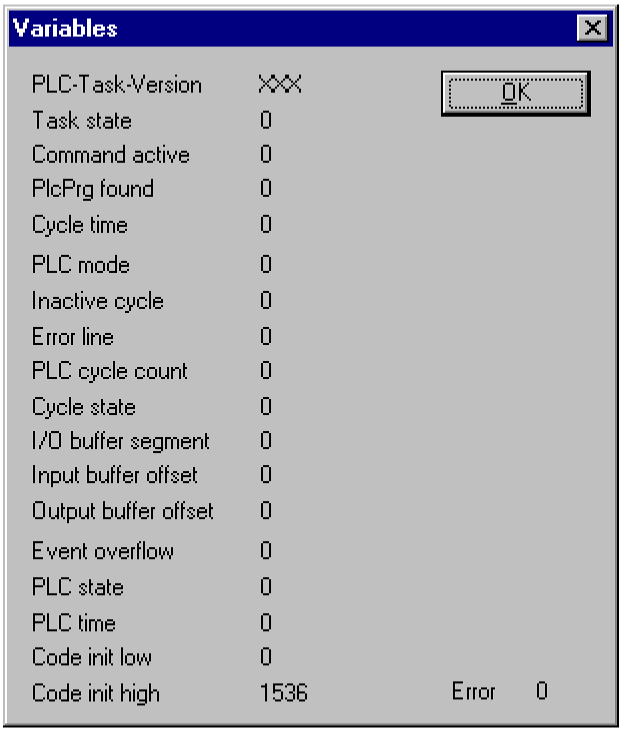


Figure 77: PLC_TASK Variables (Slave)

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

10.2.2 SPC3CTRL SPC3

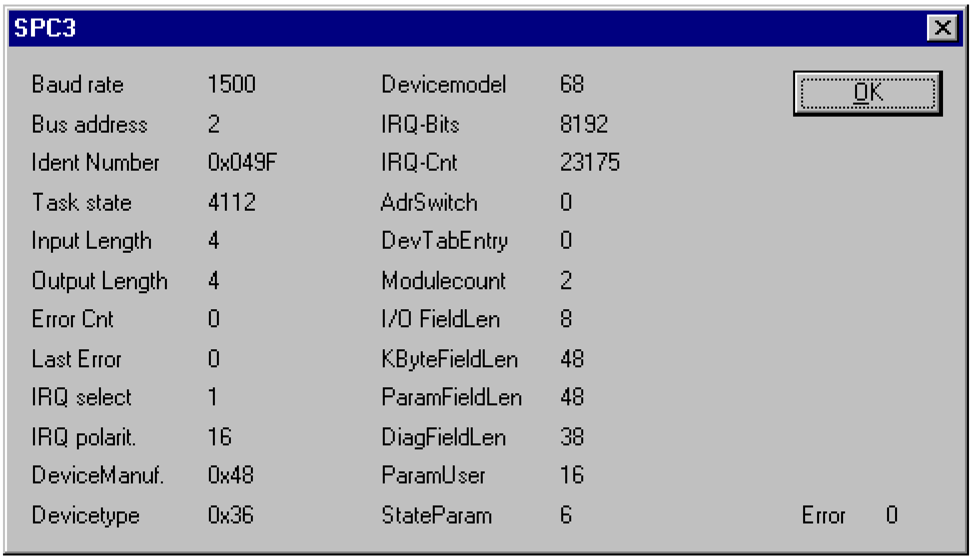


Figure 78: PLC_TASK Variables

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

Table 51: PLC_TASK Variables

10.2.3 SPC3CTRL Slave Config

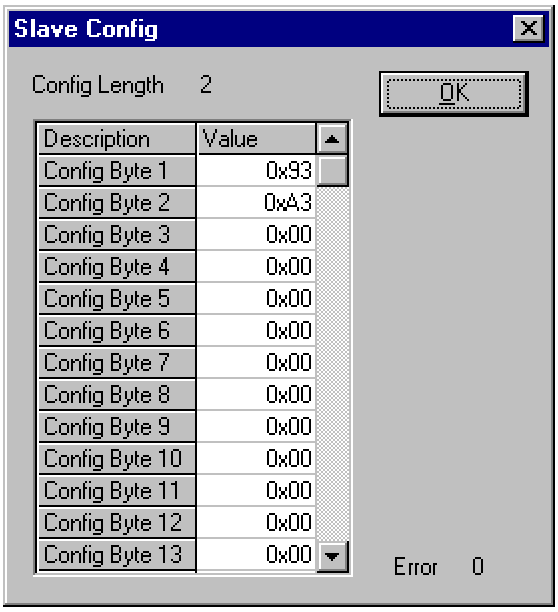


Figure 79: SPC3CTRL Slave Config

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

Table 52: SPC3CTRL Slave Config

10.2.4 SPC3CTRL Master Config

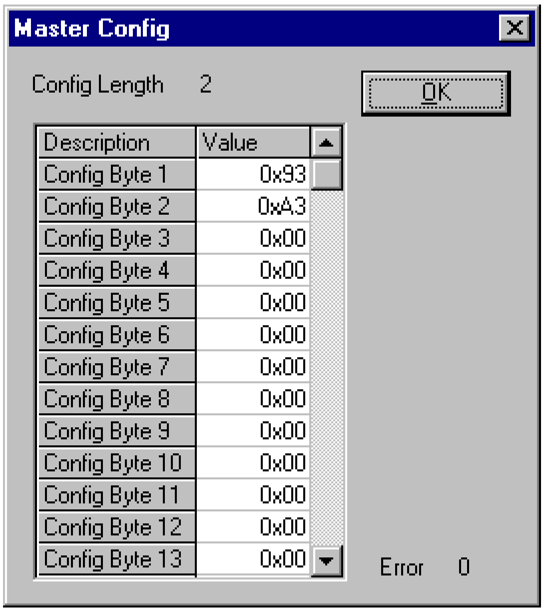


Figure 80: SPC3CTRL Master Config

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

Table 53: SPC3CTRL Master Config

10.2.5 SPC3CTRL Param Data

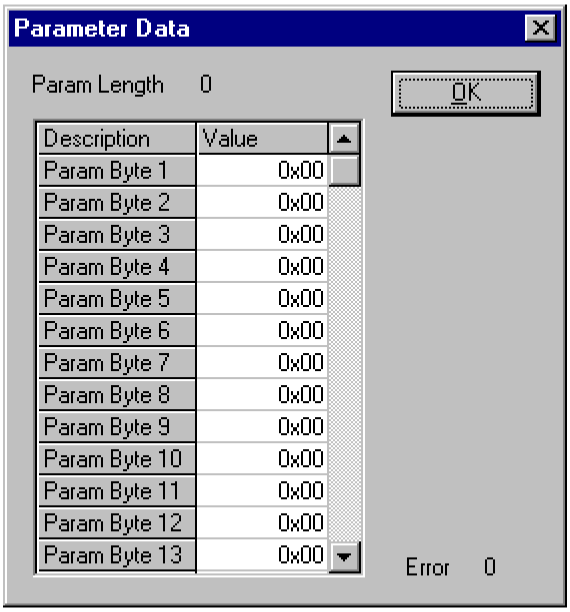


Figure 81: SPC3CTRL Param Data

Variable	**Meaning**
Param Length	Length of the User-Param-Data send by the Master
Param Byte	User-Param-Data-Byte 1
...	...

Table 54: SPC3CTRL Param Data

The standard Parameter data bytes are not displayed.

10.2.6 SPC3CTRL DPM

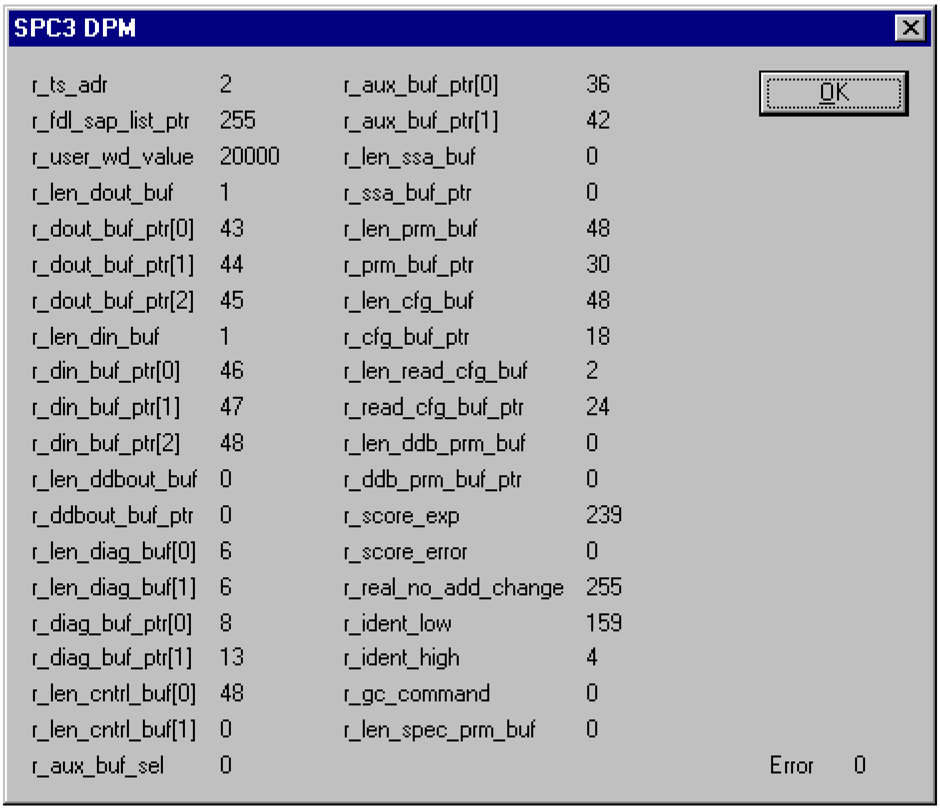


Figure 82: SPC3CTRL DPM

Display of the internal variables of the SPC3 PROFIBUS ASIC.

10.2.7 SPC3CTRL DPV1 Class 1

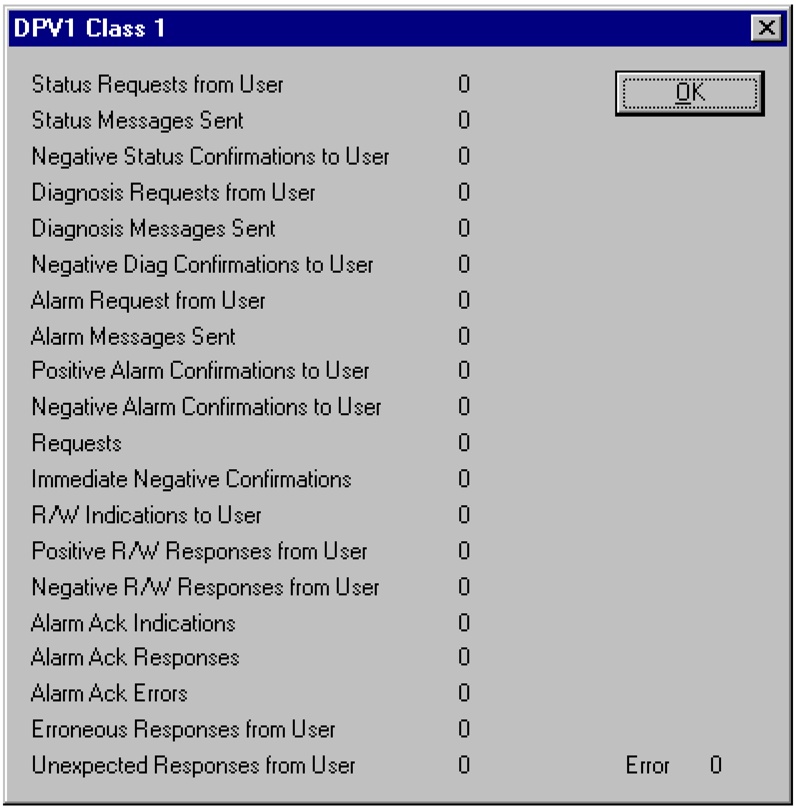


Figure 83: SPC3CTRL DPV1 Class 1

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

Table 55: SPC3CTRL DPV1 Class 1

10.2.8 SPC3CTRL DPV1 Class 2

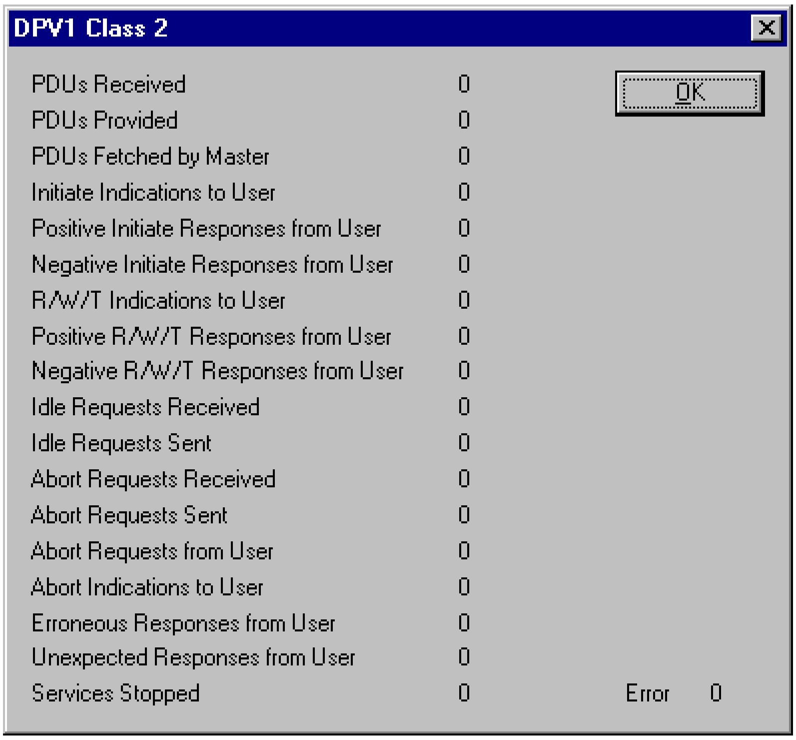


Figure 84: SPC3CTRL DPV1 Class 2

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

Table 56: SPC3CTRL DPV1 Class 2

10.2.9 SPC3CTRL Code Diagnostic

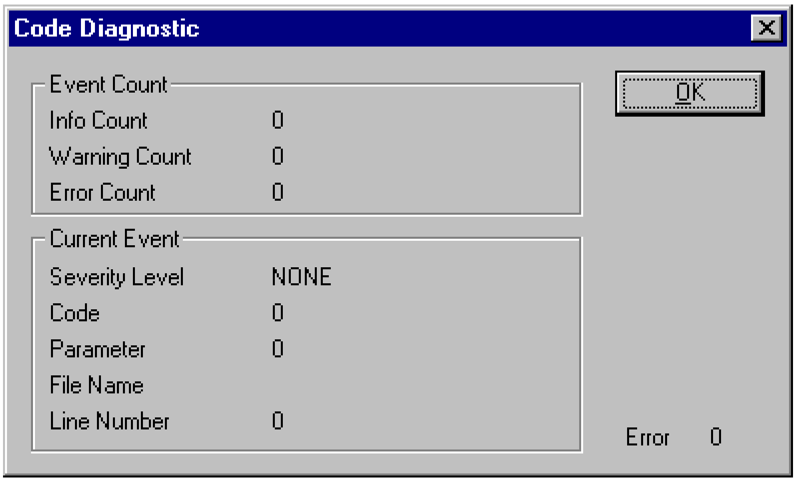


Figure 85: SPC3CTRL Code Diagnostic

Display for state and error reports from the firmware.

10.3 Identifier Bytes

In the configuration telegram identifier bytes are used. The meaning of them is specified in the PROFIBUS specification.

The following table is an overview.

	Value		Meaning			
GIF/SIF	0x00	00	free place			
	0x01-0x0F	01-15	see SIF			
GIF	0x10-0x1F	16-31	1-16	Byte	Input	Consistency over Byte
GIF	0x20-0x2F	32-47	1-16	Byte	Output	Consistency over Byte
GIF	0x30-0x3F	48-63	1-16	Byte	Input/Output	Consistency over Byte
	0x40-0x4F	64-79	see SIF			
GIF	0x50-0x5F	80-95	1-16	Word	Input	Consistency over Word
GIF	0x60-0x6F	96-111	1-16	Word	Output	Consistency over Word
GIF	0x70-0x7F	112-127	1-16	Word		Consistency over Word
	0x80-0x8F	128-143	see SIF			
GIF	0x90-0x9F	144-159	1-16	Byte	Input	Consistency over whole length
GIF	0xA0-0xAF	160-175	1-16	Byte	Output	Consistency over whole length
GIF	0xB0-0xBF	176-191	1-16	Byte		Consistency over whole length
	0xC0-0xCF	192-207	see SIF			
GIF	0xD0-0xDF	208-223	1-16	Word	Input	Consistency over whole length
GIF	0xE0-0xEF	224-239	1-16	Word	Output	Consistency over whole length
GIF	0xF0-0xFF	240-255	1-16	Word		Consistency over whole length

Table 57: Identifier bytes (overview)

10.3.1 Identifier Bytes (General Identifier Format GIF)

For the identifier bytes in general identifier format the following table shows the meaning.

MSB							**LSB**	
7	6	5	4	3	2	1	0	**Meaning**
								Bit 3 to 0: Length 0000 = 1 Byte or 1 Word 0001 = 2 Byte or 2 Word ... 1111 = 16 Byte or 16 Word
								Bit 5 and 4: Input/Output 00 = special identifier format (SIF) 01 = Input 10 = Output 11 = Input and Output
								Bit 6: Format 0 = Byte 1 = Word
								Bit 7: Consistency over 0 = Byte or Word 1 = whole length

Figure 86: Identifier Bytes (General Identifier Byte Format GIF)

	Value		Meaning			
GIF/SIF	0x00	00	Free place			
SIF	0x01 – 0x0F		see SIF			
GIF	0x10	16	1	Byte	Input	Consistency over Byte
GIF	0x11	17	2	Byte	Input	Consistency over Byte
GIF	...	...	...	Byte	Input	Consistency over Byte
GIF	0x1F	31	16	Byte	Input	Consistency over Byte
GIF	0x20	32	1	Byte	Output	Consistency over Byte
GIF	0x21	33	2	Byte	Output	Consistency over Byte
GIF	...	...	...	Byte	Output	Consistency over Byte
GIF	0x2F	47	16	Byte	Output	Consistency over Byte
GIF	0x30	48	1	Byte	Input/Output	Consistency over Byte
GIF	0x31	49	2	Byte	Input/Output	Consistency over Byte
GIF	...	...	...	Byte	Input/Output	Consistency over Byte
GIF	0x3F	63	16	Byte	Input/Output	Consistency over Byte
SIF	0x40 – 0x4F		see SIF			
GIF	0x50	80	1	Word	Input	Consistency over Word
GIF	0x51	81	2	Word	Input	Consistency over Word
GIF	...	...	...	Word	Input	Consistency over Word
GIF	0x5F	95	16	Word	Input	Consistency over Word
GIF	0x60	96	1	Word	Output	Consistency over Word
GIF	0x61	97	2	Word	Output	Consistency over Word
GIF	...	...	...	Word	Output	Consistency over Word
GIF	0x6F	111	16	Word	Output	Consistency over Word
GIF	0x70	112	1	Word	Input/Output	Consistency over Word
GIF	0x71	113	2	Word	Input/Output	Consistency over Word
GIF	...	...	...	Word	Input/Output	Consistency over Word
GIF	0x7F	127	16	Word	Input/Output	Consistency over Word
SIF	0x80 – 0x8F		see SIF			
GIF	0x90	144	1	Byte	Input	Consistency over whole length
GIF	0x91	145	2	Byte	Input	Consistency over whole length
GIF	...	...	...	Byte	Input	Consistency over whole length
GIF	0x9F	159	16	Byte	Input	Consistency over whole length

Table 58: Identifier Bytes 0x10 .. 0x3F, 0x50 .. 0x7F, 0x90 .. 0x9F (GIF)

	Value		Meaning			
GIF	0xA0	160	1	Byte	Output	Consistency over whole length
GIF	0xA1	161	2	Byte	Output	Consistency over whole length
GIF	...	...	...	Byte	Output	Consistency over whole length
GIF	0xAF	175	16	Byte	Output	Consistency over whole length
GIF	0xB0	176	1	Byte	Input/Output	Consistency over whole length
GIF	0xB1	177	2	Byte	Input/Output	Consistency over whole length
GIF	...	...	...	Byte	Input/Output	Consistency over whole length
GIF	0xBF	191	16	Byte	Input/Output	Consistency over whole length
SIF	0xC0 – 0xCF		see SIF			
GIF	0xD0	208	1	Word	Input	Consistency over whole length
GIF	0xD1	209	2	Word	Input	Consistency over whole length
GIF	...	...	...	Word	Input	Consistency over whole length
GIF	0xDF	223	16	Word	Input	Consistency over whole length
GIF	0xE0	224	1	Word	Output	Consistency over whole length
GIF	0xE1	225	2	Word	Output	Consistency over whole length
GIF	...	...	...	Word	Output	Consistency over whole length
GIF	0xEF	239	16	Word	Output	Consistency over whole length
GIF	0xF0	240	1	Word	Input/Output	Consistency over whole length
GIF	0xF1	241	2	Word	Input/Output	Consistency over whole length
GIF	...	...	...	Word	Input/Output	Consistency over whole length
GIF	0xFF	255	16	Word	Input/Output	Consistency over whole length

Table 59: Identifier Bytes 0xA0 .. 0xBF, 0xD0 .. 0xFF (GIF)

10.3.2 Special Identifier Byte Format (SIF)

The special identifier byte format (SIF) is an extension of the general identifier byte format and offers more flexibility. Also manufacturer specific information can be used with it.

MSB							**LSB**	**Meaning**
7	6	5	4	3	2	1	0	
								Bit 0 to 3: Length of manufacturer specific data according to the length byte for In- and/or Output In case of DDLM_Chk_Cfg: 0000 = no manufacturer specific data follow 0001 = 1 manufacturer specific data follow ... 1110 = 14 manufacturer specific data follow 1111 = no manufacturer specific data follow In case of DDLM_Get_Cfg: 0000 = no manufacturer specific data follow 0001 = 1 manufacturer specific data follow ... 1110 = 14 manufacturer specific data follow 1111= not allowed
								Bit 5 and 4: solid 00 = solid
								Bit 7 and 6: Input/Output 00 = free place 01 = a length byte for Input follows 10 = a length byte for Output follows 11 = a length byte for Input and Output follows

Figure 87: Special Identifier Format (SIF)

Length Byte

MSB							**LSB**	**Meaning**
7	6	5	4	3	2	1	0	
								Bit 0 to 5: Length 000000 = 1 Byte or 1 Word 000001 = 2 Byte or 2 Word ... 111111 = 64 Byte or 64 Word
								Bit 6: Format 0 = Byte 1 = Word
								Bit 7: Consistency over 0 = Byte or Word (element) 1 = whole length

Table 60:Length Byte of the SIF

	Value		Meaning
GIF/SIF	0x00	00	free place
GIF	0x01 – 0x0E	01 – 14	free place and 1-14 manufacturer specific data
GIF	0x0F	15	free place and no manufacturer specific data
GIF	0x40	64	1 length byte Input
GIF	0x41 – 0x4E	65 – 78	1 length byte Input and 1-14 manufacturer specific data
GIF	0x4F	79	1 length byte Input and no manufacturer specific data
GIF	0x80	128	1 length byte Output
GIF	0x81 – 0x8E	129 – 142	1 length byte Output 1 and 1-14 manufacturer specific data
GIF	0x8F	143	1 length byte Output 1 and no manufacturer specific data
GIF	0xC0	192	1 length byte Output and 1 length byte Input
GIF	0xC1 – 0xCE	193 – 206	1 length byte Output, 1 length Input byte and 1-14 manufacturer specific data
GIF	0xCF	207	1 length byte Output, 1 length Input byte and no manufacturer specific data

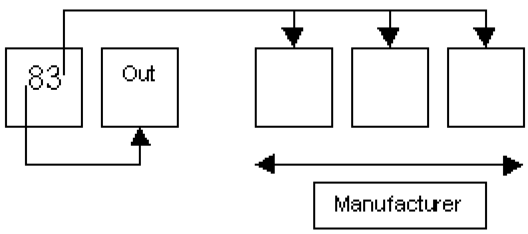
Table 61: Special Identifier bytes 0x01 .. 0x0F, 0x40 .. 0x4F, 0x80 .. 0x8F, 0xC0 .. 0xCF (SIF)

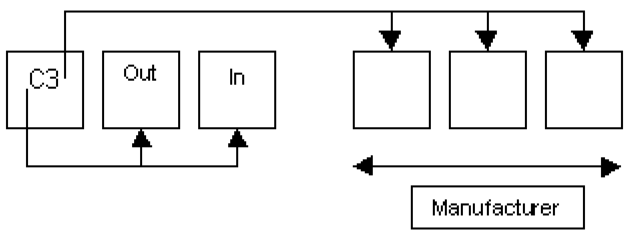
Length Byte

Value		Meaning		
0x00 – 0x3F	00-63	1-64	Byte	Consistency over Byte
0x40 – 0x7F	64-127	1-64	Word	Consistency over Word
0x80 – 0xBF	129-191	1-64	Byte	Consistency over whole length
0xC0 – 0xFF	193-255	1-64	Word	Consistency over whole length

Table 62: Length byte of the special identifiers (SIF)

Example for SIF:





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Operating Instuction Manual

907 FB 1131

Fieldbus Configurator DeviceNet

DeviceNet

Edition: 6

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4	31.08.01	2.661 DevNet.DLL 2.638 FB 1131.EXE	all	Revised, further overview tables, Diagnostic functions, Use Data Transfer
5	17.01.02	2.661 DevNet.DLL 2.638 FB 1131.EXE	6.5.5.1	Change MAC-ID
6	25.11.02	2.661 DevNet.DLL 2.6383 FB1131.exe	2	revised

Although this program has been developed with great care and intensively tested, ABB Stotz-Kontakt GmbH cannot guarantee the suitability of this program for any purpose not confirmed by us in writing.

Guarantee claims shall be limited to the right to require rectification. Liability for any damages which may have arisen from the use of this program or its documentation shall be limited to cases of intent.

We reserve the right to modify our products and their specifications at any time in as far as this contributes to technical progress. The version of the manual supplied with the program applies.

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1 Overview FB 1131

1.1 Main Functions

The main functions of the DeviceNet Fieldbus Configurator are:

Function	**Section**	**Short Description**
Configuration	*Overview Communication Types*	Overview communication types and description of the configuration steps
	Automatic Network Scan	Scans the network
Diagnostic	*Diagnostic Functions*	Diagnostic functions, Debugger, Global State Field etc.
	Use Data Transfer	I/O Monitor, I/O Watch, Get/Set Attribute, Message Monitor
Documentation	*Project Information*	Set the project information
	Print	Print out the configuration

Table 1: FB 1131 Main Functions

1.2 Properties

FB 1131 is an universal Fieldbus Configurator

This means you can configure the most important fieldbus systems like PROFIBUS, DeviceNet, and InterBus with the same tool.

FB 1131 is a global Fieldbus Configurator

You configure all devices with one tool. FB 1131 checks the dependencies between the devices. FB 1131 only allows configurations that make sense. In case of doubt FB 1131 will give you a warning.

FB 1131 documents your Fieldbus system

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

FB 1131 uses standardized configuration files

Some protocols support standardized files containing information about all features and limitations of the Slave device. FB 1131 uses these files for the configuration.

FB 1131 is a diagnostic tool

After the configuration you can switch FB 1131 into the diagnostic mode. You can watch all status information of the couplers, see protocol dependent diagnostic information. In this case a Slave is not operating correctly will be displayed in a different colour.

2 Installation and Licensing

2.1 System Requirements

- PC with 486-, Pentium processor or higher
- Windows 95/98/ME, Windows NT 4.0, Windows 2000
- Free disk space: 30 - 80 MByte
- CD ROM drive
- RAM: min. 16 MByte
- Graphic resolution: min. 800 x 600 pixel
- Windows 95: Service Pack 1
- Windows NT: Service Pack 3
- Keyboard and Mouse

2.2 Software Installation

Close all application programs on the system!

Insert the 907 AC 1131 CD in the local CD ROM drive. If "Autorun" is enabled on the PC the CD menu will start automatically. Otherwise it is started by starting the file "CD_Menu_Vxx.exe" in the root directory of the CD. For example by the menu **Start > Run** and entering "[X:]\CD_Menu_Vxx.exe" ([X] is the CD rom drive and Vxx stands for the version number).

You reach the Installation menu of the CD by operating the **Installation 907 AC 1131 Vxx** button.

With the menu Notes for Installation you get a description of the innstallation and the components of the 907 AC 1131, the programming software, the Fieldbus Configurator 907 FB 1131, OPC Server.

Note: Administrator privileges are required on Windows NT/2000/XP systems for installation of the Fieldbus Configurator 907 FB 1131!

3 Getting Started – Configuration Steps

3.1 Overview Communication Types

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

Communication	**Device**	**Device**	**Described in section**	**Page**
DeviceNet	DeviceNet Master	Any DeviceNet Device	*Configuration DeviceNet Master to any DeviceNet Slave*	*12*

Table 2: Overview Communication Types

3.2 Configuration DeviceNet Master to any DeviceNet Slave

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

#	Action	Menu in the Fieldbus Configurator	Detail information in section	Page
1	Create a new project	**File > New > DeviceNet**	*Configuration of DeviceNet with FB 1131*	*13*
2	Copy EDS file of the DeviceNet device (Slave), if the device is not in the selection list	**File > Copy EDS**	*EDS Files (Electronic Data Sheet Files)*	*13*
3	Choose DeviceNet Master and provide MAC ID address	**Insert > Master**	*Insert Master*	*15*
4	Choose DeviceNet device and provide MAC ID address	**Insert > Device**	*Insert DeviceNet Slave*	*17*
5	Assign the input and output modules	Mark the Device (left Mouse click), then **Settings > Device Configuration**	*Device Configuration*	*19*
6	Assign the offset addresses			
7	Assign the Device Parameter data, if the Device needs Parameter data	Mark the Device (left Mouse click), then **Settings > Device Configuration > Parameter Data**	*Parameter Data*	*22*
8	Set the Bus parameter	Mark the Master (left Mouse click), then **Settings > Bus Parameters**	*Bus Parameters*	*28*
9	Set device assignment if no automatic assignment has occurred	Mark the Master (left Mouse click), then **Settings > Device Assignment**	*Gateway Driver*	*27*
10	Save project	**File > Save**	*Save and Save As*	*47*
11	Download	Mark the Master (left Mouse click), then **Online > Download**	*Downloading the Configuration*	*31*
12	Live list	Mark the Master (left Mouse click), then **Online > Live List**	*Live List*	*37*
13	Start Debugger	Mark the Master (left Mouse click), then **Online > Start Debug Mode**	*Debug Mode (DeviceNet)*	*39*
14	Device diagnostic	Mark the Slave (left Mouse click), then **Online > Device Diagnostic**	*Device Diagnostic*	*40*
15	Stop Debugger	**Online > Stop Debug Mode**	*Debug Mode (DeviceNet)*	*39*
16	Global Diagnostic	Mark the Master (left Mouse click), then **Online > Global State Field**	*Global State Field*	*41*

Table 3: Steps for Configuration DeviceNet Master to any DeviceNet Slave

4 Configuration of DeviceNet with FB 1131

4.1 Setting up the DeviceNet Configuration

To create a new configuration, choose the **File > New** menu. This will offer a selection list of fieldbus systems. Choose the **DeviceNet**. If only a DeviceNet fieldbus system is installed with FB 1131, the configuration window will open directly.

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

4.2 EDS Files (Electronic Data Sheet Files)

An Electronic Data Sheet (EDS) provides information necessary to access and alter the configurable parameters of a device. An Electronic Data Sheet (EDS) is an external file that contains information about configurable attributes for the device, including object addresses of each parameter.

The application objects in a device represent the destination addresses for configuration data. These addresses are encoded in the EDS.

The figure below shows a general block diagram of a sample EDS.

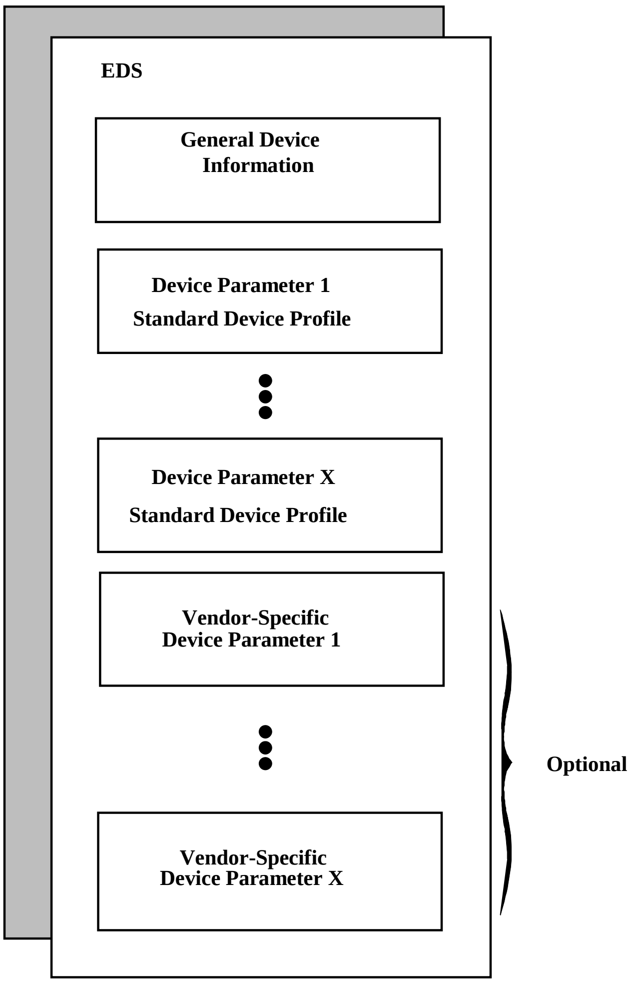


Figure 1: General block diagram of an EDS file

4.2.1 EDS files and FB 1131

When the Fieldbus Configurator is started, it automatically retrieves all the EDS files stored in the EDS directory. The device names are placed into an internal list. During the configuration, the device-specific data is retrieved directly from the EDS files.

If a DeviceNet device does not appear in the selection list (Insert Master or Insert Device), then a corresponding EDS file can be copied into the EDS directory with **File > Copy EDS**. Another possibility is to copy the EDS file into the FB 1131 EDS directory with Windows Explorer and then retrieve the EDS files into the EDS directory with **Settings > Path** and **OK**.

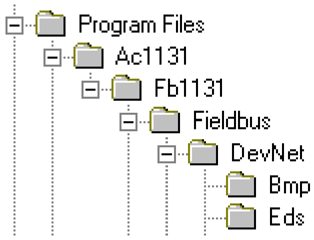


Figure 2: EDS Files and bitmaps directory

ABB Stotz-Kontakt devices: The EDS files for ABB Stotz-Kontakt devices are already included and installed.

Other devices: The respective device manufacturer provides the EDS files for other devices.

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

4.3 Master

4.3.1 Insert Master

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

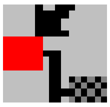
Insert > Master


Table 4: Insert > Master

The window opens from which exactly one Master can be chosen. After this selection the chosen Master is at the first position in the configuration window.

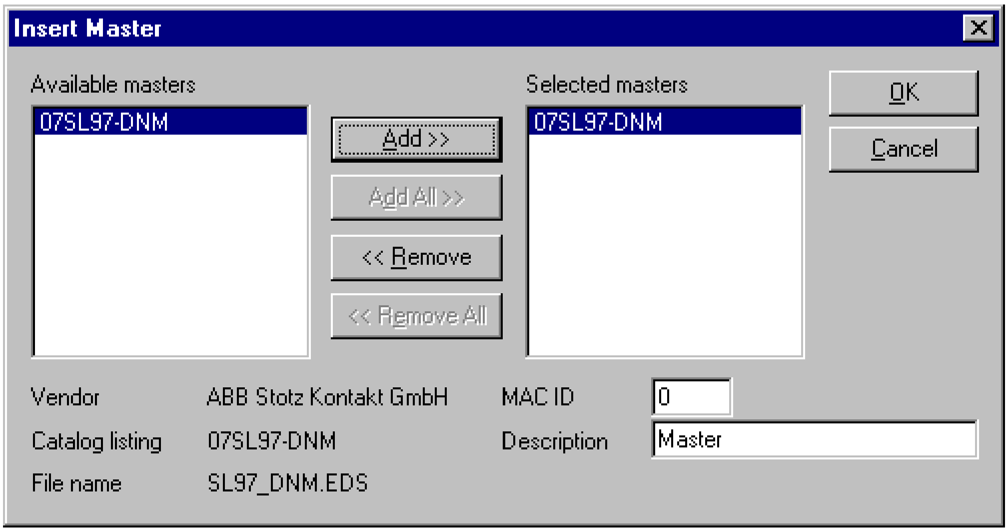


Figure 3: Insert > Master

The **MAC ID** of the Master can be changed here.

The **Description** field will accept up to 32 characters of text. This text will appear later in the main configuration window.

The chosen Master is automatically placed at the first position in the main configuration window, if the selection was confirmed with the **OK** button.

4.3.2 Replace Master

If a Master already exists in the configuration and should be replaced against another Master, you first have to set the focus on the Master (left mouse click at the Master) and then choose the menu **Edit > Replace**. In the opened window appears the question if the Master should be replaced.

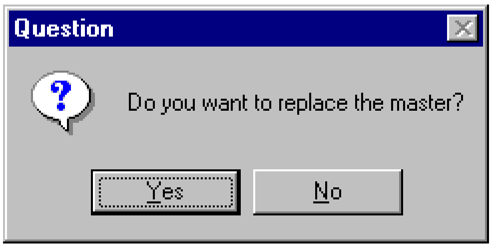


Figure 4: Security question replace Master

If you click the button **Yes** a new window opens, where you can replace the Master against the existing Master.

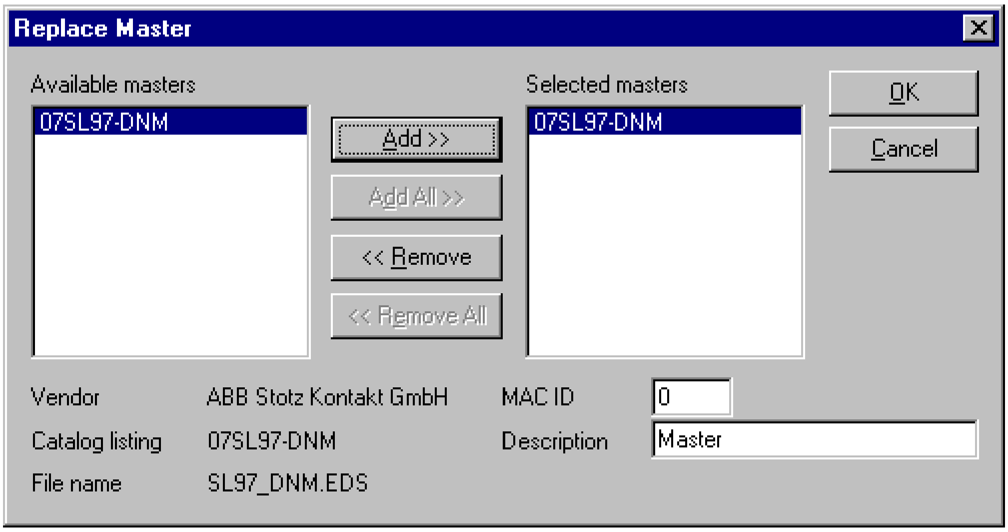


Figure 5: Edit > Replace Master

In this window you select the Master you want by clicking on it in the list **Available Masters** and then click the **Add** button to put the Master to **Selected Masters**. With **OK** you confirm the selection and the Master will be replaced.

4.4 DeviceNet Slave

4.4.1 Insert DeviceNet Slave

In order to insert an DeviceNet Slave into the configuration, choose the **Insert > Device** menu to open the selection window

or

click on the symbol:

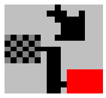
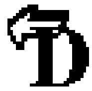
Insert > Slave device	Mousepointer for Insert > Device
	

Table 5: Insert > Device

The mouse pointer automatically changes to the Insert Slave pointer. Click at the position where the Slave should be insert. A dialog box opens where one or more Slaves could be selected.

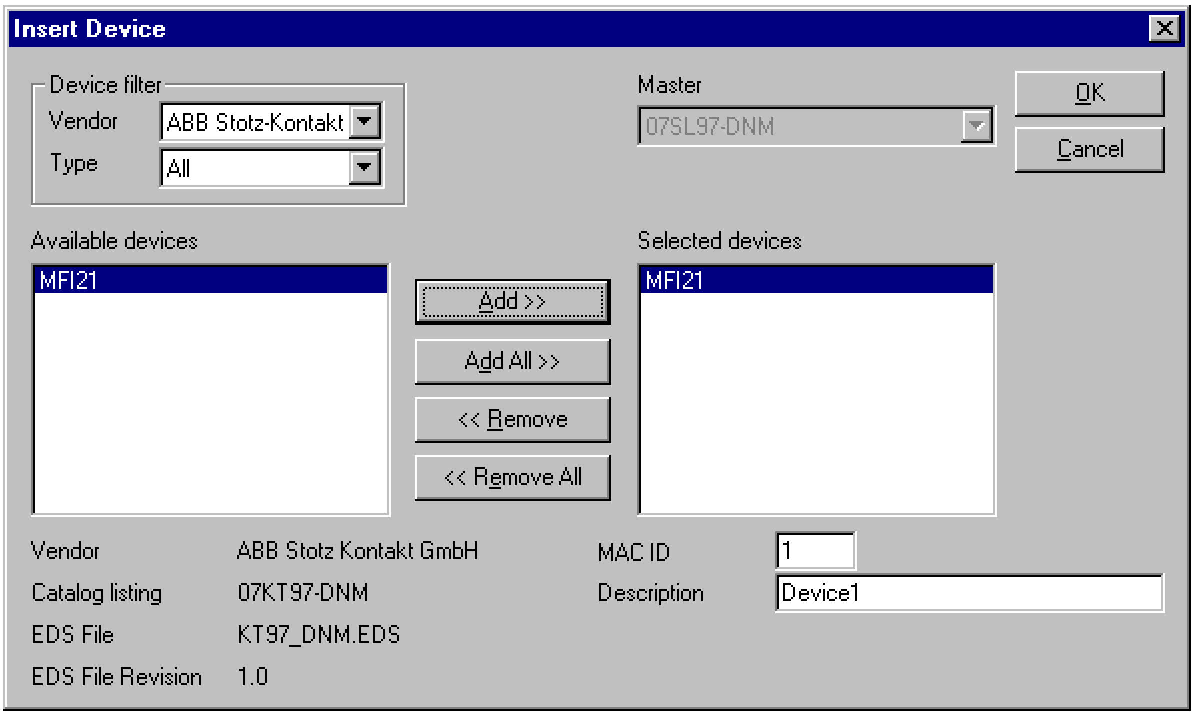


Figure 6: Insert > Device

The list on the left displays for selection all the Slave devices whose EDS files have been put in the EDS directory. A filter can be used to limit the selection list by the **Type** and the **Vendor**. Further information on a Slave is shown below the selection list (**Available Slaves**) when it is selected (one mouse click). Apart from the manufacturer name and the description especially the ID-Code, the Length-Code, the file name and the file revision are given. The Slave appears on the right-hand list with a mouse click or with the **Add** button. All devices in the right-hand list are assigned to the current **Master** that is also shown in this window. If the Slaves in the right-hand list are chosen one after the other (a mouse click), then every Slave can be assigned a **MAC ID** and a name in the **Description** field.

4.4.2 Replace Device

If a device already exists in the configuration and should be replaced against another device, you first have to set the focus on this device (left mouse click at the device) and then choose the menu **Edit > Replace**. In the opened window appears the question if the device should be replaced.

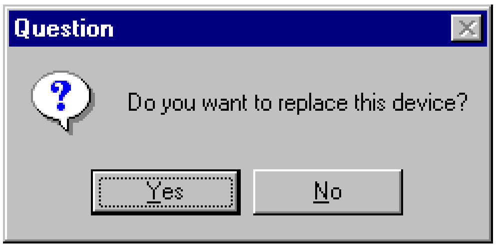


Figure 7: Security question replace device

If you click the button **Yes** a new window opens, where you can replace the device.

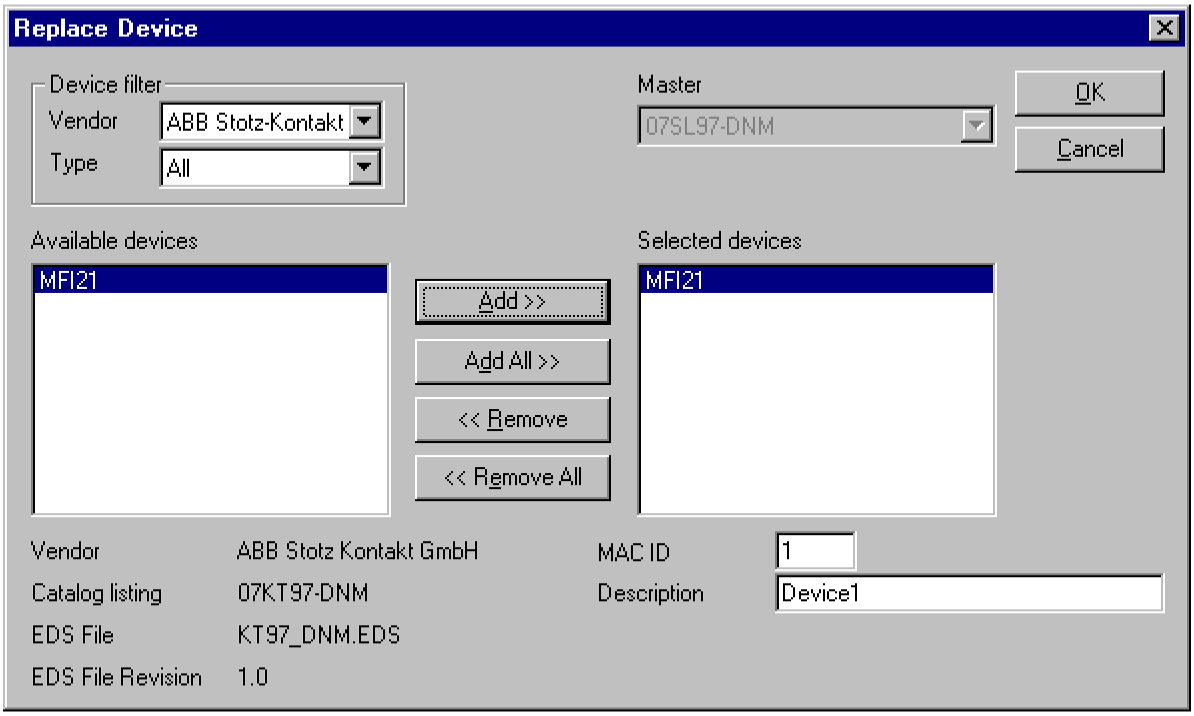


Figure 8: Edit > Replace

In this window you select the device you want by clicking on it and then click the **Add** button to put the device to **Selected devices**. With **OK** you confirm the selection and the device will be replaced.

4.4.3 Device Configuration

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

or

open the Slave configuration window by double clicking on the DeviceNet Slave device.

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

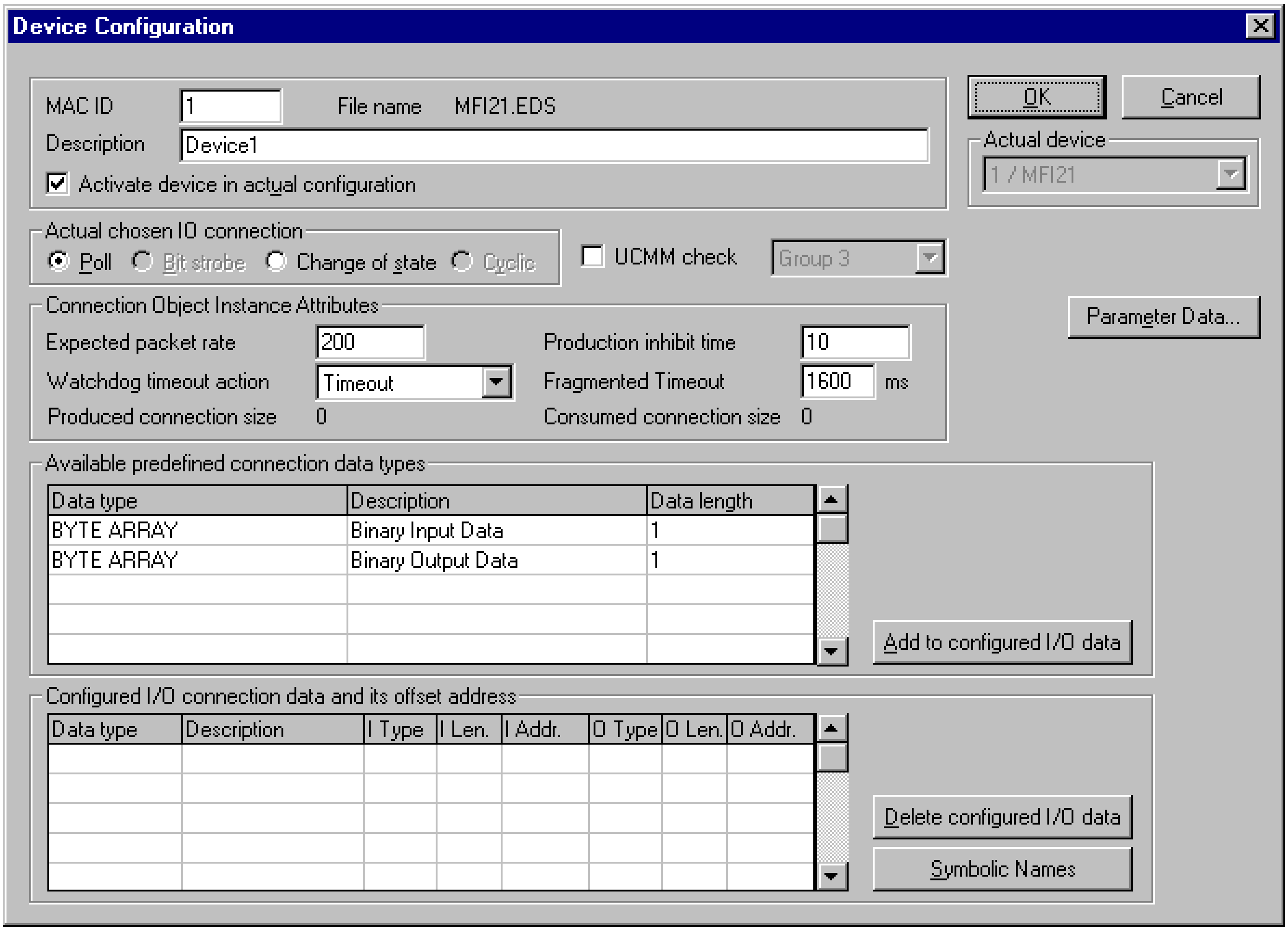


Figure 9: Settings > Slave Configuration

Note 1: The offset addresses set in this window are for the addressing of the input data and output data in the Master! These address settings (offsets) are not the settings in the DeviceNet device (Slave). The DeviceNet device (Slave) organizes its data itself.

The EDS file which is used by the device is shown by the **File name**.

The **Description** and the **MAC ID** show the settings which were set during the insert of the device. Both entries can be changed here.

If **Activate device in actual configuration** is selected, the Master carries out an data exchange to this device. Is this setting deactivated, then the Master doesn't carry out a data exchange to this device. In both cases however the memory in the process image is used respectively reserved in the Master.

4.4.3.1 MAC ID (Device network address)

The network address of a device serves to distinguish itself on a DeviceNet fieldbus system from any other device or Slave on this network. This should be a unique number for each device. A valid MAC-ID address is within a range of 0 to 63 and can be re-entered and changed in the **MAC-ID** box in the **Device Configuration** Dialog.

4.4.3.2 Actual chosen I/O Connection

DeviceNet allows to establish several kinds of I/O connections between devices. Please note that a device has not to support all types of IO connections.

I/O connection
Poll
Bit Strobe
Change of State
Cyclic

Table 6: Overview I/O connections

Here is an explanation of the different connections types.

- **Polled I/O Connection** - One poll command from the Master sends a number of output data to a single, specific device (point-to-point). The device receives (consumes) the poll command and processes the output data. If it has input data configured for this poll connection it reacts by sending (producing) back a number of input data and/or status information to the Master. Before a polled I/O connection is initiated by the Master, it reads the **Consumed** and **Produced Connection Size** of the data from the Slave first and compares each value with the internally configured one. If the Master detects differences the connection cannot be established. Sending a poll command can happen at any time the Master wants to and has timer or event dependencies. A device has to respond if it has consumed and understood the poll command request of the Master, even if it has no input data. Else the Master will report a timeout error. Polling data to many devices has the disadvantage that the network traffic rate is very high and most data which is transferred has not changed since the last transmission. Furthermore the higher the bus load more communication errors can occur if the bus is disturbed by external influences.

- **Bit Strobe I/O Connection** - Bit strobe command and response messages rapidly move small amounts of I/O data between the Master device and one/some/all Slave devices. The bit strobe message contains a bit string of 64 bits of output data, one output bit per possible device. Each bit in there is assigned to one device address in the network. Herewith this service has broadcast functionality that means more than one Slave device can be addressed by one command. Because all addressed Slave devices get this command at the same time, this command is normally used to synchronize data transfer to several Slave devices. A Slave device can take its corresponding output bit as a real output information to give it to the peripheral connections (e.g. an LED) and/or use the bit as a trigger to send back its input data with a poll response message. The data that can be send back from each Slave after a bit strobe command was received is limited to 8 bytes in length. Bit strobe usage causes therefore a reduced bus loading than poll connections.
- **Change of State/Cyclic I/O Connection** - The Master device sends a number of output data to a single, specific device (point-to-point). Data production is triggered by either a determined changed value in the output data or the cyclic timer expiration. Depending on how the Slave behaviour is configured, the Slave can send back an acknowledge message, containing a number of input data and/or status information. The Slave device sends a number of input data to the Master, if the data is either changed or the cyclic timer has expired. The Master itself can acknowledge this message with output data if configured.

Change of state only production of data hold down the bus load as small as possible, while data than can be transmitted as fast as possible by each device because bus conflicts are less possible. So you can get high performance data transmission with in comparison low baud rates.

4.4.3.3 Connection Object Instance Attributes

The **Production Inhibit Time**, one for each connection, configures the minimum delay time between new data production in multiples of a millisecond. The timer is reloaded each time new data production through the established connection occurs. While the timer is running the device suppresses new data production until the timer has expired. This method prevents that the device is overloaded with to fast incoming requests.

The value 0 defines no inhibit time and data production can and will be done as fast as possible. If in polled mode for example a **Production Inhibit Time** of 1000dec is configured, then the poll request message to the device will be sent every second.

The **Expected Packet Rate**, one for each connection, is always transferred to the device before starting and doing the I/O transfer . The value is used by the device later to reload its 'Transmission Trigger' and 'Watchdog Timer'. The 'Transmission Trigger Timer' is used in a 'cyclic' I/O connection to control the time when the data shall be produced. Expiration of this timer then is an indication that the associated connection must transmit the corresponding I/O message. In 'change of state' connections the timer is used to avoid the watchdog timeout in this connection, when a production has not occurred since the timer was activated or reloaded.

Note: the **Production Inhibit Time** is verified against the **Expected Packet Rate**. If the Expected Packet Rate value is unequal zero, but less than the Production Inhibit Time value, then an error window is opened when pressing the OK button or changing to a wrong value.

The **Watchdog Timeout Action** defines the device behaviour when the watchdog timer in the device expires. The following values are defined and their functionality is closer described in the DeviceNet specification.

Transition to Timed Out: The connection transitions to the Timed Out state and remains in this state until it is Reset or Deleted.

Auto Delete: The connection class automatically deletes the connection if it experiences an Inactivity/Watchdog timeout.

Auto Reset: The connection remains in the established state and immediately restarts the Inactivity/Watchdog timer.

4.4.3.4 UCMM Check

The UCMM Check box is used for modules that require the use of UCMM messaging format. Class 1,2,and 3 are supported. Check the documentation for your Slave device to identify if this box must be checked.

4.4.3.5 Fragmented Timeout (Expl. Message Timeout)

If a transmission of I/O data or explicit message is greater than 8 bytes in length, it must be transmitted on DeviceNet in a fragmented manner. The maximum time the Master will wait until a Slave has to respond during the fragmented transmissions is the fragmented timeout.

4.4.3.6 Parameter Data

The button **Parameter Data** can be selected in the Device Configuration window to edit the parameter data.

If default parameters are configured in the EDS file for this Node, they are inserted automatically when the menu is chosen the first time.

Some of devices need some further parameterisation data, to change for example a measurement limitation or a value range. These data is Node specific and their functionality can not be explained at this point.

The explanation can be normally found in the corresponding Node manual.

This window below shows an example of parameter data of a device.

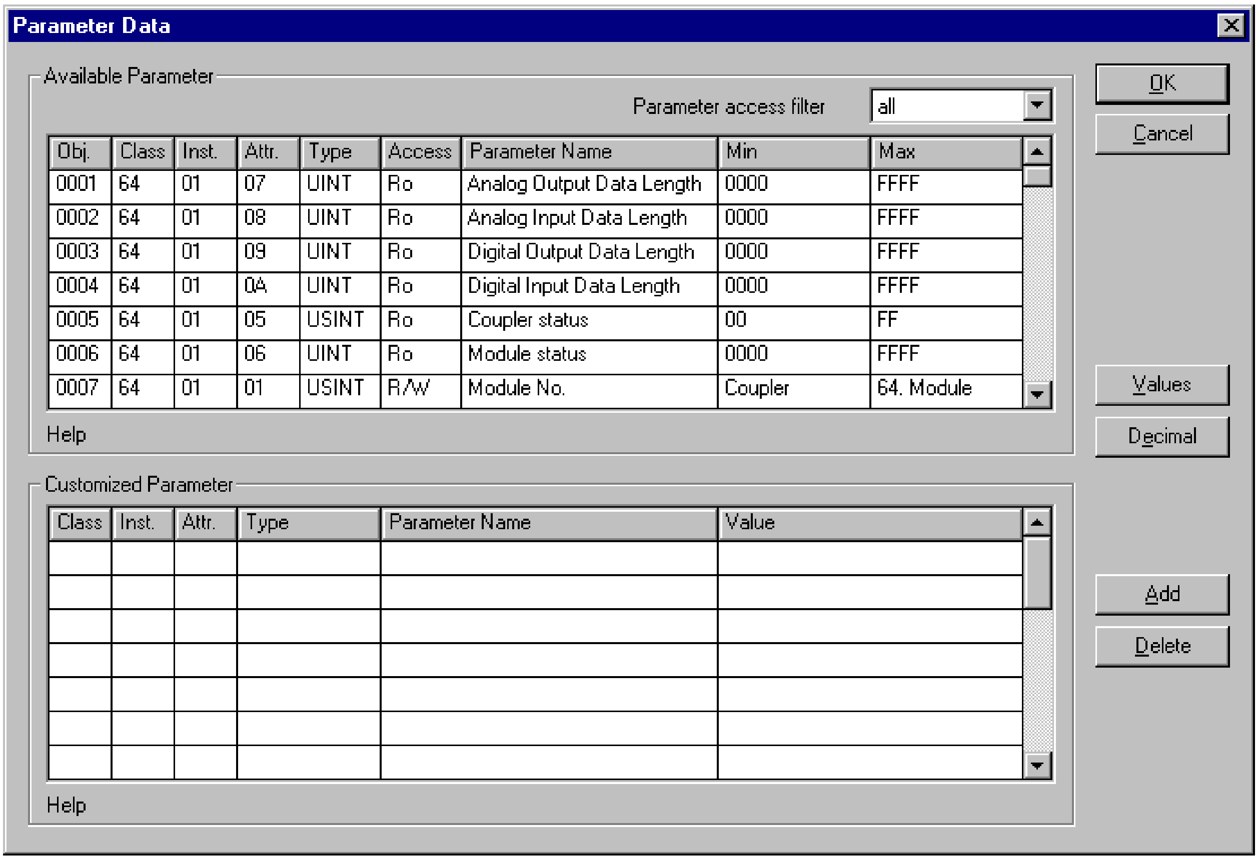


Figure 10: Parameter Data

Two tables are shown: one table with all available parameters and one table for configured parameters. These parameters can be selected from the available parameters to that table.

4.4.3.7 Process Data Configuration

- Fixed I/O data transferred

DeviceNet handles I/O data transparent as a byte string without defining any data type in the transferred data. To be operative it defines only the number of bytes in consumed and produced direction that shall be transferred across a connection, nothing else. But FB 1131 and the firmware now allows to assign modular each byte or a bunch of bytes of the transparent string to different data types. A list of the supported data types of the connection can be found in the middle table of the window called **Available Predefined Connection Data Types**.

The following data types are supported:

- Bit, Byte, Word, Dword, Byte Array

By selecting a data type of the available and defined connection types and clicking on the Add button after this or a double click at the defined connection data type in the **Configured I/O connection data and its offset address** are taken over in the table.

If the data type **Byte Array** is chosen the number of bytes that shall be reserved for this data type can be entered in the **Data Count** column in the lower table. Any other data type has its fixed length that can not be changed. The data types are distinguished in process output and process input data in the view of the Master device.

A double-click on a predefined data type or a click in the **Add to configured I/O data** button will insert the chosen data type in the lower table called **Configured I/O connection data**. This table contains all data that shall be really transferred across the connection. FB 1131 will add separately the number of used bytes of each configured I/O data and forms the values **Consumed** and **Produced Connection Size** automatically. Both values indicates the sum of bytes which shall be sent by the Master as outputs (Consumed by the device) and received by the Master as inputs (Produced by the device).

- Assigning the process data offset addresses

The I/O offset addresses of each placed data type in the connection data table can be freely configured in a range of 0 to 3583 or they are set automatically by FB 1131. To enable or disable free configuration use the flag **Auto Addressing** in the menu **Settings > Auto Addressing**. If enabled FB 1131 will place all configured I/O data spaceless in physical order one to each other based on the rising MAC-ID order. This is done during the download procedure. The assigned addresses can be checked then in the overview **Address Table** of the menu **View**. If the addresses are entered manually the default address 0 in the **input address** respectively the **output address** must be overwritten.

In case of manual addressing (that means auto addressing is deactivated) the configuration window looks like:

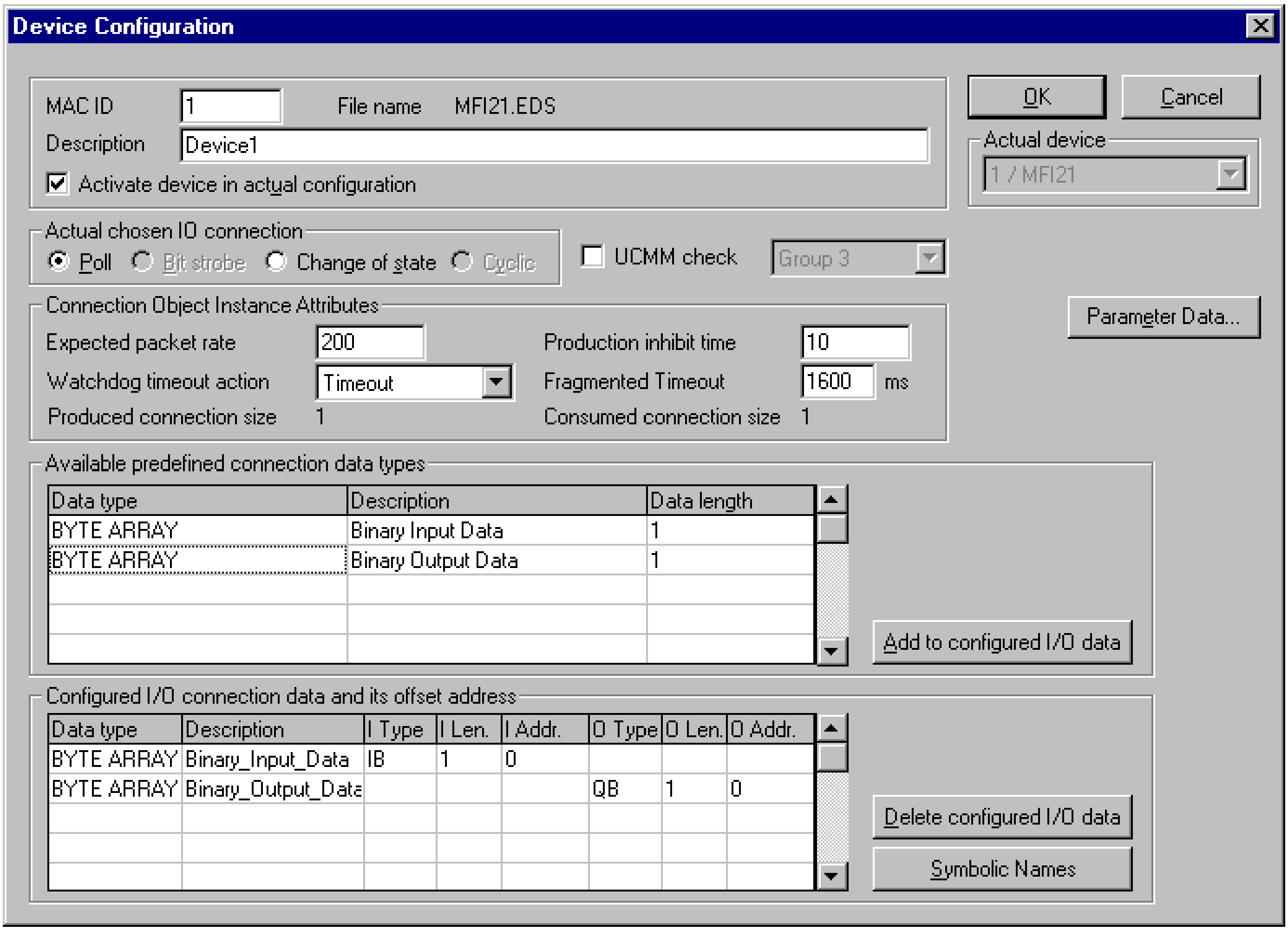


Figure 11: Settings > Device Configuration

In the column **I Addr** and **O Addr** you have to assign the addresses where to locate the data in the process image. Remember that these addresses correspond to your application on the HOST side.

If you deactivate a device in the actual configuration the device is shown like this:

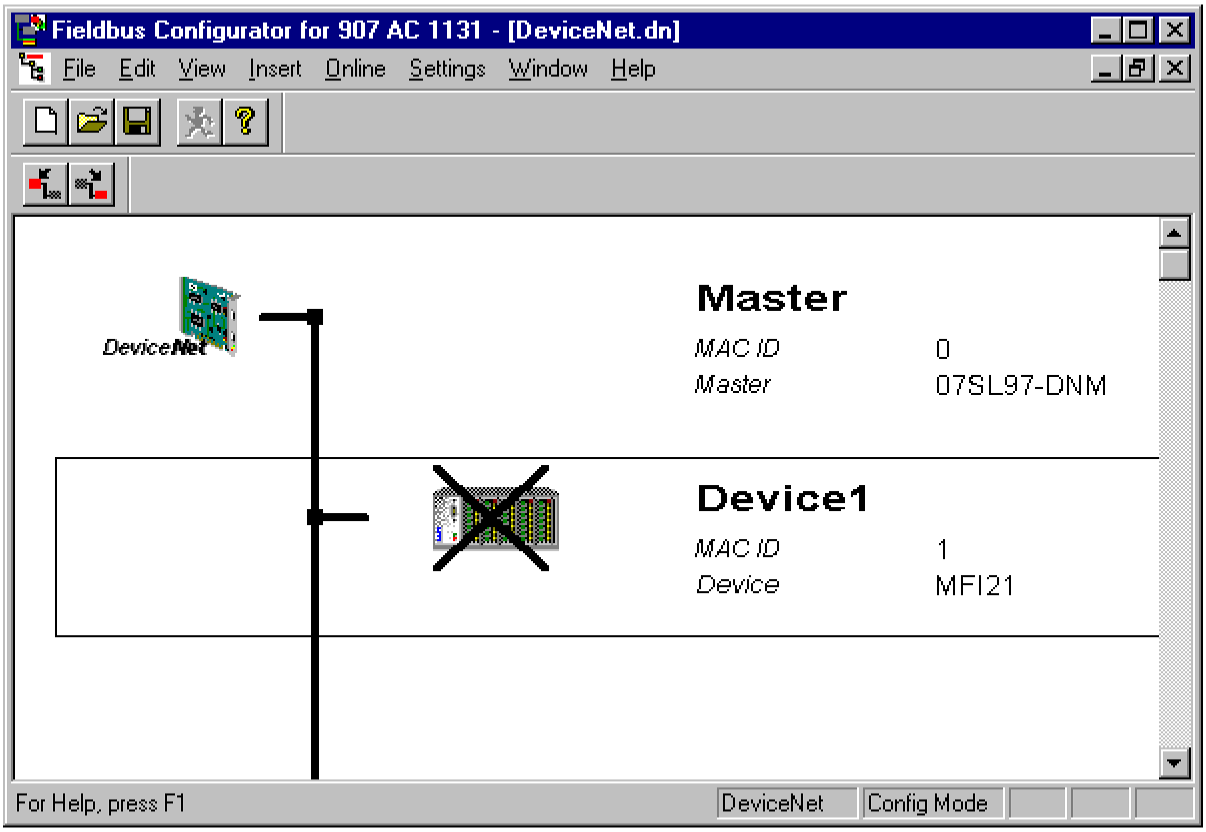


Figure 12: Deactivated Device

To activate or deactivate a device in a configuration can be very useful for such devices which don't exist in the real physical network, but for which the I/O offset addresses shall be reserved or simply a symbolic 'missing device' wanted to be inserted as long the device is not connected.

5 Settings

5.1 Gateway Driver

The Gateway Driver terminies how the Fieldbus Configurator communicates with the device. This is set in the Device Assignment which can be opened with the menu **Settings > Device Assignment**.

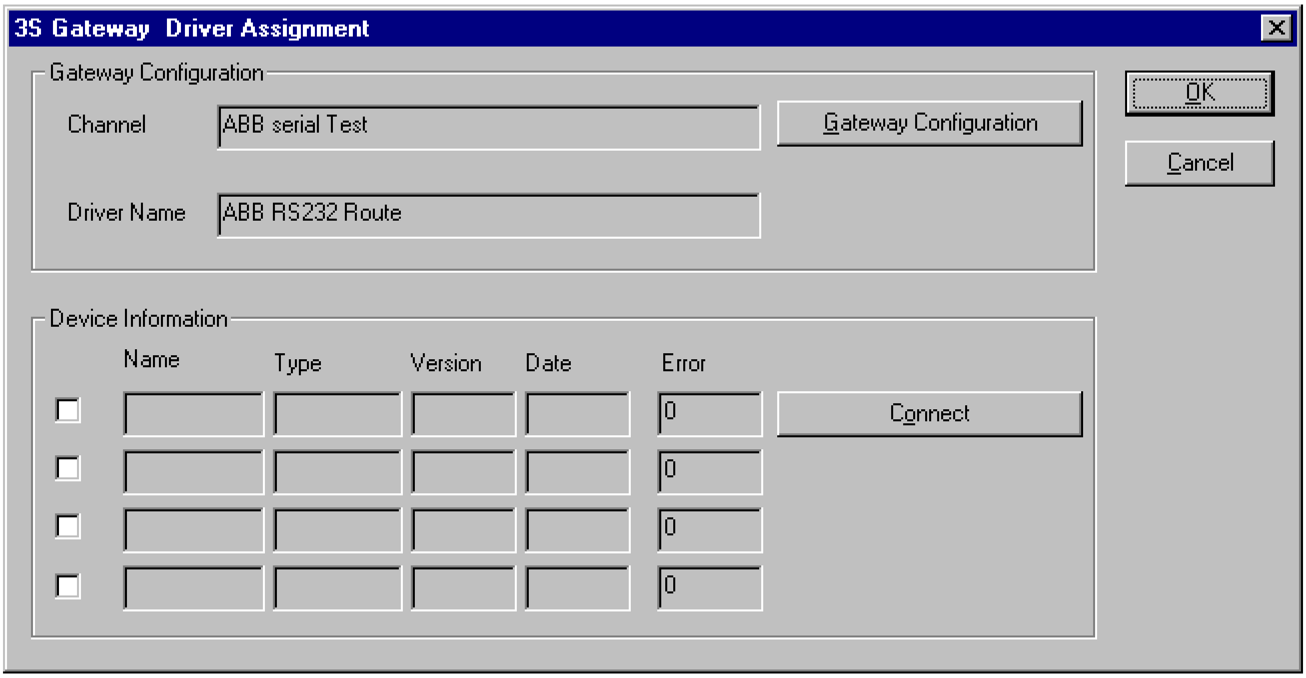


Figure 13: Settings > Device Assignment

After the selection of the Gateway channel or clicking the **Connect** button FB 1131 tries to set up a connection to the selected controller.

If the connection was successful the configurable couplers are shown in the field **Device Information**.

The desired coupler is selected by clicking on the field next to the name of the coupler and confirming with the **OK** button.

By clicking at the **Gateway Configuration** button a new window appears where the Gateway channel can be selected or a new Gateway channel can be configured.

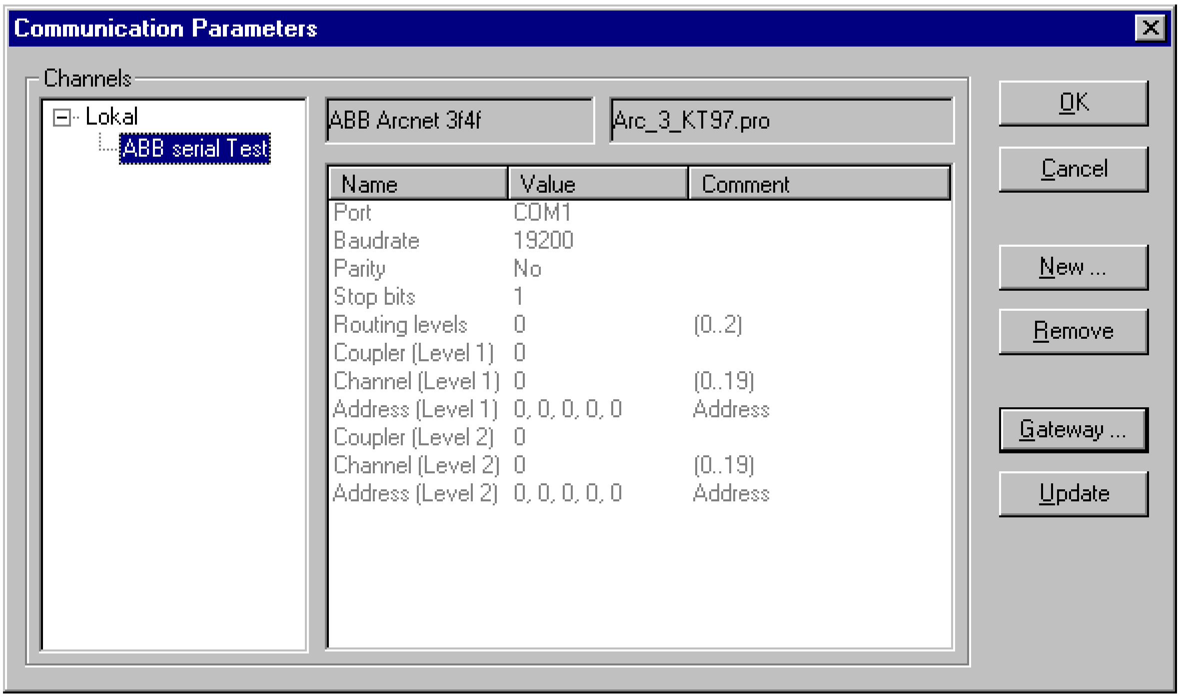


Figure 14: Configure Gateway

To confirm the Channel selection click at the **OK** button.

5.2 Bus Parameters

Here the basic settings for the DeviceNet network are carried out. The Bus Parameters can be displayed with the menu **Settings > Bus Parameters**.

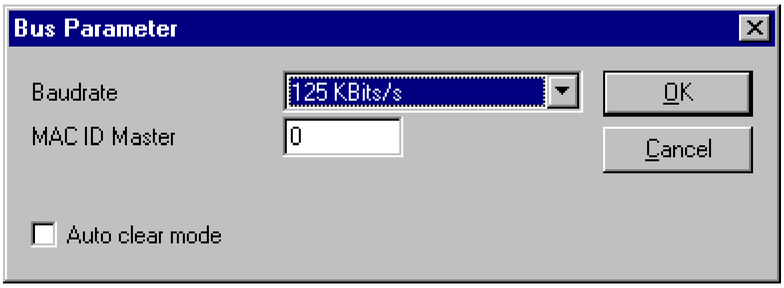


Figure 15: Settings > Bus Parameters

Mainly, this concerns the determination of the **Baudrate**. The DeviceNet board supports the baudrates 125kbit/s, 250kbit/s and 500kbit/s. Normally DeviceNet components uses the autobaud detection to get the baudrate automatically once.

The **Auto Clear mode** feature defines the behaviour of the Master if the communication breaks down or is interrupted to a Node. If the flag Auto clear mode is activated, then the Master will also stop the communication to all further Nodes which were still responding and active. If the flag Auto clear mode is not activated, then a lost communication contact to one Node has no influence on the communication channel of the still present ones. For all the error effected Nodes the Master remains in the state to try the reestablishment of the communication again.

5.3 Project Information

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

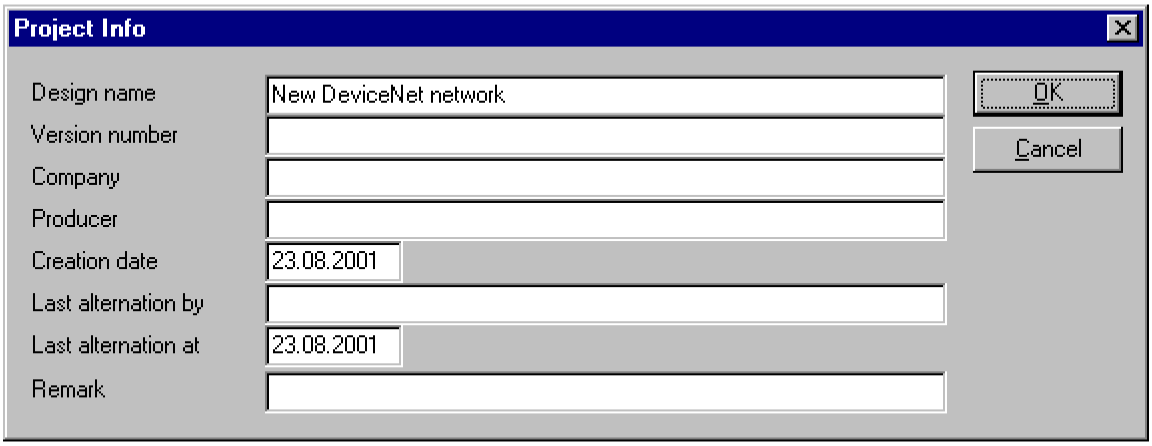


Figure 16: Settings > Project information

5.4 Path

When the **Settings > Path** menu is selected, then the search path for EDS files is displayed. The passed value is C:\Program Files\AC1131\FB1131\Fieldbus\DEVNet\EDS.

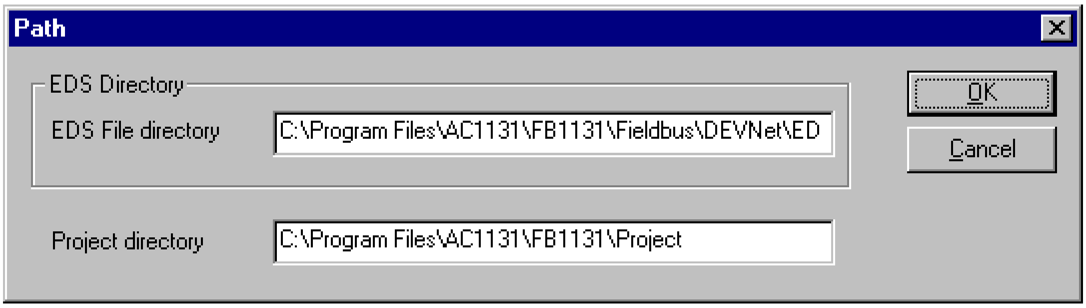


Figure 17: Settings > Path

5.5 Language

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

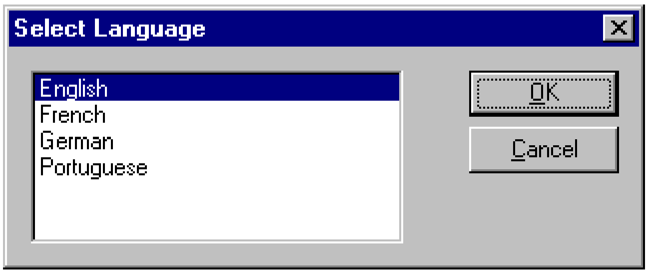


Figure 18: Settings > Language

Here can be set the language of the Fieldbus Configurator. Select the desired language and confirm the entry with the **OK** button.

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

After restarting the Fieldbus Configurator, the language will have changed to the one selected.

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

6 Online Functions

6.1 Introduction

In this chapter, all functions that directly influence the DeviceNet Master are presented.

Note: Please note that this also permits an interruption of the running communication or that input and output can be switched On or Off.

6.2 Online to the Coupler

6.2.1 Downloading the Configuration

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

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

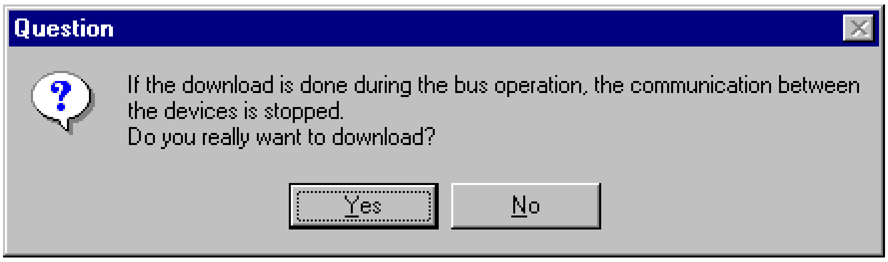


Figure 19: Security question before download

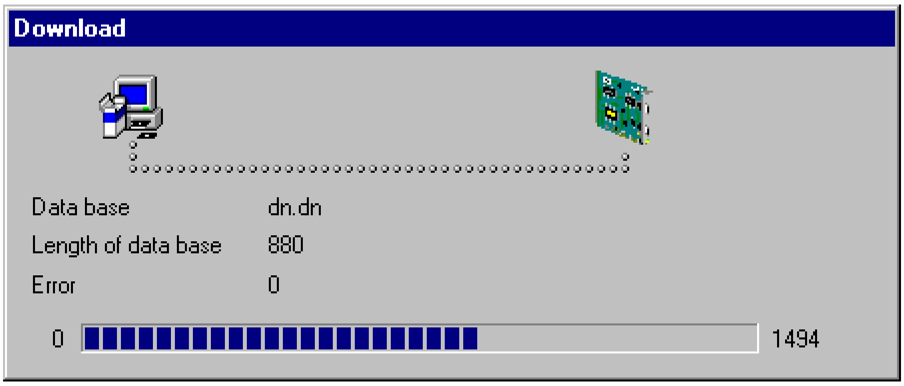


Figure 20: Online > Download

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

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

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

6.2.2 Firmware Download

If you want to carry out a Firmware download, act as follow: First the desired device for Firmware downloading must be chosen in that the symbol of the device is selected with a left mouse click. Then, call up the **Online > Firmware Download** menu. Select the new Firmware and retrieve it with **Download** into the device. The Firmware is now retrieved.

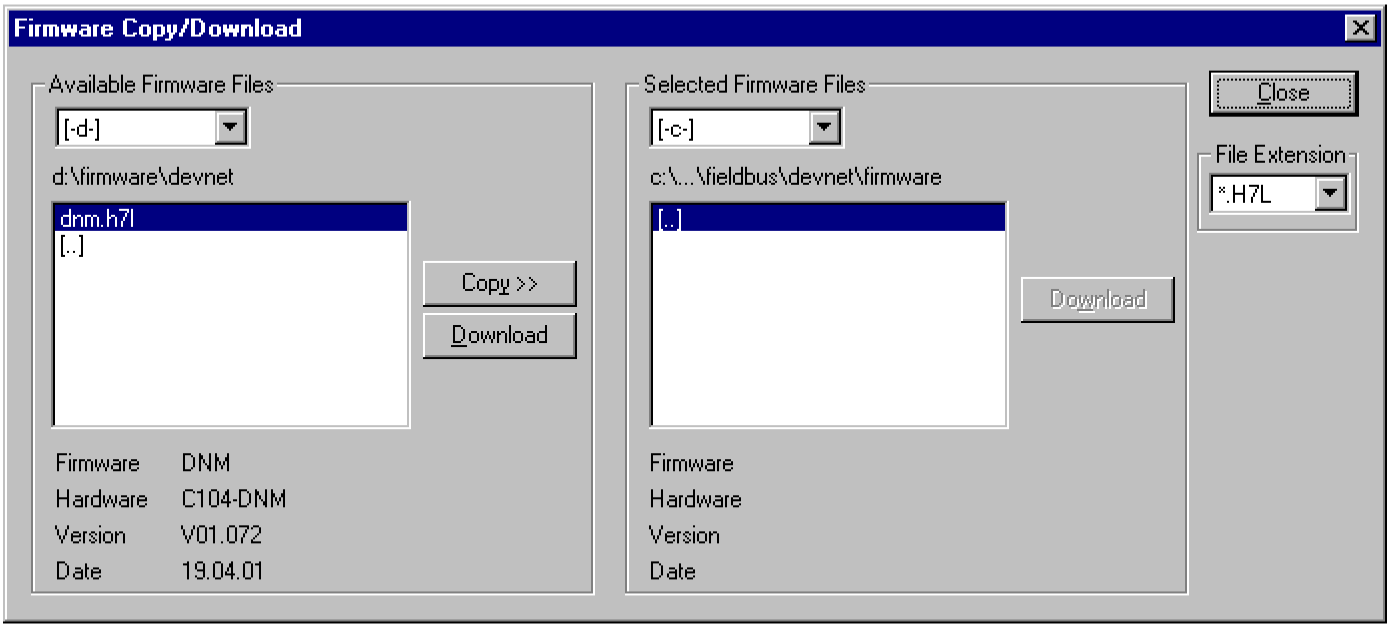


Figure 21: Online > Firmware Download

6.2.3 Firmware / Reset

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

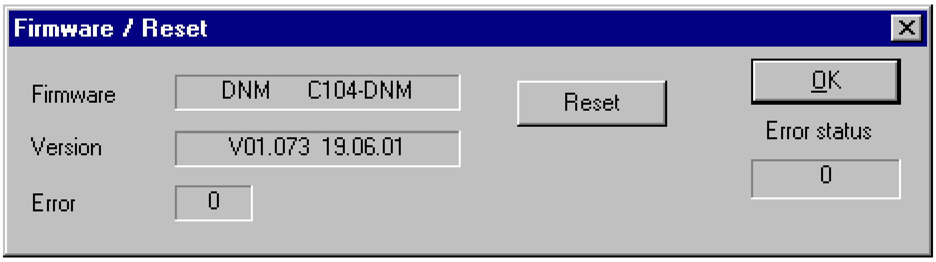


Figure 22: Online > Firmware / Reset

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

6.2.4 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.

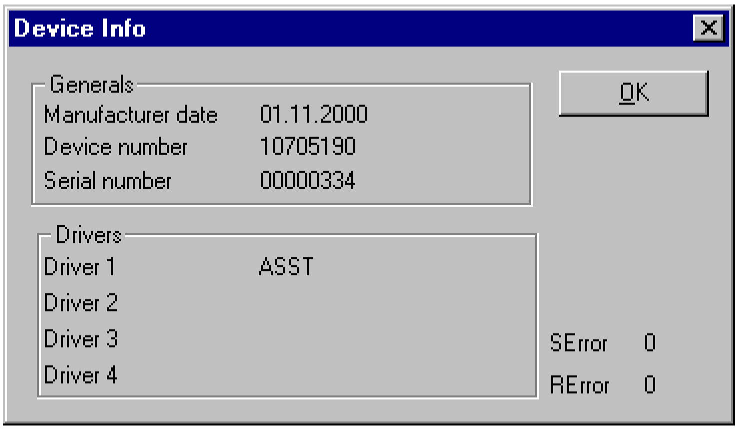


Figure 23: Online > Device Info

6.2.5 Read Project Information

With **Online > Read Project Information** can be picked out the project information from the device.

6.3 Automatic Network Scan

This function scans the network structure. This allows a very fast configuration, and you also have the possibility to change detailed parameters for these devices later.

To start an automatic network scan, please proceed as followed:

1. Insert a Master device
2. Click on **Settings > Bus Parameters** and select the baudrate and the MAC ID from the Master (explained in section *Bus Parameters* at page *28*).
3. Select **Online > Download** to load these settings into the DeviceNet Master.
4. Click on the Master and choose **Online > Automatic Network Scan**
5. A new window is displayed, where you see the current status of the network scan and the devices, which were already found in your DeviceNet network:

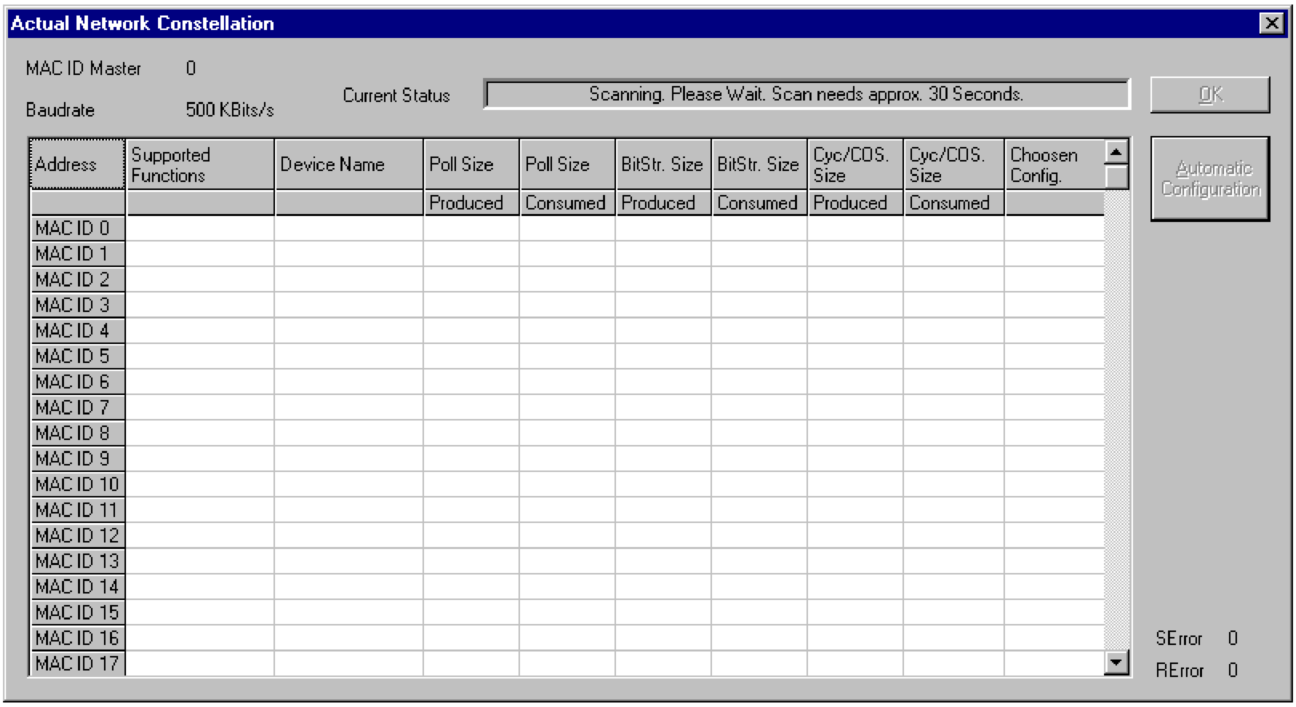


Figure 24: Online > Automatic Network Scan (During the Scan)

The Automatic Network Scan takes about 30 seconds. The scan can not be interrupted until the status shows next the "current status" changes to "Ready". When the scan has finished all detected devices and their MAC ID are shown.

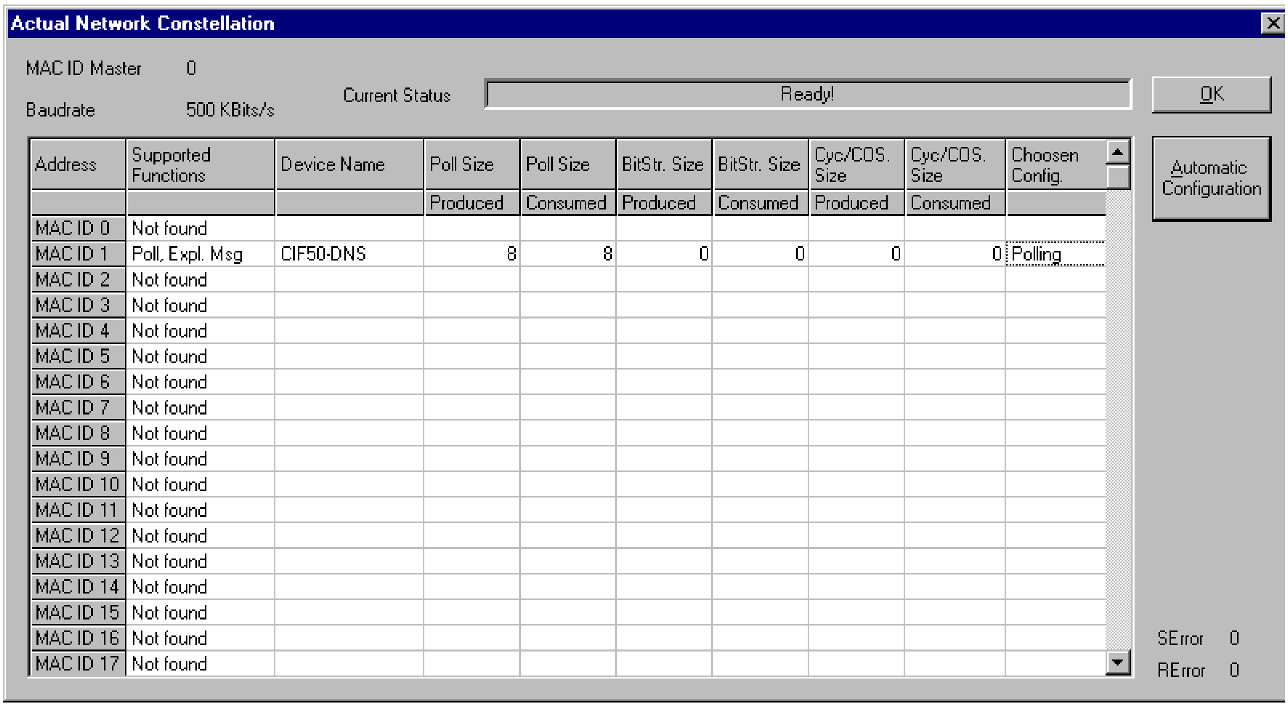


Figure 25: Online > Automatic Network Scan (After the Scan)

Here is an explanation of the different columns:

Variable	Meaning
Supported functions	Functions supported by the device, could be polled, bit strobe or cyclic/change of state (see explanation in *Actual chosen I/O Connection*, page *20*)
Device Name	Name of the device, result from network scan
Poll Size Produced	Number of data for poll connection (input)
Poll Size Consumed	Number of data for poll connection (output)
BitStr. Size Produced	Number of data for bit strobe connection (input)
BitStr. Size Consumed	Number of data for bit strobe connection (output)
Cyc/COS. Size Produced	Number of data for cyclic/COS connection (input)
Cyc/COS. Size Consumed	Number of data for cyclic/COS connection (output)
Chosen config	Configuration chosen by the user, could be Change of State, Cyclic, Polling, Bit strobed or explicit only and depends on the functions supported by the device. Click on the cell to change the configuration.

Table 7: Explanation of the columns in the automatic network scan

A double click on the first or second column of the corresponding row of the device shows information of the device.

Figure 26: Information on a device in the automatic scan window

If you want to use this configuration as your configuration, click on **Automatic Configuration** and select **Yes** when prompted. Afterwards you can close the Automatic Configuration Window by clicking on **OK**. If you do not want the devices that were found in your configuration, just click **OK**.

If you want to insert your devices manually, please go on with *section Insert DeviceNet Slave* on page *17*.

6.4 Start/Stop Communication

First the desired device must be chosen with a left mouse click on the symbol of the device. The communication between DeviceNet Master and DeviceNet Slave can be manually started or stopped. In order to do this select the **Online > Communication start** or **Online > Communication stop** menu.

6.5 Diagnostic Functions

The following table shows Diagnostic Functions and their using for DeviceNet Master:

Diagnostic Function	Using	Used for DeviceNet Master devices
Live List	Detects which devices are connected to the Master device	Yes
Debug Mode (DeviceNet)	Detects to which DeviceNet devices (Slaves) the DeviceNet Master can communicate	Yes
Global State Field	Status information of the DeviceNet Master	Yes
Extended Device Diagnostic	Statistic information and State information from the DeviceNet device	Yes

Table 1: Overview Diagnostic Functions

6.5.1 Live List

If you select the menu **Online > Live List** you will get an overview of all devices physically present in the actual network constellation. Present devices are drawn in black, all other non present devices are drawn in grey. The live list works online. If you connect or disconnect one station you will see the result as soon as SyCon collects the latest live list from the Master board. Remember that all devices on DeviceNet have to proceed the autobaud detection phase first to get wholly run. This can take up to some milliseconds.

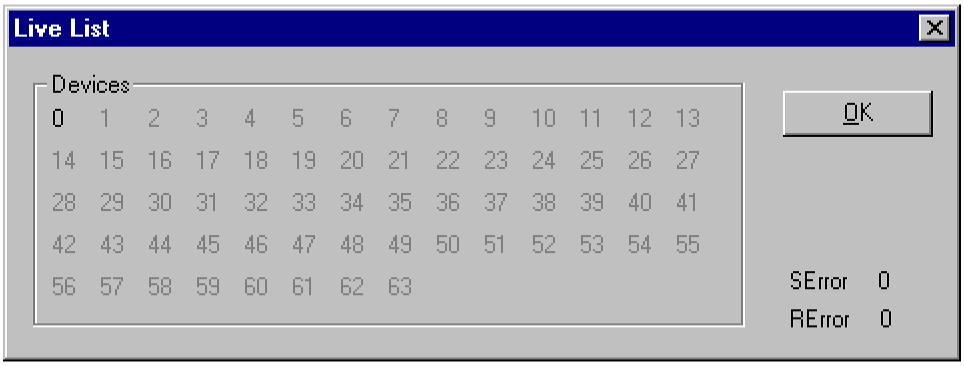


Figure 27: Online > Live List

6.5.1.1 Change MAC-ID

The window to change a MAC-ID opens with a double click on the address (MAC-ID) of a DeviceNet device (slave).

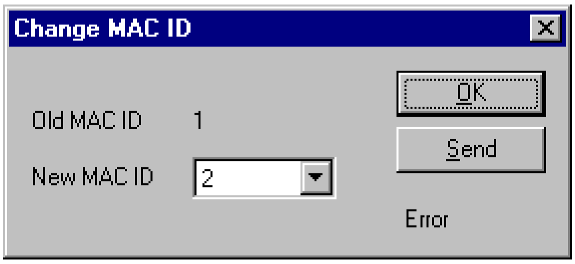


Figure 28: Online > Live List > Change MAC-ID

Select the new MAC-ID in the **New MAC-ID** field and click on the **Send** button to send it to the DeviceNet device (slave).

Note: The DeviceNet device (slave) has to support this function if this function should be used.

6.5.2 Debug Mode (DeviceNet)

Select the **Online > Start Debug Mode** menu. The Fieldbus Configurator cyclically interrogates the status of the network communication on the coupler and the individual condition of the devices.

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

6.5.2.1 Debug Window

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

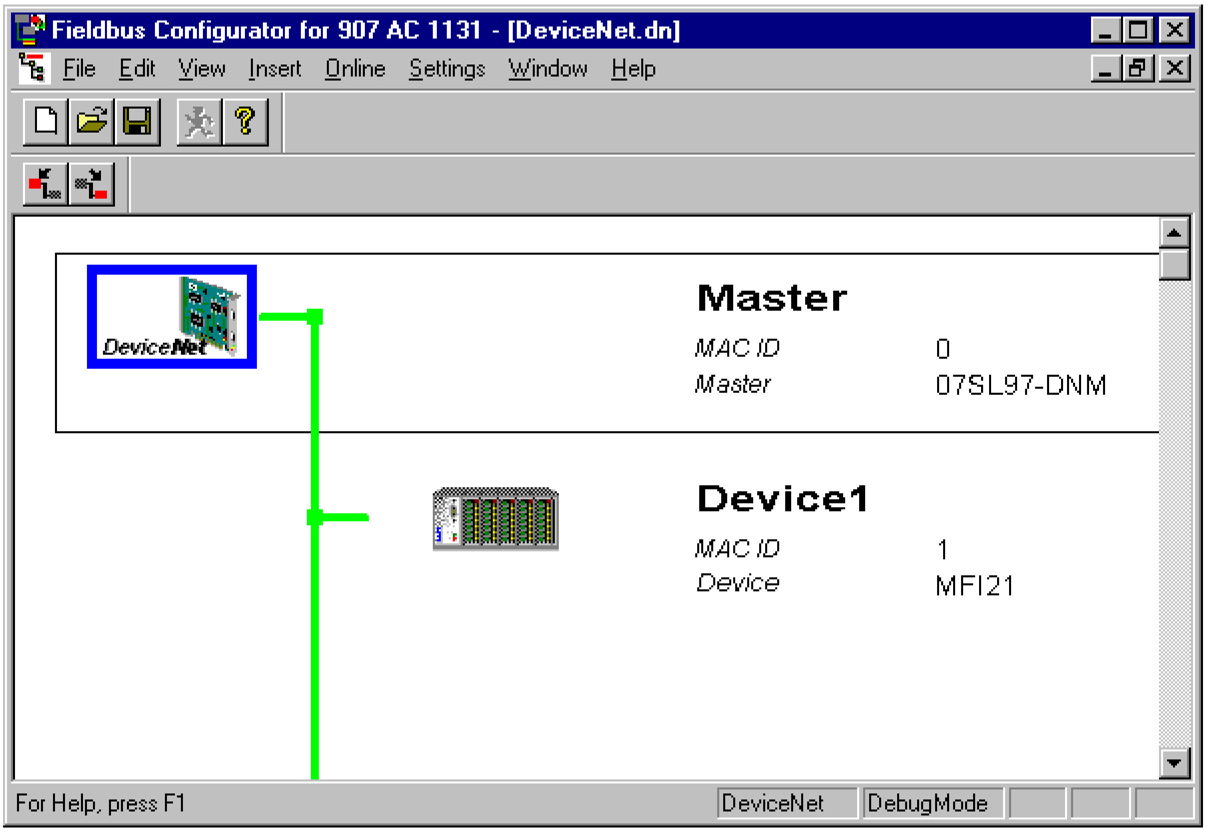


Figure 29: The Debug Window

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

6.5.3 Device Diagnostic

After the debugger was started from this time FB 1131 requests the status of all devices from the Master. If there is an error on a device the bus line to this Slave is drawn in red colour otherwise it is green. This information is displayed closer if you click with the mouse onto the corresponding device in debug mode.

To activate the debug mode you have to mark the Master and select the menu **Online > Start Debug Mode**. Then set the focus at the Slave and with the menu **Online > Device Diagnostic** you activate the DeviceNet device diagnostic. To end the Debug Mode you have to mark the Master again and select the menu **Online > Stop Debug Mode**.

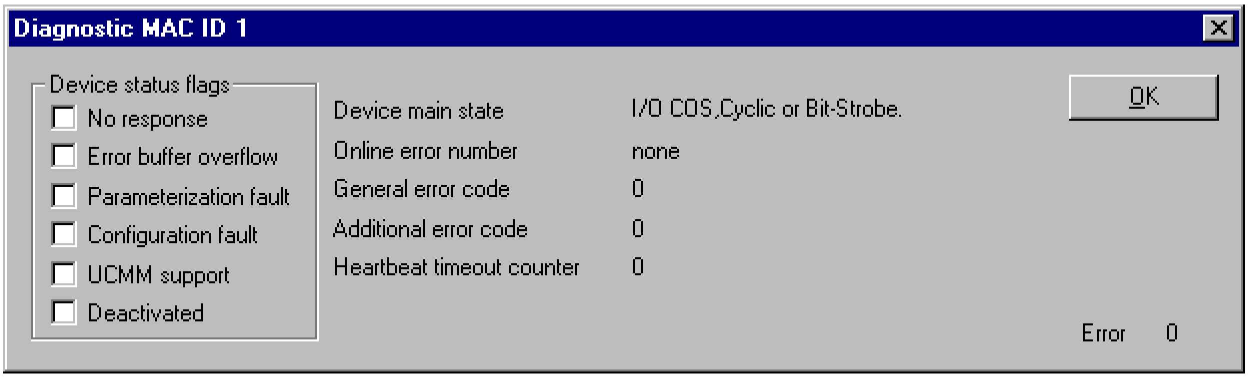


Figure 30: Online > Device Diagnostics

The individual bits in the **Device Diagnostic** have the following meaning:

Bits in the Device Diagnostic	**Meaning**
No response	The Device is configured but is not present in the network. Please check the physical connection between the Master and this Node. Check also the chosen baudrate and if this baudrate is supported by this device.
Error buffer overflow	An error can occur at each user during operation. These errors are stored in an internal buffer, which can take up 50 error registrations per user. This bit is set, if the buffer overflows.
Parameterization fault	The device announces a peripheral device error. That can be e.g. a short-circuit at the device outputs or an undervoltage.
Configuration fault	The ID code or the Length Code of the device does not correspond with that of the user configured.
UCMM support	This box is selected, if the device needs UCMM support.
Deactivated	This bit is set automatically by the Master, if the device is set in the device configuration as not active (Device Configuration > Deactivate device in actual configuration).

Table 8: Meaning of the bits in the Device Diagnostic

6.5.4 Global State Field

With the menu option **Online > Global State Field** opens a window in that cyclically Statistic about the bus status and attached devices to be output.

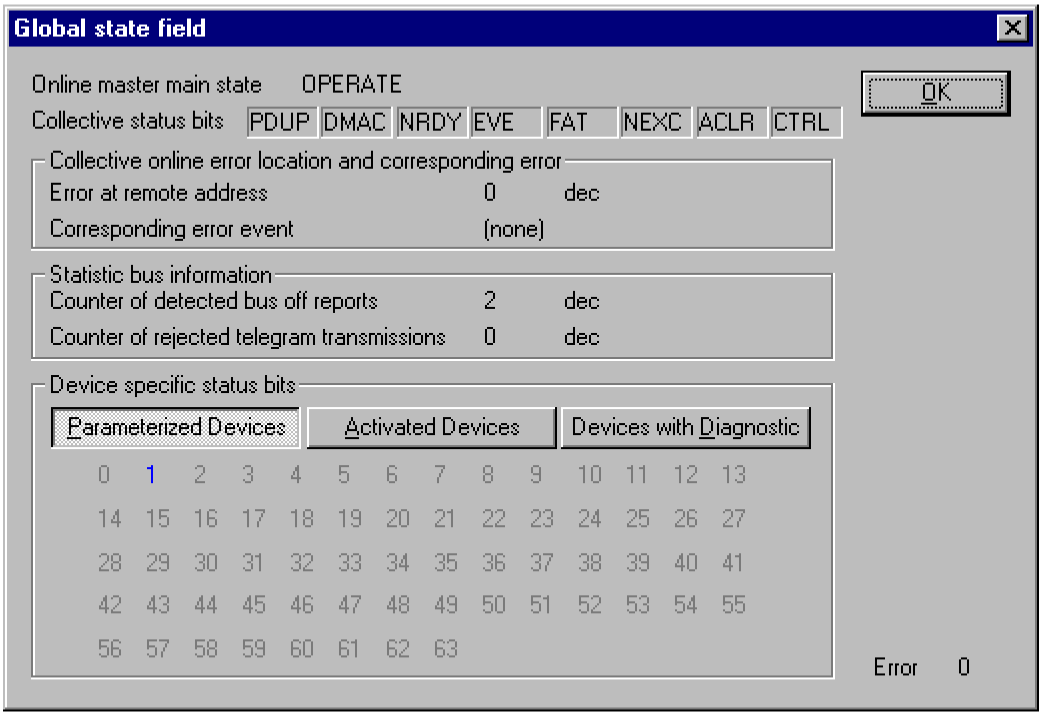


Figure 31: Online > Global State Field

The first row displays the main status of the Master. It can have the status **OPERATE** or **STOP**.
The next row displays individual bus errors. A pending error is displayed with a red field. The meaning of the individual abbreviations is described in the following.

Status Bits	Meaning
PDUP	DUPLICATE-MAC-ID check: The device is involved in the duplicate MAC-ID check procedure, to check if other devices with the same address are connected to the network. The duplicate MAC-ID check will be finished, if at least one DeviceNet device could have been found connected to the network.
DMAC	The device has stopped the duplicate MAC-ID check procedure and found an other device having the same MAC-ID address. Change the device address to avoid this failure.
NRDY	HOST-NOT-READY-NOTIFICATION indicates if the host program has set its state to operative or not. If this bit is set the host program is not ready to communicate.
EVE	EVENT-ERROR The used DeviceNet Master chip has detected at least on transmission error. The number of detected events are counted in Number of defective process data cycles and the error Number of network reintialisations. The bit will be set when the first event was detected and will not be cleared any more and remains set then.
NEXC	NON-EXCHANGE-ERROR An activated bit indicates that one of the configured device is not operational because of an configuration fault or simply because it's not present in the network.
ACLR	AUTO-CLEAR-ERROR This bit is set, when the Master stops the communication to all its handled devices because of missing devices. Before doing this it sets all output values of the left devices to the save zero condition. The behaviour, if the Master shall shut down or not, when it lost the contact to at least one device, is configurable in FB 1131 configuration tool or in the bus parameter download procedure. After the Master has shut down only a warm- or coldstart can reactivate the communication again.
CTRL	CONTROL-ERROR Configuration or heavy runtime error. Some of them can occur during startup procedure of the Master. For example if the DeviceNet controller of the Master card do not respond or the configuration of FB 1131 has inconsistencies.

Table 9: Meaning of collecting status bits in the Global State Field

Further displays are:

Collective online error location and corresponding error indicate the address of the faulty station and the pending error in plain text. **Statistical bus information** indicates the number of the detected bus short-circuits an rejected telegrams.

Devices specific status bits:

These display the **parameterized devices**, the **active devices** or **the devices with diagnostic** according to the activated switching surface. A pending diagnostic information can be received by a double click on the respective station.

This display is cyclically updated.

6.5.5 Extended Device Diagnostic

The extended device diagnostic helps to find bus and configuration errors when the FB 1131 menu functions are of no further help.

First select the device 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, status information and parameters:

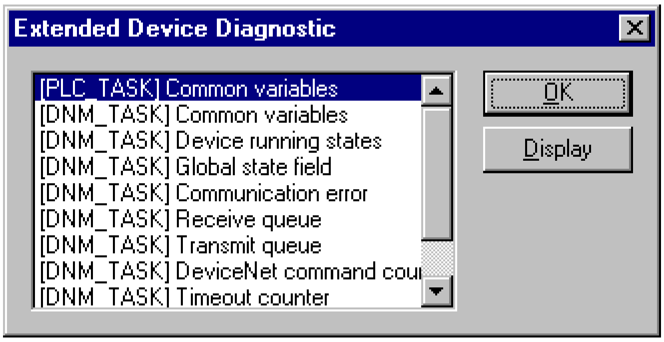


Figure 32: Extended Device Diagnostic by the example of DeviceNet Master

First the specification for the DeviceNet Master and far down for the DeviceNet Slave follows.

For DeviceNet Master

PLC_TASK: DeviceNet Administration

DNM_TASK: Application interface (PCP Channel)

Task / Task State	**Page**	**DNM**
PLC_TASK Common Variables	*63*	X
DNM_TASK Common Variables	*64*	X
DNM_TASK Device running states	*65*	X
DNM_TASK Global state field	*65*	X
DNM_TASK Communication error	*65*	X
DNM_TASK Receive queue	*66*	X
DNM_TASK Transmit queue	*67*	X
DNM_TASK DeviceNet command counter	*68*	X
DNM_TASK Timeout counter	*69*	X
DNM_TASK Init counter	*69*	X

Table 10: DeviceNet Master Task State

6.6 Use Data Transfer

The following table shows test functions with user data transfer and the usability for DeviceNet Master.

Use data transfer function	**Usage**	**Usable with DeviceNet Master devices**
Get Device Attribute and *Set Device Attribute*	Read or write data (objects)	Yes

Table 11: Overview User Data Transfer

6.7 DeviceNet Services

6.7.1 Get Device Attribute

This menu selection enables the user to get/receive attribute related information from a Slave device. The user should be familiar with the supported Class, Instance, and Attribute entrees for the Slave device. These entries should be available within the suppliers data sheet for the Slave product. The return value will be represented in Hexadecimal. Clicking the ASCII button will change this value to ASCII text. The Hexadecimal code can be resorted by clicking now the Hex button. Clicking the Get button will receive the Value from the device.

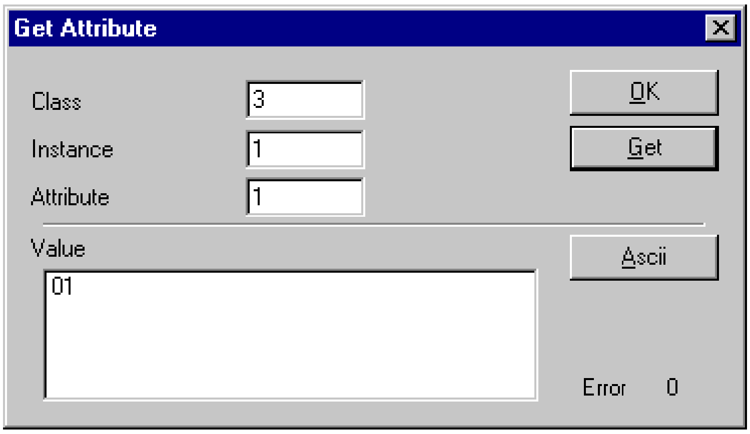


Figure 33: Get Attribute window

6.7.2 Set Device Attribute

This menu selection enables the user to set a attribute related to a Slave device. The user should be familiar with the supported Class, Instance, and Attribute entrees for the Slave device. These entrees should be available within the suppliers data sheet for the Slave product. The Value will be represented in Hexadecimal. Clicking the Set button will send the information to the Slave device.

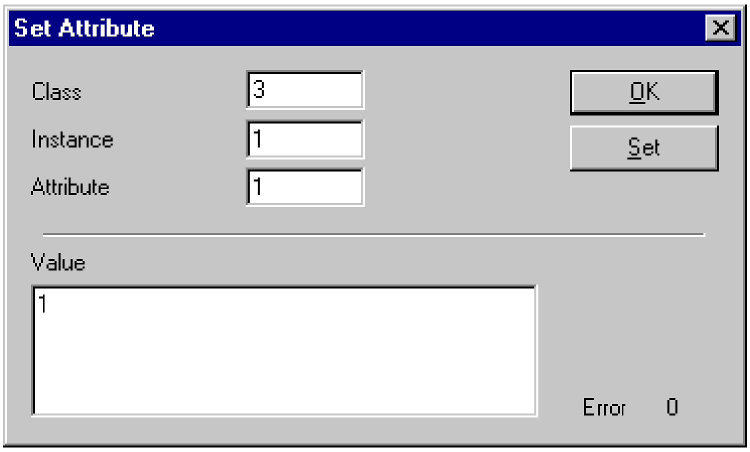


Figure 34: Set Attribute window

6.7.3 Change MAC-ID

To change a MAC-ID of a DeviceNet devie (slave) you have to open the Live List. This is described in section *Change MAC-ID* on page *38*.

7 File, Print and View

7.1 File

7.1.1 Open

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

7.1.2 Save and Save As

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

7.1.3 Close

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

7.2 Print

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

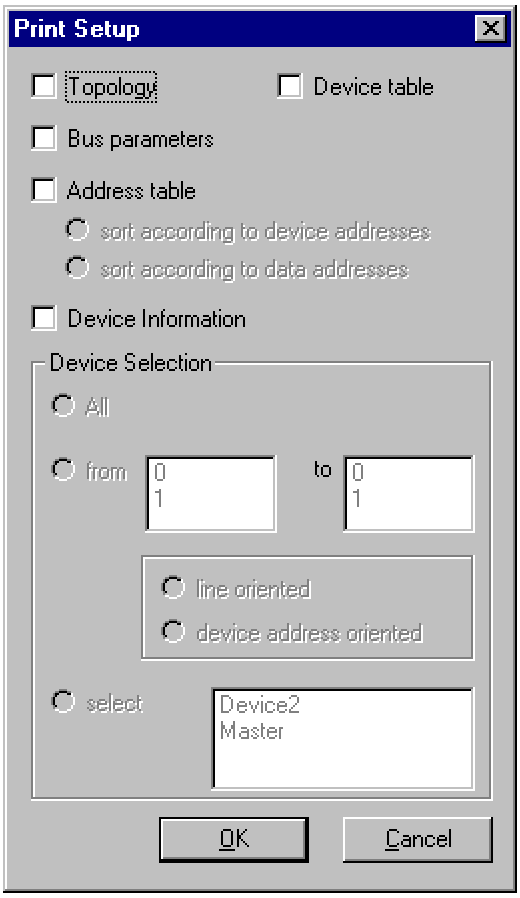


Figure 35: File > Print

Topology the topology of the Bus system.

Bus parameters prints 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.

7.3 View of the Configuration

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

- Device Table
- Address Table (Occupation of the process image memory in the DeviceNet Master)

7.3.1 Device Table

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

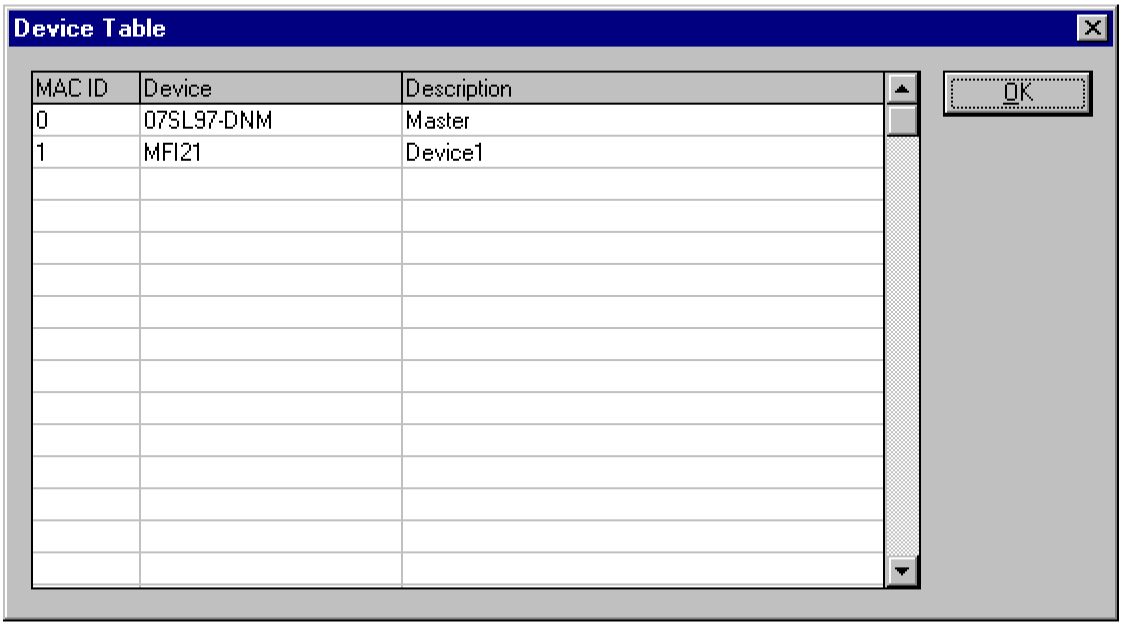


Figure 36: View > Device Table

7.3.2 Address Table

A list of all addresses used in the process depiction is displayed in the **View > Address table** menu.

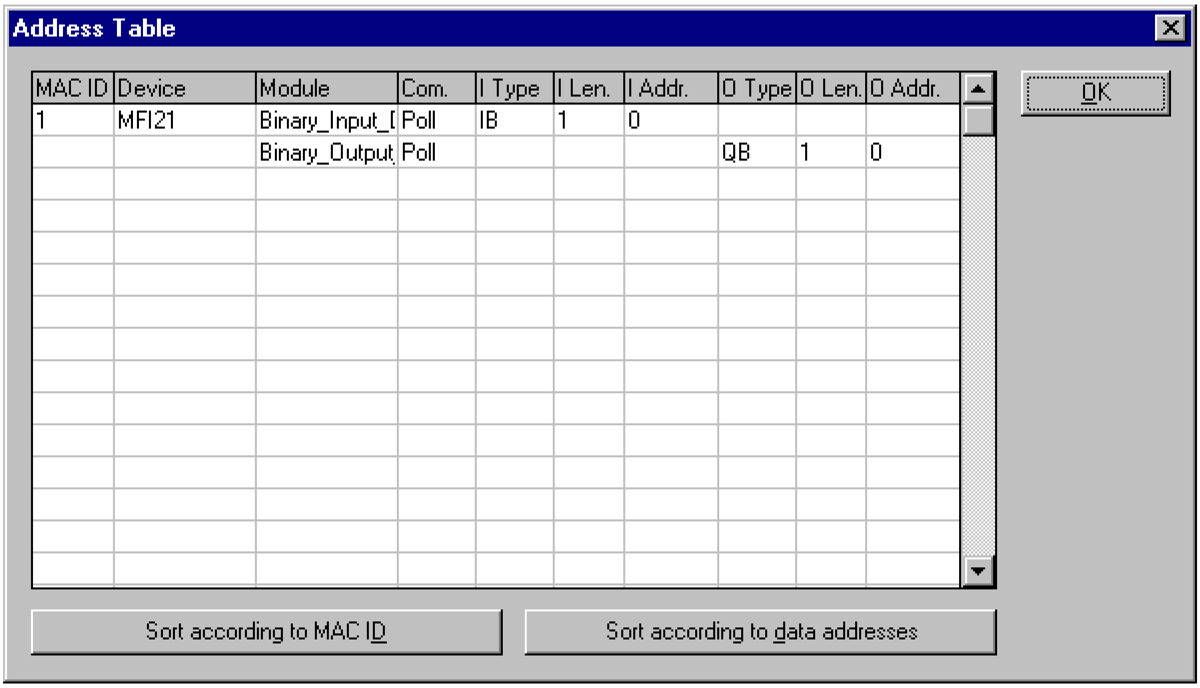


Figure 37: View > Address Table

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

8 Error Numbers

8.1 Possible Control Error Messages to FB1131 Telegrams

Error Number	Description
401	Driver error in the control
402	slot number is not supported by the hardware
403	no coupler at the given slot
404	control not in STOP
405	configuration data invalid
406	coupler still configured by 907 AC 1131-internal PROFIBUS Configurator
407	answer timeout of the coupler

Table 12: Possible Control Error Messages to FB1131 Telegrams

8.2 RCS Error Numbers (4 .. 93)

This is the list of error numbers returned by the RCS (Realtime Communication System), that is the operating system of couplers. The error number is returned in an answer message. Command messages and answer messages are used to communicate between the application (e.g. the Fieldbus Configurator) and the coupler. An example of this communication is the download of a configuration.

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

Table 13: RCS error numbers (answer message) (4..39)

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

Table 14: RCS error numbers (answer message) (40..93)

8.3 Database Access Error Numbers (100 .. 130)

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

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

Table 15: Database Access Error Numbers (100..130)

8.4 Online Data Manager Error Numbers

8.4.1 Online Data Manager Error Numbers (1000 .. 1018)

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

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

Table 16: Online Data Manager Error numbers (1000..1018)

8.4.2 Message Handler Error Numbers (2010 .. 2027)

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

Error Number	Description
2010	Message handler: 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
2026	Message handler: Wait for Delete
2027	Message handler: No cyclic Message

Table 17: Error Numbers of the Message Handler of the Online Data Manager (2010..2027)

8.4.3 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 18: Error Numbers of the Driver Functions of the Online Data Manager (2501..2512)

8.4.4 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
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 19: Subfunction Error Numbers of the Driver Functions of the Online Data Manager (8001..8035)

8.5 Data Base Functions Error Numbers (4000 .. 4199)

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 20: 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 an other function
4042	New length of data base is smaller than used
4043	Unknown access mode
4044	Old data base has to be converted
4045	Error while converting. Function not known
4046	Unknown type in set 0 found
4047	No float function available
4048	Function not in RCS module
4049	Check failed
4050	Checksum check failed
4051	More segments are existing in file, than in the structure FILE_INFO_T in wMaxEintraege
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 21: 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	Initialising 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 22: 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 exists
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 23: Error numbers of converting functions (4082..4199)

8.6 Converting Functions Error Numbers (5001 .. 5008)

The following table lists the error numbers of converting functions.

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

Table 24: Error Numbers of data base functions (5000 .. 5012)

9 Appendix

9.1 Extended Device Diagnostic Master

On the following pages the task state structures of DeviceNet Master are described.

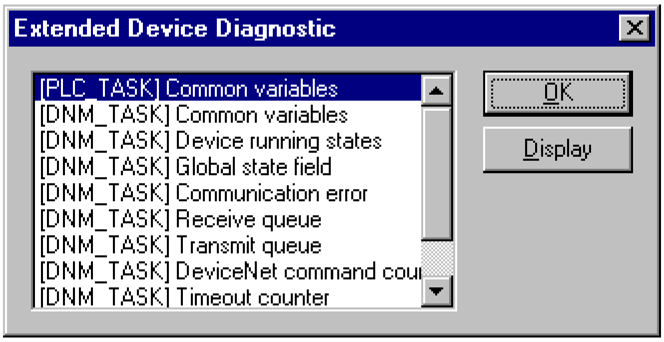


Figure 38: Online > Extended Device Diagnostic

9.1.1 PLC_TASK Common Variables

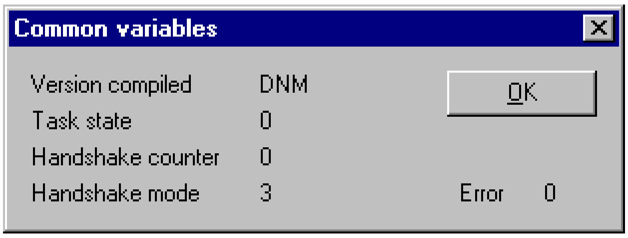


Figure 39: PLC_TASK Common Variables

Variable	Meaning
Version Compiled	Hardware
Task State	Task State
Handshake Counter	Counter for the performed process data handshakes
Handshake Mode	This value represents the actual handshake mode between application and CIF. 0 = Bus synchronous, Device Controlled 1 = Buffered, Device Controlled 2 = No consistence, Uncontrolled 3 = Buffered, Host Controlled 4 = Bus synchronous, Host Controlled 5 = Buffered, extended host controlled

Table 25: PLC_TASK Common Variables

9.1.2 DNM_TASK Common Variables

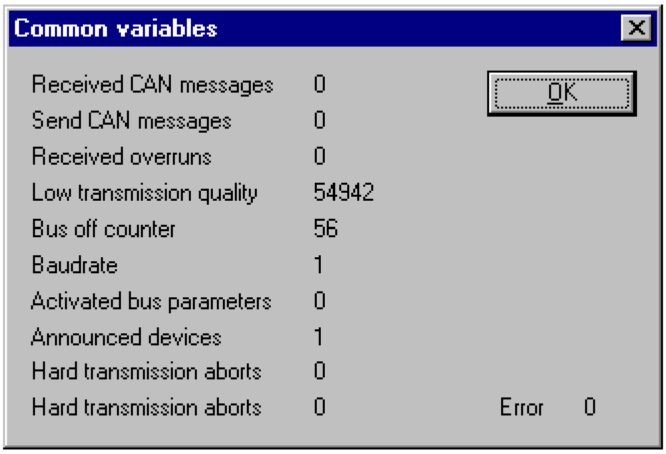


Figure 40: DNM_TASK Common Variables

Variable	Meaning
Received message	number of received CAN-messages
Sent messages	number of sent CAN-messages
Receive overruns	this counter is incrementing when to many incoming CAN messages overload the Master. An incremented counter will always cause lost CAN message data, so it should normally contain the value 0
Received Overruns	our DeviceNet controller has two internal error frame counter for detected
Low Transmission Quality	if the internal DeviceNet controller error frame counter overstep a defined limit
Bus Off Counter	This number will increment when the bus is off or not powered during bus cycles
Baudrate	this value shows numeric the actual baudrate the Master is working with (, 1 = 500kBaud, 2 = 250Kbaud, 3 = 125kBaud)
Activated bus parameters	value 0, the Master has found a configuration data base coming from FB 1131, value 1, the Master device isn't configured and need to be configured via FB 1131
Announced Nodes	this value represents the number of found device data sets in the download database
Wrong parameters	this value indicates, if the Master has detected errors in a device data set which was a containment of the actual downloaded database. For each Slave device that has a wrong entry the counter is incremented by 1
Hard Transmission Aborts	this value indicates transmission aborts by the Master

Table 26: DNM_TASK Common Variables

9.1.3 DNM_TASK Device running states

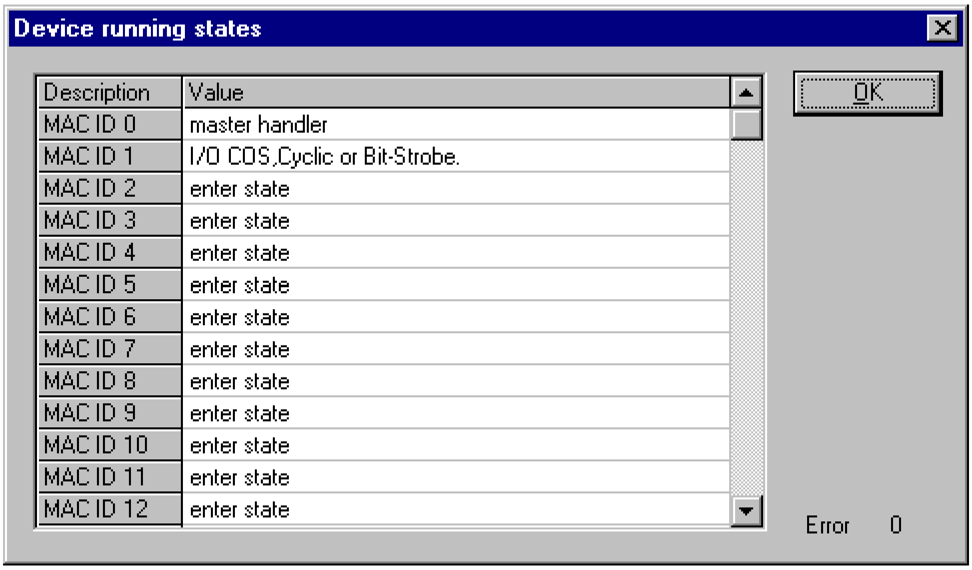


Figure 41: DNM_TASK Device running states

To handle the Slave devices in their different states the Master device has a Slave device handler running, where each Slave device has its own actual running state. FB 1131 interprets what the actual state of each Slave and enters these states on the screen in textual form.

9.1.4 DNM_TASK Global state field

See in section *Global State Field* at page *41*.

9.1.5 DNM_TASK Communication error

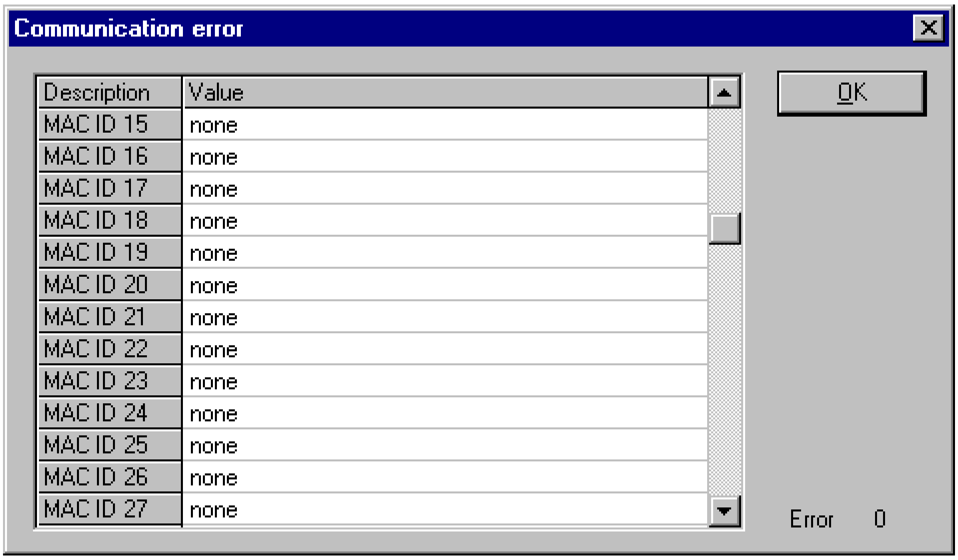


Figure 42: DNM_TASK Communication error

For each Slave device the Master has an internal online error buffer. FB 1131 interprets the actual error condition and prints it on the screen in textual form.

9.1.6 DNM_TASK Receive queue

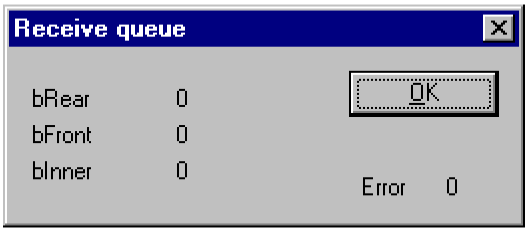


Figure 43: DNM_TASK Receive queue

The Receive Queue is used to monitor the receive transmission queue of the internal CAN controller.

Variable	**Meaning**
bRear	A pointer to where the next message will be dequeue from the queue body
bFront	A pointer to where the next message will be stored
bInner	The actual number of stored messages

Table 27: DNM_TASK Receive queue

9.1.7 DNM_TASK Transmit queue

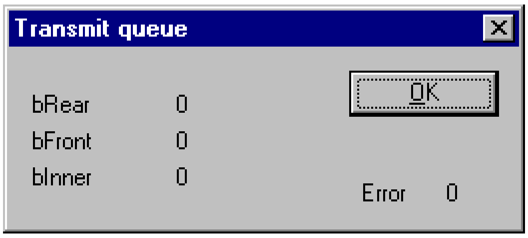


Figure 44: DNM_TASK Transmit queue

The Transmit Queue is used to monitor the transmission queue of the internal CAN controller.

Variable	**Meaning**
bRear	A pointer to where the next message will be dequeue from the queue body
bFront	A pointer to where the next message will be stored
bInner	The actual number of stored messages

Table 28: DNM_TASK Transmit queue

9.1.8 DNM_TASK DeviceNet command counter

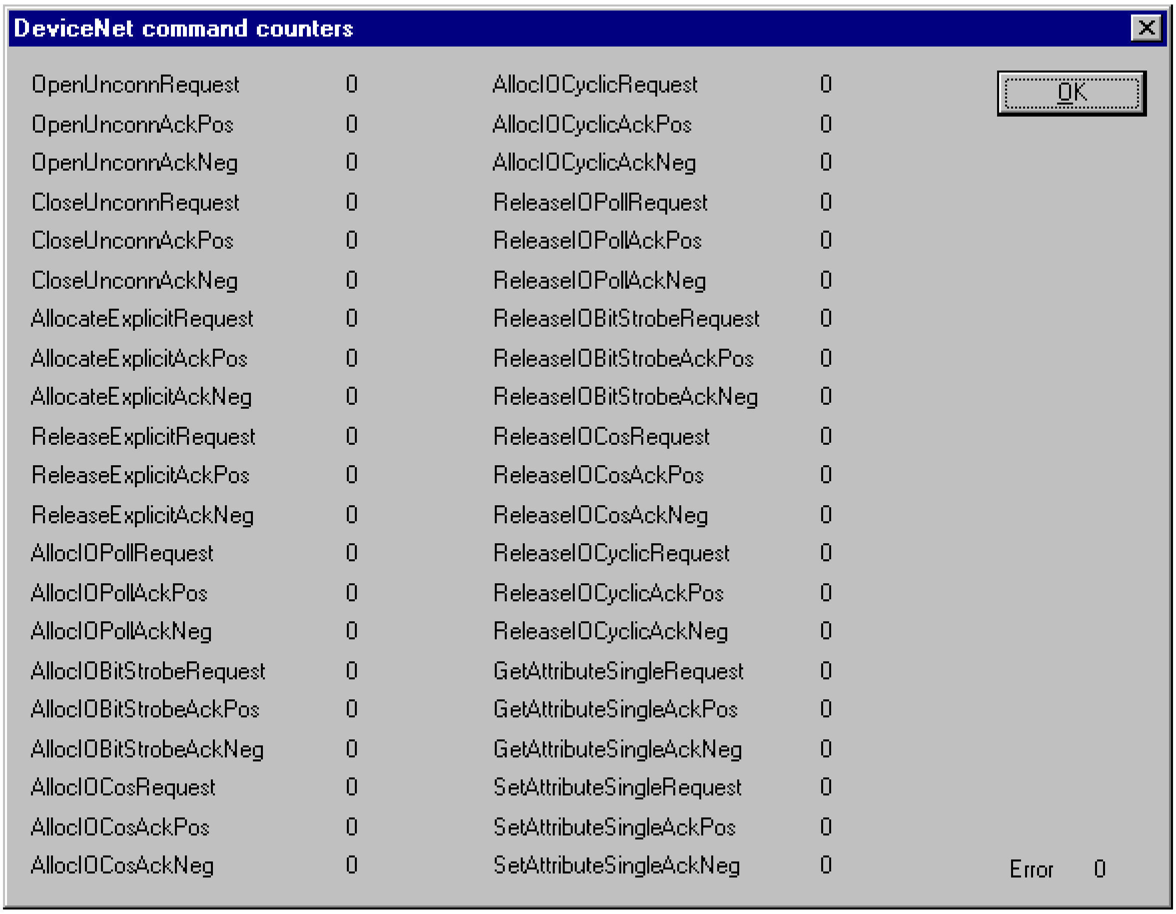


Figure 45: DNM_TASK DeviceNet command counter

The DeviceNet command counters dialog box shows a listing of the DeviceNet specific commands used by the controller and there associated usage count.

9.1.9 DNM_TASK Timeout counter

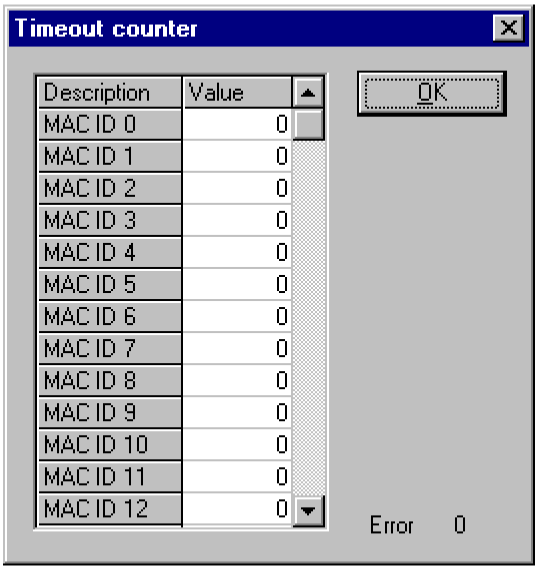


Figure 46: DNM_TASK Timeout counter

The Timeout Counter shows the number of timeouts for each Slave device configured in the DeviceNet bus system.

9.1.10 DNM_TASK Init counter

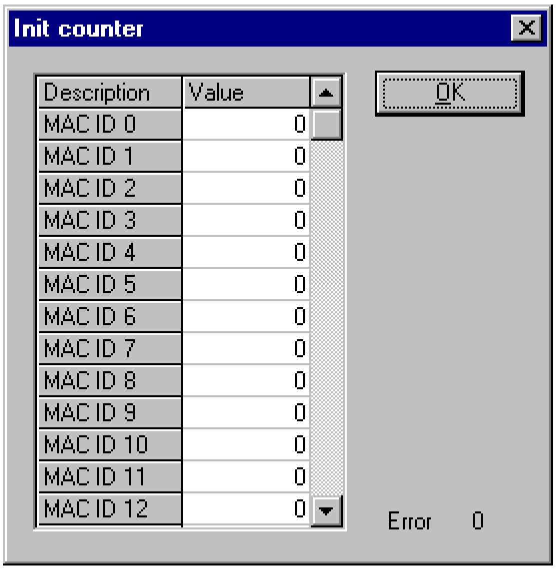


Figure 47: DNM_TASK Init counter

The Device init counter is incremented whenever the Slave device is initialized. Normally the counter must show the value 1 for each configured Slave, but if a Slave is detected as inactive during the diagnostic procedure, then the Master tries to reinitialise the Slave again. If this happens the Slave init counter is incremented by a value of 1. So values larger then 1 are an indication for communication error to the corresponding Slave.

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Operating Instruction Manual

907 FB 1131

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4	04.09.01	2.700 INTERBUS.DLL 2.638 FB 1131.EXE	all	InterBus device counting starts with 0
5	24.01.02	2.701 INTERBUS.DLL 2.6383 FB 1131.EXE	all 7.3.2 7.7 10.3	revised Chapter: CSV Export added Chapter: View Menu FB 1131 added Chapter: Length- and ID Codes added
6	25.11.02	2.701 INTERBUS.DLL 2.6383 FB1131.exe	2	revised

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1 Overview FB 1131

1.1 Main Functions

The main functions of the InterBus Fieldbus Configurator are:

Function	**Section**	**Short Description**
Configuration	*Overview Communication Types*	Overview communication types and description of the configuration steps
	Automatic Network Scan	Scans the network
Diagnostic	*Diagnostic Functions*	Diagnostic functions, Debugger, Global State Field etc.
	User Data Transfer	I/O Monitor, I/O Watch, PCP Monitor, Message Monitor
Documentation	*Project Information*	Set the project information
	Print	Print out the configuration

Table 1: FB 1131 Main Functions

1.2 Properties

FB 1131 is an universal Fieldbus Configurator

This means you can configure the most important fieldbus systems like PROFIBUS, InterBus and DeviceNet with the same tool.

FB 1131 is a global Fieldbus Configurator

You configure all devices with one tool. FB 1131 checks the dependencies between the devices. FB 1131 only allows configurations that make sense. In case of doubt FB 1131 will give you a warning.

FB 1131 documents your Fieldbus system

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

FB 1131 uses standardized configuration files

Some protocols support standardized files containing information about all features and limitations of the Slave device. FB 1131 uses these files for the configuration.

FB 1131 is a diagnostic tool

After the configuration you can switch FB 1131 into the diagnostic mode. You can watch all status information of couplers, see protocol dependent diagnostic information. In this case a Slave is not operating correctly will be displayed in a different colour.

2 Installation and Licensing

2.1 System Requirements

- PC with 486-, Pentium processor or higher
- Windows 95/98/ME, Windows NT 4.0/2000/XP
- Free disk space: 30 - 80 MByte
- CD ROM drive
- RAM: min. 16 MByte
- 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 Software Installation

Close all application programs on the system!

Insert the 907 AC 1131 CD in the local CD ROM drive. If "Autorun" is enabled on the PC the CD menu will start automatically. Otherwise it is started by starting the file "CD_Menu_Vxx.exe" in the root directory of the CD. For example by the menu **Start > Run** and entering "[X:]\CD_Menu_Vxx.exe" ([X] is the CD rom drive and Vxx stands for the version number).

You reach the Installation menu of the CD by operating the **Installation 907 AC 1131 Vxx** button.

With the menu Notes for Installation you get a description of the innstallation and the components of the 907 AC 1131, the programming software, the Fieldbus Configurator 907 FB 1131, OPC Server.

Note: Administrator privileges are required on Windows NT/2000/XP systems for installation of the Fieldbus Configurator 907 FB 1131!

3 Getting Started – Configuration Steps

3.1 Overview Communication Types

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

Communication	Device	Device	Described in section	Page
InterBus (I/O)	ABB InterBus Master	Any InterBus Slave	*Configuration InterBus Master to any InterBus Slave*	*12*
InterBus PCP	ABB InterBus PCP Master	Any InterBus PCP Slave	*Configuration InterBus PCP Master to any InterBus PCP Slave*	*13*

Table 2: Overview Communication Types

3.2 Configuration InterBus Master to any InterBus Slave

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

#	Action	Menu in the Fieldbus Configurator	Detail information in section	Page
1	Create a new project	**File > New > InterBus**	*Setting up the InterBus Configuration*	*15*
2	Choose InterBus Master	**Insert > Master**	*Insert Master*	*16*
3	Choose InterBus Slave	**Insert > Remote Bus Branch Interface** or **Insert > Local Bus Branch Interface** or **Insert > Remote Bus Device** or **Insert > Local Bus Device**	*Insert InterBus Slave*	*18*
4	Assign the input and output modules	Mark the Slave (left Mouse click), then **Settings > Slave Configuration**	*Slave Configuration*	*20*
5	Assign the offset addresses			
6	Set device assingment, if no automatic assignment has occured	Mark the Master (left mouse click), then **Settings > Device Assingment**	*Gateway Driver*	*29*
7	Save project	**File > Save**	*Save and Save As*	*55*
8	Download	Mark the Master (left Mouse click), then **Online > Download**	*Downloading the Configuration*	*37*
9	Start Debugger	Mark the Master (left Mouse click), then **Online > Start Debug Mode**	*Debug Mode (InterBus* Master)	*43*
10	Device diagnostic	Mark the Slave (left Mouse click), then **Online > Device Diagnostic**	*InterBus Slave Device Diagnostic*	*44*
11	Stop Debugger	**Online > Stop Debug Mode**	*Debug Mode (InterBus* Master)	*43*
12	Global Diagnostic	Mark the Master (left Mouse click), then **Online > Global State Field**	*Global State Field*	*46*

Table 3: Steps for Configuration InterBus Master to any InterBus Slave

3.3 Configuration InterBus PCP Master to any InterBus PCP Slave

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

#	Action	Menu in the Fieldbus Configurator	Detail information in section	Page
1	Create a new project	**File > New > InterBus**	*Setting up the InterBus Configuration*	*15*
2	Choose InterBus PCP Master	**Insert > Master**	*Insert Master*	*16*
3	Choose InterBus PCP Slave	**Insert > Remote Local Bus Device**	*Insert InterBus Slave*	*18*
4	Set InterBus PCP Parameter	Mark the Slave (left Mouse click), then **Settings > Communication Reference List (CRL)**	*Communication Reference List (CRL)*	*23*
5	Set objects	Mark the Master (left Mouse click), then **Settings > Object Directory**	*Object Directory*	*27*
6	Set device assingment, if no automatic assignment has occured	Mark the Master (left mouse click), then **Settings > Device Assingment**	*Gateway Driver*	*29*
7	Save project	**File > Save**	*Save and Save As*	*55*
8	Download	Mark the Master (left Mouse click), then **Online > Download**	*Downloading the Configuration*	*37*

Table 4: Steps for Configuration InterBus PCP Master to any InterBus PCP Slave

4 Configuration of InterBus with FB 1131

4.1 Setting up the InterBus Configuration

To create a new configuration, choose the **File > New** menu. This will offer a selection list of fieldbus systems. Choose the **InterBus**. If only the InterBus 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 EDS Files

EDS (Electronic Data Sheet of a device) files contain and describe the functions and characteristics of InterBus devices. All the available EDS files together from the device database.

When the Fieldbus Configurator is started, the program automatically retrieves all the EDS files stored in the EDS directory. The device names for example are placed into an internal list. During the configuration, the device-specific data is retrieved directly from the EDS files.

If an EDS file for a device is needed which does not appear in the selection list, you can generate with the Fieldbus Configurator in the menu **Tools > EDS Generator** an EDS file (see section *EDS Generator* on page *64*). If an EDS file was already generated then the EDS file can be copied into the EDS directory with **File > Copy EDS**. Another possibility is to copy the EDS file into the FB 1131 EDS directory with the Windows Explore and then retrieve the EDS files into the EDS directory with **Settings > Path** and **OK**.

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

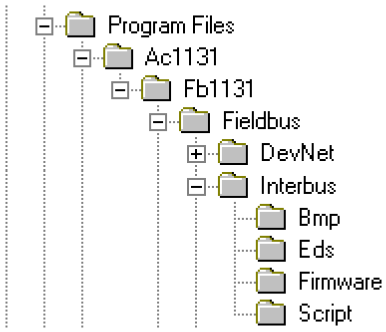


Figure 1: EDS files and bitmaps directory

The EDS files for ABB STOTZ-KONTAKT devices as well as devices from other manufacturers are already included in the scope of delivery and installed. The files are based on no standard and couldn't obtained from other manufacturers because of this reason.

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

4.3 Master

4.3.1 Insert Master

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

Insert > Master

Figure 2: Insert > Master Symbol

The window opens from which exactly one Master can be chosen. After this selection the chosen master is at the first position in the configuration window.

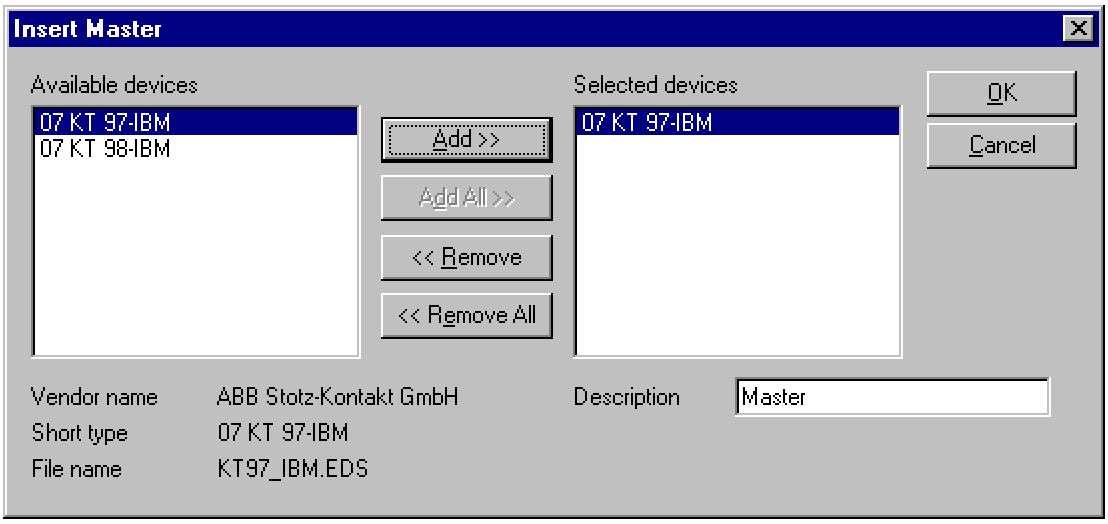


Figure 3: Insert > Master

This example shows a 07 KT 97-IBM. It gets no Station address but the standard description **Master**. This description is changeable in this window.

4.3.2 Replace Master

If a Master already exists in the configuration and should be replaced against another Master, you first have to set the focus on the Master (left mouse click at the Master) and then choose the menu **Edit > Replace**. In the opened window appears the question if the Master should be replaced.

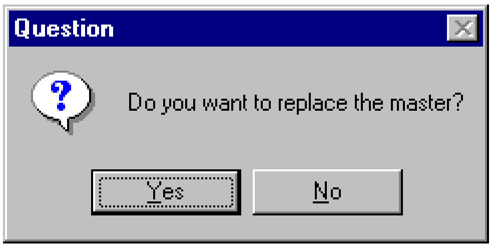


Figure 4: Security question replace Master

If you click the button **Yes** a new window opens, where you can replace the Master against the existing Master.

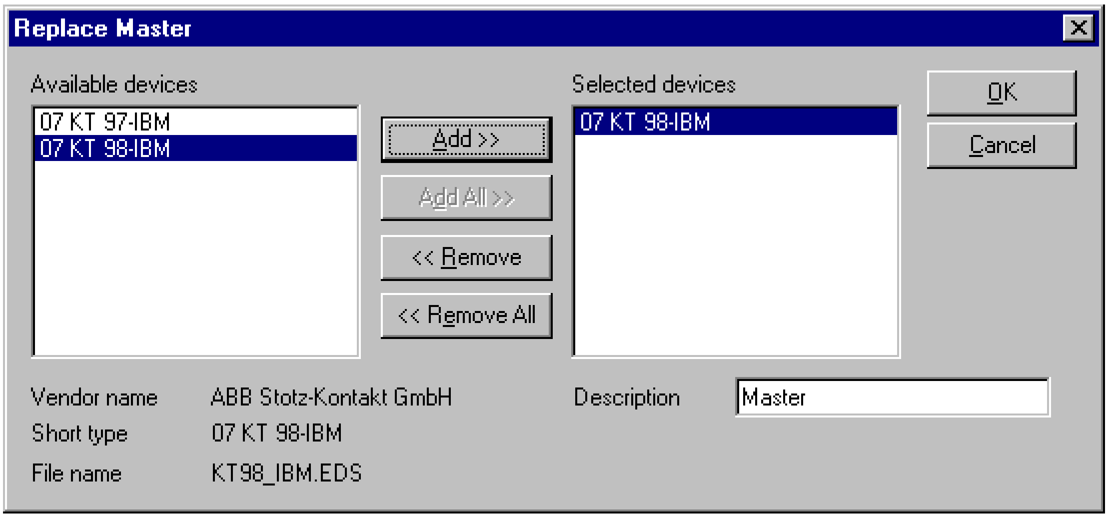


Figure 5: Edit > Replace Master

In this window you select the Master you want by clicking on it and then click the **Add** button to put the Master to **Selected devices**. With **OK** you confirm the selection and the Master will be replaced.

4.4 InterBus Slave

4.4.1 Insert InterBus Slave

In order to insert an InterBus Slave into the configuration, choose the **Insert > Remote Bus Branch Interface, Insert > Local Bus Branch Interface, Insert > Remote Bus Device, Insert > Local Bus Device** menu to open the selection window

or

click on the symbol:

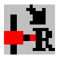
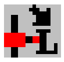
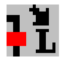
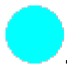
Insert > Remote Bus Branch Interface	**Insert > Local Bus Branch Interface**	**Insert > Remote Bus Device**	**Insert > Local Bus Device**
			

Table 5: Insert an InterBus Slave

The mouse pointer automatically changes to the Insert Slave pointer. First the a mouse pointer for “no insert position” appears.

Mouse pointer “no insert position”


Table 6: Mouse pointer “no insert position“

Possible insert positions are displayed with a coloured circle . If you move the mouse pointer on the coloured circle, it changes into these symbols:

Mouse pointer for Insert > Remote Bus Branch Interface	**Mouse pointer for Insert > Local Bus Branch Interface**	**Mouse pointer for Insert > Remote Bus Device**	**Mouse pointer for Insert > Local Bus Device**
			

Table 7: Mouse pointer for insert an InterBus Slave

Click on the position where the Slave is to be inserted.

Figure 6: Possible insert positions of devices with identification by a coloured circle

The window opens where one or more Slaves could be selected.

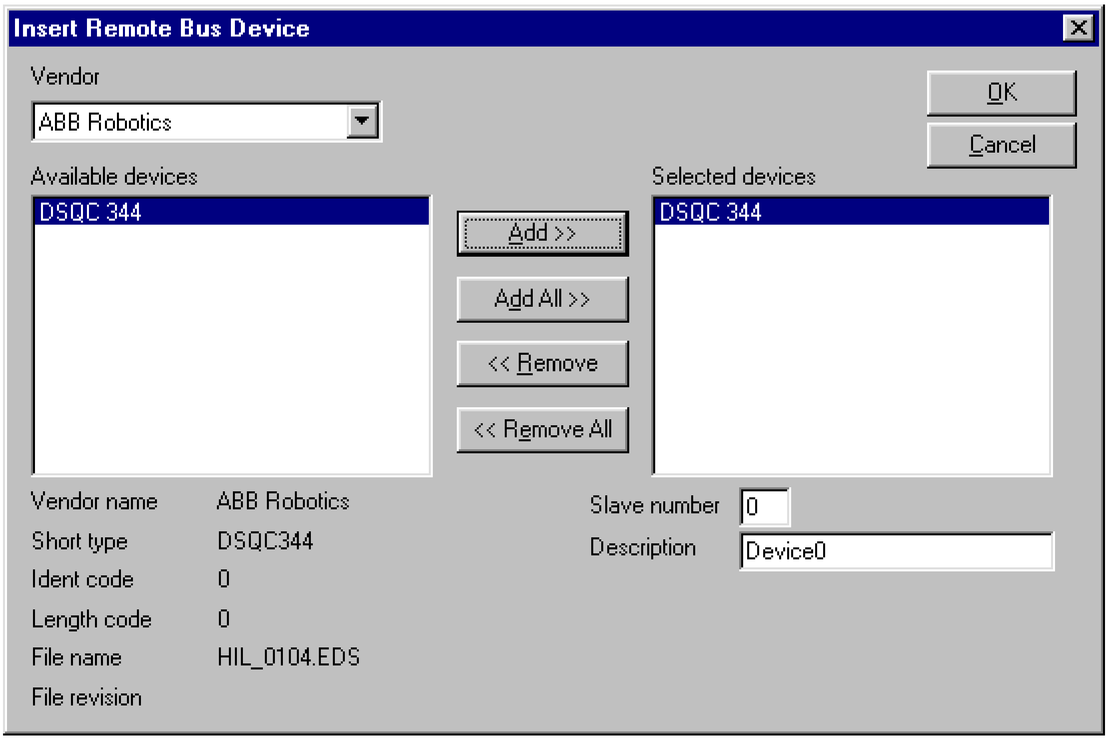


Figure 7: Insert > Remote Bus Device

The list on the left displays for selection all the Slave devices whose EDS files have been put in the EDS directory. A filter can be used to limit the selection list of the manufacturer. Further information on a Slave is shown below the selection list (**Available Slaves**) when it is selected (one mouse click). Apart from the manufacturer name and the description especially the ID-Code, the Length-Code, the file name and the file revision are given. The Slave appears on the right-hand list with a mouse click or with the **Add** button. All devices in the right-hand list are assigned to the current insert point 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 assigned a name in the **Description** field.

4.4.2 Slave Configuration

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

or

open the Slave configuration window by double clicking on the Slave device.

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

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

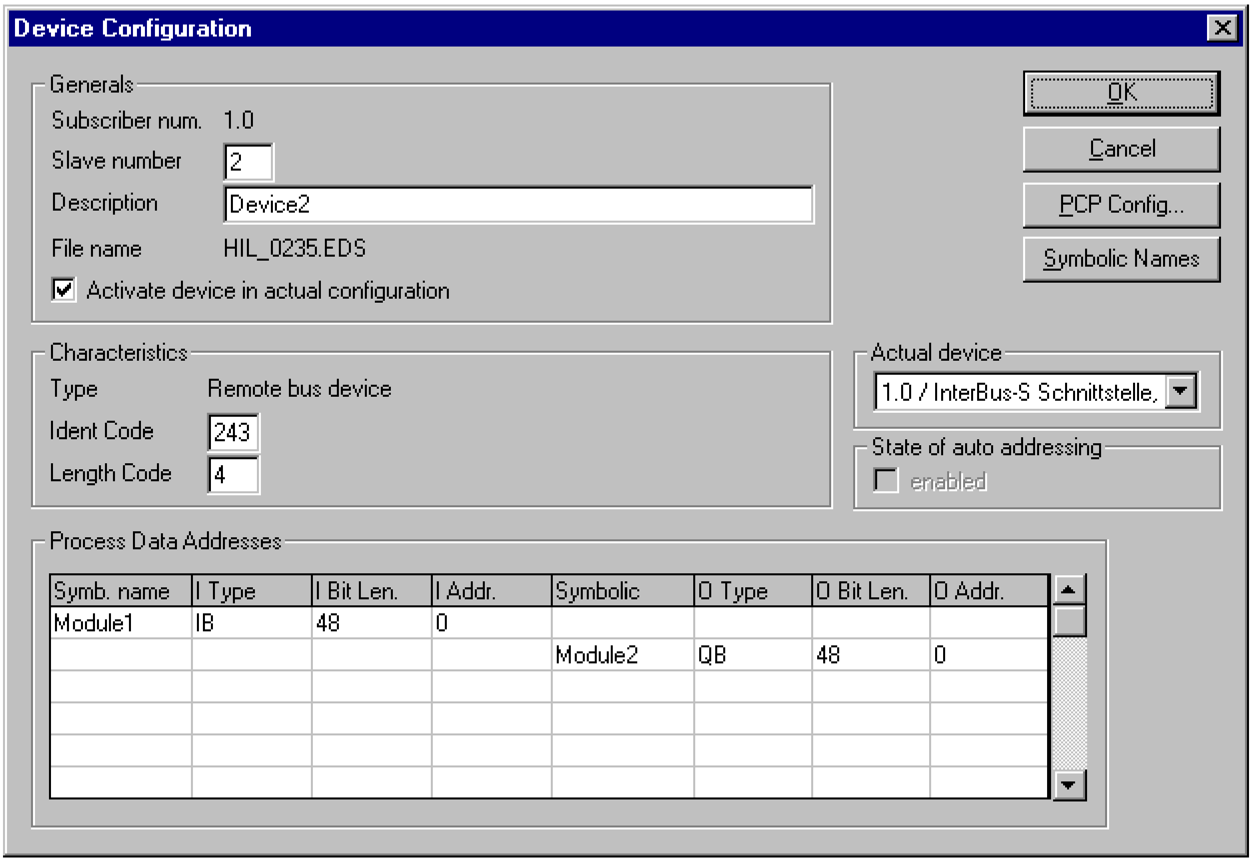


Figure 8: Settings > Slave Configuration

The device-specific configuration is carried out here. These are in detail:

- a **Description** of the device,
- **activate** or **deactivate** the Slave in the actual configuration,
- configurating the **Process Data Addressing** (see following description)
- selecting an other device without leaving the window
- changing the settings for the Parameter Data Channel with the **PCP Config...** button, if the device is PCP capable. You first have to set the focus on the Slave (left mouse click) and select the menu **Edit > Replace.** The *Parameter Data Channel (PCP* is described in an own section *on page 23*.

If **Activate device in actual configuration** is selected, the Master carries out an data exchange to this device. Is this setting deactivated, then the master doesn't carry out a data exchange to this device. In both cases however the memory in the process image is used respectively reserved in the Master.

The I/O addresses can be automatically assigned by FB 1131 or can be allocated by the user. For this purpose you have to activate (Auto addressing) and deactivate (manual addressing) respectively it in the menu **Settings > Global Settings** the **Process Data Auto Addressing**. When the Auto Addressing is active, then the addresses of the Slaves will be allocated in their physical order by FB 1131. The addresses can be viewed and checked in the **View > Address Table**. When the Auto addressing is deactivated, then only the address 0 is shown in the **I Addr** or **O Addr** and must be overwritten by the user.

In the state of auto configuration is shown if the Process Data Addressing are placed automatically by FB 1131 (selected) or manual by the user (not selected).

At **actual device** you can change to another Slave device without leaving the window.

Individual InterBus Slave devices can be combined to groups with **the group number**. This is optional. In the field group number you can

- indicate only one number (from 1 to 255)
- also indicate an alternative number (from 1 to 255) apart from the group number in the course of which group number and alternative have to be separated with a hyphen. For example: **2-4** (group 2, alternative 4).

The group number is used to switch devices of one group on and off together.

The alternative number is used to switch on one or another alternative, however not more than one alternatives.

4.4.3 Replace Slave

To replace a Slave device in the configuration against another you first have to set the focus on the Slave (left mouse click at the Slave) and select the menu **Edit > Replace**. In the opened window the question appears if the Slave device should be replaced.

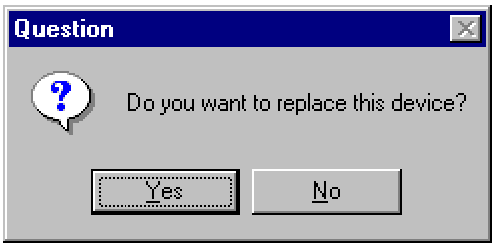


Figure 9: Security question replace device

If you answer this question with **Yes**, the following window appears where you can select an other Slave device.

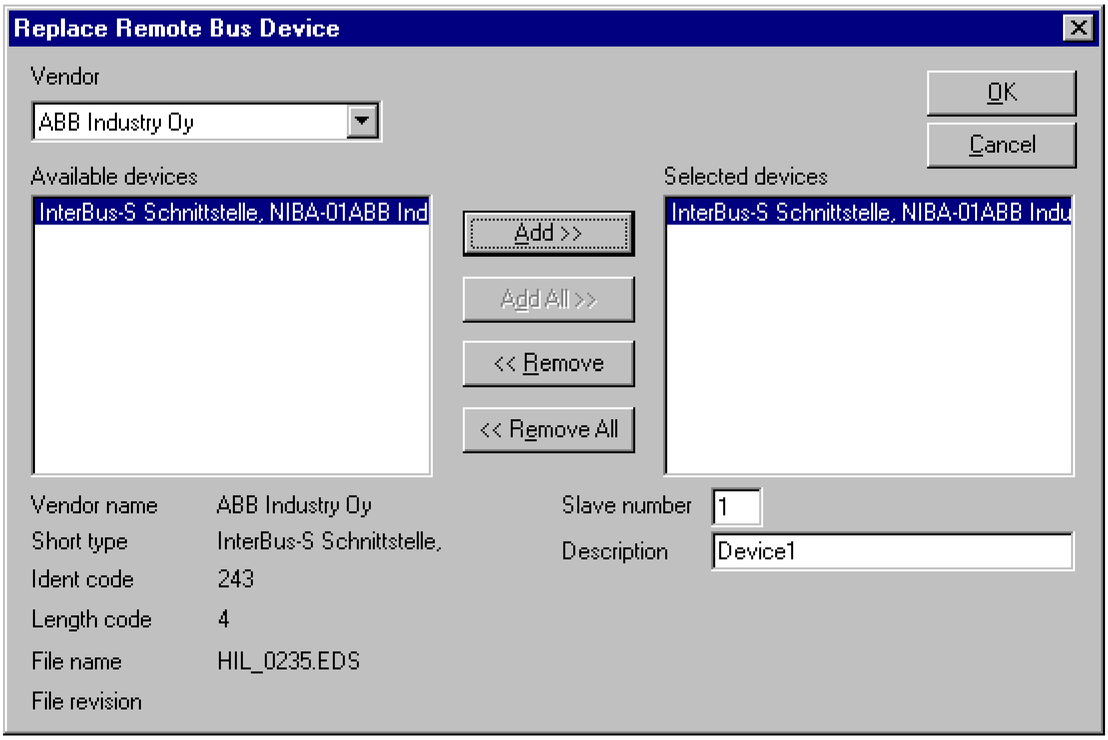


Figure 10: Edit > Replace Device

In this window you can choose the device you want by clicking on it. By clicking the **Add** button the Slave is shown under **Selected devices**. With **OK** you confirm the selection and the Slave will be replaced.

4.4.4 Parameter Data Channel (PCP)

The PCP Channel offers the user data exchange with the functions read and write.

The direction of user data is shown in the following table:

Function	**Direction of user data**
Read	From server to client
Write	From client to server

Table 8: PCP Channel: direction of user data for reading and writing

Before you are able to use the functions read and write you first have to

- Set logic connection (Communication Reference List, CRL) in both devices (see section *Communication Reference List (CRL)* at page *23*) as well as
- Set objects in the sever (see section *Object Directory* at page *27*)

With the Download of the configuration into the ABB InterBus Master the Communication Reference List is loaded into the Master.

4.4.4.1 Communication Reference List (CRL)

Communication between two PCP devices is only possible, when a communication relation is configured between both devices (each device has to be PCP capable). This means both devices get information how to communicate with the other device. This information is saved in a data base, called Communication Reference List (CRL).

The logic connection (Communication Reference CR) can be set from the view of the Master or from the view of the Slave.

From the view point of the Master:

At first you have to mark the Master (left mouse click) and then select the menu **Settings > Communication Reference List...**

or

right mouse click on Master and click on **Communication Reference List...**

A new Communication Reference will be added in the CRL Table with **Add** or **Insert**.

If a new entry is added or insert into an empty CRL table, this entry gets the description CR 2 because CR 1 is used internally.

In **Remote address / device** you can select the remote station for the current **Communication Reference**.

Note: The number of the Communication Reference is the key for the communication.

The difference between CR **Add** and **Insert** is:

With the button **Add** you insert the new entry at the end of the list. With **Insert** the new entry is fitted in at the current position and the other CR in the list move one position forwards.

The following figure shows the typical settings for **Max. SCC**, **Max. RCC, Max SAC**, **Max RAC**, the Client Services, the Server Services, the **Acyclic Control Interval (ACI)** as well as for the **Max. PDU Size Send** and **Max. Size Receive**.

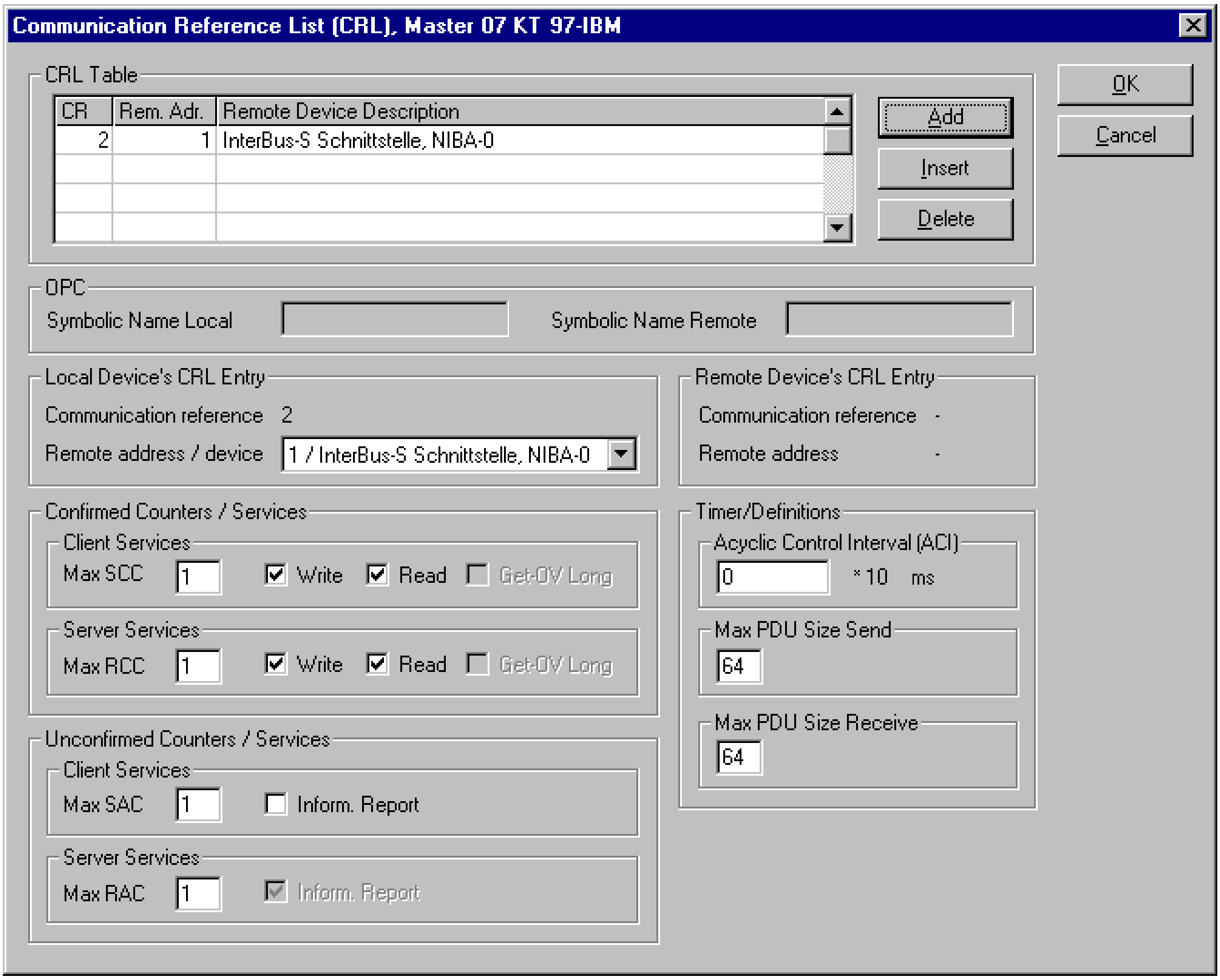


Figure 11: Communication Reference List from the view of the Master

Note: Please note that the permissible settings in the instruction of InterBus Slave device (configuration instructions).

Note: Please note that these settings also exist in the communication partner device!

From the view point of the Slave:

At first you have to mark the Slave (left mouse click) and select the menu **Settings > Communication Reference List...**

or

right mouse click on the Slave and click on **Communication Reference List...**

or

double click on the Slave and press in the window **Device Configuration** the button **PCP Config...** In the following window **PCP Configuration** you have to choose **Device CRL**. Finally confirm with the **OK** button.

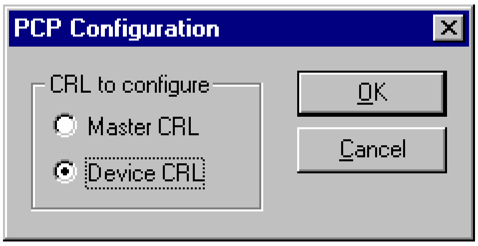


Figure 12: Selection of Master or Device CRL

A window with the CRL of the selected Device appears.

You have to carry out the settings as already described in this section. These settings are from the view point of the Slaves.

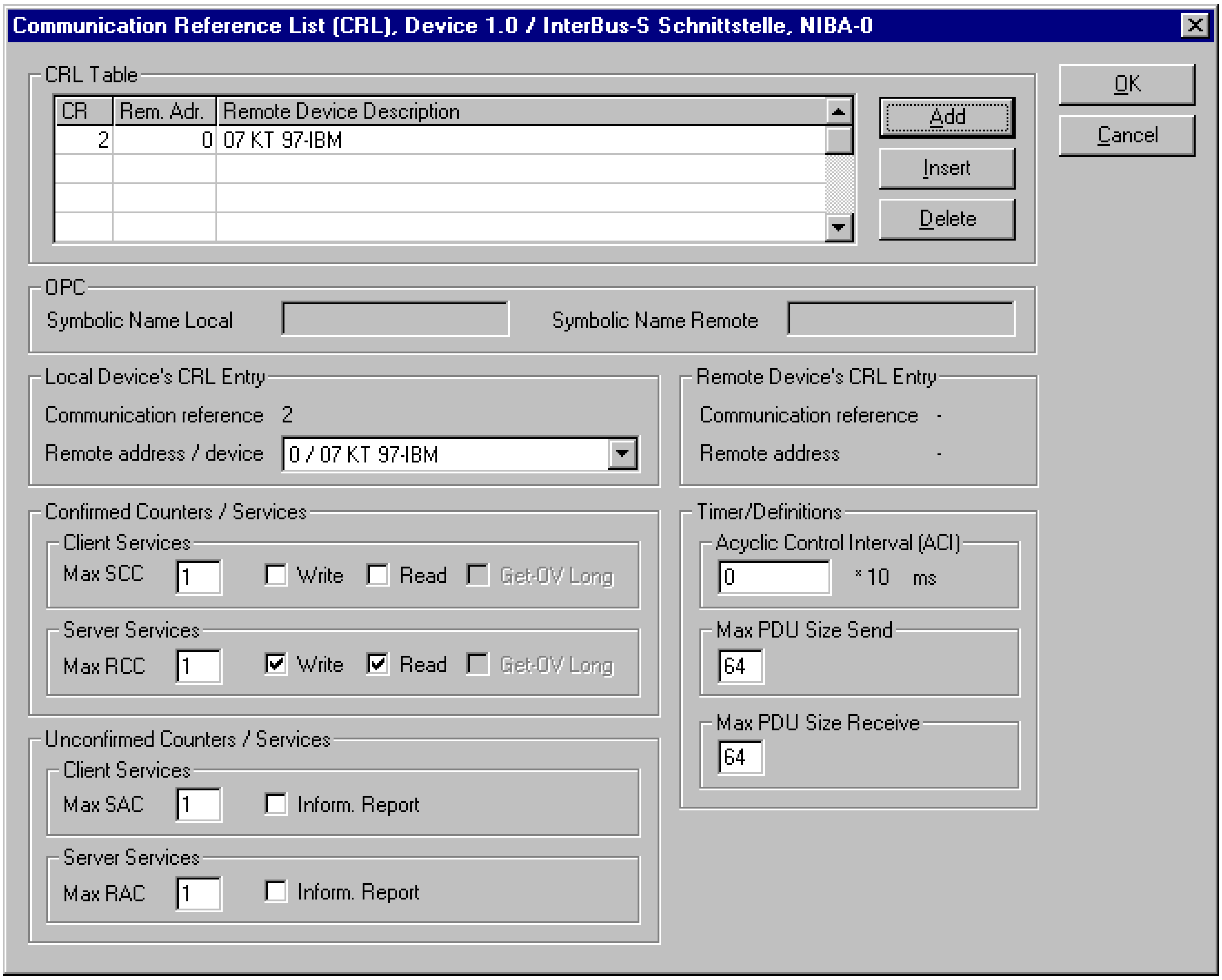


Figure 13: Communication Reference List from the Slaves point of view

4.4.4.2 Object Directory

The Slave expects a description about the objects, which are available in the user application. For this you have to create an **Object Directory**. All configured objects are shown in the window Object Directory. Objects can be added or removed and their specific property can be set.

First mark the Slave (left mouse click) and select the menu **Settings > Object Directory**

or

right mouse click on the Slave and select **Object Directory.**

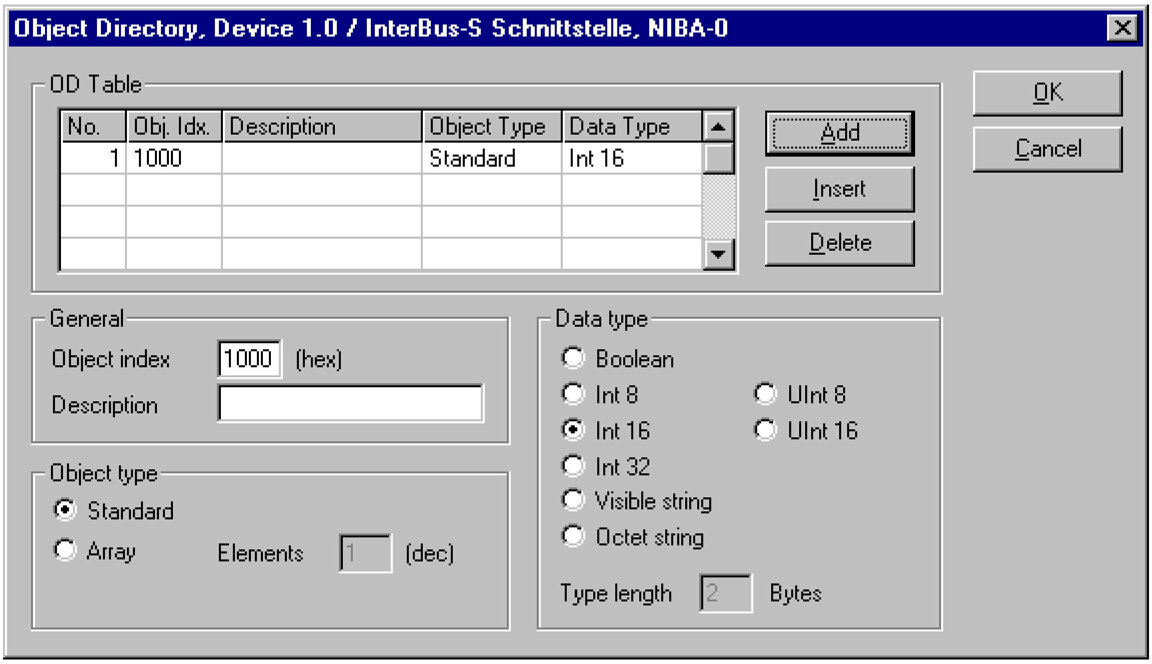


Figure 14: Object Directory single element

Insert a new object into the Object Directory with **Add** or **Insert**.

- General

  The **Objectindex** describes a unique number which is assigned to a definite data object inside the Object Directory of the Slave. You can save a short text as a **description** to each object. Here appears a standard object with the index 1000h.

- Data Type

  The **Data Type** of an object is decisive for it's length. Here you can select different Data Types: Boolean, Int8, Int16, Int32, Uint8, Uint16 and two string Data Types (ASCII in OCTET), which require information for it's **length**.

- Object Type

  Objects can be distinguished according to single element or field. Single element Types (**Standard** Object Types or Single Element) are for example Integer-Variable. On the other hand field Object Types are **Arrays**. Arrays need the information about the number of the available **Elements**.

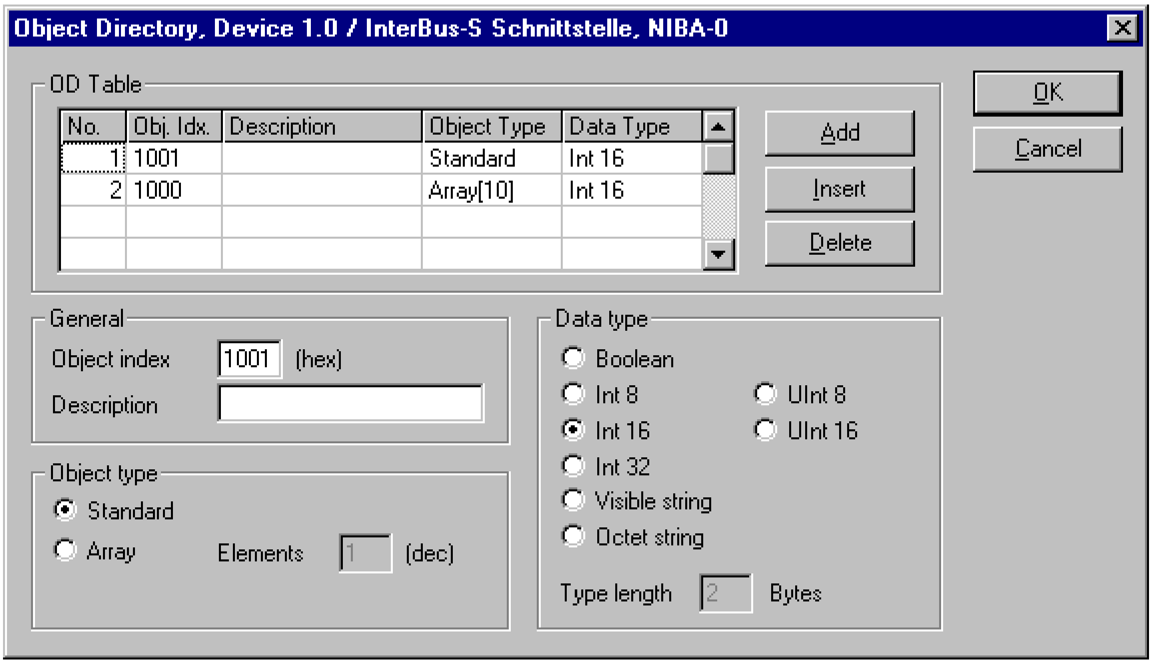


Figure 15: Object Directory Array (field)

5 Settings

5.1 Gateway Driver

The Gateway Driver terminies how the Fieldbus Configurator communicates with the device. This is set in the Device Assignment which can be opened with the menu **Settings > Device Assignment**.

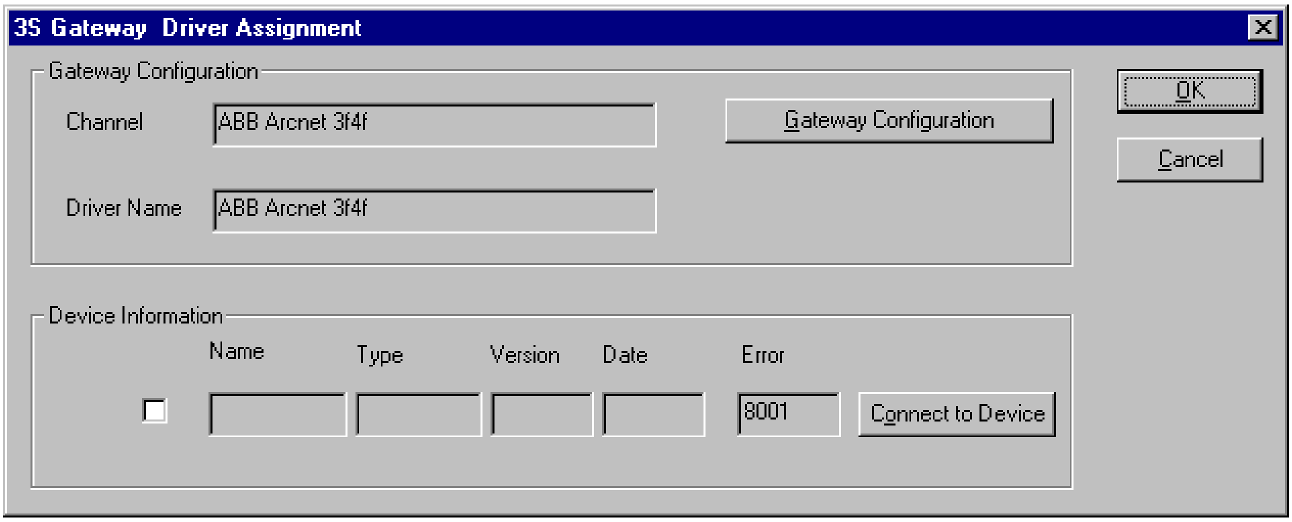


Figure 16: Settings > Device Assignment

After the selection of the Gateway channel or clicking the **Connect** button FB 1131 tries to set up a connection to the selected controller. If the connection was successful the configurable couplers are shown in the field **Device Informatio**n. The desired coupler is selected by clicking on the field next to the name of the coupler and confirming with the **OK** button.

By clicking at the **Gateway Configuration** button a new window appears where the Gateway channel can be selected or a new Gateway channel can be configured.

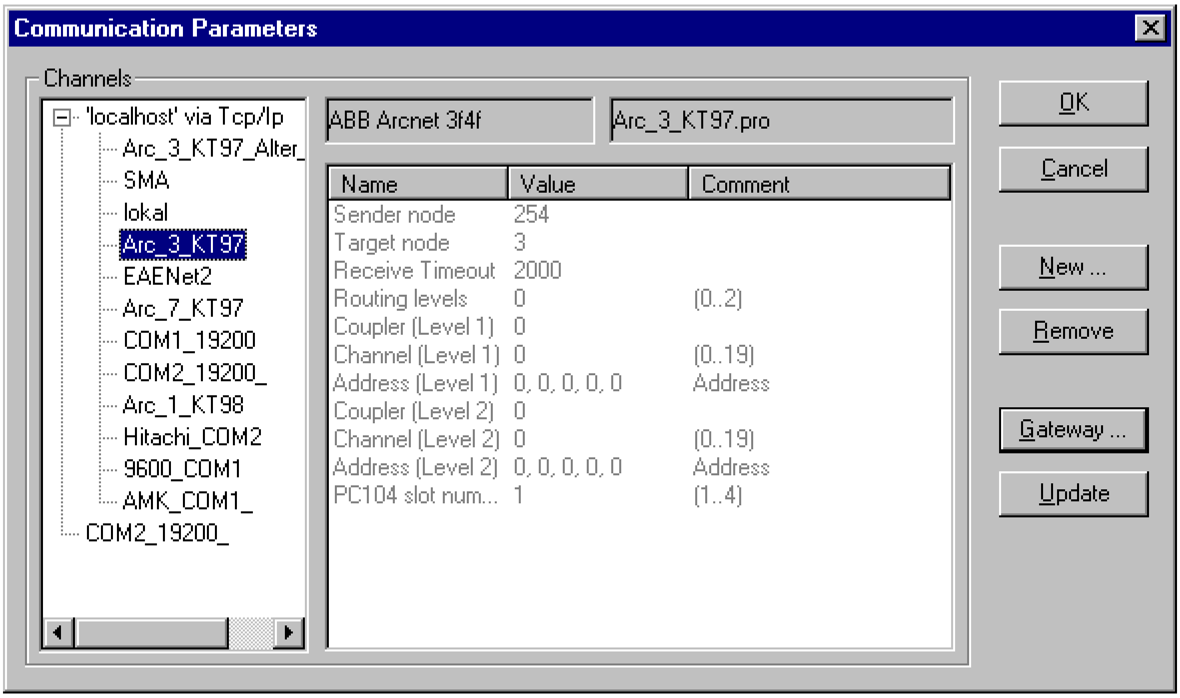


Figure 17: Configure Gateway

To confirm the Channel selection click at the **OK** button.

5.2 Bus Parameters

The Bus Parameters can be displayed with the menu **Settings > Bus Parameters**.

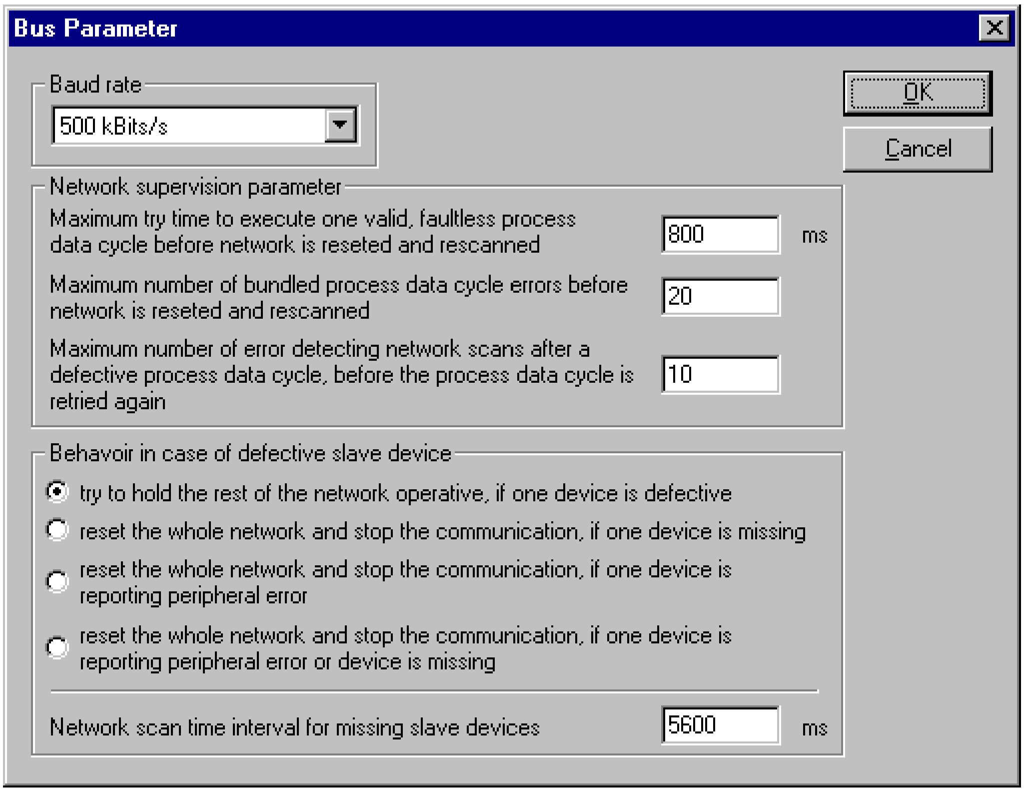


Figure 18: Settings > Bus Parameters

Attention: The alteration of Bus Parameters can cause communication faults.

Note: The displayed Bus Parameters are offline values. The Bus Parameters are used after the download of the configuration to the device.

The **Baud rate** is only adjustable up to 500kBaud. We reserve the right for extensions.

The **Network Supervision Parameters** serve for adjustment of error tolerance in the case of data cycle errors. The Master supervises every data cycle. If an error happens this data cycle is repeated after an identification cycle was executed.

- **Maximum try time to execute one valid, faultless process data cycle before network is resetted and rescanned.** This parameter is a time in the multiples of 8 milliseconds, in which the master tries to transmit a disturbed data cycle error free N times. After a data cycle error the master always starts an identification cycle, in order to recognize all available Slave devices, before the same data cycle is restarted. This procedure is repeated until the data cycle is transferred without an error and is however terminated when the maximum configured time interval exceeds its limit. At least then the network is resetted. As a function of the **Behaviour in case of defective Slave device** and **Network Scan Time Interval if devices missing** the master stops the entire communication or tries to initialize the network again.
- **Maximum number of bundled process data cycle errors before network is resetted and rescanned.** Sometimes it is possible, e.g. by an EMC disturbance within the InterBus network that a whole sequence of successive data cycles are destroyed. The maximum permissible number of direct successively disturbed cycles are defined here. A value of 20 is the presented value. If this value is exceeded, the master as a function of **Behaviour in case of defective Slave device** and **Network Scan Time Interval if devices missing** stops entire communication or tries to reinitialize the network again.
- **Maximum number of error detecting network scans after a defective process data cycle, before the process data cycle is retried again.** If a data cycle error occurs, the master starts automatically an identification cycle, in order to determine the source of error in the network. If this following identification cycle is executed also incorrect too, the master tries to repeat it according the number indicated here, before it reacts in accordance to the **Behaviour in case of defective Slave device** and **Network Scan Time Interval if devices missing**.

The **Behaviour in case of defective Slave device** determines the procedure of the Masters, if a Slave is detected as missed during run time and during the first network start up phase

- **Try to hold the rest of the network operative, if one device is defective.** The master does not consider the status of the attached Slaves and the resetting of the network in the case of an error is disabled. Depending on the **Network Scan Time Interval in case of missing devices**, the master tries to get all missing devices reoperative by rescanning the network cyclically.
- **Reset the whole network and stop the communication, if one device is missing.** The master stops entire network communication and resets the entire network, if it detects a missing Slave device during the first network scan or during the data exchange.
- **Reset the whole network and stop the communication, if one device is reporting peripheral error.** The master stops the entire communication and resets the whole network, if at least one Slave device is reporting an InterBus specific module error. Modules reporting such an error are indicating thereby e.g. a short-circuit at an output or undervoltage.
- **Reset the whole network and stop the communication, if one device is reporting peripheral error or device is missing.** The master stops entire communication and resets the network, if it detects a missing Slave during the first network scan or during the data exchange or if at least one Slave device indicates an InterBus specific module error.

Network scan time interval in case of missing devices

This parameter enables or disables the scan cycles in those cases a missing Slave device was detected. If the value is configured to 0, this function is deactivated.

The first network scan cycle, which is executed by the master directly after the initialization, is independent of this parameter and is always executed. Values unequal of 0 configure a cycle time in the multiples of 800 msec. Please note that the cyclic data exchange during this rescan is interrupted, but the initially left and original process data during this cycle are remaining at their old values.

5.2.1 Slave Configuration

The Slave configuration is described further above in the section *Slave Configuration* on page *20*.

5.3 Project Information

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

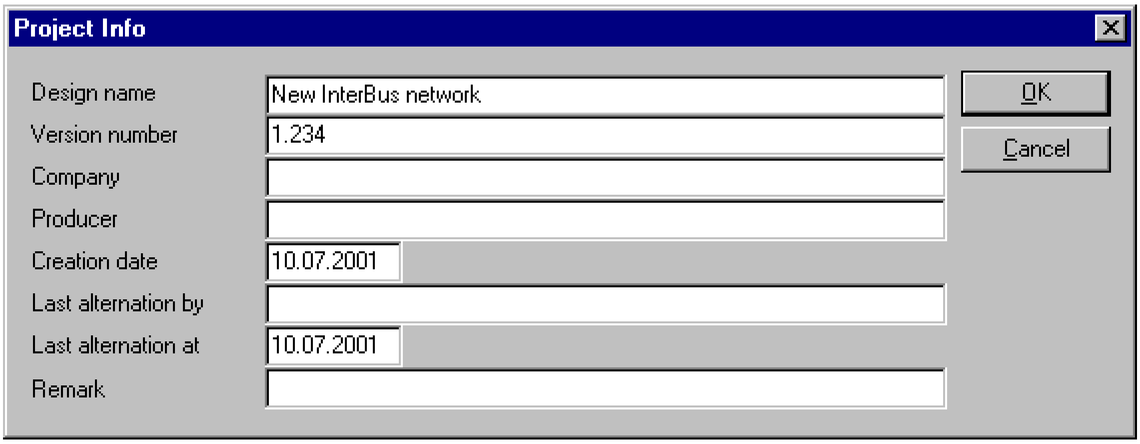


Figure 19: Settings > Project Information

By clicking the **OK** button the Project Information is saved.

5.4 Path

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

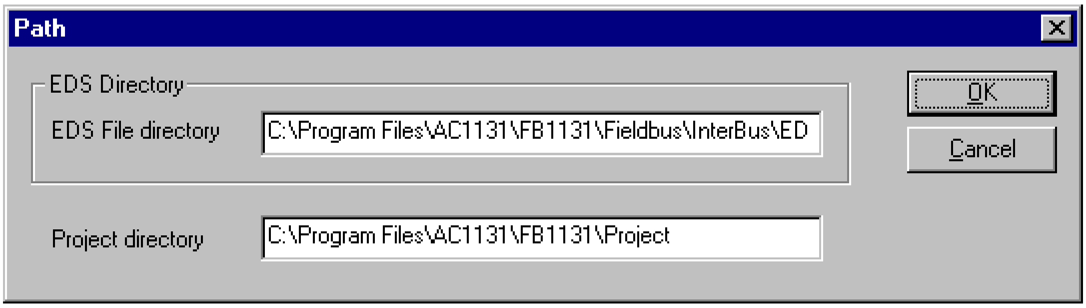


Figure 20: Settings > Path

If you click the **OK** button all EDS files are read in.

5.5 Language

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

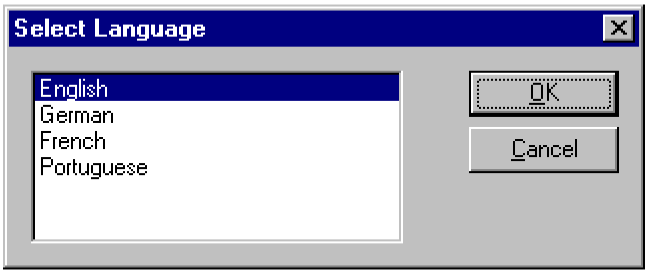


Figure 21: Settings > Language

Here can be set the language of the Fieldbus Configurator. Select the desired language and confirm the entry with the **OK** button.

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

After restarting the Fieldbus Configurator, the language will have changed to the one selected.

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

6 Online Functions

6.1 Introduction

In this section, all the functions that directly influence InterBus devices, are presented.

Note: Please note that this also permits an interruption of the running communication or that input and output can be switched ON or OFF.

6.2 Online to the Coupler

6.2.1 Downloading the Configuration

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

In order to transfer the configuration, a transfer download to the devices must be carried out on the **Online > Download** menu. A warning will appear that the communication on the InterBus will be interrupted. This warning must be confirmed.

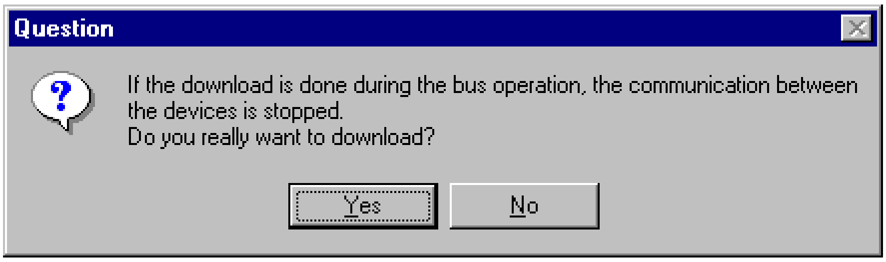


Figure 22: Security question before download

Attention: The download overwrites the configuration in the device.

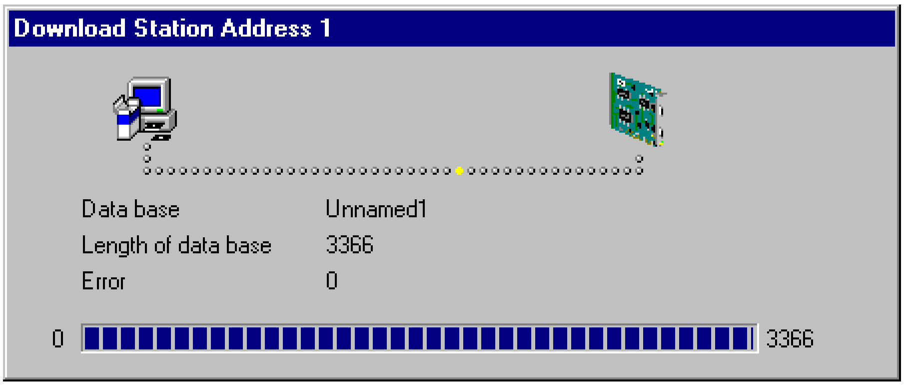


Figure 23: Online > Download

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.

6.2.2 Firmware Download

If you want to carry out a Firmware download, act as follow: First the desired device for Firmware downloading must be chosen in that the symbol of the device is selected with a left mouse click. Then, call up the **Online > Firmware Download** menu. Select the new Firmware and retrieve it with **Download** into the device. The Firmware is now downloaded.

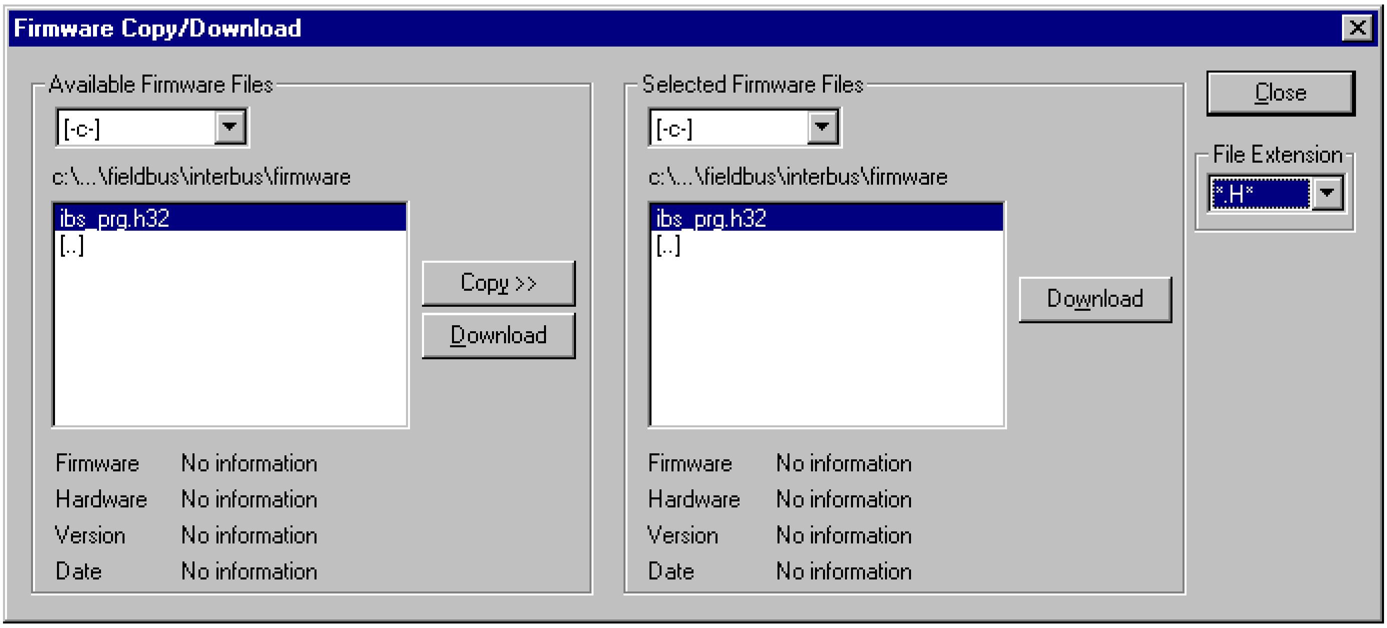


Figure 24: Online > Firmware Download

6.2.3 Firmware / Reset

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

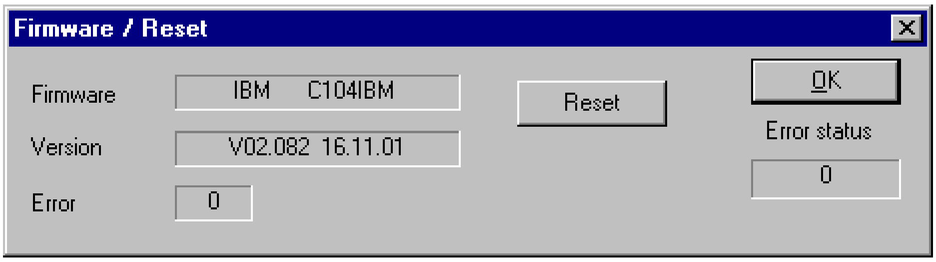


Figure 25: Online > Firmware / Reset

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

6.2.4 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 read out and shown.

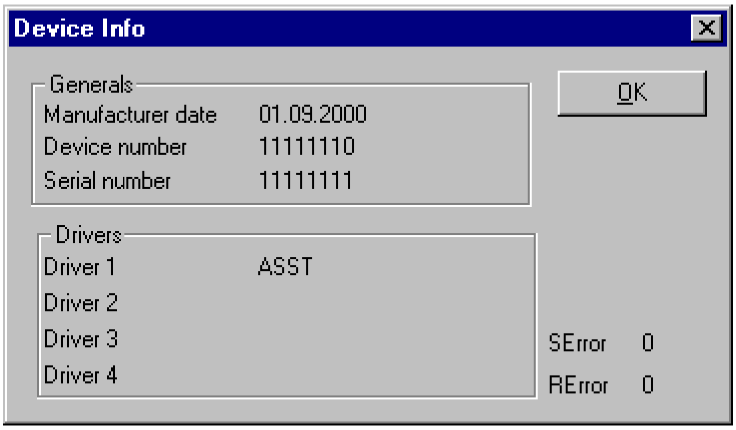


Figure 26: Online > Device Info

6.2.5 Read Project Information

With **Online > Read Project Information** can be read out the project information from the device.

6.3 Automatic Network Scan

This function scans the network structure. During the scan it will be detected which devices are connected to this InterBus. Therefore the following steps are necessary:

- Create a new project: Select the menu **File > New** and InterBus.
- Select the Master: Select the Master from the menu **Insert > Master**.
- If the Master isn't initialized you need to make a download first. To make this download select the menu **Online > Download**.
- Scan the network: Select the menu **Online > Automatic Network Scan**. Hereby the Length and ID code as well as the installation depth of all users attached at the network are determined.

Figure 27: Online > Automatic Network Scan (security question)

Answer this question with **Yes**, if the connected InterBus network should be scanned. Answer this question with **No**, if this functions should not be performed.

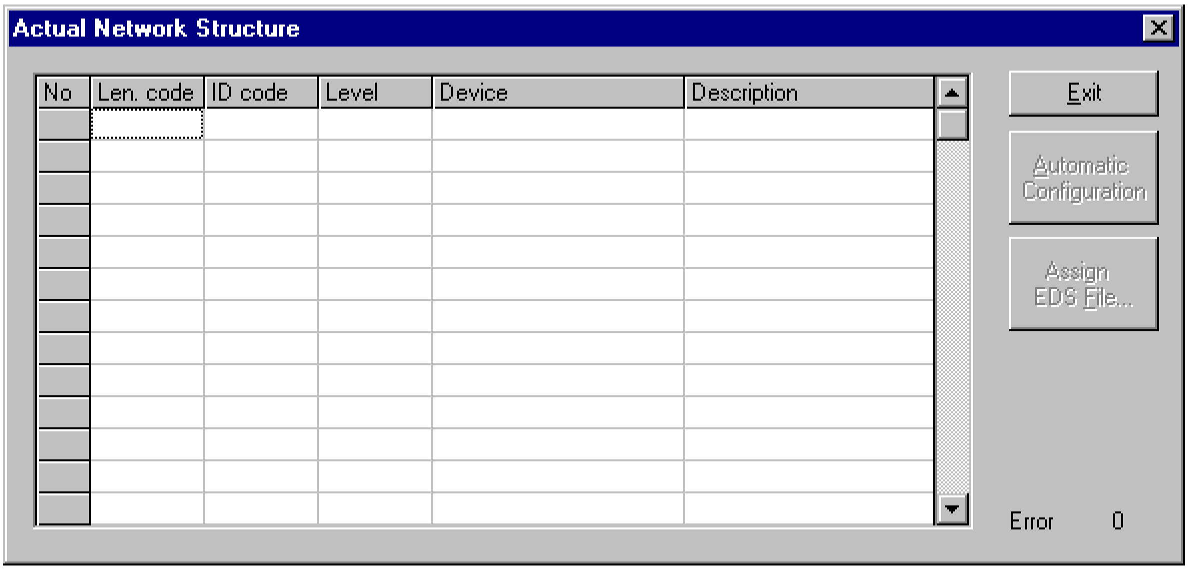


Figure 28: Online > Automatic Network Scan (During the Scan)

All buttons are grey during the network scan.

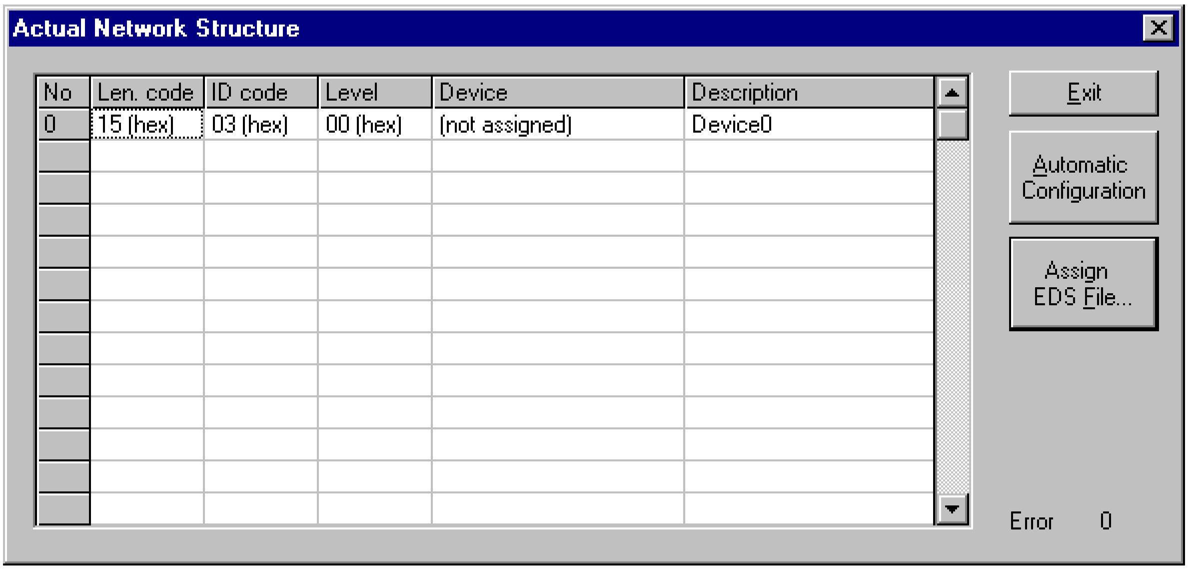


Figure 29: Online > Automatic Network Scan (After the Scan)

6.3.1 Automatic Configuration

If you activate the button **Automatic Configuration**, the following safety question appears.

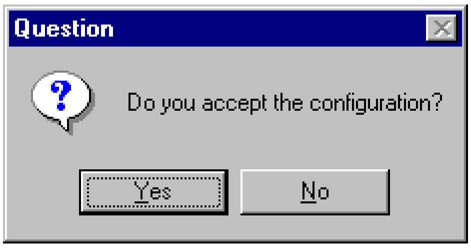


Figure 30: Online > Automatic Network Scan > accept configuration

Answer the question with **Yes**, if the read in structure is to be taken over as configuration. Answer the question with **No**, if the old configuration is to be maintained.

6.4 Start/Stop Communication

First the desired device must be chosen with a left mouse click on the symbol of the device. The communication between InterBus Master and InterBus Slave can be manually started or stopped. In order to do this select the **Online > Communication start** or **Online > Communication stop** menu.

6.5 Diagnostic Functions

6.5.1 Debug Mode (InterBus Master)

Starting from the Master select the **Online > Start Debug Mode** menu. The Fieldbus Configurator cyclically reads out the status of the network communication on the device and the individual condition of the devices.

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

6.5.1.1 Debug Window

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

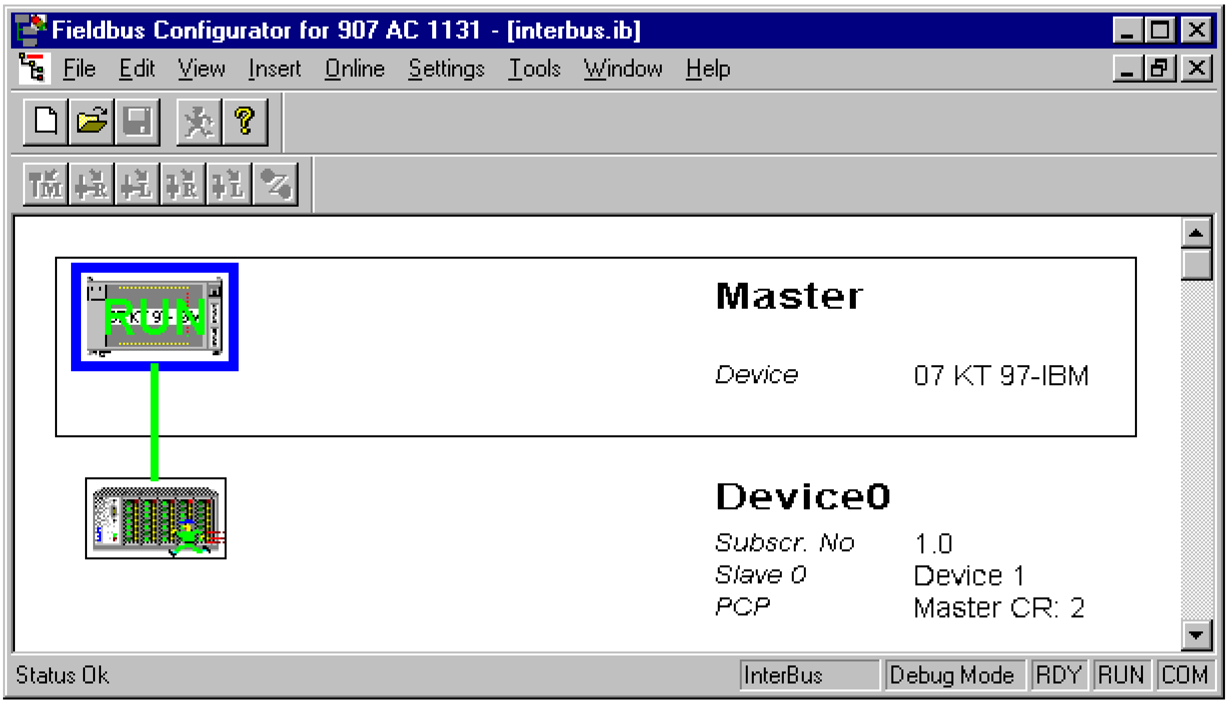


Figure 31: The Debug Window

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

6.5.1.2 InterBus Slave Device Diagnostic

After the debugger was started from this time FB 1131 requests the status of all devices from the Master. If there is an error on a device the bus line to this Slave is drawn in red colour otherwise it is green. This information is displayed closer if you click with the mouse onto the corresponding device in debug mode.

To activate the debug mode you have to mark the Master and select the menu **Online > Start Debug Mode**. Then set the focus at the Slave and with the menu **Online > Device Diagnostic** you activate the InterBus device diagnostic. To end the Debug Mode you have to mark the Master again and select the menu **Online > Stop Debug Mode**.

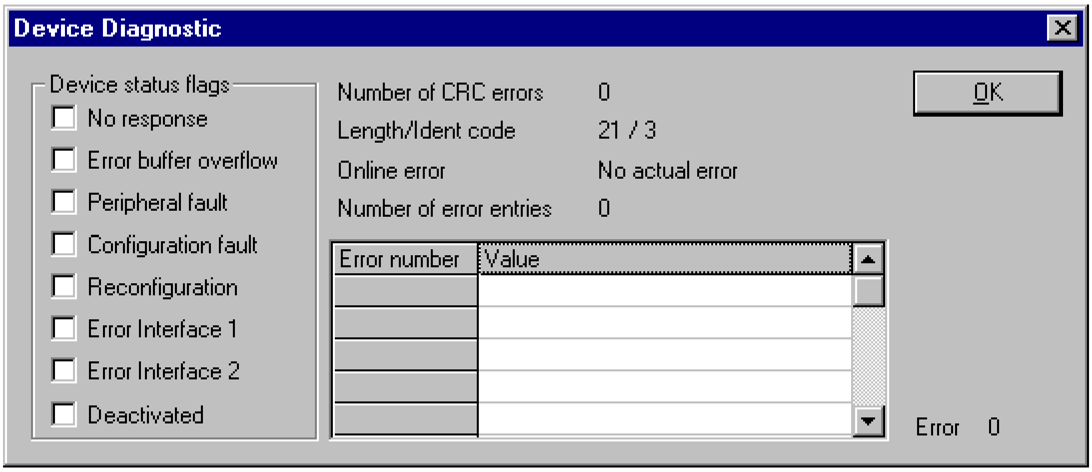


Figure 32: Online > Device Diagnostic (InterBus standard diagnostic)

The individual bits in the **Device Diagnostic** have the following meaning:

Bits in the Device Diagnostic	**Meaning**
No answer	The station is configured but missing at the network. Please you check the cable connection between the master and the Slave device.
Error buffer overflow	An error can occur at each Slave device during operation. These errors are stored in an internal buffer, which can take up 50 error registrations per Slave device . This bit is set, if the buffer overflows.
Peripheral device error	The Slave device announces a peripheral device error. That can be e.g. a short-circuit at the device outputs or an undervoltage.
Configuration error	The ID code or the Length Code of the Slave device does not correspond with the configured ID code or length code.
Reconfiguration	The device announces a reconfiguration request.
Error interface 1	An error on the outgoing interface 1 was detected.
Error interface 2	An error on the outgoing interface 2 was detected.
Deactivated	The Slave device is deactivated in the current configuration and does not participate in the data exchange.
Number of CRC errors	This counter accumulates all detected check sum errors.
Length-/Ident-Code	The real length code and ID code of the Slave device are displayed here.
Online error	The currently detected errors are displayed here.
Number of error registrations	This value indicates the number of entries in the internal error buffer.
Error table	This table shows the detected errors in the occurred order.

Table 9: Meaning of the bits in the Device Diagnostic

6.5.2 Global State Field

With the menu option **Online > Global State Field** opens a window in that cyclically Statistic about the bus status and attached devices to be output.

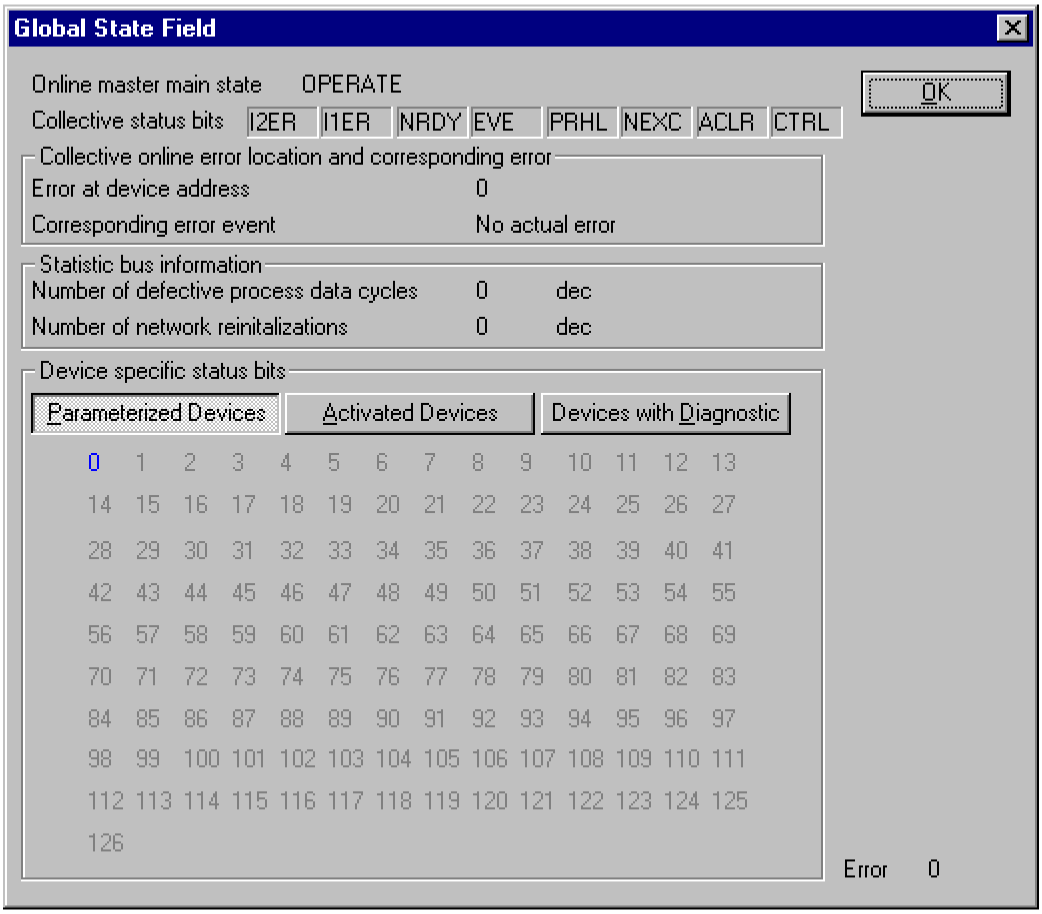


Figure 33: Online > Global State Field

The first row displays the main state of the Master. It can have the state **OPERATE** or **STOP**.
The next row displays individual bus errors. A pending error is displayed with a red field. The meaning of the individual abbreviations is described in the following.

Status Bits	Meaning
I2ER	INTERFACE-2-ERROR: If this bit is set at least one remote bus interface (called outgoing interface 2) of a Slave device was detected during the ID scan, which has produced a timeout after it was opened in this session. This error can only occur either at InterBus branch interface or at remote bus devices, because both are having the outgoing interface 2 to connect it to the next remote bus device. If more defective interfaces were detected at the same time, the value shows the physically nearest Slave device to the master in the InterBus ring.
I1ER	INTERFACE-1-ERROR: If this bit is set at least one local bus interface or remote bus branch interface (called outgoing interface 1) of a Slave device was detected during the ID scan, which has produced a timeout after it was opened in this session. This error can only occur at InterBus branch interfaces, because these are the only components which have an interface 1 to manage InterBus branching. If more defective interfaces were detected at the same time, the value shows the physically nearest Slave device to the master in the InterBus ring.
NRDY	HOST-NOT-READY-NOTIFICATION: indicates if the host program has set its state to operative or stop. If this bit is set the host program is not ready to communicate.
EVE	EVENT-ERROR: The used InterBus master chip has detected at least one transmission error. The number of detected events are counted in Number of defective process data cycles and the error Number of network reinintialisations. The bit will be set when the first event was detected and will not be cleared any more and remains set then.
PRHL	PERIPHERAL-ERROR: Some InterBus modules have the capability to indicate if they have detected low power or a short circuit in the in the external periphery. If at least one module reports this error it is shown in this bit. If all errors have disappeared, the bit will be released.
NEXC	NON-EXCHANGE-ERROR: An activated bit indicates that at least one of the configured Slave device is not operational because of an configuration fault or simply because it's not present in the network.
ACLR	AUTO-CLEAR-ERROR: This bit is set, when the master stops the communication to all handled Slave devices because of missing Slave devices. Before doing this the Master sets all output values of the left Slave devices to the save zero condition. The behaviour, if the master shall shut down or not, when it losts the contact to at least one device, is configurable in FB 1131 configuration tool or in the bus parameter download procedure. After the master has shut down only a warm- or coldstart (reset) can reactivate the communication again.
CTRL	CONTROL-ERROR: Configuration error or heavy runtime error. Some of them can occur during startup procedure of the master. For example if the InterBus controller Ix1 of the master card do not respond or the configuration of FB 1131 has inconsistencies.

Table 10: Meaning of collecting status bits in the Global State Field

Further displays are:

Error at device address and **Corresponding error event** indicate the address of the faulty station and the actual error in plain text. Statistical bus information indicates the number of the detected bus short-circuits an rejected telegrams.

Devices specific status bits:

These display the **parameterized devices**, the **active devices** or **the devices with diagnostic** according to the activated button. A pending diagnostic information can be received by a double click on the respective number of the station.

This display is cyclically updated.

6.5.3 Extended Device Diagnostic

The Extended Device Diagnostic helps to find bus errors and configuration errors when the FB 1131 menu functions are of no further help.

First select the device 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, status information and parameter information:

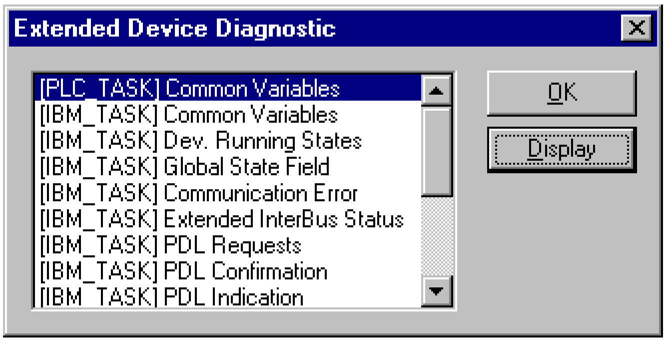


Figure 34: Online > Extended Device Diagnostic

6.5.3.1 Extended Device Diagnostic for the InterBus Master

IBM_TASK: InterBus Administration

ALPMLIPD: Application interface (PCP Channel)

Task / Task State	**Page**
PLC_TASK Common Variables	*79*
IBM_TASK Common Variables	*80*
IBM_TASK Device Running States	*82*
IBM_TASK Global State Field	*82*
IBM_TASK Communication Error	*83*
IBM_TASK Extended InterBus Status	*84*
IBM_TASK PDL Requests	*85*
IBM_TASK PDL Confirmation	*86*
IBM_TASK PDL Indication	*87*
IBM_TASK Data Cycle Status	*87*
IBM_TASK Scanned ID Codes	*89*
ALPMLIP Common Variables	*90*
ALPMLIPD ALI Information	*92*
ALPMLIPD PMS Information	*93*
ALPMLIPD LLI Information	*94*

Table 11: Extended Device Diagnostic for the InterBus Master

6.5.4 Statistic Information

In the window **Statistic Information** a long-term recording of the InterBus communication can be activated and deactivated. Occurred error messages can be stored into a log file.

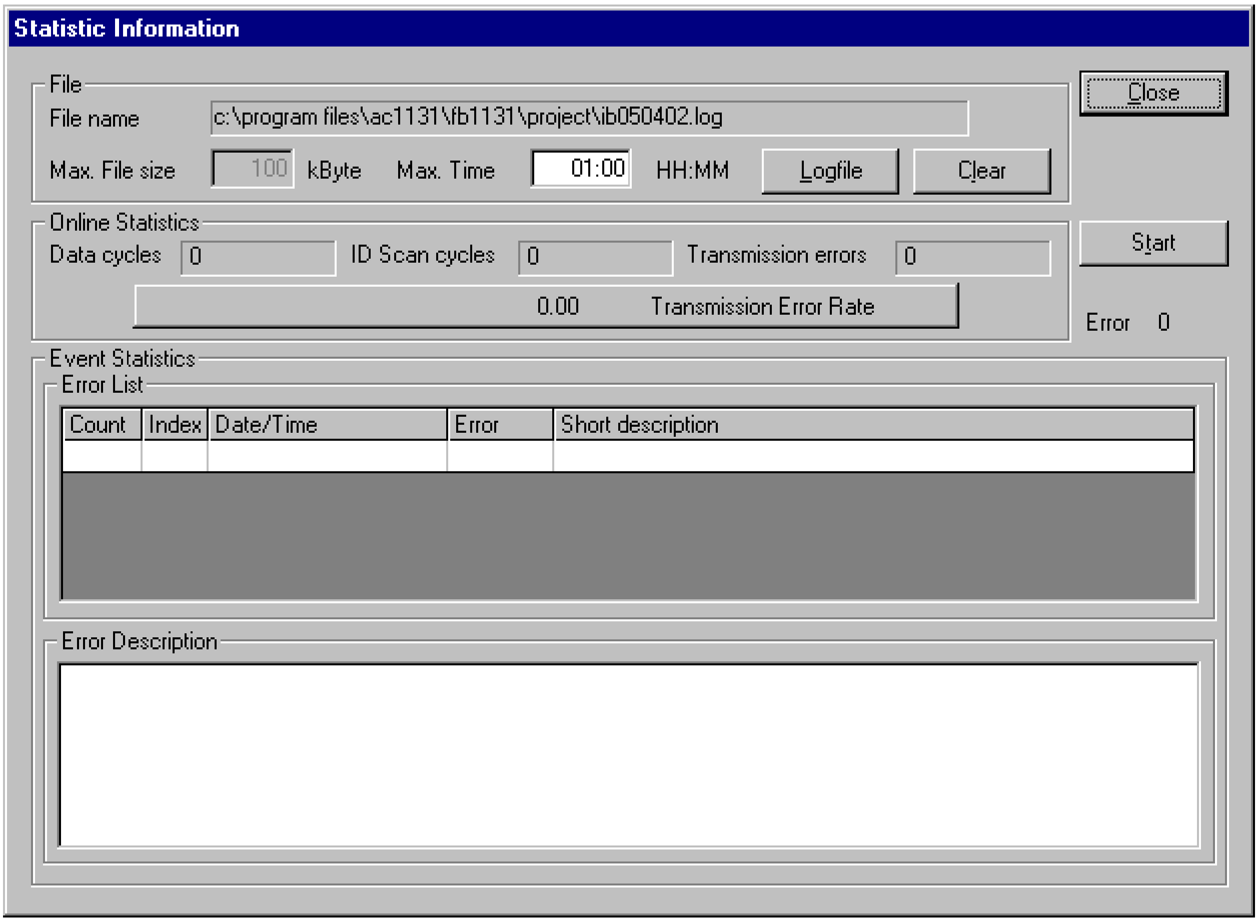


Figure 35: Online > Statistic Information

Under log file the path and the name of the file can be changed. The recording is started by clicking the **Start** button.

If the Master is connected, the information about **data cycles, ID scan cycles**, **transfer errors** and the **transfer rate** are displayed online.

The following figure shows a faultless communication.

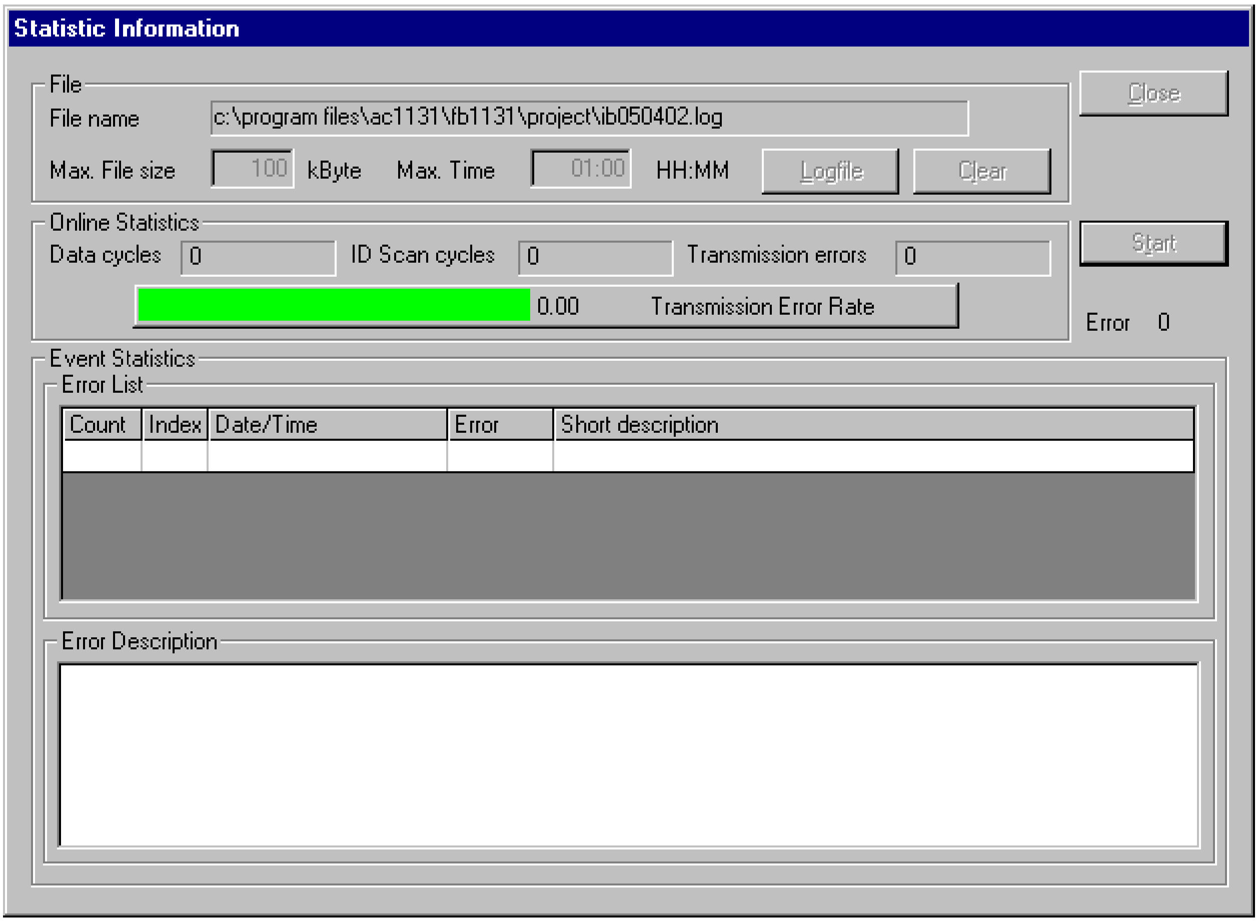


Figure 36: Online > Statistic Information (faultless)

The following figure shows an error message to a data transfer with an occurred communication error. The displayed figure shows an error message of an cable interruption (cable disconnected and connected again).

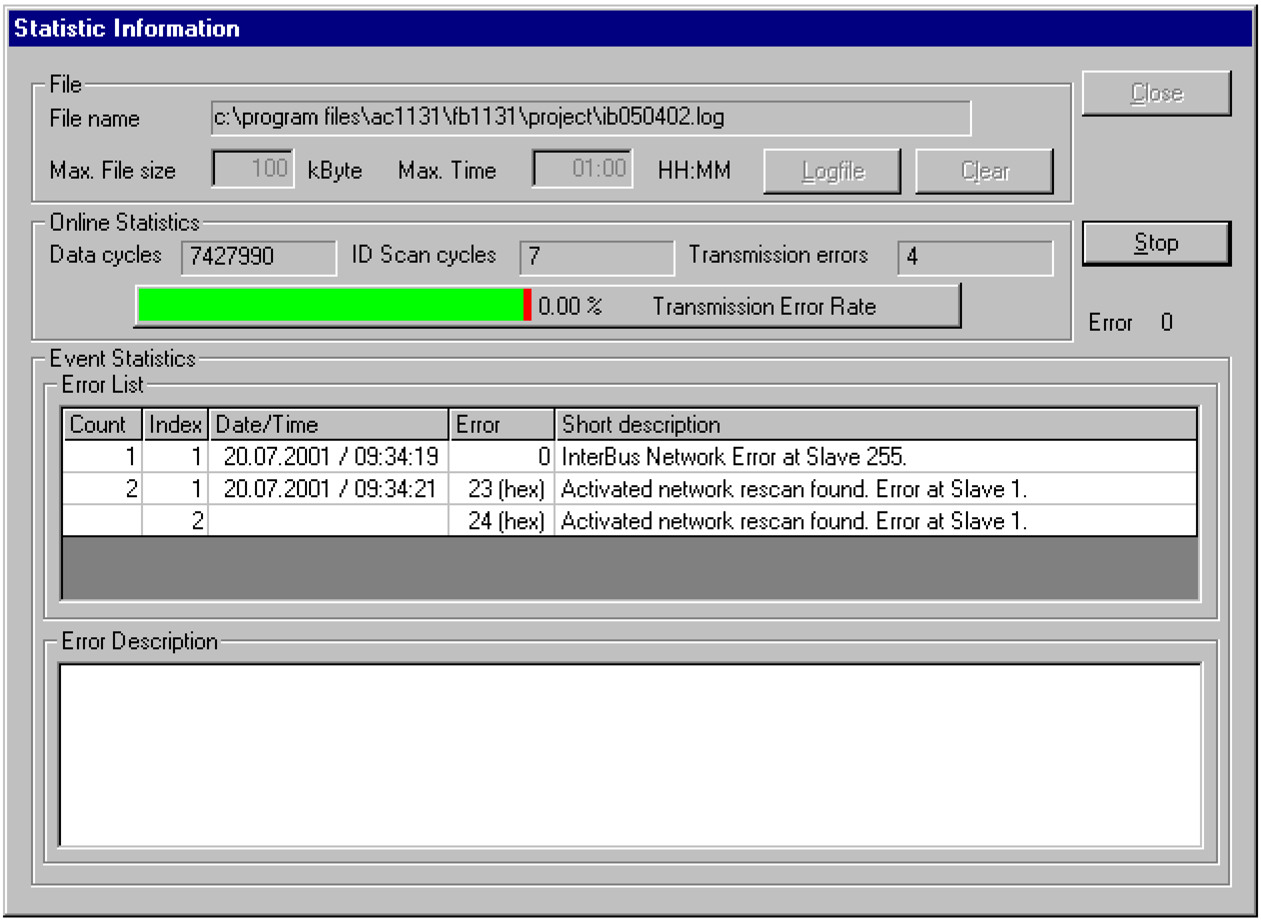


Figure 37: Online > Statistic Information (error displayed)

6.6 User Data Transfer

The following table shows test functions with user data transfer and the usability for

- InterBus Master devices
- InterBus Slave devices

User data transfer function	Usage	Usable with ABB InterBus Master devices	Usable with ABB InterBus Slave devices
PCP Monitor	Read or write data (objects)	Yes	No

Table 12: Overview User Data Transfer

6.6.1 PCP Monitor

With this function InterBus services based on the current configuration, can be carried out.

First select the Master with a left mouse click on the Master device. Then select **Online > PCP Monitor**.

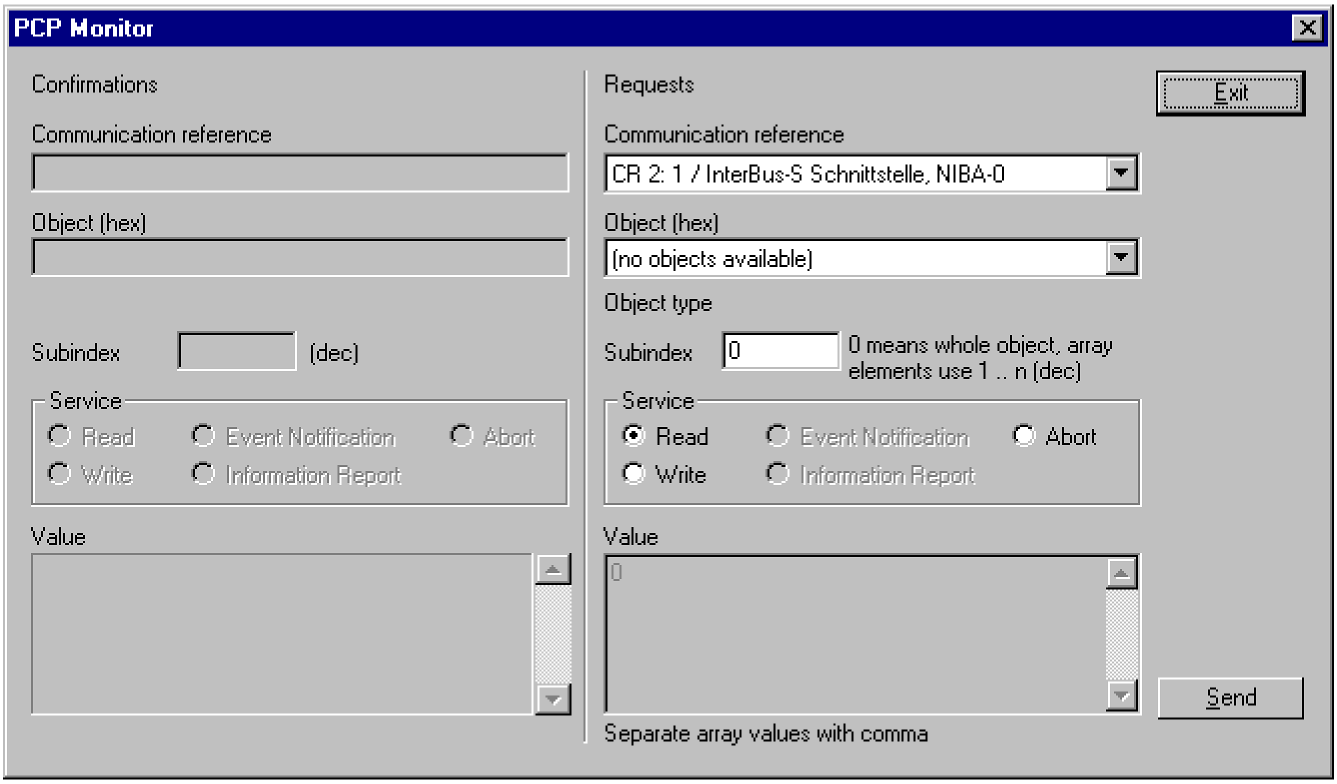


Figure 38: Online > PCP Monitor

The **Read** or **Write** service on the desired **Object** can be selected by means of the corresponding **Communication reference** and can be activated via the **Send** button. When writing, the data must be entered in the **Value** field. On the left side, the acknowledgement, or when reading, the received data are displayed.

Note: Only Client functions are available in this version. Server functions are not supported.

Positive result:

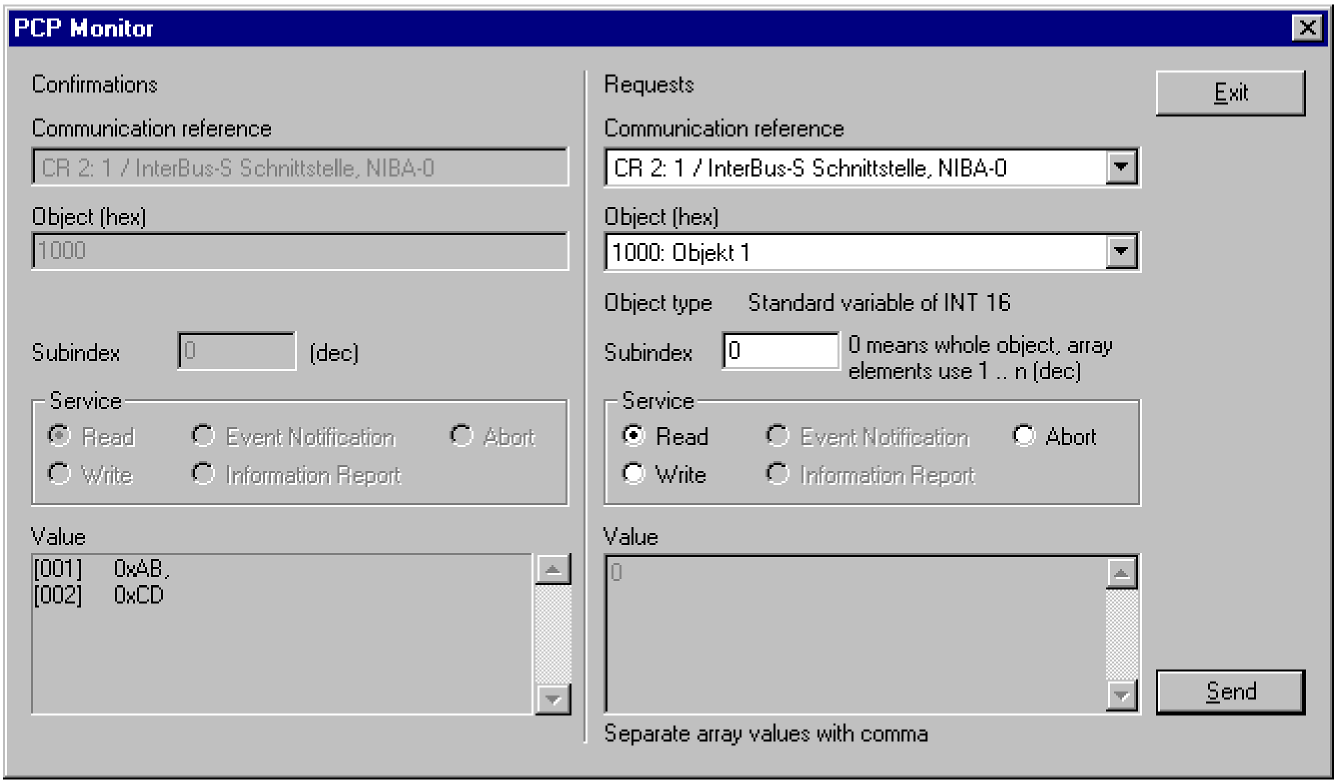


Figure 39: Online > PCP Monitor (positive result)

Negative result:

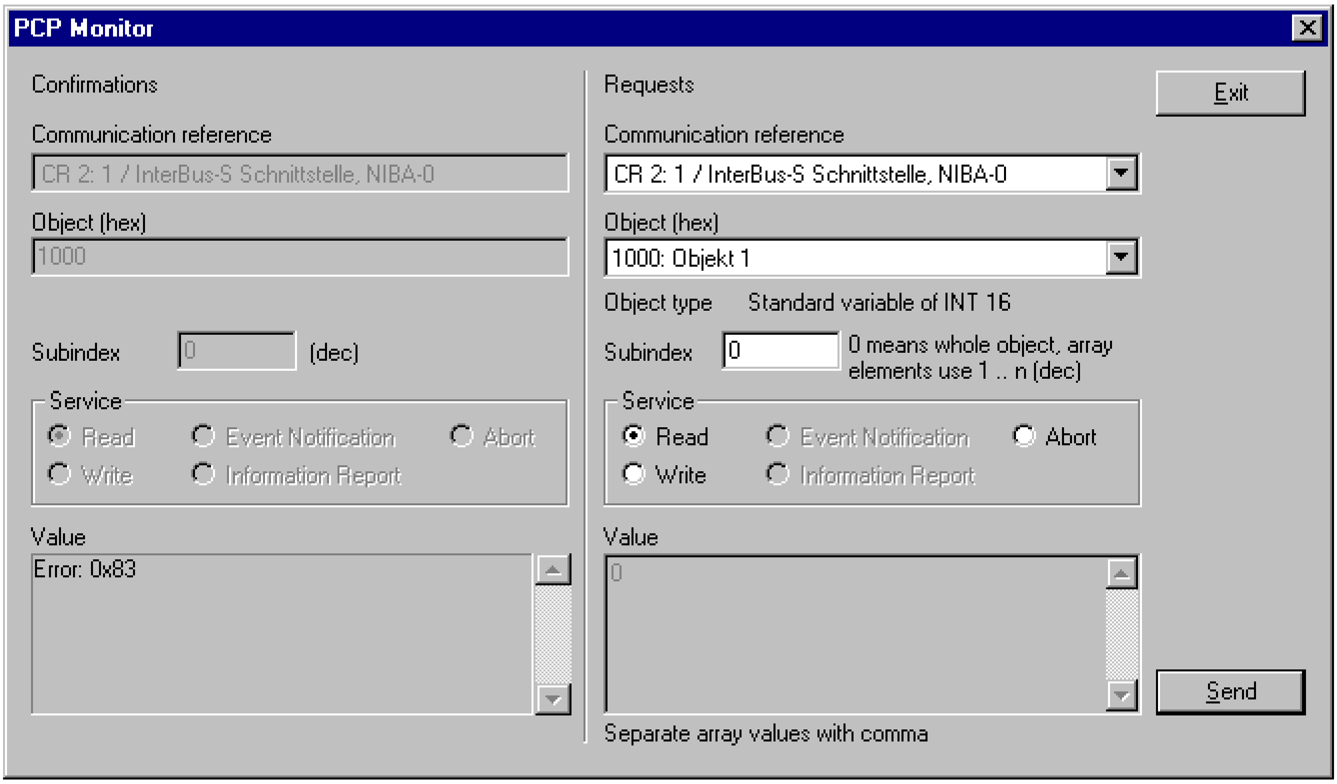


Figure 40: Online > PCP Monitor (negative result)

7 File, Print, Edit and View

7.1 File

7.1.1 Open

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

7.1.2 Save and Save As

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

7.1.3 Close

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

7.2 Print

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

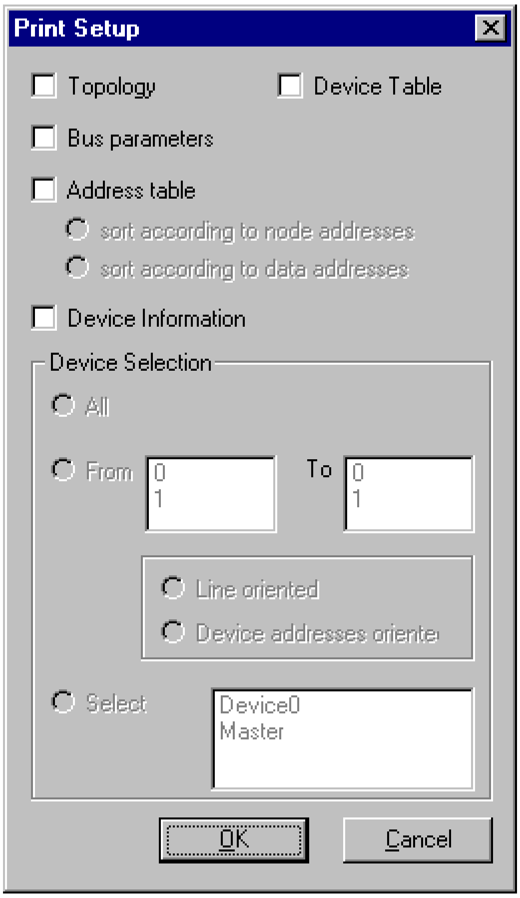


Figure 41: File > Print

Topology the topology of the Bus system.

Bus parameters prints 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 number to Station number
- 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.

7.3 Edit

7.3.1 Cut, Copy and Paste

With **Edit > Cut** and **Edit > Copy** you put the cut/copied Slave device with its settings and configuration (only not the description of the device) in the Clipboard and with **Edit > Paste** it can be insert.

The difference between **Cut** and **Copy** is:

With the menu option **Edit > Cut** you move a Slave device from one point in the configuration to another. With the menu option **Edit > Copy** you duplicate an existing Slave device.

If you select **Edit > Cut** a security question appears.

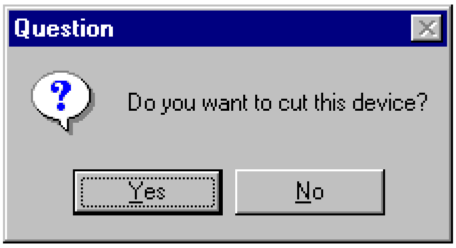
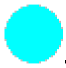


Figure 42: Security question cut device

If you answer this question with **Yes** the Slave device is cut and stays in the clipboard.

When you select **Edit > Paste** the device can be insert again at the position you want.

Possible insert positions are displayed with a coloured circle . If you move the mouse pointer over this circles it changes into one of these symbols dependent on which Slave device was cut or copied.

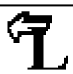
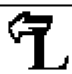
Mousepointer - possible insert positions			
			
Remote Bus Branch Interface	Local Bus Branch Interface	Remote Bus Device	Local Bus Device

Table 13: Mousepointer - possible insert positions

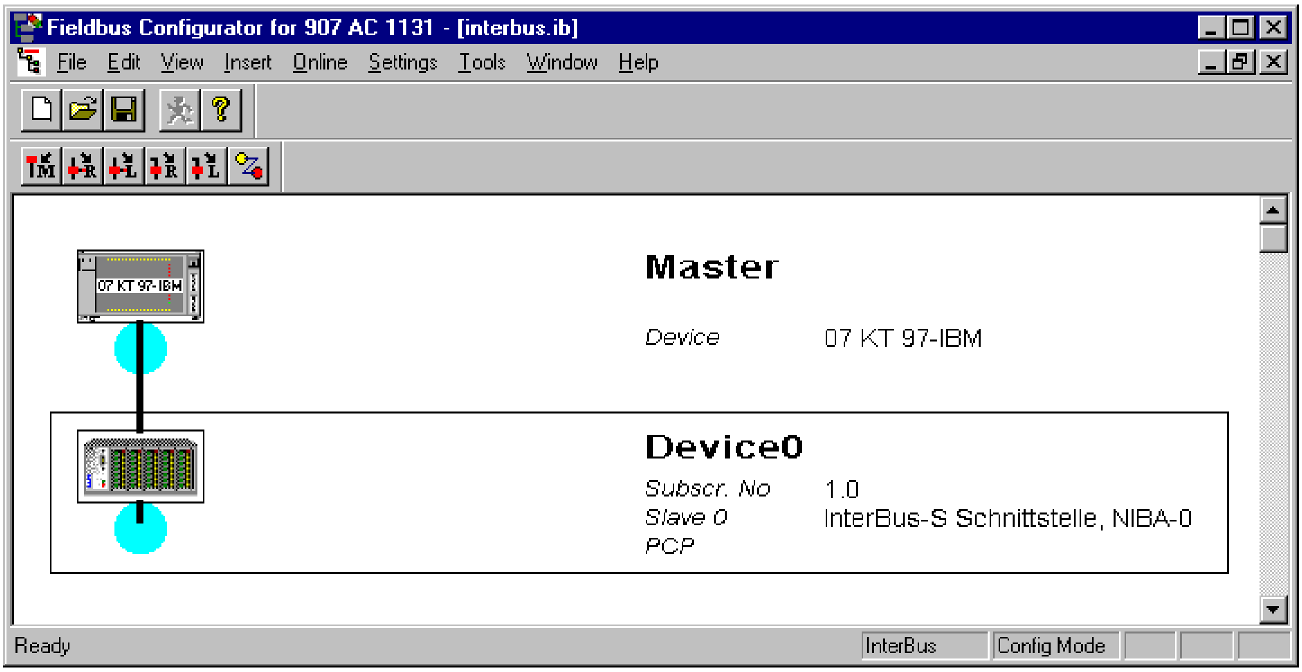


Figure 43: Paste a Slave device in the configuration

Click on the position where the Slave is to be inserted. A window opens where the cut/copied Slave device can be selected.

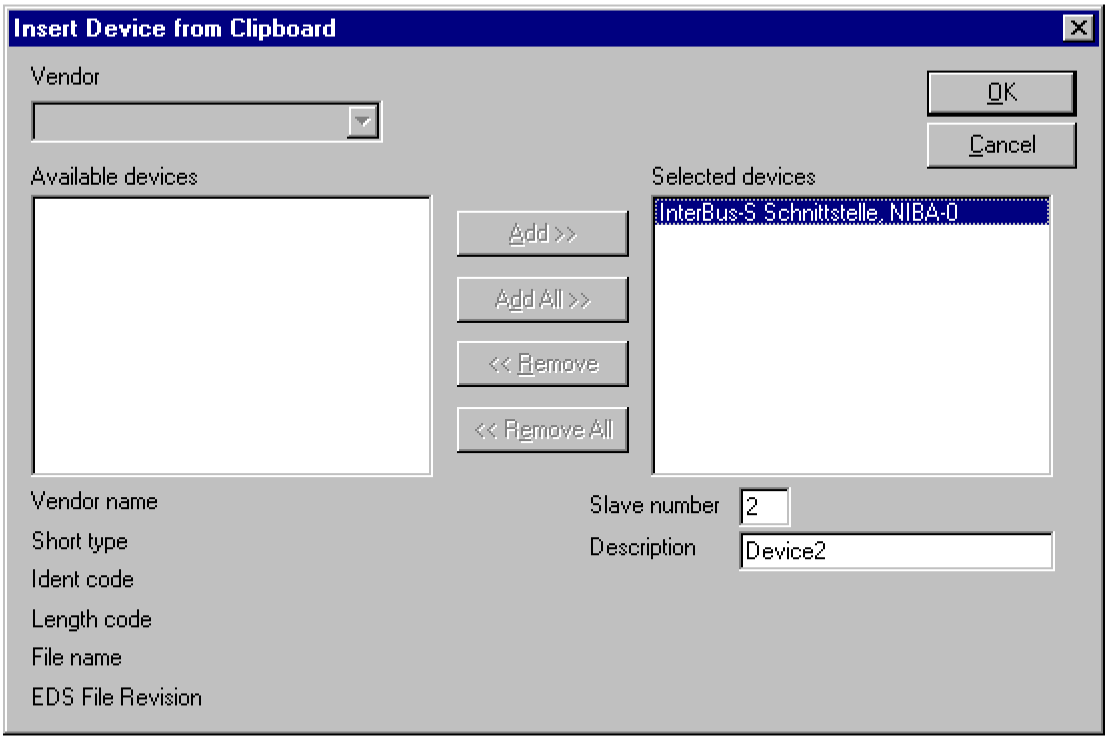


Figure 44: Edit > Paste Insert Device from Clipboard

With the **OK** button the Slave will be insert.

7.3.2 Delete

To delete the Master or a Slave device you have to have to mark this device and then select the menu **Edit > Delete**. Before FB 1131 deletes the Master or a Slave a security question appears.

Figure 45: Security question delete device

Note: When you delete a device the settings and the configuration of this device get lost.

7.3.3 Replace

With the menu **Edit > Replace** the Master or a Slave device can be replaced. How to replace the Master look in section *Replace Master* at page *17*. If you want to replace a Slave device look in section *Replace Slave* at page *22*.

7.4 View of the Configuration

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

- Device Table
- Address Table (Occupation of the process image memory in the InterBus Master)

7.4.1 Device Table

The **View > Device Table** menu shows the list of all devices are used in the configuration.

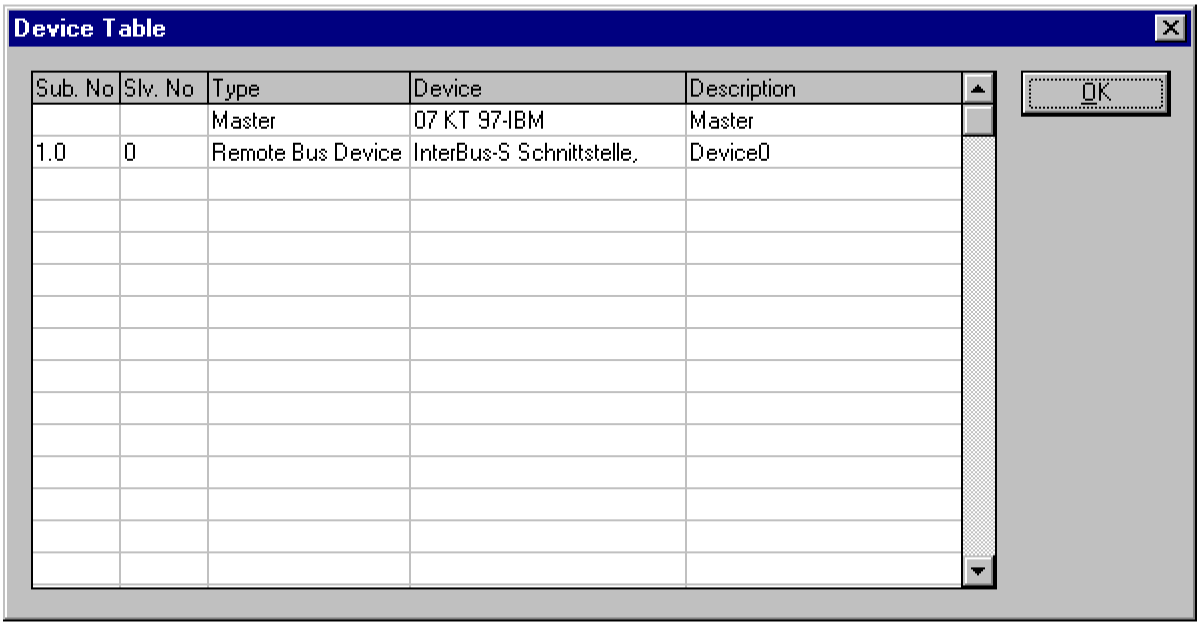


Figure 46: View > Device Table

7.4.2 Address Table

A list of all addresses used in the process data image is displayed in the **View > Address table** menu.

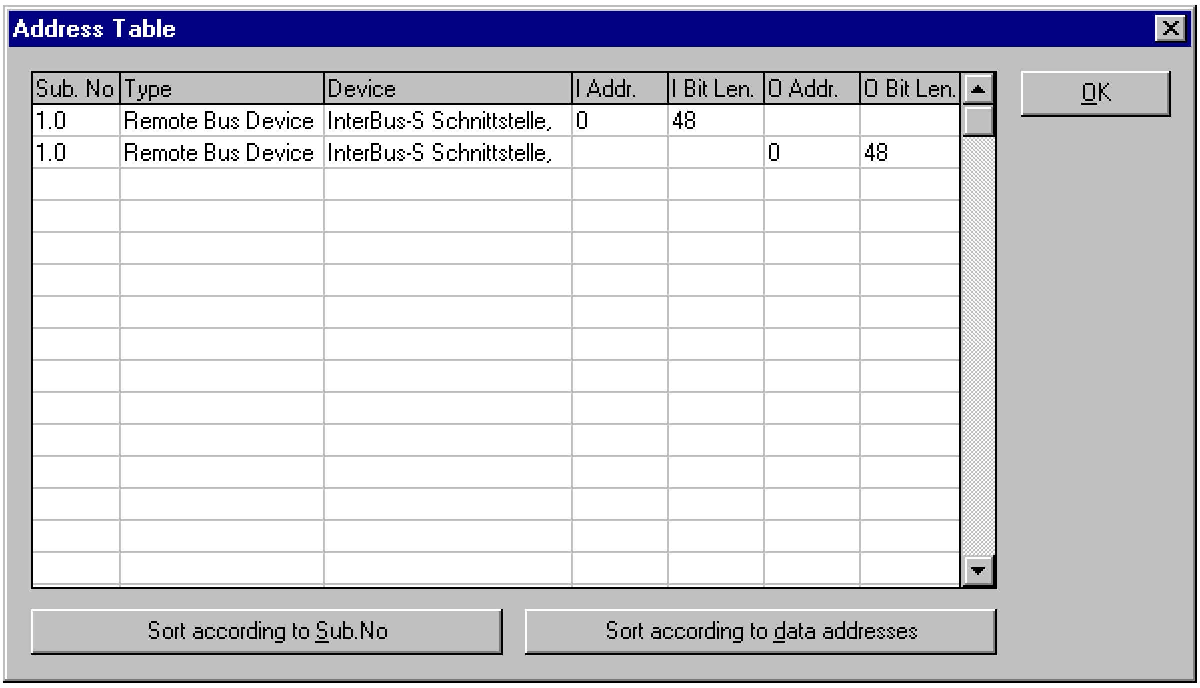


Figure 47: View > Address Table

It is possible to sort the addresses according to Slave numbers or data addresses.

7.5 View Menu FB 1131

7.5.1 Toolbars

In the menu **View > Toolbars** the user has the possibility to activate or deactivate the Toolbars **Standard** and **Fieldbus**. If this function is deactivated the toolbars are not shown.

7.5.2 Status Bar

In the menu **View > Status Bar** this bar can be activated (with hook) or deactivated (without hook).

8 Tools

8.1 EDS Viewer

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

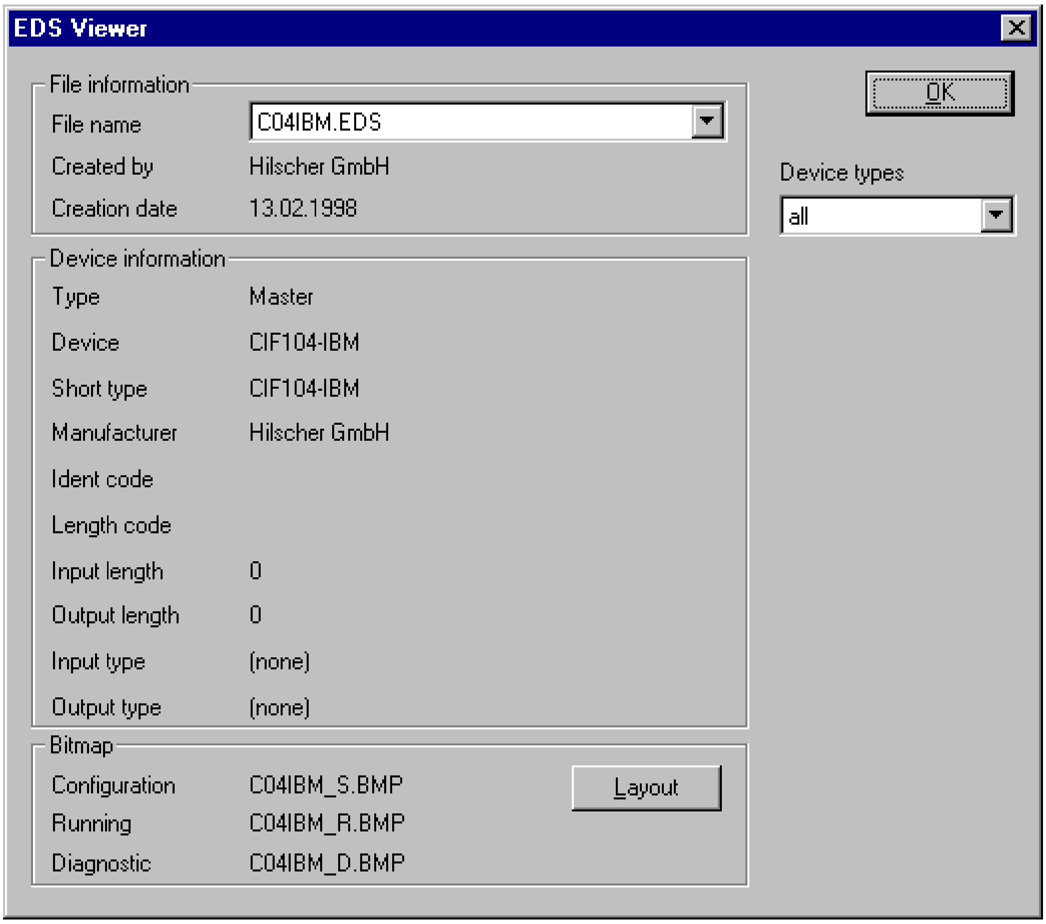


Figure 48: Tools > EDS Viewer

ID-Code, Length Code, input length and output length are not displayed, if the device supports several ID- and Length Codes.

The following device types are available:

- Remote Bus Branch Interface
- Local Bus Branch Interface
- Remote Bus Device
- Local Bus Device

The button **Layout** displays the assigned figures of the device (see section *Layout* on page *65*).

8.2 EDS Generator

If a InterBus device is not contained into the provided EDS files, the appropriate EDS file can be produced with **Tools > EDS Generator**.

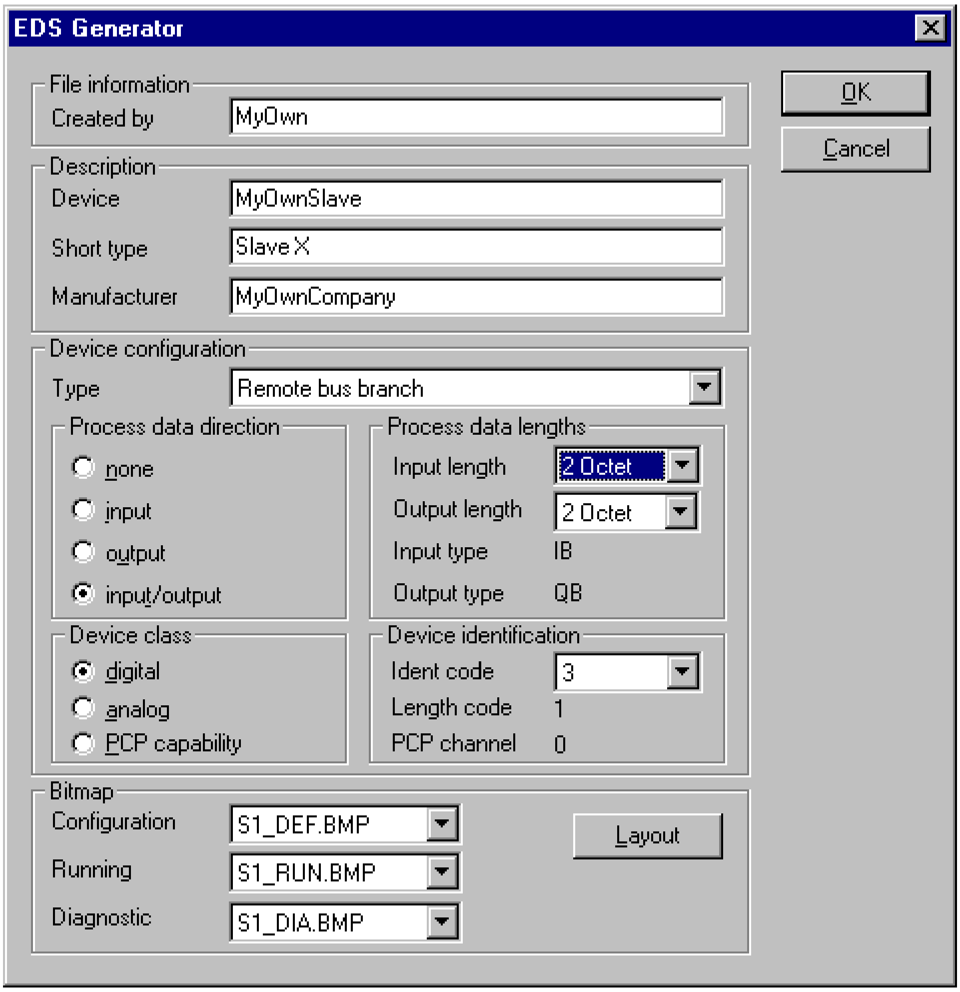


Figure 49: Tools > EDS Generator

In this window the device-specific data must be filled in. See manual of this device. The two most important parameters are the Length Code and the ID-Code, which are also imprinted on the devices normally. Both guarantee that the Slave device is detected in the network.

8.3 Layout

On the basis of **Tools > EDS Viewer** or **Tools > EDS Generator** the current course arranging of bitmaps of the device can be seen.

The bitmaps of the device for

- Configuration Phase (typical colour grey),
- Operating Phase (typical colour: green),
- Diagnostic Phase (typical colour: red)

are displayed.

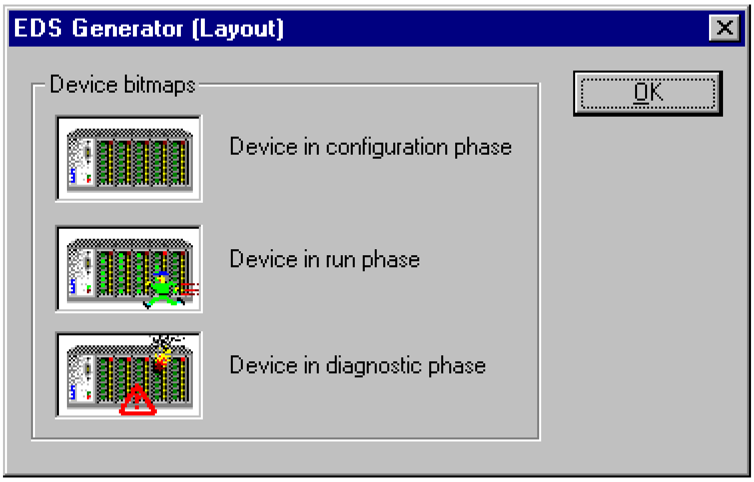


Figure 50: Layout for Tools > EDS Viewer or Tools > EDS Generator

9 Error Numbers

9.1 Possible Control Error Messages to FB1131 Telegrams

Error Number	Description
401	Driver error in the control
402	slot number is not supported by the hardware
403	no coupler at the given slot
404	control not in STOP
405	configuration data invalid
406	coupler still configured by 907 AC 1131-internal PROFIBUS Configurator
407	answer timeout of the coupler

Table 14: Possible Control Error Messages to FB1131 Telegrams

9.2 RCS Error Numbers (4 .. 93)

This is the list of error numbers returned by the RCS (Realtime Communication System), that is the operating system of couplers. The error number is returned in an answer message. Command messages and answer messages are used to communicate between the application (e.g. the Fieldbus Configurator) and the couplers. An example of this communication is the download of a configuration.

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

Table 15: RCS error numbers (answer message) (4..39)

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

Table 16: RCS error numbers (answer message) (40..93)

9.3 Database Access Error Numbers (100 .. 130)

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

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

Table 17: Database Access Error Numbers (100..130)

9.4 Online Data Manager Error Numbers

9.4.1 Online Data Manager Error Numbers (1000 .. 1018)

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

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

Table 18: Online Data Manager Error numbers (1000..1018)

9.4.2 Message Handler Error Numbers (2010 .. 2027)

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

Error Number	Description
2010	Message handler: 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
2026	Message handler: Wait for Delete
2027	Message handler: No cyclic Message

Table 19: Error Numbers of the Message Handler of the Online Data Manager (2010..2027)

9.4.3 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 20: Error Numbers of the Driver Functions of the Online Data Manager (2501..2512)

9.4.4 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 21: Subfunction Error Numbers of the Driver Functions of the Online Data Manager (8001..8035)

9.5 Data Base Functions Error Numbers (4000 .. 4199)

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 22: 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 wMaxEintraege
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 23: 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	Initializing of DBM through RCS had no success
4066	Passed data length incorrect
4067	Sorting function not linked
4068	Error in function parameter
4069	Error from ODBC table
4070	No free handle available. Too many data base links are already opened
4071	Unknown data type found in the table
4072	Structure of table GLOBAL not correct or no such table existing
4073	No name of an ACCESS data base
4074	Download window can't be created
4075	Download not fully performable

Table 24: 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 exists
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 25: Error numbers of converting functions (4082..4199)

9.6 Converting Functions Error Numbers (5001 .. 5008)

The following table lists the error numbers of converting functions.

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

Table 26: Error Numbers of data base functions (5000 .. 5012)

10 Appendix

10.1 Extended Device Diagnostic Master

On the following pages the task state structures of the InterBus Master are described.

10.1.1 PLC_TASK Common Variables

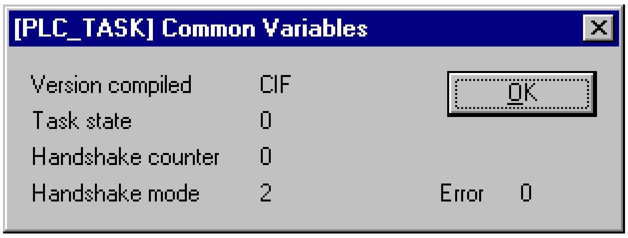


Figure 51: PLC_TASK Common Variables

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

Table 27: Meaning of Variables

10.1.2 IBM_TASK Common Variables

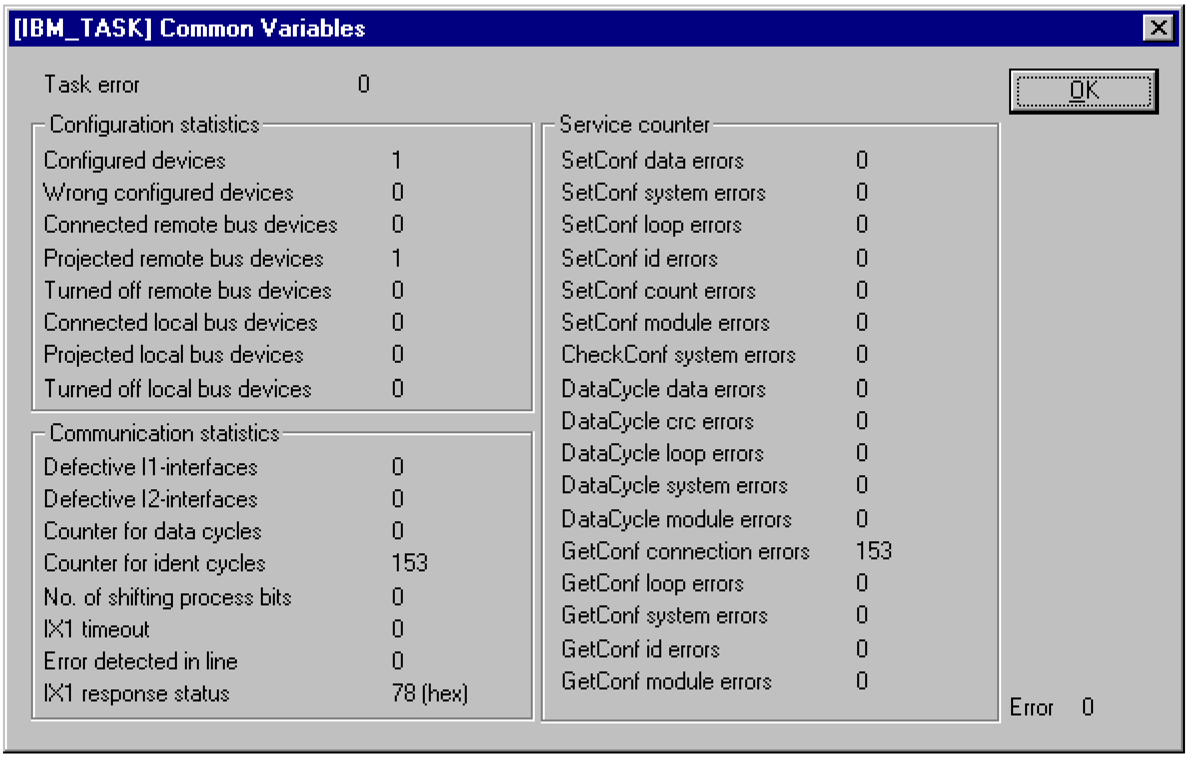


Figure 52: IBM_TASK Common Variables

Configuration State	**Meaning**
Configured devices	number of device that are actual configured
Wrong configured devices	the master executes a consistency check of each Slave parameter set and increments this counter by each found faulty data set
Connected remote bus devices	this value shows the actual number of scanned remote bus device in the connected network.
Projected remote bus devices	this value indicates the number of configured remote bus devices the master wants to run with.
Turned off remote bus devices	in case of configuration faults, like wrong ID code for example, the master deactivates these network components. The number of disabled device is indicated here. The value should normally be 0.
Connected local bus devices	this value shows the actual number of scanned local bus device in the connected network.
Projected local bus devices	this value indicates the number of configured local bus devices the master wants to run with.
Turned off local bus devices	in case of configuration faults, like wrong ID code for example, the master deactivates these network components. The number of disabled device is indicated here. The value should normally be 0.
Defective I1-Interfaces	for each timeout causing branch interface of the network this counter is incremented. The value should normally be zero, else check the network visual and search for red LB-LEDs on the modules. This indicates the defective interface module.
Defective I2-Interfaces	for each timeout causing remote interface of the network this counter is incremented. The value should normally be zero, else check the network visual and search for red RB-LEDs on the modules. This indicates the defective interface module.

Counter of data cycles	this value shows the actual number of driven process data cycles since the last master reset.
Counter of ident cycles	this value is normally incremented during the startup phase of the InterBus network when the master does its management ID-sequence. If the counter increments during runtime, then the master has to proceed some extra ID-sequences because of defective data cycles. So normally the value shouldn't increment.
No. of shifting process bits	the master adds up here the number of actual shifted process data bits of all active devices.
Error detected in line	the master code has special debug information included, which shows in case of a hard communication to the fieldbus controller at which source code line the error happened.
IX1 response status	this value represents the actual confirmation command of the fieldbus controller. During runtime the value is 48hex which indicates 'Start data cycle confirmation'.
SetConf service counter	during the management ID-sequence startup phase of the network. The values should normally be zero.
DataCycle service counter	here the master counts all InterBus process data cycle errors which forced him to leave the process data exchange and need to drive an extra management ID cycle to search for the error location. The data errors as well as CRC errors and module errors are errors which can occur normally during runtime because of electrical disturbance. These kind of errors can be corrected by the master and influence the process data exchange in case of moderate occurrence only a little. But the system errors which means timeout in the incoming process data stream, or loop errors which means the InterBus ring was shortened, forces the master to go into stop and resets the network.
SetConf, CheckConf, DataCycle and Get Conf counter	These counter are incremented only if the Master detects heavy communication errors. These values should normally be zero.

Table 28: Configuration State

10.1.3 IBM_TASK Device Running States

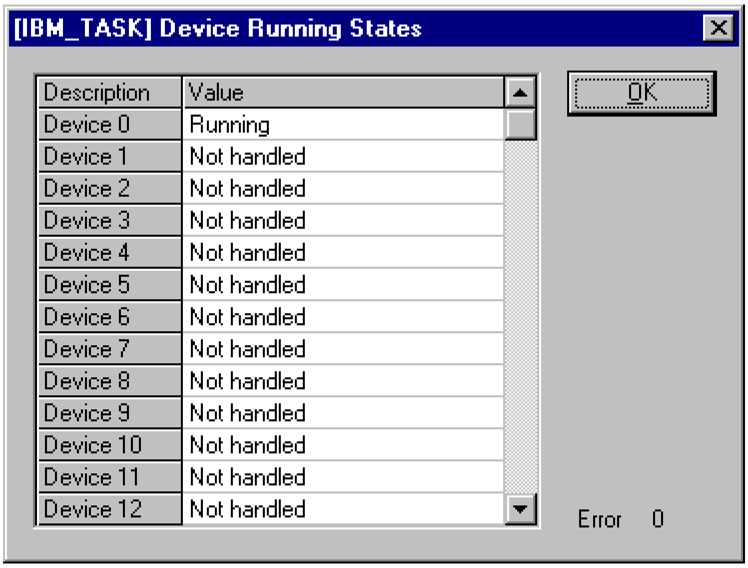


Figure 53:IBM_TASK Device Running States

Variable	Meaning
Device x (x=0..128)	Textural state for station address

Table 29: IBM_TASK Device Running States

10.1.4 IBM_TASK Global State Field

See section *Global State Field* on page *46*.

10.1.5 IBM_TASK Communication Error

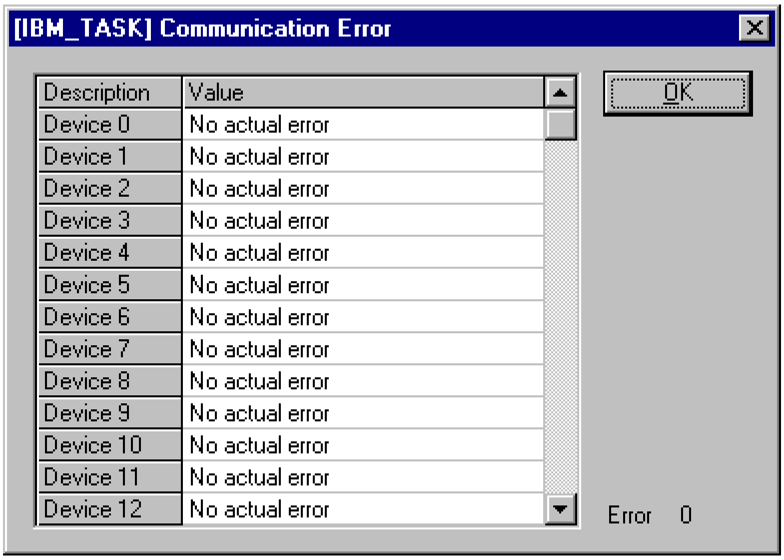


Figure 54: IBM_TASK Communication Error

Variable	Meaning
Slave x (x=0..128)	Actual error number of the Slave

Table 30: IBM_TASK Communication Error

10.1.6 IBM_TASK Extended InterBus Status

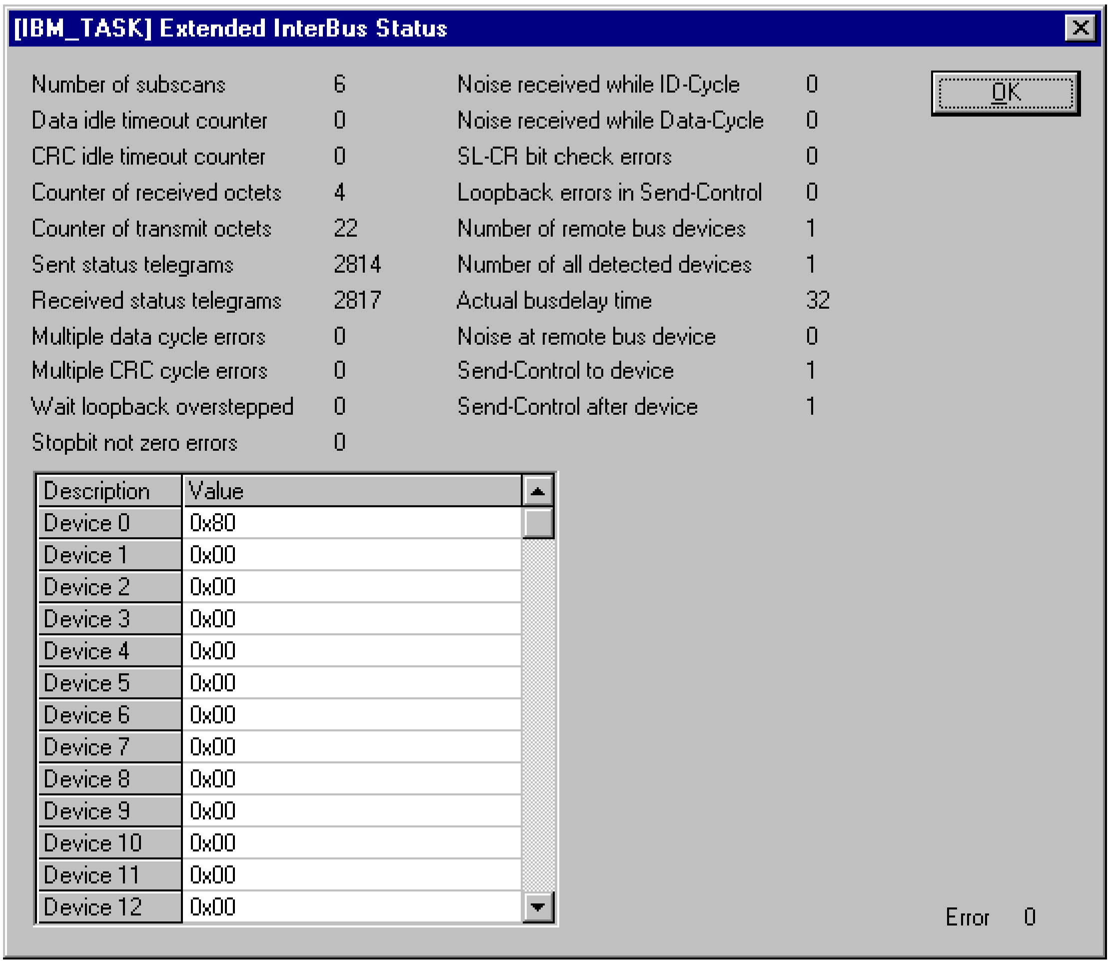


Figure 55: IBM_TASK Extended InterBus Status

The extended InterBus status displays special variables, which are stored directly after the first ID cycle. These values can help networks errors in special cases in again installed InterBus to localize. These values can be interpreted just with our Hotline and because of this they are not described here furthermore.

10.1.7 IBM_TASK PDL Requests

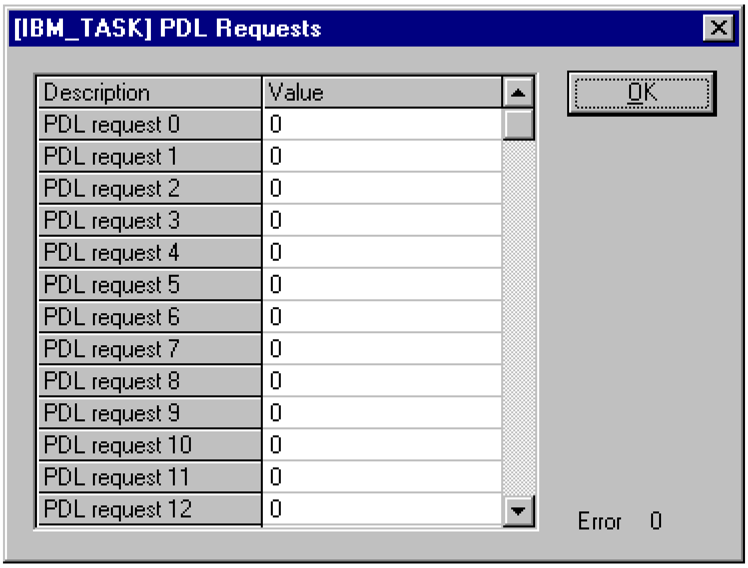


Figure 56: IBM_TASK PDL Requests

The Peripherals Data Link (PDL) layer is part of Data Link Layer (DLL) which is responsible for the safety transmission of data packages trough the PCP protocol and ensures that each PDL message is transported to the other remote station without any error.

The Counter for PDL Requests counts for each Slave the number of sent PDL service data units from the master to a PCP capable Slave device.

10.1.8 IBM_TASK PDL Confirmation

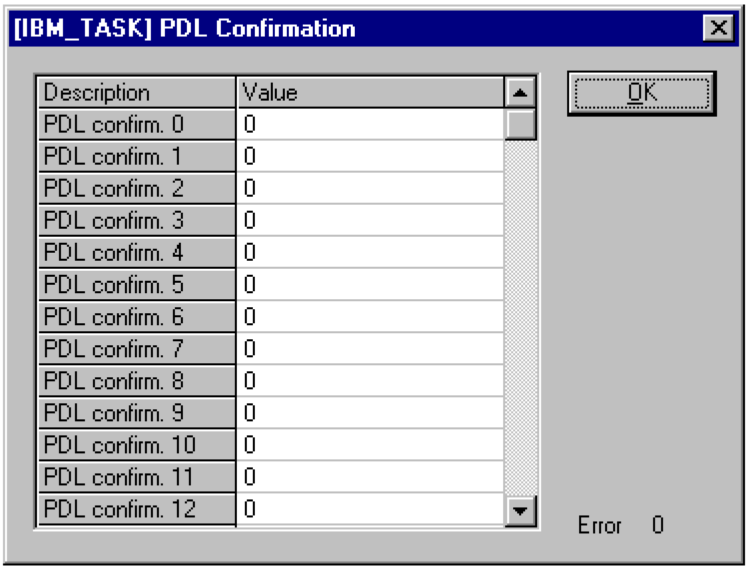


Figure 57: IBM_TASK PDL Confirmation

The Peripherals Data Link (PDL) layer is part of Data Link Layer (DLL) which is responsible for the safety transmission of data packages trough the PCP protocol and ensures that each PDL message is transported to the other remote station without any error.

The Counter for PDL Confirmations counts for each Slave the number of confirmed PDL service data units which were previously sent by the master as requests.

10.1.9 IBM_TASK PDL Indication

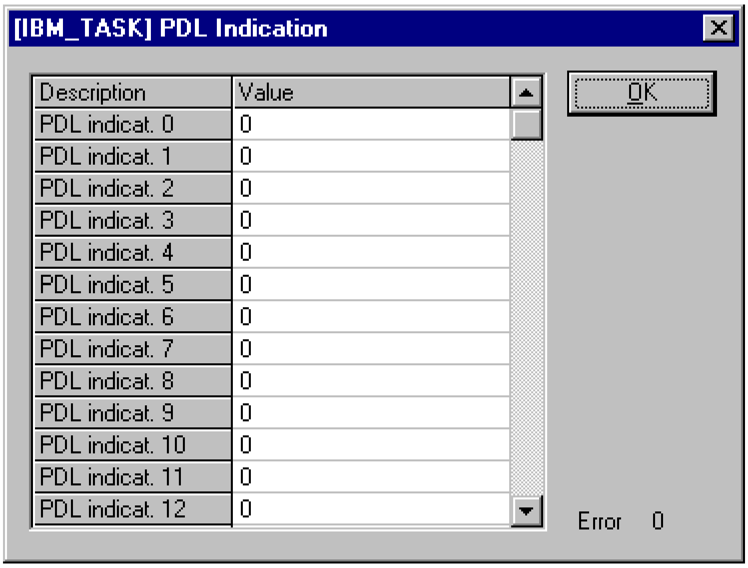


Figure 58: IBM_TASK PDL Indication

The Peripherals Data Link (PDL) layer is part of Data Link Layer (DLL) which is responsible for the safety transmission of data packages trough the PCP protocol and ensures that each PDL message is transported to the other remote station without any error.

The Counter for PDL Indications counts for each Slave the number of received PDL service data units which were sent by a PCP capable Slave device to the master. Usually an indication is received from a PCP server Slave when a previous request was sent before, or can be received at any time if a Slave works as PCP client Slave.

10.1.10 IBM_TASK Data Cycle Status

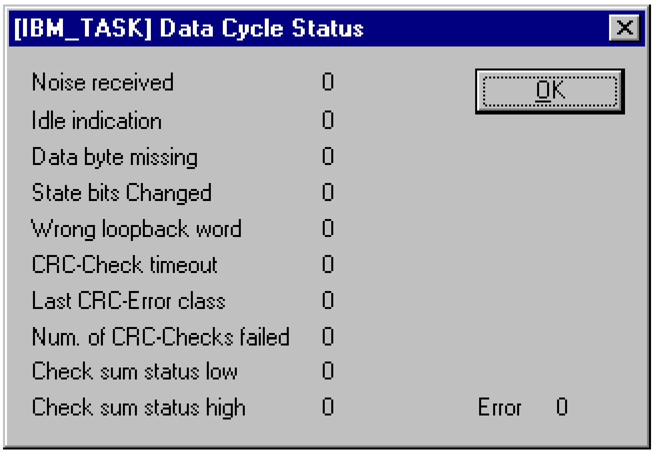


Figure 59: IBM_TASK Data Cycle Status

Variable	Meaning
Noise received	after a process data cycle is finished normally no further data should be received be the master in the backline of the InterBus ring. But in case of electronical disturbance the InterBus can be influence in this way that noise is produced in the shifting register. Before the master starts the next data cycle it looks for received noise telegrams. If noise was received it increments the counter and drives an ID-cycle to search for the error location.
Idle indication	the master supervises the incoming bit stream all the time. Because of the InterBus principle there exits always bus activity also in process data idle times. If the incoming bus activity is interrupted because of a cut wire for example, the master increment this value and drive ID cycles to search for the error.
Data byte missing	the master supervises the InterBus delay of incoming process data. If this time equidistant value is overstepped in its limit, the mater drives ID-cycles to search for the error.
State bits changed	each telegram that is sent into the InterBus ring has a IBS specific 3 bit head information included which is transported by each device back to the master transparently. If the master detects differences between the constellation it has sent and the constellation that comes back from the devices it drives an extra ID-cycle and searches for the error.
Wrong loop back word	the transmission of the process data, must be received back after all process input data was received without any change. If there are differences detected a transmission error has occurred and the master drives an extra I management cycle.
CRC-Check timeout	after each data cycle a CRC check procedure is following. This procedure is supervised by a timer. If the time limit is overstepped for the incoming CRC telegrams of the devices a transmission error has occurred and the master drives an ID-cycle.
Last CRC-Error class	1 = Stopbit unequal zero 2 = CRC indicated transmission error 3 = Faulty InterBus-Telegramstatusbits 4 = Process data transfer timeout 5 = Checksum transfer timeout
Num. of CRC-Checks failed	here the number of failed CRC procedures are counted.
Check sum status low	Counts the number of received invalid checksum-status low telegrams
Check sum status high	Counts the number of received invalid checksum-status high telegrams

Table 31:IBM_TASK Data Cycle Status

10.1.11 IBM_TASK Scanned ID Codes

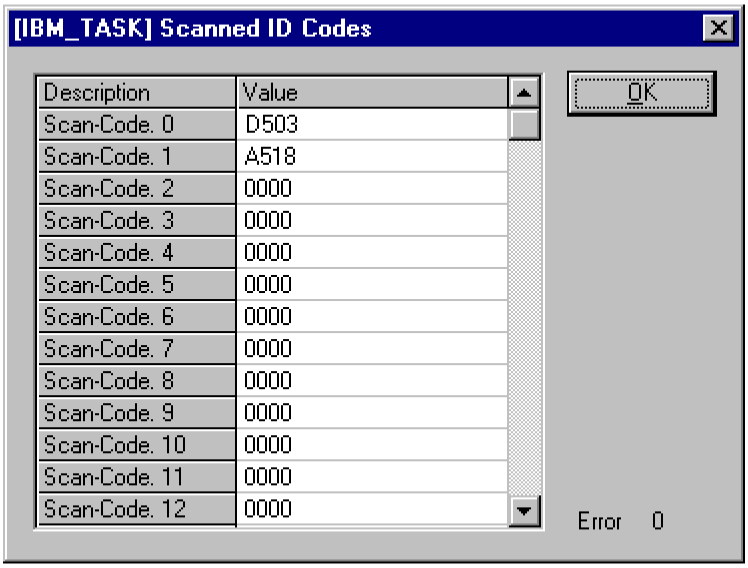


Figure 60: IBM_TASK Scanned ID Codes

This buffer represents always the last received ID code image of the current connected InterBus network. Is it updated by the master on each extra driven ID cycle during the process data cycle transfer. With its contents conclusions are possible for the kind of error and error location. For example the picture above shows a scanned ID-Code to D503hex and the next value to A518hex = loop back word. The master sends in case of a transmission error always the number of expected active (devices + 1) loop back words into the InterBus ring. Normally it will receive back all ID-Codes of the connected device instead of the loop back word, but in the picture it receives only the ID-Code of the first device. So it seems that the contact was interrupted to all the following Devices and this was actually the fault that was produced here in this example constellation.

10.1.12 ALPMLIP Common Variables

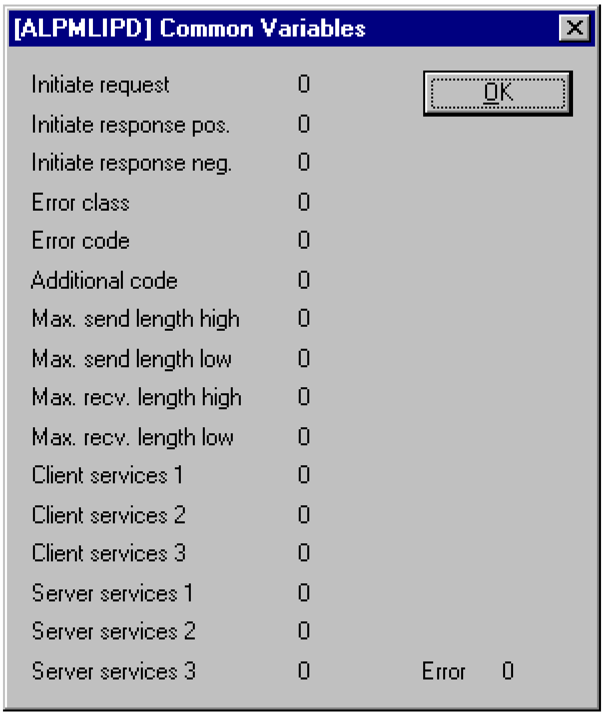


Figure 61: ALPMLIP Common Variables

This common variables structure is responsible for the indication of connection establishment errors during the initiate phase of the master in an PCP connection. The structure always shows the latest information of a failed connection initialisation.

Variable	**Meaning**
Initiate request	Counts the number of initialisation requests of all Client-Slaves.
Initiate response pos.	Counts globally the number of faultless master initialisations to PCP Slaves.
Initiate response neg.	Counts globally the number of failed master initialisations to PCP Slaves.
Error class	0 = Initiate 5 = Service 6 = Access 8 = Other
Error code	1 = Max. PCP length insufficient 2 = Service not supported.
Additional code	Actually not used.
Max. send length low	Maximum supported send PCP length with low priority of the last requested device to which the connection initialisation has failed
Max. send length high	Not supported, always 0
Max. recv. length low	Maximum supported receive PCP length with low priority of the last requested device to which the connection initialisation has failed.
Max. recv. length high	Not supported, always 0
Client services 1	Bit 7 (128) Get OV Long
Client services 2	Bit 5 (32) Read Bit 4 (16) Write
Client services 3	Bit 7 (128) Information Report
Server services 1	Bit 7 (128) Get OV Long
Server services 2	Bit 5 (32) Read Bit 4 (16) Write
Server services 3	Bit 7 (128) Information Report

Table 32: ALPMLIP Common Variables

10.1.13 ALPMLIPD ALI Information

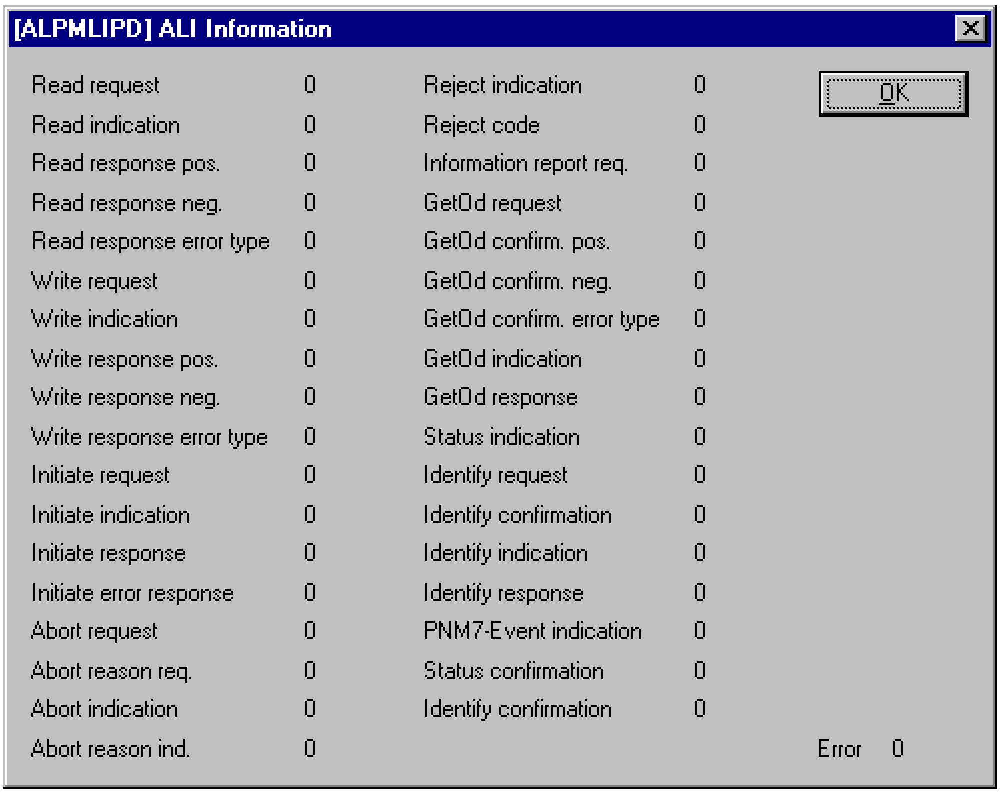


Figure 62: ALPMLIPD ALI Information

This table shows the actual status information of all ever requested and received services within the master since its last reset.

10.1.14 ALPMLIPD PMS Information

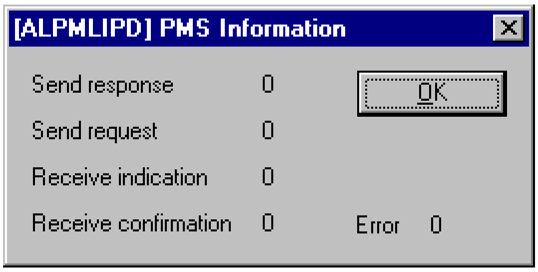


Figure 63: ALPMLIPD PMS Information

Variable	**Meaning**
Send response	Number of sent master response to previous corresponding Slave request.
Send request	Number of sent master requests.
Receive indication	Number of received Slave requests.
Receive confirmation	Number of received Slave response to previous corresponding master request.

Table 33: ALPMLIPD PMS Information

10.1.15 ALPMLIPD LLI Information

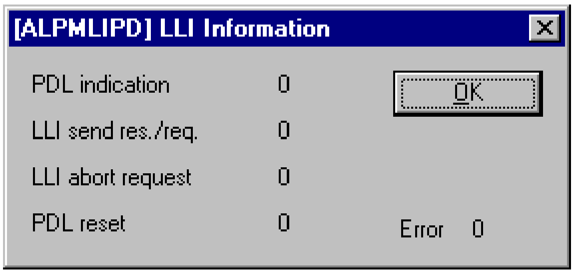


Figure 64: ALPMLIPD LLI information

Variable	Meaning
PDL receive ind./conf.	Number of all ever received Slave confirmation or indications.
LLI send res./req.	Number of all ever sent master requests or responses.
LLI abort request	Number of ever sent connection aborting requests.
PDL reset	Number of internal resets of the sub protocol stack PDL.

Table 34: ALPMLIPD LLI information

10.2 Length and ID Codes

10.2.1 Length Code

The Length Code contains information about the (max. possible) data weigth of the Slave. The Master can read out the 5 bit containing Length Code over the Bus from the Slave. The following table shows the determination in accordance with the InterBus standard DIN EN 50254.

Decimal	Hexadecimal	Meaning	Alternatively Interpretation (Hex)
0	00	No Data	00
1	01	1 Word	01
2	02	2 Words	02
3	03	3 Words	03
4	04	4 Words	04
5	05	5 Words	05
6	06	8 Words	08
7	07	9 Words	09
8	08	4 Bit	41
9	09	1 Byte	81
10	0A	12 Bit	43
11	0B	3 Byte	83
12	0C	1 Bit	C1
13	0D	2 Bit	C2
14	0E	6 Words	06
15	0F	7 Words	07
16	10	reserved	-
17	11	26 Words	1A
18	12	16 Words	10
19	13	24 Words	18
20	14	32 Words	20
21	15	10 Words	0A
22	16	12 Words	0C
23	17	14 Words	0E
24	18	reserved	-
25	19	reserved	-
26	1A	reserved	-
27	1B	reserved	-
28	1C	reserved	-
29	1D	reserved	-
30	1E	reserved	-
31	1F	reserved	-

Table 35: Lengths Code

Note see next page.

Note: The given values in the column **Alternatively Interpretation** (8 Bits) are used partly by other configuration softwares and printed on the lables of Slaves or they are given in the product documentation. FB 1131 used the Length Code in accordance with DIN EN 50254. Is for example the Length Code 41H printed on the Slave (Alternatively Interpretation), you have to use 08H in FB 1131.

10.2.2 ID Code

The ID Code contains information about the device type. A part of this are for example the information Remote Bus-, Local Bus Device, Bus Branch, digital or analog modules and further more the PCP capacity of the device.

Dec	Hex	Description of the Modul Function
1	01	Remote Bus Device, digital Output modules
2	02	Remote Bus Device, digital Input modules
3	03	Remote Bus Device, digital In- and Output modules
4	04	Bus Branch with InterBus-Loop-Branch
5	05	Remote Bus Device (digital), ISO-Valve Ile (Output)
8	08	Bus Branch with 2-Conductor-Local Bus Branch
12	0C	Bus Branch with 2-Conductor-Remote Bus Branch
13	0D	Remote Bus Device (digital), profile concurring digital Output modules
14	0E	Remote Bus Device, profile concurring digital Input modules
47	2F	Remote Bus Device, profile concurring digital In- and Output modules
49	31	Remote Bus Device, analog Output modules
50	32	Remote Bus Device, analog Input modules
51	33	Remote Bus Device, analog In- and Output modules
52	34	Bus Branch with 8-Conductor-Local Bus Branch
53	35	Remote Bus Device, profile concurring analog Output modules
54	36	Remote Bus Device (analog), ENCOM with Input data
55	37	Remote Bus Device (analog), ENCOM with In- and Output data
56 *	38 *	Remote Bus Device with Parameter Cannel, "µP_Not_Ready" with register interlock
58	3A	Remote Bus Device, profile concurring analog Input modules
59	3B	Remote Bus Device, profile concurring analog In- and Output modules
60 *	3C *	Remote Bus Device with Parameter Channel, "µP_Not_Ready" for reinitialization
83	53	Local Bus Device, analog In- and Output modules with event Inputsand Configuration Outputs
91	5B	Local Bus Device, analog Output modules with event Inputs
95	5F	Local Bus Device, analog Input modules with Configuration Outputs
99 **	63 **	Local Bus Device, analog Loop In- and Loop Output modules with event Inputs and Configuration Outputs
102	66	Local Bus Device (analog), ENCOM with Input data
103	67	Local Bus Device (analog), ENCOM with In- and Output data
104 *	68 *	Local Bus Device with Parameter Channel, "µP_Not_Ready" for reinitialization, Loop
107 **	6B **	Local Bus Device, analog Loop Output modules with event Inputs
108 *	6C *	Local Bus Device with Parameter Channel, "µP_Not_Ready" for reinitialization, Local Bus
111 **	6F **	Local Bus Device, analog Loop Input modules with configuration Outputs
113	71	Local Bus Device, analog Loop Output modules
114	72	Local Bus Device, analog Loop Input modules
115	73	Local Bus Device, analog Loop In- and Output modules

120 *	78 *	Local Bus Device with Parameter Channel, "µP_Not_Ready" with register interlock
121	79	Local Bus Device, profile concurring analog Output modules
122	7A	Local Bus Device, profile concurring analog Input modules
123	7B	Local Bus Device, profile concurring analog In- and Output modules
125	7D	Local Bus Device, analog Output modules
126	7E	Local Bus Device, analog Input modules
127	7F	Local Bus Device, analog In- and Output modules
177	B1	Local Bus Device, digital-InterBus-Loop Output modules
178	B2	Local Bus Device, digital-InterBus-Loop Input modules
179	B3	Local Bus Device, digital-InterBus-Loop In- and Output modules
181	B5	Local Bus Device, profile concurring digital Output modules
182	B6	Local Bus Device, profile concurring digital Input modules
183	B7	Local Bus Device, profile concurring digital In- and Output modules
187	BB	Local Bus Device, screwing controller
189	BD	Local Bus Device, digital Output modules
190	BE	Local Bus Device, digital Input modules
191	BF	Local Bus Device, digital In- and Output modules
192 *	C0 *	Local Bus Device with Parameter Channel, DRIVECOM (2 PCP-Words)
193 *	C1 *	Local Bus Device with Parameter Channel, DRIVECOM (4 PCP-Words)
195	C3	Local Bus Device with Parameter Channel, DRIVECOM (1 PCP-Word)
212 *	D4 *	Local Bus Device with Parameter Channel, ENCOM (2 PCP-Words)
213 *	D5 *	Local Bus Device with Parameter Channel, ENCOM (4 PCP-Words)
215	D7	Local Bus Device with Parameter Channel, ENCOM (1 PCP-Word)
216 *	D8 *	Local Bus Device with Parameter Channel, profile concurring (2 PCP-Words)
217 *	D9 *	Local Bus Device with Parameter Channel, profile concurring (2 PCP-Words)
219	DB	Local Bus Device with Parameter Channel, profile concurring (1 PCP-Word)
220 *	DC *	Local Bus Device, modul with Parameter Channel (2 PCP-Words)
221 *	DD *	Local Bus Device, modul with Parameter Channel (4 PCP-Words)
223	DF	Local Bus Device, modul with Parameter Channel (1 PCP-Word)
224 *	E0 *	Remote Bus Device with Parameter Channel, DRIVECOM (2 PCP-Words)
225 *	E1 *	Remote Bus Device with Parameter Channel, DRIVECOM (4 PCP-Words)
227	E3	Remote Bus Device with Parameter Channel, DRIVECOM (1 PCP-Word)
228 *	E4 *	Remote Bus Device with Parameter Channel, profile concurring modules (2 PCP-Words)
229 *	E5 *	Remote Bus Device with Parameter Channel, profile concurring modules (4 PCP-Words)
231	E7	Remote Bus Device with Parameter Channel, profile concurring modules (1 PCP-Word)

240 *	F0 *	Remote Bus Device, modul with Parameter Channel (2 PCP-Words)
241 *	F1 *	Remote Bus Device, modul with Parameter Channel (4 PCP-Words)
243	F3	Remote Bus Device, modul with Parameter Channel (1 PCP-Word)
244 *	F4 *	Remote Bus Device with Parameter, ENCOM (2 PCP-Words)
245 *	F5 *	Remote Bus Device with Parameter, ENCOM (4 PCP-Words)
247	F7	Remote Bus Device with Parameter, ENCOM (1 PCP-Word)

Tabelle 1: ID-Codes

* This ID Code is not supported until the InterBus Master Generation 4.

** This ID Code is not supported until the InterBus Master Firmware V 4.50.

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Operating Instruction Manual

907 FB 1131

Fieldbus Configurator CANopen

CANopen

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1 Overview FB1131

1.1 Main Functions

The main functions of the CANopen Fieldbus Configurator are:

Function	Section	Short Description
Configuration	*Overview Communication Types*	Overview communication types and description of the configuration steps
Diagnostic	*Diagnostic Functions*	Diagnostic functions, e.g. Life List, Debugger, Global State Field etc.
	User Data Transfer	Read and Write Objects
Documentation	*Project Information*	Set the project information
	Print	Print out the configuration

Table 1: FB1131 Main Functions

1.2 Properties

FB 1131 is an universal Fieldbus Configurator

This means you can configure the most important fieldbus systems like PROFIBUS, DeviceNet, and InterBus with the same tool.

FB 1131 is a global Fieldbus Configurator

You configure all devices with one tool. FB 1131 checks the dependencies between the devices. FB 1131 only allows configurations that make sense. In case of doubt FB 1131 will give you a warning.

FB 1131 documents your Fieldbus system

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

FB 1131 uses standardized configuration files

Some protocols support standardized files containing information about all features and limitations of the Slave device. FB 1131 uses these files for the configuration.

FB 1131 is a diagnostic tool

After the configuration you can switch FB 1131 into the diagnostic mode. You can watch all status information of the couplers, see protocol dependent diagnostic information. In this case a Slave is not operating correctly will be displayed in a different colour.

1.3 CAN and CANopen

1.3.1 CAN

CAN means Controller Area Network. The CAN specification describes the physical interface, the telegram structure and the secure transmission of a CAN telegram. It describes the send and the receive of a telegram.

The CAN telegram consists (simplified) of a telegram identifier and 0 to 8 bytes of data.

The meaning of the telegram identifier and of the max. 8 bytes user data is not described, e.g. it does not say anything about the application layer.

1.3.2 CANopen

CANopen is an open standard and based on CAN. The meaning of the telegram identifier and of the 0 to 8 bytes of user data is described (specified).

CANopen is a standard application layer defined by the CIA (CAN in automation) specifications DS 301.

CANopen is network concept and determines what data and what services are to be transmitted and what is the meaning of the data for the individual device classes.

CANopen provides functions for the network initialization, the network guarding and the network configuration.

CANopen offers a big flexibility.

1.3.3 CANopen Device Model

A CANopen device can be described generally as 3 components: communication, objects and application.

Component	**Description**
Communication	The communication unit contains the mechanism for the transport of data according to the CANopen specification over the CAN.
Object dictionary	The object dictionary is the connection between the application unit and the communication unit. It contains configuration data and device information. All entries have an object index (index) and a subindex.
Application	The application unit describes the function of the CANopen device.

Table 2: Components of the CANopen Device Model

2 Installation

2.1 System Requirements

- PC with 486-, Pentium processor or higher
- Windows 95/98/ME, Windows NT 4.0/2000/XP
- Free disk space: 30 - 80 MByte
- CD ROM drive
- RAM: min. 16 MByte
- 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 Software Installation

Close all application programs on the system!

Insert the 907 AC 1131 CD in the local CD ROM drive. If "Autorun" is enabled on the PC the CD menu will start automatically. Otherwise it is started by starting the file "CD_Menu_Vxx.exe" in the root directory of the CD. For example by the menu **Start > Run** and entering "[X:]\CD_Menu_Vxx.exe" ([X] is the CD rom drive and Vxx stands for the version number).

You reach the Installation menu of the CD by operating the **Installation 907 AC 1131 Vxx** button.

With the menu Notes for Installation you get a description of the innstallation and the components of the 907 AC 1131, the programming software, the Fieldbus Configurator 907 FB 1131, OPC Server.

Note: Administrator privileges are required on Windows NT/2000/XP systems for installation of the Fieldbus Configurator 907 FB 1131!

3 Getting Started – Configuration Steps

3.1 Overview Communication Types

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

CANopen offers the following communication possibilities:

Communication	**Overview in section**	**Page**
PDO (CANopen)	*Configuration for PDO Communication (CANopen)*	*14*
SDO (CANopen)	*Configuration for SDO Communication (CANopen)*	*14*
Send/Receive Transparent (CAN)	*Configuration for Send/Receive transparent (CAN)*	*14*

Table 3: Overview Communication Types CANopen

3.1.1 Configuration for PDO Communication (CANopen)

Communication	Device	Device	Described in section	Page
PDO (CANopen)	CANopen Master	Any CANopen Node	*Configuration CANopen Master to any CANopen Node*	*15*

Table 4: Overview Communication Types PDO Communication

3.1.2 Configuration for SDO Communication (CANopen)

Communication	Device	Device	Described in section	Page
SDO (CANopen)	CANopen Master	Any CANopen Node	*Configuration CANopen Master to any CANopen Node*	*16*

Table 5: Overview Communication Types SDO Communication

3.1.3 Configuration for Send/Receive transparent (CAN)

Communication	Device	Device	Described in section	Page
Send / Receive transparently (CAN)	CANopen Master	Any CAN device	*Configuration CANopen Master to any CAN Device for Send/Receive transparent (CAN)*	*17*

Table 6: Overview Communication Types CAN send/receive transparent

3.2 Configuration for PDO Communication

3.2.1 Configuration CANopen Master to any CANopen Node (PDO)

The following table describes the steps to configure a CANopen Master to any CANopen Node for PDO communication, as it is typical for many cases.

#	Action	Menu in the Fieldbus Configurator	Detail information in section	Page
1	Create a new project	**File > New > CANopen**	*Setting up the CANopen Configuration*	*19*
2	Copy EDS file of CANopen Node, if Node is not available yet	**File > Copy EDS**	*EDS files*	*19*
3	Select CANopen Master	**Insert > Master**	*Insert Master*	*20*
4	Select CANopen Node and set Node address	**Insert > Node**	*Insert Node*	*22*
5	Set PDO	Left mouse click at the Node, then **Settings > Node Configuration**	*Node Configuration*	*24*
6	Set Offset address **(*1)**			
7	Set Bus Parameter	Left mouse click at the Master, then **Settings > Bus Parameter**	*Bus Parameter*	*45*
8	Save project	**File > Save**	*Save and Save As*	*65*
9	Download	Left mouse click at the Master, then **Online > Download**	*Downloading the Configuration*	*51*
10	Live List	Left mouse click at the Master, then **Online > Live List**	*Live List*	*56*
11	Start Debugger	Left mouse click at the Master, then **Online > Start Debug Mode**	*Debugmode (CANopen)*	*57*
12	Stop Debugger	**Online > Stop Debug Mode**	*Debugmode (CANopen)*	*57*
13	Global Diagnostic	Left mouse click at the Master, then **Online > Global State Field**	*Global State Field*	*59*

Table 7: Configuration CANopen Master to any CANopen Node (PDO)

Note (*1): The Offsetaddresses assigned in the Node configuration are always related to the Master.

3.3 Configuration for SDO Communication

3.3.1 Configuration CANopen Master to any CANopen Node (SDO)

The following table describes the steps to configure a CANopen Master to any CANopen Node for SDO communication, as it is typical for many cases.

#	Action	Menu in the Fieldbus Configurator	Detail information in section	Page
1	Create a new project	**File > New > CANopen**	*Setting up the CANopen Configuration*	*19*
2	Copy EDS file of CANopen Node, if Node is not available yet	**File > Copy EDS**	*EDS files*	*19*
3	Select CANopen Master	**Insert > Master**	*Insert Master*	*20*
4	Select CANopen Node and set Node address	**Insert > Node**	*Insert Node*	*22*
5	Set Bus Parameter	Left mouse click at the Master, then **Settings > Bus Parameter**	*Bus Parameter*	*45*
6	Save project	**File > Save**	*Save and Save As*	*65*
7	Download	Left mouse click at the Master, then **Online > Download**	*Downloading the Configuration*	*51*
8	Live List	Left mouse click at the Master, then **Online > Live List**	*Live List*	*56*
9	Transfer user data: Read objects Write objects	Left mouse click at the Node, then **Online > Read Objects** **Online > Write Objects**	*Read Objects (SDO Upload)* *Write Object (SDO Download)*	*63* *63*

Table 8: Configuration CANopen Master to any CANopen Node (SDO)

3.4 Configuration for Send/Receive transparently (CAN)

3.4.1 Configuration CANopen Master to any CAN Device for Send/Receive transparent (CAN)

The following table describes the steps to configure a CANopen Master for send/receive CAN telegrams (Layer 2) transparently, as it is typical for many cases.

#	Action	Menu in the Fieldbus Configurator	Detail information in section	Page
1	Create a new project	**File > New > CANopen**	*Setting up the CANopen Configuration*	*19*
2	Select CANopen Master	**Insert > Master**	*Insert Master*	*20*
3	Set Bus Parameter	Left mouse click at the Master, then **Settings > Bus Parameter**	*Bus Parameter*	*45*
4	Save project	**File > Save**	*Save and Save As*	*65*
5	Download on the Master	Left mouse click at the Master, then **Online > Download**	*Downloading the Configuration*	*51*
6	Send/Receive of CAN telegrams via function blocks in the SPS program	**-**	-	-

Table 9: Configuration CANopen Master to any CAN Device for Send/Receive transparent (CAN)

4 Configuration of CANopen with FB1131

4.1 Setting up the CANopen Configuration

To create a new configuration, choose the **File > New** menu. This will offer a selection list of fieldbus systems. Select **CANopen**. If only the CANopen 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 EDS files

Each CANopen device manufacturer defines the CANopen characteristics of its device in a so called Electronic Data Sheet, also called EDS file. This description files form the basis of the configuration.

Devices	EDS files
ABB STOTZ-KONTAKT devices	The EDS files for ABB STOTZ-KONTAKT devices are already included in the delivery of the Fieldbus Configurator FB1131.
Devices from other manufacturers	For other devices these have to be delivered by the device manufacturer.

Table 10: EDS files - Source of Supply

During the program start the Fieldbus Configurator reads in automatically all EDS files, which are put down in the EDS directory. In this act the device names are taken up to an internal list. The device-specific data are read out during the configuration directly from the EDS file.

If a CANopen Node (Slave) is needed, which does not appear yet in the selection list, then the appropriate EDS file can be copied in the EDS directory with the menu **File > Copy EDS**. Another possibility is to copy the EDS file with the Windows Explore into the FB1131 EDS directory and then read in the EDS files in the EDS directory again with the menu **Settings > Path**.

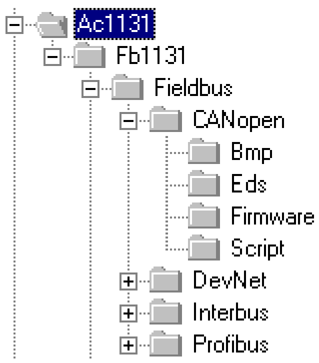


Figure 1: EDS files and bitmaps directory

The EDS path is changeable. The standard setting can be changed with the menu **Settings > Path**.

4.3 Master

4.3.1 Insert Master

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

Insert > Master


Figure 2: Insert > Master Symbol

A window appears where you can select one master device.

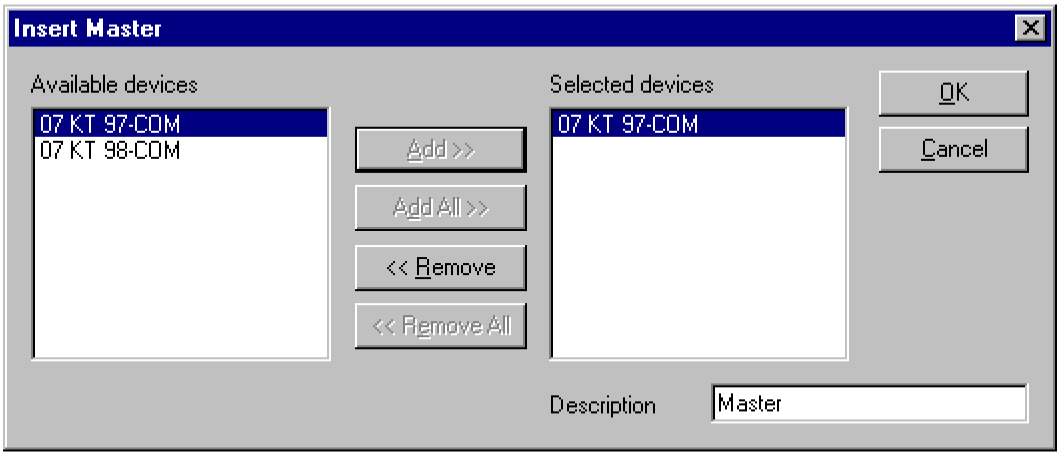


Figure 3: Insert > Master

In this window you select the Master you want by clicking on it in the list **Available devices** and then click the **Add** button or make a double click to put the Master in the list **Selected devices**. With **OK** you confirm the selection and the Master will be insert.

This example shows a 07 KT 97-COM with the **Description** Master, which is changeable in this field.

4.3.2 Replace Master

If a Master already exists in the configuration and should be replaced against another Master, you first have to set the focus on the Master (left mouse click) and then select the menu **Edit > Replace**.

or

make a right mouse click at the Master and select in the now opened window the menu **Replace**.

In the opened window appears the question if the Master should be replaced.

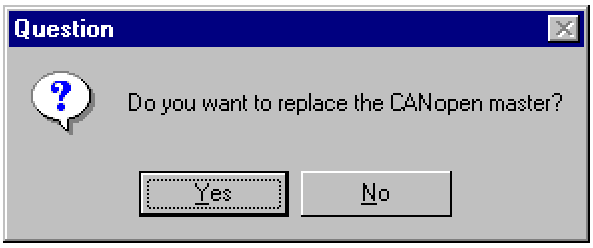


Figure 4: Security question Replace Master

If you click the **Yes** button a new window opens, where you can replace the Master against the existing Master.

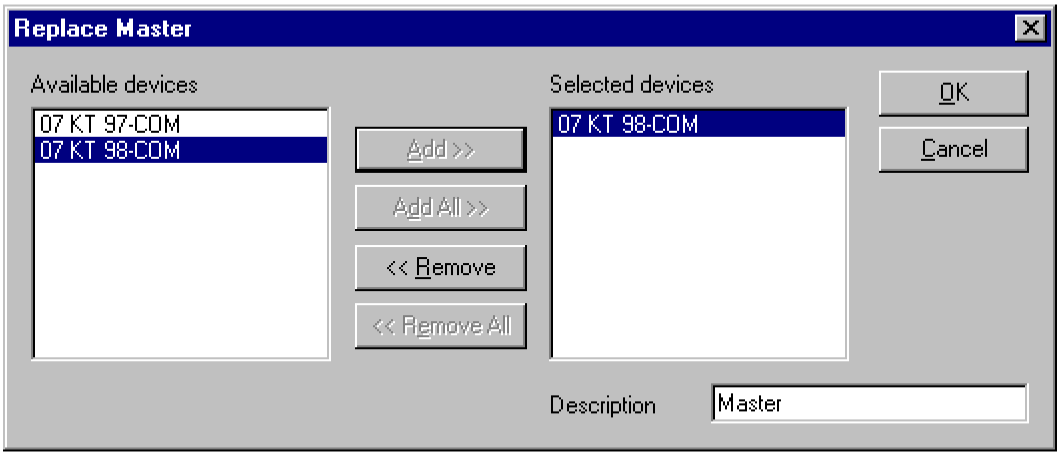


Figure 5: Edit > Replace Master

In this window you select the Master you want by clicking on it. By clicking the **Add** button this Master is shown in the first position by **Selected devices**. With **OK** you confirm the selection and the Master will be replaced.

4.4 Node (Slave)

4.4.1 Insert Node

In order to insert a CANopen Node into the configuration, select the **Insert > Node** menu to open the selection window, or click on the symbol:

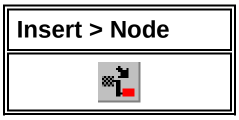


Figure 6: Insert > Node

The mouse cursor changes automatically to the insert Node cursor. Click on the position where you want to insert the new Node. A dialogue box appears where you can select one or more Nodes for insertion.

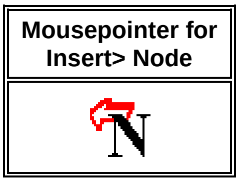


Figure 7: Mousepointer for Insert > Node

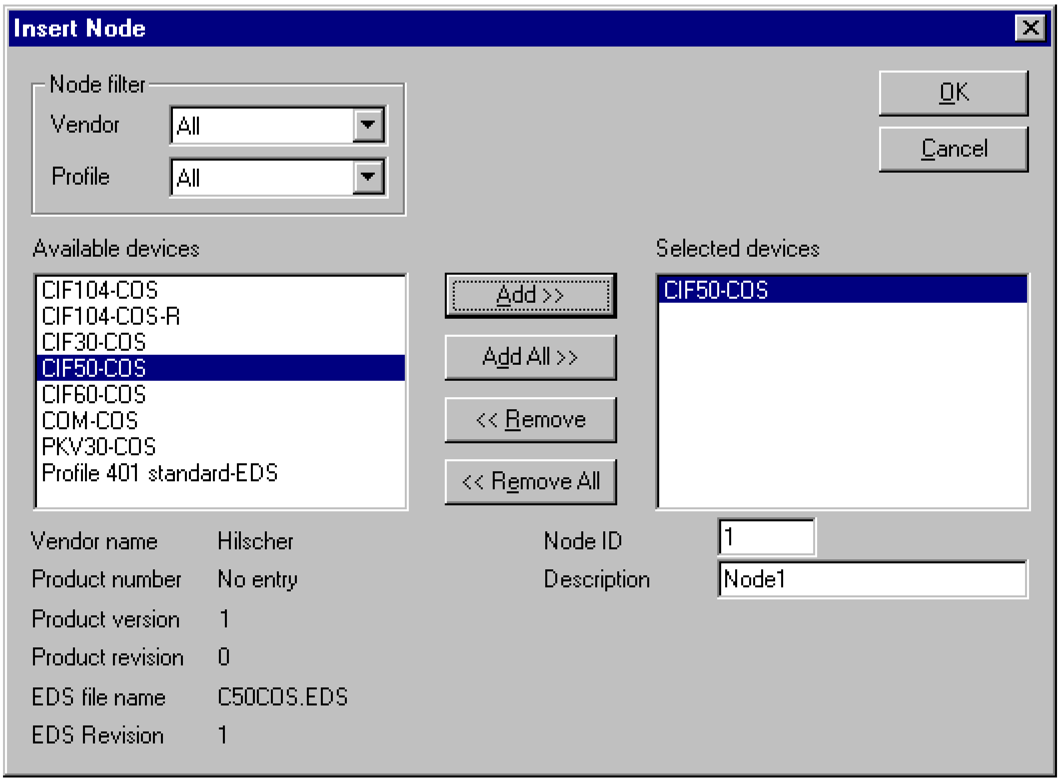


Figure 8: Insert > Node

The left list all available Node devices are shown which are present in the EDS directory. A filter can be used to limit the selection list via the **Vendor** and the **Profile**. If one Node is selected there you can see some additional information about that Node below the list box.

With a double click or with the button **Add**, the Node appears in the list **Selected devices**. When a new Node is chosen FB1131 always looks for the next free Node ID value and propose it. If you select each Node by each you can change its Node ID and give it a short description in the field **Description**. The Description field will accept up to 32 characters of text.

It is possible to configured an available Node multiple times with different **Node ID**s. In CANopen the Node address is called Node ID. The Node ID distinguishes the different Nodes from each other in the network. It's a unique number that can't be forgiven twice. Therefore your made entry in the field **Node ID** must be equivalent to the real Node ID itself, else the master will get no contact later to the Node when it wants to establish the communication.

4.4.2 Node Configuration

At first you have to make a left mouse click on the symbol of the Node and select the menu **Settings > Node Configuration**.

or

Make a double click on the CANopen Node to open the Node Configuration window.

The Node specific configuration is carried out in this window. Here the PDO (Process data objects) and their addresses in the process data image are assigned in the Master. Please note, that the addresses have to agree with the addresses in the PC application program.

Note (Master): The information about the Offset addresses relate to the addressing of the data in the Master! The addresses don't relate to the addressing of the data in the Node. The Node organizes its data addressing itself.

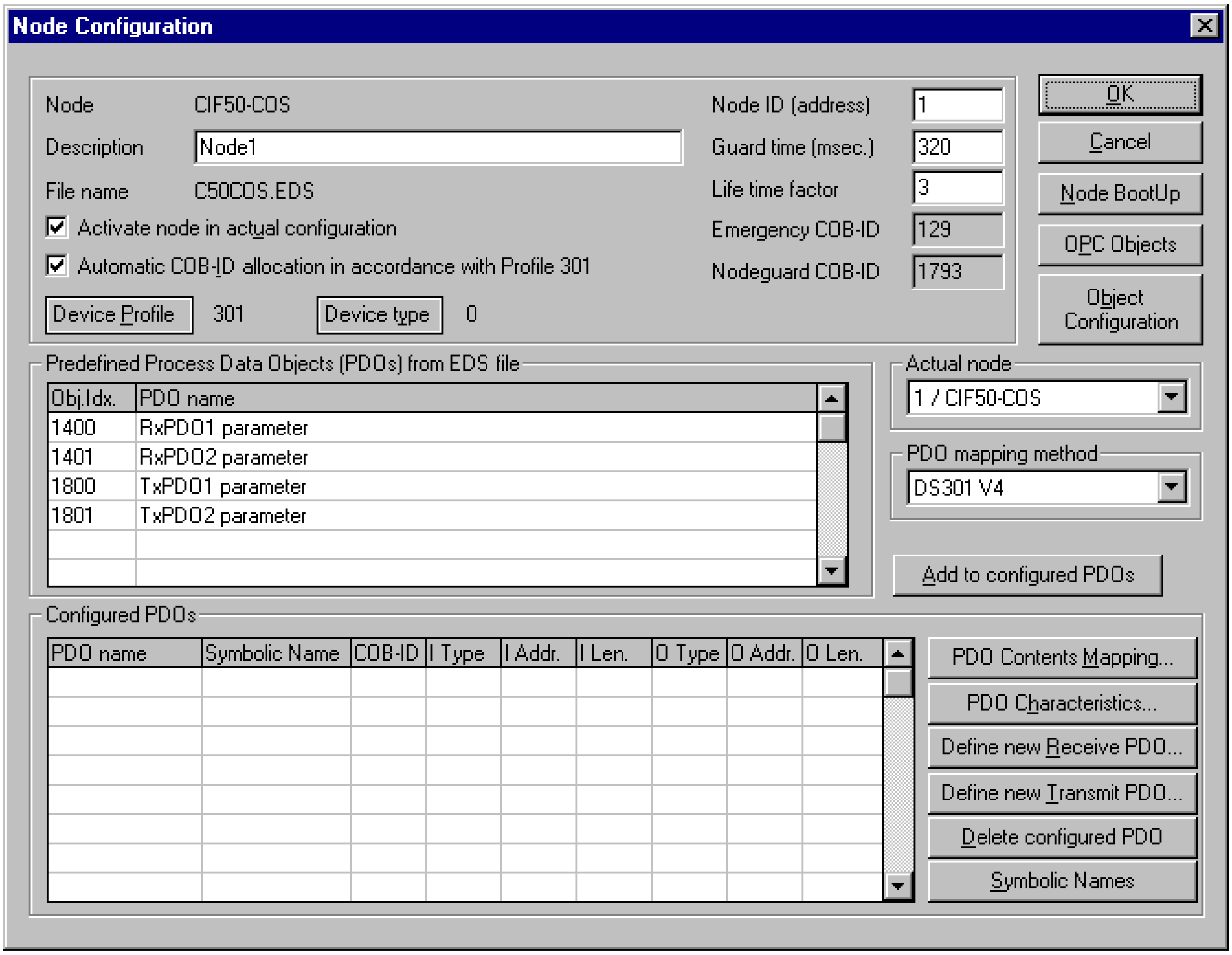


Figure 9: Settings > Node Configuration

The following table shows the fields and elements of the Node Configuration window.

- **Node**

  The name of the device coming from the EDS file is shown in the field **Node**.

- **Description**

  The field **Description** contains a symbolic name for the Node.

- **File name**

  File name of the EDS file.

- **Activate Node in actual configuration**

  If **Activate Node in actual configuration** is selected, process memory in the Master is reserved for this Node and the Master makes a data exchange at the bus to this Node. If this setting is deactivated, the Master reserves memory in the process data image for this Node, but no data exchange to this Node is made at the bus.

- **Automatic COB-ID allocation in accordance with Profile 301**

  In the basic setting **Automatic COB-ID allocation in accordance with Profile 301** is activated. Then the COB-ID is presetted for a PDO depending on the Node address and depending on the used PDO. If this field is deactivated, a manual assignment can be done.

  In order to reduce configuration effort for simple networks a mandatory default identifier allocation scheme is defined, which is described in section *COB-ID* at page *98*. These identifiers are available in the Pre-operational state of a Node which works in accordance to the Communication Profile 301 directly after initialization. These pre-defined connection sets are used by FB1131 if automatic allocation is enabled. Then the COB-IDs in the already configured PDO COB-ID column are not editable. So if the automatic allocation is disabled the COB-IDs can be edited in the range from 0 –2047.

Note: If the setting Automatic COB-ID allocation in accordance with Profile 301 is deactivated, FB1131 does not check if a COB-ID was assigned two times. This is the job of the user. Further more you have to check, if the Node supports this function.

- **Device Profile and Device Type**

  Because of the information of the Device Profile and the Device Type the Master can read out the Object 1000H from the Node and compare it with this information when it start communication.

  If the Device Profile and the Device Type do not agree the Master reports a parameterization error.

  Further information about the Device Profile and the Device Type you find in section *Device Profile and Device Type* at page *28*.

- **NodeID (address)**

  The NodeID (address) is necessary for the addressing of the device at the bus and has to be unique. Therefore it is not allowed to use this number two times in the same network. And it has to agree with the set Node address of the device. Otherwise it is not possible for the Master to build up a communication to this device.

  The NodeID (address) also fixes the used COB-ID.

- **Guard time**

  The Guard time is the supervision time of the Master related to the Node. Further information about the Guard Time you find in section *Node supervision - Nodeguarding and Lifeguarding* at page *39*.

- **Life time factor**

  The Life time factor is an information for the Node for the supervision of the Master. Further information about the Life time factor you find in section *Node supervision - Nodeguarding and Lifeguarding* at page *39*.

- **Emergency COB-ID**

  Is an information of the COB-ID of the Emergency telegram.

- **Nodeguard COB-ID**

  Is an information of the COB-ID of the Nodeguard telegram.

- **OK**

  To close the Node Configuration window and to take over the settings.

- **Cancel**

  To close the Node Configuration window and to reject the settings.

- **Node BootUp**

  The NodeBootUp defines the start up behaviour of the Master with regard to each individual Node and is described in section *Node BootUp* at page *37*.

- **Object Configuration**

  Via the button Object Configuration the object directory can be read out from the EDS file and if necessary added to the Node configuration. Further information you find in section *Object Configuration* at page *40*.

- **Actual Node**

  Changes to the Node configuration of another Node without leaving the window.

- **PDO mapping method**

  Lays down the procedure of the PDO mapping. You can select between the methods DS301 V4 and DS301 V3. The difference between this methods are described in section *PDO Mapping Method* at page *107*.

- **Predefined Process Data Objects (PDOs) from the EDS file**

  Shows the list of the PDOs which are given in the EDS file and which can be used for the configuration. Further information you find in section *Process Data Configuration - Selection of PDO* at page *29*.

- **Configured PDOs**

  Shows the PDOs which are used for the data exchange between Master and Node. In addition to the Offsets in the process data image also the length of the PDOs is indicated. Further information you find in section *Process Data Configuration - Selection of PDO* on page *29*.

- **Add to configured PDOs**

  By clicking on a PDO in the list **Configured PDOs** and afterwards a click on the button **Add to configured PDOs** the selected PDO is taken over in the list of **Configured PDOs**.

- **PDO Contents Mapping**

  First you have to select a PDO in the list **Configured PDOs**. By making a double click or a click at the **PDO Contents Mapping** button the in the PDO transferred user data can be shown and the combination can be changed if necessary. Further information you find in section *PDO Contents Mapping* on page *36*.

- **PDO Characteristics**

  First you have to select a PDO in the list **Configured PDOs**. With a click at the **PDO Characteristics** button the transmission settings of the PDO can be shown and adjusted if necessary.

- **Define new Receive PDO**

  By clicking on this button a new Receive PDO is added to the **Configured PDOs**. This is described in section *Creating own Receive PDOs* at page *33*.

- **Define new Transmit PDO**

  By clicking on this button a new Transmit PDO is added to the **Configured PDOs**. This is described in section *Creating own Transmit PDOs* at page *35*.

- **Delete configured PDO**

  To delete a configured PDO you first have to select the PDO in **Configured PDOs** and then click on the **Delete configured PDO** button.

4.4.2.1 Overview Node Configuration

For the Node Configuration to transfer PDO data the following typical steps have to be made.

Configuration step	Description
Device Profile and Device Type	Set or take over the value which is read out of the EDS file
Process Data Configuration	Select the PDO
Process Data Configuration	Set the PDO transmission characteristics
PDO Mapping	Take over the basic setting or adjust the PDO combination
Node Bootup	Set startup behaviour
Node supervision	Set Nodeguarding and/or Lifeguarding

Table 11: Overview Node Configuration

4.4.2.2 Device Profile and Device Type

Each CANopen Node has a mantatory Object 1000H, which has to be existing in the object directory. This object is named Device Type. The Device Type also includes the information about the Device Profile.

The Master reads out the Object 1000H from the Node when starting up the CANopen bus and compares the entries, which are made in the two available fields **Device Profile** and **Device Type**. If the Device Profile and the Device Type do not agree, the Master reports a parameterization error and does not establish a process data transfer to the Node. To get the real values of the Node, use the online function **Online > Read Object** or click on the Node in Debug mode.

4.4.2.3 Process Data Configuration - Selection of PDO

The process data are transmitted via process data objects, short PDOs, and assigned to the process data image. CANopen distinguishes between receive- and send PDOs.

Receive PDOs	Send PDOs
Data from the Master to the Node Output data are processed by the Node	Data from the Node (Slave) to the Master Input data are generated by the Node (Slave)

Table 12: PDO: Send PDO and Receive PDO

The data of the Node in the process data image of the Master are serviced for the application with the configuration of the PDOs.

The configuration window contains two tables. The upper table **Predefined Process Data Objects (PDOs) from EDS file** shows all configurable PDOs, which are predefined in the EDS file of the device. By making a double click on a table entry or via the **Add to configured PDOs** button the entry is taken over in the table **Configured PDOs**.

The columns of the table **Configured PDOs** have the following meaning:

- **PDO name**

  Here the RxPDO parameter and TxPDO parameter are shown.

- **Symbolic Name**

  Here the symbolic name, which is used in case of OPC communication, is given. PDO_1400 and PDO_1800 and continuous names are used as pre-set value. This can be overwritten by the user.

- **COB-ID**

  In this column the CAN telegram identifier is shown. In case of automatic award of COB-ID the routine described in section *COB-ID (Predefined Connection Set)* on page *98* is used. In case of manual award the telegram identifier of the CAN telegram which is transmitted with the PDO can be edit in the range from 0 to 2047.

- **I Type** and **O Type**

  The specification IB stands for Input Byte and the specification QB stands for Output Byte.

- **I Addr.** and **O Addr.**

  The **I Addr.** (Input Address) and the **O Addr.** (Output Address) define the address of the PDO data in the process data image, which is lead in the Dual-port memory of the Master. The range can be between 0 and 3583. According to information the number of data bytes is shown under **I Number** and **O Number**.

  The addresses can be assigned automatically by FB1131 or manually by the user. This is set in the menu **Settings > Global Settings** in the field **Process Data Auto Addressing**, which is described in section *Global Settings* at page *47*. A screening for double addresses takes place before the Download of Configuration and when you open the window **Address Table**.

- **I Len.** and **O Len.**

  Gives the length of the PDO in bytes and can be max 8. If the value 0 is shown, the PDO still does not includes user data. Via the PDO Mapping the user data for this PDO have to be set.

4.4.2.4 PDO Communication Parameter (PDO Characteristic)

Before a chosen PDO is moved into the lower window, the **PDO characteristics** window is opened automatically.

A PDO in CANopen can be configured in Event Driven mode or Cyclic Transmission. Both kinds of transmission types can be synchronised to a special sychronization message which is sent by the master in defined time intervals. Because of the different behaviour of a transmit and receive PDO, two different windows will be open during the PDO insertion. The several transmissions are distinguished in the so-called **Transmission type** value.

Synchronous means that the transmission of the PDO shall be related to the SYNC message that is sent cyclically by the Master. Preferably the Nodes use the SYNC message as a trigger to output or actuate based on the previous synchronous Receive-PDO respectively to update the data transmitted at the following synchronous Transmit-PDO. Details of this mechanism depend on the device type and are defined in the device profile.

Asynchronous means that the transmission of the PDO is not related to the SYNC message and can happen at any time.

4.4.2.5 Receive PDO characteristics

Receive PDO are output data of the Master and where received from the Node. One calls this PDOs therefore Receive PDOs from view of the Node.

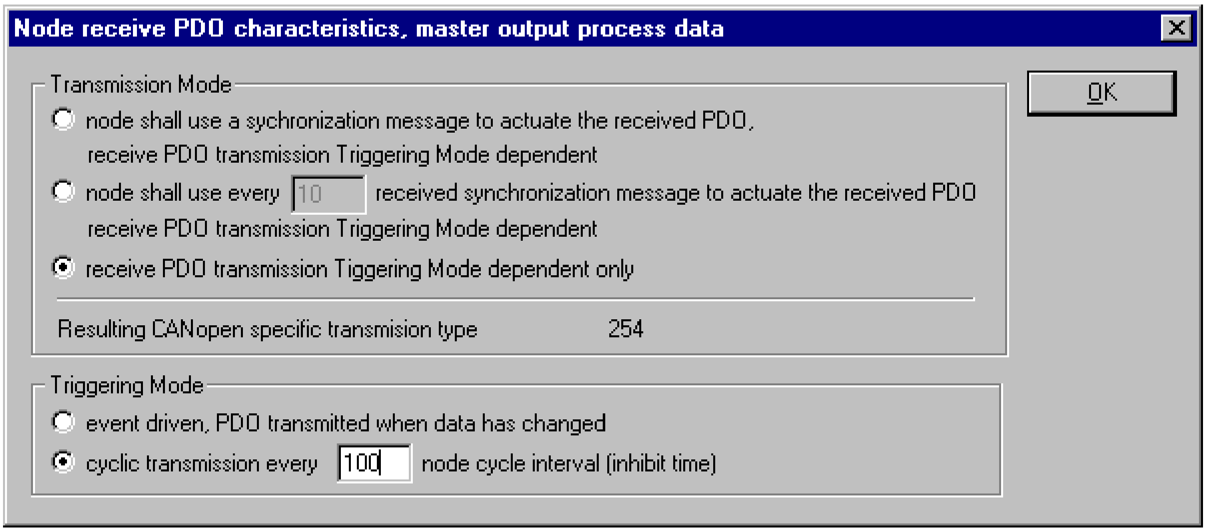


Figure 10: Receive PDO Parameter

Transmission Type	cycl.	acycl.	syn-chronous	asyn-chronous	RTR	Description
0		X	X			The telegram is transferred related to the SYNC, but not periodically.
1..240	X		X			A value between 1 and 240 means that the PDO is transferred synchronously and periodically and that the value of the type of transmission shows the number of SYNC telegrams between the two transferring PDOs.
241..251			res.			reserved
254				X		Type of transmission 254 means that the application event is manufacturer dependent.

Table 13: PDO Communication Parameter > Transmission Types (Receive PDO)

The event control selection menu has two possibilities to configure a Receive PDO for its mailing event.

- On the one hand there is the selection event-controlled, which configures the Master in such a way, that the Master sends the Receive PDO only if it has changed. This kind of the event control keeps the bus load low.
- On the other hand there is the possibility to transmit the PDO cyclic. However this time is indicated here not in milliseconds, but in Node cycle intervals. A Node cycle interval is the time the Master needs to test all configured PDOs in their states and to process them once. The smallest cycle interval is indicated with about 300µsec.

4.4.2.6 Creating own Receive PDOs

If further PDOs shall be used, which are not predefined in the table **Predefined Process Data Objects (PDOs) from EDS file**, this can be done with the functions **Define new Receive PDO**.

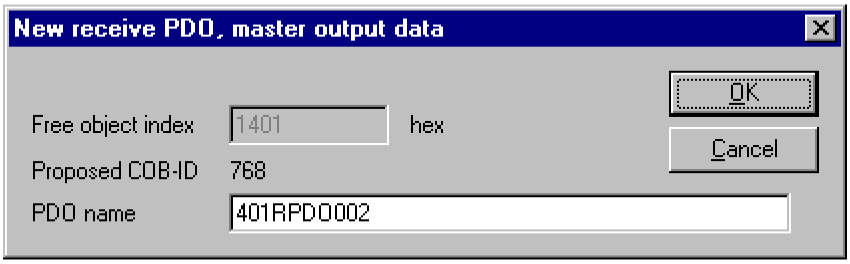


Figure 11: Definite a new receive PDO

FB1131 suggests a free message number, which can be edited later in the PDO configuration window, if the PDO was taken over.

4.4.2.7 Transmit PDO characteristics

Transmit PDOs are input data of the Masters and they were sent by the Node. This PDOs are called Transmit PDOs from view of the Node.

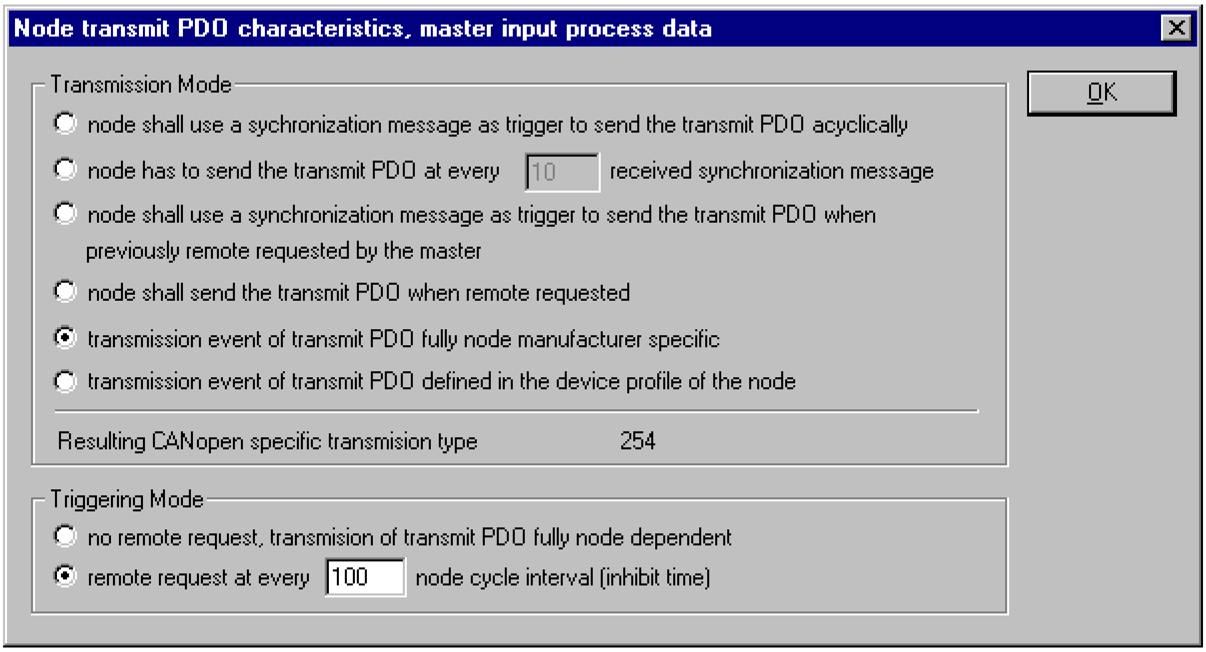


Figure 12: Transmit PDO Parameter

Transmission Type	cycl.	acycl.	syn-chronous	asyn-chronous	RTR	Description
0		X	X			The telegram is transferred related to the SYNC, but not periodically.
1..240	X		X			A value between 1 and 240 means that the PDO is transferred synchronously and periodically and that the value of the type of transmission indicates the number of SYNC of telegrams between the two transferring PDOs.
241..251			res.			reserved
252			X		X	The transmission types 252 and 253 mean that the PDO is an event without immediate notification and it is only transferred with remote transmission requirement. With the type of transmission 252 the data are immediately updated after receiving the SYNC Telegram (however not sent).
253				X	X	The transmission types 252 and 253 mean that the PDO is an event without immediate notification and it is only transferred with remote transmission requirement. With the type of transmission 253 the data are immediately updated after receiving the SYNC Telegram
254				X		The Transmission type 254 means that the application event is manufacturer dependent.
255				X		The Transmission type 255 means that the application event is defined in the respectively supported equipment profile. The exact transmission mode whether cyclically, event-controlled etc. can reread there.

Table 14: PDO Communication Parameter > Transmission Types (Transmit PDO)

The event control selection menu has to two possibilities to configure a transmit PDO for its mailing event.

- On the one hand there is the selection no remote request. The Master behaves completely passively to the PDO and is programmed only for receiving. When the PDO is received is completely Node dependent here.
- On the other hand there is the possibility to set remote request. Here the Master sends so-called Remote-Telegrams in settable Node cycle intervals, which arrange the Node to send its Transmit PDO to the Master after receiving it.

4.4.2.8 Creating own Transmit PDOs

If further PDOs shall be used, which are not predefined in the table **Predefined Process Data Objects (PDOs) from EDS file**, this can be done with the functions **Define new Transmit PDO**.

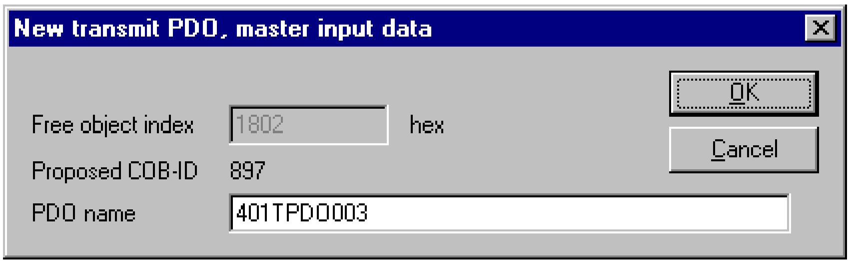


Figure 13: Definite a new Transmit PDO

FB1131 suggests a free message number, which can be edited later in the PDO configuration window, if the PDO was taken over.

4.4.2.9 PDO Contents Mapping - Arrange a PDO

Some CANopen Nodes support the PDO data mapping and dynamic distribution. That means a user defined containment mapping of objects into a PDO. The mapping itself is always done by the Node internally after is has received new RX-PDO or has to send new TX-PDO, so that the master can handle the input and output PDOs coming from and going to the Node completely transparent. This guarantees high speed data transfer and execution in the view of the master. His job is it only to configure the Node's mapping dictionary during its configuration phase once.

A PDO can contain always up to 8 byte process data. The combination of these individual process data elements can be changed when the button **Append Object** is used. When a PDO was transferred from the upper table to the **Configured PDOs** table, FB1131 maps automatically all found mappable process data from the Node EDS file into this PDO.

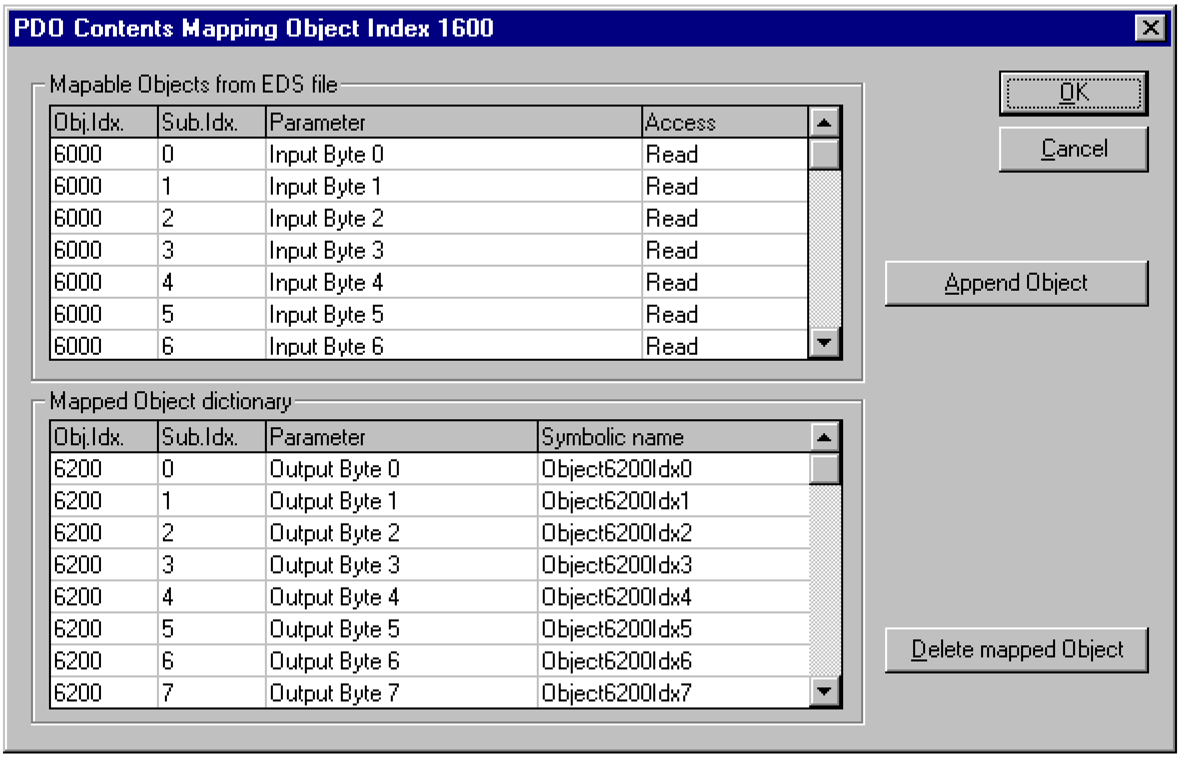


Figure 14: PDO Contents Mapping

The picture above is an example for a TX-PDO mapping. The upper table shows all available objects with their access right which are declared as supported in the node's EDS file. A double click onto one of these transfer it into the lower table. This table contains the real mapped objects that shall be a content of the PDO later in the process data exchange phase.

Note: Not all CANopen Nodes supports the PDO mapping feature!

4.4.2.10 Node BootUp

The Node BootUp defines the network startup behaviour of the Master for the particular Node to get it operative. There are different states a Master is running through per Node, till the BootUp sequence is finished for the Node. Each state now is configurable and can be enabled (activated) or disabled (deactivated) here. In the basic setting all states are activated.

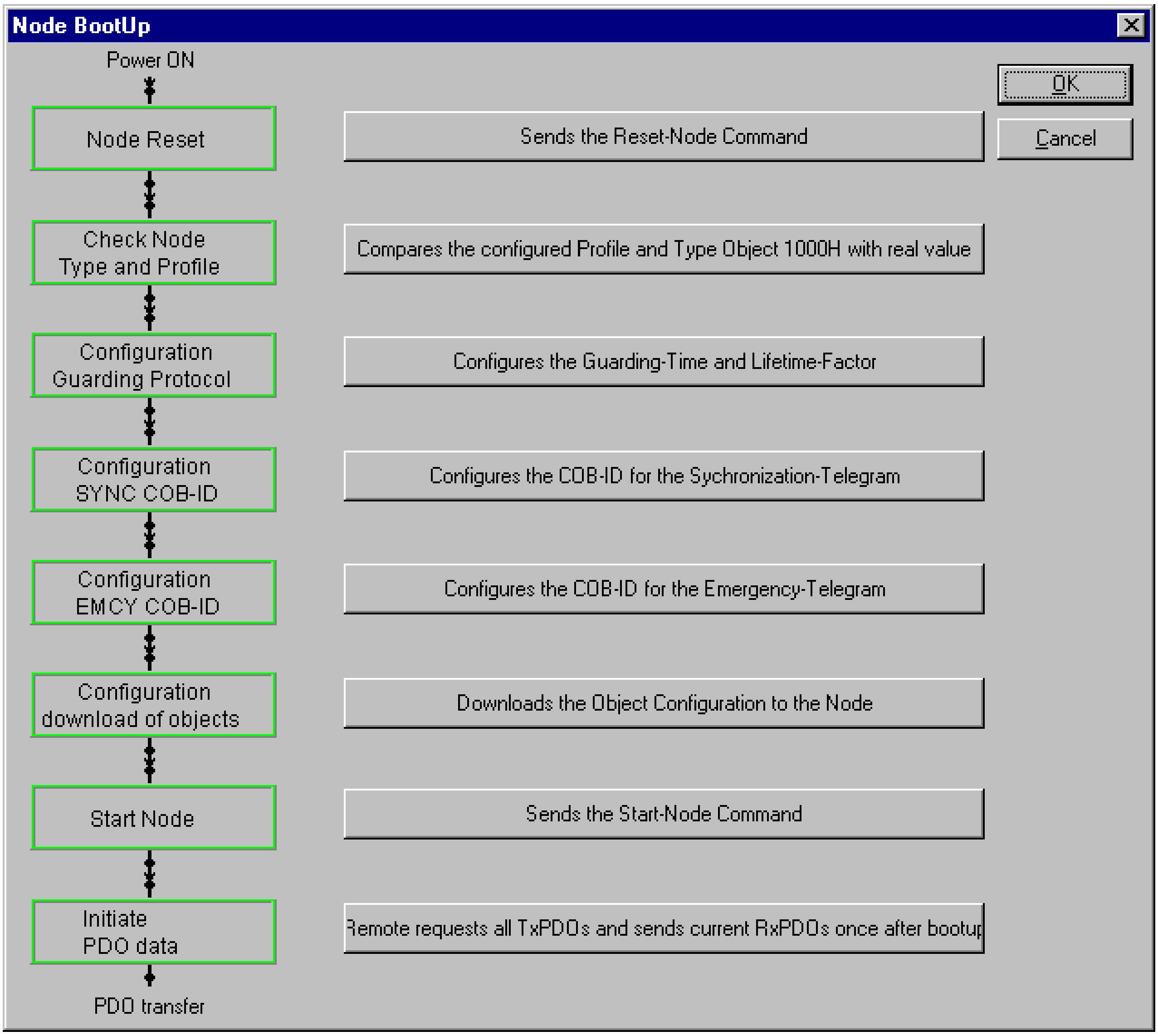


Figure 15: Online > Node Configuration > Node BootUp

Node BootUp parameter	**Description**
Node Reset	If enabled, the master sends as first the CANopen specific Node Reset Communication command.
Check Node Type and Profile	If enabled, the master will compare the contents of the mandatory Node Object 1000H is the device type with the values that are configured within FB1131. If the values are different, the master will report a parameterisation error.
Configuration Guarding Protocol	A CANopen has two specific register responsible for the Node guarding protocol. If the item is enabled, the master will write the Guard Time and Life-Time factor of the Node configuration into the corresponding objects of the Node during startup.
Configuration SYNC COB-ID	If the item is enabled, the master will write the SYNC COB-ID of the configuration into the corresponding objects of the Node during startup.
Configuration EMCY COB-ID	If the item is enabled, the master will write the EMCY COB-ID of the configuration into the corresponding objects of the Node during startup.
Configuration download of objects	To get a PDO communication to a Node working, the master has to send all relevant configuration objects to the Node. For example the mapping table, the COB-ID a PDO shall be sent through are covered here. If enabled, all these parameter and also the user specific objects which are added manually in the Node object configuration window are written down to the Node by the master.
Start Node	To reach the operational state in CANopen a Node has to get the CANopen specific Start Node command. If enabled, the master will send the Start Node command to the Node at the end of the boot-up procedure.
Initiate PDO data	This item selects if the installed PDOs shall be automatically written and read by the master directly after the startup once. This ensures that the latest output data which can be found within the Masters output process data area is sent to the Node and that the latest Node input data is read from the Node and be placed into the input process data area.

Table 15: Node BootUp

4.4.2.11 Node supervision - Nodeguarding and Lifeguarding

The **Guard time** and **Life time factor** settings serve the supervision of the Node and the supervision of the Master in the view of the Node. If the communication is established once to the Node later, the Master will poll the Node in **Guard time** multiplied **Life time factor** time intervals with special guard telegrams to check if it is still present in the network or not. The Node supervises if the Master has done a guard polling during the configured time interval to check if the Master is still present. If one of these values is configured to **0**, then the supervision is disabled in the Master as well as in the Node. The Node itself will start with the Node guarding when the first remote-transmit-request from the Master for its guarding identifier is received. The Master itself will start the Node guarding after it has initialized all for the communication necessary objects of the Node. If the Node guarding fails during runtime, the Master will reset the communication to the specific Node and restarts its initialization again.

Note: If the Node does not support the Nodeguarding, the Master cannot recognize that the Node failed.

4.4.2.12 Object Configuration

The most important part of a CANopen device is its object directory. The object directory is essentially a grouping of objects accessible via the network in an ordered predefined fashion. Each object within the directory is addressed using a 16-bit index. The Device profiles of CANopen define the name, the meaning, the value range and data type of the Service Data Objects (SDO). With so-called Service Data Messages the contents of an object and its subindex can be changed. This is necessary to set up the behaviour of a CANopen Node in the right manner. This is necessary to change the behaviour of the CANopen Node.

To get access to the SDO configuration press the **Object Configuration** button. The following window below will appear and FB1131 shows in the upper table all supported objects read out from the EDS file of the Node. If you have already inserted some PDOs you will find existing entries in the lower table too.

FB1131 places some objects in this table automatically when a PDO in the **Node Configuration** window is inserted, to set up the several variables of the PDO objects right, so that the wished configuration corresponds to the Node behaviour later in the process data communication. These values can not be edited.

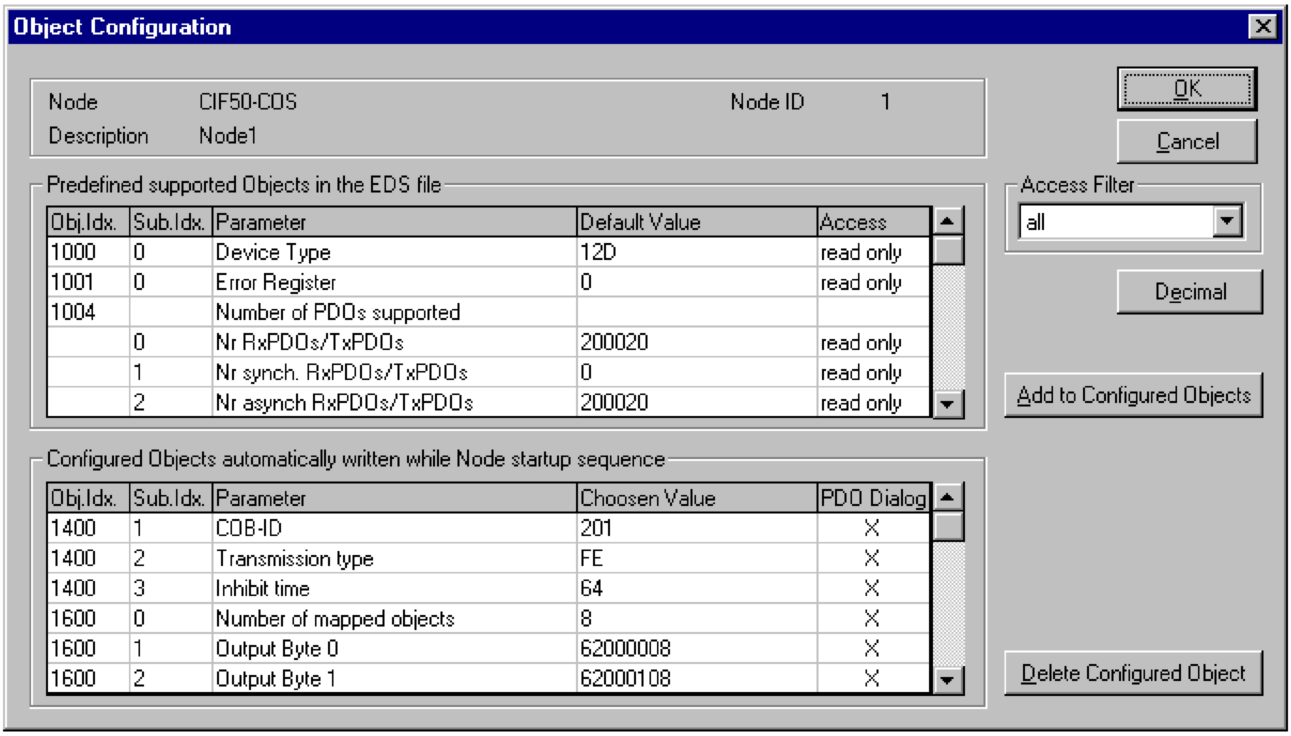


Figure 16: Online > Node Configuration > Object Configuration

4.4.3 Replace Node

If a Node already exists in the configuration and should be replaced against the other Node, you first have to set the focus on the Node (left mouse click) and then choose the menu **Edit > Replace**.

or

make a right mouse click at the Node and select **Replace** in the now opened menu.

In the opened window the question appears if the Node should be replaced.

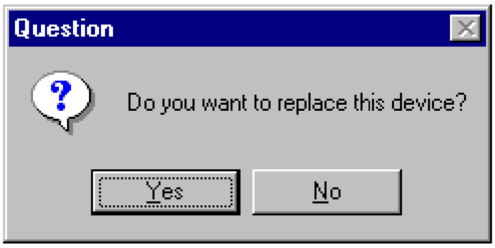


Figure 17: Security question Replace Device

If you click the button **Yes** a new window opens, where you can replace the Node against the existing Node.

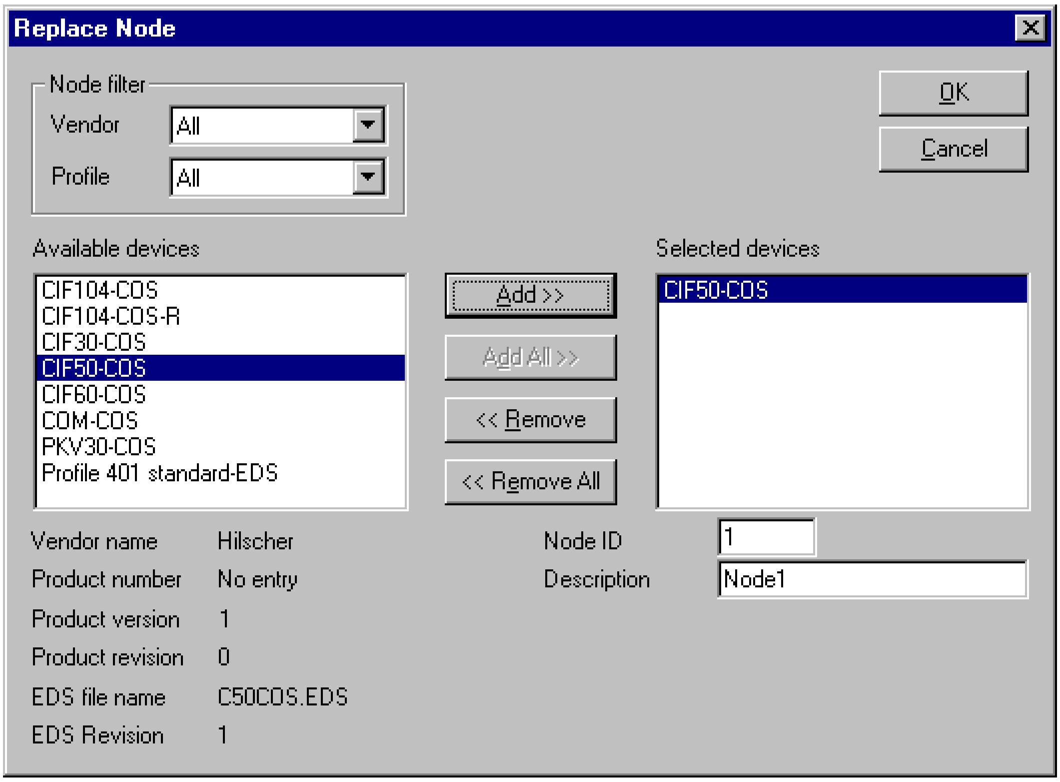


Figure 18: Edit > Replace Node

In this window you select the Node you want by clicking on it. By clicking the **Add** button this Node is shown in the first position by **Selected devices**. With **OK** you confirm the selection and the Node will be replaced.

5 Settings

5.1 Gateway Driver

The Gateway Driver terminies how the Fieldbus Configurator communicates with the device. This is set in the Device Assignment which can be opened with the menu **Settings > Device Assignment**.

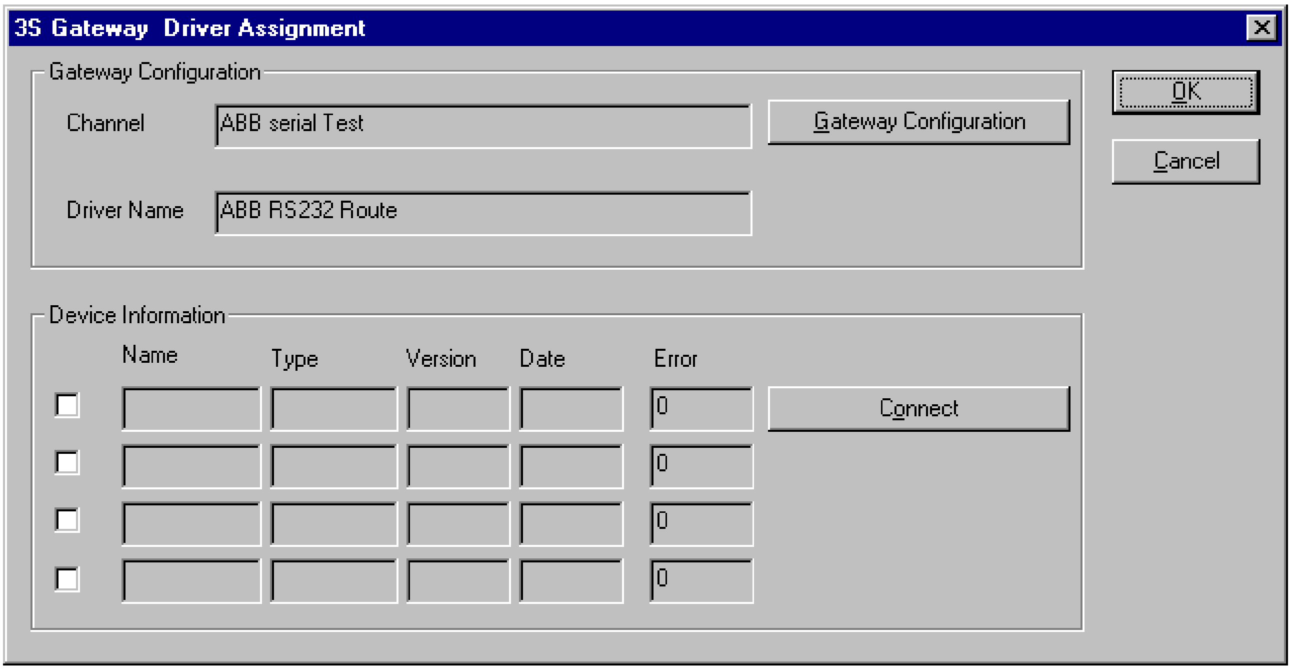


Figure 19: Settings > Device Assignment

After the selection of the Gateway channel or clicking the **Connect** button FB 1131 tries to set up a connection to the selected controller.

If the connection was successful the configurable couplers are shown in the field **Device Information**.

The desired coupler is selected by clicking on the field next to the name of the coupler and confirming with the **OK** button.

By clicking at the **Gateway Configuration** button a new window appears where the Gateway channel can be selected or a new Gateway channel can be configured.

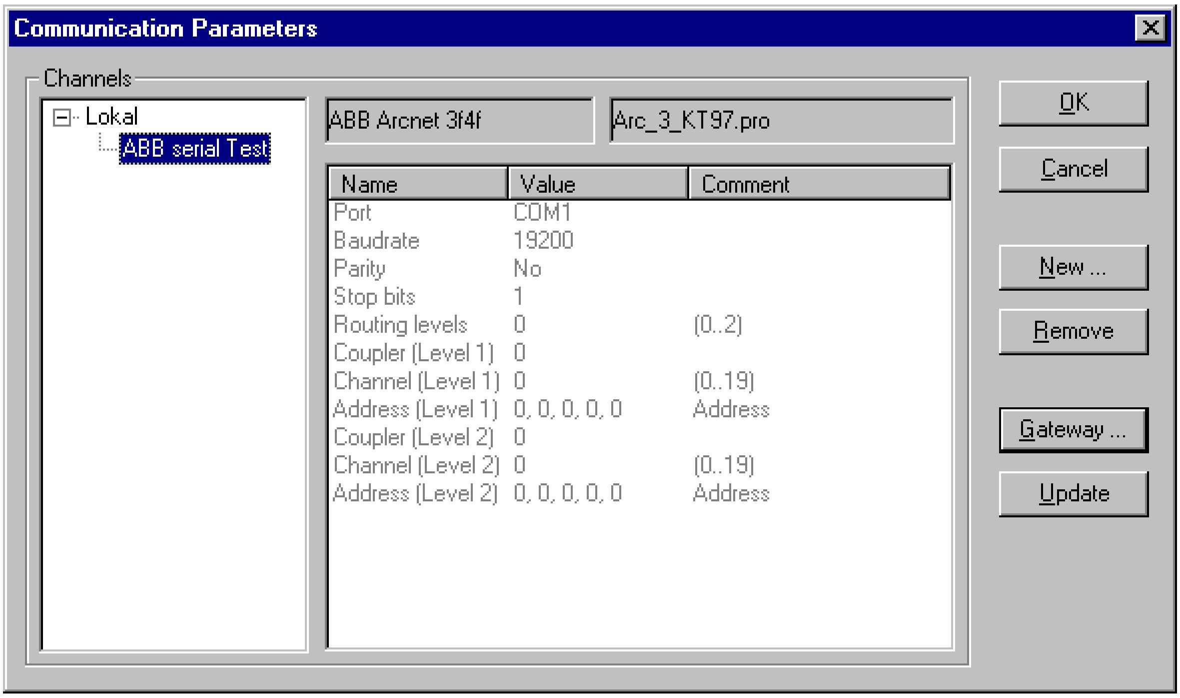


Figure 20: Configure Gateway

To confirm the Channel selection click at the **OK** button.

5.2 Bus Parameter

In this windows the basic settings for the CANopen network are done. Mainly, this concerns the setting of the **Baudrate**.

Attention: Check that all CANopen Nodes support also the selected Baud rate.

Basic rule: The Baud rate must be set same for all devices. The Node address on the other hand must differ from Node to Node. The Master itself does not have a Node address.

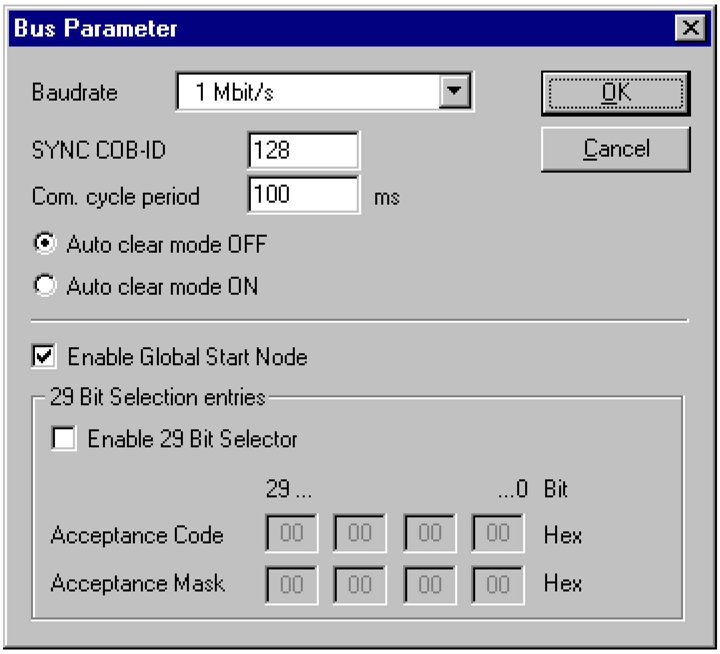


Figure 21: Settings > Bus Parameter

- **SYNC COB-ID and SYNC-Message**

  Furthermore the cycle time of the **SYNC-Message** and its message number **COB-ID** has to be set. The default value is 128. As soon as a participant with synchronized PDO transfer is configured, the SYNC message is sent in the configured cycle period frame from the Master.

- **Auto clear mode OFF**

  The **Auto Clear** feature defines the behaviour of the Master if the communication is interrupted to at least one Node. If the flag **Auto clear mode ON** is activated, the Master will also stop the communication to all further Nodes which were still responding and active. If the flag **Auto clear mode OFF** is activated, then a lost communication contact to one Node has no influence on the communication channel of the still present ones. For all the error affected Nodes the master remains in the state to try the reestablishment of the communication again.

- **Enable Global Start Node**

  After the Master started all Nodes configured individually first, it sends a Global Start Node with activated menu option afterwards, in order to synchronize all Nodes again.

- **Enable 29 Bit Selector**

  If this menu option is activated the 29 Bit identifier is switched free for the Master.

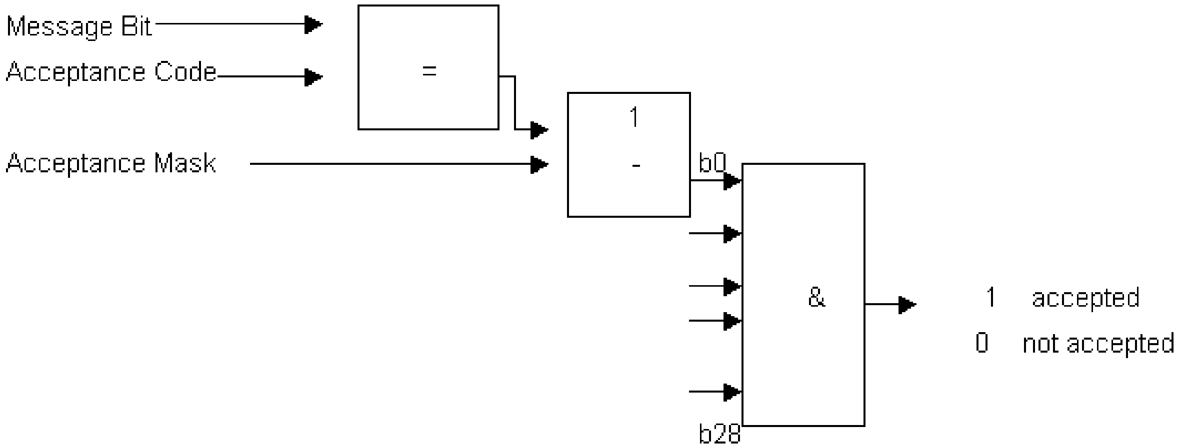


Figure 22: Diagram Acceptance Code / Acceptance Mask

5.3 CANopen Master

5.3.1 Global Settings

First you have to set the focus on the Master (left mouse click) and select the menu **Settings > Global Settings**

or

click with the right mouse key on the symbol of the Master device to select the menu **Master Configuration** and then click the button **Global Settings**.

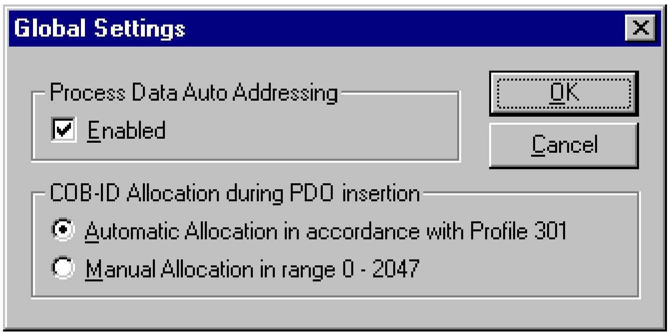


Figure 23: Settings > Global Settings

- **Process Data Auto Addressing**

  In this window it is adjusted whether the process data addressing is executed automatically by FB1131 (active selected) or manually by the user (active not selected).

Auto Addressing active	**Auto Addressing deactivated**
Auto addressing (by FB1131)	Manually addressing (by the user)
The addresses will be allocated beginning with 0 and incremented in accordance with the entry sequence of the Slaves before downloading and can be viewed and checked in the menu **View > Address Table**.	The address 0 is shown in the **I Addr or O Addr** and must be overwritten by the user.

Table 16: Process Data Auto Addressing activated / deactivated

- **COB-ID Allocation during PDO insertion**

  The CANopen specification provides that the message number (COB-ID) of a PDO is given relatively to the Node address according to a fixed routine. It is called Pre-Defined Connection Set. This is described in section *COB-ID (Predefined Connection Set)* on page *98*.

- **Automatic Allocation in accordance with Profile 301**

  If this menu option is selected, an alteration of the message number of the PDOs is not possible and its assignment takes place automatically by the CANopen profile 301.

- **Manual Allocation in range 0-2047**

  If this menu option is selected, a definition of the message number of the PDOs is possible and can take place in the context of the possible 2048 (11 bit) different CAN-Identifier manually.

5.4 Project Information

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

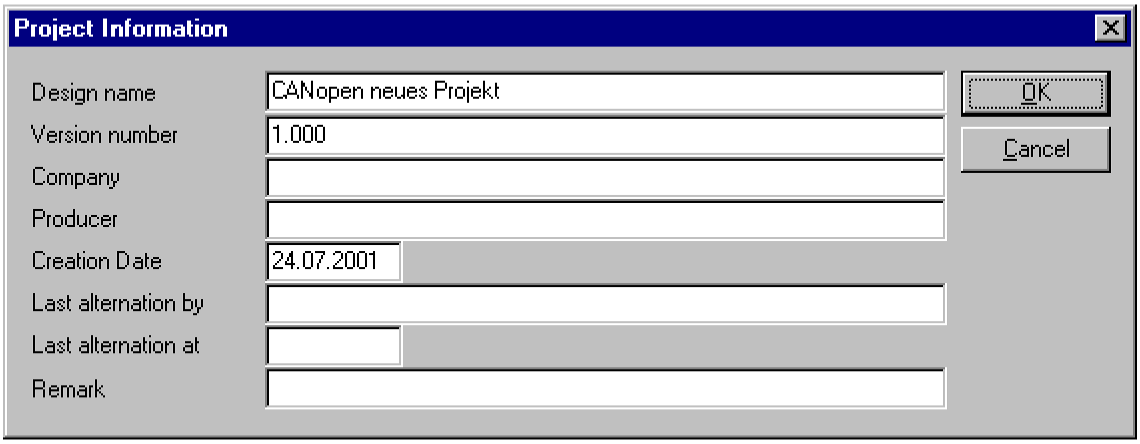


Figure 24: Settings > Project Information

By clicking the **OK** button the Project Information is saved.

5.5 Path

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

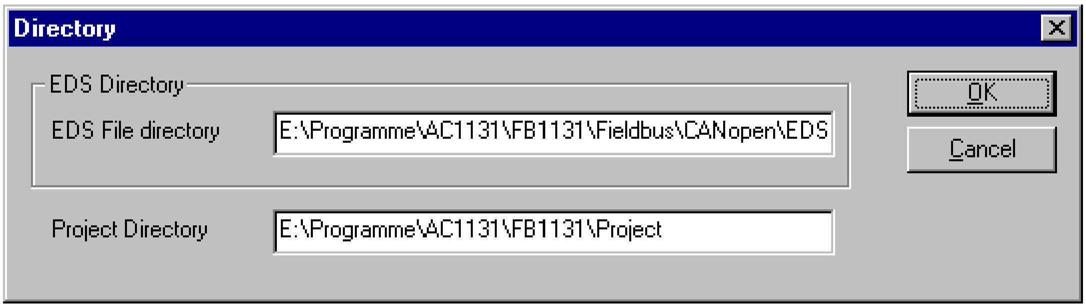


Figure 25: Settings > Path

If you click the button **OK**, all EDS files are read in.

5.6 Language

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

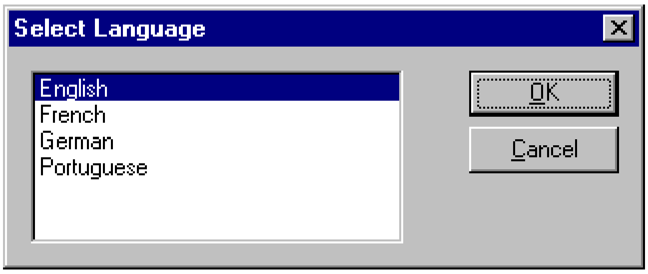


Figure 26: Settings > Language

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

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

After restarting the Fieldbus Configurator, the language will have changed to the one selected.

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

6 Online Functions

6.1 Introduction

In this section all the functions that directly influence CANopen devices, e.g. 07 KT 97-COM, 07 KT 97-COM are presented.

Note: Please note that this also permits an interruption of the running communication or that input and output can be switched ON or OFF.

6.2 Online to the Coupler

6.2.1 Downloading the Configuration

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

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

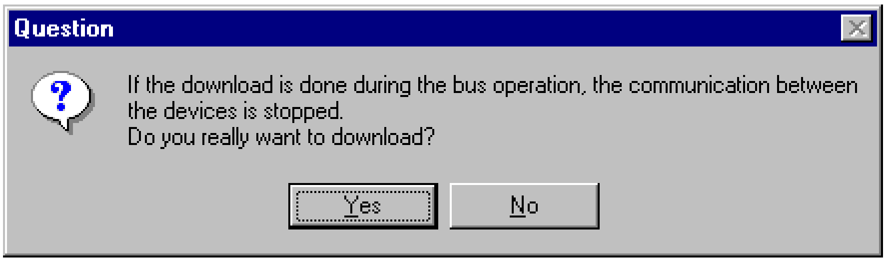


Figure 27: Security question before Download

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

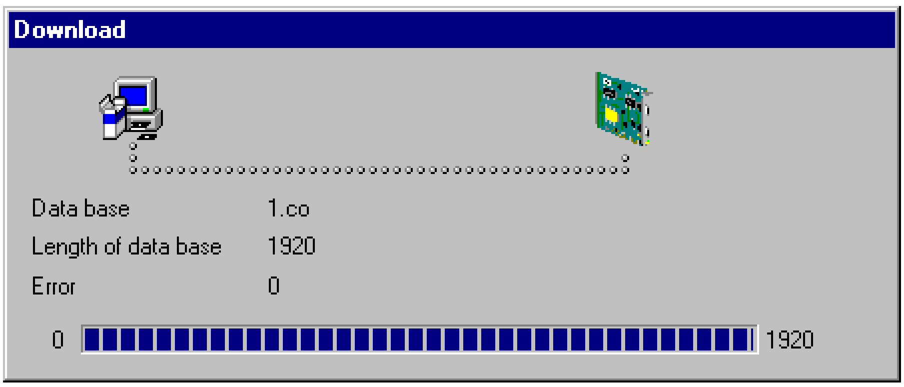


Figure 28: Online > Download

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 point.

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

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

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

6.2.2 Firmware Download

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

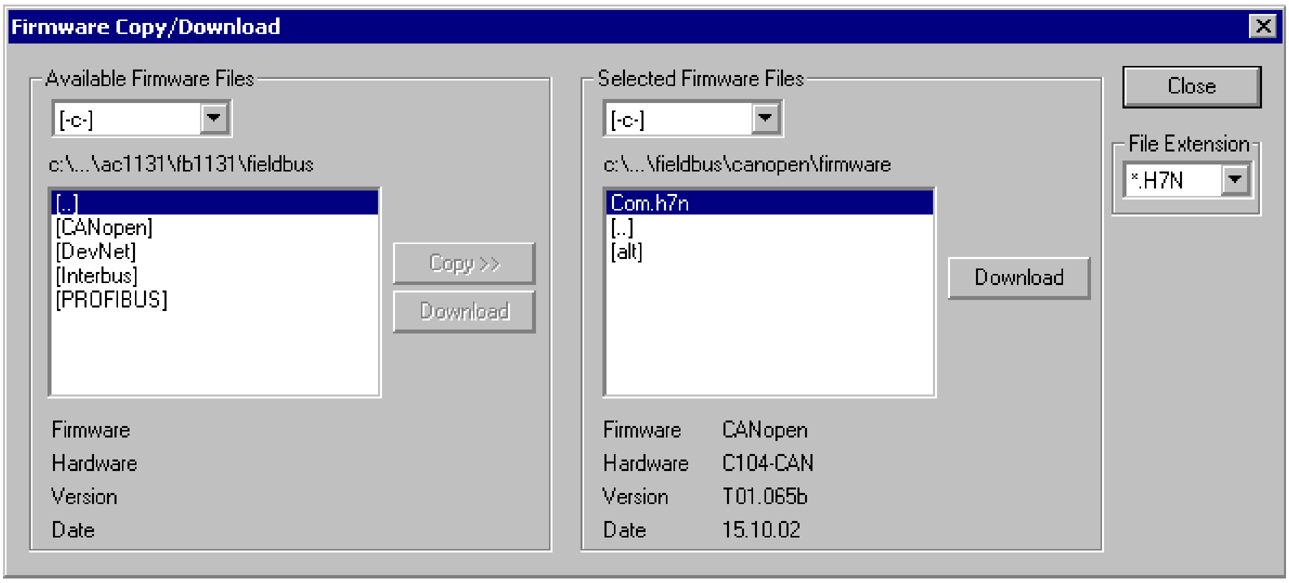


Figure 29: Online > Firmware Download

6.2.3 Firmware / Reset

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

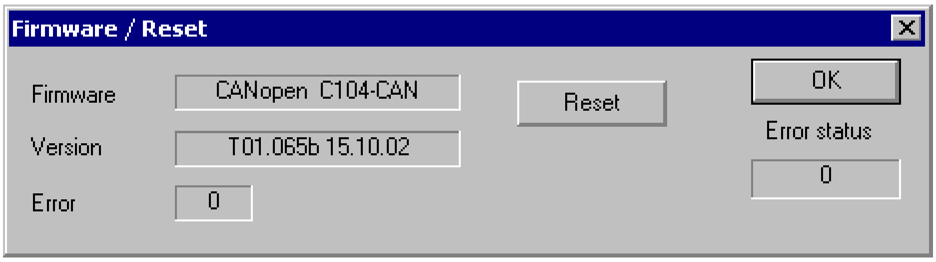


Figure 30: Online > Firmware / Reset

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

6.2.4 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.

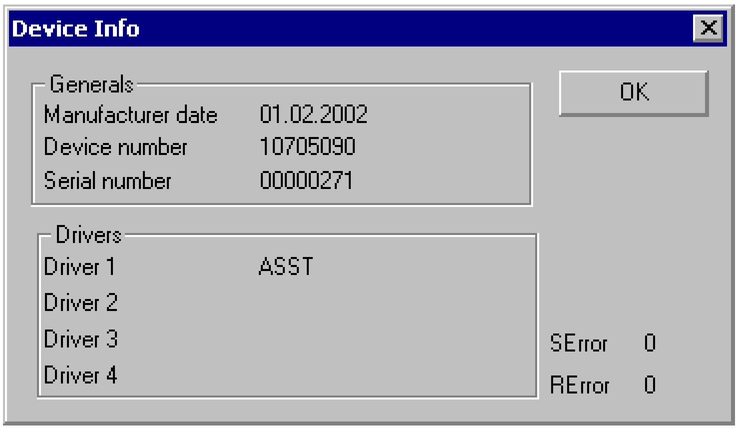


Figure 31: Online > Device Info

6.3 Start/Stop Communication

The communication between CANopen Master and CANopen Node can be manually started or stopped.

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

6.4 Diagnostic Functions

The following table shows diagnostic functions and their using in case of CANopen Master devices.

Diagnostic Function	Using	Usable for CANopen Master devices
Live List	Determine, which devices are connected to the CANopen Master device.	Yes
Debugmode (CANopen)	Determine, to which CANopen Nodes the CANopen Master has communication	Yes
Global State Field	Status information of the CANopen Master	Yes
Extended Device Diagnostic	Statistic information and status information from the CANopen device	Yes

Table 17: Overview Diagnostic Functions

6.4.1 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 and obtain an overview over all active devices at the CANopen network.

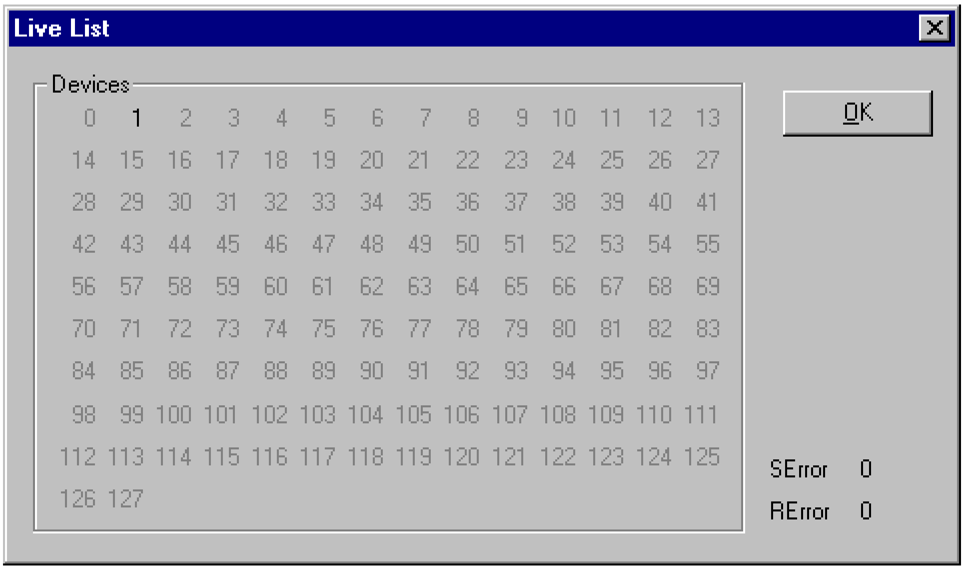


Figure 32: Online > Live List

Generally all devices are displayed grey. At the bus detected Nodes are represented black on the basis their appropriate Node address.

6.4.2 Debugmode (CANopen)

Click the menu item **Online > Start Debug Mode**. Then the Fieldbus Configurator cyclically interrogates the status of the network communication from the Bus Coupler and the individual conditions of the Nodes.

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

6.4.2.1 The Debugwindow

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.

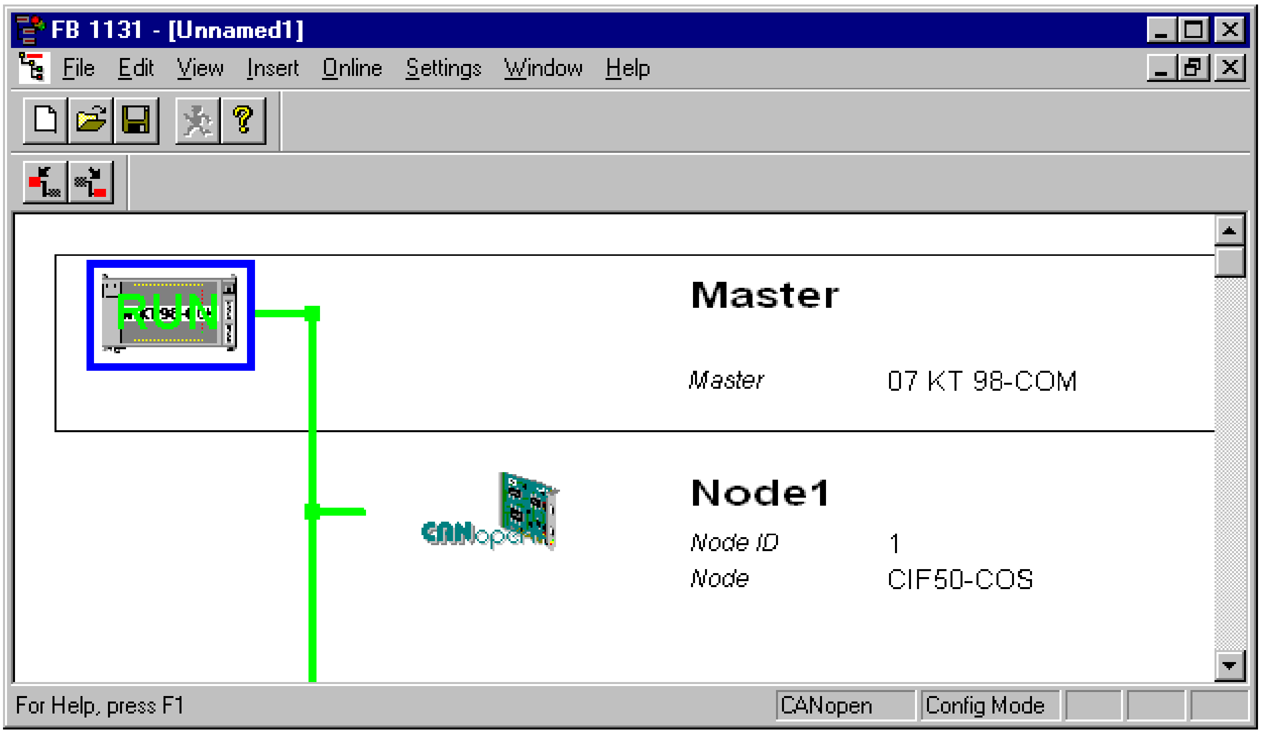
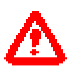
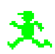


Figure 33: The Debugwindow

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

Note: Only if the CANopen Node supports the Nodeguarding, the CANopen Master (NMT-Master) can recognize that the Node has failed.

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

In run mode the Master icon has the sign .

6.4.2.2 Emergency Telegrams

Emergency telegrams are sent by the Node when an internal event occurs if a Node enters. The CANopen Master can buffer maximally 5 Emergency telegrams.

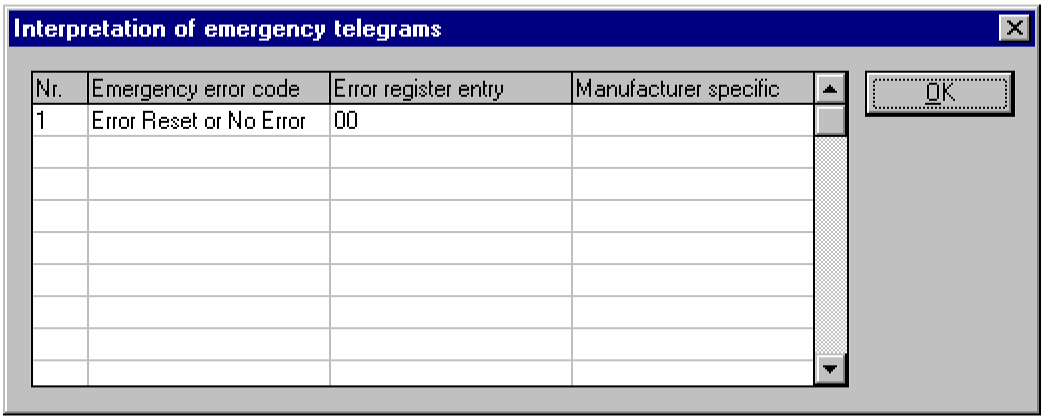


Figure 34: Online > Device Diagnostic > Interpretation of emergency telegrams

A table with the Error Codes is described in section *Emergency Telegram Error Codes* at page *112*.

Note: The table Emergency Error Codes is a general list. For the exact meaning it is referred to the manual of the Node manufacturer.

6.4.3 Global State Field

With the menu option **Online > Global State Field** opens a window in that cyclically statistic about the bus status and connected devices are shown.

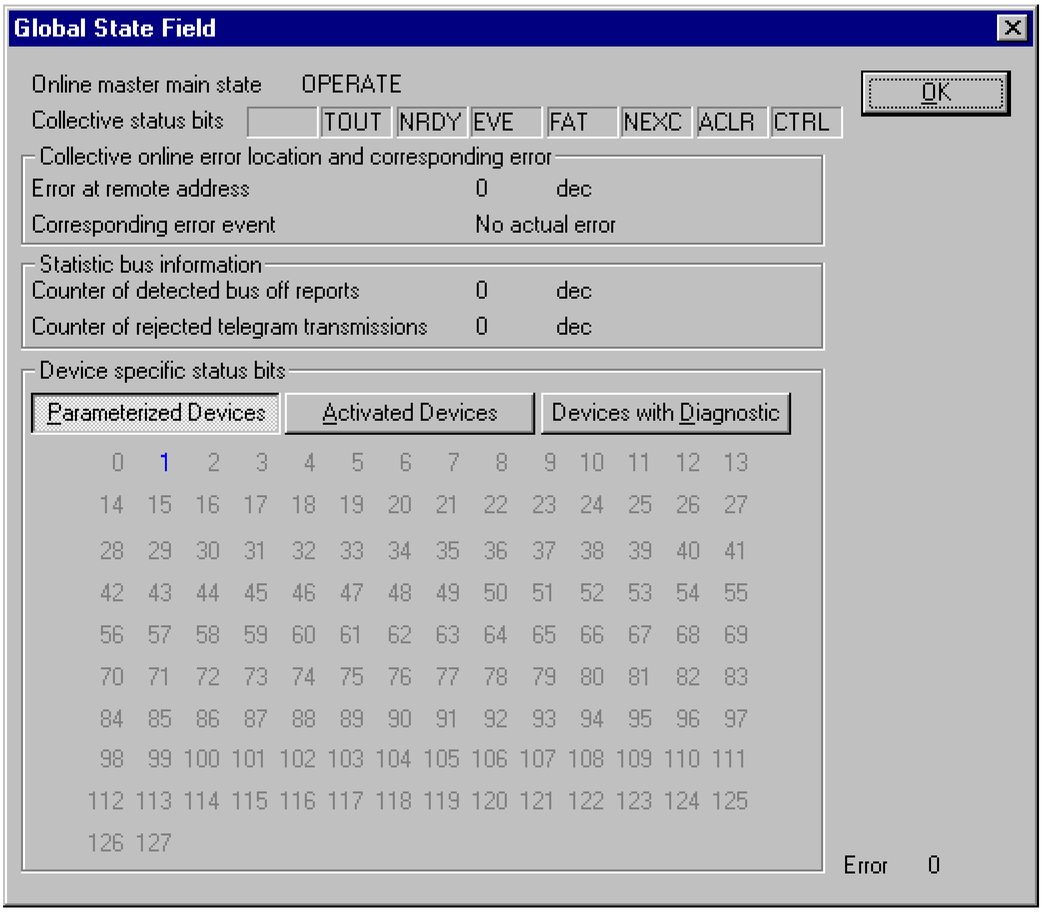


Figure 35: Online > Global State Field

The first row displays the main status of the Master. It can take the status **OPERATE** or **STOP** or **OFFLINE**.
The next row displays individual bus errors. A pending error is displayed with a red field. The meaning of the individual abbreviations is described in the following:

Bus error	Meaning
TOUT	Timeout Error
NRDY	HOST-NOT-READY-NOTIFICATION shows, if the application program is ready or not. If this bit is set the application program is not ready to communicate.
EVE	EVENT-ERROR the CAN chip has detected transmission errors. The number of detected events are counted in the bus off reports and the error warning limit counter. The bit will be set when the first event was detected and will not be deleted any more.
FAT	FATAL-ERROR because of heavy bus error, no further bus communication is possible.
NEXC	NON-EXCHANGE-ERROR At least one Node has not reached the data exchange state and no process data are exchange with it.
ACLR	AUTO-CLEAR-ERROR device stopped the communication to all Nodes and reached the auto-clear end state.
CTRL	CONTROL-ERROR a parameterisation error has occurred.

Table 18: Meaning of collective status bits in the Global State Field

Further contents are given:

Collective online error location and corresponding error gives the address of the incorrect station and the lining up error in plain text.

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

Device specific status bits

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

This displaying is cyclically updated.

6.4.4 Extended Device Diagnostic

The Extended Device Diagnostic helps to find Bus and configuration errors when the FB1131 menu functions are of no further help.

First the required 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, statuses and parameters:

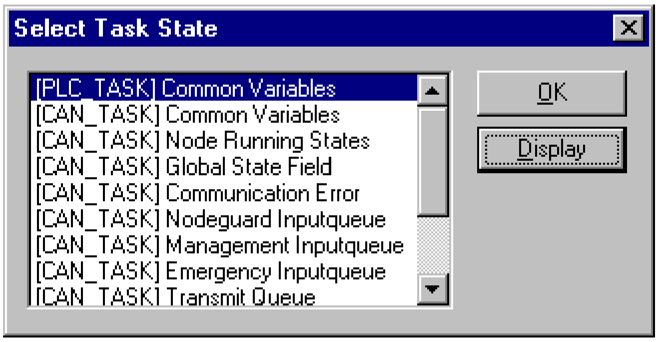


Figure 36: Online > Extended Device Diagnostic

6.4.4.1 Extended Device Diagnostic CANopen Master

Task/Taskstate	Page
PLC_TASK Common Variables	*89*
CAN_TASK Common Variables	*90*
CAN_TASK Node Running State	*92*
CAN_TASK Global State Field	*92*
CAN_TASK Communication Error	*92*
CAN_TASK Nodeguard Inputqueue	*93*
CAN_TASK Management Inputqueue	*93*
CAN_TASK Emergency Inputqueue	*94*
CAN_TASK Transmit Queue	*94*
CAN_TASK CMS Domain Services	*95*
CAN_TASK Timeout Counter	*96*
CAN_TASK Node Init Counter	*97*

Table 19: CANopen Master Taskstate

6.5 User Data Transfer

The following table show test functions with user data transfer and the usability for CANopen Master devices.

User data transfer function	**Usage**	**Usable with CANopen Master devices**
Read Objects (SDO Upload)	Read objects (SDO Upload)	Yes
Write Object (SDO Download)	Write objects (SDO Download)	Yes

Table 20: Overview User Data Transfer

6.5.1 Read Objects (SDO Upload)

With this function you can execute the CANopen services read object and write object based on the current configuration.

As the first you must select the required device, by clicking with the left mouse button on the symbol Node. Then select the menu **Online Read Object** or **Online > Write Object**.

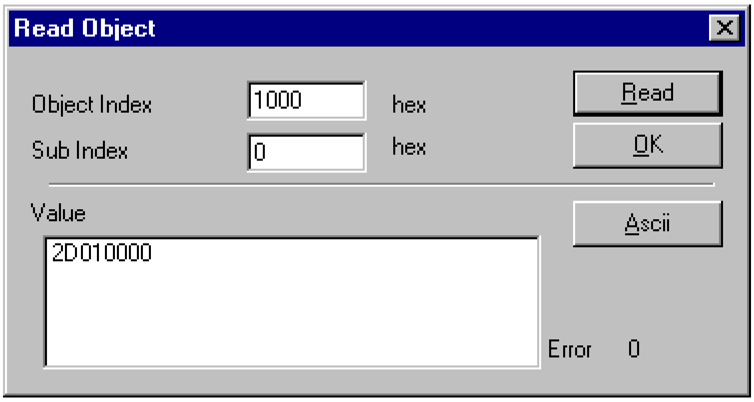


Figure 37: Online > Read Object

6.5.2 Write Object (SDO Download)

With this function you can execute the CANopen services read object and write object based on the current configuration.

As the first you must select the required device, by clicking with the left mouse button on the symbol Node. Then select the menu **Online Read Object** or **Online > Write Object**.

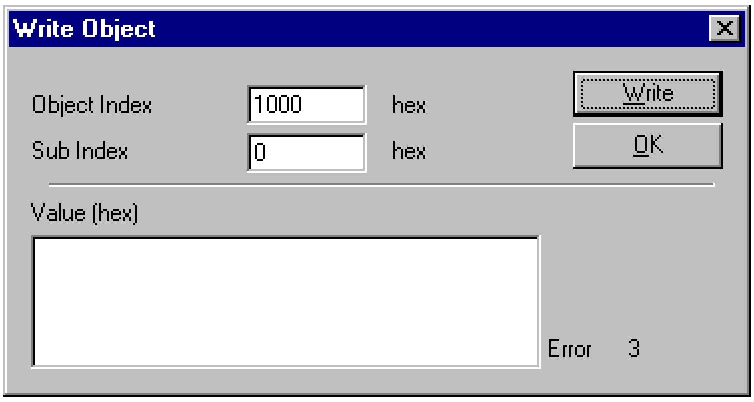


Figure 38: Online > Write Object

Objects in CANopen are addresses in the manner Object-Index and corresponding Sub-Index. Both values must be specified in the selected window. Press **Read** or **Write** button to start the action. FB1131 informs about success and failure of the action.

7 File, Print, Edit, Export and View

7.1 File

7.1.1 Open

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

7.1.2 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.

7.1.3 Close

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

7.2 Print

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

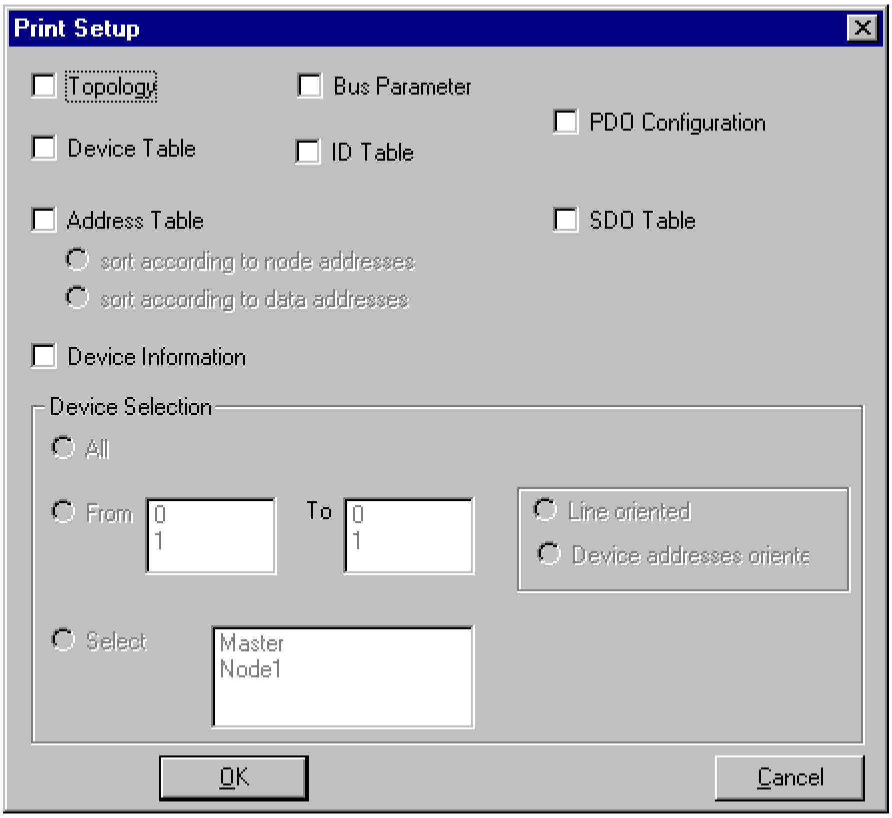


Figure 39: File > Print

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

Topology prints the topology of the Bus system.

Bus parameters prints the Bus Parameters of the Bus system.

Address table prints the address table of the Master.

Device table prints the device table.

ID Table prints the ID Table.

PDO Configuration prints the **PDO Configuration**.

SDO Table prints the **SDO 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.

7.3 Export Functions

7.3.1 CSV Export

With the menu **File > Export > CSV** the configuration data of the connected Slaves can be exported into a table.

Requirement is, that the configuration was saved before the export is executed. The exported file has the ending .csv (comma separated value) and is taken off in the same directory as the configuration, but with the ending *.csv.

The CSV file can be read with a table program like for example 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.

Here is the description of the parameters:

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, where the devices are related to.
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 DataType, which is used in the configuration. The code for this you find below this table in section *Description of the Parameter DataType.*
DataPosition_0	The byte DataPosition, which is used in the configuration. The code for this you find below this table in section *Description of the Parameter DataPosition.*
Address_0	Offset Address in the Dual-port memory
...	...
DataSize_59	if used, see at the top
DataType_59	if used, see at the top
DataPosition_59	if used, see at the top
Address_59	if used, see at the top

Table 21: CSV Export - Meaning of the values

7.3.1.1 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 22: CSV-Export - Description of the Byte Settings

7.3.1.2 Description of the Parameter DataType

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 23: CSV Export > DataType Code

7.3.1.3 Description of the Parameter DataPosition

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

Table 24: CSV Export > DataPosition Code

7.3.1.4 Example of a CSV file

Example of a CSV file which was exported in Excel:

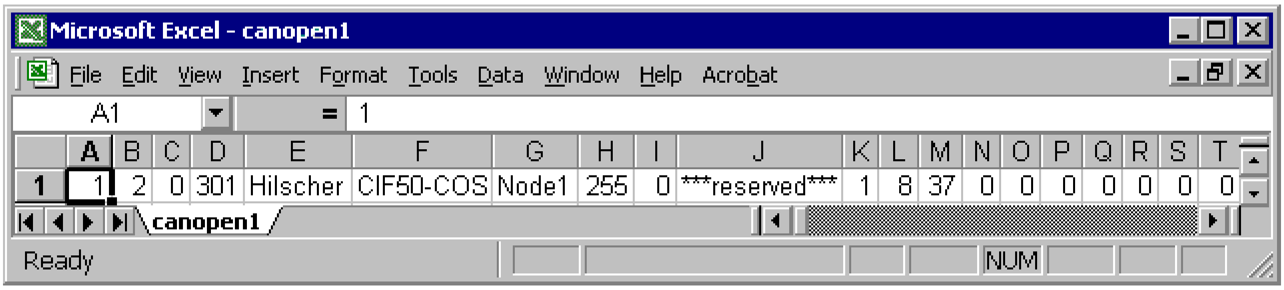


Figure 40: Example of a CSV File in Excel

Cell	Parameter	Value	Meaning
A1	StationAddress	1	Station address of the CANopen Node.
B1	RecordType	2	The RecordType is always 2.
C1	IdentNumber	0	IdentNumber of the Node.
D1	VendorNumber	301	The vendor number is 301.
E1	VendorName	Hilscher	Vendor name of the device.
F1	Device	CIF 50-COS	Description of the device.
G1	Description	Node1	Description of the device which is also shown in FB1131 as the name of the device.
H1	MasterAddress	255	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 description you see in section *Description of the Parameter Settings*.
J1	reserved	reserved	reserved
K1	ModulCount	1	Number of the modules of the device. For each modul the information with datatype, data size, data position and the offsetaddress 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 and so on.
L1	DataSize	8	The size of the modul is 8 bytes.
M1	DataType	37	Input; Datatype unsigned Integer 8
N1	DataPosition	0	Output; Datatype unsigned Integer 8
O1	Offsetaddress	0	The Offset address is 0.
P1...IQ1	DataSize	0	The modules 2 till 59 are not used for this device and so a 0 is shown.

Table 25: 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.

7.4 Edit

7.4.1 Cut, Copy and Paste

With the menus **Edit > Cut** and **Edit > Copy** you put the cut/copied device with its settings and configuration (only not the description of the device) in the Clipboard and with **Edit > Paste** it can be insert.

The difference between **Cut** and **Copy** is:

With the menu option **Edit > Cut** you move a device from one point in the configuration to another. With the menu option **Edit > Copy** you duplicate an existing device.

If you select **Edit > Cut** a security question appears.

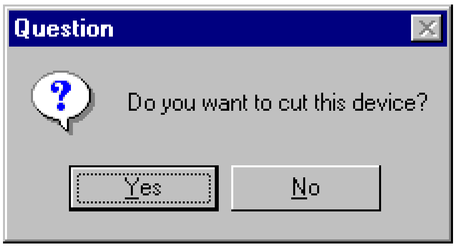


Figure 41: Security question cut device

If you answer this question with **Yes** the device is cut and stays in the clipboard.

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

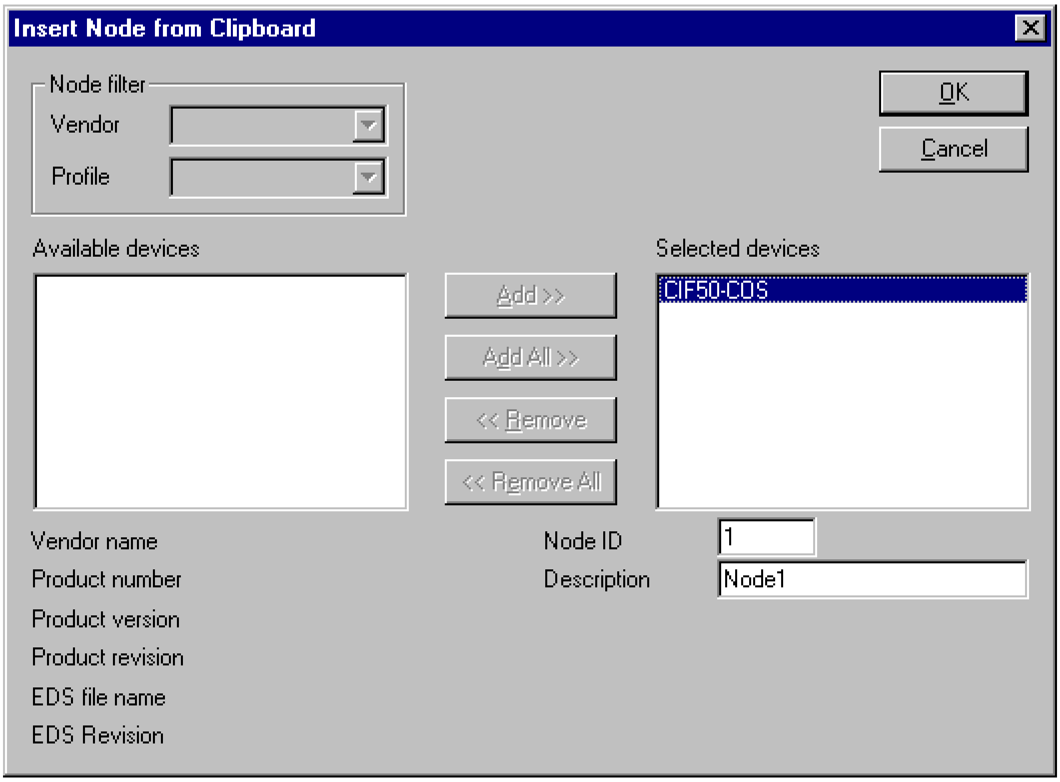


Figure 42: Edit > Insert cut/copied device

When you click on the **OK** button the device will be insert in the configuration.

7.4.2 Delete

To delete the Master or a Slave device you have to have to mark this device and then select the menu **Edit > Delete**. Before FB1131 deletes the Master or a Slave a security question appears.

Figure 43: Security question delete device

Note: When you delete a device the settings and the configuration of this device get lost.

7.4.3 Replace

With the menu **Edit > Replace** the Master or a Slave device can be replaced. How to replace the Master look in section *Replace Master* at page *21*. If you want to replace a Slave device look in section *Replace Node* at page *41*.

7.5 View of the Configuration

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

- Device Table
- Address Table
- ID Table
- SDO Table

7.5.1 Device Table

The list of all added devices is displayed with the menu item **View > Device Table**. Apart from the Node address the name of the device displayed with the pertinent alterable description. Look at section *Node Configuration* at page *24*.

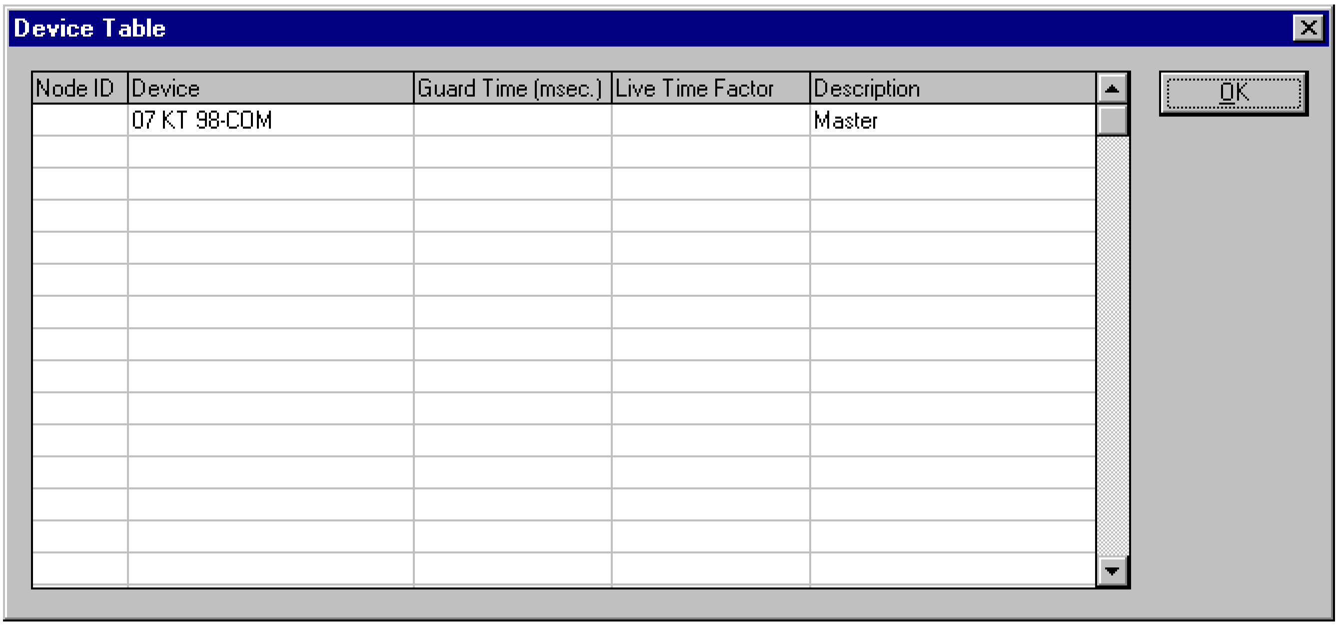
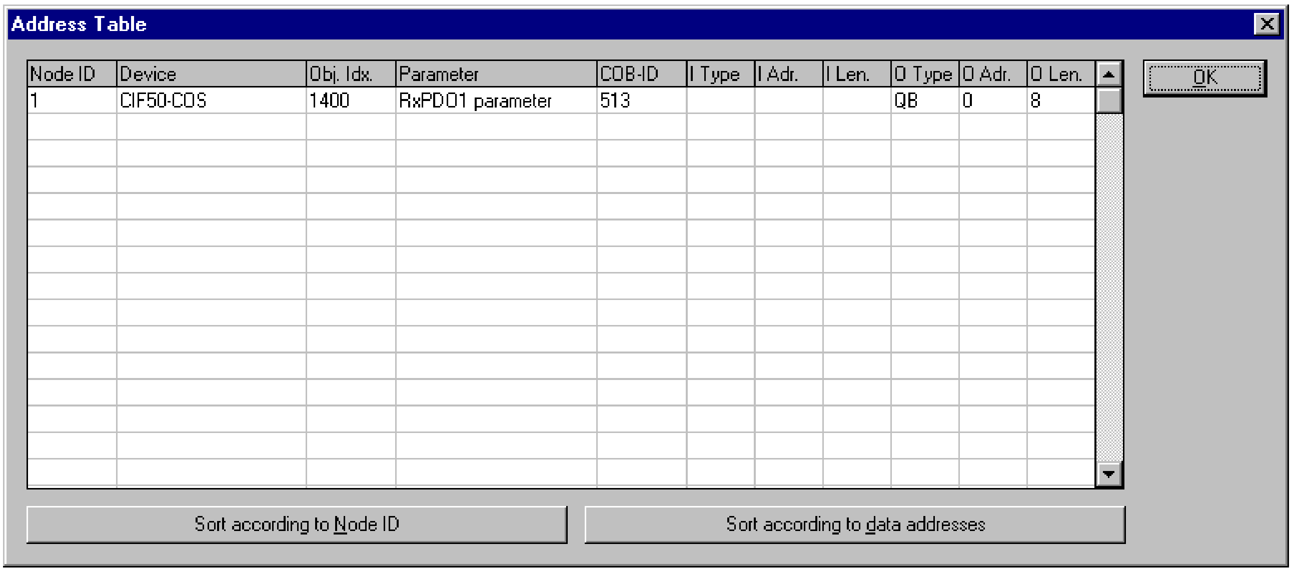


Figure 44: View > Device Table

7.5.2 Address Table

With the menu item **View > Address Table** you get an overview of all configured PDOs and the booked start addresses in the process image including their length.



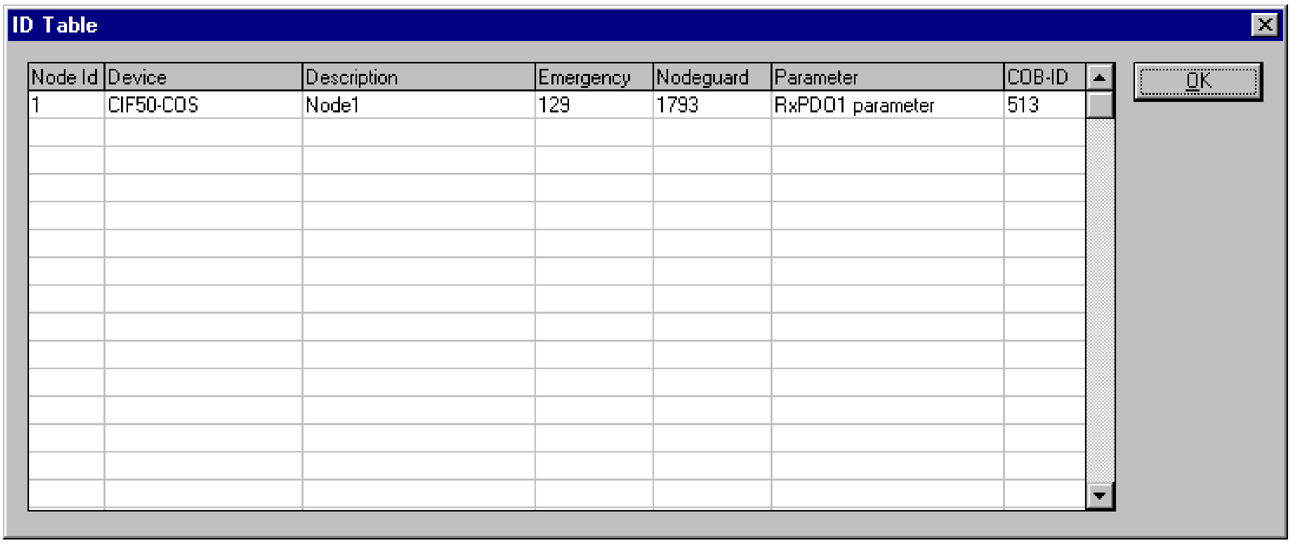
Node ID	Device	Obj. Idx.	Parameter	COB-ID	I Type	I Adr.	I Len.	O Type	O Adr.	O Len.
1	CIF50-COS	1400	RxPDO1 parameter	513				QB	0	8

Figure 45: View > Address Table

It is possible to sort the addresses according to Station Addresses or according to Data Addresses.

7.5.3 ID Table

With the menu item **View > ID Table** is sorted listed for each Node, which message numbers in the CAN network are occupied by the respective Nodes. This are the Emergency ID, Nodeguard ID and the IDs of the PDOs.

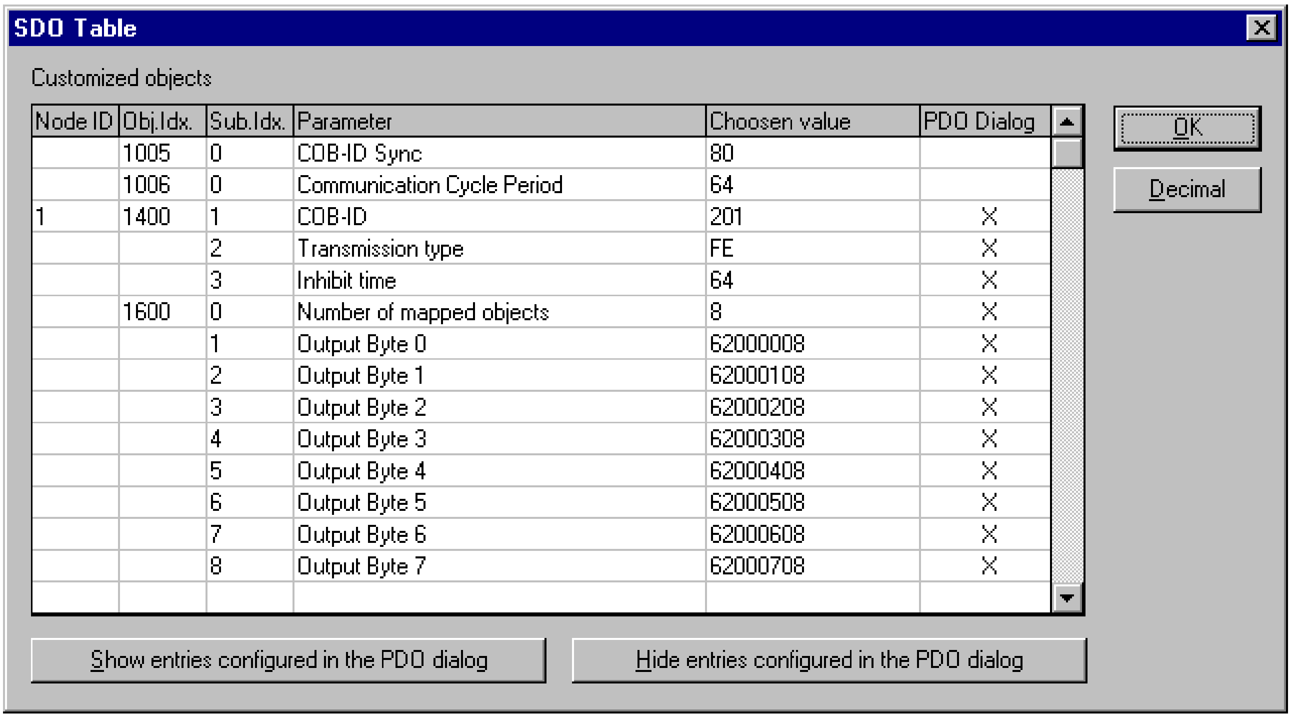


Node Id	Device	Description	Emergency	Nodeguard	Parameter	COB-ID
1	CIF50-COS	Node1	129	1793	RxPDO1 parameter	513

Figure 46: View > ID Table

7.5.4 SDO Table

With the menu item **View > SDO Table** you get an overview of the transmitted objects during the Node BootUp phase for each Node. Apart from the Node Address for each entry the Object- and Subindex is displayed with the pertinent value. Thereby if a line contains a cross in the column PDO Dialog, then the entry was created automatically when inserting a PDOs by FB1131 and can be changed in section *Node Configuration* (see at page *24*). If an entry does not contain a cross in the column PDO Dialog, then the appropriate object is manually created in the *Object Configuration* (see at page *40*) and can be changed there. Exceptions here form the entries COB-ID SYNC and Communication Cycle Period, which can be changed in the dialog *Bus Parameter* (see at page *45*). It is possible to hid or to display the configured objects of the PDO Dialog. The representation method of the object values can be selected between decimal and hexadecimal.



Node ID	Obj.Idx.	Sub.Idx.	Parameter	Choosen value	PDO Dialog
	1005	0	COB-ID Sync	80	
	1006	0	Communication Cycle Period	64	
1	1400	1	COB-ID	201	X
		2	Transmission type	FE	X
		3	Inhibit time	64	X
	1600	0	Number of mapped objects	8	X
		1	Output Byte 0	62000008	X
		2	Output Byte 1	62000108	X
		3	Output Byte 2	62000208	X
		4	Output Byte 3	62000308	X
		5	Output Byte 4	62000408	X
		6	Output Byte 5	62000508	X
		7	Output Byte 6	62000608	X
		8	Output Byte 7	62000708	X

Figure 47: View > SDO Table

8 Error Numbers

8.1 Possible PLC Error Messages to FB1131 Telegrams

Error Number	Description
401	Driver error in the control
402	slot number is not supported by the hardware
403	no coupler at the given slot
404	control not in STOP
405	configuration data invalid
406	coupler still configured by 907 AC 1131-internal PROFIBUS Configurator
407	answer timeout of the coupler

Table 26: Possible Control Error Messages to FB1131 Telegrams

8.2 RCS Error Numbers (4 .. 93)

This is the list of error numbers returned by the RCS (Realtime Communication System), that is the operating system of Controller of series 90. The error number is returned in an answer message. Command messages and answer messages are used to communicate between the application (e.g. the Fieldbus Configurator) and the ABB Stotz-Kontakt device. An example of this communication is the download of a configuration.

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

Table 27: RCS error numbers (answer message) (4..39)

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

Table 28: RCS error numbers (answer message) (40..93)

8.3 Database Access Error Numbers (100 .. 130)

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

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

Table 29: Database Access Error Numbers (100..130)

8.4 Online Data Manager Error Numbers

8.4.1 Online Data Manager Error Numbers (1000 .. 1018)

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

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

Table 30: Online Data Manager Error numbers (1000..1018)

8.4.2 Message Handler Error Numbers (2010 .. 2027)

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

Error Number	Description
2010	Message handler: 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
2026	Message handler: Wait for Delete
2027	Message handler: No cyclic Message

Table 31: Error Numbers of the Message Handler of the Online Data Manager (2010..2027)

8.4.3 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 32: Error Numbers of the Driver Functions of the Online Data Manager (2501..2512)

8.4.4 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 33: Subfunction Error Numbers of the Driver Functions of the Online Data Manager (8001..8035)

8.5 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 34: 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 wMaxEintraege
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 35: 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	Initializing of DBM through RCS had no success
4066	Passed data length incorrect
4067	Sorting function not linked
4068	Error in function parameter
4069	Error from ODBC table
4070	No free handle available. Too many data base links are already opened
4071	Unknown data type found in the table
4072	Structure of table GLOBAL not correct or no such table existing
4073	No name of an ACCESS data base
4074	Download window can’t be created
4075	Download not fully performable

Table 36: 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 exists
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 37: Error numbers of converting functions (4082..4199)

8.6 Converting Functions Error Numbers (5001 .. 5008)

The following table lists the error numbers of converting functions.

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

Table 38: Error Numbers of data base functions (5000 .. 5012)

9 Appendix

9.1 Extended Device Diagnostic Master

The menu item **Online > Extended Device Diagnostic** helps to find possible network and configuration faults while trying to get the network fully operative, when the normal debugger does not rudicate any helpful information any more to get the fault location. This menu activates a list of available structures. The listed structures can be displayed to show the values. The structures will be resetted after power on or after a cold or warmstart command.

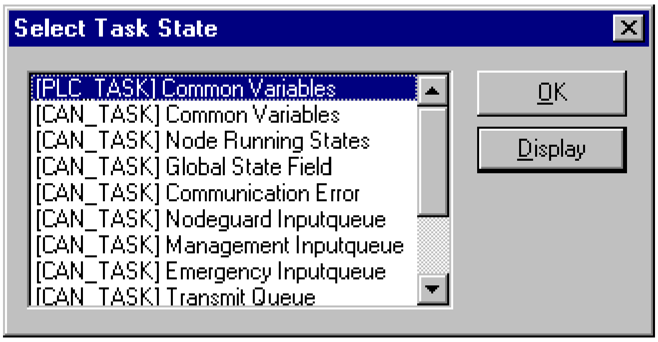


Figure 48: Online > Extended Device Diagnostic

This points contain online counters, values, parameters and statuses. Several task states are available

9.1.1 PLC_TASK Common Variables

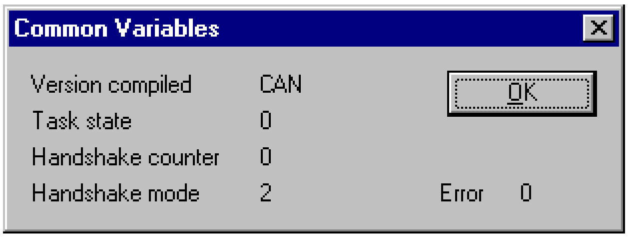


Figure 49: PLC_TASK Common Variables

Variable	Meaning
Version compiled	indicates the hardware version the software is compiled for
Task state	is always filled up with value 0
Handshake counter	number of process data handshakes ever done with the application
Handshake mode	represent the actual process data handshake mode the card is actual running with. The mode can be switched in the menu **Settings > CANopen Master Settings**

Table 39: PLC_TASK Common Variables

9.1.2 CAN_TASK Common Variables

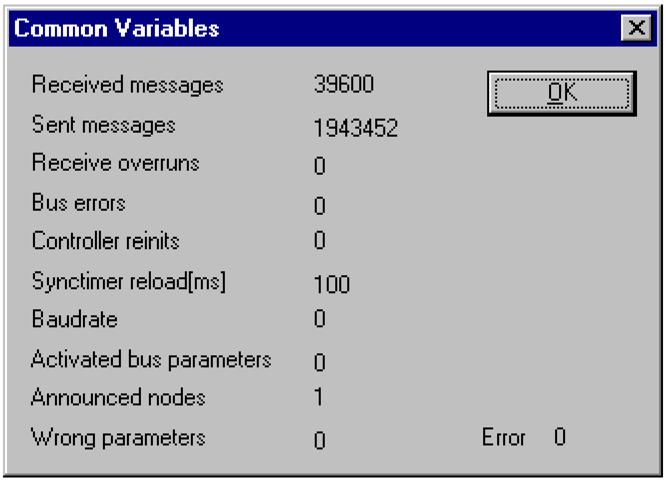


Figure 50: CAN_TASK Common Variables

Variable	Meaning
Received messages	Number of received CAN-Messages
Sent messages	Number of sent CAN-Messages
Receive overruns	This counter is incrementing when to much incoming CAN messages overload the master. An incremented counter will always cause lost CAN message data, so it should normally contain the value 0.
Bus errors	Our used CAN controller has two internal error frame counter for detected transmission errors one for receive and one for transmit messages. If one of these error counter oversteps a defined value, the bus error counter is incremented by a value of 1.
Controller reinits	If the internal CAN controller error frame counter overstep a defined limit the controller goes into the bus off state. If this occurs we reinitialize the controller again to be preoperative and increment this counter value. A value unequal 0 is an indication for bad transmission quality, for unsatisfied bus wiring or for low power in the CAN-controller interface driver.
Synctimer reload	This value represent the value that was configured via the menu **Settings > Bus parameter** in FB1131 and shows the actual configured and handled value.
Baudrate	This value shows numeric the actual baudrate the master is working with: 0 = 1Mbaud, 1 = 800Kbaud, 2 = 500kBaud, 3 = 250Kbaud, 4 = 125kBaud, 5 = 100Kbaud, 6 = 50kBaud, 7 = 20kBaud, 8 = 10kBaud
Activated bus parameter	Value 0, the master device has found a configuration data base coming from FB1131, value 1, the master device isn't configured and need to be configured via FB1131
Announced Nodes	This value represents the number of found Node data sets in the download database.
Wrong parameters	This value indicates, if the master has detected any error in a Node data set which was a containment of the actual downloaded data base. For each Node which has a wrong entry in there the counter is incremented by 1.

Table 40: CAN_TASK Common Variables

9.1.3 CAN_TASK Node Running State

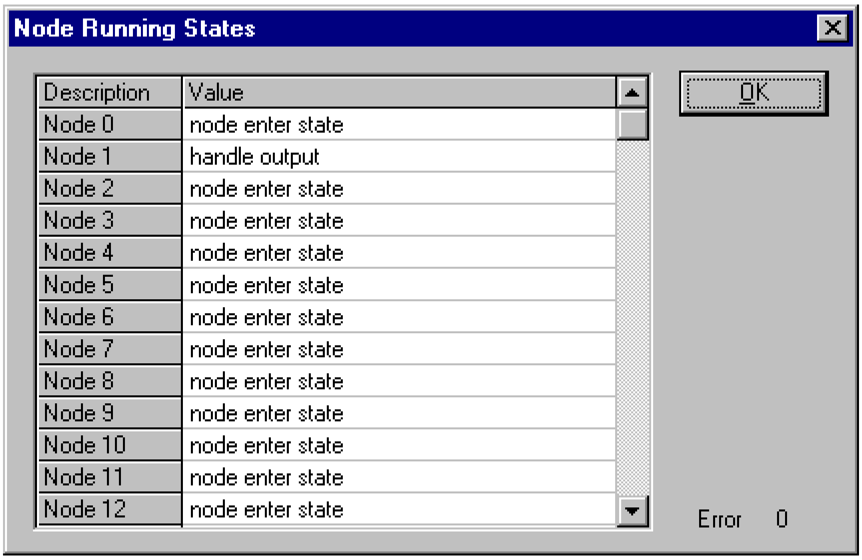


Figure 51: CAN_TASK Node Running State

To handle the Nodes in their different states and requirements the master device has a so-called Node handler running, where each Node has its own actual state. FB1131 interpret now the actual state of each Node and print it on the screen in textual form.

9.1.4 CAN_TASK Global State Field

See section *Global State Field* at page *59*.

9.1.5 CAN_TASK Communication Error

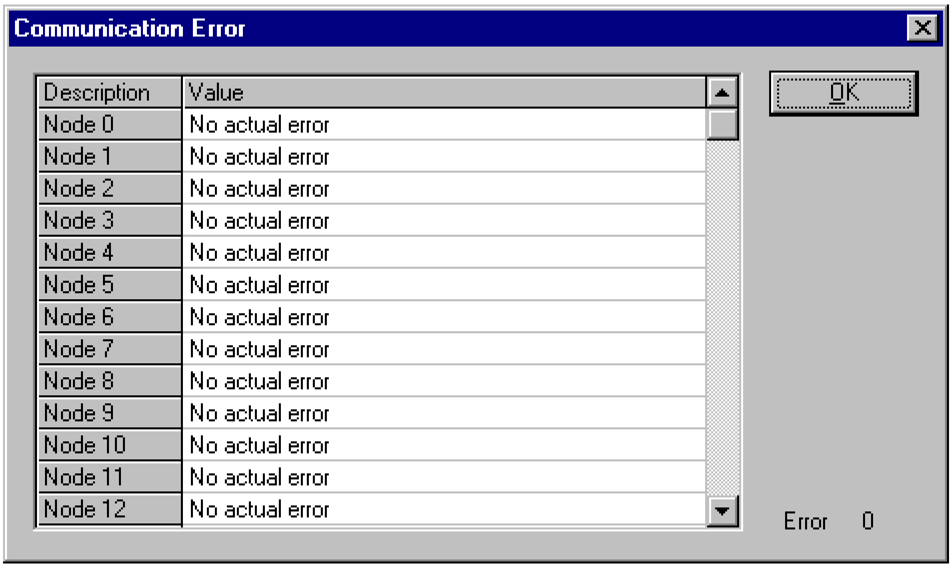


Figure 52: CAN_TASK Communication Error

For each Node the master has an internal online error buffer. FB1131 interprets now the actual error condition and print it on the screen in textual form.

9.1.6 Queues

The different incoming CAN specific identifier with their message containment are assigned to different input message queues. A received message is interpreted directly after it was received by the CAN controller and stored into its corresponding queue as well as the messages that shall be sent are stored in a queue while the CAN controller is busy in sending a message. A main loop then interpret these messages and dequeue them or the interrupt handler send the next message. The message queue handler has three parameters and their containments are shown by FB1131. **bInner** is the number of actual stored messages. **bFront** is the pointer where the next message will be store and **bRear** is the pointer where the next message will be dequeue from the queue body area. In a running system the value **bInner** should normally decrease automatically to 0 and **bFront** and **bRear** should be equal.

9.1.6.1 CAN_TASK Nodeguard Inputqueue

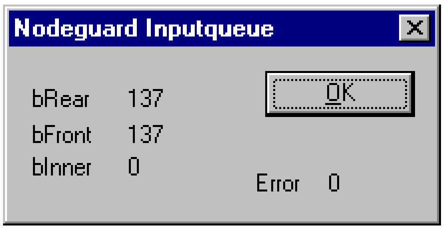


Figure 53: CAN_TASK Nodeguard Inputqueue

Variable	Meaning
bRear	Position of the next read access to the puffer of received CAN telegrams
bFront	Position of the next write access
bInner	Number of CAN telegrams which are actual included in the puffer

Table 41: CAN_TASK Nodeguard Inputqueue

9.1.6.2 CAN_TASK Management Inputqueue

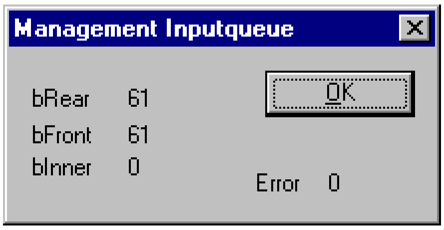


Figure 54: CAN_TASK Management Inputqueue

Variable	Meaning
bRear	Position of the next read access to the puffer of received CAN telegrams
bFront	Position of the next write access
bInner	Number of CAN telegrams which are actual included in the puffer

Table 42: CAN_TASK Management Inputqueue

9.1.6.3 CAN_TASK Emergency Inputqueue

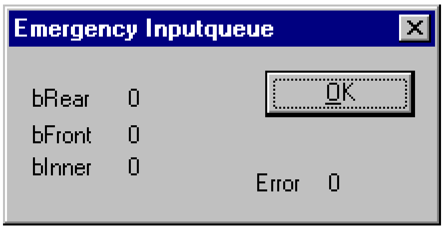


Figure 55: CAN_TASK Emergency Inputqueue

Variable	Meaning
bRear	Position of the next read access to the puffer of received CAN telegrams
bFront	Position of the next write access
bInner	Number of CAN telegrams which are actual included in the puffer

Table 43: CAN_TASK Emergency Inputqueue

9.1.6.4 CAN_TASK Transmit Queue

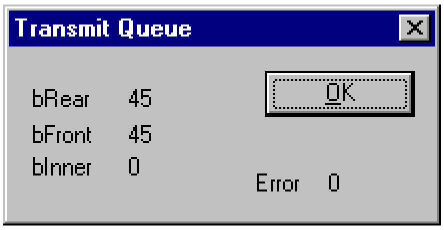


Figure 56: CAN_TASK Transmit Queue

Variable	Meaning
bRear	Position of the next read access to the puffer of received CAN telegrams
bFront	Position of the next write access
bInner	Number of CAN telegrams which are actual included in the puffer

Table 44: CAN_TASK Transmit Queue

9.1.7 CAN_TASK CMS Domain Services

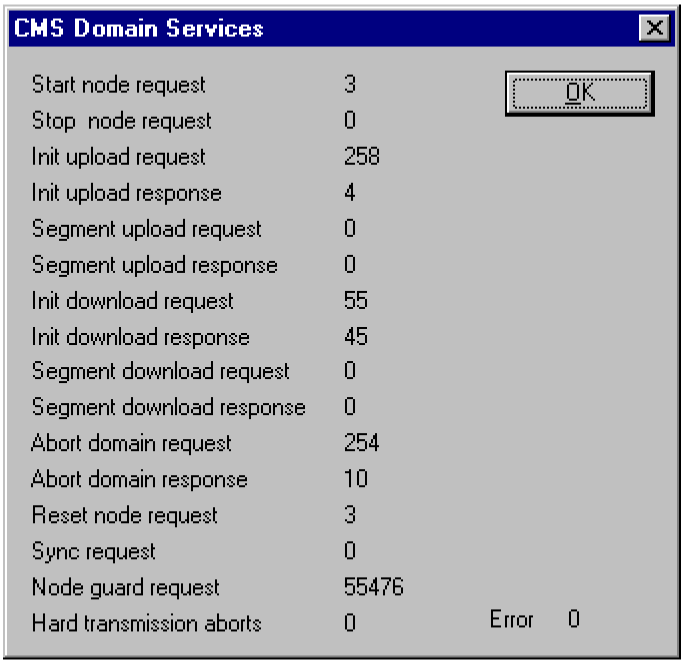


Figure 57: CAN_TASK CMS Domain Services

The CANopen protocol defines different services which are summarised under the name **Domain Services**. All Domain Services that are transmitted and were received are counted in this table and shown online by FB1131. A special value is the **Hard transmission abort** counter. Each CAN message which is inserted into the CAN controller to be sent is supervised by a simultaneously started timer. If the CAN controller cannot sent the message because it don't find any other CAN controller active in the connected network who is acknowledging him the message, the message can't be sent and the timer expires. If so the message is thrown away and the next message of the queue is inserted to be sent. So an incrementing **Hard transmission abort** counter is directly an indication for a physical hardware problem in the network. A possible fault that is often made is a wrong configured baud rate for example that causes such an error too.

9.1.8 CAN_TASK Timeout Counter

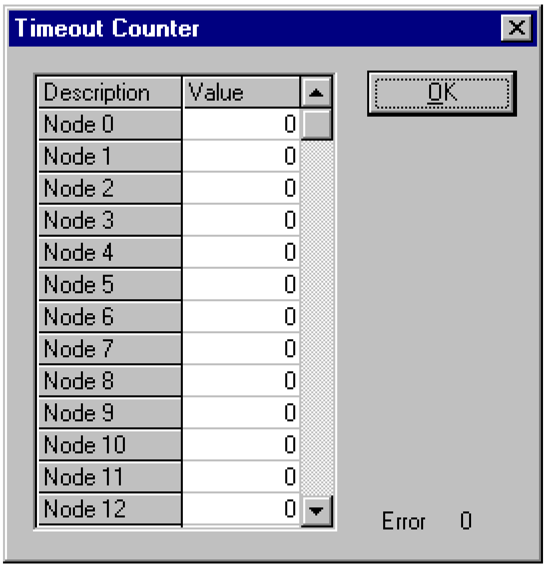


Figure 58: CAN_TASK Timeout Counter

Normally PDOs are transferred in CANopen protocol without sending back any kind of acknowledge message. But if input PDO data is polled by the master with a remote request telegram each addressed Node has to response. If a Node do not response to an outstanding remote request, then the **Timeout Counter** of the corresponding Node is incremented by a value of 1. So if a counter shows a value unequal 0 this can be seen as an indication that the remote request rate is to high for the Node which cannot answer to every request. In such case decrease the Node request poll rate in the Node configuration window.

9.1.9 CAN_TASK Node Init Counter

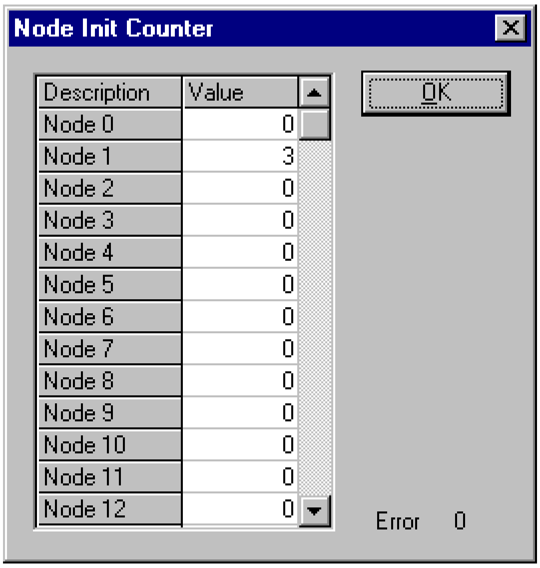


Figure 59: CAN_TASK Node Init Counter

The Node init counter is always incremented whenever the Node is initialized. Normally the counter must show the value 1 for each configured Node, but if a Node is detected as inactive during the Node guarding procedure, then the master tries to reinitialize the Node again. If this happens the Node init counter is incremented by a value of 1. So values larger then 1 are an indication for communication error to the corresponding Node station.

9.2 COB-ID (Predefined Connection Set)

COB-ID means Communication Object Identifier. This is the 11 bit telegram identifier of the CAN telegram. The higher 4 bits (bit 10 to 8) is the function code and the lower 7 bits (bit 7 to 0) is the bus address of the Node.

Broadcast Objects:

Object	**Function Code**	**COB ID hex**	**COB ID dec**	**Index in the Object Directory**
NMT	0000	00H	0	-
SYNC	0001	80H	128	1005H, 1006H, 1007H
TIME STAMP	0010	100H	256	1012H, 1013H

Table 45: COB ID - Broadcast Objects

Peer-to-Peer Objects:

Object	**Function Code**	**COB ID hex**	**COB ID dec**	**Index in the Object Directory**
Emergency	0001	81H-FFH	129-255	1014H, 1015H
PDO 1 (tx)	0011	181H-1FFH	385-511	1800H
PDO 1 (rx)	0100	201H-27FH	513-639	1400H
PDO 2 (tx)	0101	281H-2FFH	641-767	1801H
PDO 2 (rx)	0110	301H-37FH	769-895	1401H
PDO 3 (tx)	0111	381H-3FFH	897-1023	1802H
PDO 3 (rx)	1000	401H-47FH	1025-1151	1402H
PDO 4 (tx)	1001	481H-4FFH	1153-1279	1803H
PDO 4 (rx)	1010	501H-57FH	1281-1407	1403H
SDO (tx)	1011	581H-5FFH	1409-1535	1200H
SDO (rx)	1100	601H-67FH	1537-1663	1200H
NMT Error Control	1110	701H-77FH	1793-1919	1016H, 1017H

Table 46: COB ID - Peer-to-Peer Objects

9.3 Object Dictionary

The Object Dictionary is a collection of data, which have influence on the application and the communication of a CANopen device and the device can be configured with this data collection. The entries are structured by the index and the subindex.

9.3.1 Object Name and Object Code

The following table shows a list of the Object Codes:

Object Name	**Comment**	**Object Code**
NULL	A dictionary entry with no data fields	0
DOMAIN	Large variable amount of data e.g. executable program code	2
DEFTYPE	Denotes a type definition such as a Boolean, UNSIGED 16, float and so on	5
DEFSTRUCT	complex Data type definition, e.g. PDO Mapping-Structure	6
VAR	A single value such as Unsigned 8, Boolean, visible string etc.	7
ARRAY	A multiple data field object where each data field is a simple variable of the same basic data type e.g. array of Unsigned 16 Sub-index 0 is of Unsigned 8 and therefore not part of the array data.	8
RECORD	A multiple data field object where the data fields may be any combination of simple variables. Sub-index 0 is of Unsigned 8 and therefor not part of the record data.	9

Table 47: Object Codes

Note: The list of the Object Names and Object Codes is no information that the Master or the Node support the respective data type.

9.3.2 Object Dictionary Data Types

The following table is a survey of the data types and an extract of the CANopen specification.

Note: The list of the data types is no information that the Master or the Node support the respective data type.

Range	Index (Hex)	Object	Name
Reserved	0000	reserved	reserved
Static data types	0001	DEFTYPE	BOOLEAN
	0002	DEFTYPE	INTERGER 8
	0003	DEFTYPE	INTERGER 16
	0004	DEFTYPE	INTERGER 32
	0005	DEFTYPE	UNSIGNED 8
	0006	DEFTYPE	UNSIGNED 16
	0007	DEFTYPE	UNSIGNED 32
	0008	DEFTYPE	REAL 32
	0009	DEFTYPE	VISIBLE_STRING
	000A	DEFTYPE	OCTET_STRING
	000B	DEFTYPE	UNICODE_STRING
	000C	DEFTYPE	TIME_OF_DAY
	000D	DEFTYPE	TIME_DIFFERENCE
	000E	DEFTYPE	BIT_STRING
	000F	DEFTYPE	DOMAIN
	0010	DEFTYPE	INTERGER 24
	0011	DEFTYPE	REAL 64
	0012	DEFTYPE	INTERGER 40
	0013	DEFTYPE	INTERGER 48
	0014	DEFTYPE	INTERGER 56
	0015	DEFTYPE	INTERGER 64
	0016	DEFTYPE	UNSIGNED 24
	0017	reserved	reserved
	0018	DEFTYPE	UNSIGNED 40
	0019	DEFTYPE	UNSIGNED 48
	001A	DEFTYPE	UNSIGNED 56
	001B	DEFTYPE	UNSIGNED 64
	001C-001F	reserved	reserved

Continuation see next page.

Complex data types	0020	DEFSTRUCT	PDO_COMMUNICATION_PARAMETER
	0021	DEFSTRUCT	PDO_MAPPING
	0022	DEFSTRUCT	SDO_PARAMETER
	0023	DEFSTRUCT	IDENTITY
	0024-003F	reserved	reserved
Manufacturer specific complex data types	0040-005F	DEFSTRUCT	Manufacturer specific complex data types
Device profile data types	0060-007F	DEFTYPE	Device profile (0) specific standard data types
	0080-009F	DEFSTRUCT	Device profile (0) specific complex data types
	00A0-00BF	DEFTYPE	Device profile 1 specific standard data types
	00C0-00DF	DEFSTRUCT	Device profile 1 specific complex data types
	00E0-00FF	DEFTYPE	Device profile 2 specific standard data types
	0100-011F	DEFSTRUCT	Device profile 2 specific complex data types
	0120-013F	DEFTYPE	Device profile 3 specific standard data types
	0140-015F	DEFSTRUCT	Device profile 3 specific complex data types
	0160-017F	DEFTYPE	Device profile 4 specific standard data types
	0180-019F	DEFSTRUCT	Device profile 4 specific complex data types
	01A0-01BF	DEFTYPE	Device profile 5 specific standard data types
	01C0-01DF	DEFSTRUCT	Device profile 5 specific complex data types
	01E0-01FF	DEFTYPE	Device profile 6 specific standard data types
	0200-021F	DEFSTRUCT	Device profile 6 specific complex data types
	0220-023F	DEFTYPE	Device profile 7 specific standard data types
	0240-025F	DEFSTRUCT	Device profile 7 specific complex data types
Reserved	0300-0FFF	reserved	reserved

Table 48: Object Dictionary Data Types

9.3.3 Object Dictionary Profile

The following table is a survey of the profile object dictionary and an extract of the CANopen specification.

Note: The list of the single objects is no information that the Master or the Node support the respective object and the function which is associated with it.

Range	Index (Hex)	Object	Name	Type / Access
Communication Profile	1000	VAR	Device Type	Unsigned 32 / ro
	1001	VAR	Error Register	Unsigned 8 / ro
	1002	VAR	Manufacturer Status Register	Unsigned 32 / ro
	1003	ARRAY	Pre-defined Error Field	Unsigned 32 / ro
	1004	-	Reserved	-
	1005	VAR	COB-ID SYNC	Unsigned 32 / rw
	1006	VAR	Communication Cycle Period	Unsigned 32 / rw
	1007	VAR	Synchronous Window Length	Unsigned 32 / rw
	1008	VAR	Manufacturer Device Name	Visible_string / c
	1009	VAR	Manufacturer Hardware Version	Visible_string / c
	100A	VAR	Manufacturer Software Version	Visible_string / c
	100B	-	Reserved	-
	100C	VAR	Guard Time	Unsigned 32 / rw
	100D	VAR	Life Time Factor	Unsigned 32 / rw
	100E	-	Reserved	-
	100F	-	Reserved	-
	1010	VAR	Store Parameters	Unsigned 32 / rw
	1011	VAR	Restore Default Parameters	Unsigned 32 / rw
	1012	VAR	COB-ID TIME	Unsigned 32 / rw
	1013	VAR	High Resolution Time Stamp	Unsigned 32 / rw
	1014	VAR	COB-ID EMCY	Unsigned 32 / rw
	1015	VAR	Inhibit Time EMCY	Unsigned 16 / rw
	1016	ARRAY	Consumer Heartbeat Time	Unsigned 32 / rw
	1017	VAR	Producer Heartbeat Time	Unsigned 16 / rw
	1018	RECORD	Identity Object	Identity / ro
	1018 / 0		Number of Entries	Unsigned 8
	1018 / 1		Vendor Information	Unsigned 32
	1018 / 2		Product Code	Unsigned 32
	1018 / 3		Revision Number	Unsigned 32
	1018 / 4		Serial Number	Unsigned 32
	1019-11FF	-	Reserved	-

Continuation see next page.

Range	Index (Hex)	Object	Name	Type / Access
Communication Profile	1200	RECORD	Server 1. SDO Parameter	SDO_Parameter / ro
	1200 / 0		Number of Entries	Unsigned 8
	1200 / 1		COB-ID Client -> Server	Unsigned 32
	1200 / 2		COB-ID Client <- Server	Unsigned 32
	1200 / 3		NodeID	Unsigned 8
	1201-1277	RECORD	Server 2. to 127. SDO Parameter	SDO_Parameter / rw
	1280-12FF	RECORD	Client SDO Parameter	SDO_Parameter / rw
	1300-13FF	-	Reserved	-
	1400-15FF	RECORD	Receive PDO Parameter	PDO_Com_Para / rw
	1400 / 0		Number of Entries	Unsigned 8
	1400 / 1		COB-ID	Unsigned 32
	1400 / 2		Transmission Type	Unsigned 8
	1400 / 3		Transmit Prohibited Time	Unsigned 16
	1400 / 4		Reserved	Unsigned 8
	1400 / 5		Event Timer	Unsigned 16
	1600-17FF	ARRAY	Receive PDO Mapping	PDO_Mapping / rw
	1600 / 0		Number of Entries	Unsigned 8
	1600 / 1		1. Object	Unsigned 32
	1600 / 2		2. Object	Unsigned 32
	1600 / ...		n. Object	Unsigned 32
	1600 / 40		64. Object	Unsigned 32
	1800-19FF	RECORD	Transmit PDO Parameter	PDO_Com_Para / rw
	1A00-1BFF	ARRAY	Transmit PDO Mapping	PDO_Mapping / rw
	1C00-1FFF	-	Reserved	-
Manufacturer Specific Profile	2000-5FFF			
Standardized Device Profiles	6000-67FF		Device Profile 1	
	6800-6FFF		Device Profile 2	
	7000-77FF		Device Profile 3	
	7800-7FFF		Device Profile 4	
	8000-87FF		Device Profile 5	
	8800-8FFF		Device Profile 6	
	9000-97FF		Device Profile 7	
	9800-9FFF		Device Profile 8	
Reserved	A000-FFFF	-	Reserved	-

Table 49: Object Dictionary Profile

9.4 Communication Profile, Device Profile and Device Type

The Communication Profile DS 301 specifies, how to communicate. The Device Profiles DS 401ff specify, what is communicated.

Device Profile	Description
301	Common communication profile according to DS301
401	Device profile for I/O modules
402	Device profile for drives
406	Device profile for encoder

Table 50: Device Profile and Device Type

9.4.1 Communication Profile 301

The communication profile DS 301 is a common profile. It is the basic of CANopen communication and lays down, how the device on the CANopen communicate with each other.

9.4.2 Device Profile 401 - Device Profile for I/O Modules

The device profile DS 401 is a profile for I/O modules.

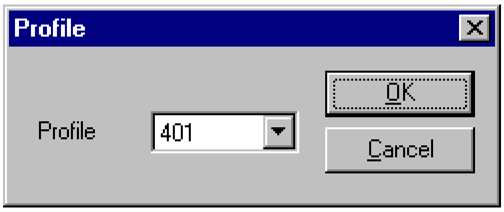


Figure 60: Device Profile 401

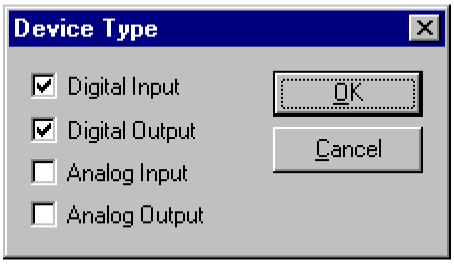


Figure 61: Selection of the Device Type in case of Device Profile 401

Device Profile	Device Type	Description
401	Digital Input Digital Output Analog Input Analog Output	Device Profile for I/O Modules

Table 51: Device Profile for I/O Modules

9.4.3 Device Profile 402 - Device Profile for Drives

The device profile DS 402 is a profile for drives.

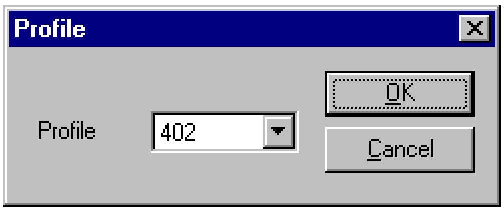


Figure 62: Device Profile 402

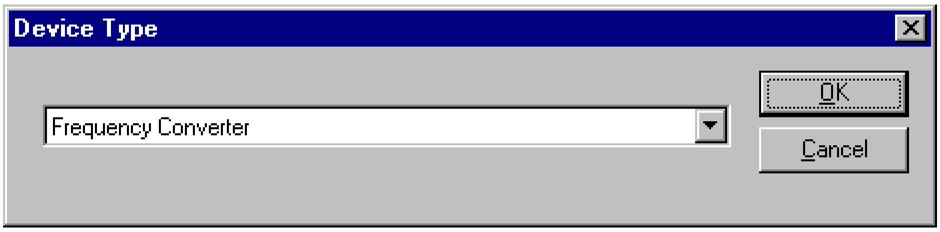


Figure 63: Selection Device Type in case of Device Profile 402

Device Profile	**Device Type**	**Description**
402	Frequency Converter Servo Drive Stepper Motor I/O Module Multi device module	Device profile for drives

Table 52: Device Profile for Drives

9.4.4 Device Profile 406 - Device Profile for Encoder

The device profile DS 406 is a profile for encoder.

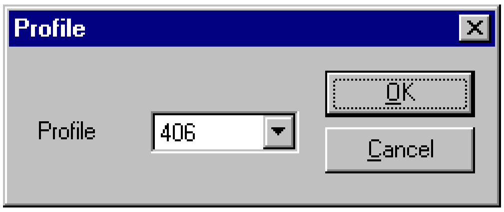


Figure 64: Device Profile 406

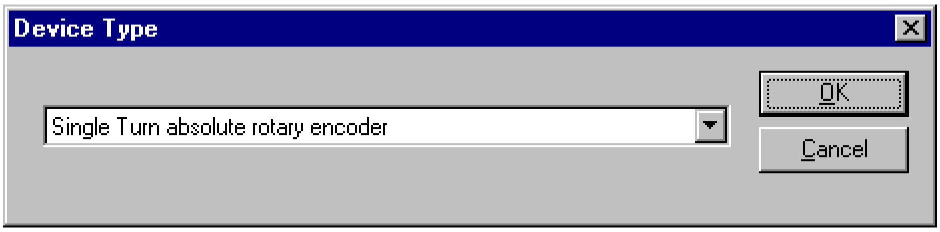


Figure 65: Selection of the Device Type in case of Device Profile 406

Device Profile	Device Type	Description
406	Single Turn absolute rotary encoder Multi Turn absolute rotary encoder Single Turn absolute rotarey encoder with electronic turncount Incremental rotary encoder Incremental rotary encoder with electronic counting Incremental linear encoder Incremental linear encoder with electronic counting Absolute linear encoder Absolute linear encoder with cyclic coding	Device profile for encoder

Table 53: Device Profile for Encoder

9.5 PDO Mapping Method

The PDO Mapping with degree of freedom was fixed in the specification DS301 V3. The Fieldbus Configurator produces the following PDO Mapping:

- Subindex 0 the number of objects (value N) is entered in object 16xx (and object 1Axx respectively).
- Subindex 1 to N are entered in the objects which are to be mapped in object 16xx (and object 1Axx respectively).

The PDO Mapping was laid down more exactly in the specification DS301 V4. Thereby particular the fist mapped information in the Node is deleted, then it is described new and after this it is set to valid.

- To delete the information of the PDO Mapping in the Node (and to set it back to the default mapping respectively), in object 16xx (and object 1Axx respectively) Subindex 0 the value 0 is written down.
- The objects which are to be mapped are entered in object 16xx (and respectively object 1Axx) Subindex 1 to N.
- The number of objects is entered (value N) in object 16xx (and respectively object 1Axx).

9.6 NMT State Machine (State Diagram)

NMT stands for Network Management.

The following diagram shows the possible states of a CANopen Node.

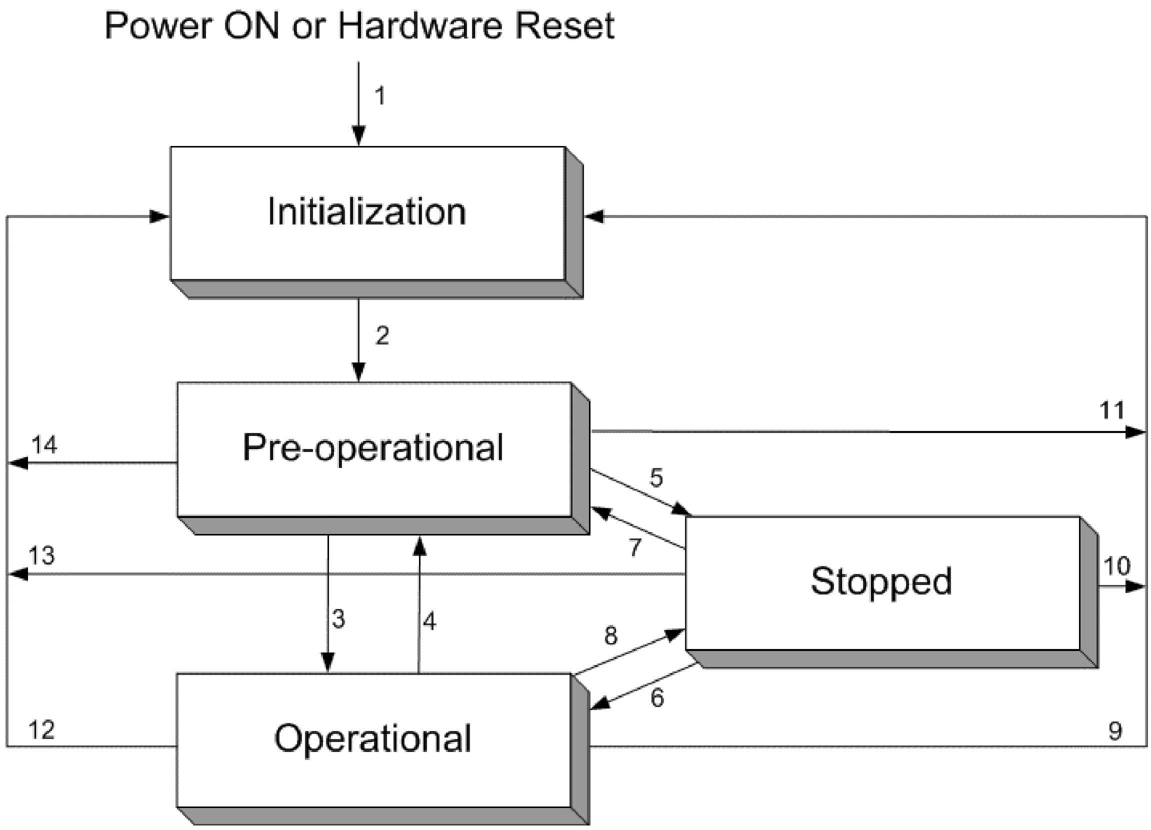


Figure 66: NMT-State Machine

Number	Meaning
1	At Power on the initialisation state is entered autonomously
2	Initialisation finished -enter PRE_OPERATIONAL automatically
3, 6	Start_Remote_Node indication
4, 7	Enter_PRE-OPERATIONAL_State indication
5, 8	Stop_Remote_Node indication
9, 10, 11	Reset_Node indication
12, 13, 14	Reset_Communication indication

Table 54: Description NMT-State Machine

9.6.1 Communication Characteristics in the different NMT States

The following table shows the possible communication in the respective NMT states.

Communication	Initialization	Pre-Operational	Operational	Stopped
PDO			X	
SDO		X	X	
SYNC		X	X	
Time Stamp		X	X	
EMCY		X	X	
BootUp	X			
NMT		X	X	X

Table 55: Communication in the different NMT States

9.7 LSS/LMT Services

LSS stands for Layer Setting Services, LMT stands for Layer Management and is an older designation.

LSS/LMT supports access to the basic parameter like

- Baud Rate
- Node ID

via the CAN network also without mechanical setting possibilities on the Node. The communication is based on a Master/Slave relationship and uses the COB-ID 2020 (07E4H, Slave to Master) and 2021 (07E5H, Master to Slave).

The LSS/LMT Slave need to be in the NMT state Stop, to perform the LSS/LMT services. The LSS/LMT Slave is able to take the following both states

- Operation Mode = Operating mode with valid parameters and
- Configuration Mode = Configuration Mode.

Note: It is permitted to couple only one Node to the Master at a time.

9.8 Emergency Telegrams

Emergency Telegrams are sent by the Node in case of a Node internal event.

The Emergency Telegram has the following structure:

Byte 1	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**	**Byte 8**
Error Code LSB	Error Code MSB	Error Register	Comm. Error	Device Error	Emergency Trigger	Info 0	Info 1

Table 56: Emergency Telegram (Structure)

- Error Code (Byte 1 and 2): See section *Emergency Telegram Error Codes* on page *112*.
- Error Register (Byte 3): Object 1001H. See device description of the Node manufacturer.
- Manufacturer specific error field (Byte 4 to 8): See device description of the Node manufacturer.

9.8.1 Emergency Telegram Error Codes

The meaning of the Error Codes are shown in the following table:

Error Code (Hex)	Meaning
00xx	No error or reset
10xx	Generic error
20xx	Current
21xx	Current, device input side
22xx	Current inside the device
23xx	Current, device output side
30xx	Voltage
31xx	Mains voltage
32xx	Voltage, inside the device
33xx	Output Voltage
40xx	Temperature
41xx	Ambient temperature
42xx	Device temperature
50xx	Device Hardware
60xx	Device Software
61xx	Internal Software
62xx	User Software
63xx	Data Set
70xx	Additional Modules
80xx	Monitoring
81xx	Communication
8110	CAN Overrun (Object lost)
8120	CAN in Error Passive Mode
8130	Life Guarding Error or Heartbeat Error
8140	recoverefrom bus off
82xx	Protocol Error
8210	PDO not processed due to length error
8220	PDO length exceeded
90xx	External Error
F0xx	Additional Functions
FFxx	Device specific

Table 57: Emergency Error Codes

Note: The table Emergency Error Codes is a common list. To see the exact meaning of these codes we refer to the Node manufacturer.

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11 Glossary

COB-ID

Communication object identifier. Table in section COB-ID on page 98.

LMT

Layer Management.

LSS

Layer Setting Services.

NMT

Network Management. This contains the functions configuration, initialization and supervision of the network devices.

FB1131

Fieldbus Configurator.

Configurations- and Diagnostic Tool.

Operating Instruction Manual

907 FB 1131

Ethernet Configurator

Language: English (EN)
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List of Revisions

Index	Date	Version	Chapter	Revision
1	10.06.03	FB1131.exe 2.6383 Protocol.dll 2.691	all	Created

Although this program has been developed with great care and intensively tested, ABB STOTZ-KONTAKT GmbH cannot guarantee the suitability of this program for any purpose not confirmed by us in writing.

Guarantee claims shall be limited to the right to require rectification. Liability for any damages which may have arisen from the use of this program or its documentation shall be limited to cases of intent.

We reserve the right to modify our products and their specifications at any time in as far as this contributes to technical progress. The version of the manual supplied with the program applies.

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1 Overview FB1131

1.1 Main Functions

The main functions of the CANopen Fieldbus Configurator are:

Function	Section	Short Description
Configuration	*Overview Communication Types*	Overview communication types and description of the configuration steps
Diagnostic	*Diagnostic Functions*	Extended device diagnostic
Documentation	*Project Information*	Set the project information
	Print	Print out the configuration

Table 1: FB1131 Main Functions

1.2 Properties

FB 1131 is an universal Fieldbus Configurator

This means you can configure the most important fieldbus systems like PROFIBUS, DeviceNet, and InterBus with the same tool.

FB 1131 is a global Fieldbus Configurator

You configure all devices with one tool. FB 1131 checks the dependencies between the devices. FB 1131 only allows configurations that make sense. In case of doubt FB 1131 will give you a warning.

FB 1131 documents your Fieldbus system

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

FB 1131 uses standardized configuration files

Some protocols support standardized files containing information about all features and limitations of the Slave device. FB 1131 uses these files for the configuration.

FB 1131 is a diagnostic tool

After the configuration you can switch FB 1131 into the diagnostic mode. You can watch all status information of the couplers, see protocol dependent diagnostic information. In this case a Slave is not operating correctly will be displayed in a different colour.

2 Installation

2.1 System Requirements

- PC with 486-, Pentium processor or higher
- Windows 98/ME, Windows NT 4.0/2000/XP
- Free disk space: 30 - 80 MByte
- CD ROM drive
- RAM: min. 16 MByte
- Graphic resolution: min. 800 x 600 pixel
- Windows 95: Service Pack 1 or higher
- Windows NT: Service Pack 6 or higher
- Keyboard and Mouse

2.2 Software Installation

Close all application programs on the system!

Insert the 907 AC 1131 CD in the local CD ROM drive. If "Autorun" is enabled on the PC the CD menu will start automatically. Otherwise it is started by starting the file "CD_Menu_Vxx.exe" in the root directory of the CD. For example by the menu **Start > Run** and entering "[X:]\CD_Menu_Vxx.exe" ([X] is the CD rom drive and Vxx stands for the version number).

You reach the Installation menu of the CD by operating the **Installation 907 AC 1131 Vxx** button.

With the menu **Notes for Installation** you get a description of the installation and the components of the 907 AC 1131, the programming software, the Fieldbus Configurator 907 FB 1131, OPC Server.

Note: Administrator privileges are required on Windows NT/2000/XP systems for installation of the Fieldbus Configurator 907 FB 1131!

3 Getting Started – Configuration Steps

3.1 Overview Communication Types

Select from the following table the Ethernet protocol that you want to use. The configuration steps are described in the given section.

Communication	Described in section	Page
Ethernet (TCP(UDP) Open Modbus / TCP	*Configuration Ethernet (TCP/UDP) / Open Modbus/TCP*	*11*

Table 2: Overview Communication Ethernet Protocols

3.2 Configuration Ethernet Protocols

3.2.1 Configuration Ethernet (TCP/UDP) / Open Modbus/TCP

The following table describes the steps to configure an Ethernet coupler with the Ethernet (TCP/UDP) and the Open Modbus/TCP protocol as it is typical for many cases.

#	Action	Menu in the System Configurator	Detail information in section	Page
1	Create a new project	**File > New > Ethernet/Protocol**	*Setting up the Ethernet Configuration*	*13*
2	Choose Ethernet coupler	**Insert > Device**	*Insert Coupler (Device)*	*14*
3	Set Device Assignment	**Settings > Device Assignment**	*Device Assignment*	*17*
4	Set Parameter	**Settings > Device Parameters**	*Ethernet Parameter*	*22*
5	Save project	**File > Save**	*Save and Save As*	*37*
6	Download	**Online > Download**	*Downloading the Configuration*	*32*

Table 3: Steps for Configuration of the Ethernet (TCP/UDP) and Open Modbus / TCP coupler

4 Configuration of Ethernet with FB 1131

4.1 Setting up the Ethernet Configuration

To create a new configuration, choose the **File > New** menu. This will offer a selection list of fieldbus systems. Choose **Ethernet/Protocol**. If only the Ethernet/Protocol 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 Coupler

4.2.1 Insert Coupler (Device)

In order to insert a coupler (device) into the configuration, choose the **Insert > Device** menu or click on the symbol:

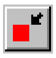
Symbol Insert > Device


Figure 1: Symbol Insert > Device

The dialog box opens, from which exactly one coupler can be chosen in the list **Available devices**. By clicking at the **Add** the chosen coupler appears in the right dialog **Selected Devices**.

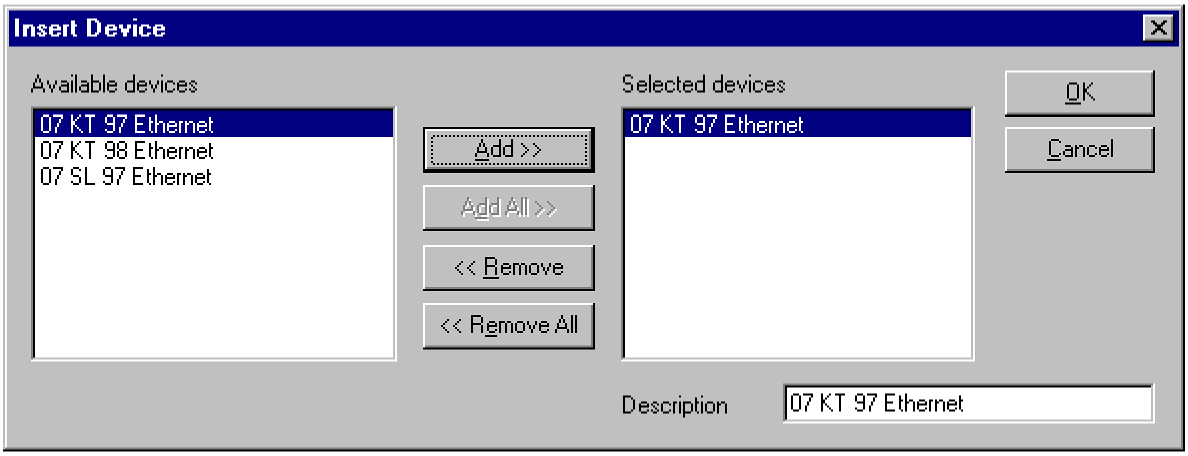


Figure 2: Insert > Device

This example shows a 07 KT 97 Ethernet with the **Description** 07 KT 97 Ethernet, which is changeable in this field.

4.2.2 Replace Device (Coupler)

If a coupler already exists in the configuration and should be replaced against another coupler select the menu **Insert > Device** or click on the "Insert device" symbol. A security question appears, if the device should be replaced.

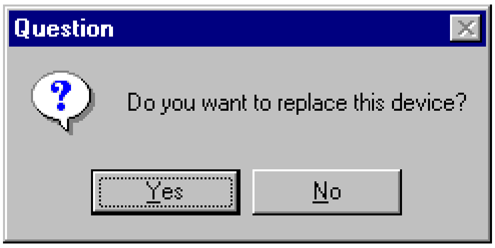


Figure 3: Security Question Replace Device

If you click the **Yes** button a new window opens, where you can replace the existing coupler against another one.

In this window you select the coupler from the list **Available devices** by clicking on it and by clicking the **Add** button this coupler is shown in the first position in the list **Selected devices**. With **OK** you confirm the selection and the coupler will be replaced.

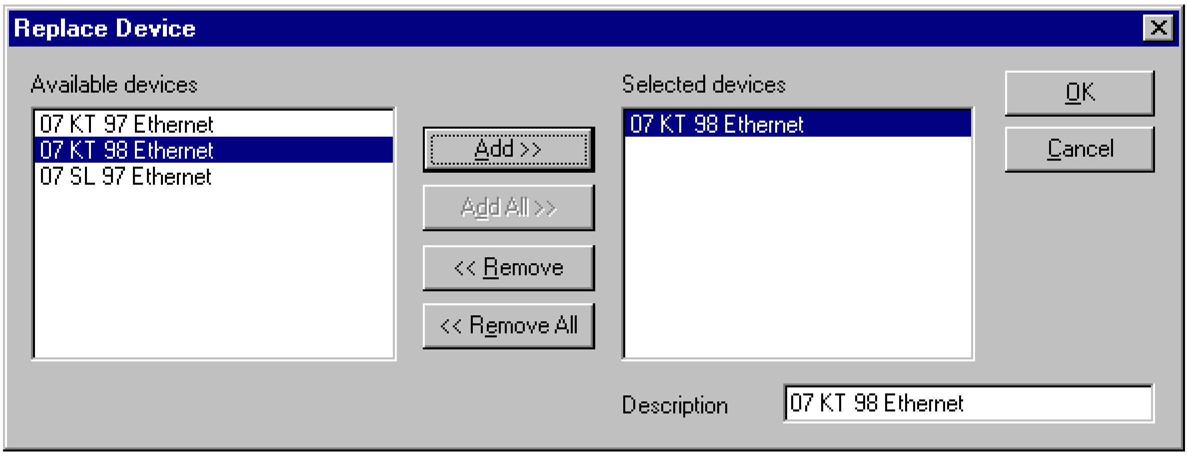


Figure 4: Replace coupler (Device)

5 Settings

5.1 Device Assignment

5.1.1 TCP/IP Driver

The TCP/IP Driver builds up a connection to the coupler via TCP/IP and is choosen via **Settings > Device Assignment.**

When the window opens or by a click on the button **NetIdent Rescan** the local Ethernet network will be scanned for devices that support the identification with the NetIdent protocol. Found and connectable couplers are displayed in the table **Board Selection** (upper table). Exactly to one coupler a connection can be build up, which is done by selecting the checkbox in front of the **IP Address**.

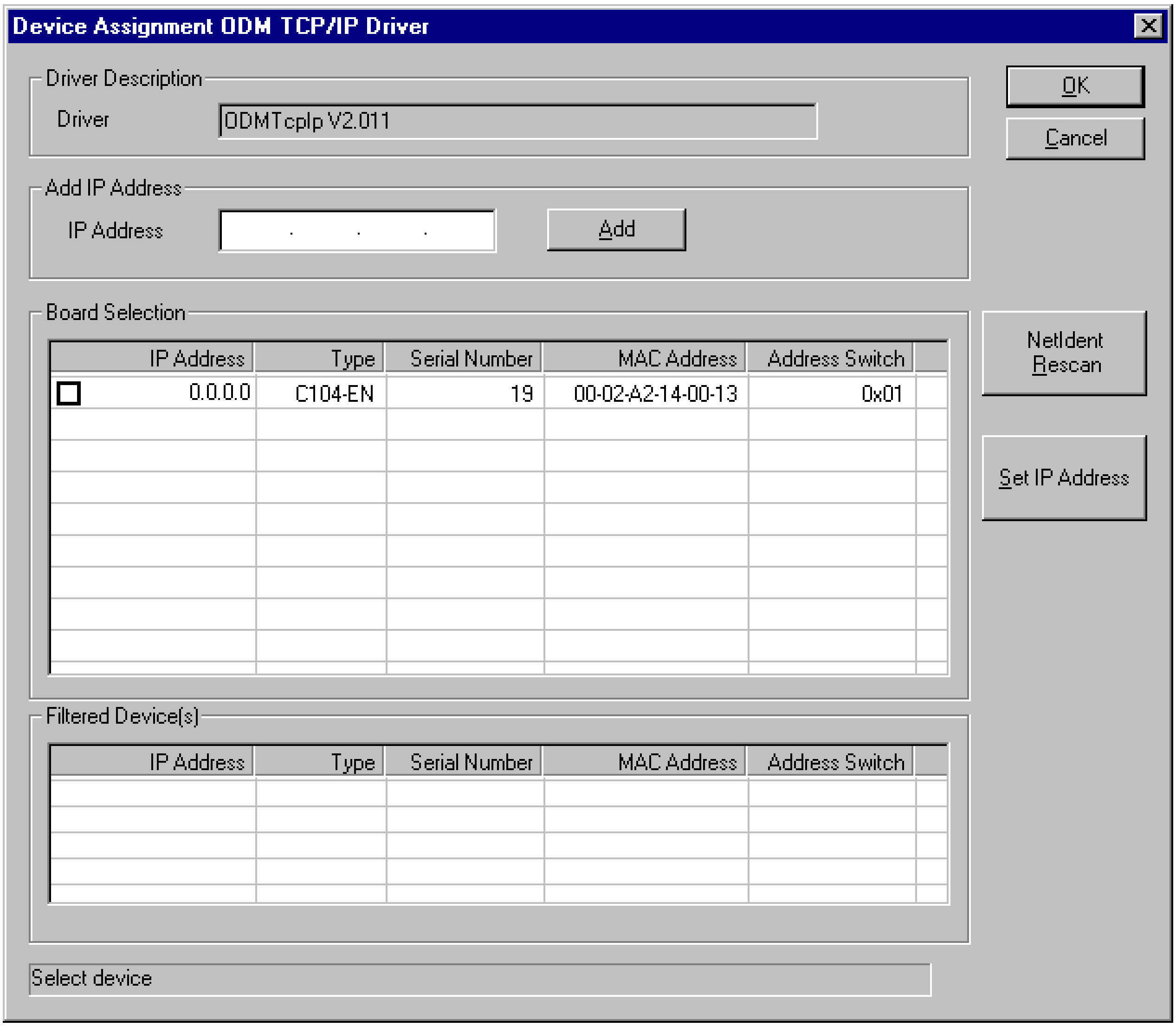


Figure 5: Settings > Device Assignment > TCP/IP Driver

Alternatively, the IP Address can be filled in at **Add IP Address** and be added with the button **Add**. This way has to be used,

- when the coupler is located in an other Ethernet network and reachable via an Ethernet gateway
- when the coupler does not support the NetIdent protocol.

When the coupler already has an IP Address, it is shown in the field IP Address. If the shown IP Address is 0.0.0.0, an IP Address has to be assigned to the coupler with the button **Set IP Address**.

Note: This IP Address is only temporarly adjusted. A permanent storage of the IP Address takes place with a download of the configuration from the FB1131 configurator.

The following figure shows an assigned coupler.

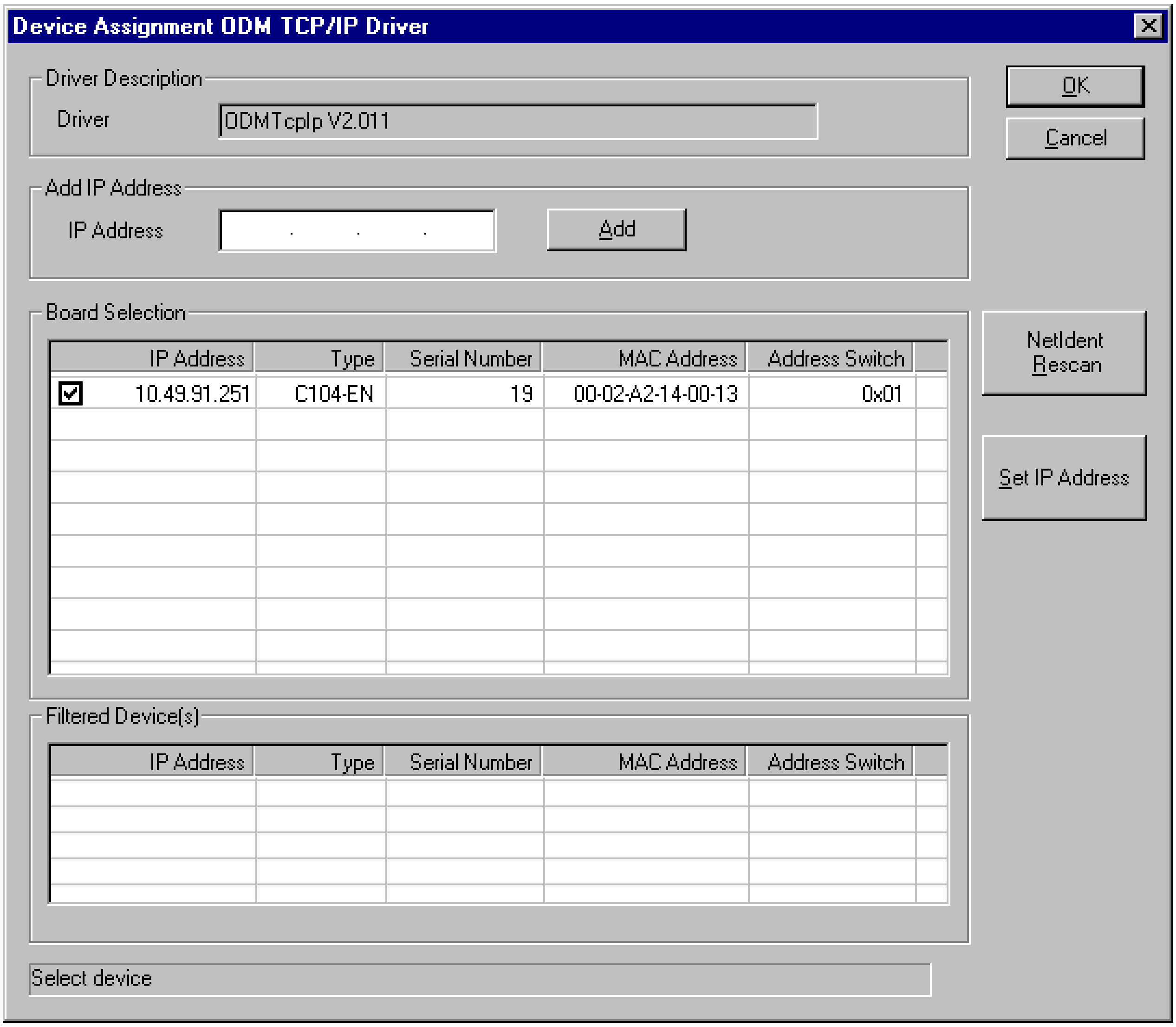


Figure 6: Settings > Device Assignment > TCP/IP Driver

Couplers listed in the lower table are found in the local Ethernet network, but can't be assigned, because they belong to an other device family.

5.1.2 Gateway Driver

The Gateway Driver terminies how the Fieldbus Configurator communicates with the device. This is set in the Device Assignment which can be opened with the menu **Settings > Device Assignment**.

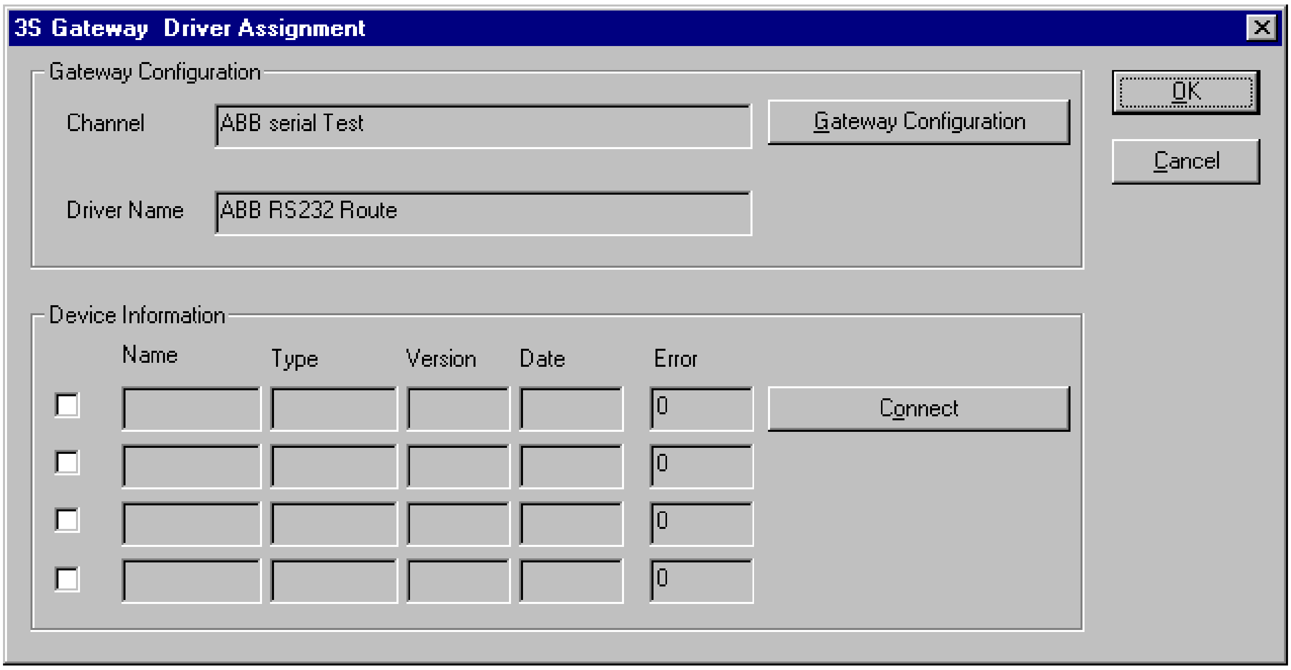


Figure 7: Settings > Device Assignment

After the selection of the Gateway channel or clicking the **Connect** button FB 1131 tries to set up a connection to the selected controller.

If the connection was successful the configurable couplers are shown in the field **Device Information**.

The desired coupler is selected by clicking on the field next to the name of the coupler and confirming with the **OK** button.

By clicking at the **Gateway Configuration** button a new window appears where the Gateway channel can be selected or a new Gateway channel can be configured.

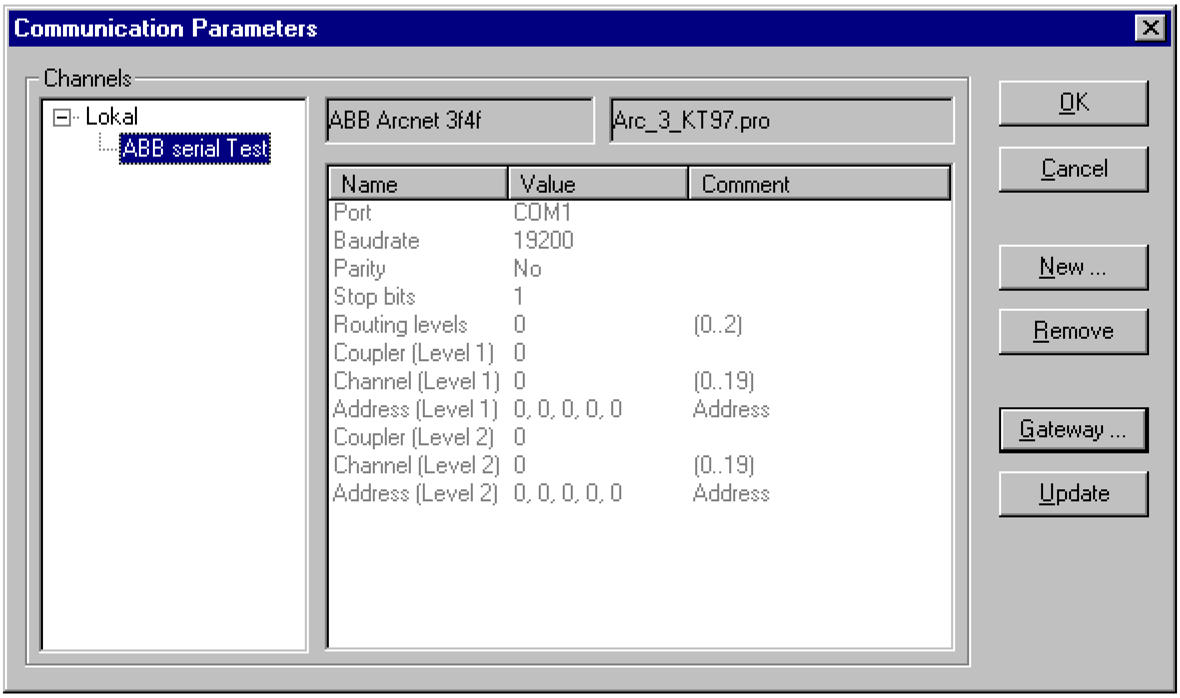


Figure 8: Configure Gateway

To confirm the Channel selection click at the **OK** button.

5.2 Ethernet Parameter

The Ethernet Parameter are the basis for the working communication. This section contains information for setting the Ethernet Parameter and a description for the individual parameter.

Parameter	**Described in section**	**Page**
IP Address	*IP Address*	*23*
Ethernet	*Ethernet*	*24*
Open Modbus/TCP	*Open Modbus/TCP*	*26*

Table 4: Setting of the Coupler Parameter

If you have set an configuration and you want to set the Parameter select the menu **Settings > Device Parameter**.

5.2.1 IP Address

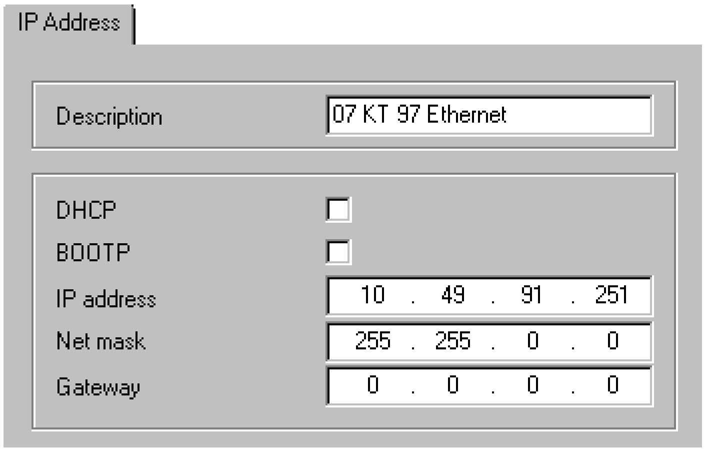


Figure 9: Settings > Device Parameter > IP Address

Description:

The description of the coupler is shown in FB 1131 as the name of the device. The description is changeable in this field.

The handing over of the IP parameters (IP address, Net mask, Gateway) can result in three ways.

DHCP:

The coupler gets the IP parameters from a DHCP server.

BOOTP:

The coupler gets the IP parameters from a BOOTP server.

IP address, Net mask and Gateway:

The IP parameters can be entered in this fields.

If more than one configuration way is activated (for example DHCP and manually entered IP parameters), the device trys to process the different configuration ways one after the other. As soon as it got an IP configuration in one of this ways, the coupler starts with this parameters.

5.2.2 Ethernet

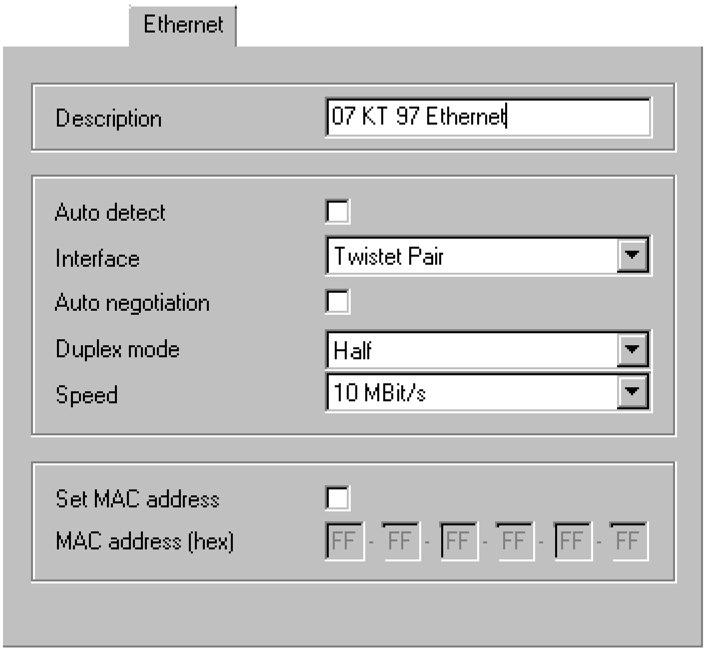


Figure 10: Settings > Device Parameter > Ethernet

Description:

The description of the coupler is shown in FB 1131 as the name of the device. The description is changeable in this field.

Auto detect:

If this option is selected an automatic detection of the Ethernet interface results.

Interface:

Here the manually setting of the Ethernet interface can be done. The user has the possibility to select Twisted Pair or AUI but at the moment just Twisted Pair is supported. The description of this you find in section *Twisted Pair and AUI* on page *65*.

Auto negotiation:

If this option is selected, the speed of the interface is detected automatically.

Duplex mode:

Duplex mode of the Ethernet interface. You can select between Full Duplex and Half Duplex. The description of this you find in section *Full Duplex and Half Duplex* on page *65*.

Speed:

Transmission speed of the data: 10 Mbit/s or 100 Mbit/s.

Set MAC address:

If this option is selected you activate the manual MAC address configuration. If this option is not selected the card has the default address which was set by the manufacturer.

MAC address (hex):

Here you can enter the manual settings of the MAC address of the device. The address format is 6 byte in the Hex Code.

5.2.3 Open Modbus/TCP

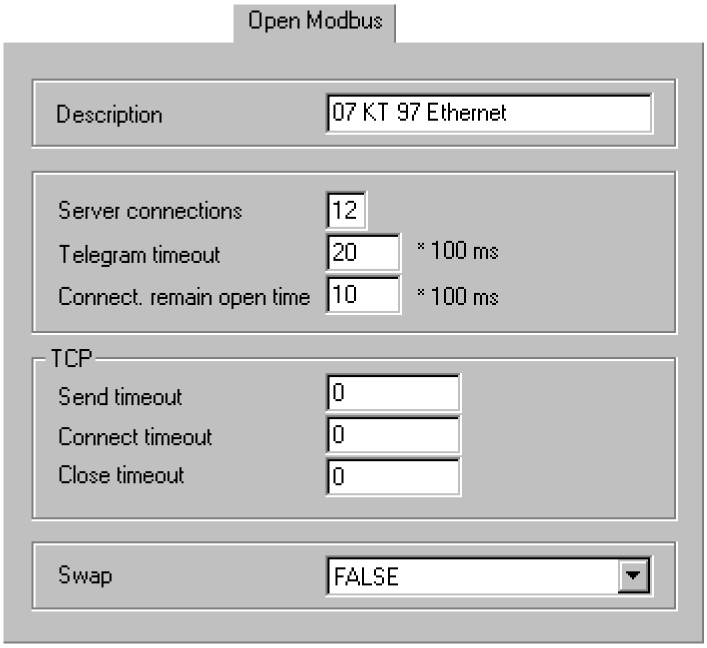


Figure 11: Settings > Device Parameter > Open Modbus

Description:

The description of the coupler is shown in FB 1131 as the name of the device. The description is changeable in this field.

Server connections:

You can set up max. 12 Server connections simultaneously.

Telegram timeout:

The order is stopped by the application when no answer results from the couple partner depending on the set time in this field.

Connect. remain open time:

The connection to the Server is maintained depending on the set time and after expiration of this time it is stopped, if no new order was sent by the application.

Send timeout:

This is the Send timeout for the TCP connection. Is only used internally. In this field you type in the timeout, how long it is tried to take off the orders via TCP/IP.

Connect timeout:

This is the connect timeout for the TCP connection. Is only used internally. Here you give the timeout, how long the TCP Task tries to built up a connection to the Server.

Close timeout:

This is the close timeout for the TCP connection built up. This is only used internally. In this field you type in the timeout, how long the TCP Task tries to built up a connection.

Swap:

Data format, filling of the I/O data in the DPM. Motorola / Intel Format.

5.3 Project Information

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

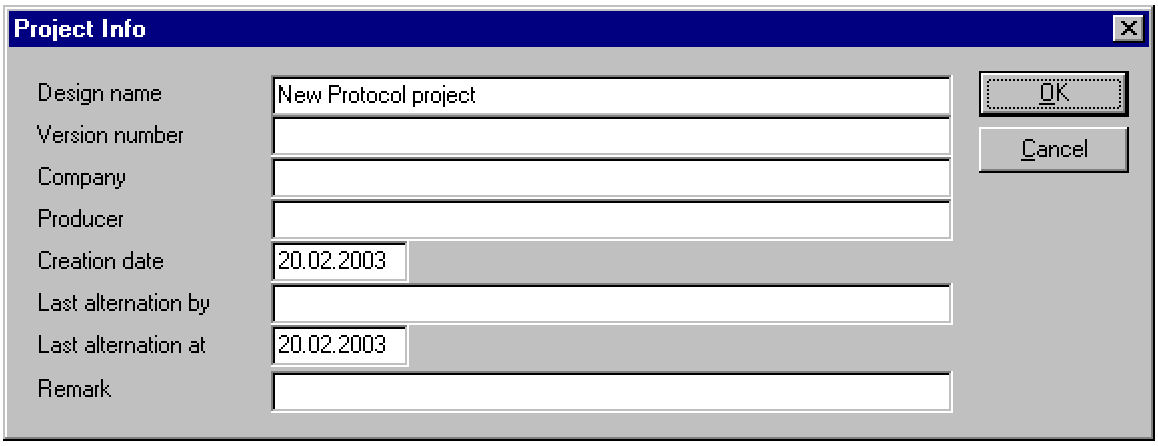


Figure 12: Settings > Project Information

By clicking the **OK** button the Project Information is saved.

5.4 Language

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

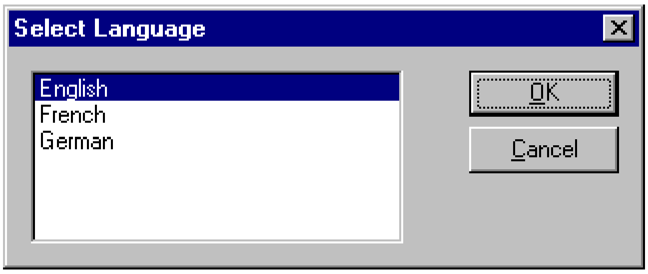


Figure 13: Settings > Language

Here you have the possibility of setting the language of the FB1131. Select the desired language and confirm the entry with the **OK** button.

A message appears that the FB 1131 must be started again in order to activate the selected language. Please carry this out.

After restarting the FB 1131, the language will have changed to the one selected.

Note: Up to now not all languages are available for all FB 1131 modules!

6 Online Functions

6.1 Introduction

In this section all the functions that directly influence Ethernet coupler.

Note: Please note that this also permits an interruption of the running communication or that input and output can be switched ON or OFF.

6.2 Online to the Coupler

6.2.1 Downloading the Configuration

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

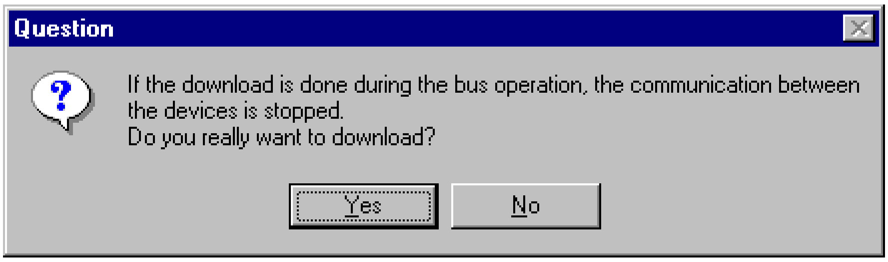


Figure 14: Security question before Download

Attention: The download overwrites the configuration in the coupler and the communication with the connected devices is interrupted.

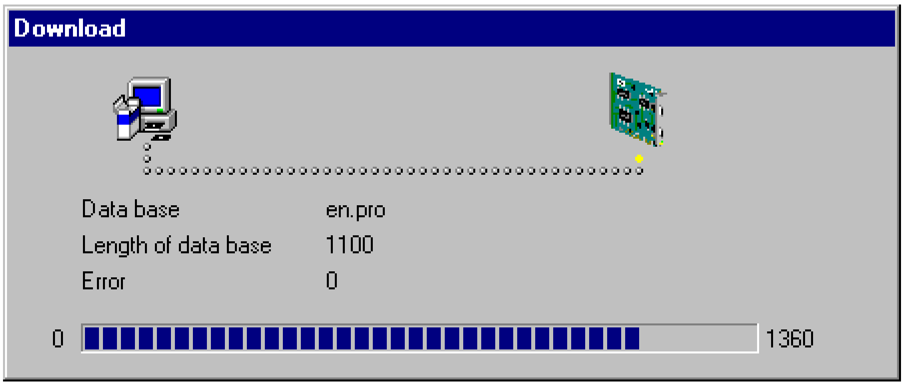


Figure 15: Online > Download

Before the Download is executed, the configuration is checked by the Configurator.

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

After the download, the coupler carries out an internal restart (reset).

6.2.2 Firmware Download

If you want to carry out a Firmware download, act as follow: Call up the **Online > Firmware Download** menu.

A warning appears that the communication will be interrupted. This warning must be confirmed by clicking at the **Yes** button.

Figure 16: Security question before Firmware Download

Select the new Firmware and retrieve it with **Download** into the coupler. The Firmware is now retrieved.

6.2.3 Firmware / Reset

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

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

6.2.4 Device Info

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

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

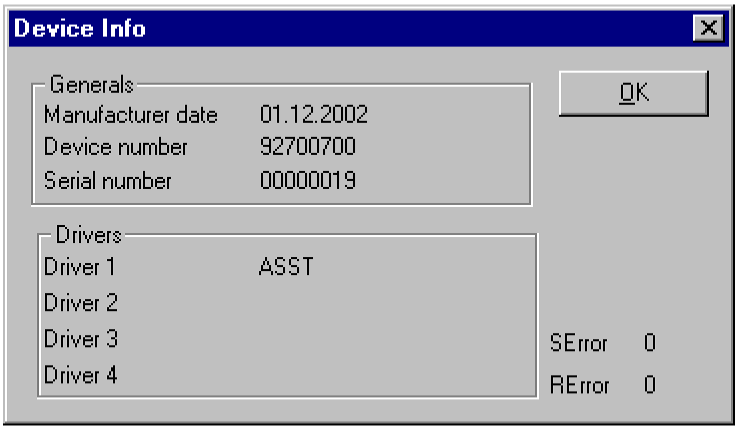


Figure 17: Online > Device Info

6.3 Diagnostic Functions

The following table shows diagnostic functions and their using in case of Ethernet couplers.

Diagnostic Function	Using
Diagnostic Functions	Statistic information and State information of the Ethernet coupler

Table 5: Overview Diagnostic Functions

6.3.1 Extended Device Diagnostic

The Extended Device Diagnostic helps to find communication and configuration errors when the FB1131 menu functions are of no further help.

Select the **Online > Extended Device Diagnostic** menu.

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

Select the protocol which is used in your configuration in the following table. In the given section you find the Extended Device Diagnostic for the corresponding protocol.

Protocol	Page
Extended Device Diagnostic Ethernet (TCP/UDP) / Open Modbus/TCP	*36*

Table 6: Selection of the Protocol for the Extended Device Diagnostic

6.3.1.1 Extended Device Diagnostic Ethernet (TCP/UDP) / Open Modbus/TCP

If an Ethernet (TCP/UDP) / Open Modbus/TCP configuration is loaded and the menu **Online > Extended Device Diagnostic** is selected the following window with the diagnostic structures of the Ethernet (TCP/UDP) / Open Modbus/TCP configuration appears.

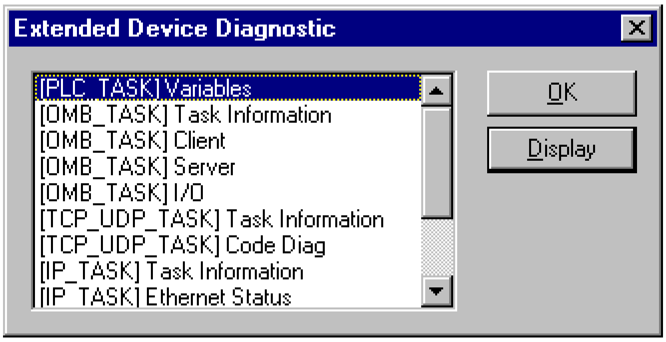


Figure 18: Online > Extended Device Diagnostic Etherent (TCP/UDP) / Open Modbus/TCP

Task/Taskstate	**Page**
PLC_TASK Variables	*60*
OMB_TASK Task Information	*61*
OMB_TASK Client	*62*
OMB_TASK Server	*63*
OMB_TASK I/O	*64*
TCP_UDP_TASK Task Information	*53*
TCP_UDP_TASK Code Diag	*54*
IP_TASK Task Information	*55*
IP_TASK Ethernet Status	*56*
IP_TASK Ethernet Count	*57*
IP_TASK Packet Count	*58*
IP_TASK Code	*59*

Table 7: Ethernet (TCP/UDP) / Open Modbus/TCP Task States

7 File, Print, Export, Edit and View

7.1 File

7.1.1 Open

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

7.1.2 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.

7.1.3 Close

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

7.2 Print

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

7.3 Export Functions

7.3.1 DBM Export

Select the **File > Export > DBM** menu in order to save the previously saved project file 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 FB 1131 Installation with the extension *.DBM.

Attention: The file name may be long max. 8 characters.

7.4 Edit

7.4.1 Delete

To delete a coupler you have to select the menu **Edit > Delete**. Before FB 1131 deletes the coupler a security question appears. If you really want to delete this coupler you have to confirm this question with **Yes**, and the coupler will be deleted.

Figure 19: Security question delete device (coupler)

Note: When you delete a coupler the settings and the configuration of this coupler get lost.

7.5 View

7.5.1 Toolbars

In the menu **View > Toolbars** the user has the possibility to activate or deactivate the Toolbars **Standard** and **Fieldbus**. If this function is deactivated the toolbars are not shown.

7.5.2 Status Bar

In the menu **View > Status Bar** this bar can be activated (with hook) or deactivated (without hook).

8 Error Numbers

8.1 Possible PLC Error Messages to FB1131 Telegrams

Error Number	Description
401	driver error in the control
402	slot number is not supported by the hardware
403	no coupler at the given slot
404	control not in STOP
405	configuration data invalid
406	coupler still configured by 907 AC 1131-internal PROFIBUS Configurator
407	answer timeout of the coupler

Table 8: Possible Control Error Messages to FB1131 Telegrams

8.2 RCS Error Numbers (4 .. 93)

This is the list of error numbers returned by the RCS (Realtime Communication System), that is the operating system of Controller of series 90. The error number is returned in an answer message. Command messages and answer messages are used to communicate between the application (e.g. the Fieldbus Configurator) and the ABB Stotz-Kontakt device. An example of this communication is the download of a configuration.

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

Table 9: RCS error numbers (answer message) (4..39)

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

Table 10: RCS error numbers (answer message) (40..93)

8.3 Database Access Error Numbers (100 .. 130)

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

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

Table 11: Database Access Error Numbers (100..130)

8.4 Online Data Manager Error Numbers

8.4.1 Online Data Manager Error Numbers (1000 .. 1018)

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

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

Table 12: Online Data Manager Error numbers (1000..1018)

8.4.2 Message Handler Error Numbers (2010 .. 2027)

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

Error Number	Description
2010	Message handler: 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
2026	Message handler: Wait for Delete
2027	Message handler: No cyclic Message

Table 13: Error Numbers of the Message Handler of the Online Data Manager (2010..2027)

8.4.3 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 14: Error Numbers of the Driver Functions of the Online Data Manager (2501..2512)

8.4.4 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 15: Subfunction Error Numbers of the Driver Functions of the Online Data Manager (8001..8035)

8.5 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 16: 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 wMaxEintraege
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 17: 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	Initializing of DBM through RCS had no success
4066	Passed data length incorrect
4067	Sorting function not linked
4068	Error in function parameter
4069	Error from ODBC table
4070	No free handle available. Too many data base links are already opened
4071	Unknown data type found in the table
4072	Structure of table GLOBAL not correct or no such table existing
4073	No name of an ACCESS data base
4074	Download window can’t be created
4075	Download not fully performable

Table 18: 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 exists
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 19: Error numbers of converting functions (4082..4199)

8.6 Converting Functions Error Numbers (5001 .. 5008)

The following table lists the error numbers of converting functions.

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

Table 20: Error Numbers of data base functions (5000 .. 5012)

9 Appendix

9.1 Extended Device Diagnostic

9.1.1 TCP_UDP_TASK Task Information

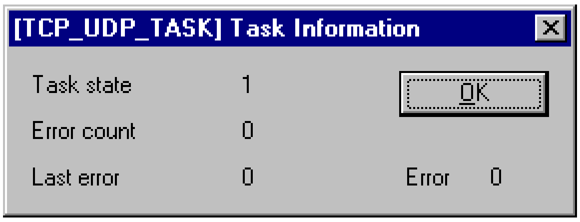


Figure 20: TCP_UDP_TASK Task Information

Variable	Meaning
Task state	State of the Task: 0 = Task not initialized 1 = Task is running 2 = Task initialized 3 = reports an error by initialization
Error count	Number of appeared errors
Last error	Last appeared error (Description see belonging manual)

Table 21: TCP_UDP_TASK Task Information

9.1.2 TCP_UDP_TASK Code Diag

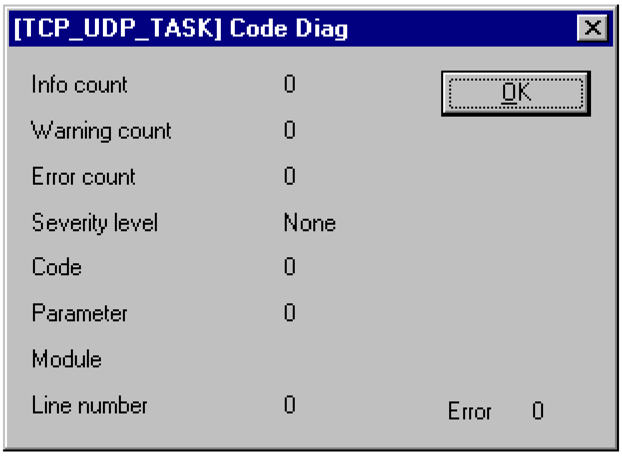


Figure 21: TCP_UDP_TASK Code Diag

Variable	**Meaning**
Info count	Counter for information reports
Warning count	Counter for warning reports
Error count	Counter for errors
Severity level	Level of the last appeared error
Code	Code of the last appeared error
Parameter	Additional information to the error
Module	Software-module
Line number	Line number inside the software-module

Table 22: TCP_UDP_TASK Code Diag

9.1.3 IP_TASK Task Information

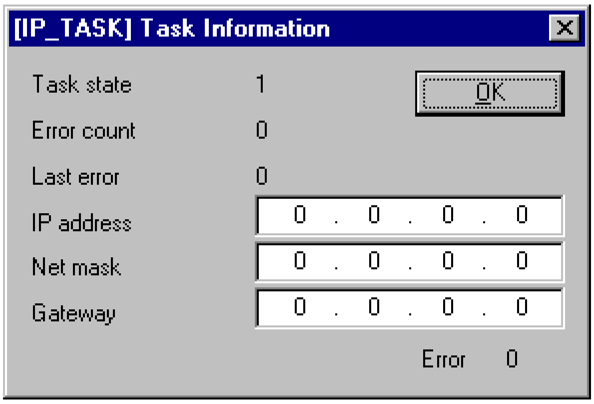


Figure 22: IP_TASK Task Information

Variable	**Meaning**
Task state	State of the Task: 1 = Task is running 2 = initialization is running 3 = initialization has failed
Error count	Counter for appeared errors
Last error	Last appeared error
IP address	IP-Address of the device
Net mask	Net mask of the device
Gateway	Gateway of the device

Table 23: IP_TASK Task Information

9.1.4 IP_TASK Ethernet Status

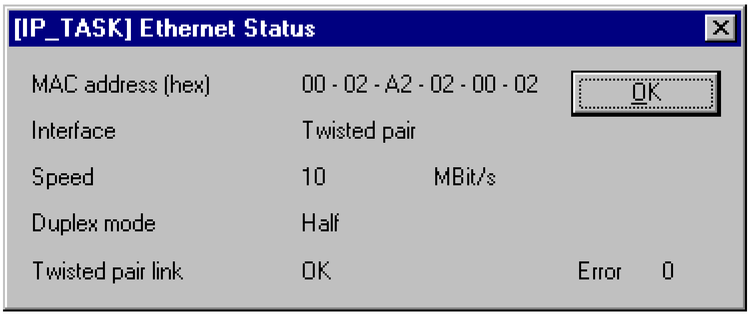


Figure 23: IP_TASK Ethernet Status

Variable	Meaning
MAC address (hex)	MAC address of the device
Interface	Actual known Ethernet interface
Speed	Transmission rate
Duplex mode	Shows the actual Duplex mode: Half-/Fullduplex
Twisted pair link	State of the Twisted Pair connection

Table 24: IP_TASK Ethernet Status

9.1.5 IP_TASK Ethernet Count

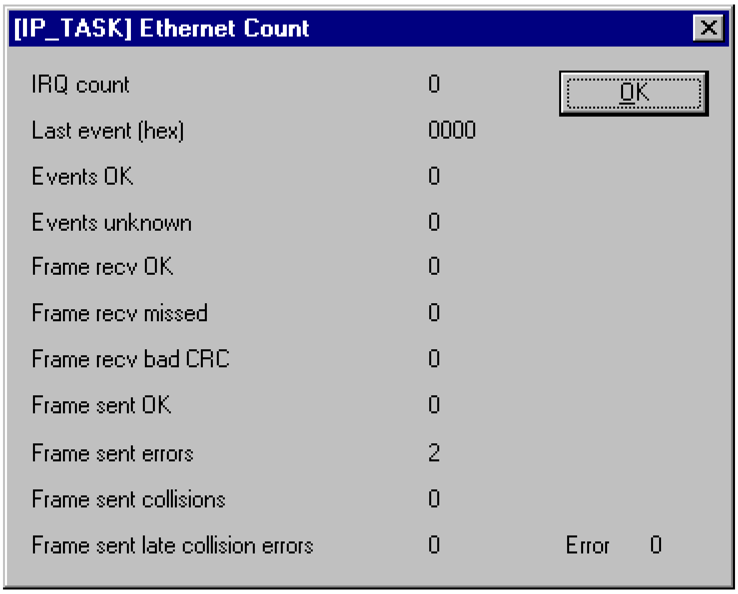


Figure 24: IP_TASK Ethernet Count

Variable	Meaning
IRQ count	Counter for interrupts of the Ethernet controller
Last event (hex)	Last appeared interrupt type
Events OK	Counter for known interrupt types
Events unknown	Counter for unknown interrupt types
Frame recv OK	Counter for received Ethernet frames
Frame recv missed	Counter for missed Ethernet frames
Frame recv bad CRC	Counter for Ethernet frames with CRC errors
Frame sent OK	Counter for sent Ethernet frames
Frame sent errors	Counter for send errors
Frame sent collisions	Counter for sending collisions
Frame sent late collision errors	Counter for late sending collisions

Table 25: IP_TASK Ethernet Count

9.1.6 IP_TASK Packet Count

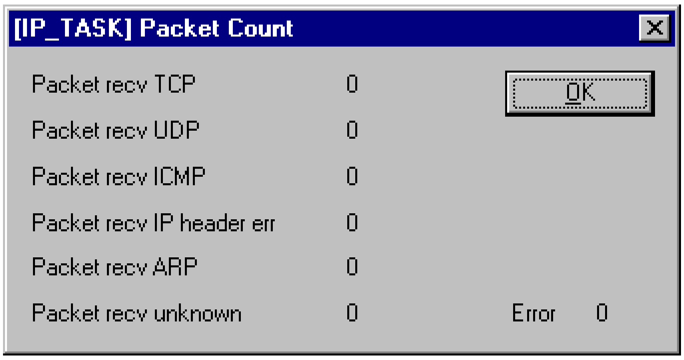


Figure 25: IP_TASK Packet Count

Variable	Meaning
Packet recv TCP	Counter for received TCP packets
Packet recv UDP	Counter for received UDP packets
Packet recv ICMP	Counter for received ICMP packets
Packet recv IP header err	Counter for received IP packets with errors
Packet recv ARP	Counter for received ARP packets
Packet recv unknown	Counter for received packets of an unknown type

Table 26: IP_TASK Packet Count

9.1.7 IP_TASK Code Diag

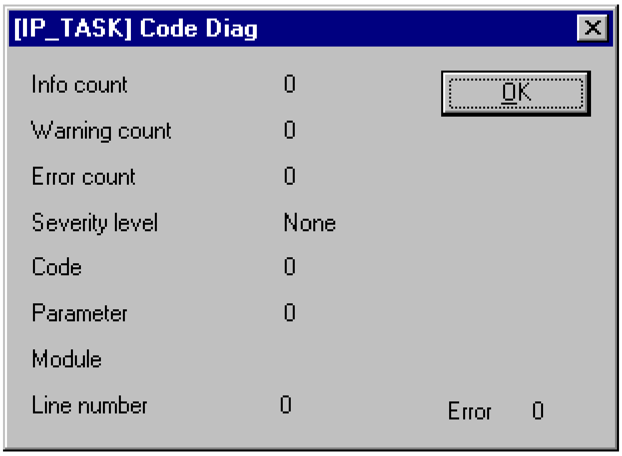


Figure 26: IP_TASK Code Diag

Variable	Meaning
Info count	Counter for information reports
Warning count	Counter for warning reports
Error count	Counter for errors
Severity level	Level of the last appeared error
Code	Code of the last appeared error
Parameter	Additional information to the error
Module	Software-module
Line number	Line number inside the software-module

Table 27: IP_TASK Code Count

9.1.8 PLC_TASK Variables

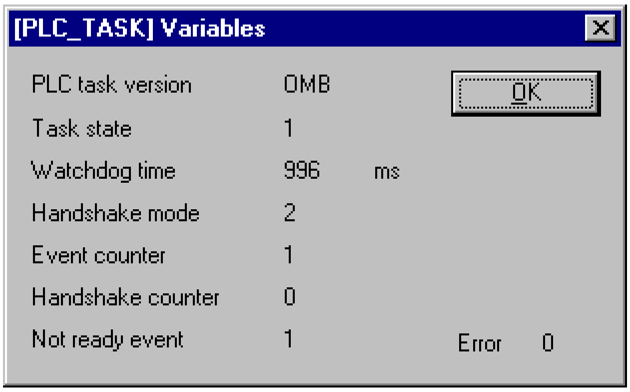


Figure 27: PLC_TASK Variables

Variable	**Meaning**
PLC task version	Version of the PLC task
Task state	State of the Task: 0 = The task is not initialized 1 = The task is initialized and running 2 = The task is actually initializing 3 = Initialization error 4 = Task is initialized and waits for TCP Task
Watchdog time	Watchdog time in milliseconds
Handshake mode	The following PCL modes are supported by the device: 1 = buffered / device controlled 2 = inconsistent / uncontrolled 3 = buffered / host controlled
Event counter	Counter for received events
Handshake counter	Counter for Handshakes
Not ready event	Number of Not ready events

Table 28: Open Modbus / TCP PLC_TASK Variables

9.1.9 OMB_TASK Task Information

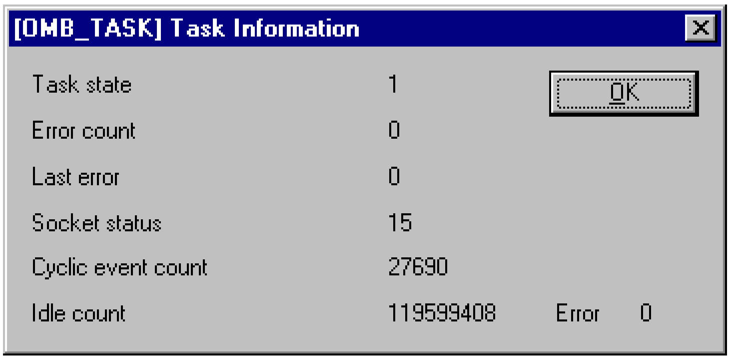


Figure 28: OMB_TASK Task Information

Variable	Meaning
Task state	State of the Task: 0 = The task is not initialized 1 = The task is initialized and running 2 = The task is actually initializing 3 = Initialization error 4 = Task is initialized and waits for TCP Task
Error count	Number of occurred errors
Last error	Last occurred error
Socket status	Information about the actual used TCP socket: 1 = Socket 0 (Connection 0 Close/Open, Bit 0) 2 = Socket 1 (Connection 1 Close/Open, Bit 1) 4 = Socket 2 (Connection 2 Close/Open, Bit 4) 8 = Socket 3 (Connection 3 Close/Open, Bit 8) 16 = Socket 4 (Connection 4 Close/Open, Bit 16)
Cyclic event count	Counter for cyclic events
Idle count	Idle count

Table 29: OMB_TASK Task Information

9.1.10 OMB_TASK Client

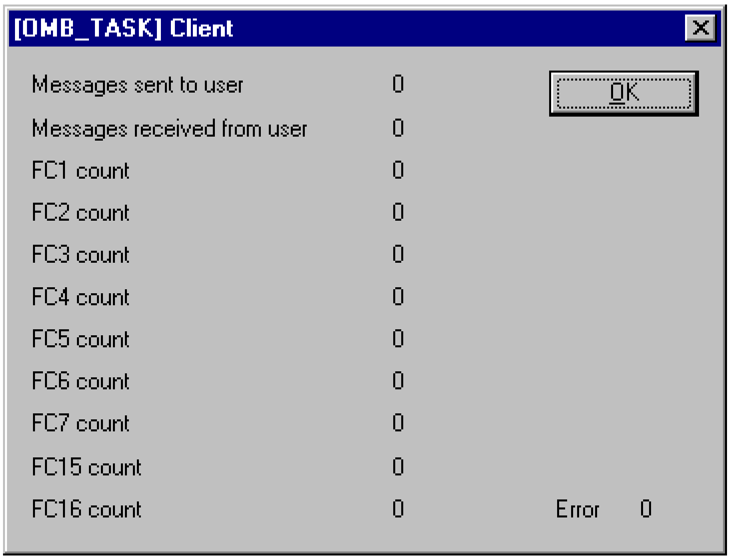


Figure 29: OMB_TASK Client

Variable	**Meaning**
Messages sent to user	Number of messages sent to the user
Messages received from user	Number of messages received from the user
FC1 count	Number of Function Calls for function code 1
FC2 count	Number of Function Calls for function code 2
...	...
FC16 count	Number of Function Calls for function code 16

Table 30: OMB_TASK Client

9.1.11 OMB_TASK Server

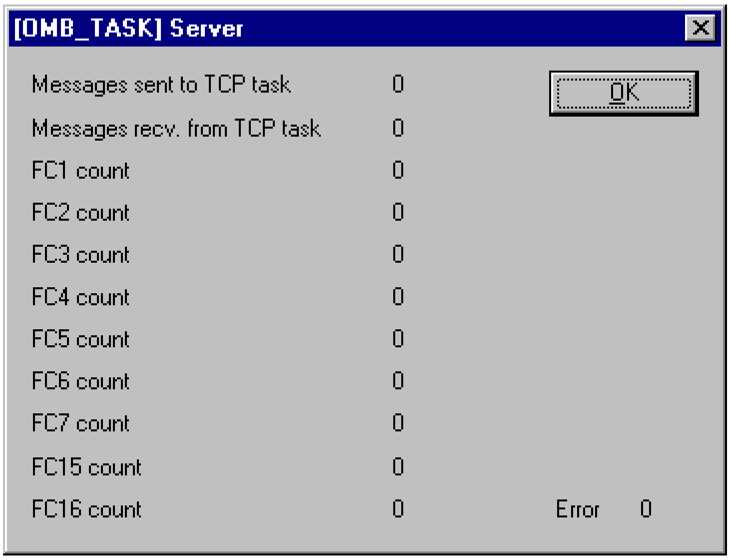


Figure 30: OMB_TASK Server

Variable	Meaning
Messages sent to TCP task	Number of messages which were sent to the TCP task
Messages recv. from TCP task	Number of messages which were received from the TCP task
FC1 count	Number of Function Calls for function code 1
FC2 count	Number of Function Calls for function code 2
...	...
FC16 count	Number of Function Calls for function code 16

Table 31: OMB_TASK Server

9.1.12 OMB_TASK I/O

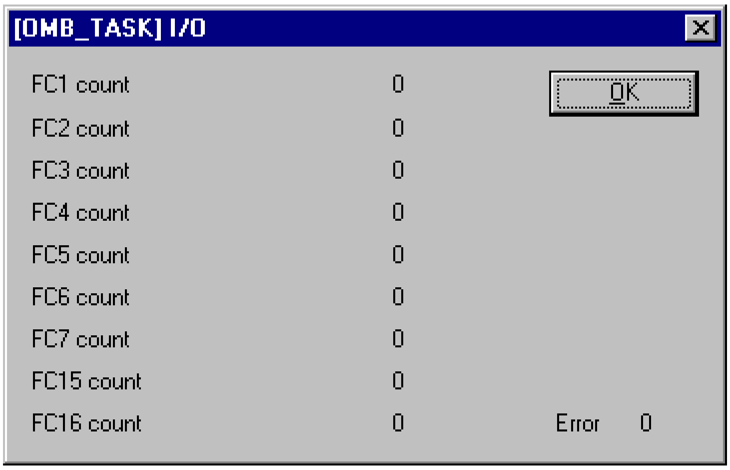


Figure 31: OMB_TASK I/O

Variable	Meaning
FC1 count	Number of Function Calls for function code 1
FC2 count	Number of Function Calls for function code 2
...	...
FC16 count	Number of Function Calls for function code 16

Table 32: OMB_TASK I/O

9.2 Full Duplex and Half Duplex

Full Duplex:
Full Duplex is the designation for a process of data transmission which allows a simultaneously transmission of the data in both directions. That means both devices can send and receive simultaneously.

Half Duplex:

In contrast to Full Duplex where two wires can be used to transmit data (one for send and one for receive) the Half Duplex works mutually with one channel. That means one the device can send and the other device can receive.

9.3 Twisted Pair and AUI

Twisted Pair:
Twisted Pair cable are used for point to point connections and they need four cores therefore two pairs of cores for separate towards and back transmission. Partly this cable has to be crossed, for example by using two repeaters. In view of faster network constellations everywhere four double wires (eight wires) with Cat 5 cable should be used.
Twisted Pair is exclusively connected with RJ45 connectors.

AUI:
The interface between an Ethernet-Transceiver and an Ethernet-Interface which is connected by a direct connection between the Transceiver and the Interface or via an AUI cable.

9.4 MAC Address

(Media Access Control-Address) This is the hardware address of a component in the network which can generate the data packet on its own. The MAC Address is given by the manufacturer who has a reserved memory location. The manufacturer guarantee that the address is unique.

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11 Glossary

FB1131

Ethernet Configurator.

Configurations- and Diagnostic Tool.

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