



Application Note

HFB Driver / OPC Server V 8.00

connecting to a

S5 PLC

via

Profibus FMS

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Draft

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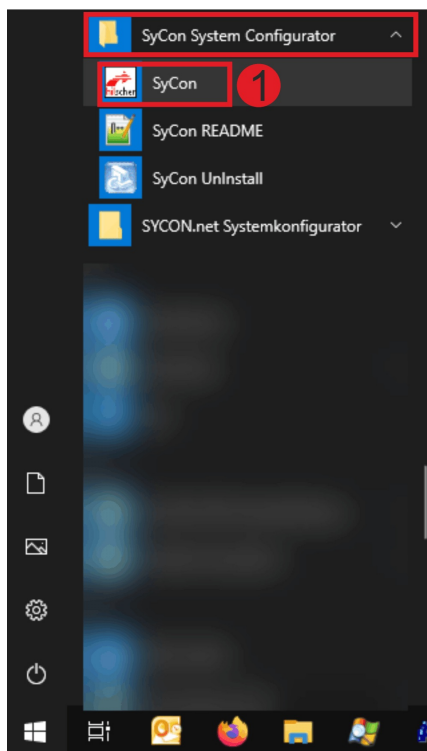
1 Configuration of the CIF50-PB interface

When you receive a CIF50-PB card, this card is blank. That means it has no specific configuration but only the Profibus firmware is loaded. For the configuration of the project-specific settings like bus parameters, connections and FMS objects, the so-called SyCon software is required. SyCon requires a license from the company Hilscher. It is a customer related license, so it can be used on multiple systems of the license owner.

Note: In a second step the HFB Driver / OPC Server has to be configured with the so-called HFB Power Tool. Since the CIF50-PB card resp. the CIF device driver is not able to communicate with two programs at the same time, you have to make sure, that only one of the two programs (SyCon or HFB Power Tool) is active (at the same time). Otherwise especially the Online functions of the SyCon (Download, Live List, FMS Monitor etc.) and the HFB Power Tool will not work properly and can lead to a undetermined system state.

1.1 Starting SYCON

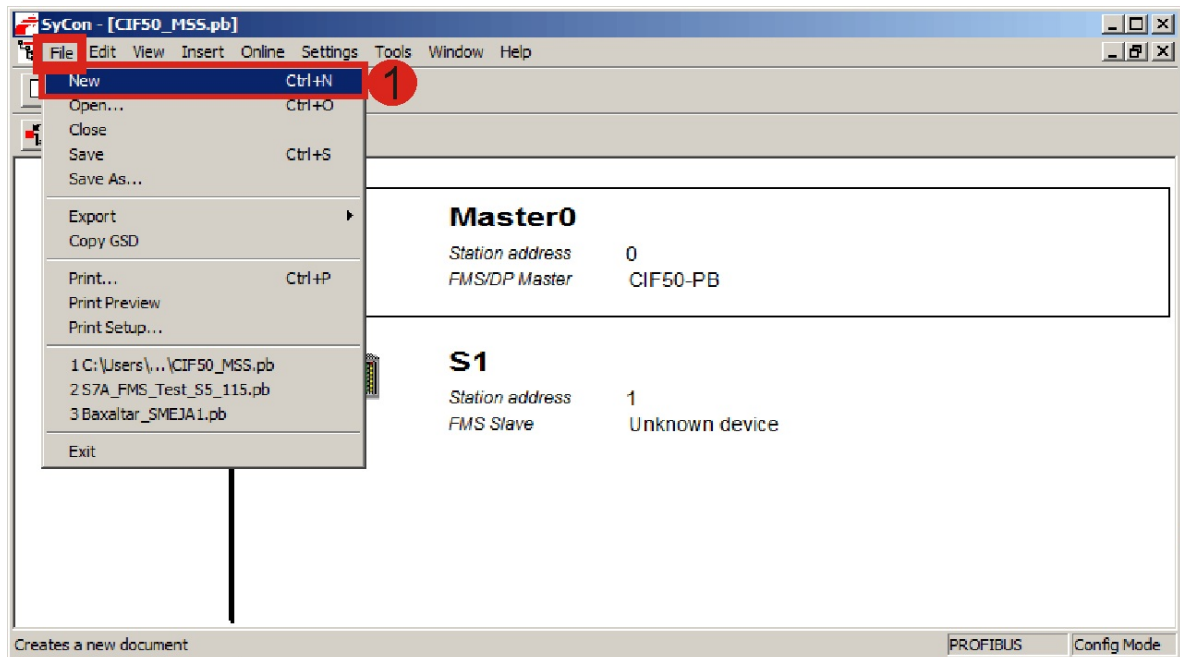
Picture 1: Start of SYCON via Windows Start Menu



1

Start->SyCon System Configuration->SyCon

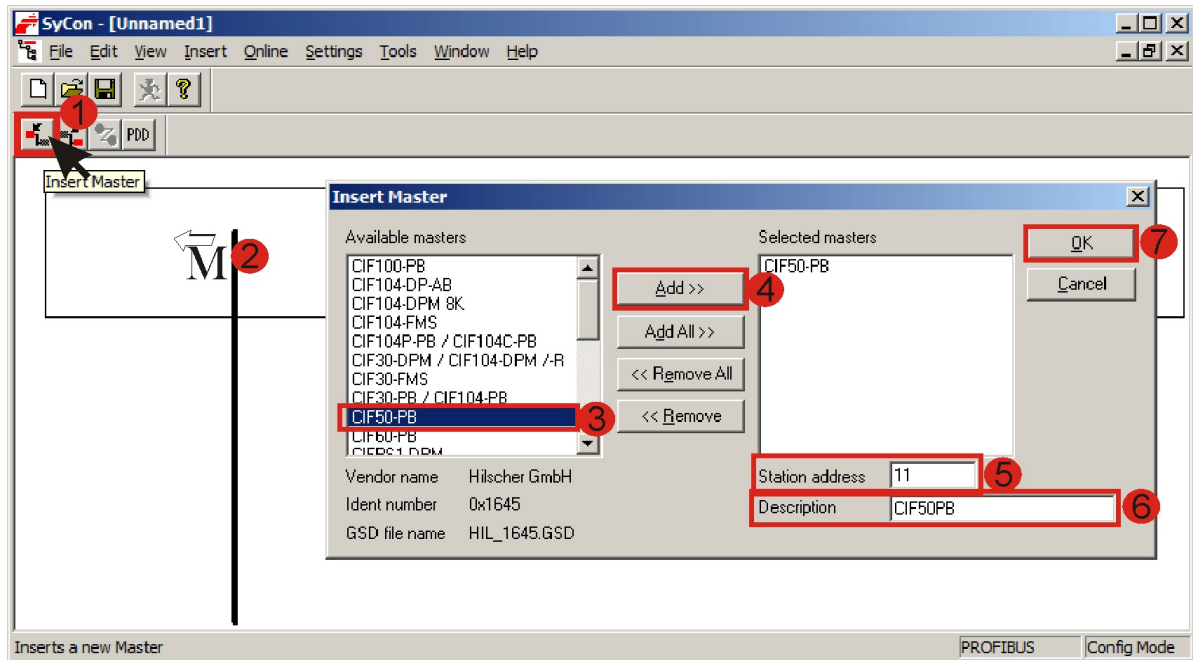
1.2 Create a new configuration



Picture 2: SYCON: Create new configuration

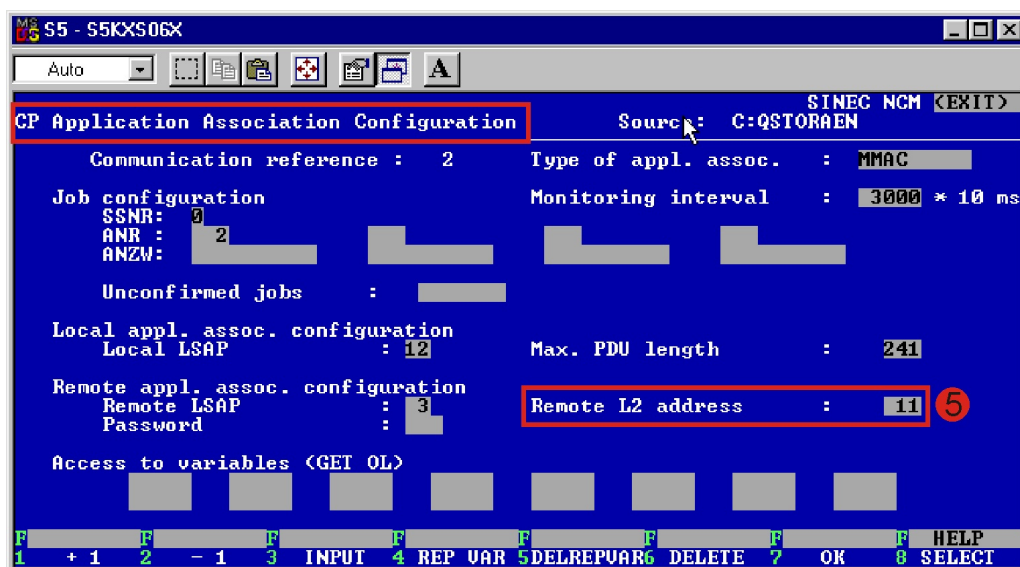
- 1 Select **File->New** from the Sycon application menu to create a new (blank) configuration.

1.3 Add a CIF50-PB as Profibus Master device to the new configuration

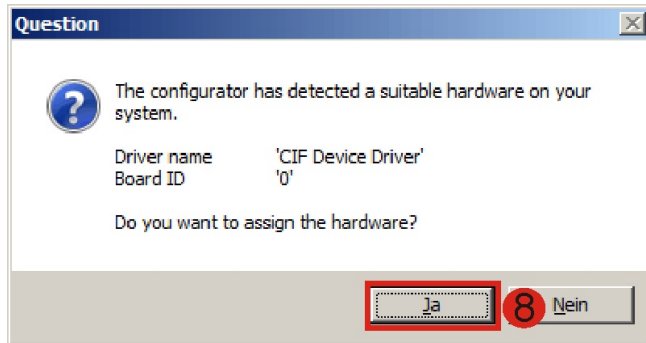


Picture 3: Insert a Master Device.

1. Klick the **Insert Master** Button.
2. Move the special M-Cursor to the top row of the configuration window and click left mouse button. The selection dialog with a list of the available master devices occurs.
3. Select CIF50-PB from the list of Available masters and...
4. ... click the Add button to move it to the Selected master list.
5. Set the Profibus station address for the CIF50-PB master. This address must be the same as specified in the field **Remote L2 address** of the communication reference in the SINEC NCM software! See the following screen shot for an example:



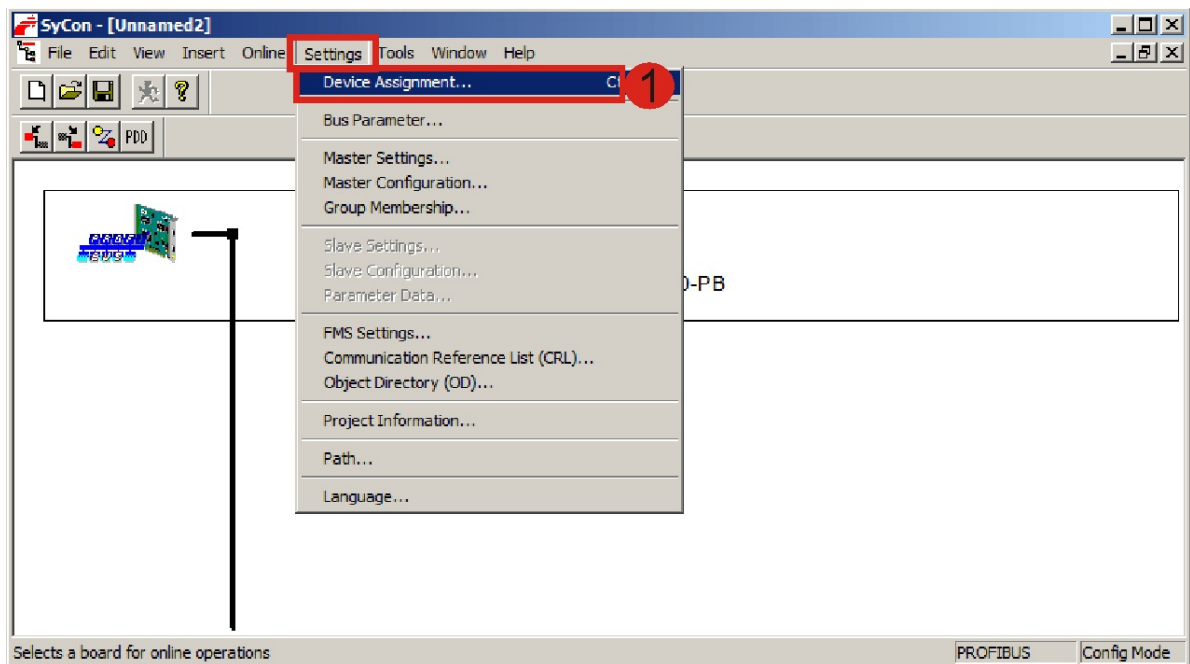
- 6 Give the Master CIF card a meaningful name. Note: Special characters like '-' (minus), '_' (underline) or ' ' (space) are not allowed in the description text!
- 7 Click OK button to close the dialog and to add the CIF50-PB device to the configuration window.



Picture 4: Device Assignment Question Dialog Box.

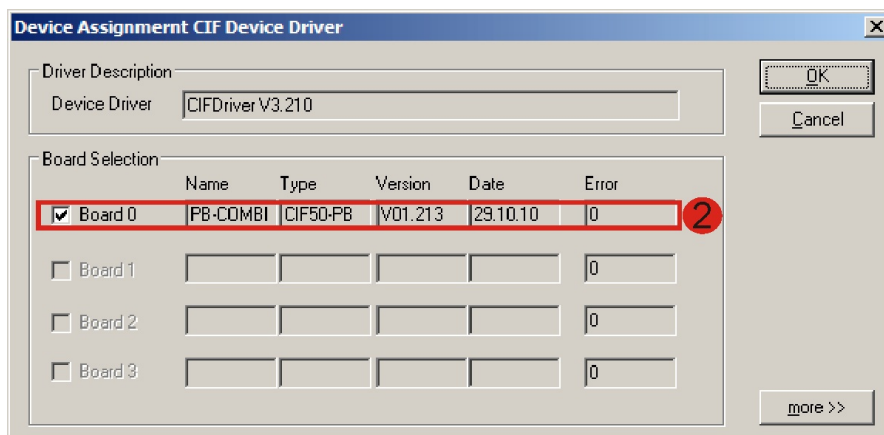
- 8 If a CIF50-PB card is installed in the system and this card isn't assigned to another (opened) SyCon configuration, this Question Dialog Box occurs. Click the **Yes** button to assign the CIF50-PB card to the Master device of your new configuration.

1.4 Check the Device Driver and Board assignment



Picture 5: Opening the Device Assignment dialog.

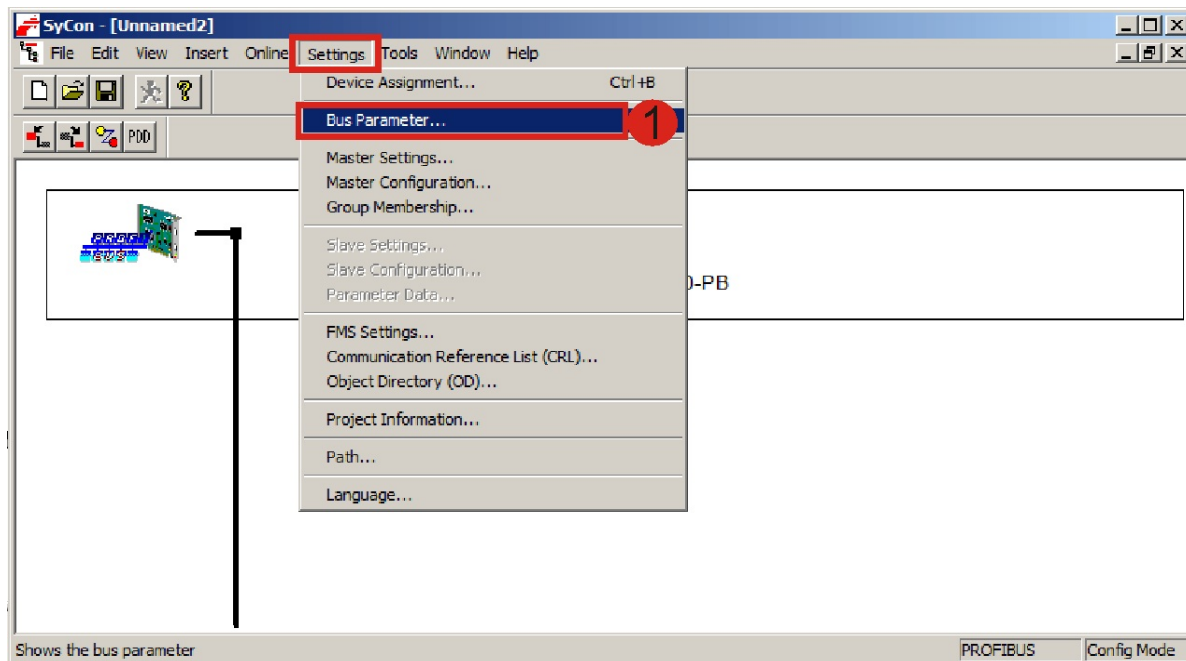
- 1 You can verify the current board assignment by selecting the menu item **Settings->Device Assignment...** from the Sycon application menu.



Picture 6: Device driver info and Board Selection dialog.

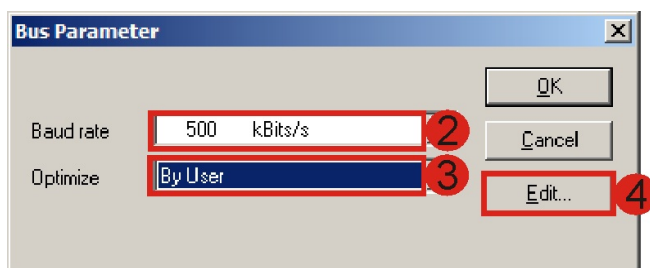
- 2 When the CIF50-PB board and the device driver software are installed correctly, the board should be displayed as Board 0 and should be assigned to the new configuration.

1.5 Set the Profibus Bus Parameters



Picture 7: Opening the Bus Parameter Dialog.

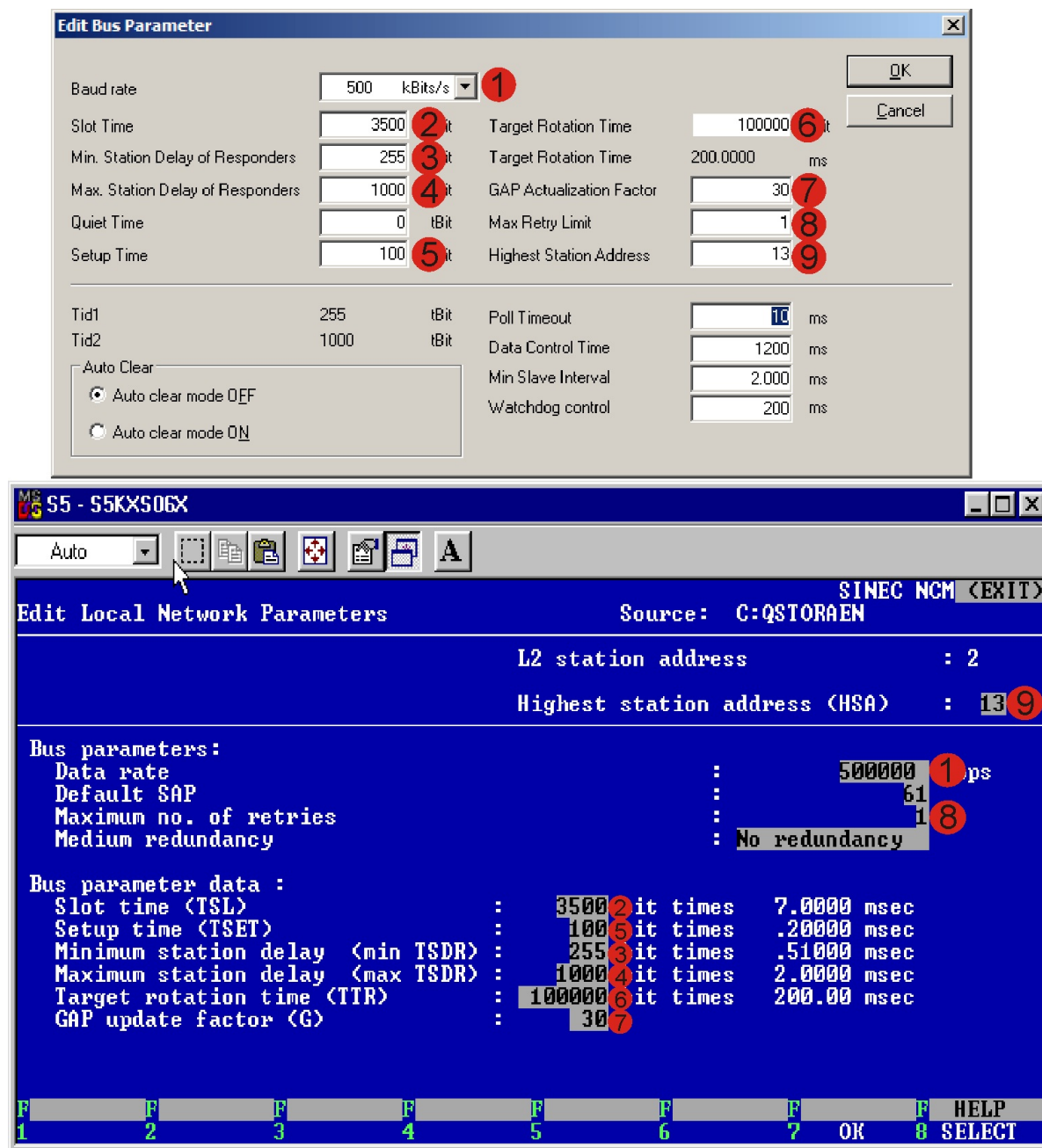
- 1 Select **Settings->Bus Parameters...** to open the **Bus Parameter** dialog.



Picture 8: Bus Parameter Base Dialog.

- 2 Select the proper baud rate in the **Baud rate** drop down list.
- 3 To be able to set individual Profibus bus parameters, you have to select **By User** in the **Optimize** drop down list. This selection enables the **Edit...** button.
- 4 Click the **Edit...** button to open the Profibus parameters dialog.

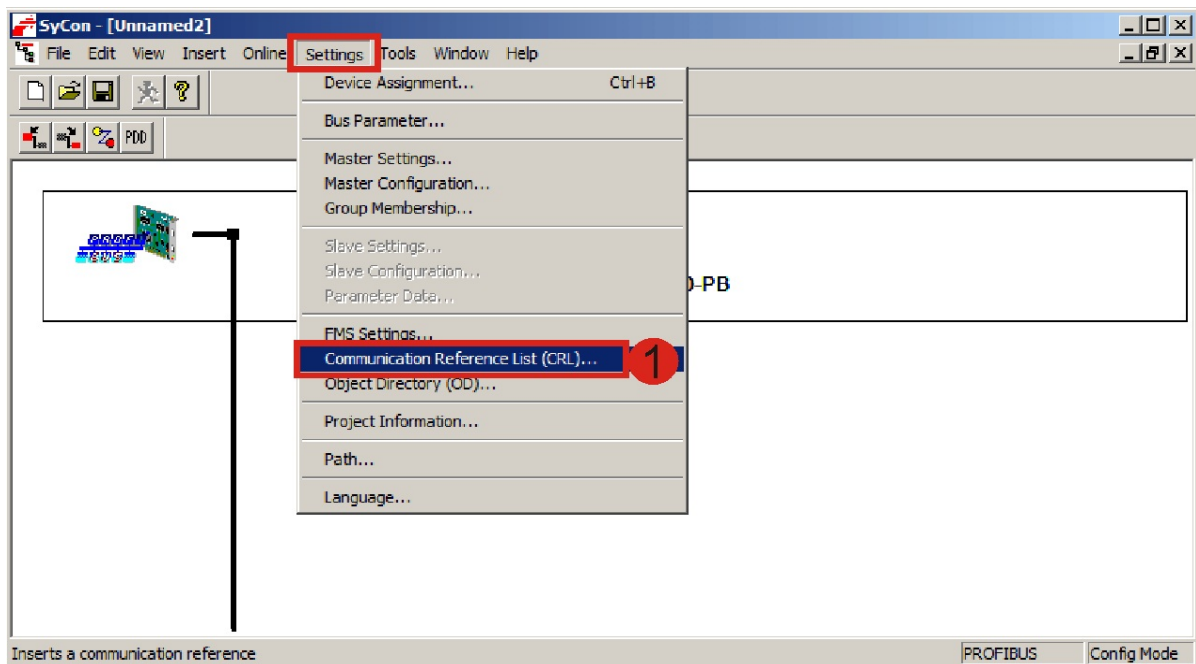
The following screen shots show the relation of the bus parameters between the SINEC NCM Dialog in COM5431 and the SyCon Bus Parameter Dialog.



Picture 9: Relation between SyCon Bus Parameters and SINEC NCM Bus parameters.

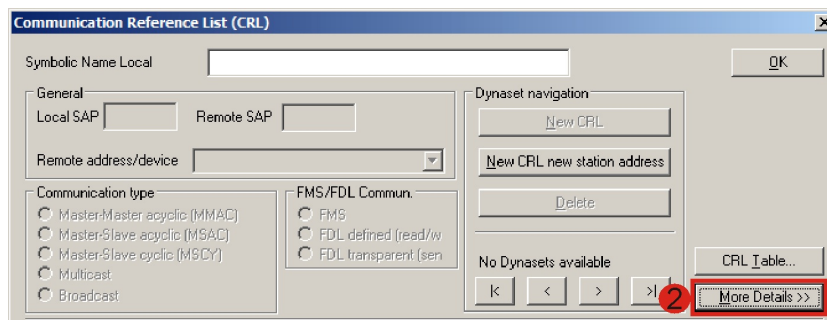
Make sure, that all parameters in the SyCon dialog are set to the same value as in the SINEC-NCM dialog.

1.6 Create a Communication Reference



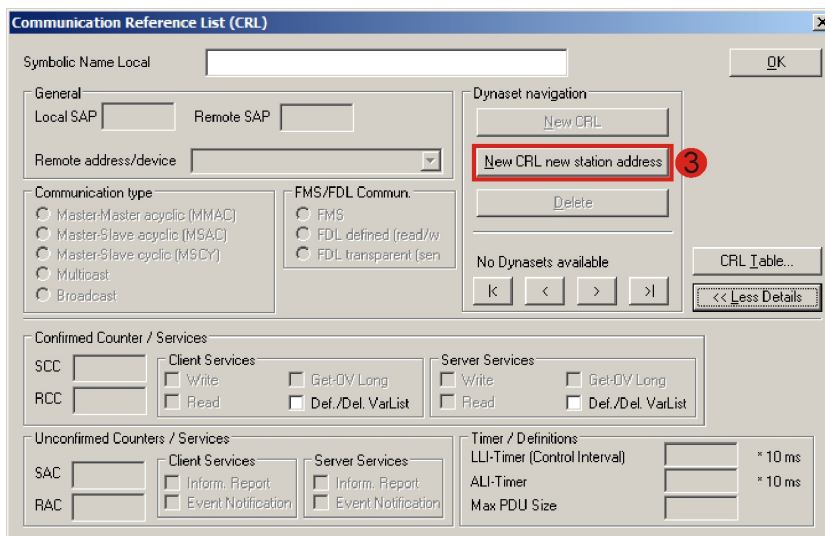
Picture 10: Opening the Communication Reference List dialog.

- 1 Select **Settings->Communication Reference List(CRL)....** to open the CRL dialog.



Picture 11: Expanding the Communication Reference List dialog.

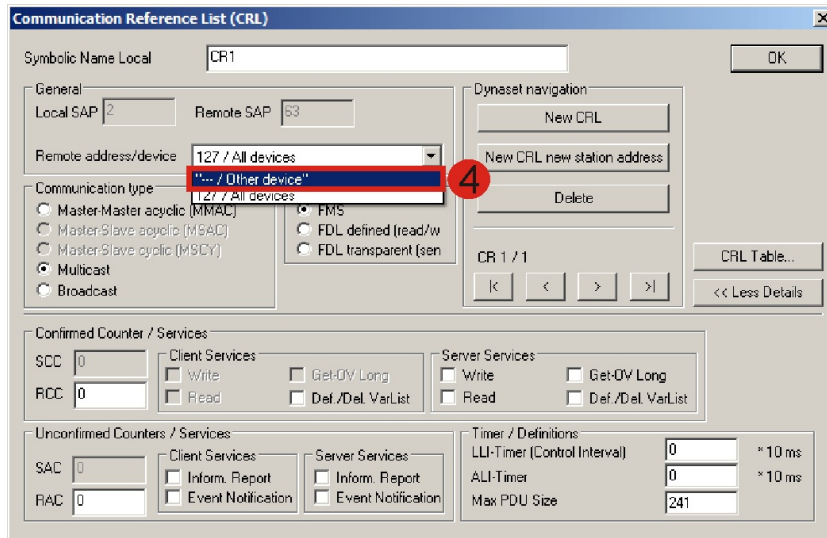
- 2 Click the **More Details >>** button to expand the CRL dialog.



Picture 12: Creating a new communication reference and station.

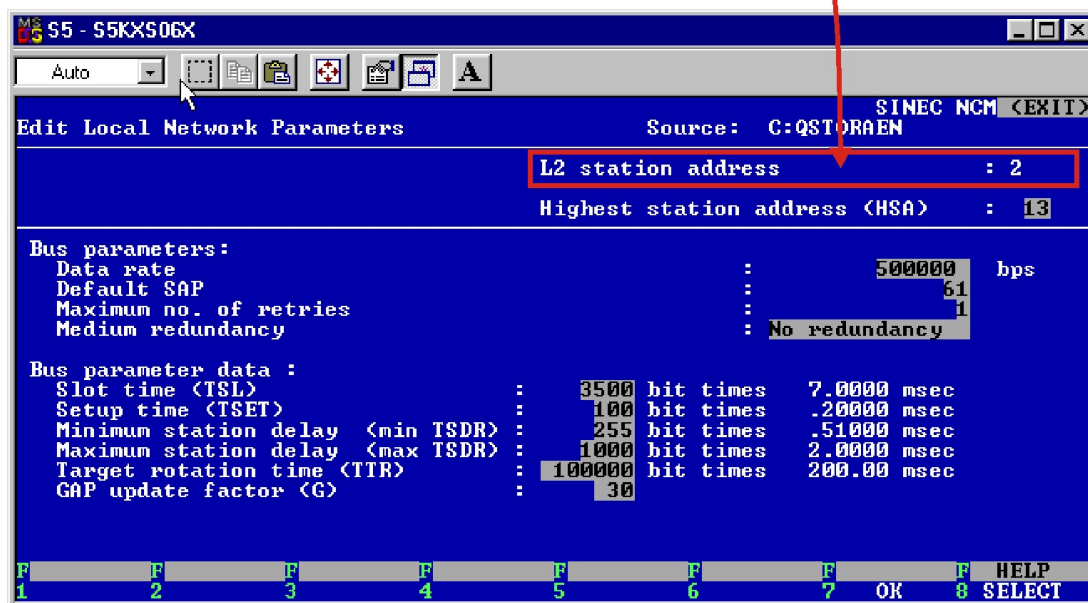
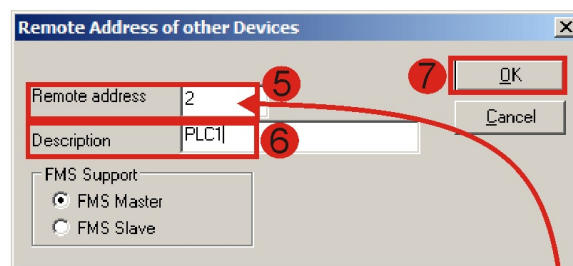
- 3 To add a new Profibus device (e.g. a S5 PLC with CP5431), click the **New CRL new station**

address button. The new device will automatically be added to the configuration window after the new communication reference is completely defined.



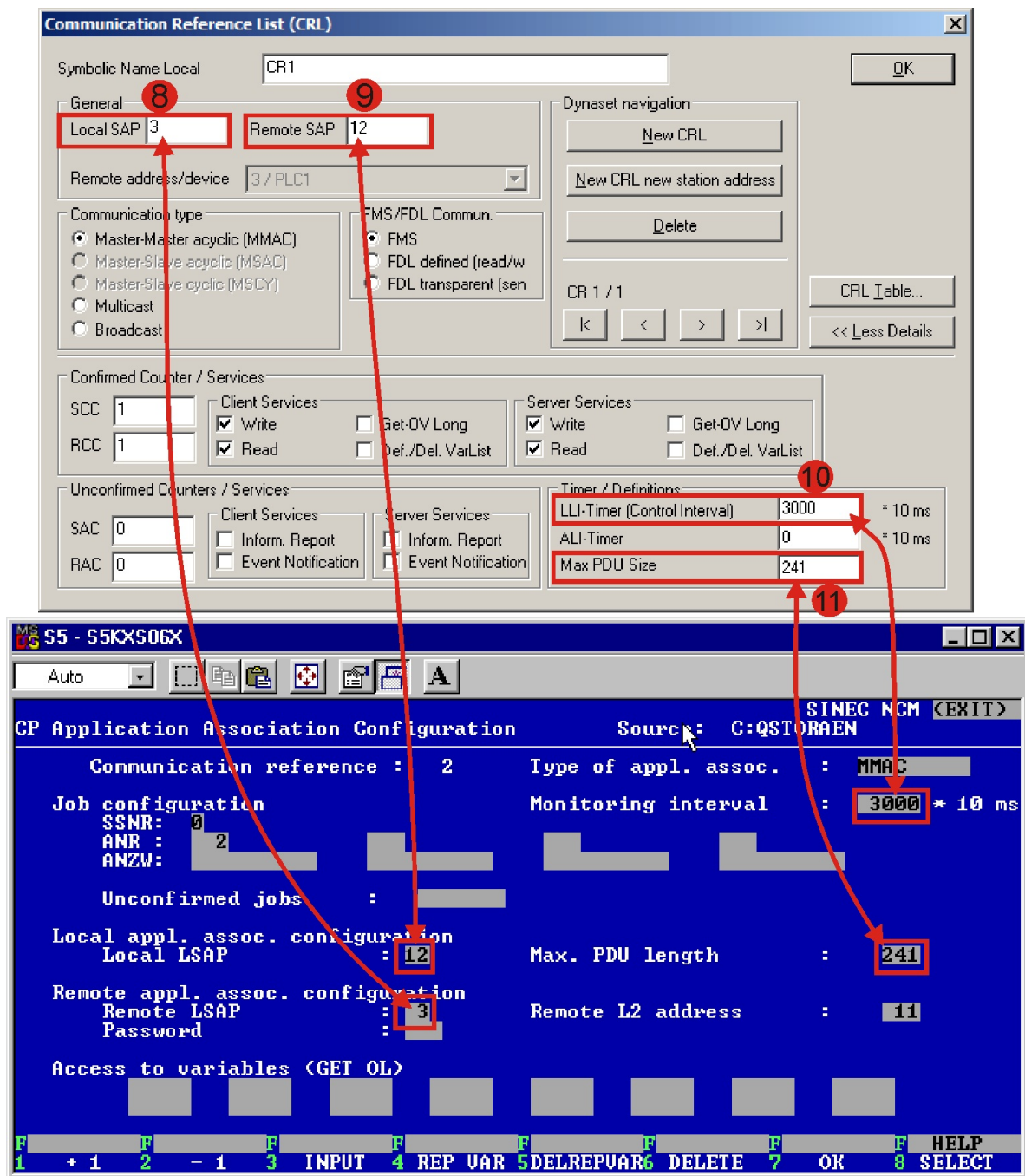
Picture 13: Comm. Ref. Device selection.

- 4 Select “—/ Other device” from the **Remote address/device** list.



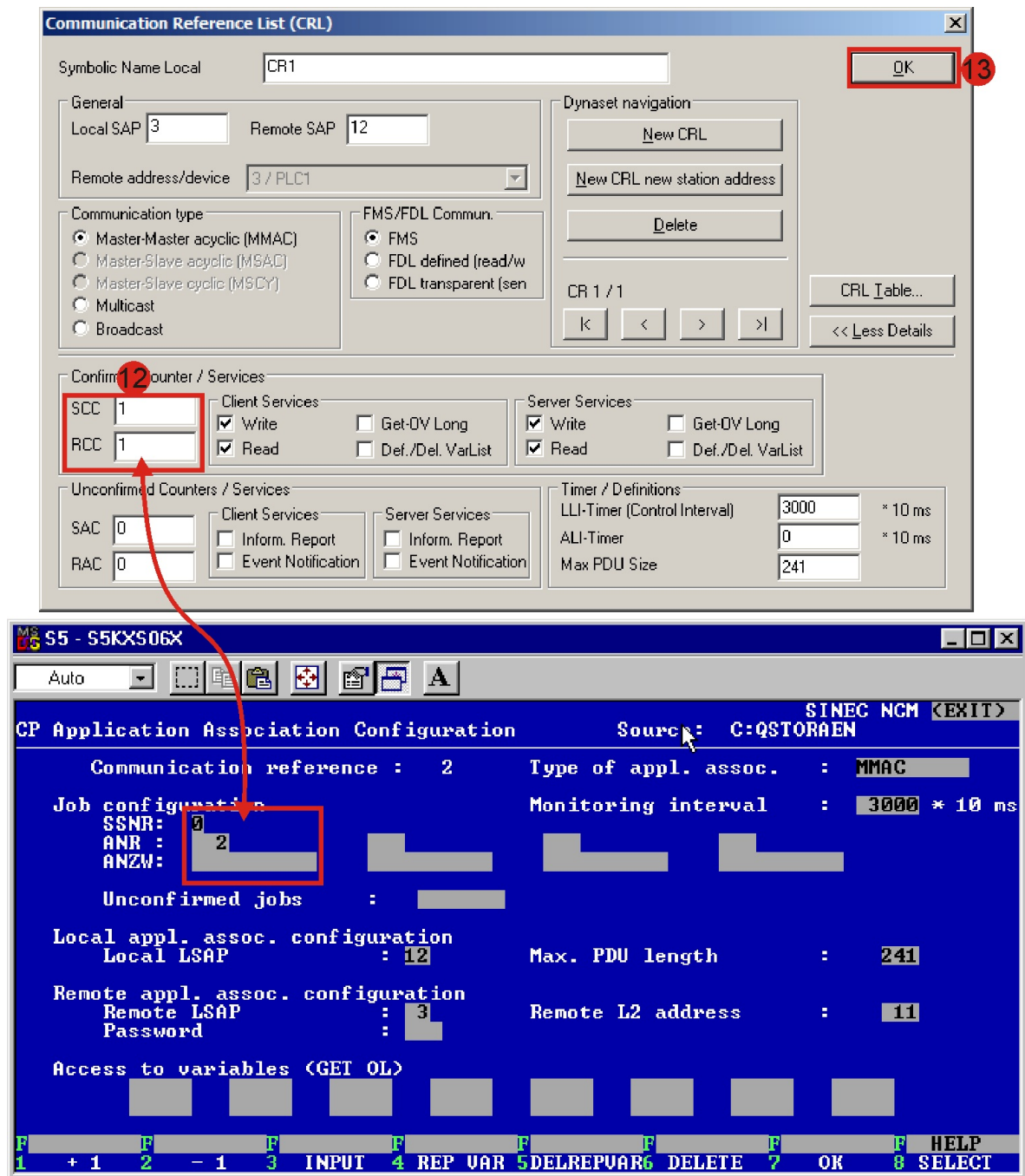
Picture 14: Comm. Ref.: Remote address of new device.

- 5 Enter the Profibus station address of the new remote device. This address must correspond to the **L2 station address** of the SINEC NCM Local Network Parameter settings.
- 6 Enter a meaningful name for the new PLC device.
- 7 Click the OK button to close the dialog.



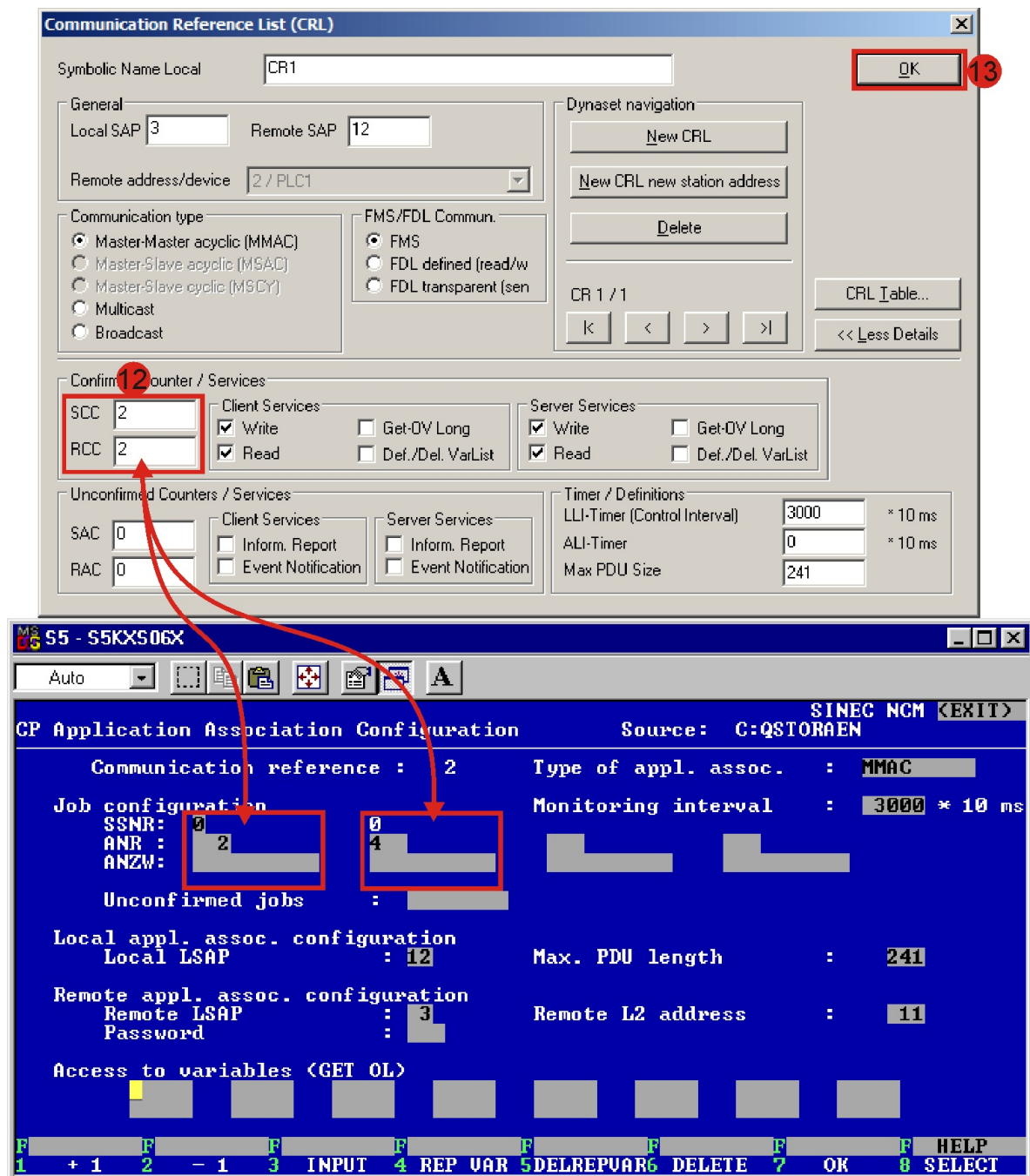
Picture 15: Relation of SAPs, LLI Timer and Max. PDU between SINEC NCM and SyCon.

- 8 Enter the **Local SAP** value which corresponds to the **Remote LSAP** value in the SINEC NCM.
- 9 Enter the **Remote SAP** value which corresponds to the **Local LSAP** value in the SINEC NCM.
- 10 Enter the **LLI-Timer** value which corresponds to the **Monitoring interval** value in the SINEC NCM.
- 11 Verify and if unequal enter the **Max. PDU Size** value which corresponds to the **Max. PDU length** value in the SINEC NCM.



Picture 16: Relation between SCC and RCC in SyCon and Job config in SINEC NCM for one job.

- 12 To determine the proper values for **SCC** and **RCC** you have to check the **Job configuration** of the communication reference in SINEC NCM. The value for **SCC** and **RCC** is the number of (parallel) jobs configured for the communication reference. A configured job is recognisable by a number in the **ANR** field. The above screen shot shows a SINEC NCM communication reference with one job, only the leftmost **ANR** column contains a value, so the **SCC** and **RCC** value in SyCon has to be set to 1. The screen shot below shows a SINEC NCM communication reference with two parallel jobs (the leftmost and the second from left **ANR** field contain values), so the **SCC** and **RCC** value in SyCon has to be set to 2.



Picture 17: Relation between SCC and RCC in SyCon and Job config in SINEC NCM for two jobs.

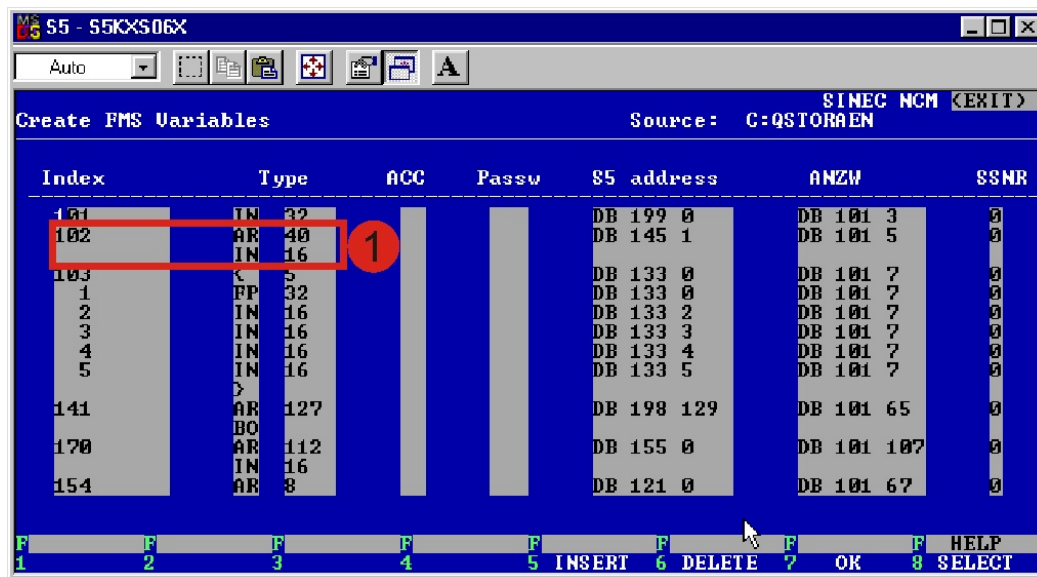
13

Click the **OK** button to terminate the configuration of the communication reference.

1.7 Create an Object for test purposes

Basically it is not necessary to configure all of the FMS data objects which are configured in the remote stations (PLCs) but to test the communication between SyCon and the remote PLC. It is necessary to configure at least one FMS object.

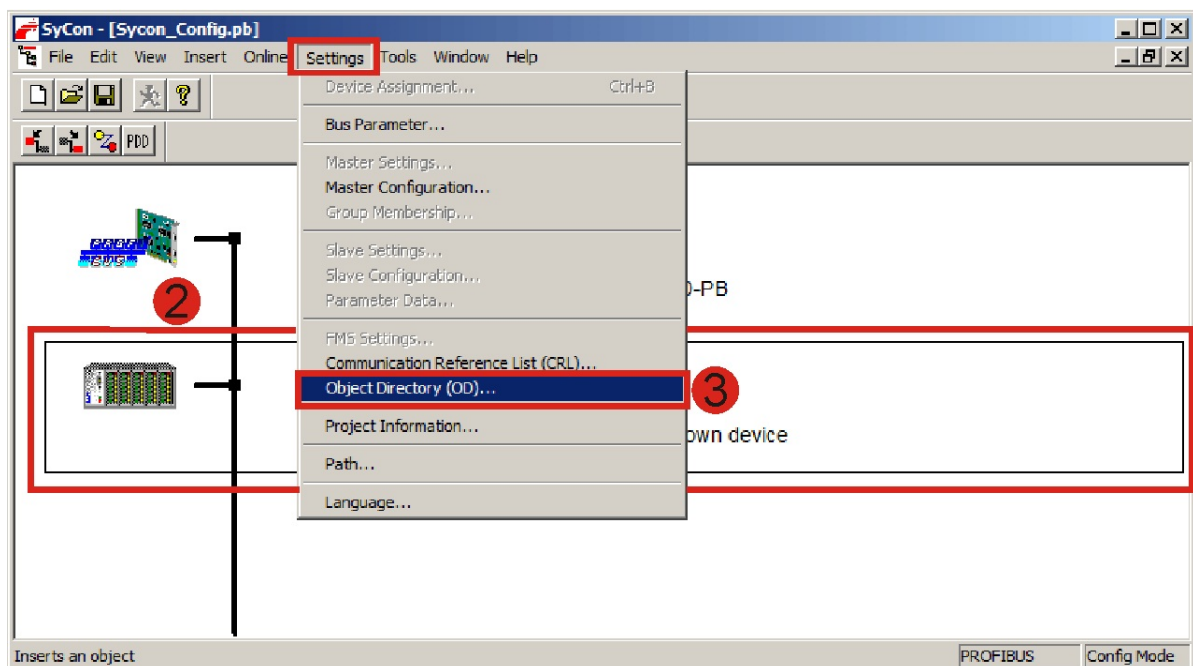
1.7.1 Pick one object from the list of configured objects in the PLC



Picture 18: SINEC NCM: FMS Variable list

- 1 Select one FMS object of an array type from the SINEC NCM **FMS** variable list. The marked object with index 102 in the above screen shot is of type Int16 and has 40 Elements.

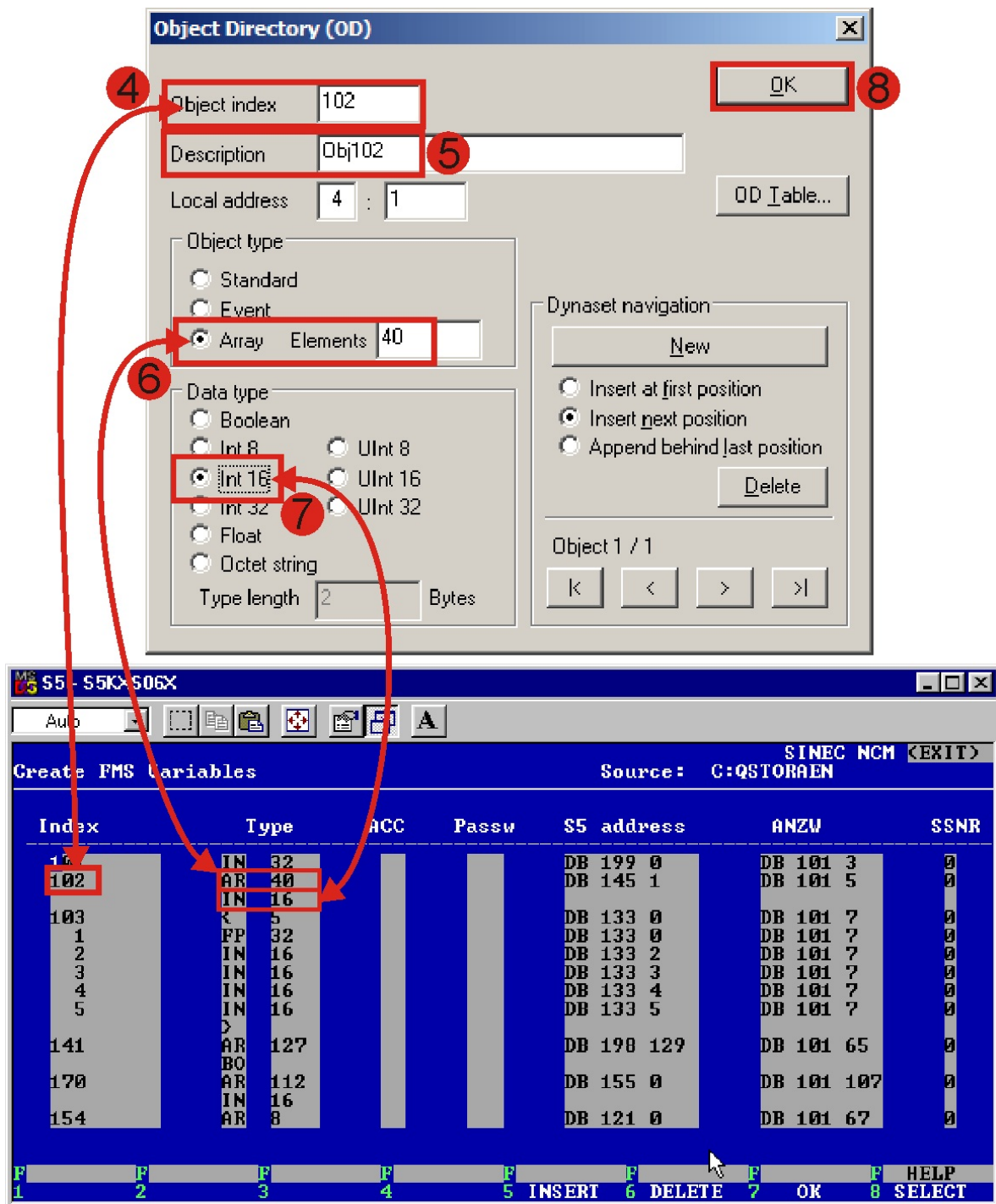
1.7.2 Configure the FMS object in SyCon



Picture 19: Opening FMS Object Directory dialog.

- 2 Before you open the Object Directory dialog you must select the remote station (PLC), because the FMS object are logically owned by the remote stations but not by the CIF50 card. So all object have to be configured in the context of its owner which is the PLC.

- ③ Select **Settings->Object Directory(OD)....** to open the object directory dialog.

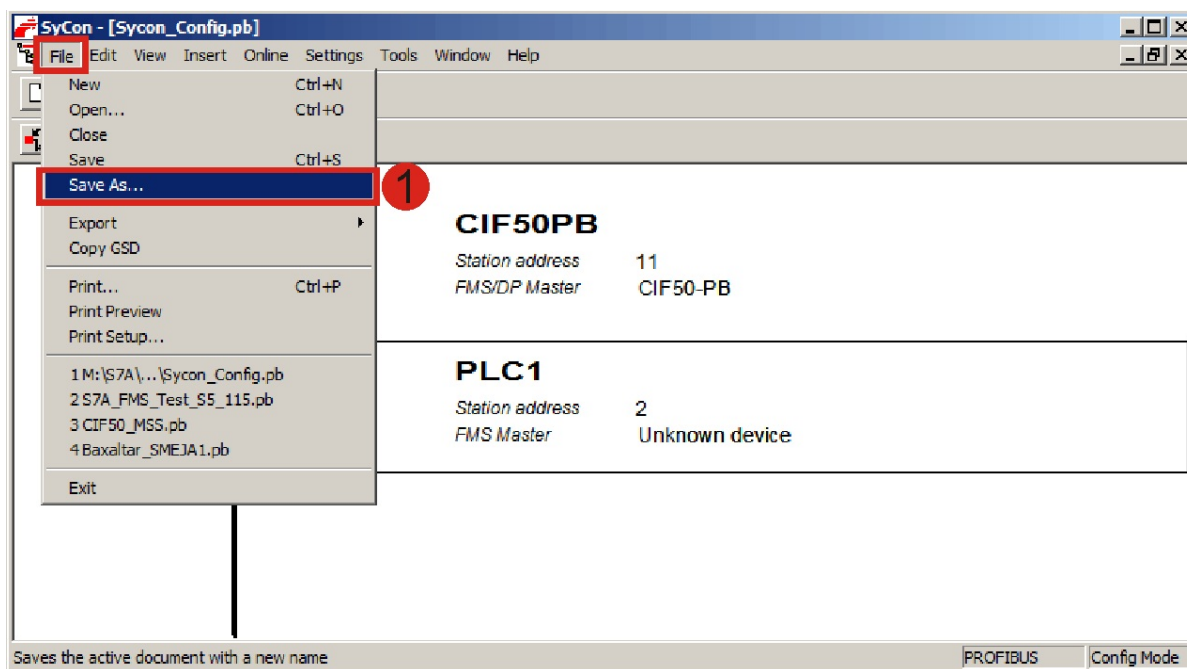


Picture 20: SyCon/NCM: Relation of Object parameters between SyCon and NCM.

- ④ Enter the **Object index** which corresponds to the **Index** value of the object in the SINEC NCM FMS Variable list.
- ⑤ Enter a meaningful name for the object.
- ⑥ Select **Object type Array** and enter the array's number of elements which must correspond to the value in the upper right field in the **Type** column of the object in the SINEC NCM FMS Variable list.
- ⑦ Set the data type, corresponding to the type of the object in SINEC NCM.

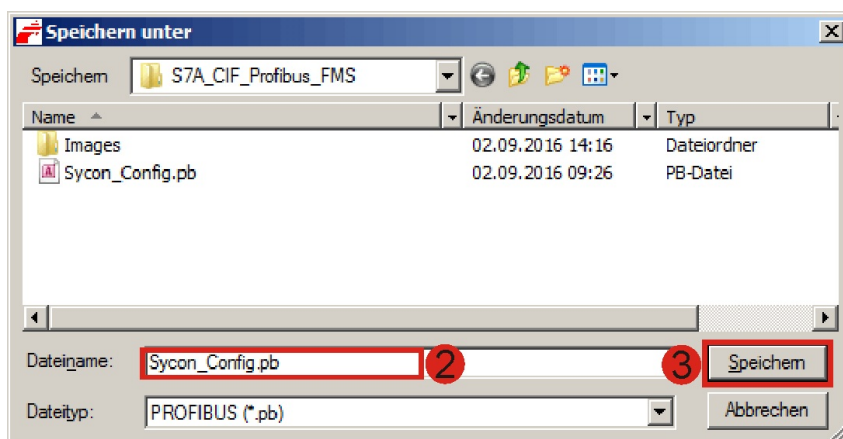
- 8 Click the **OK** button to terminate the configuration of the object.

1.8 Save the configuration



Picture 21: Saving the configuration.

- 1 Select **File->Save As....** to open the File Save dialog.

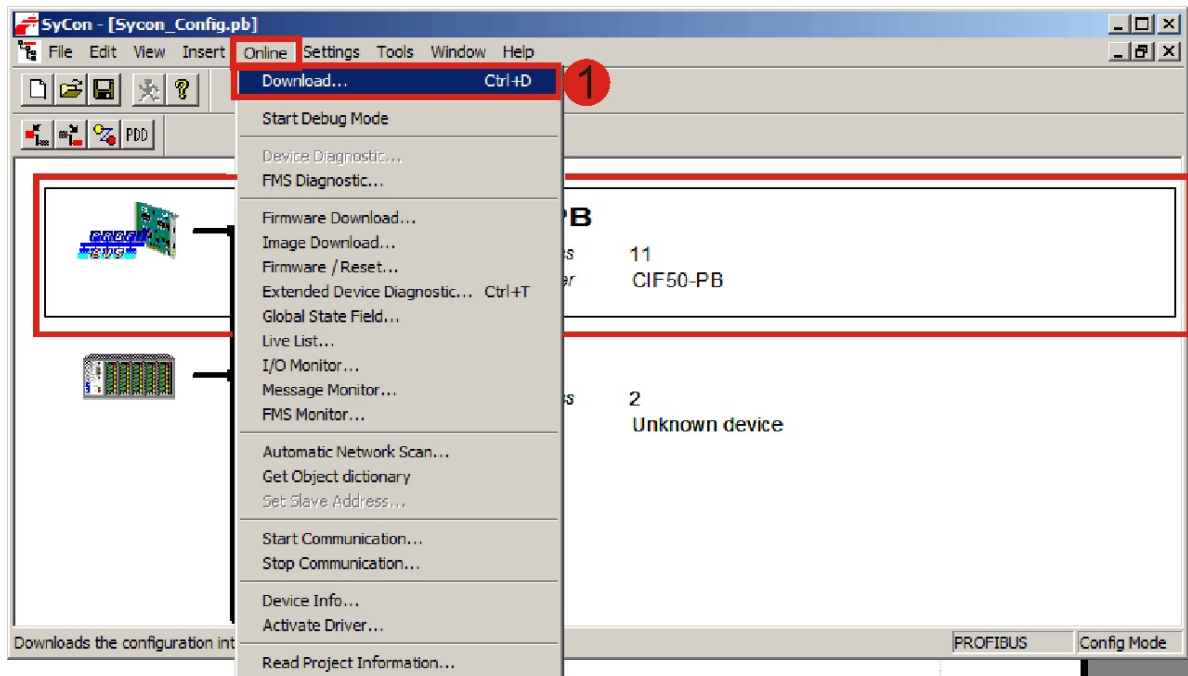


Picture 22: SyCon File save dialog.

- 2 Enter a meaningful name for the configuration file. File extension must be named to ".pb".
- 3 Click the **Save** button to store the configuration to the file.

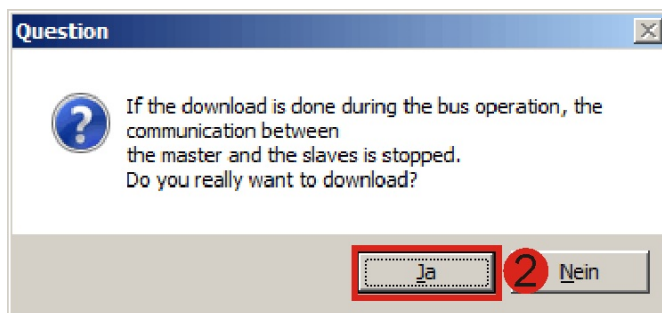
1.9 Download the configuration

Before the CIF50-PB card can work with the new configuration, the configuration has to be downloaded to the CIF50-PB card into a non-volatile (permanent) flash memory.



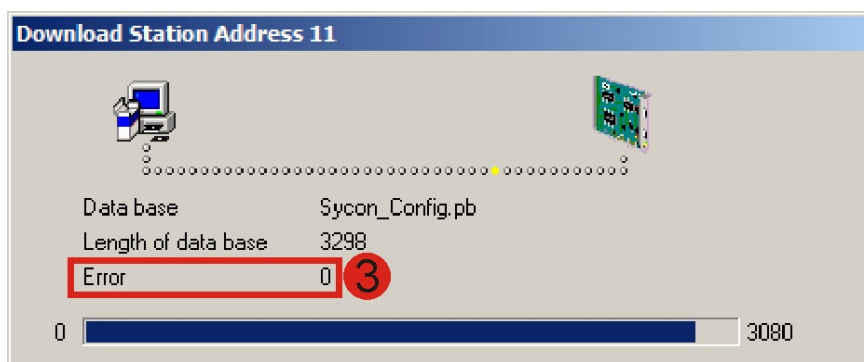
Picture 23: Downloading the configuration.

- 1 Select **Online->Download...** to open the Download dialog.



Picture 24: Download question.

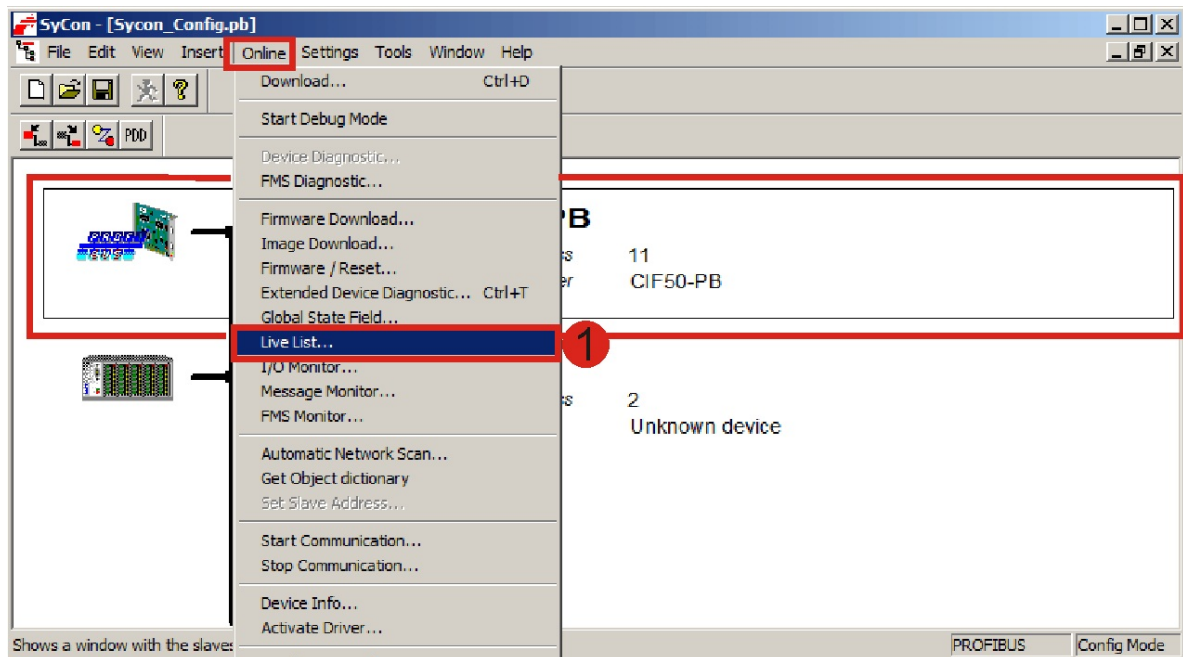
- 2 Click **Yes**.



Picture 25: Download in progress.

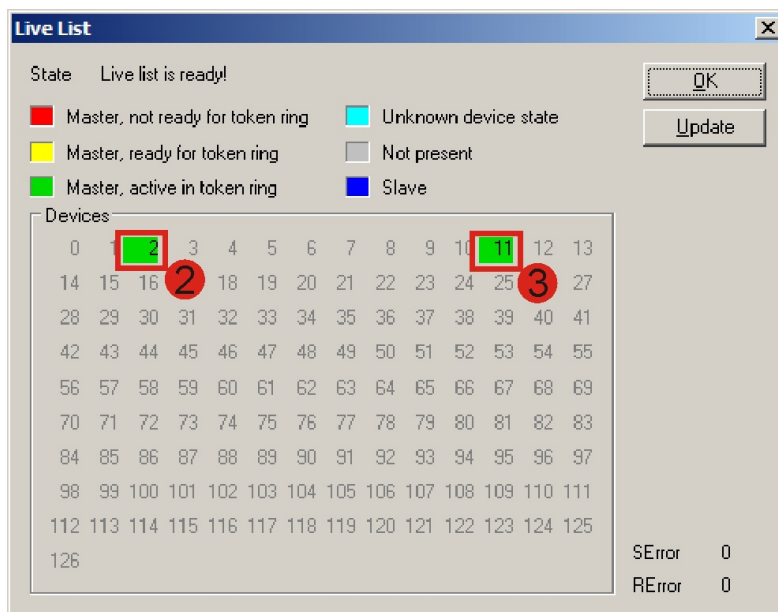
- 3 After the download is finished, the Error field should show error 0.

1.10 Check Live List of Profibus stations



Picture 26: Opening Live list.

1 Select **Online->Live List...** to open the Live List dialog.



Picture 27: The SyCon Live list.

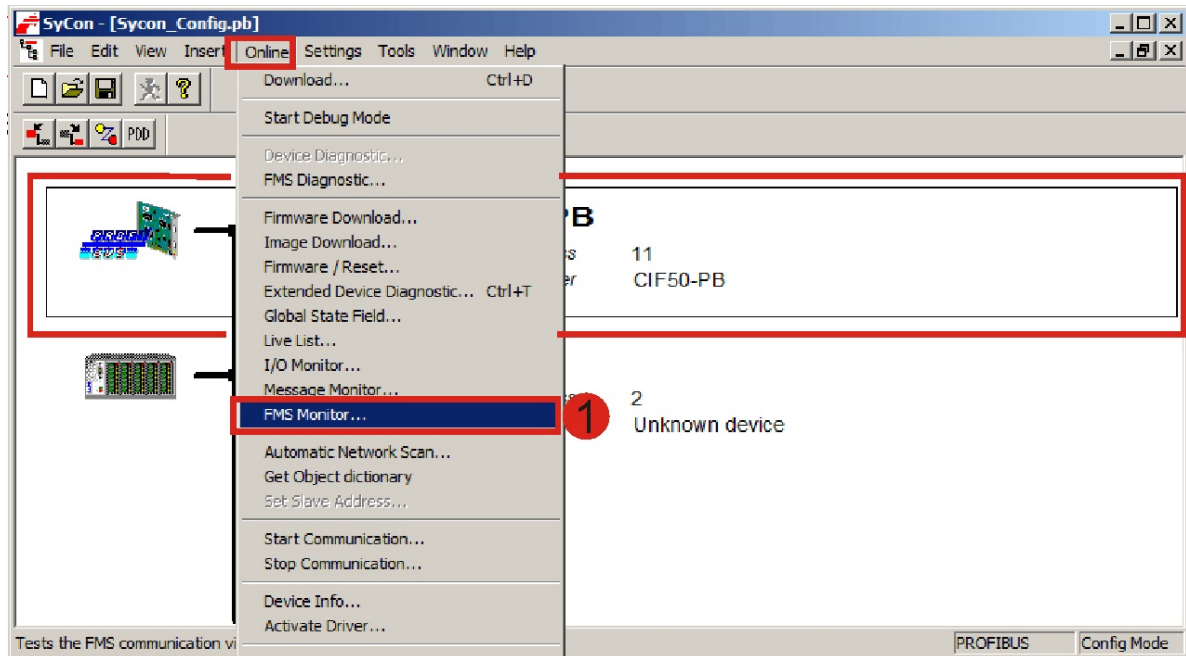
Assumed that the Profibus parameters are set correctly, both devices are connected via Profibus cable and the PLC is switched on, the two configured devices 2 (2 the PLC) and 11 (3 the PC station with the CIF50-PB card) must be displayed with green background color.

If only the PC station is marked green, you should check

1. The Profibus parameters on both sides
2. The Profibus cable (especially the termination).
3. Run/Stop state of the S5-CP5431

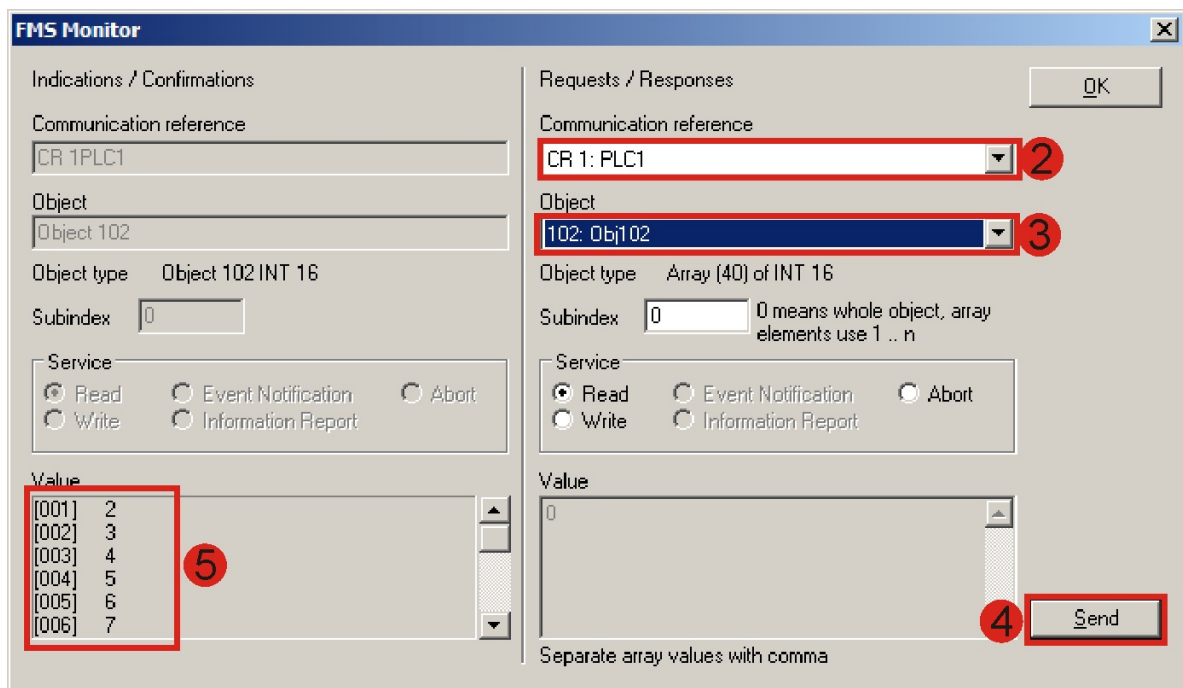
1.11 Check FMS connection

To verify if the FMS communication reference is configured properly you can try to read the FMS object which was previously configured in step 1.7.2.



Picture 28: Opening the FMS Monitor.

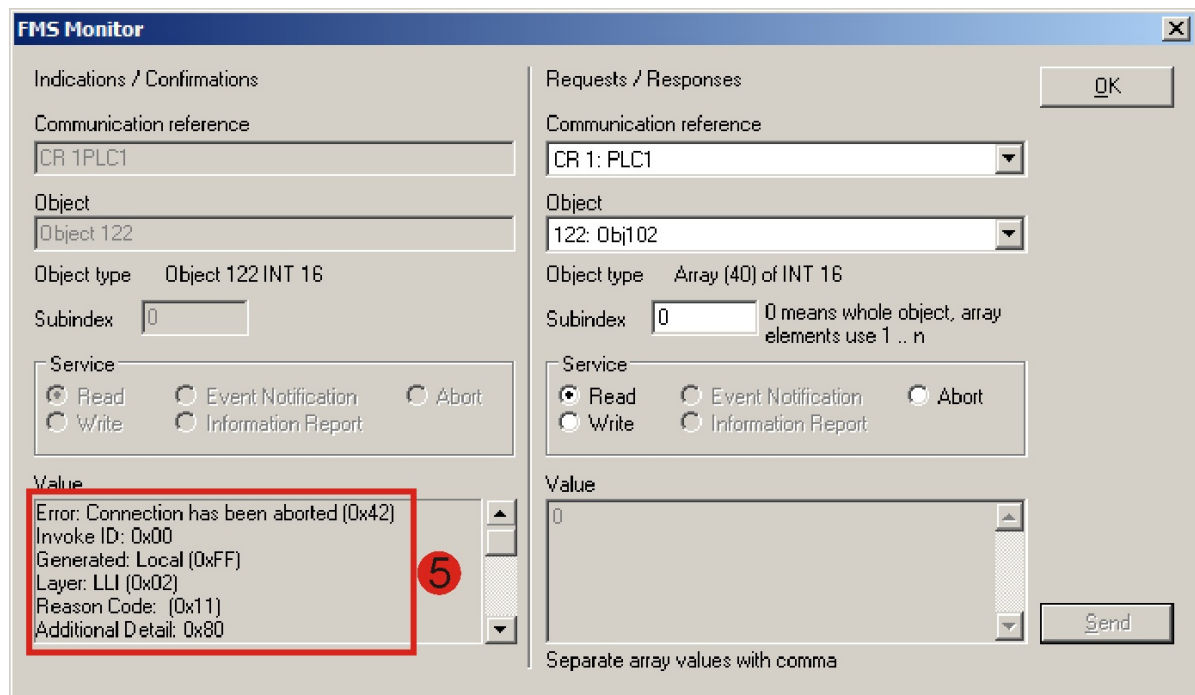
- 1 Select **Online->FMS Monitor...** to open the FMS Monitor dialog.



Picture 29: The FMS Monitor which shows object's data values.

- 2 Select the communication reference (CR) to the PLC. If only one CR is configured, this CR is already selected.
- 3 Select the FMS object you want to read from the PLC. If only one object is configured, this object is already selected.

- 4 Click the **Send** button. The CIF50-PB card then tries to open the connection via the selected communication reference. If the connection can be established, the program reads the object data from the PLC.
- 5 If the object could be read successfully, all data values of the object are listed in the Value list.
If the connection could not be established or the object couldn't be read, the Value list shows detailed error information. The following screen shot shows such an error message:



Picture 30: The FMS Monitor which shows connection error.

The variety of possible errors is very high and we can't describe all these errors and reasons for it here in this manual. You can find a description of these errors in the Hilscher **Protocol interface manual for Profibus FMS** which you can download via the following link:
www.incosol.de/WP_Downloads/Hilscher_PIM_Profibus_FMS_EN.pdf

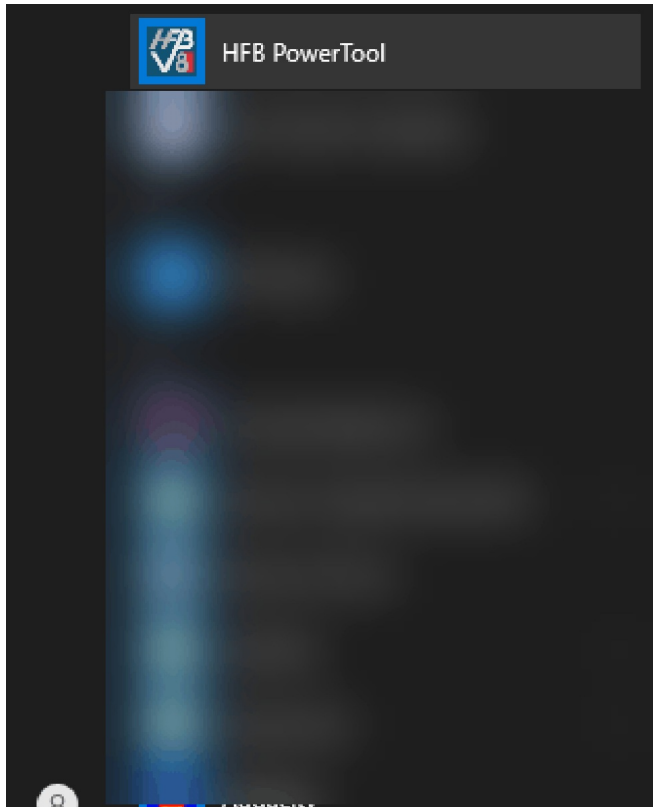
See chapter **3.2 General Error Messages** (page 14 and following) for details about errors and its reasons.

If you have successfully passed all the steps up to this point you can save the SyCon configuration, close the SyCon software and continue with the next main step, the configuration of the HFB Driver / OPC Server.

As mentioned at the beginning of the chapter, it is mandatory to close the SyCon software before the HFB software is started and vice versa. The HFB process HFBDRV.EXE may not be started together with the SYCON.EXE process. Please be aware of this circumstance!

2 Configuration via HFB Power Tool

2.1 Start the HFB Power Tool

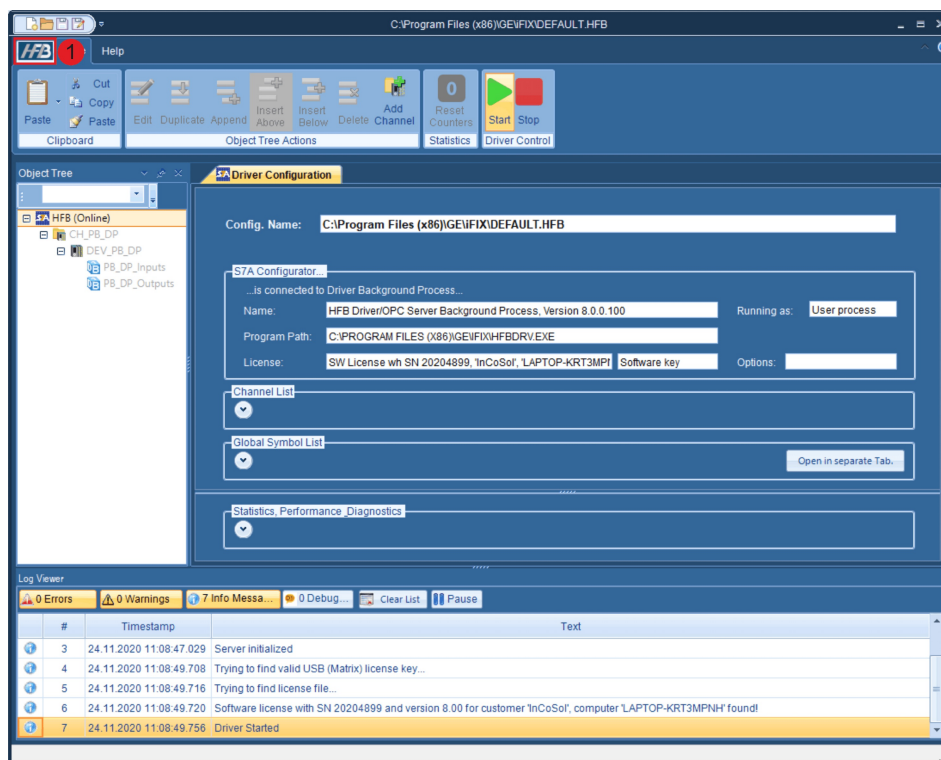


Picture 31: Starting HFB Power Tool via Windows Start Menu

1

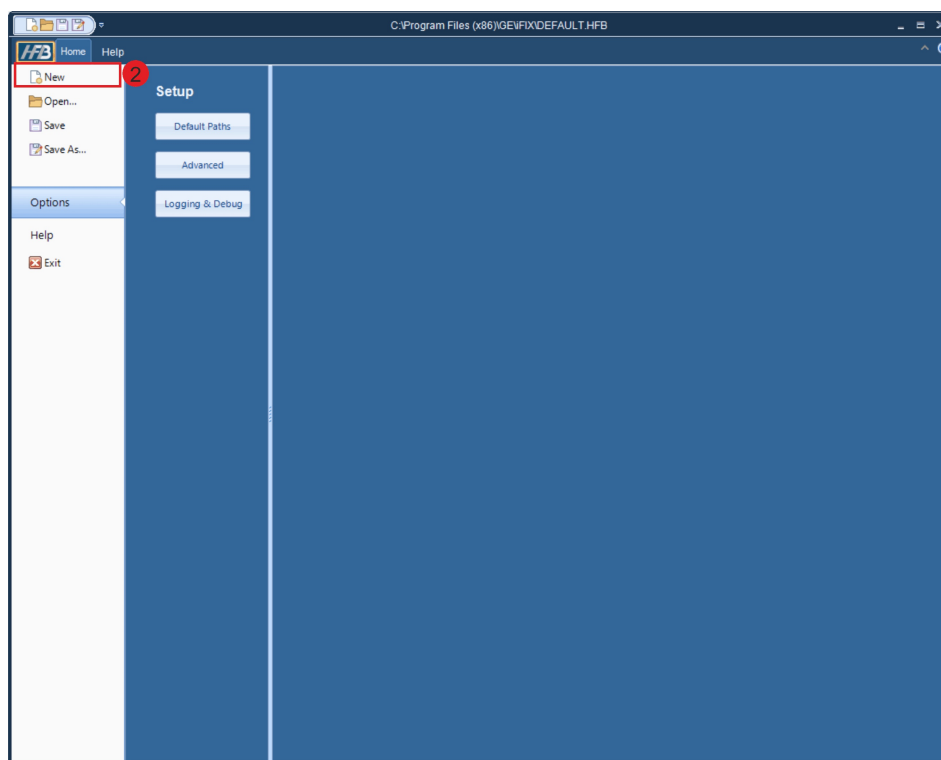
You can start the HFB Power Tool via Windows Start Menu. Look for the HFB Power Icon either in the “Recently added” folder or in the parent folder of the target application (iFIX, Cimplicity or InCoSol) you installed the HFB Driver / OPC Server in.

2.2 Create a new configuration



Picture 32: Opening the program's backstage menu

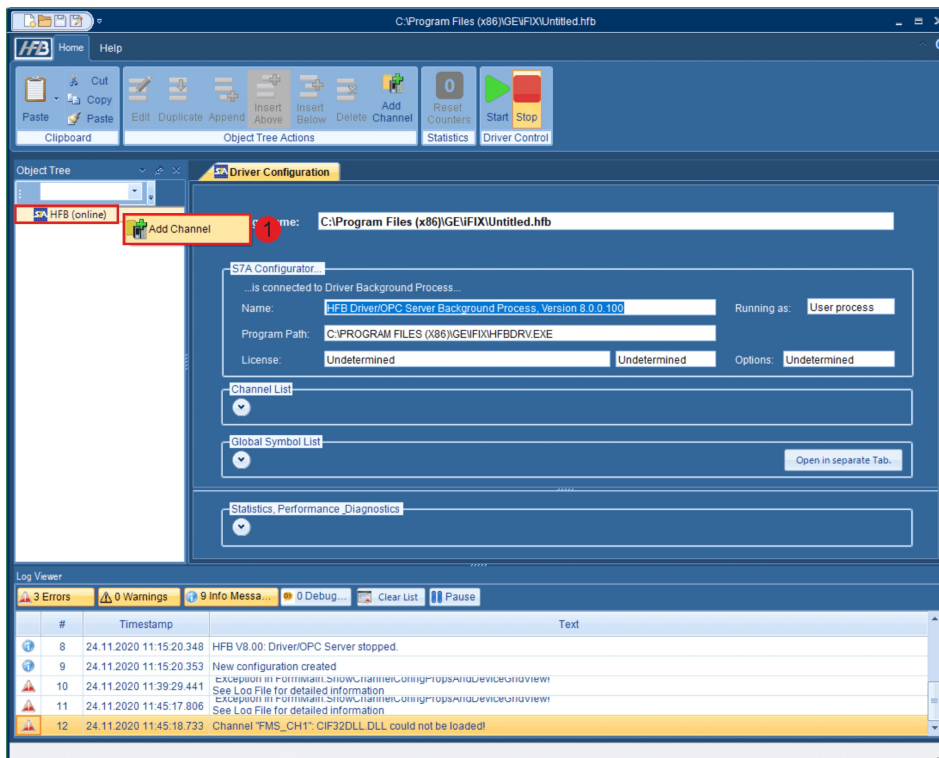
- 1 Click on the HFB Program Icon to open the application (backstage) menu.



Picture 33: Creating a new (blank) configuration.

- 2 Select the menu item **New** to create a new (blank) configuration.

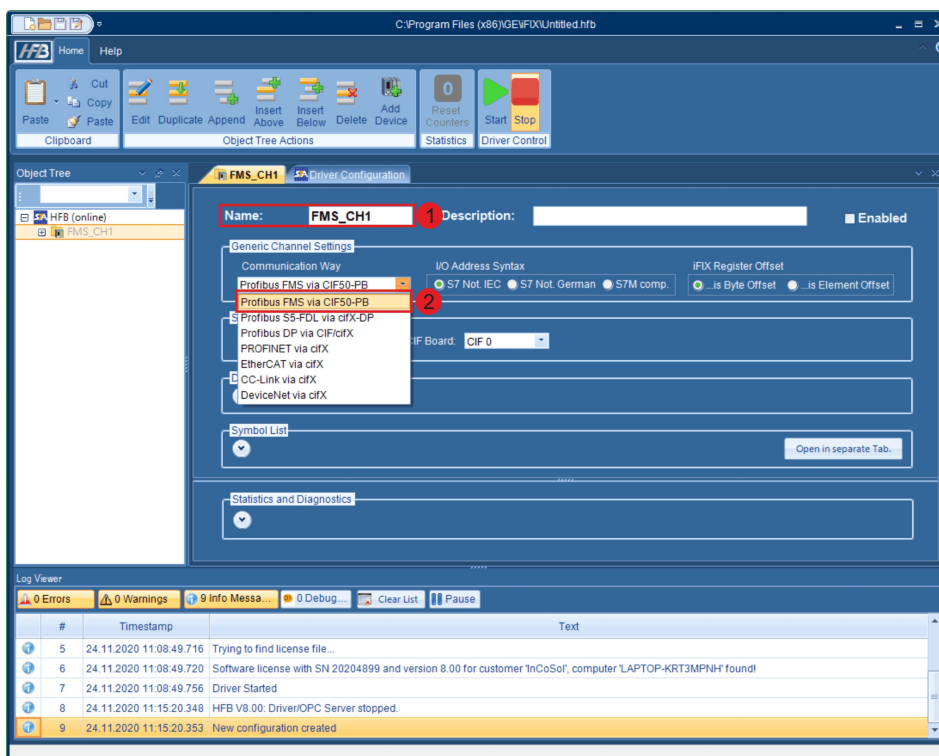
2.3 Create a new channel



Picture 34: Creating a new channel

- 1 Select the root item HFB (Online) in the Object Tree View, open the context menu via right mouse click and select **Add Channel** from the context menu to create a new channel object.

2.4 Configure the new channel

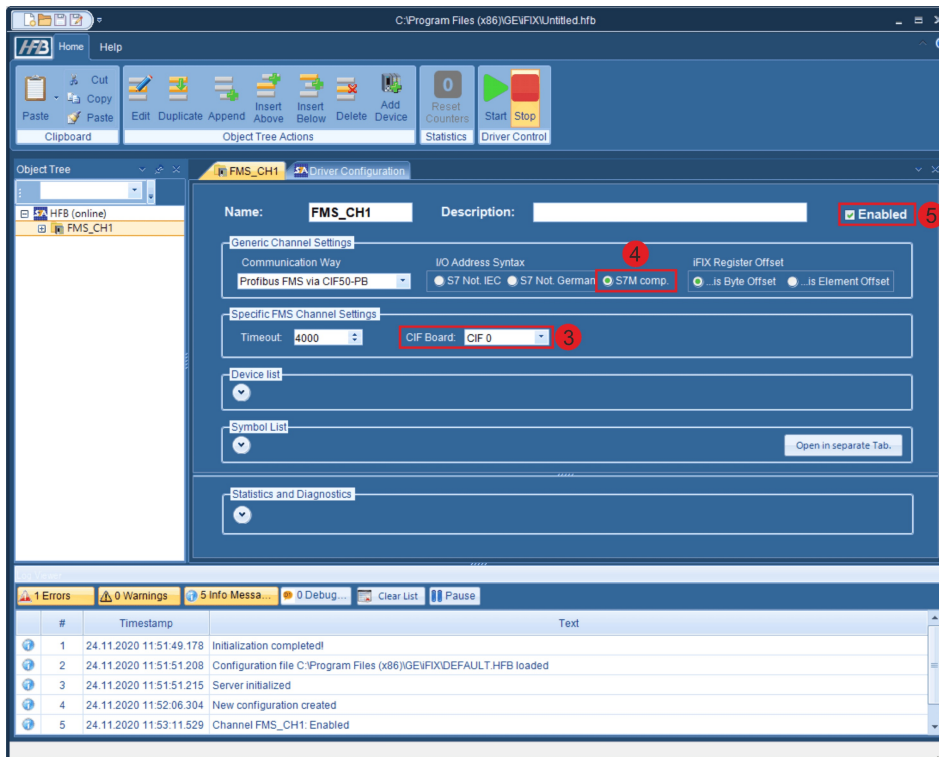


Picture 35: Configuring the new channel, part 1.

- 1 Give the channel an unique name. This name must not be used for another channel!

- 2 Since the new channel not yet has a specific communication way, you have to select the proper communication way **Profibus FMS via CIF50-PB** from the **Communication Way** drop down list. The program then automatically loads the specific dialog for the selected communication way.

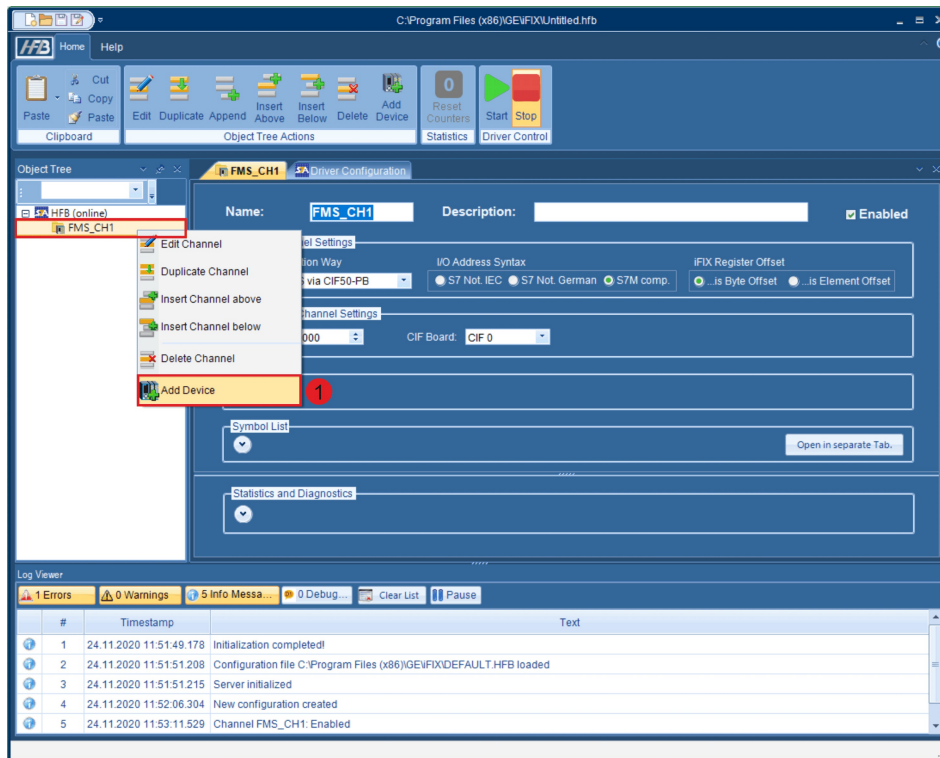
2.4.1 Configure the specific channel parameters



Picture 36: Configuring the specific channel parameters.

- 3 Select the entry **CIF 0** from the **CIF Board** drop down list.
- 4 Click the radio button **S7M comp.** in the **I/O Address Syntax** group. This setting is very important because it controls the syntax of the iFIX I/O address resp. the OPC Item ID.
- 5 Enable the channel.

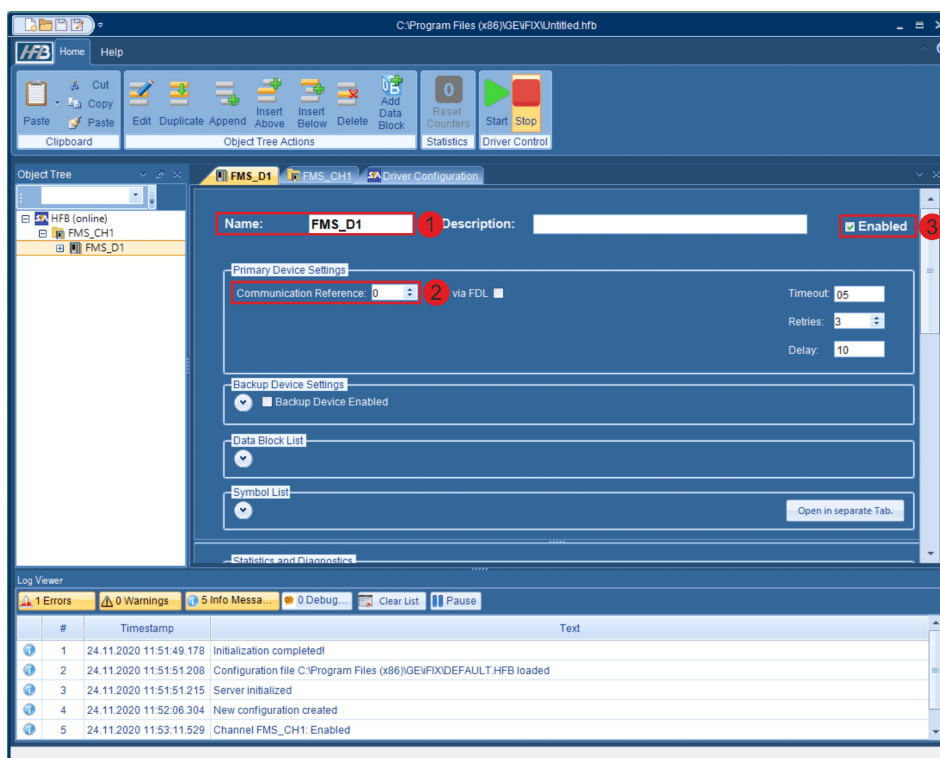
2.5 Create a new device



Picture 37: Creating a new device

- 1 Select the previously created channel in the Object Tree View, open the context menu via right mouse click and select **Add Device** from the context menu to create a new device object.

2.6 Configure the new device

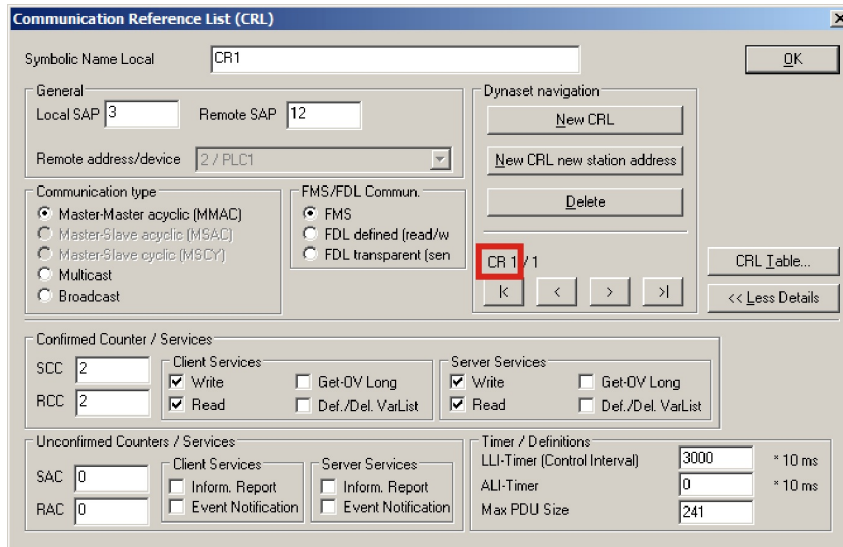


Picture 38: Configuring the specific device parameters.

- 1 Give the device an unique name. This name must not be used for another device!

Note! The device name will later on be used as part of an iFIX I/O address or an OPC item id.

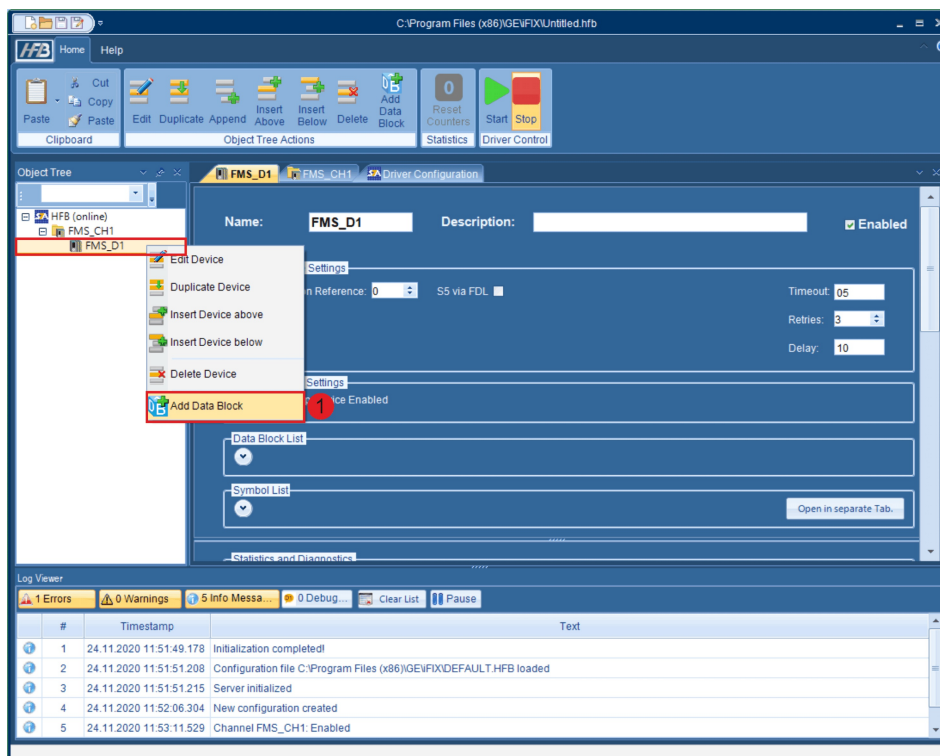
- 2 Enter the FMS communication reference index. This index corresponds to the communication reference (CR) number which is automatically generated by the SyCon software when a new CR is created (see chapter 1.6). You can determine this index as shown in the following screen shot of the **SyCon Communication Reference List** dialog:



Picture 39: Determine the Communication Reference Index

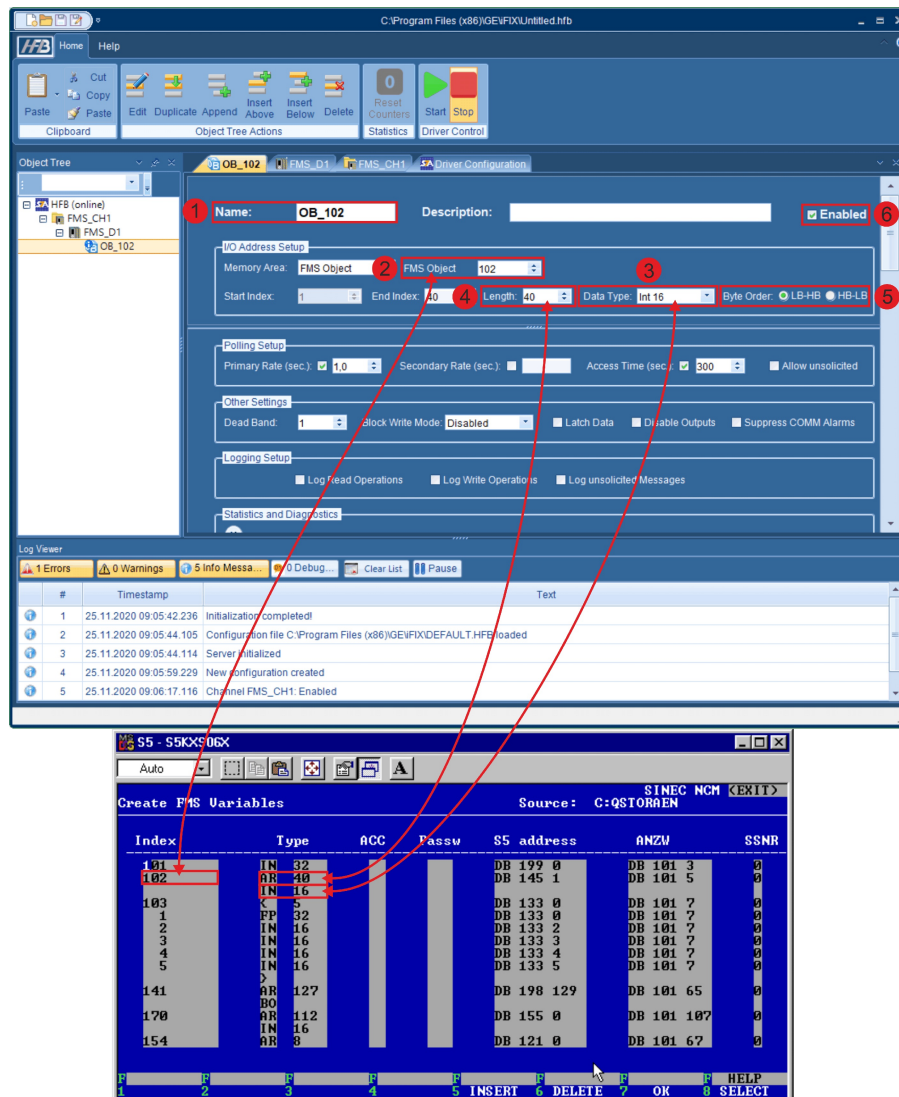
- 3 Enable the device.

2.7 Create a new data block



Picture 40: Creating a new data block

2.8 Configure the new data block



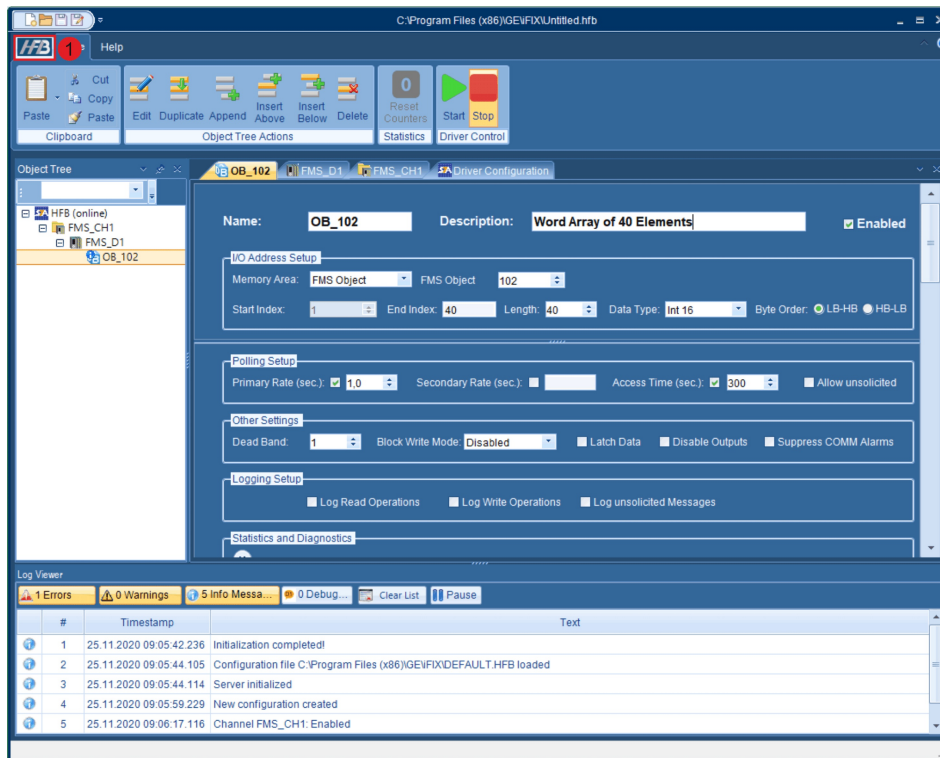
Picture 41: Relation of parameter between data block and SINEC FMS Variable

- 1 Give the data block an unique name. This name must not be used for another data block!
- 2 Enter the object index according to the SINEC NCM FMS Variable configuration.
- 3 Select the **Data Type** of the FMS object according to the SINEC NCM FMS Variable configuration.
- 4 Enter the **Length** (number of array elements) of the FMS object according to the SINEC NCM FMS Variable configuration.
- 5 Set the **Byte Order** to **LB-HB**. This is the proper setting for a S5 FMS connection. Connection to other PLCs than S5 might require opposite byte order setting.
- 6 Enable the data block.

Now a minimum configuration is completed. Of course you can add additional channels, devices and data blocks as required for your application.

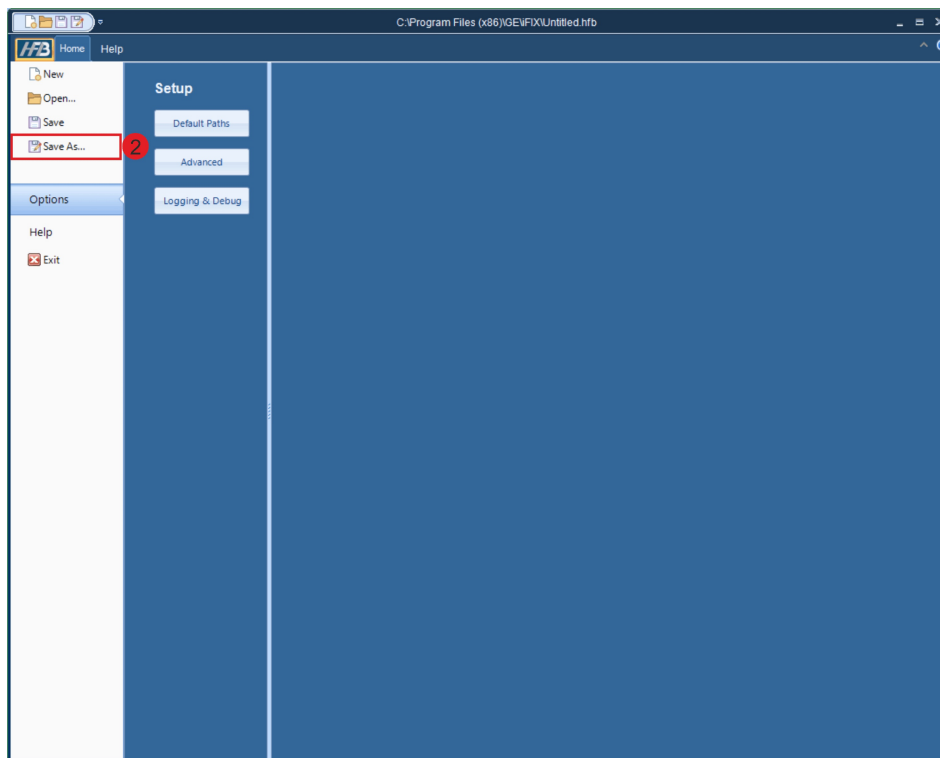
All parameters for channel, device and data block which are not described in this documentation can be left at their default values. The only parameters which may have to be adapted are the polling parameters (primary rate, secondary rate and access time) of the data block.

2.9 Save the new configuration



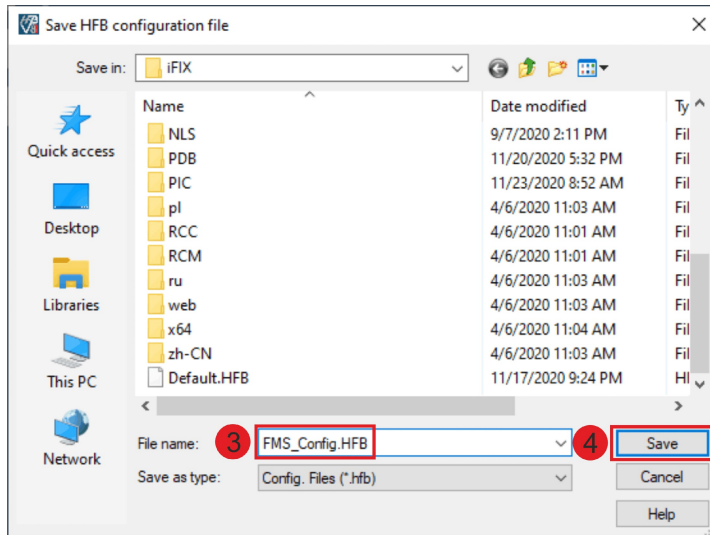
Picture 42: Opening the program's backstage menu

- 1 Click the HFB Program Icon to reach the application (backstage) menu.



Picture 43: Saving the new configuration

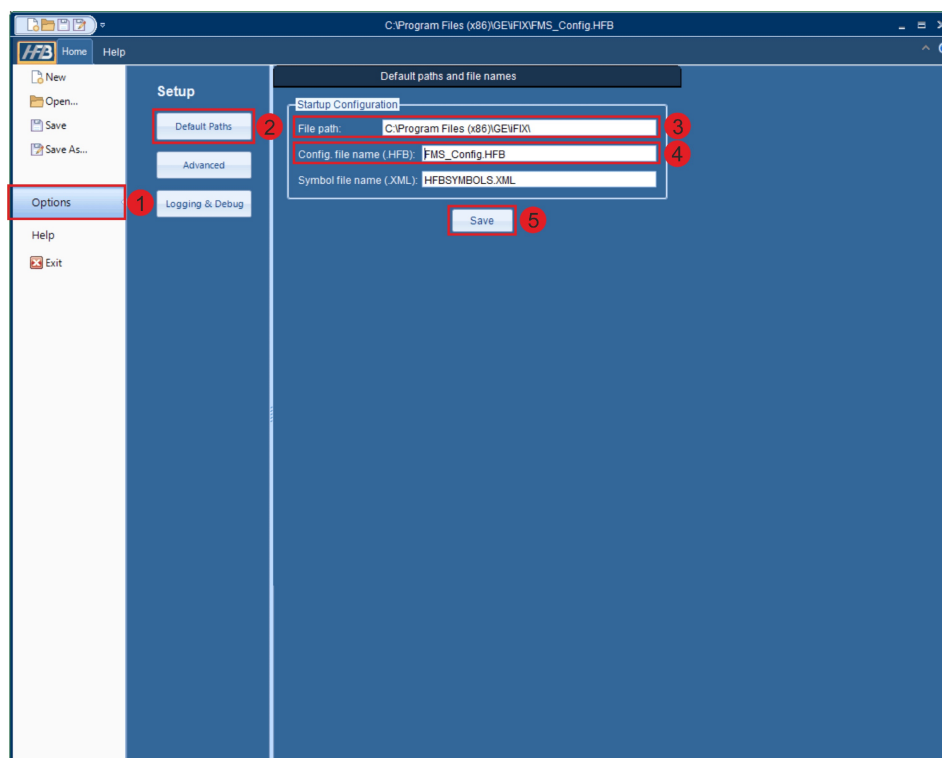
- 2 Select the menu item **Save As...** to open the File Save dialog.



Picture 44: Configuration file save dialog

- 3 Select a folder and enter a valid file name. The name must have the extension .HFB. Click the Save button to finally save the configuration to disk.

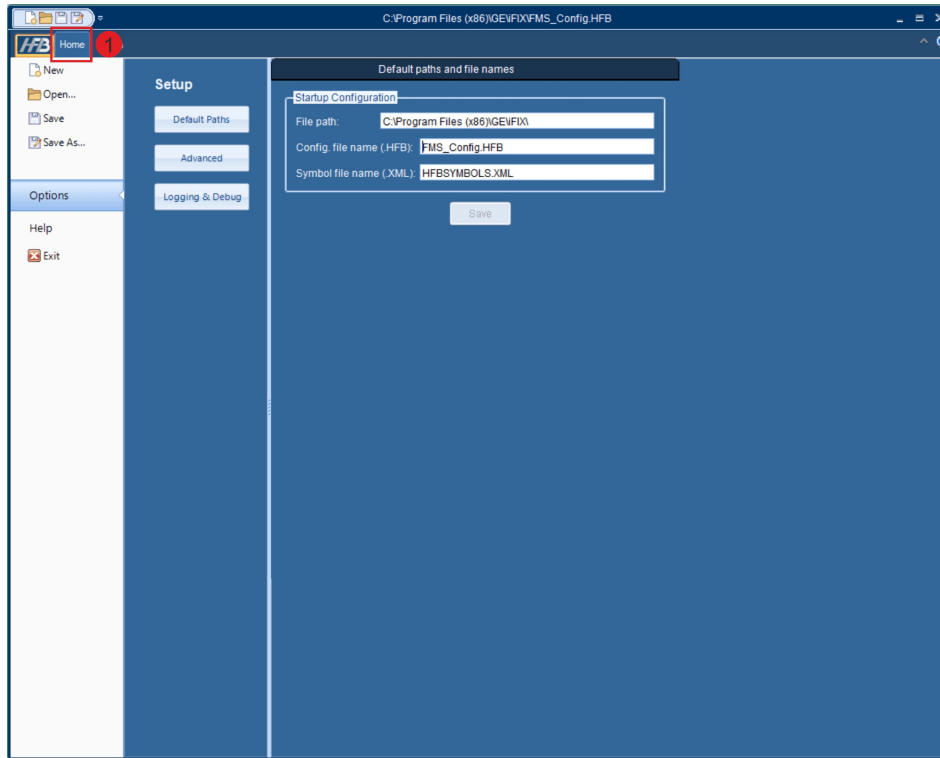
2.10 Set the new configuration as default/startup configuration



Picture 45: Setting default configuration path and file

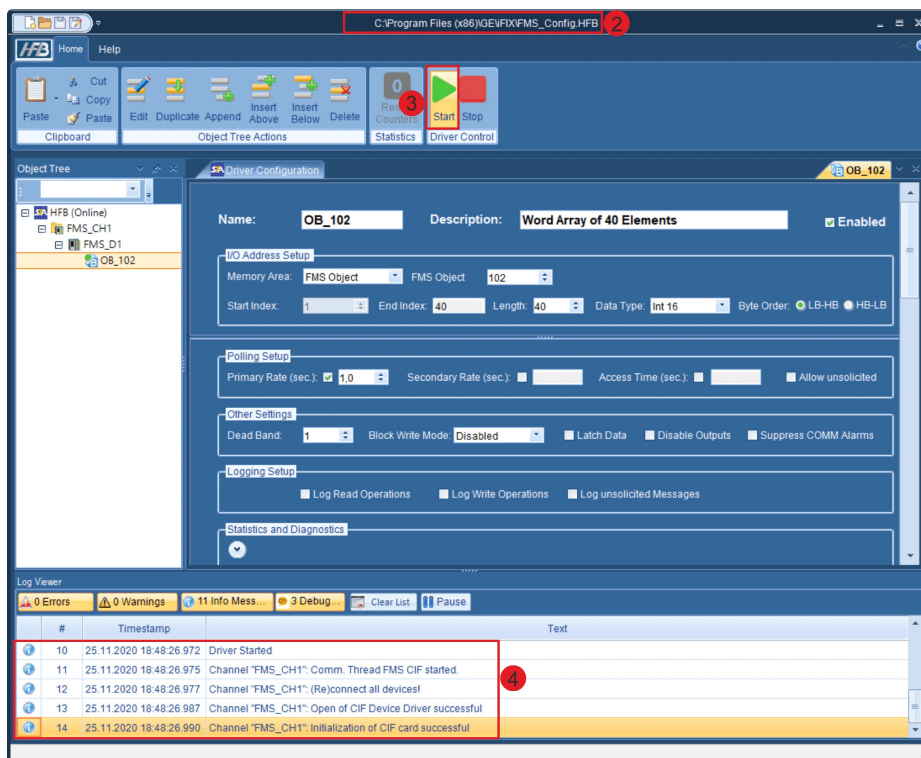
- 1 Open the application (backstage) menu and select the menu item **Options**.
- 2 Click the **Default Paths** button to open the Default paths and filenames dialog.
- 3 Enter the complete path of the previously saved configuration file.
- 4 Enter the name of the previously saved configuration file.

2.11 Online check of the new configuration



Picture 46: From backstage view to configuration view

- 1 Click the Home tab to go back to the configuration view



Picture 47: Message sequence in Log Viewer window

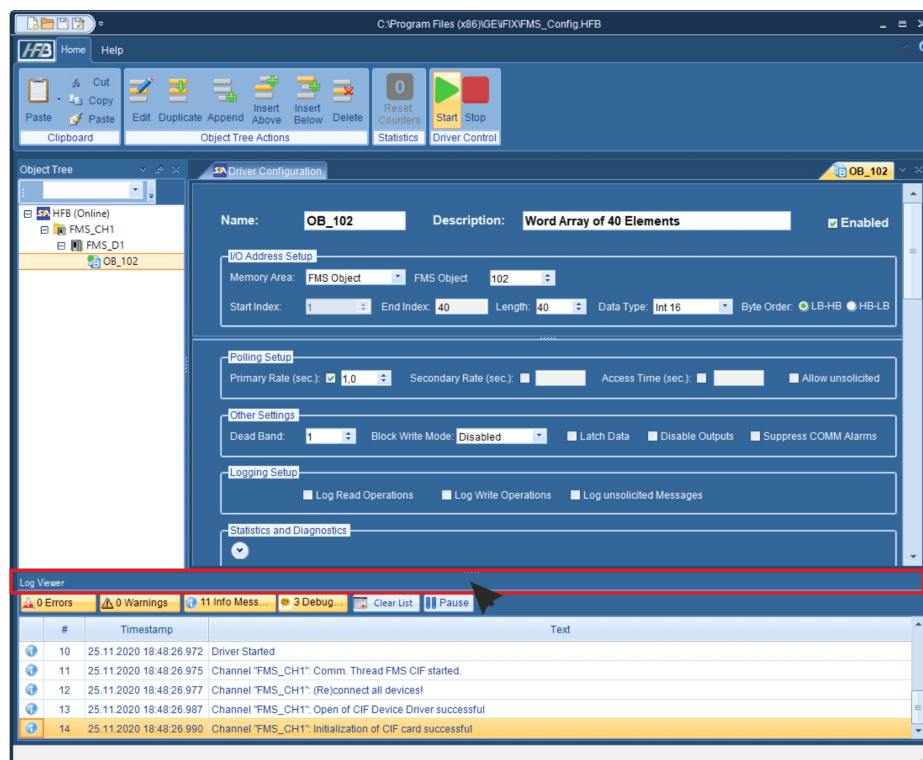
- 2 Check the program header for the correct configuration file path and name which you have entered as default/startup configuration.

- 3 If the driver is not yet started, click the **Start** button to start it.
- 4 Check the messages in the Log Viewer window. For the previously configured channel and device the following sequence of messages should appear:

```
Channel <Your channel name>: Comm. Thread FMS CIF started!  
Channel <Your channel name>: (Re)connect all devices!  
Channel <Your channel name>: Open of CIF Device Driver successful  
Channel <Your channel name>: Initialization of CIF card successful.
```

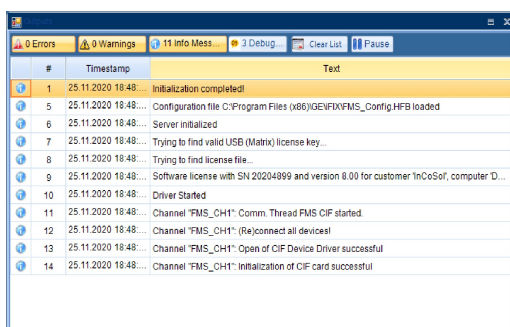
If some of these messages are not shown but instead error messages then you should verify all channel, device and data block parameters, you have configured before. If the problem should persist please contact our support team at support@incosol.de and send us a screen shot of the Log Viewer Window for further analysis.

Hint: For a better presentation of the messages in the Log Viewer window you can drag this window out of the HFB Power Tool's program frame. Afterwards you can resize the separated window in height and width to display a larger amount of messages.



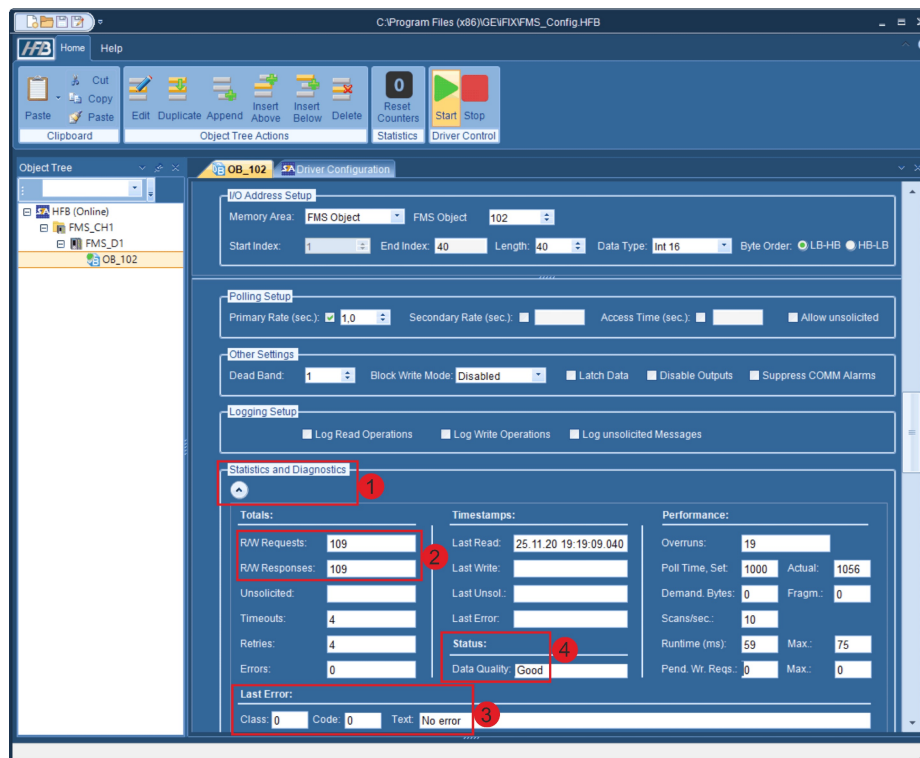
Picture 48: Dragging the Log Viewer window

To drag the window click into the header line of the Log Viewer window, keep the left mouse button pressed and drag the window to the desired area of the desk top. Now you can resize the separated window by pulling it with the mouse cursor at any edge or corner of the window.



Picture 49: The separated Log Viewer Window

2.12 Check the communication state of a particular data block



Picture 50: Data block statistics

- 1 Click the expand button in the data block's **Statistics and Diagnostics** Group to expand the dialog. The expanded dialog now shows numerous data fields with counter values, timestamp and other values which give you a detailed view of the runtime behaviour of the data block.
- 2 When the data block or the FMS object is polled properly, the counter fields **R/W Requests** and **R/W Responses** should increase in the rate specified by the Primary Rate field.
- 3 The **Last Error Code** and **Text** field should show **0** resp. **No Error**.
- 4 The **Data Quality** should show **Good**.

3 Configuration of the Clients (iFIX or OPC)

The Item ID and iFIX I/O Address must follow the following structure:

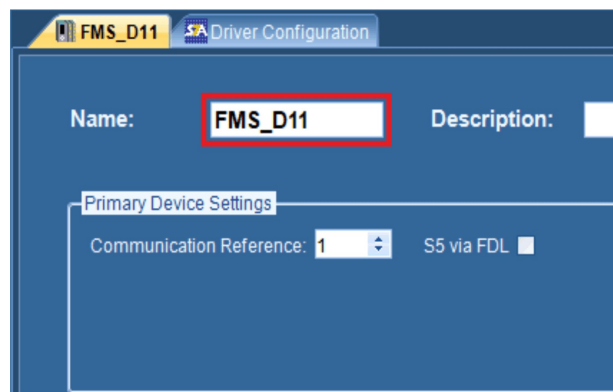
For a digital address:

<Device Name>:**OB**.<FMS Object>.< Index>.<Bit Number>

For an analog address

<Device Name>:**OB**.<FMS Object>.< Index>|<Option>

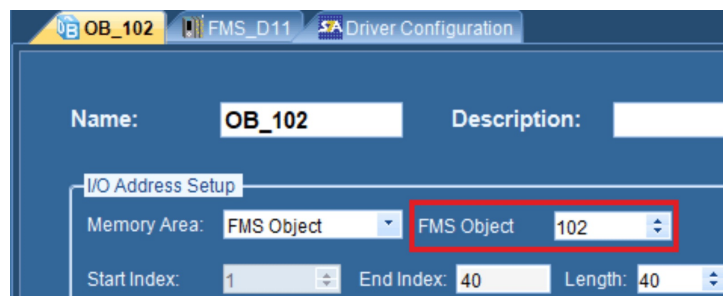
<Device Name> Is the name of the HFB device as specified in chapter 2.6. A FMS communication reference to a specific PLC is specified by this device name .



Picture 51: Device name is part of the I/O address

<FMS Object>

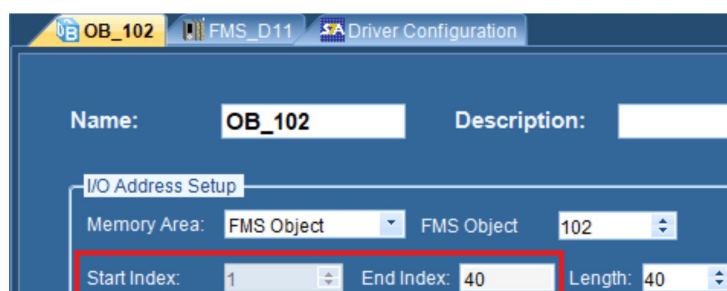
Is the number of the FMS object. A data block must be created in the HFB configuration for this object number.



Picture 52: FMS Object number is part of the I/O address

<Index>

Specifies a single data item within the FMS object. Minimum index is 1 (start index of HFB data block) and the maximum index is the end index or the length of the HFB data block.



Picture 53: FMS Index is part of the I/O address

<Option> are valid for analog addresses of particular data types. The following table shows all possible options:

Option	allowed data types	Description
LBYT	Int16	Converts the lower 8 bits of a signed 16 bit value to a signed 8 bit value
	UInt16	Converts the lower 8 bits of an unsigned 16 bit value to an unsigned 8 bit value
HBYT	Int16	Converts the upper 8 bits of a signed 16 bit signed value to a signed 8 bit value
	UInt16	Converts the upper 8 bits of an unsigned 16 bit value to an unsigned 8 bit value
LWRD	Int16	Converts the lower 8 bits of a (signed or unsigned) 16 bit value (signed or unsigned) to an unsigned 8 bit value
HWRD	Int16	Converts the upper 8 bits of a (signed or unsigned) 16 bit value to an unsigned 8 bit value
FWRD	Int16	Converts a 16 bit signed value to an unsigned 16 bit value
FDIN*	Int16	Converts * two consecutive 16 bit values to a signed 32 bit value
FDWR*	Int16	Converts * two consecutive 16 bit values to an unsigned 32 bit value
FREA*	Int16	Converts two consecutive 16 bit values to a 32 bit floating point (real) value
*)The block write mode of the respective data blocks has to be set to "Auto" when values with these options must be written.		

<Bit Number> For an analog data item of an integer data type (Int8, UInt8, Int16 and UInt16) a single bit can be addressed by extending an analog I/O address with the bit number between 0 and 15.

3.1 Examples of OPC Item IDs

Item ID	Data Type	Value	Timestamp	Quality	Update Co...
FMS_D11:OB.102.1 FWRD	Word	65436	15:39:22:625	Good	1
FMS_D11:OB.102.1 LWRD	Word	156	15:39:22:625	Good	1
FMS_D11:OB.102.1.7	Boolean	1	15:39:22:625	Good	1
FMS_D11:OB.102.1.6	Boolean	0	15:39:22:625	Good	1
FMS_D11:OB.102.1.5	Boolean	0	15:39:22:625	Good	1
FMS_D11:OB.102.1.3	Boolean	1	15:39:22:625	Good	1
FMS_D11:OB.102.1.4	Boolean	1	15:39:22:625	Good	1
FMS_D11:OB.102.1.1	Boolean	0	15:39:22:625	Good	1
FMS_D11:OB.102.1.2	Boolean	1	15:39:22:625	Good	1
FMS_D11:OB.102.1.0	Boolean	0	15:39:22:625	Good	1
FMS_D11:OB.102.1 LBYT	Short	-100	15:39:22:625	Good	1
FMS_D11:OB.102.1 HBYT	Short	-1	15:39:22:625	Good	1
FMS_D11:OB.102.1 HWRD	Word	255	15:39:22:625	Good	1
FMS_D11:OB.102.1 FDIN	Long	-6488065	15:39:22:625	Good	1
FMS_D11:OB.102.1	Short	-100	15:39:22:625	Good	1

Picture 54: Example of OPC Items