BECKHOFF New Automation Technology

Documentation | EN

KS2000

Configuration Software for Fieldbus Components



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1 Foreword

1.1 Notes on the documentation

Intended audience

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.
It is essential that the documentation and the following notes and explanations are followed when installing and commissioning these components.
The qualified personnel is obliged to always use the currently valid documentation.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.

We reserve the right to revise and change the documentation at any time and without prior announcement.

No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

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1.2 Safety instructions

Safety regulations

Please note the following safety instructions and explanations!
Product-specific safety instructions can be found on following pages or in the areas mounting, wiring, commissioning etc.

Exclusion of liability

All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

This description is only intended for trained specialists in control, automation and drive engineering who are familiar with the applicable national standards.

Signal words

The signal words used in the documentation are classified below. In order to prevent injury and damage to persons and property, read and follow the safety and warning notices.

Personal injury warnings

⚠ DANGER
Hazard with high risk of death or serious injury.

⚠ WARNING
Hazard with medium risk of death or serious injury.

⚠ CAUTION
There is a low-risk hazard that could result in medium or minor injury.

Warning of damage to property or environment

NOTICE
The environment, equipment, or data may be damaged.

Information on handling the product



This information includes, for example:
recommendations for action, assistance or further information on the product.

1.3 Notes on information security

The products of Beckhoff Automation GmbH & Co. KG (Beckhoff), insofar as they can be accessed online, are equipped with security functions that support the secure operation of plants, systems, machines and networks. Despite the security functions, the creation, implementation and constant updating of a holistic security concept for the operation are necessary to protect the respective plant, system, machine and networks against cyber threats. The products sold by Beckhoff are only part of the overall security concept. The customer is responsible for preventing unauthorized access by third parties to its equipment, systems, machines and networks. The latter should be connected to the corporate network or the Internet only if appropriate protective measures have been set up.

In addition, the recommendations from Beckhoff regarding appropriate protective measures should be observed. Further information regarding information security and industrial security can be found in our https://www.beckhoff.com/secguide.

Beckhoff products and solutions undergo continuous further development. This also applies to security functions. In light of this continuous further development, Beckhoff expressly recommends that the products are kept up to date at all times and that updates are installed for the products once they have been made available. Using outdated or unsupported product versions can increase the risk of cyber threats.

To stay informed about information security for Beckhoff products, subscribe to the RSS feed at https://www.beckhoff.com/secinfo.

1.4 Documentation issue status

Version	Comment
6.2.0	• System requirements updated • Chapter *Notes on information security* added
6.1.0	• Chapter *Communication via ADS* updated
6.0.0	• Migration • Document Structure updated
5.1.0	• Notes about operation of KS2000 Configuration Software under Windows XP removed

2 Product overview

2.1 Introduction

The KS2000 Configuration Software serves the purpose of configuring, parameterizing and commissioning bus couplers and bus terminals.

Parameterizing

KS2000 offers simple access to the parameters of the terminal station: for all bus couplers and all intelligent bus terminals, specific high-level dialogs are available with which the settings can be modified easily. Alternatively, you have full access to all internal registers of the bus couplers and intelligent terminals. Refer to the technical documentation of the terminals for the meanings of the registers. You will find the technical documentation on the KS2000 CD.

Commissioning

The KS2000 software tool makes it easy to commission machine parts or their terminal stations:

- Configured coupler and terminal settings can be downloaded to the terminal stations.
- After logging in to the terminal station, it is possible to define settings in couplers and terminals directly 'online'. The same high level dialogs and register access as in the configuration phase are available for this purpose.
- Changes in the coupler settings do not take effect until after a restart. Such coupler rebooting can be triggered from the KS2000.
- When 'manufacturer settings' is selected in the KS2000, after rebooting, the bus coupler again operates with the settings defined in the manufacturer settings.
- The KS2000 offers access to the process images of the bus couplers. Thus, the coupler's input and output images can be observed by monitoring.
- For commissioning of the output terminals, process values can be specified in the output image.
- All possibilities in the 'online mode' can be used in parallel with actual field bus operation of the terminal station. At the same time, it goes without saying that the field bus protocol always has the higher priority.
- The user interface of the KS2000 software tool is multilingual. The program automatically starts in the respective national language that is set in Windows (if the language is available). The language can also be changed during the run time by selecting the 'Options/Language' menu item. English and German are currently supported.

2.2 Included in delivery

Parts

- CD with the setup file and documentation
- Data cable to start a communication via the COM-port

2.3 System requirements

- Windows 7 SP1, Windows 10 or Windows 11
- 25 MB free hard disk space
- You need the ADS router. This is included in TC1000, TwinCAT 3 ADS, TX1100 and TwinCAT I/O.
- You need administration rights on your operating system.

Supported products

All Beckhoff Bus Couplers (BK) and Bus Terminal Controllers (BC, BX), produced since October 1996, do support the KS2000 configuration software:

- BK1xxx
- BK2xxx: from EEPROM-Version "BC"
- BK3xxx: from EEPROM-Version "BF"
- BK4xxx: from EEPROM-Version "BC"
- BK5xxx: from EEPROM-Version "BC"
- BK73xx
- BK8xxx: from EEPROM-Version "BC"
- BK9xxx
- BC3100: from EEPROM-Version "B3"

Special functions of the KS2000 configuration software are only supported from a certain firmware version of the bus coupler. You can find more detailed information here [▶ 33].

A sticker on the backside of the bus coupler provides information about its firmware status in the delivery state “x x x x x B K x x - - - - - ”.

NOTICE



Refer product specific documentation

In addition, please refer to the product-specific documents for installation, parameterization, programming etc., which are available to you on the internet at www.beckhoff.com in the download section of the respective product pages.

3 QuickStart



Fig. 1: KS2000 Configuration Software

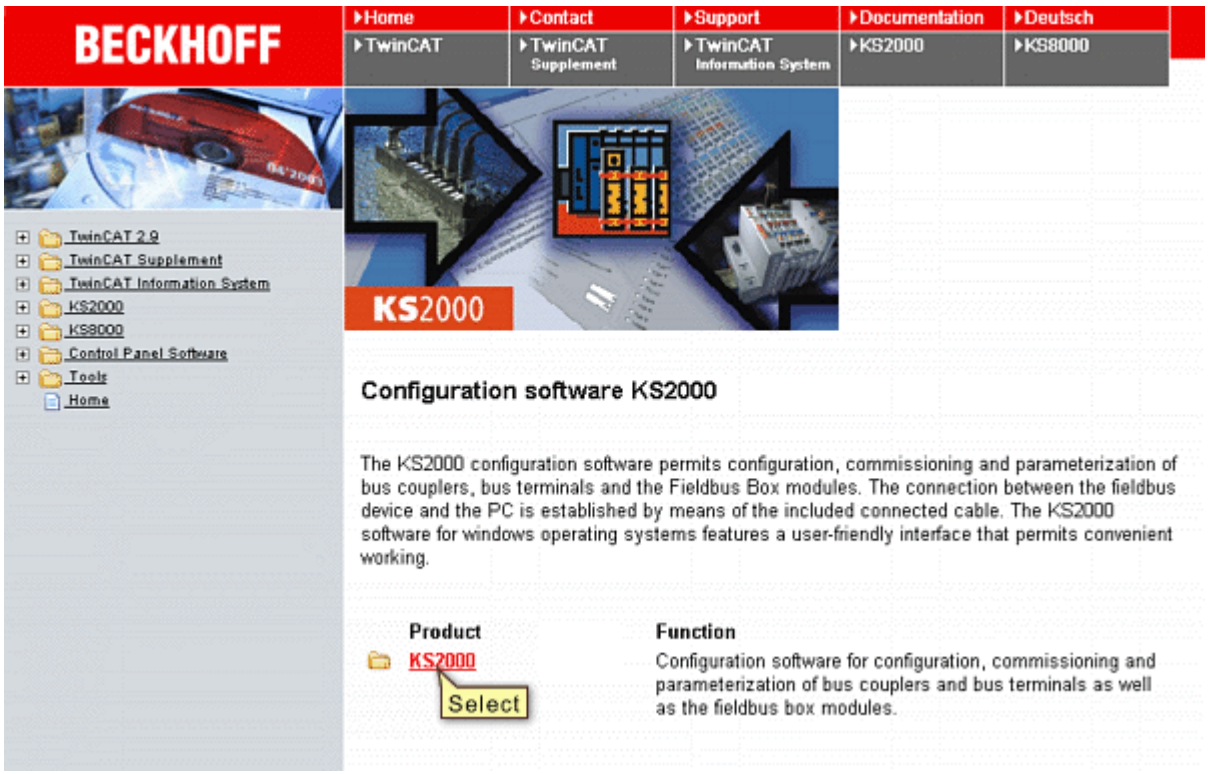
3.1 How to install the KS2000 software?

System requirements

- Windows 7 SP1, Windows 10 or Windows 11
- 25 MB free hard disk space
- You need the ADS router. This is included in TC1000, TwinCAT 3 ADS, TX1100 and TwinCAT I/O.
- You need administration rights on your operating system.

Installing KS2000 software

step 1: Insert the KS2000 software CD-ROM into your CD-ROM drive. When the KS2000 menu appears, click *KS2000*.



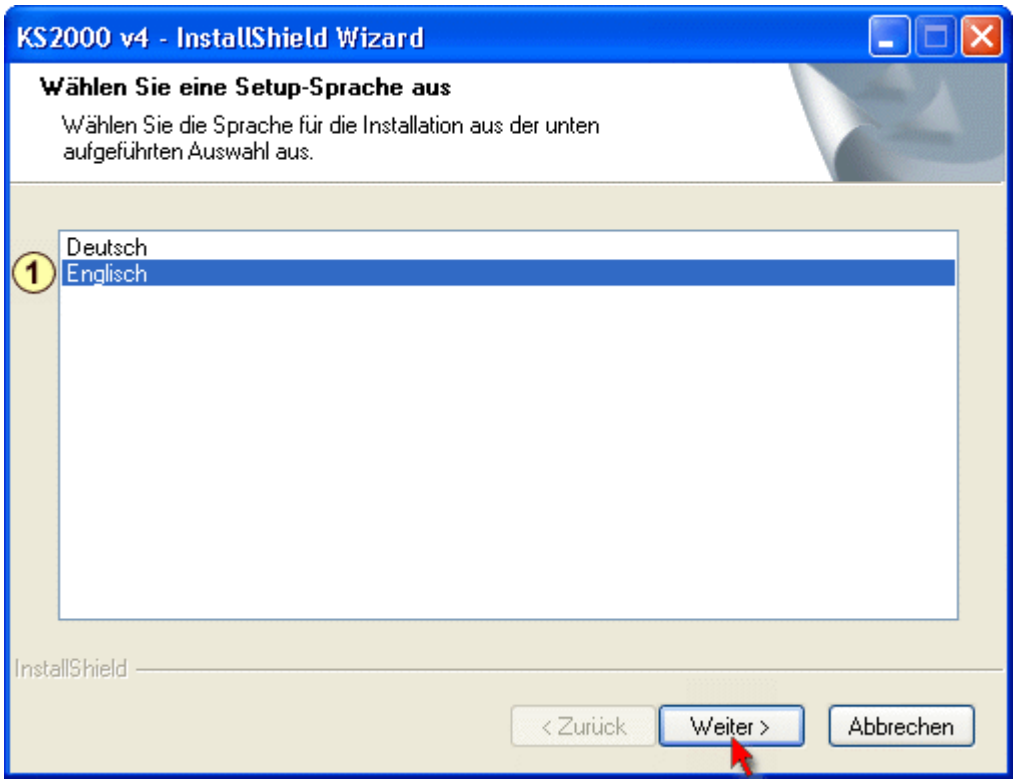
If the program does not start automatically, start the windows explorer, and select the CD-ROM drive. Then double-click *ks2000.htm*.



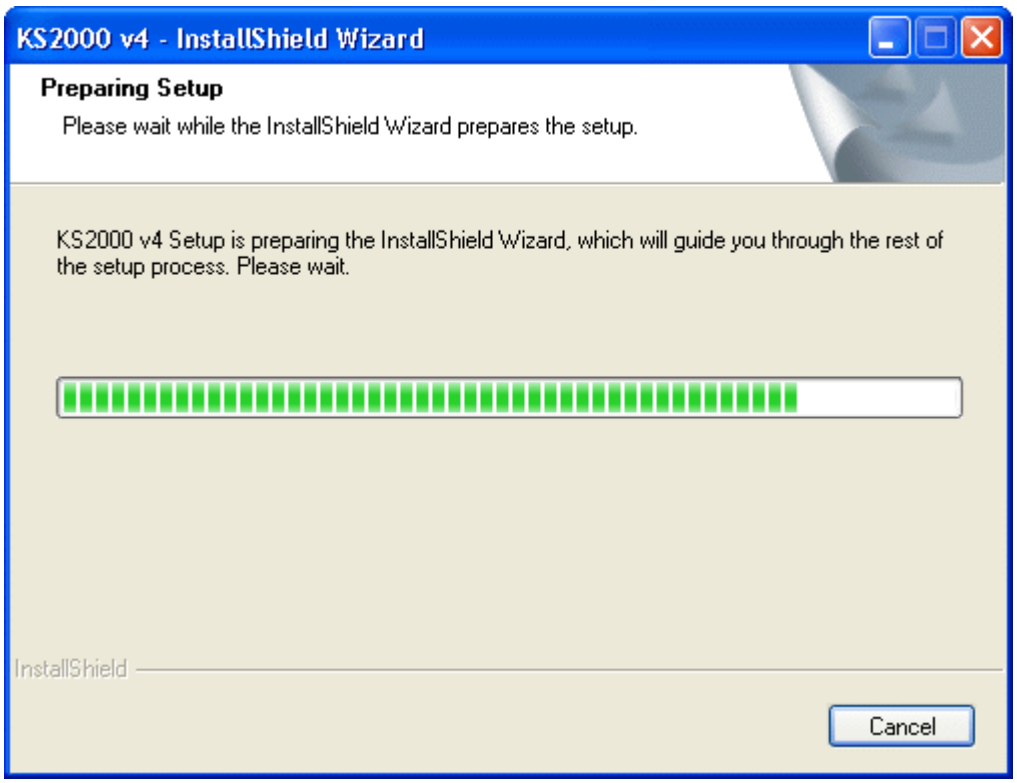
step 2: double-click *KS2000_v4.exe*



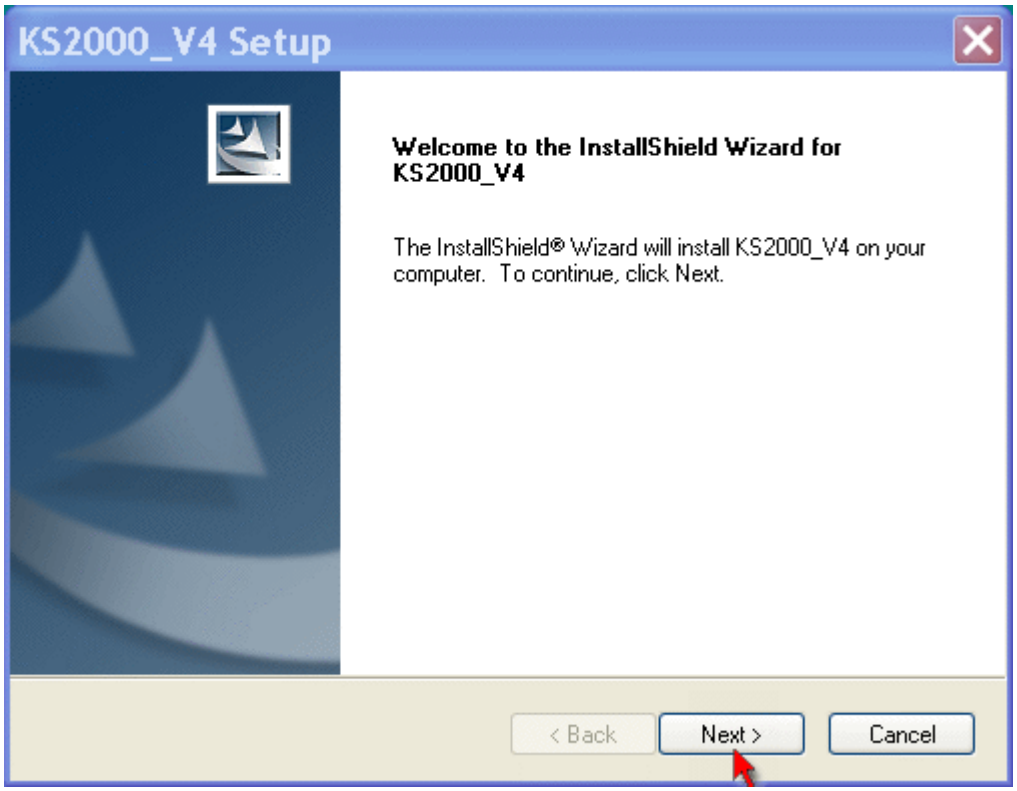
step 3: Select the language of the InstallShield Wizard and click *Next (Weiter)*.



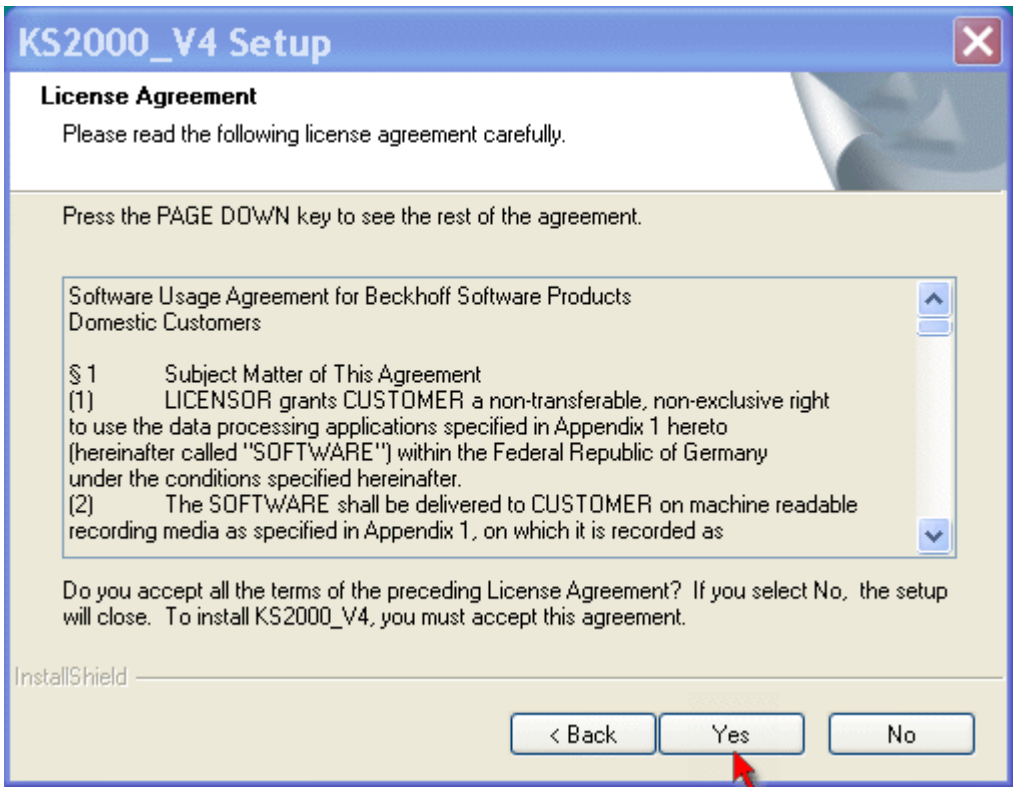
The following window will appear.



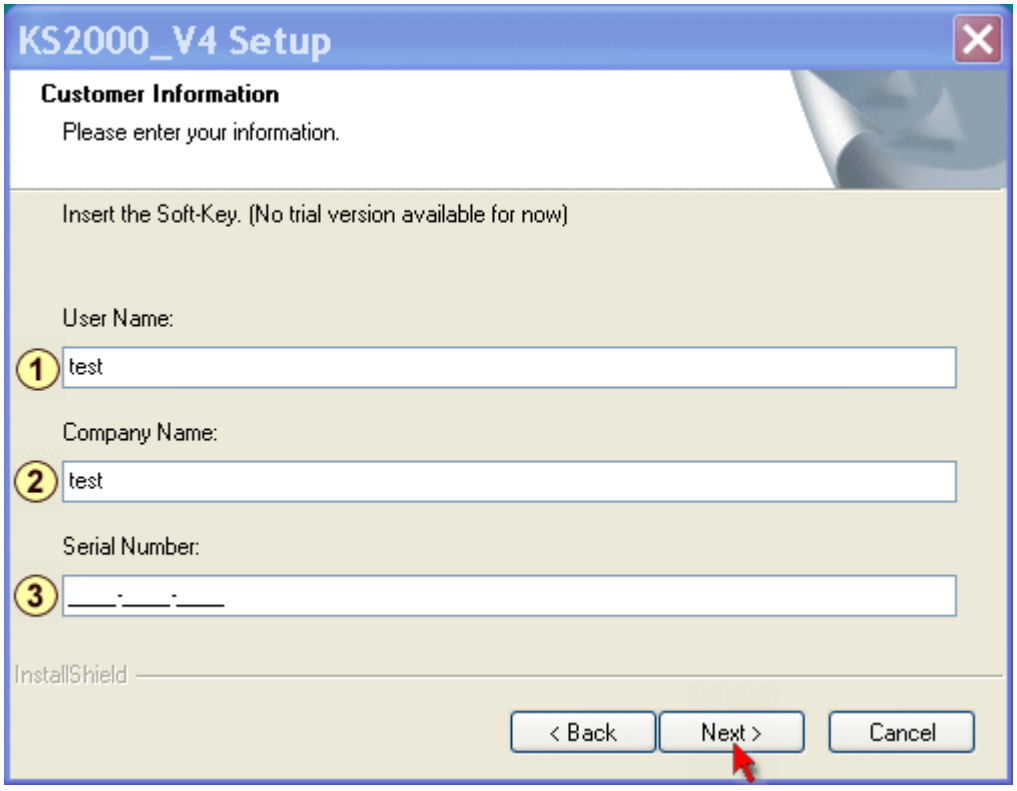
step 4: Follow the on-screen instructions to complete the setup. When the InstallShield Wizard runs, click *Next*



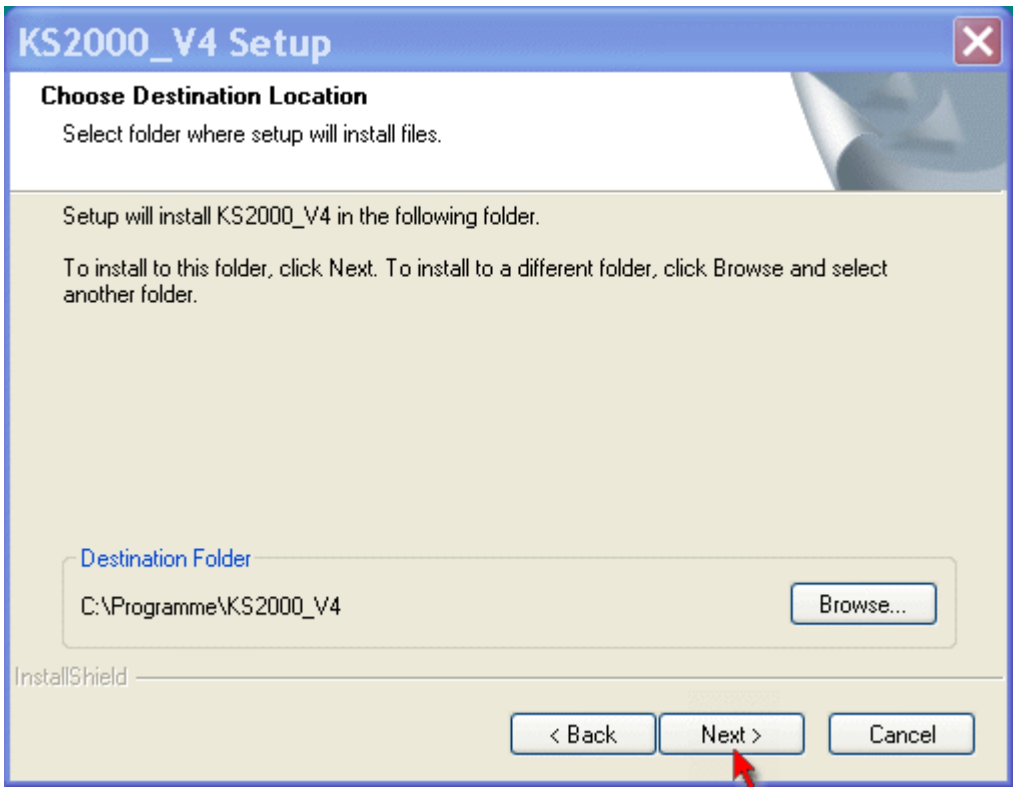
step 5: Read and confirm End User License Agreement and click *Yes*.



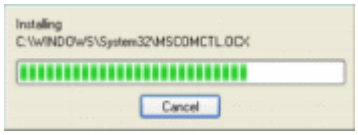
step 6: Type in your User Name, the Company Name and the Serial Number. The Serial Number you will find on the cover of your KS2000 software CD-ROM. After you finished click *Next*.



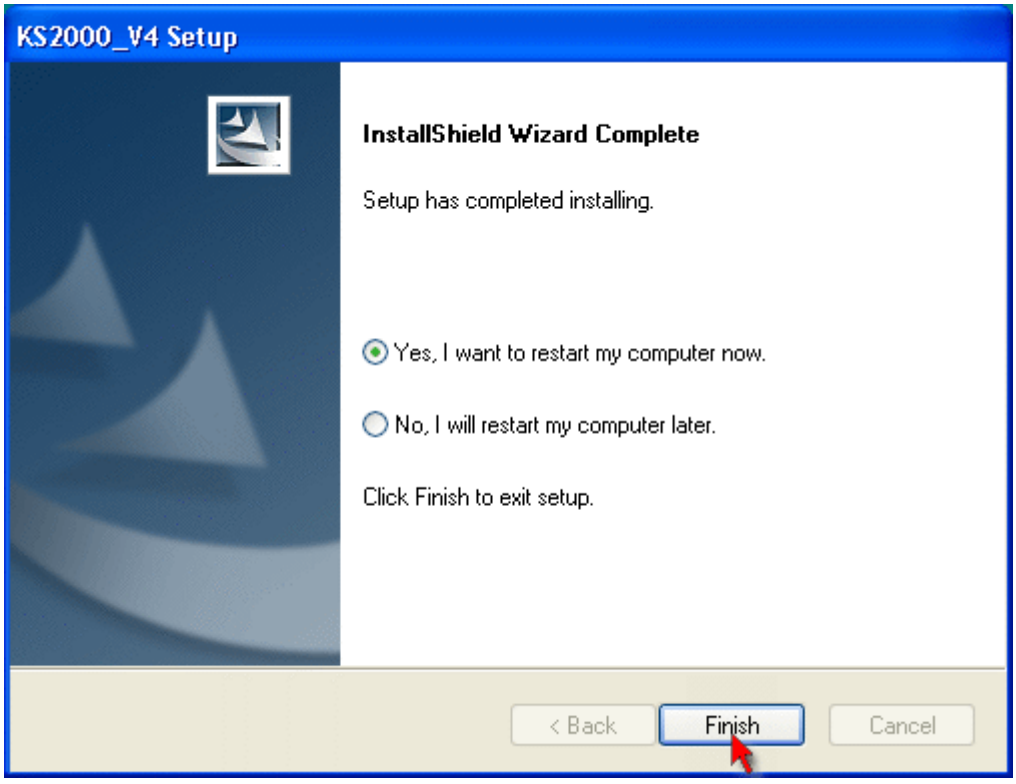
step 7: Choose a folder to install the KS2000 software. It is recommended to select the default folder. If you want to install the software in a different folder, click *Browse* and select the folder you want. Click *Next*.



step 8: The InstallShield Wizard will now start the installation process.



step 9: The installation process is complete. Select *Yes, I want to restart my computer now* when you want to use the KS2000. Before you click *Finish*, make sure that all open files are saved because your system is getting rebooted.



3.2 USB cable for the connection between PC and fieldbus components



Fig. 2: KS2000-Zx-USB

The further development of PC technology and the establishment of new standards sometimes makes older technologies redundant. One example is the common serial RS232 interface, which is increasingly replaced by USB technology. In line with this development, the USB KS2000 cable is now available.

The KS2000 cable establishes a connection between the fieldbus components and the PC. It can be used for parametering Bus Terminals or Bus Couplers, local diagnostics, forcing Bus Terminal data, monitoring Bus Terminal values, updating firmware and programming Beckhoff mini PLCs via TwinCAT. The USB cable is available in two versions: **KS2000-Z2-USB** is used for the connection between a PC and a Bus Couplers from the BK, BC and LC series; **KS2000-Z3-USB** for the connection with Fieldbus Box modules. The USB cable features electrical isolation. Status LEDs indicate whether data are sent or received. On the connected PC the USB cable behaves like a COM port and can therefore be used for all Beckhoff tools using serial communication.

Ordering information	Description
KS2000-Z2-USB	connection cable for KS2000 or TwinCAT for serial conversion from USB for BK, BC, LC Couplers, length 3 m
KS2000-Z3-USB	connection cable for KS2000 or TwinCAT for serial conversion from USB for Fieldbus Box, lenght 3 m

3.2.1 How to install KS2000 USB drivers on Windows 7 ?

1. First download the KS2000-Zx-USB drivers from Beckhoff's website.
Then connect the KS2000 USB cable with your Personal Computer (PC).

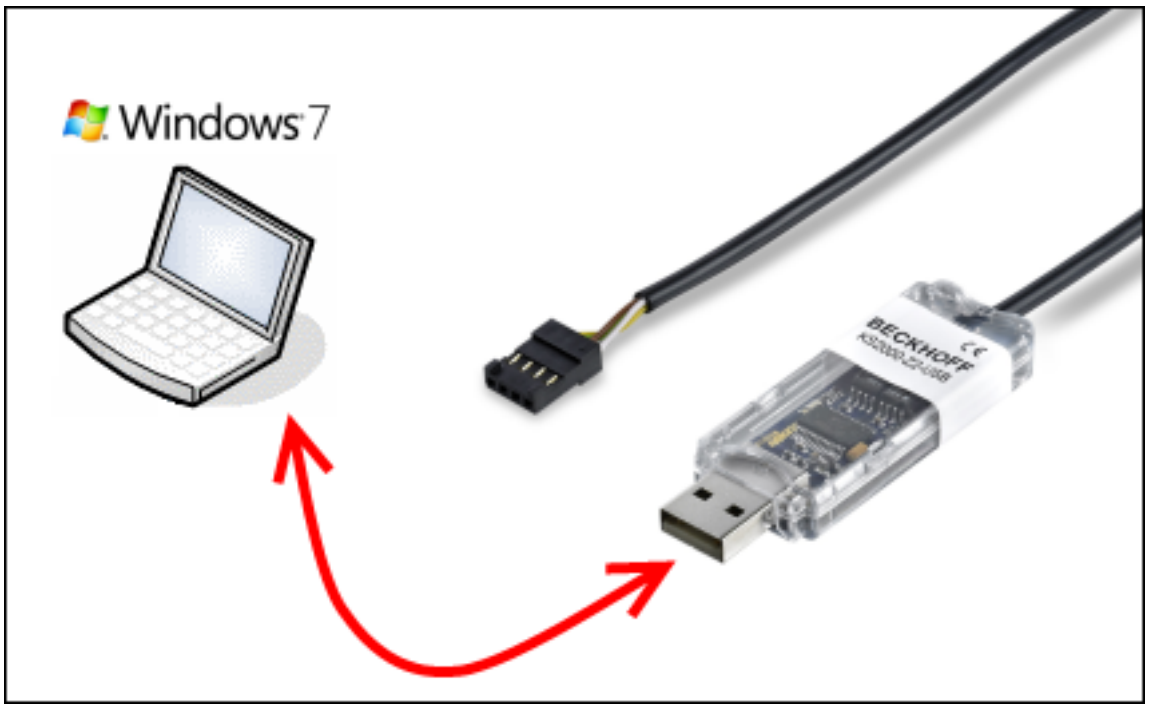


Fig. 3: KS2000 Z2 USB

2. After that reports a notification message, that the Windows 7 is
Installing device driver software, but it occurs an error, because Windows 7
don't find the folder of the device driver software.

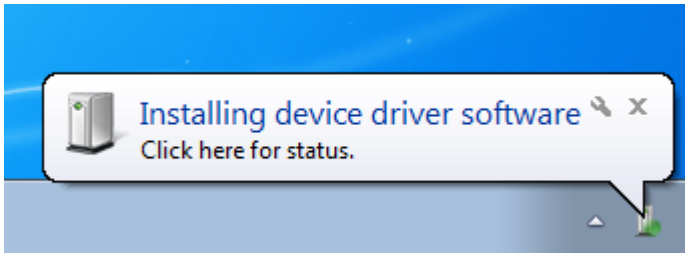


Fig. 4: Installing device driver Software

3. Now we must manually install the driver software for KS2000 USB cable. First, we install the first driver software, that is for USB Serial Converter. Open Device Manager by clicking the Start button, clicking Control Panel,

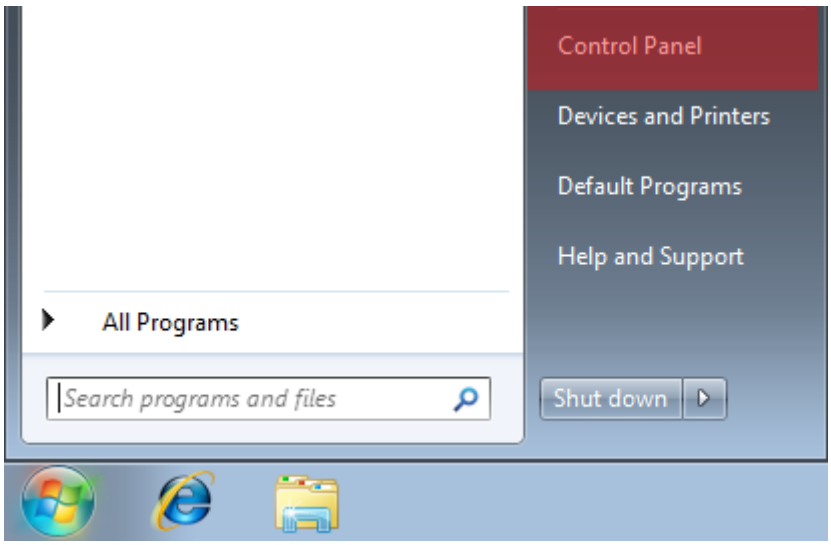


Fig. 5: Control Panel

clicking Hardware and Sound,



Fig. 6: Hardware and Sound

and then clicking Device Manager!

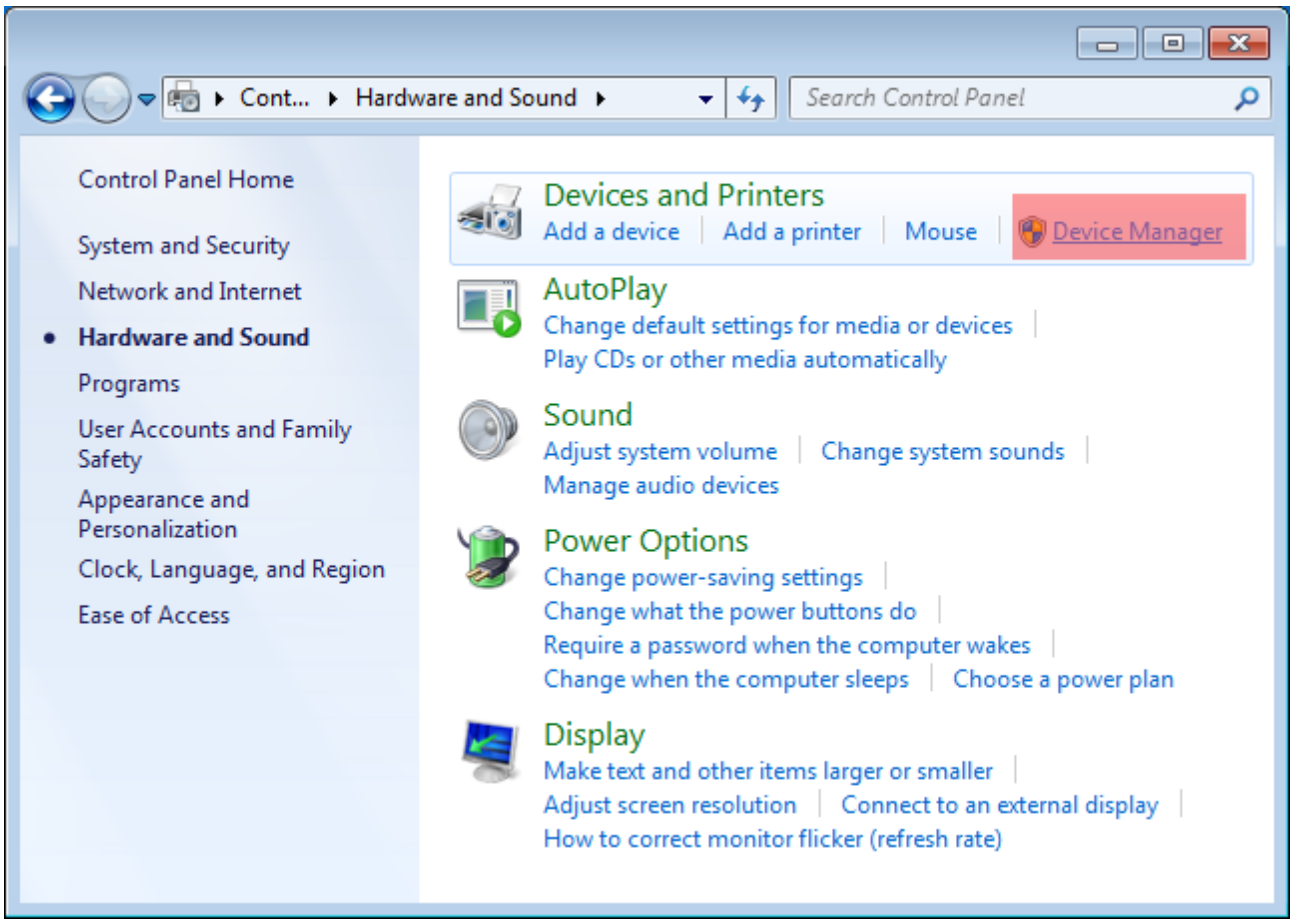


Fig. 7: Device Manager

4. Right-click the new device KS2000-Zx-USB for which you need a new driver, click Update Driver Software...

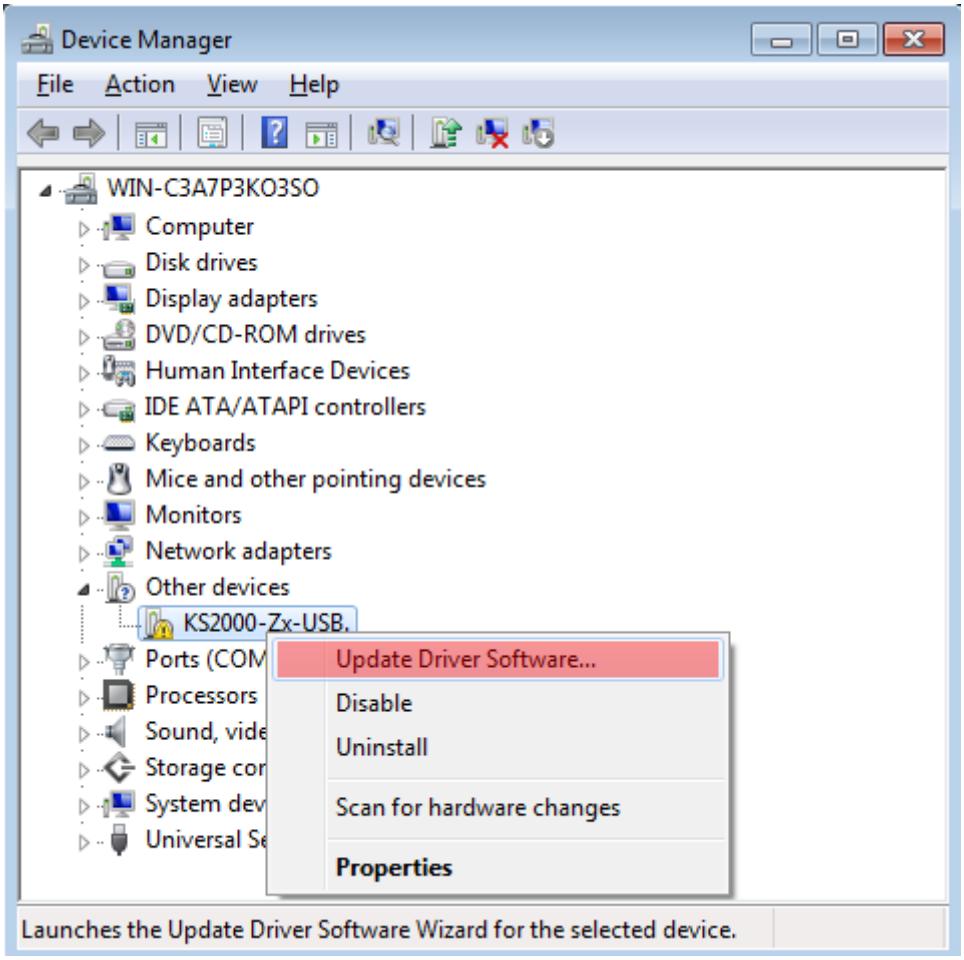


Fig. 8: Update Driver Software

5. In the next window you have two choices to search for driver Software. We select and click Browse my computer for driver software.

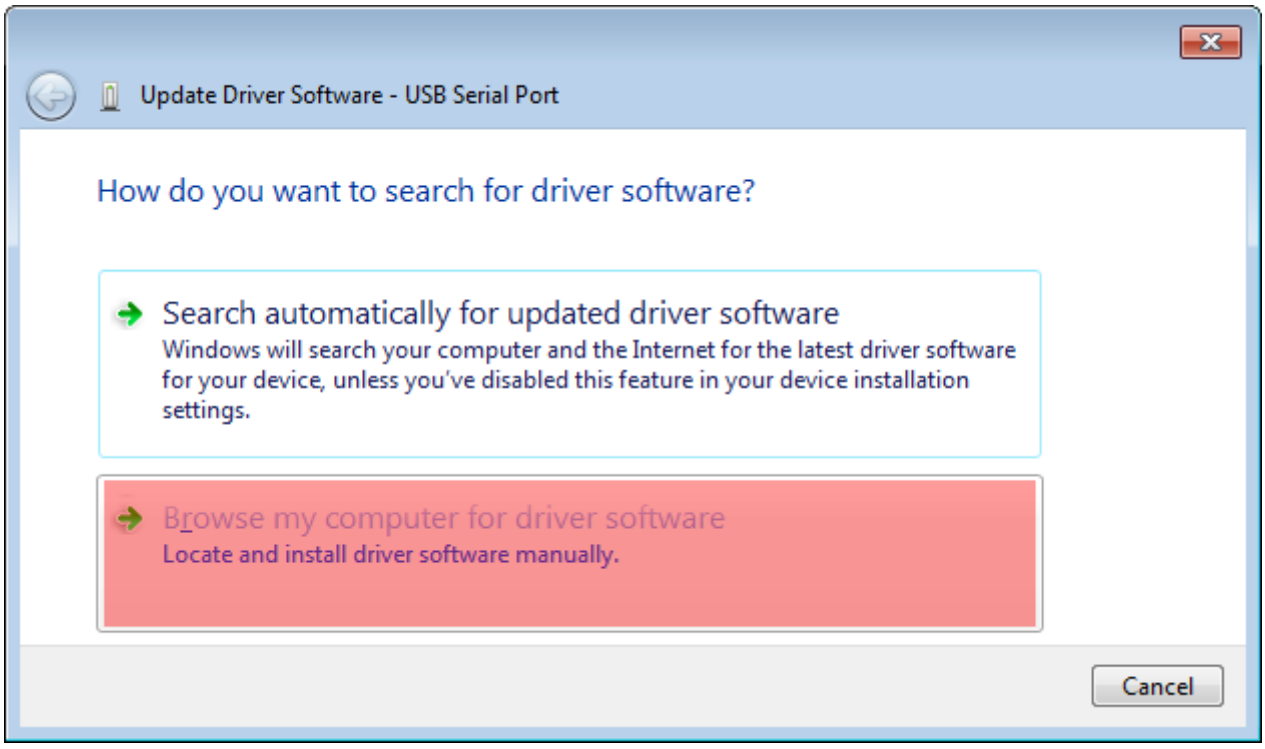


Fig. 9: Browse my computer for driver software

6. By Clicking Browse button select the folder for driver software.

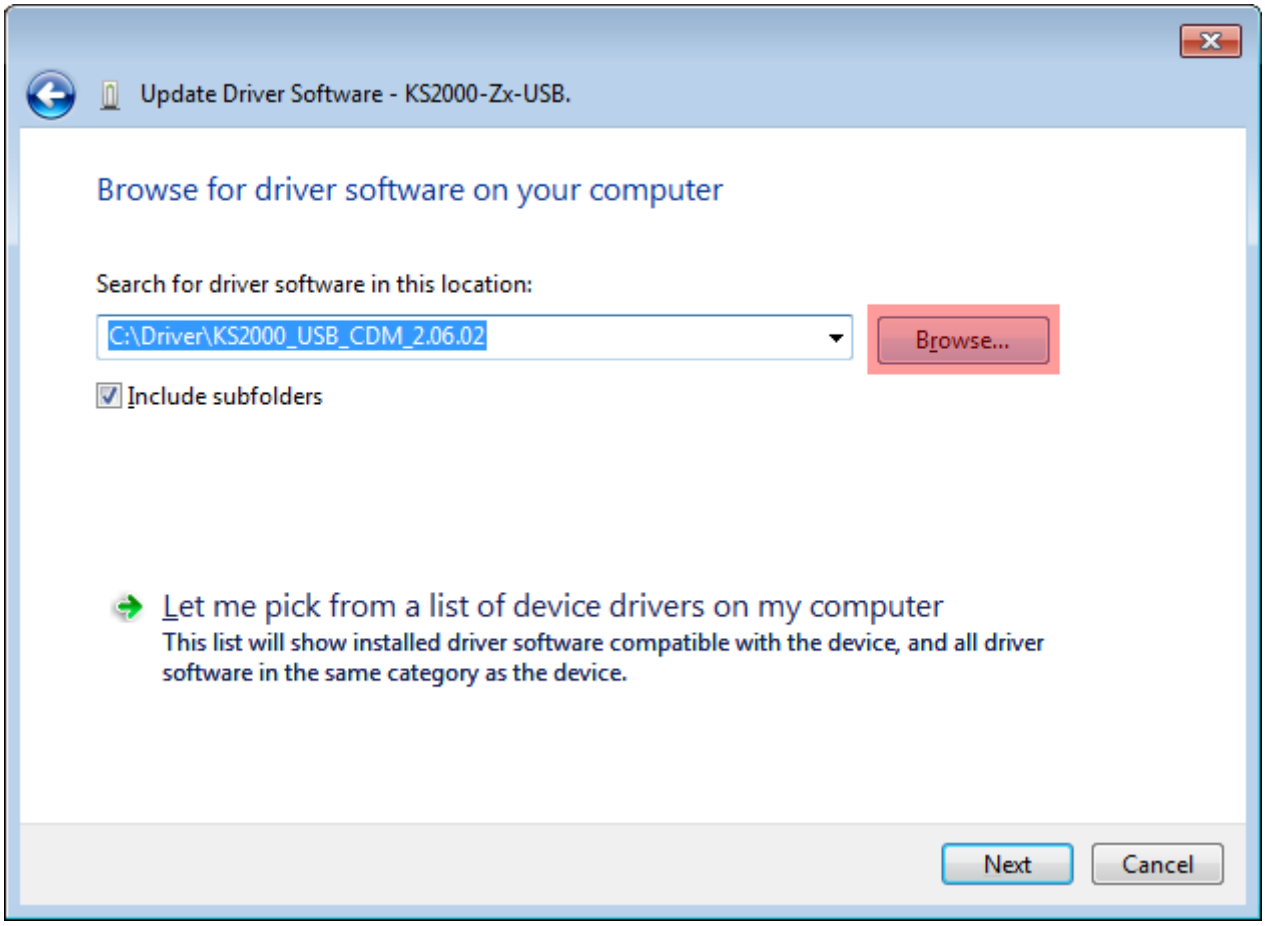


Fig. 10: Browse to folder for driver software

7. Would you like to install device software? The Windows Security wants a confirmation to install the driver software. Confirm by clicking the Install button.

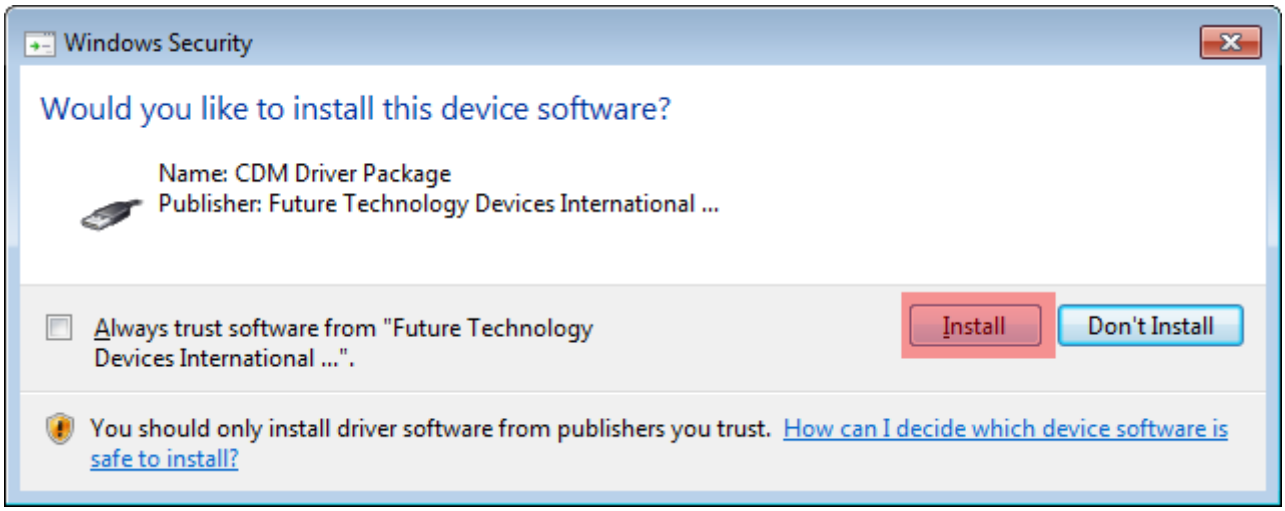


Fig. 11: Click Install

8. Windows has successfully installed the driver software for USB Serial Converter. This is the first driver software installation of two drivers, the next begins with the next step.

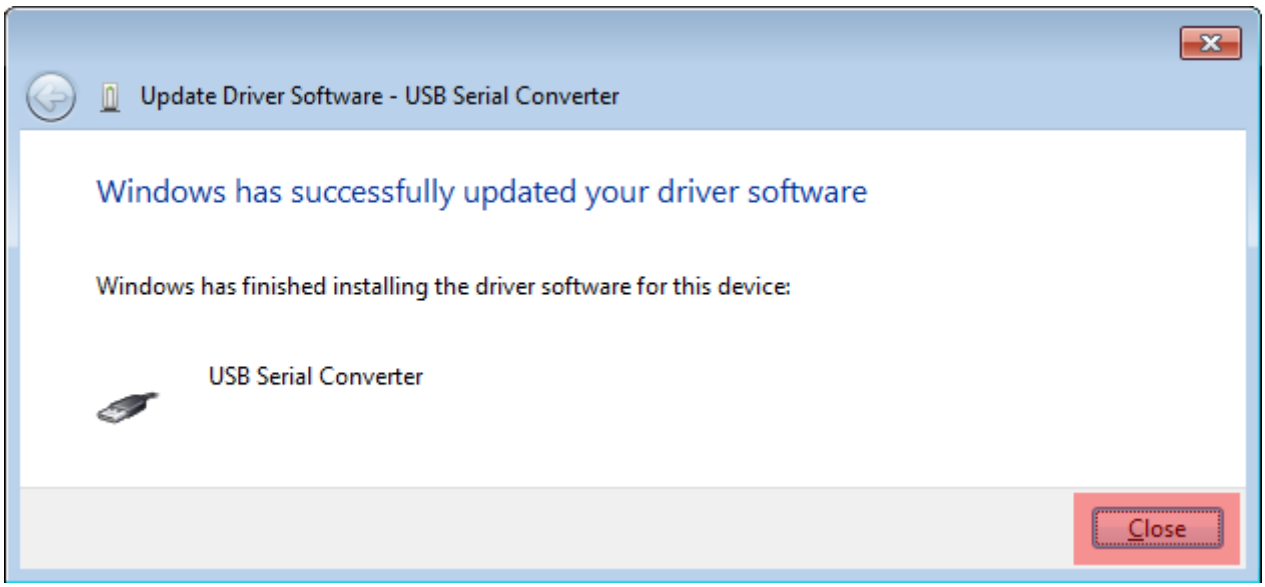


Fig. 12: Windows has successfully installed your driver software for USB Serial Converter

9. Now open Device Manager again by clicking the Start button, clicking Control Panel, clicking Hardware and Sound, and then clicking Device Manager! There is under Other Devices the second device USB Serial Port, which driver software we now install. Right-click the new device USB Serial Port for which you need a new driver software. Clicking Update Driver Software...

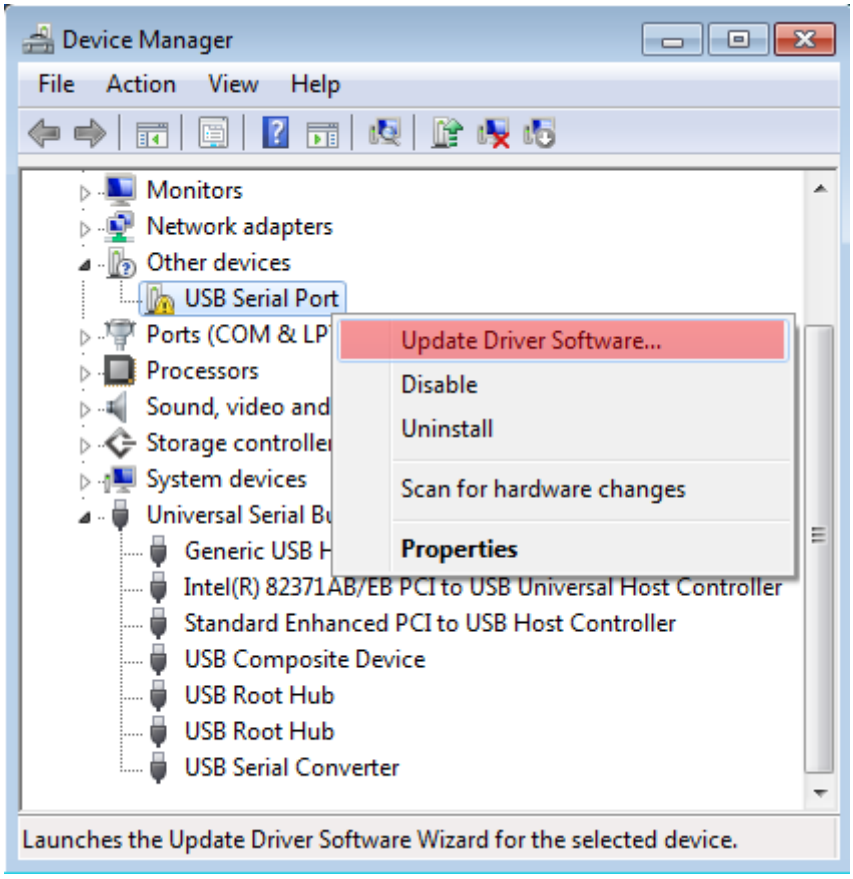


Fig. 13: Clicking Update driver Software...

10. Select and click Browse my computer for driver software.

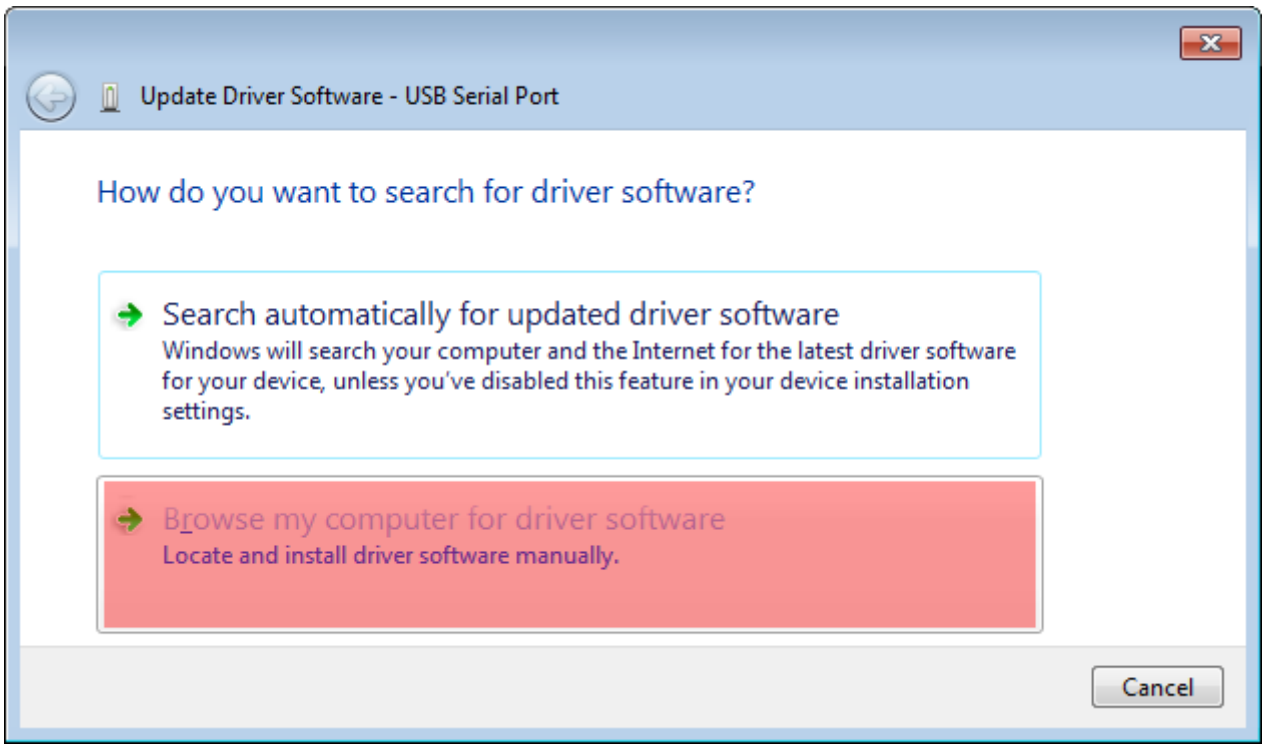


Fig. 14: Browse my computer for driver software

11. By Clicking Browse button select the folder for driver software.

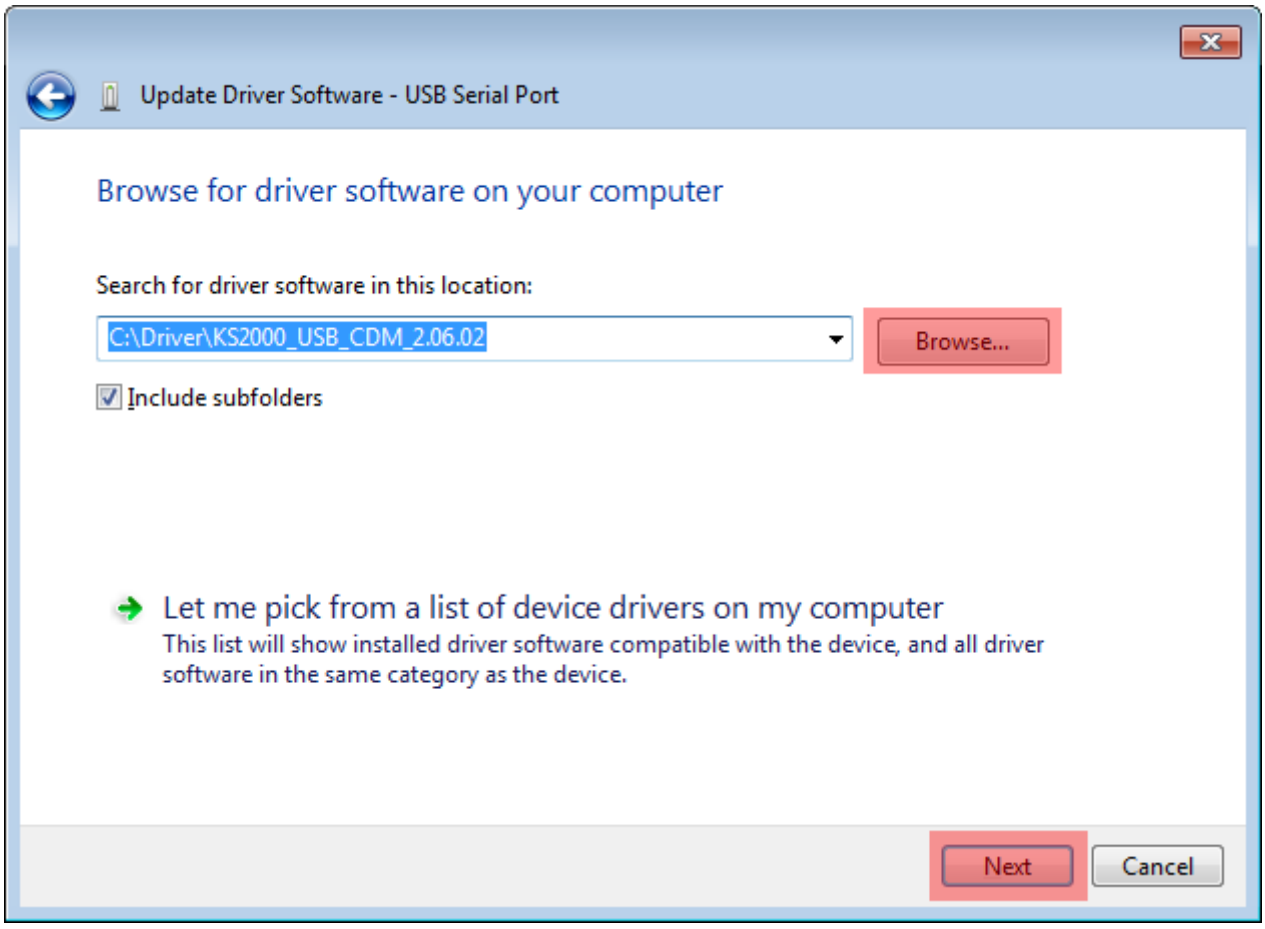


Fig. 15: Browse to folder for driver software

12. Would you like to install device software? The Windows Security wants a confirmation to install the driver software. Confirm by clicking the Install button.

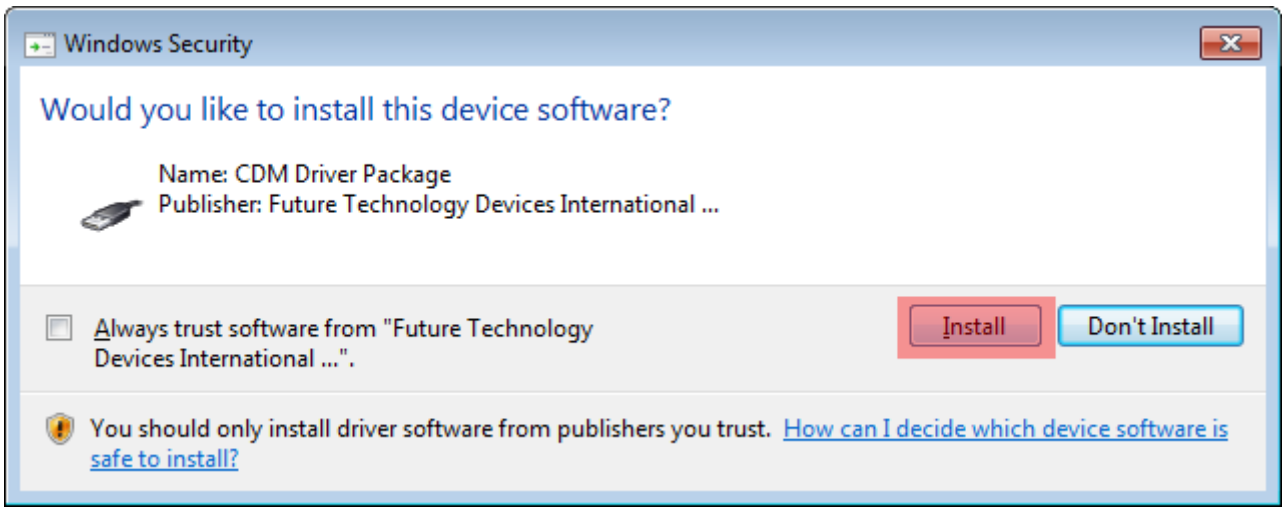


Fig. 16: Click Install

13. Windows has successfully installed the driver software for USB Serial Port.

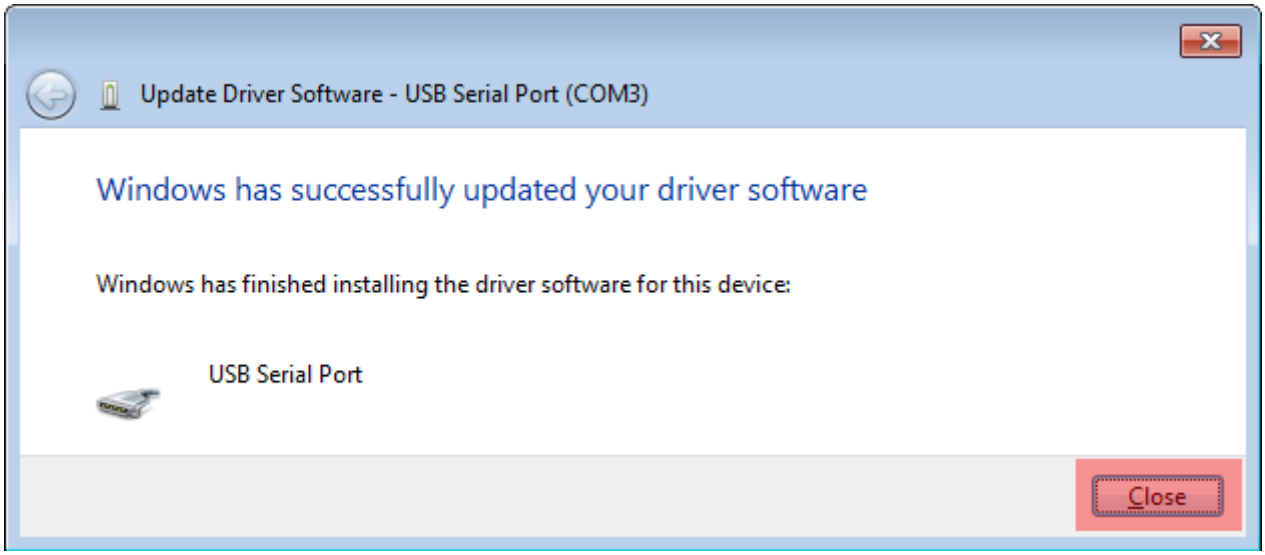


Fig. 17: Windows has successfully installed your driver software for USB Serial Converter

14. Now you see both devices in Device Manager. On the device USB Serial Port you can see which COM port number you can use.

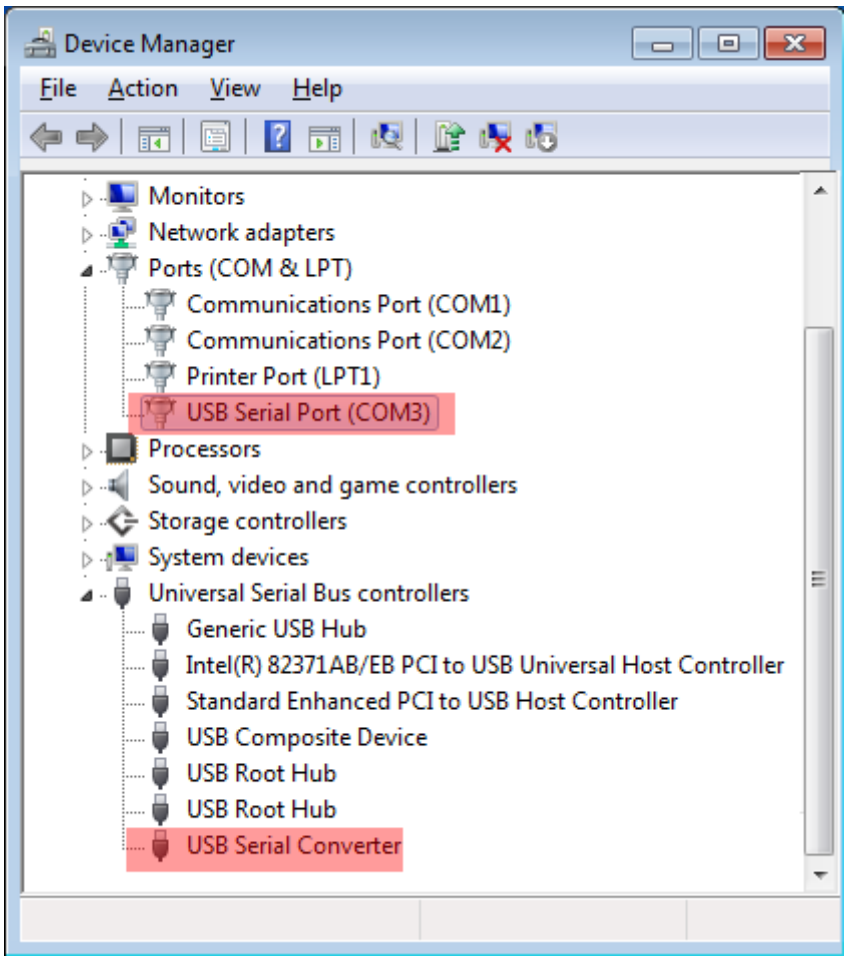


Fig. 18: Both devices in Device Manager

3.3 How to connect a Bus Terminal or Fieldbus Box to a computer?

1. connect the COM-port adapter to your computer
2. connect the other adapter to the configuration and programming interface

Use the original data cable!

Beckhoff can only guarantee a successful data exchange with their original data cable.

Bus Coupler and Bus Terminal Controller

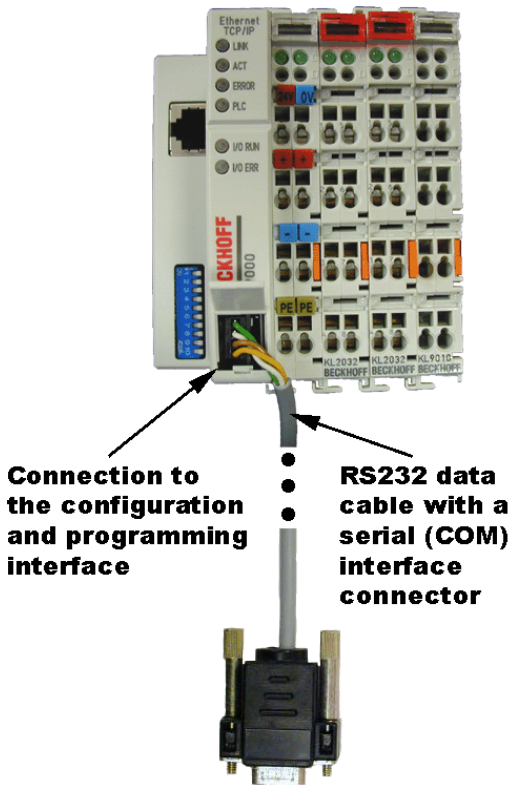


Fig. 19: Connection of Bus Coupler and Bus Terminal Controller

Fieldbus Box Modules

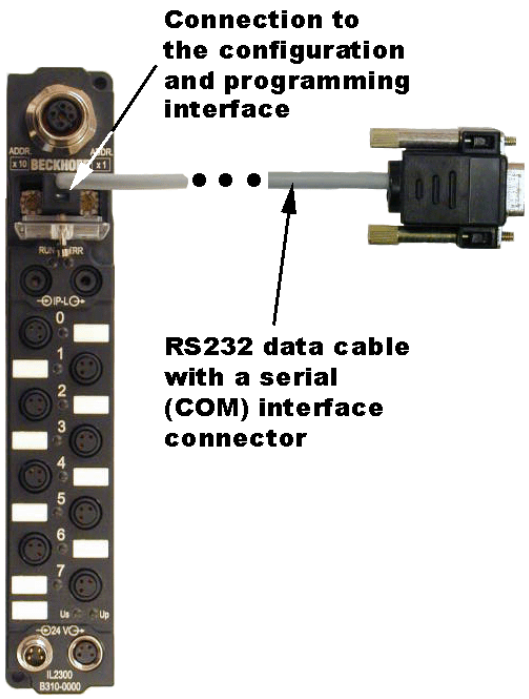


Fig. 20: Connection of Fieldbus Box Modules

3.4 How to set the language

The KS2000 is a multilingual software. It provides German and English. The picture shows you where to find the settings to change the language.

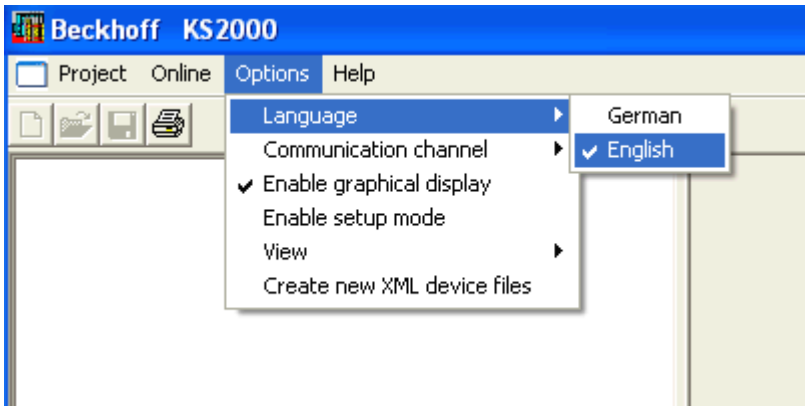


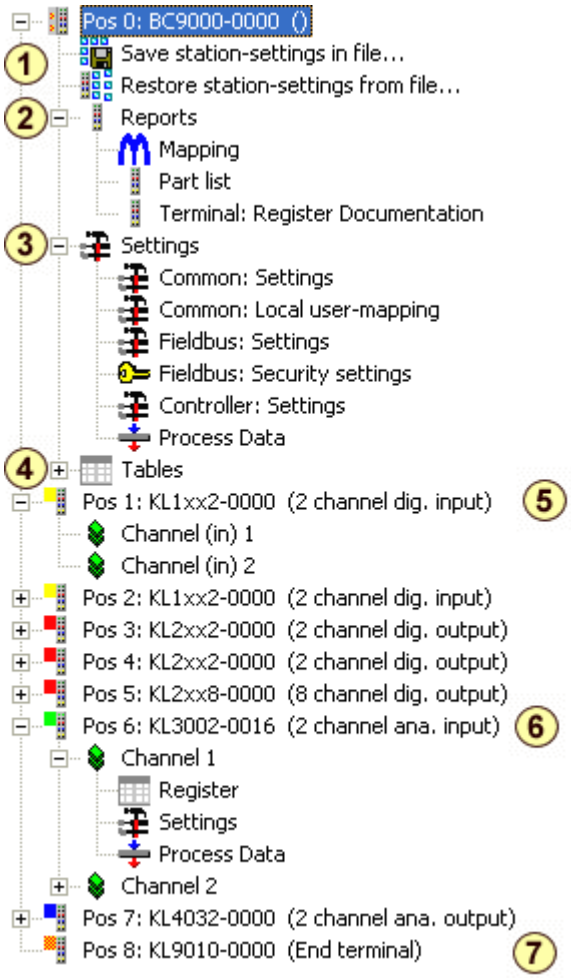
Fig. 21: Setting the language

3.5 Control and configuration menu

This is how the control and configuration menu can look like when you are online. The menu is designed to control and configure a connected terminal station easily. In the following we will introduce the menu and its general features to you.

If you have a look at the examples, you will find out, that the general look of the menu stays the same. Only specific features change when you connect different kind of Beckhoff components (Bus Terminals or Fieldbus Boxes).

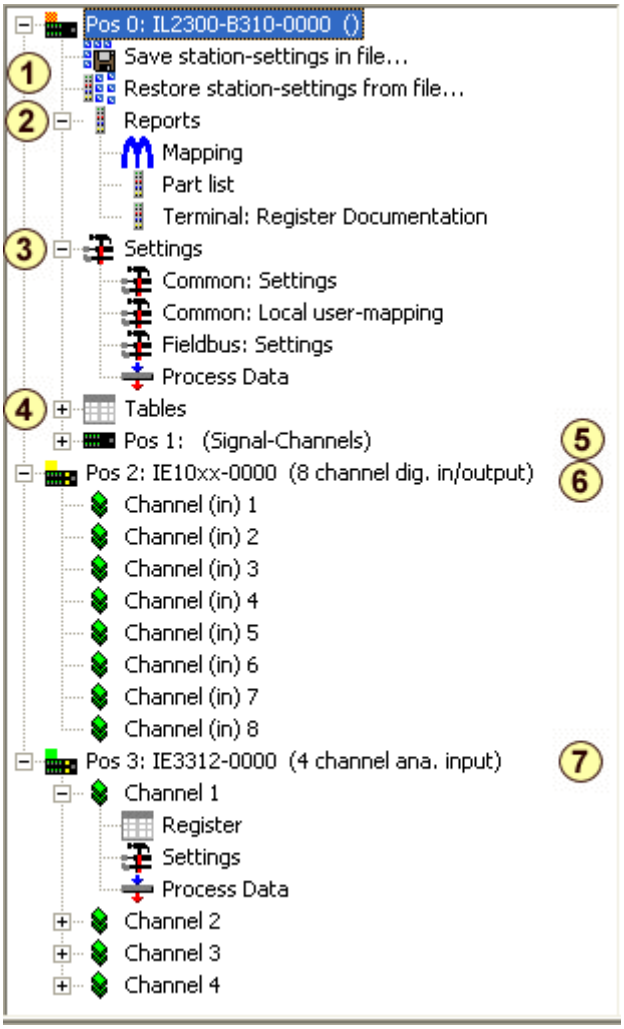
Bus Terminal



1. **Save station-settings in file... / Restore station-settings from file...:**
   With these two functions you can save and restore the station your are connected to.
2. **Reports:**
   This function provides you general information about a terminal station.
   - click *mapping* and you get the information about the I/O address and bit size of the connected terminals
   - click *pice list* and you get the information about the position and number of the connected parts
   - click *Terminal: Register Documentation* to save the register of a terminal into a script file
3. **Settings:**
   This function provides you general information about the settings of a terminal station.
   - click *Common: Settings* to do the settings for the K-bus, SPS Interface and the Process Data 1 - 4
   - click *Common: Local user-mapping* to define the specific sequence of your connected terminals
   - click *Fieldbus: Settings* to do the specific fieldbus configuration.
   - click *Controller: Settings* to do the specific controller configuration **(only available when a controller is connected)**
   - click *Process Data* to do a direct configuration of your K-bus I/O process image
4. **Tables:**
   If you want to configure a terminal station directly and without menues, then click *tables* and a list of different tables will appear. Select the table you want to change and type in the information.
   This function should be used only from advanced users!
5. **digital Terminals:**
   From here all digital terminals are listed.
   - click *Channel* and you will get detailed information about the process

6. **analog Terminals:**
   From here all analog terminals are listed.
   - click *Register* to do a direct configuration in the register of the terminal
   - click *Settings* to do a general configuration of the terminal
   - click *Process Data* and you will get detailed information about the process.
7. **End terminal**

Fieldbus Box



1. **Save station-settings in file... / Restore station-settings from file...:**
   With these two functions you can save and restore the station your are connected to.
2. **Reports:**
   This function provides you general information about the fieldbus box.
   - click *mapping* and you get the information about the I/O address and bit size of the connected terminals
   - click *pice list* and you get the information about the position and number of the connected parts
   - click *Terminal: Register Documentation* to save the register of a terminal into a script file
3. **Settings:**
   This function provides you general information about the settings of the fieldbus box.
   - click *Common: Settings* to do the settings for the K-bus, SPS Interface and the Process Data 1 - 4
   - click *Common: Local user-mapping* to define the specific sequence of your connected extension boxes

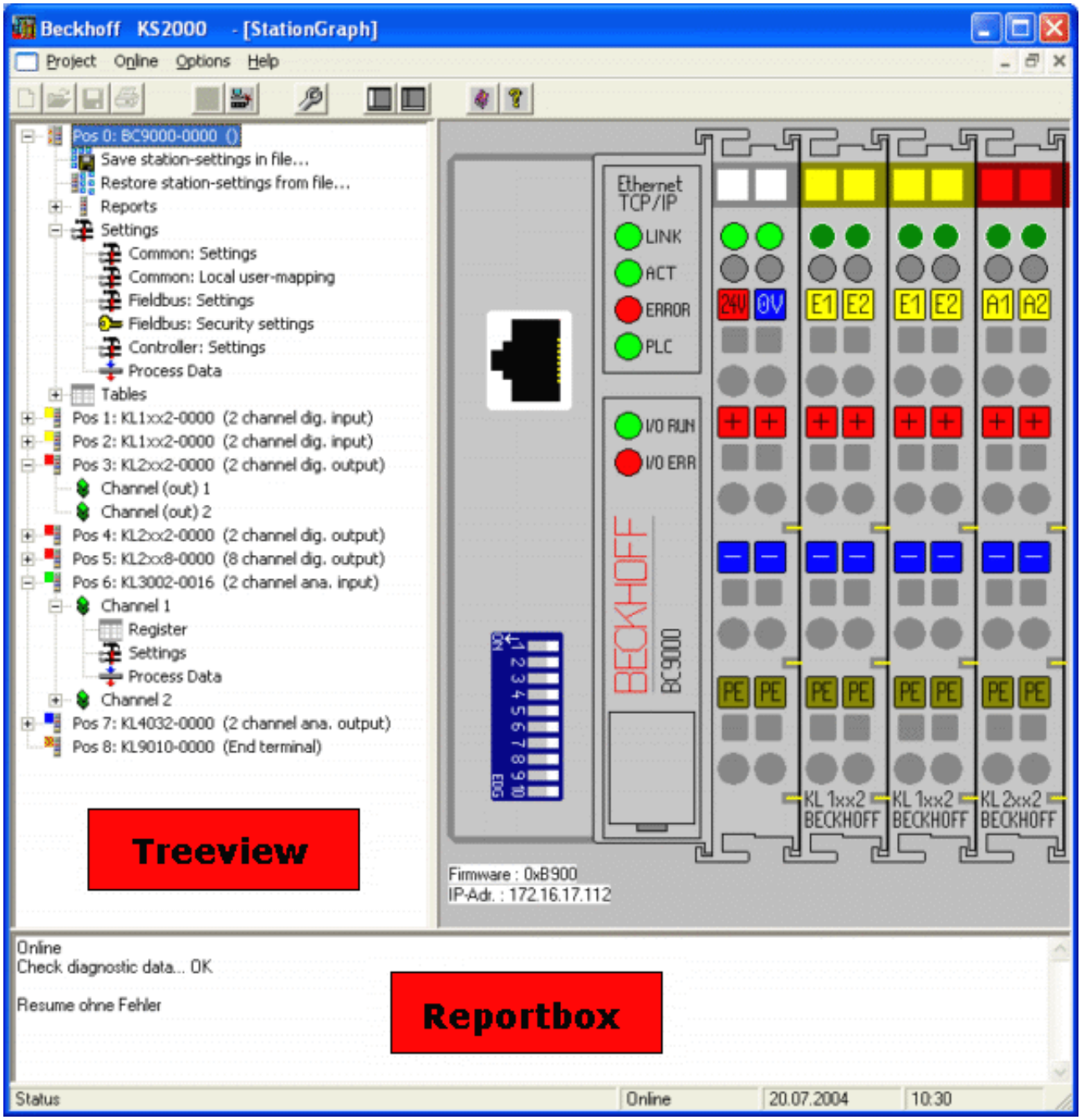
- click *Fieldbus: Settings* to do the specific fieldbus configuration
- click *Process Data* to do a direct configuration of your K-bus I/O process image

4. **Tables:**
   If you want to configure a Fieldbus Box directly and without menues, then click *tables* and a list of different tables will appear. Select the table you want to change and type in the information.
   This function should be used only from advanced users!
5. **Signal-Channels:** I/Os of the (compact, coupler, plc) box
6. **digital extension boxes:**
   From here all digital extension boxes are listed.
   - click *Channel* and you will get detailed information about the process
7. **analog extension boxes:**
   From here all analog terminals are listed.

- click *Register* to do a direct configuration in the register of the extension boxes
- click *Settings* to do a general configuration of the extension boxes
- click *ProcData* and you will get detailed information about the process

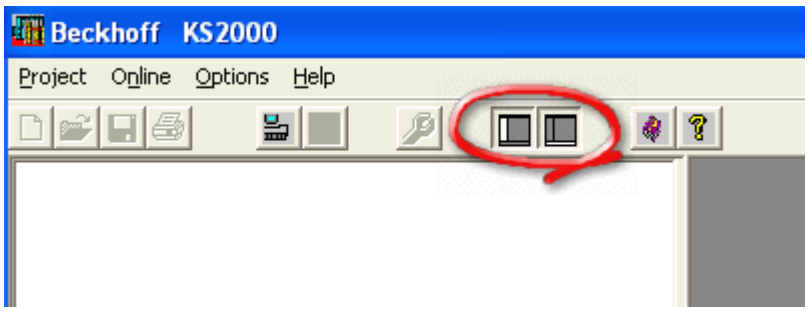
3.6 How to do the view settings?

To make it easier to navigate you can activate or deactivate the views *Treeview* and *Reportbox*.



There are two ways of changing the views

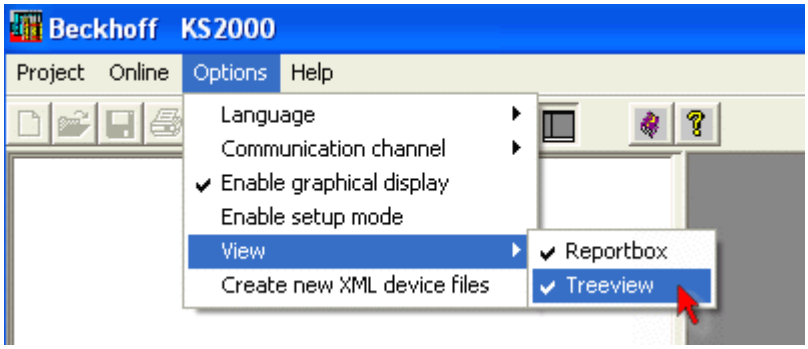
Select from the tool bar the view buttons.



click onto the buttons to activate or deactivate the view.

step 1: click onto *Options* in the menu bar.

step 2: Then hover onto *View* and click onto the view you want to activate or deactivate.



3.7 Commissioning and diagnostic with KS2000

3.7.1 Which firmware support's the new KS2000 features

Bus Coupler / Bus Terminal Controller

NOTICE

The Commissioning Mode requires certain firmware versions on the Bus Coupler or the Bus Terminal Controller. The firmware version is specified at the rear of the Bus Coupler (see example below for CANopen). If required, the firmware can be updated via the serial port (KS2000 cable required) or - depending on the bus system - via the fieldbus. The current firmware versions and the program for the firmware update can be found on www.beckhoff.com.

Fieldbus System	Bus Coupler / Bus Terminal Controller	Firmware version required on the Bus Coupler / Bus Terminal Controller for the Commissioning Mode
Lightbus	BK2020	in preparation (B1)
Profibus	BK3000	not supported
	BK3010	BA
	BK3100	not supported
	BK3110, BK3120	BA
	BK3150	in preparation (B0)
	BK3500, BK3520	BA
	LC3100	BA
	BC3100	in preparation (C4)
	BX3100	in preparation (1.00)
Interbus	BK4020	not supported
	BC4000	not supported
CANopen	BK5120	B0
	BX5100	in preparation (1.00)
DeviceNet	BK5220	in preparation
ControlNet	BK7000	BB
Modbus	BK7300	in preparation (B4)
Sercos	BK7500, BK7520	not supported
Fip IO	BK7420	B1
RS485	BK8000	not supported
RS232	BK8100	not supported
Ethernet	BK9000	in preparation (B9)
	BC9000	in preparation (BA)
USB	BK9500	not supported
CX	CX1100	in preparation (B4)

Not listed Bus Coupler and Bus Terminal Controller are not prepared for the Commissioning Mode.

Fieldbus Box

NOTICE

The Commissioning Mode requires certain firmware versions on the Fieldbus Box. The firmware version is specified at the side of the Fieldbus Box. If required, the firmware can be updated via the serial port (KS2000 cable required) or - depending on the bus system - via the fieldbus. The current firmware versions and the program for the firmware update can be found on our home page at www.beckhoff.com.

Fieldbus System	Fieldbus Box	Firmware version required on the Fieldbus Box for the Commissioning Mode
Lightbus	IPxxxx-B200	in preparation
	IL230x-B200	in preparation
Profibus	IPxxxx-B31x	in preparation (B5)
	IL230x-B31x	in preparation (B3)
	IL230x-C31x	in preparation (B2)
Interbus	IPxxxx-B400	not supported
	IL230x-B400	not supported
CANopen	IPxxxx-B51x	in preparation (C5)
	IL230x-B51x	in preparation (C5)
DeviceNet	IPxxxx-B52x	in preparation
	IL230x-B52x	in preparation
Modbus	IPxxxx-B730	in preparation
	IL230x-B730	in preparation
RS485	IPxxxx-B800	in preparation
	IL230x-B800	in preparation
RS232	IPxxxx-B810	in preparation
	IL230x-B810	in preparation
Ethernet	IPxxxx-B900	in preparation
	IL230x-B900	in preparation

3.7.2 The KS2000 graphical display

The KS2000 graphical display provides you an overview of the most important information of a terminal station.

1. Graphic display of the connected coupler/controller and terminals
2. Gives you information about the:
   - - Firmware- IP-Adr
   - - Process data
3. The mouse pointer will change when you hover onto the outputs. With a double click you can force a value to this channel.

Example

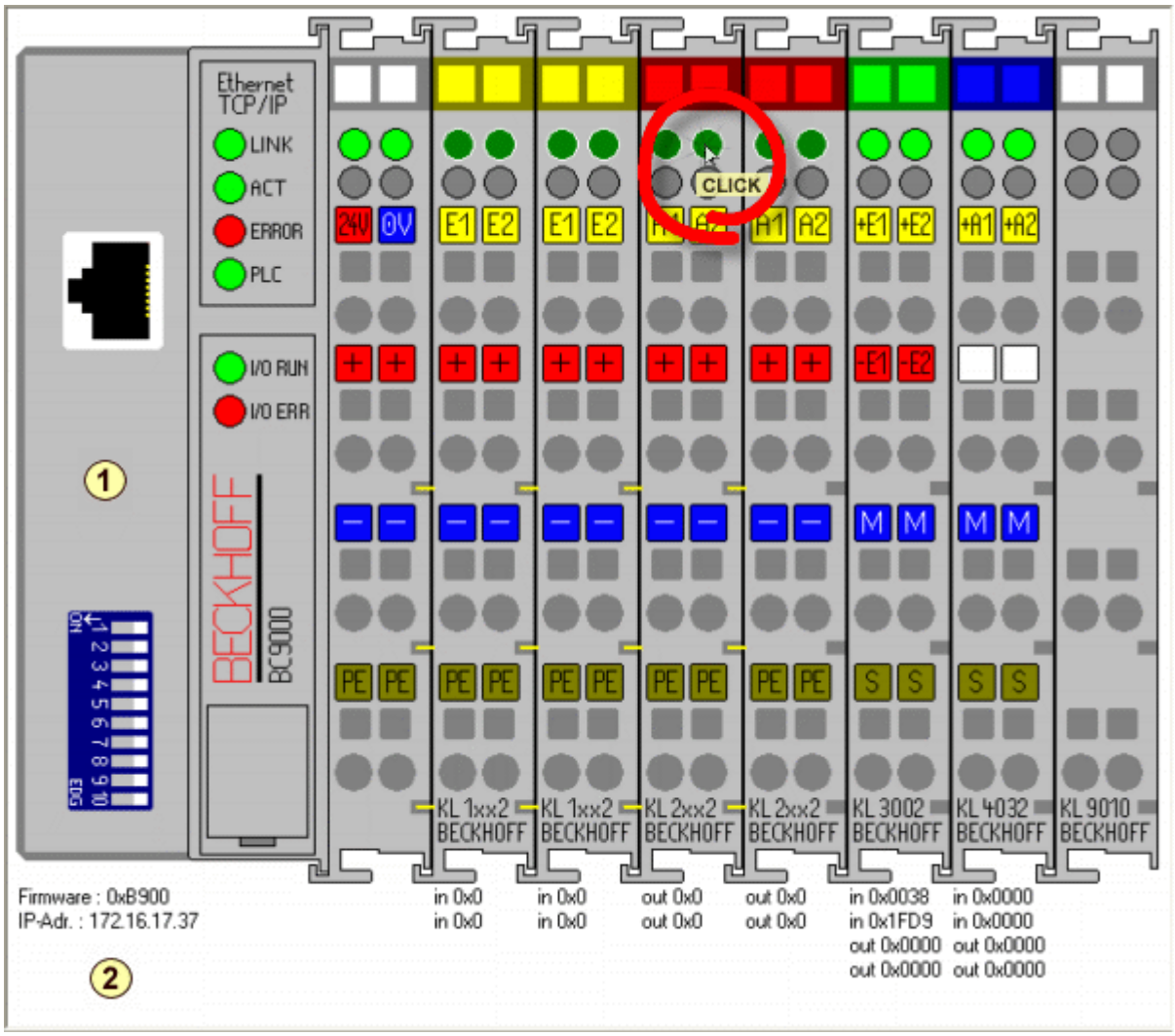


Fig. 22: Graphic display of the connected coupler/controller and terminals

3.7.3 Mapping report

The *Mapping Report* provides information about:

- The I/O address of all terminals
- The I/O bit size of all terminals
- The bit sum of the I/O
- The possibility to print or export the mapping.

Example

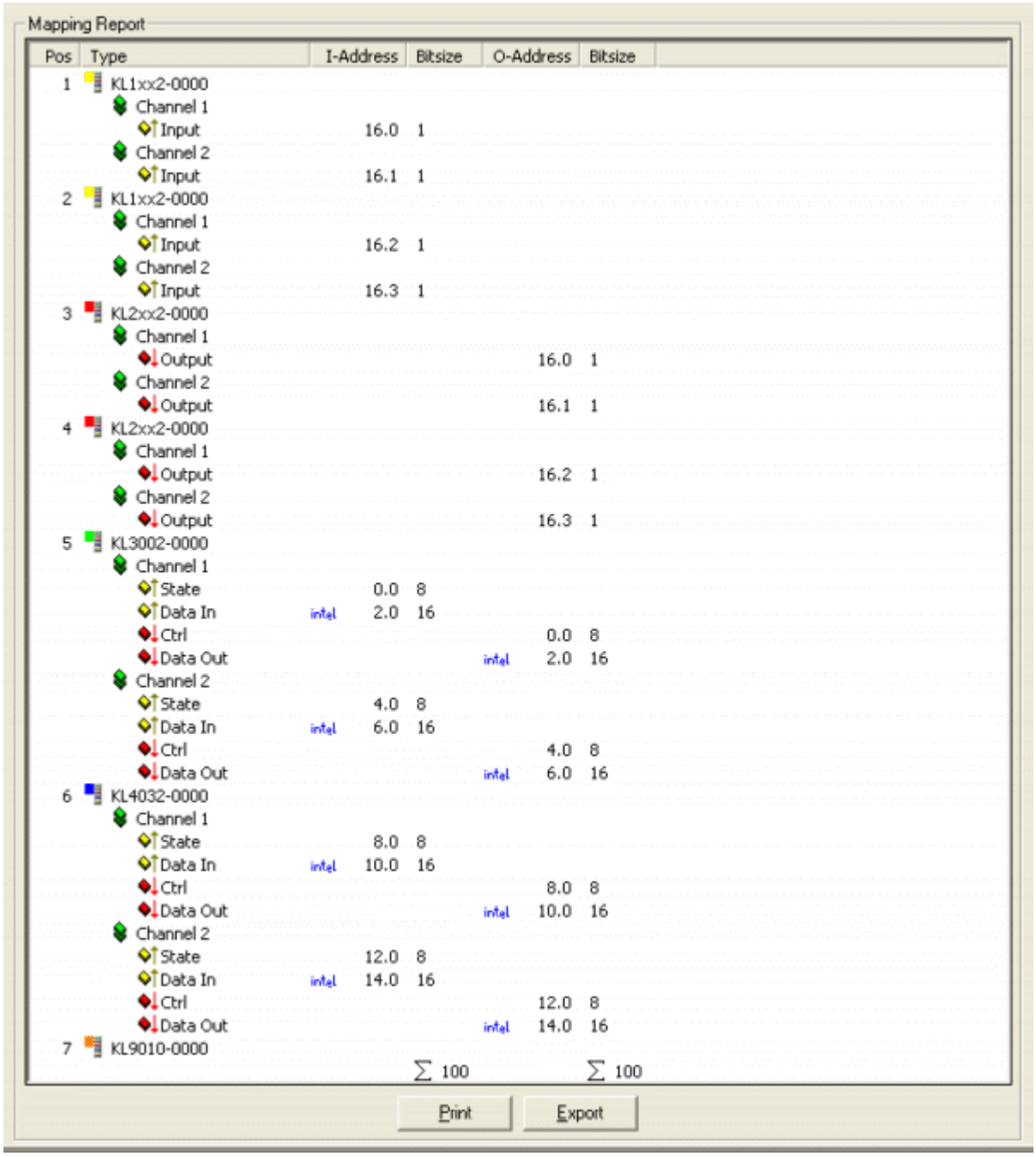


Fig. 23: Mapping report

3.7.4 Part list

The *Part List* gives an overview about:

- The order of the connected coupler/controller and terminals
- The quantity of the connected coupler/controller and terminals

Example

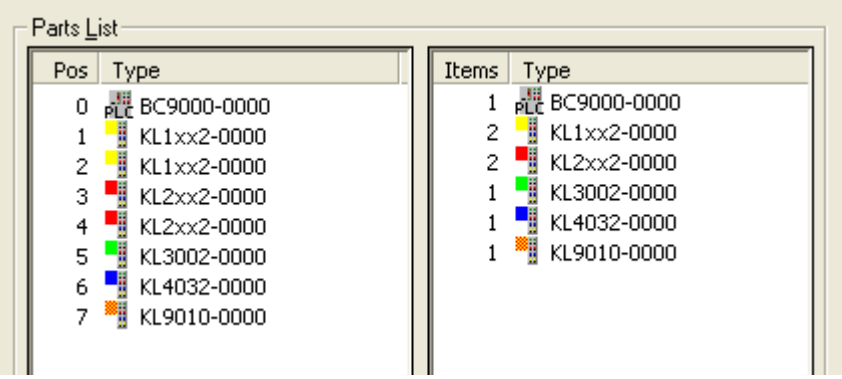


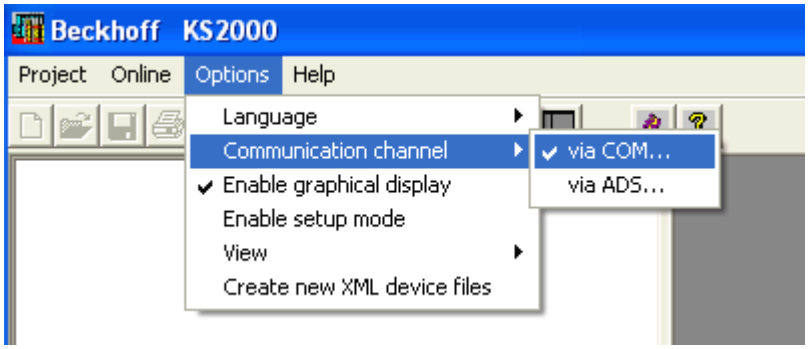
Fig. 24: Part list

3.8 How to get online and offline

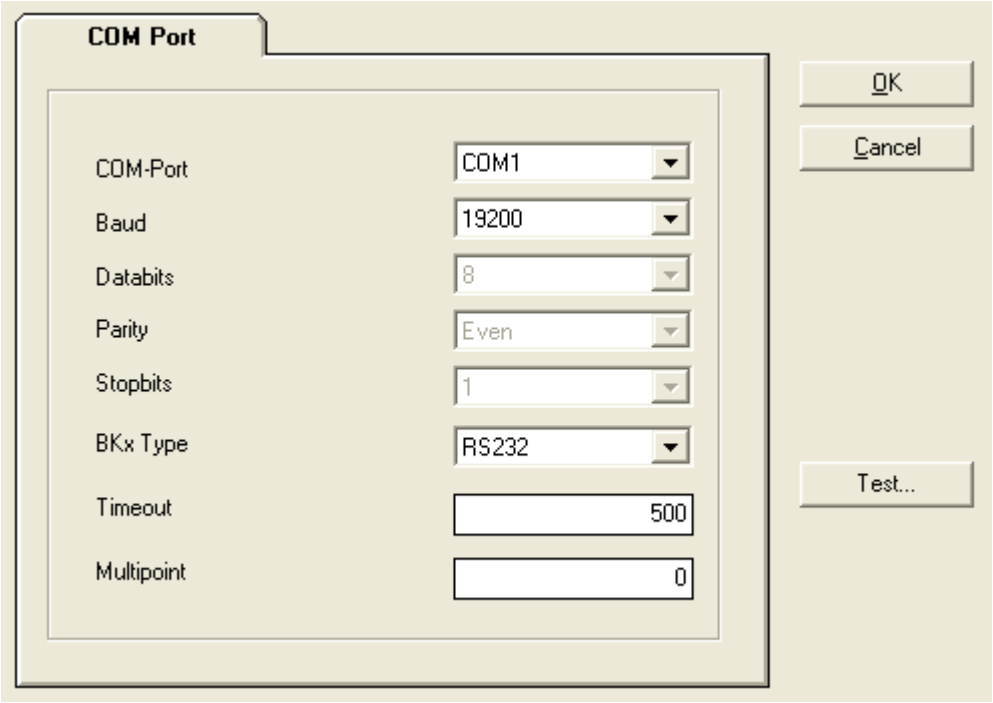
3.8.1 Communication via a COM port

In the following we will show you how to establish a communication via a COM port.

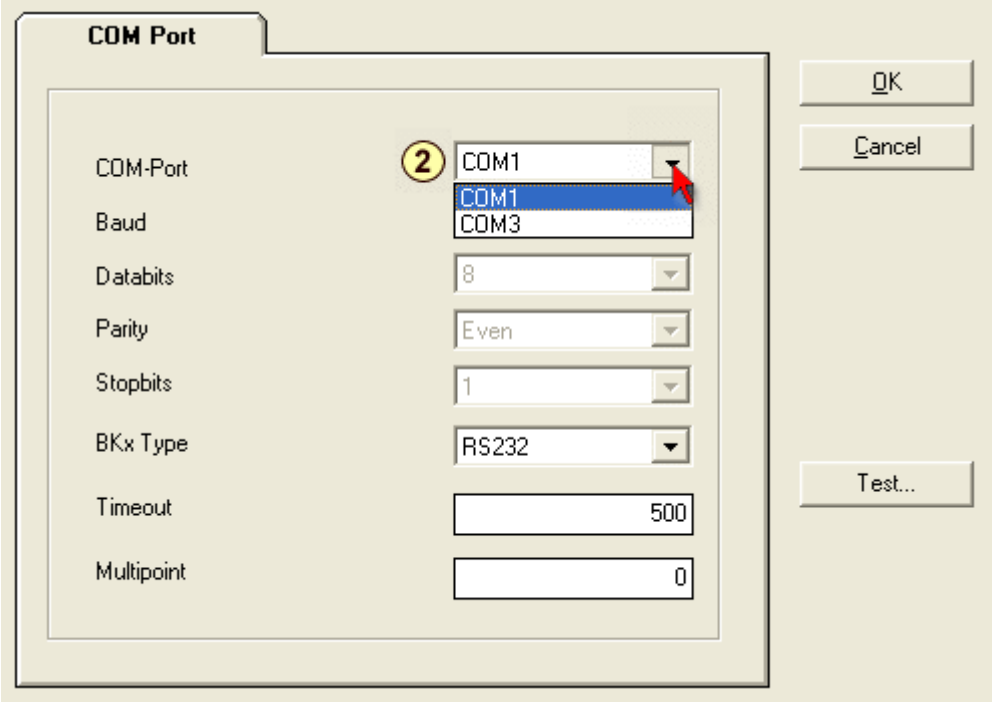
step 1: Click on *Options* in the menu bar. Then hover onto *Communication channel* and do a double click on *via COM...*



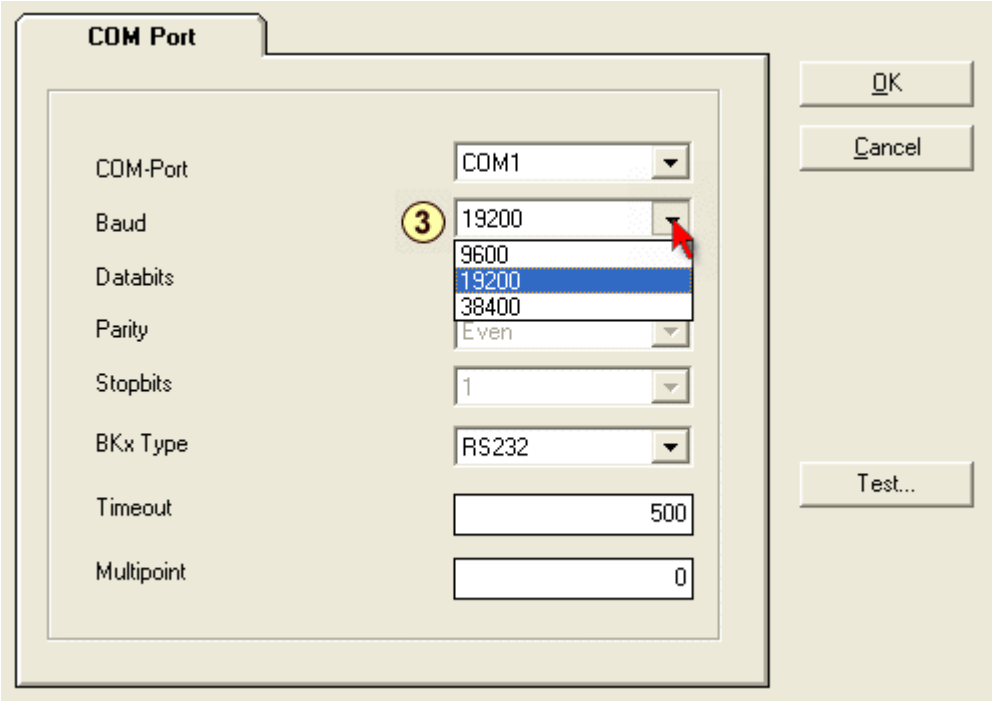
The following menu appears:



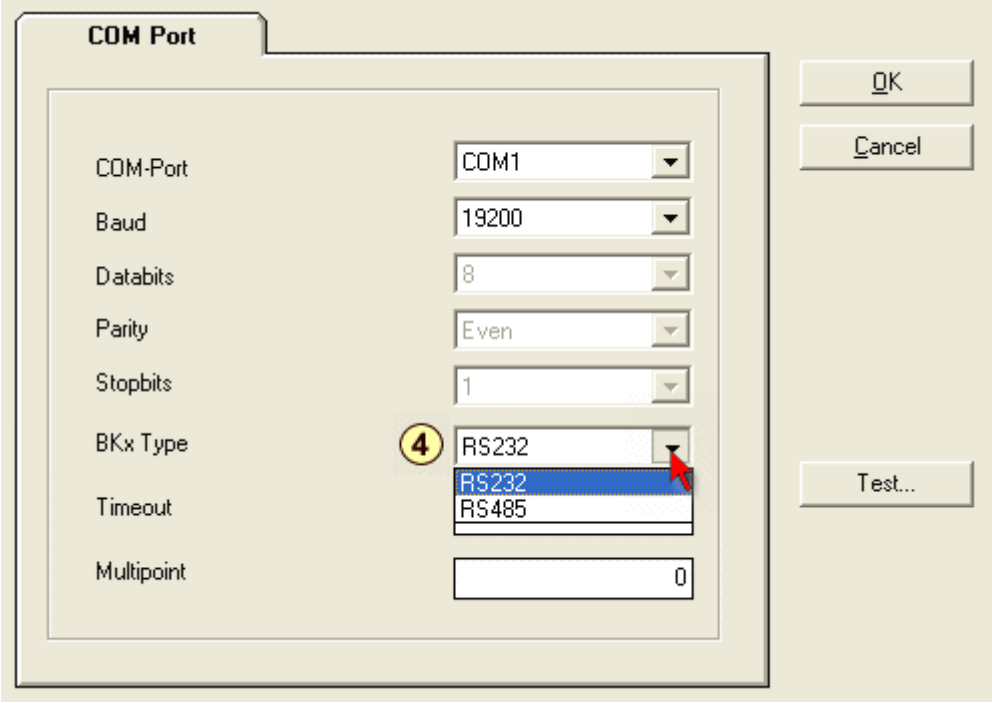
step 2: Click the pull-down menu. It could be, that there are more than one COM-port is available. Choose the COM-port your data cable is connected to.



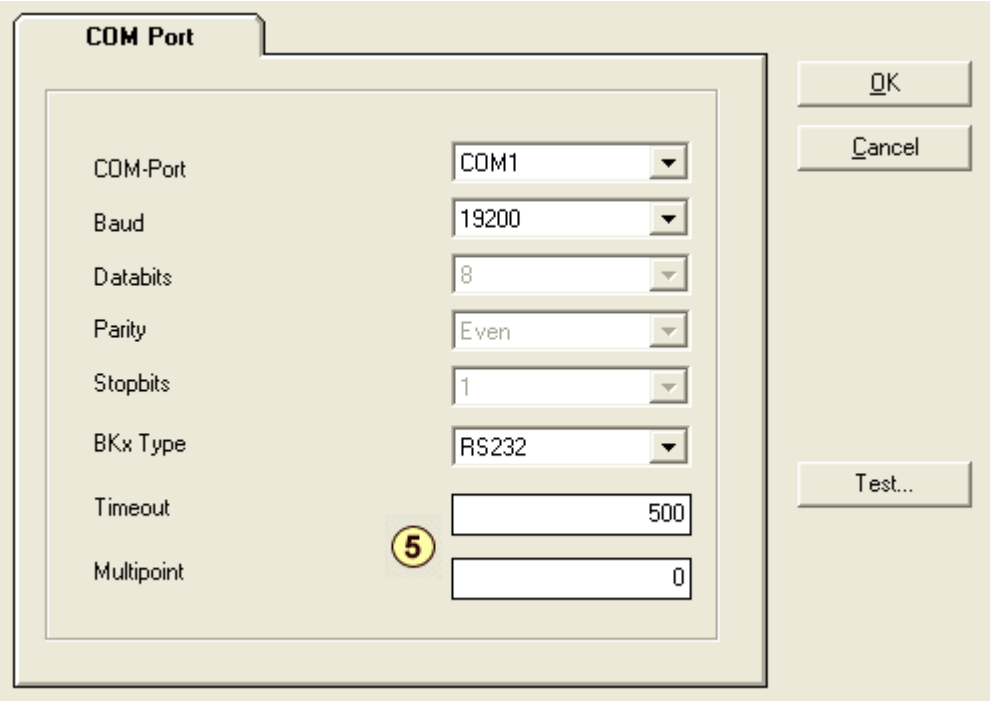
step 3: Change the baud rate to 19200 if something else is selected. Therefor click the pull-down menu and choose 19200.



step 4: To setup a peer to peer connection select RS232. Therefor click the pull-down menu and choose RS232.



step 5: Leave the settings if you don't use a BK8xxx or BC8xxx.



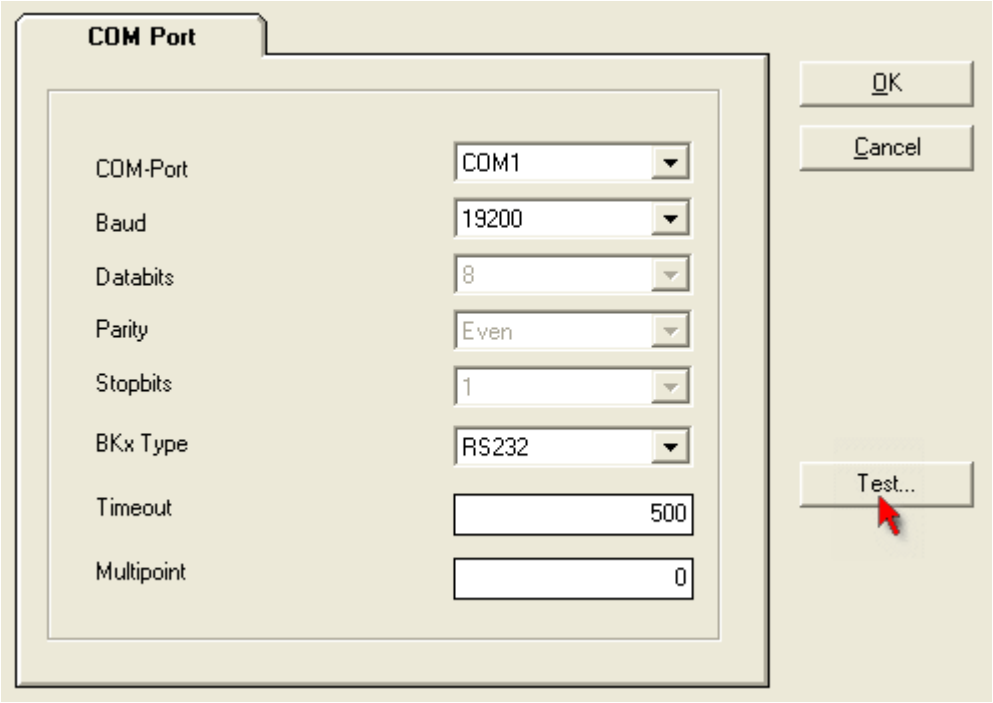
If you use a BK8xxx or BC8xxx:

1. check the address of the BK or BC you are connected to
2. Enter the address into the the *Multipoint* input box (therefor see the example)



Fig. 25: Example: Addess = 11

step 6: If you have done all the settings click *Test...*



The reason why you could get the following message:



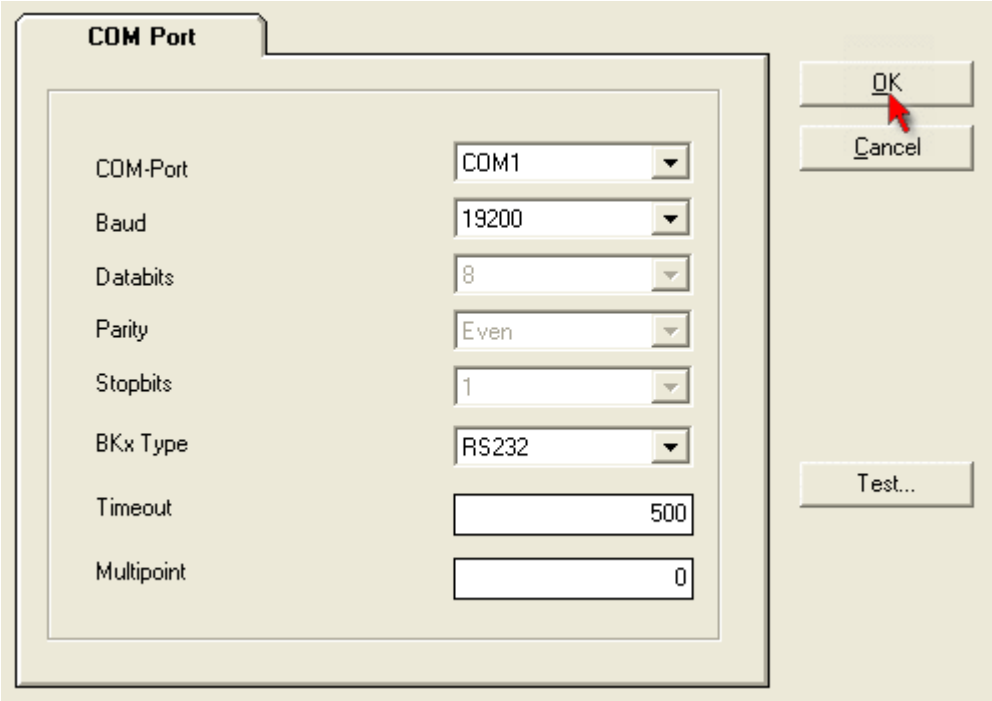
- The bus terminal does not have power
- You are not using the original Beckhoff data cable
- The data cable is wrongly connected
- The settings are not correctly

Check everything once again and click *Test...*

When you get this message, then the test was a success.



step 7: click *OK* to save the settings.



step 8: Go online [▶ 47]

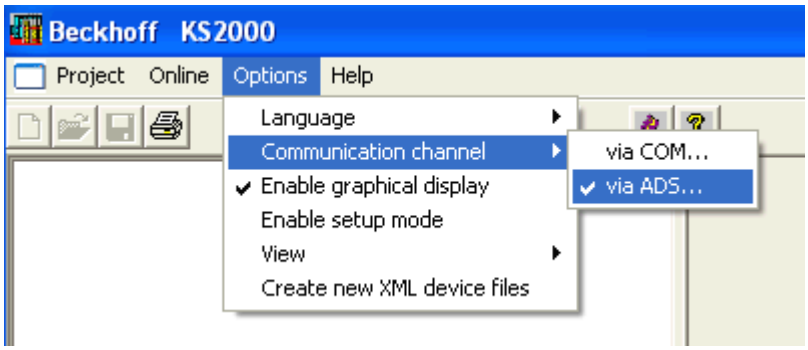
3.8.2 Communication via ADS

The following describes how to establish communication via ADS with a Beckhoff device of the **BK, BC**, **BX**, and **CX** series. This requires the AmsServerNetId and IP address of the target system.

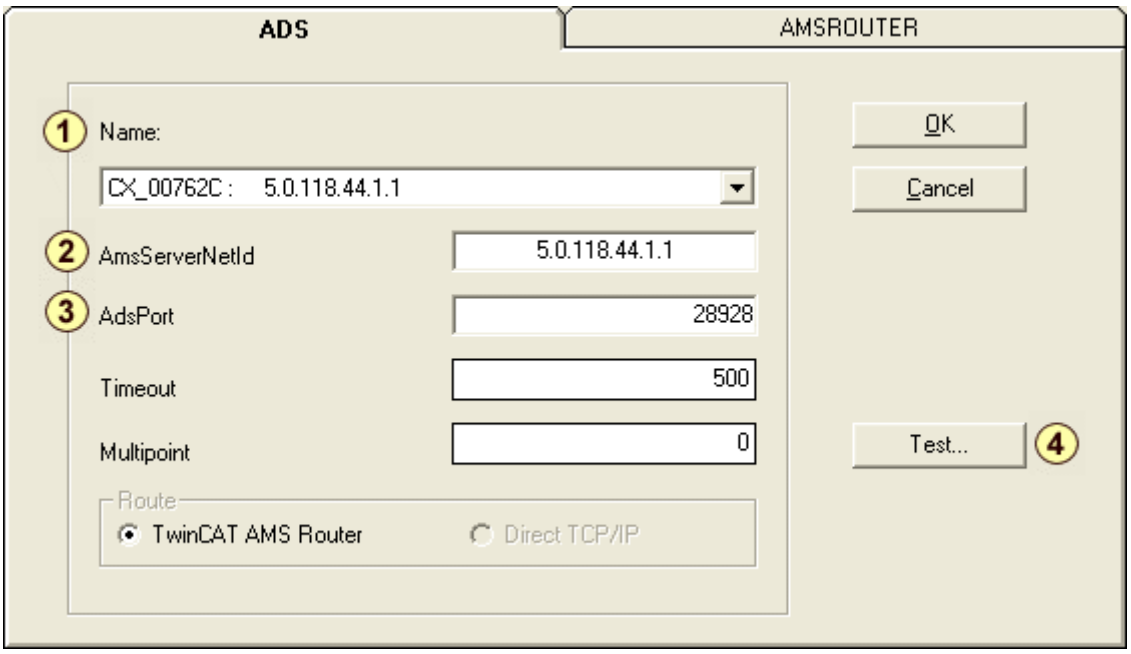
ADS router required

The TwinCAT ADS router is also required for ADS communication. It is included in:

- TC1000, TwinCAT 3 ADS
- TX1100, TwinCAT I/O



Step 1: Select or manually enter a device.



Selection of a registered device

Click on the **Name (1)** combo box and select a registered device from the name list.

- If you select a registered device from the name list, the **AmsServerNetId (2)** and **AdsPort (3)** are automatically adopted.
- Here you can change the settings for the **AdsPort**. This is essential when communicating with a Beckhoff device, as they have different AdsPorts:
  - The **BK**, **BC**, and **BX** series bus couplers and bus terminal controllers communicate via **ADS port 100** (default value).
  - The **CX1xxx** and **CX9xxx** series embedded PCs communicate via **ADS port 28928**.

Entering a device manually

If you want to enter a device manually, select **User Defined** in the name list.

- If you select **User Defined** from the **Name (1)** combo box in the name list, you must enter **AmsServerNetId (2)** and **AdsPort (3)** manually.

Step 2: Click on the **Test (4)** button to check the connection settings.

Possible causes for the following error message are:



- The terminals do not have sufficient power
- There is no connection
- The *AmsServerNetId* is invalid or an incorrect connection has been selected

The test was successful if the following dialog box appears.



Step 3: Click on the **OK** button to accept the set values.

Step 4: See chapter Login [▶ 47].

3.8.3 Communication with a CX

In the following we will show you how to establish a communication with a CX. Therefore, you need the AmsServerNetId, IP-Adress and Ads-Port of your target system.

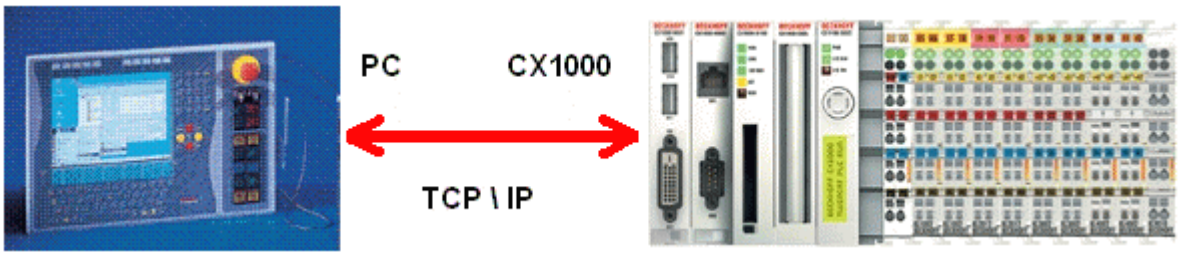
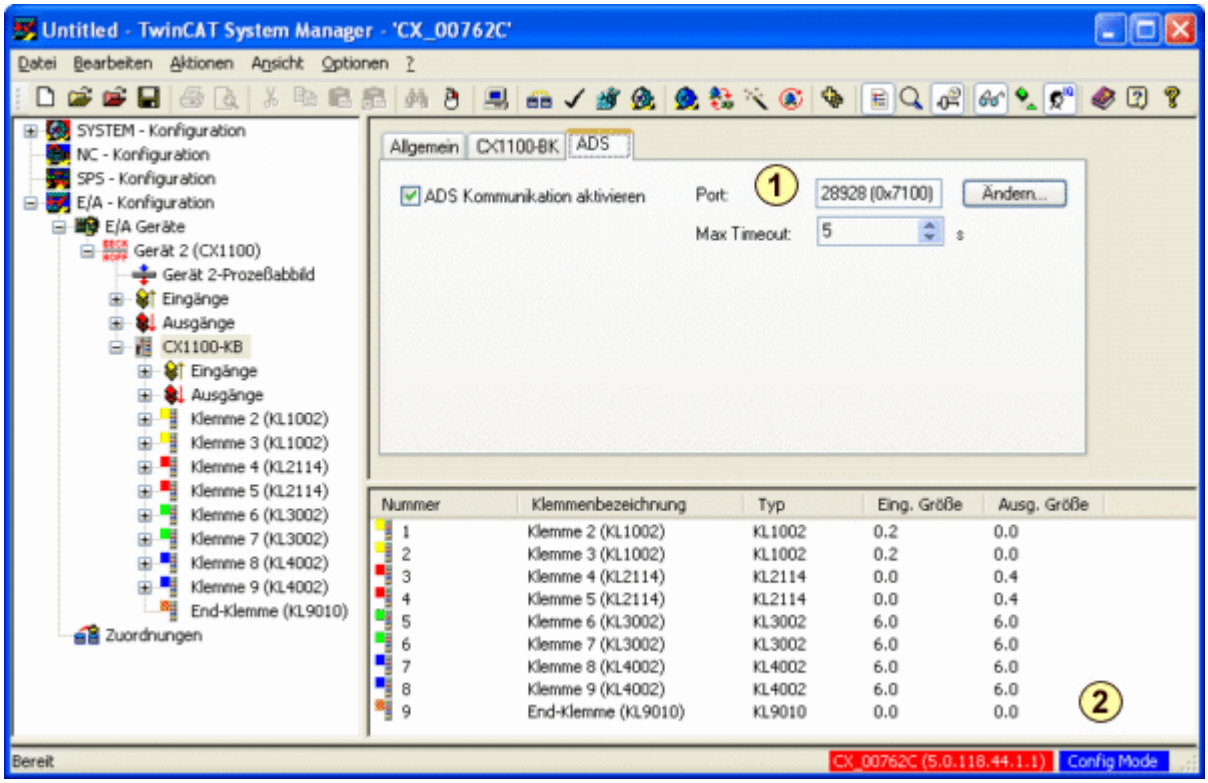


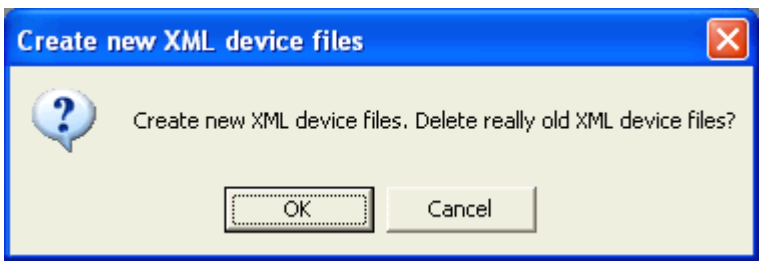
Fig. 26: Communication with a CX

step 1: Write down the Port Address from the TwinCAT System Manager of the CX you want to connect.

step 2: Start the *Config Mode*.



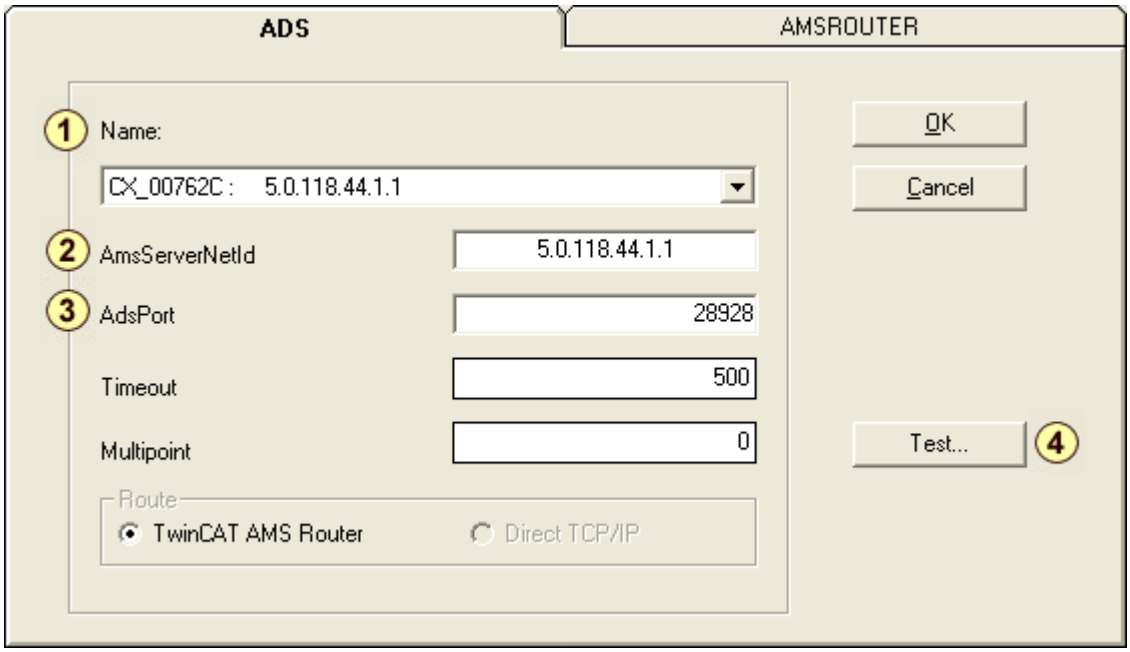
Dialog: See this topic [▶ 47] for further information:



step 3: Click onto the pull down menu **(1)** and choose between *User Defined* or devices from the list (e.g. CX0027E8: 5.0.39.232.1.1).

- **Device from the list:** All devices in the are defined in the AMS router of TwinCAT. When you select a device defined in the list, then the AmsServerNetId **(2)** will automatically be entered. Now you have to type in the *AdsPort***(3)**, which you have written down in *step 1*. This must be done, because the CX can use different addresses for the AdsPort. In our e.g. it would be the address "28928" instead of "100". Click onto *Test...***(4)** to check your entries.

- **User Defined:** Select *User Defined*, if the device you want to connect is not entered in TwinCAT. Then you have to type in manually the *AmsSerNetId***(2)** and *AdsPort***(3)**. When you are finished click onto *Test...***(4)** to check your entries.



step 4: The test was successful, when you get this message. Click *OK* to close the message box.



step 5: Click *OK* to save the settings.

step 6: Go online [▶ 47].

3.8.4 How to get online and offline?

There are two ways to get on/off line.

To get online:

Select from the tool bar the *Login* button.

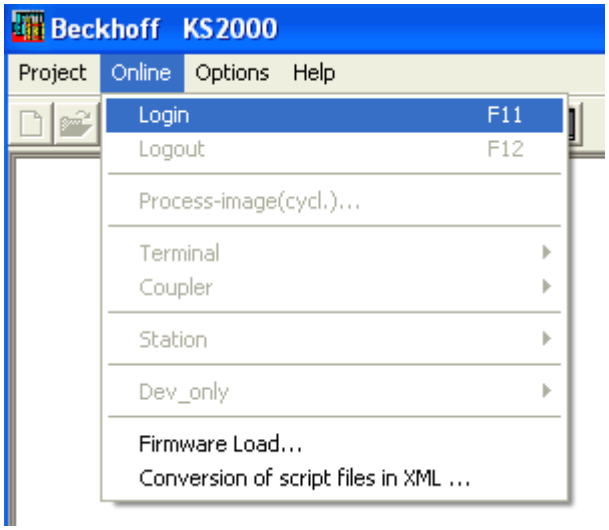


click the *Login* button

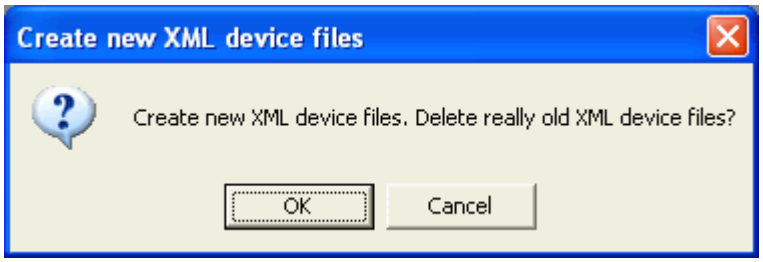


step 1: click on *Online* in the menu bar.

step 2: click *Login*.



Dialog: See this topic [▶ 85] for further information



Example with BC/BK

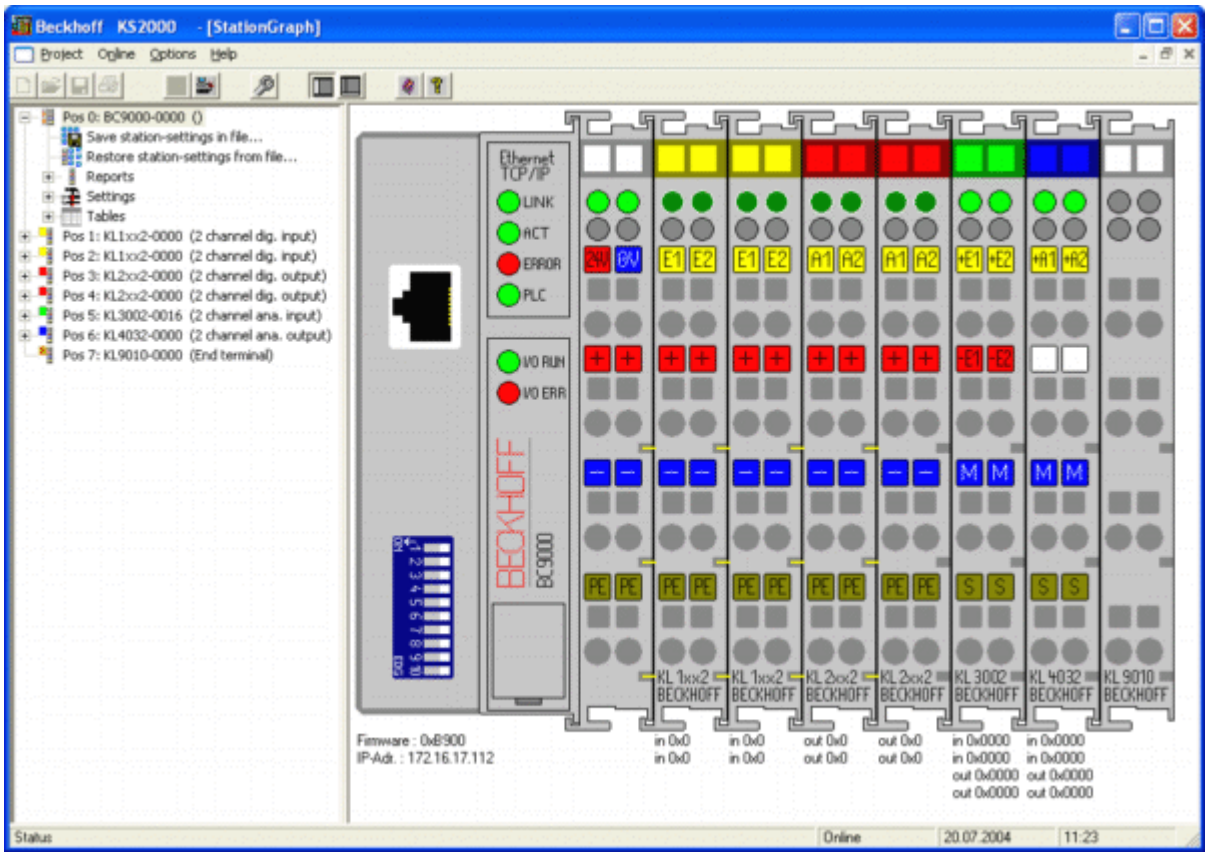


Fig. 27: Online screen when a BC/BK with bus terminals is connected

Example with fieldbus box

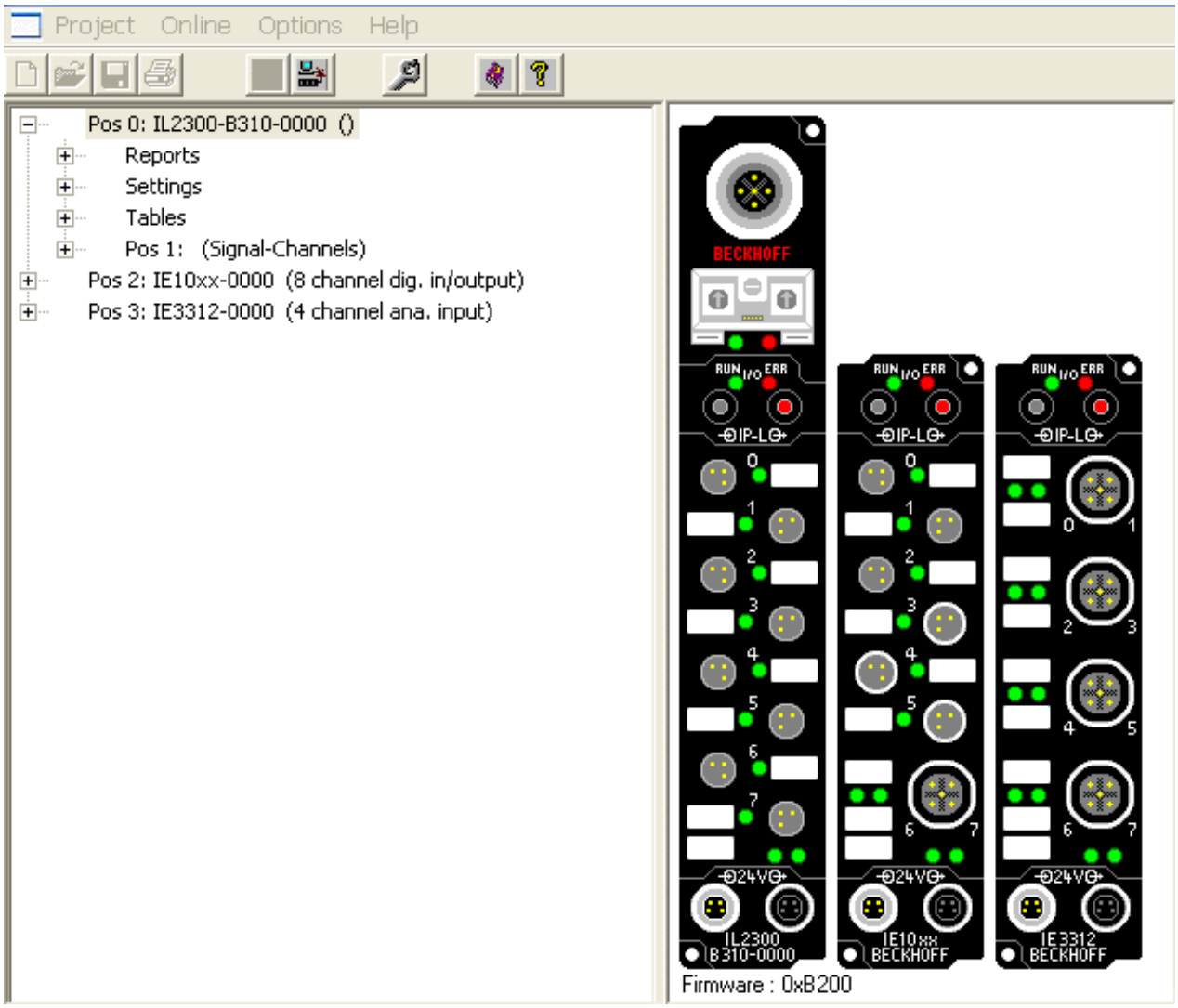


Fig. 28: Online screen when a fieldbus box is connected

Example with CX

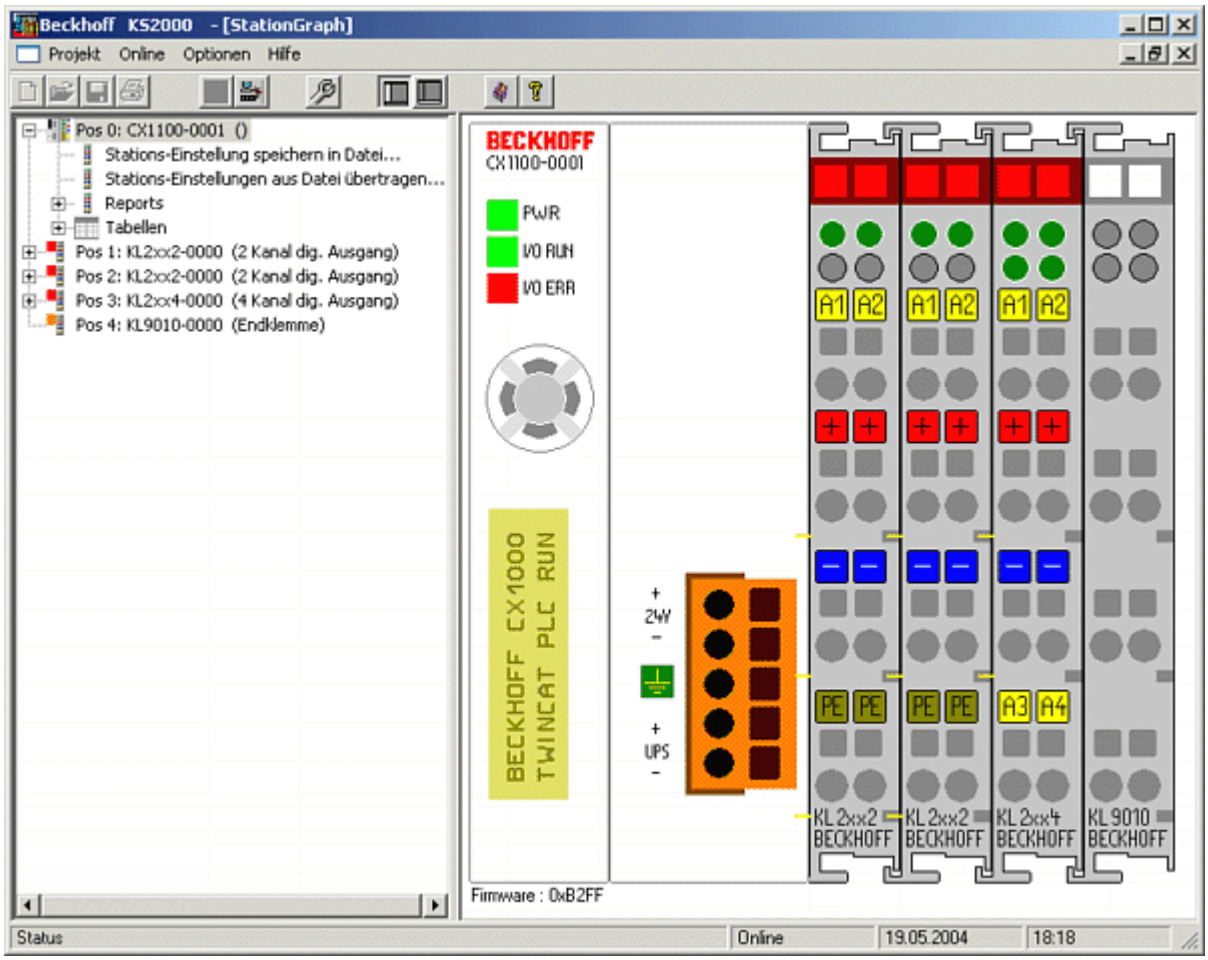


Fig. 29: Online screen when a CX is connected

To get offline:

Select from the tool bar the *Logout* button.

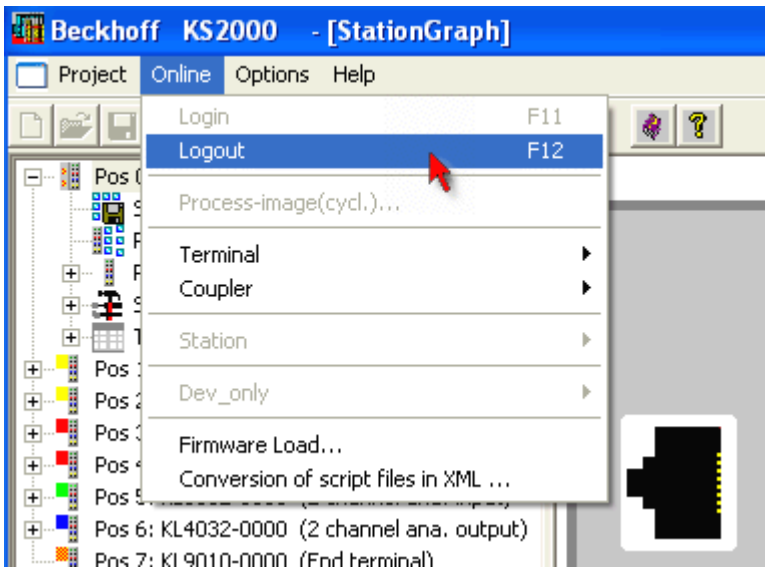


click the *Logout* button



step 1: click on *Online* in the menu bar.

step 2: click *Logout*.



3.9 Coupler and Controller

3.9.1 About the Coupler service menu

There are two ways to enter the coupler services.

Select from the tool bar the *coupler service* button.

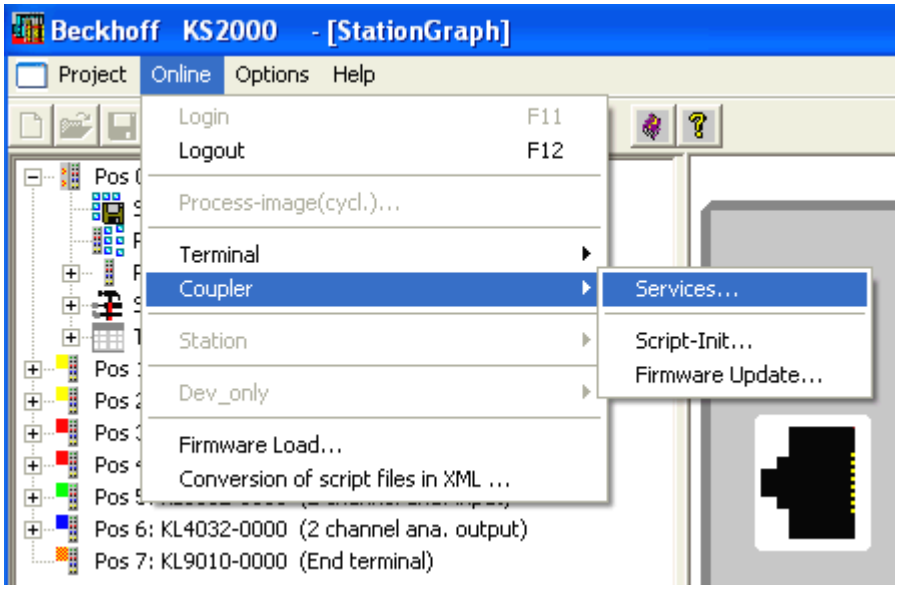


click the *coupler service* button

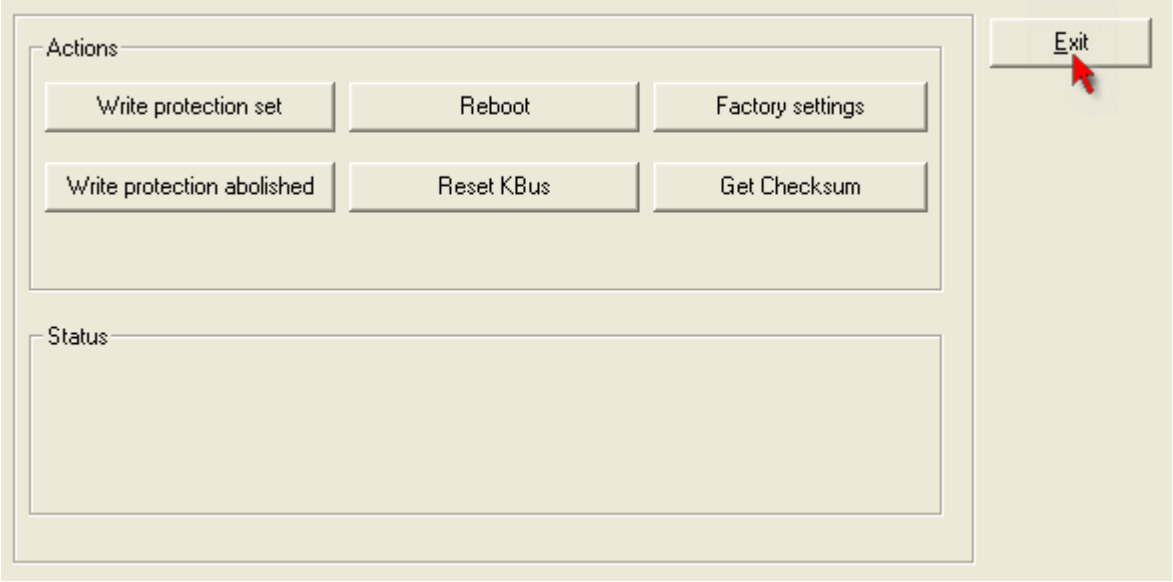


step 1: click on *Online* in the menu bar.

step 2: hover onto *Coupler* and click *Services*.



Coupler Service menu:



Write protection set: enables the write protection of the coupler

Write protection abolished: disables the write protection of the coupler

Reset KBus: does a K-bus reset

Factory settings: does a software reset to default settings

Get Checksum: does a checksum test

Reboot: does a hardware reset and reboot

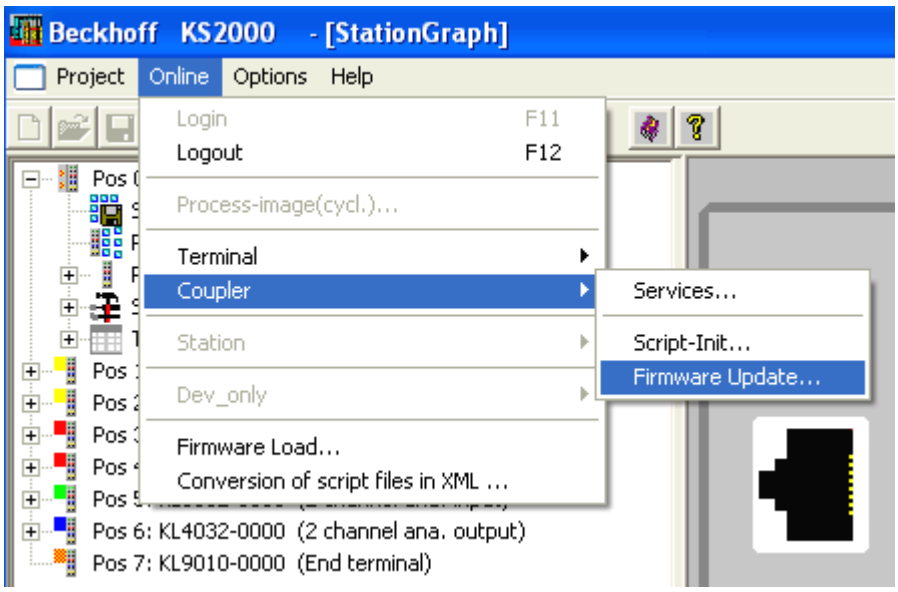
Click *Exit* to leave the *coupler service* menu.

3.9.2 How to do a coupler software update?

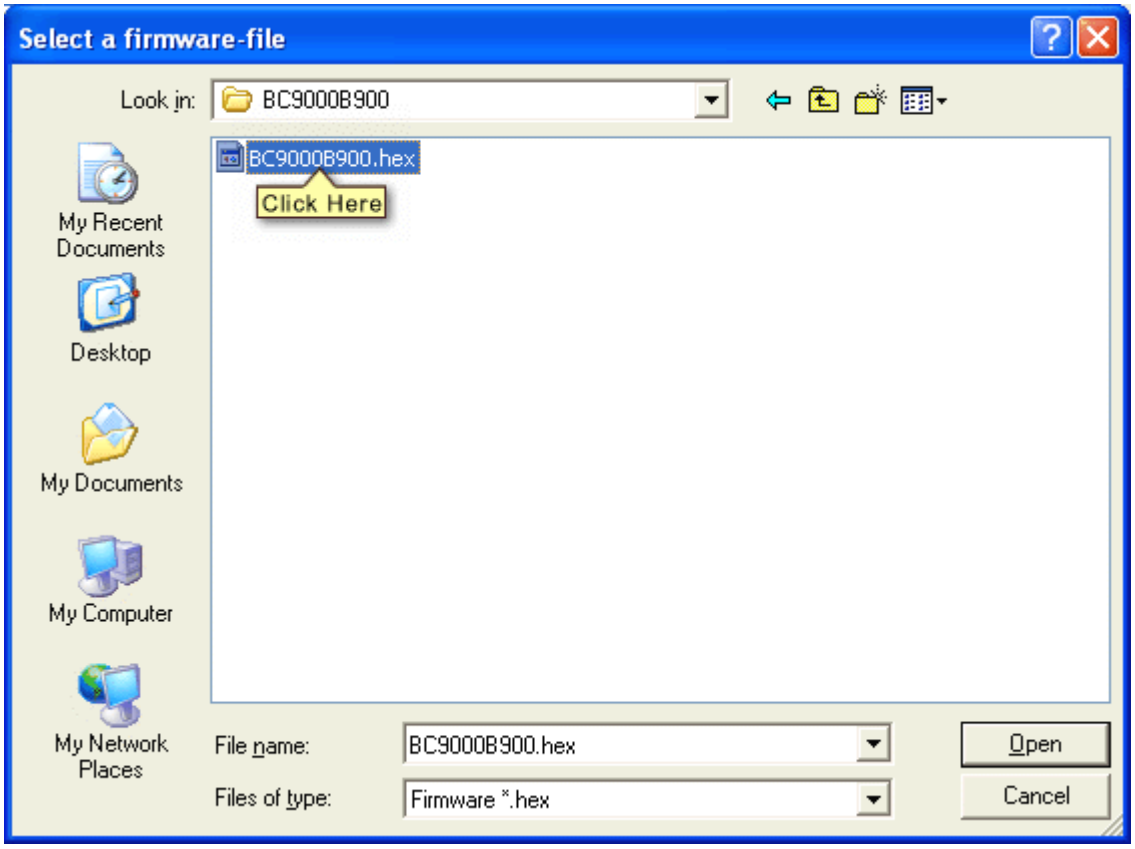
Always consider, before you do a software update "**Never touch a running system! ! !**" The update should be done by major problems with the coupler and than only in accord with Beckhoff.

step 1: click *Online*.

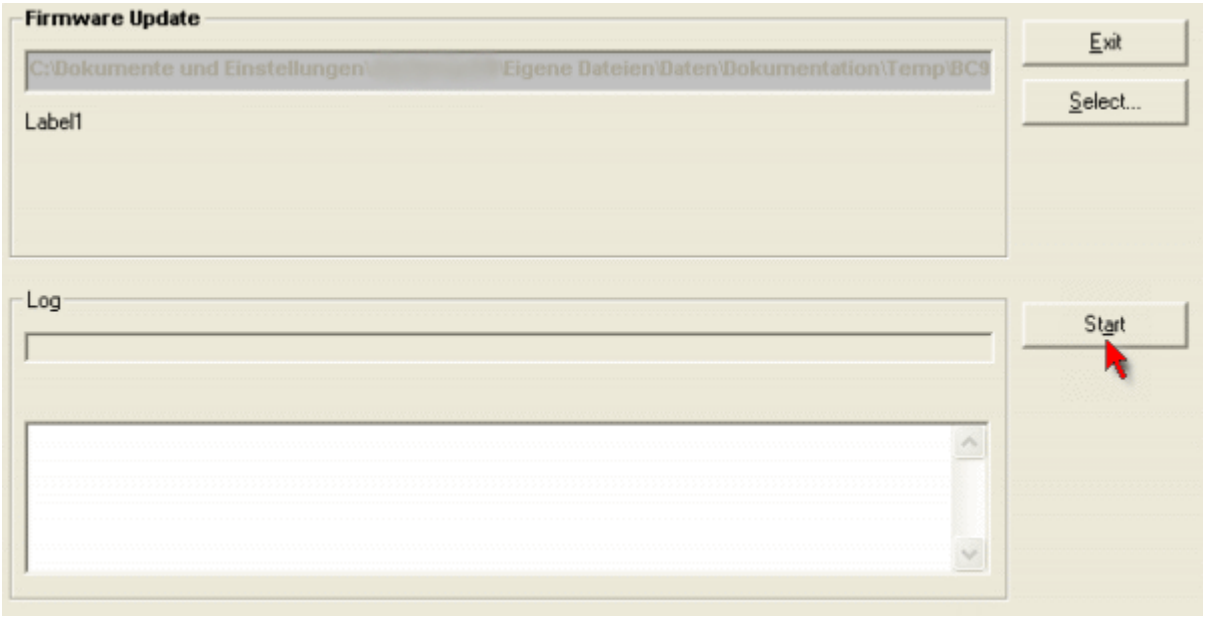
step 2: hover onto *Coupler* and click *Firmware Update...*



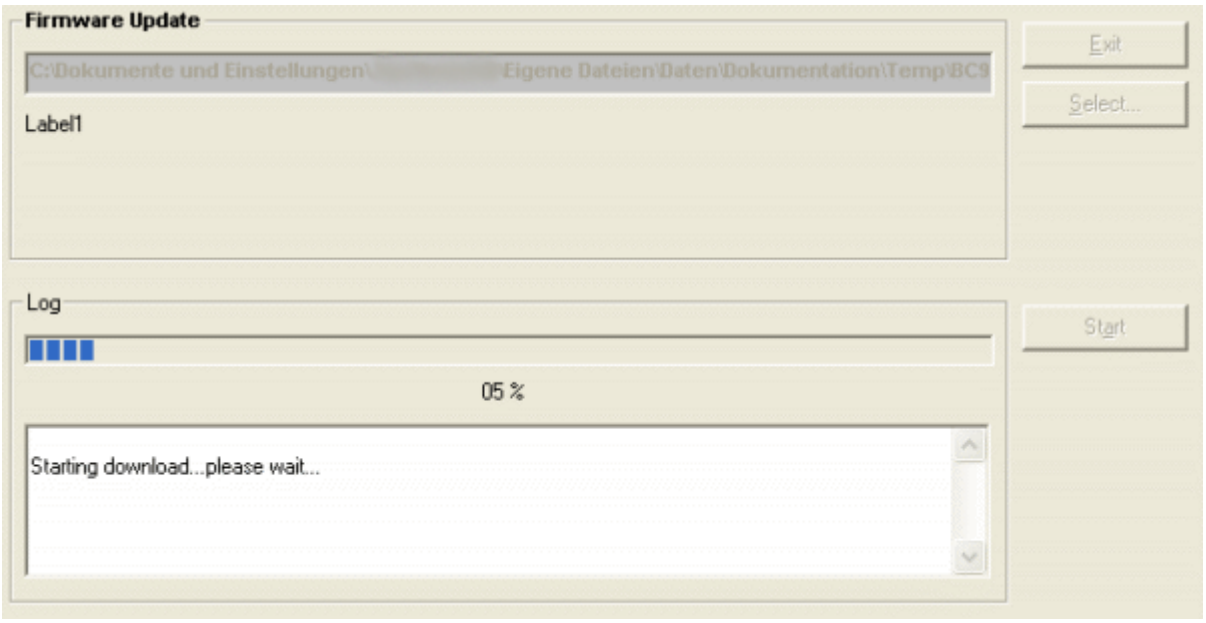
step 3: choose the file and click *open (öffnen)*. (example filename: BC9000B900.hex)



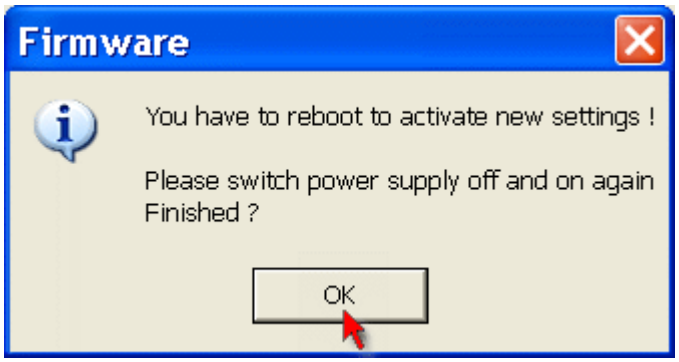
step 4: The following menu will appear. If you have chosen the wrong file click *Select...* otherwise click *Start*.



Don't do anything while the update process is running.



step 5: the update process is completed. click *OK*

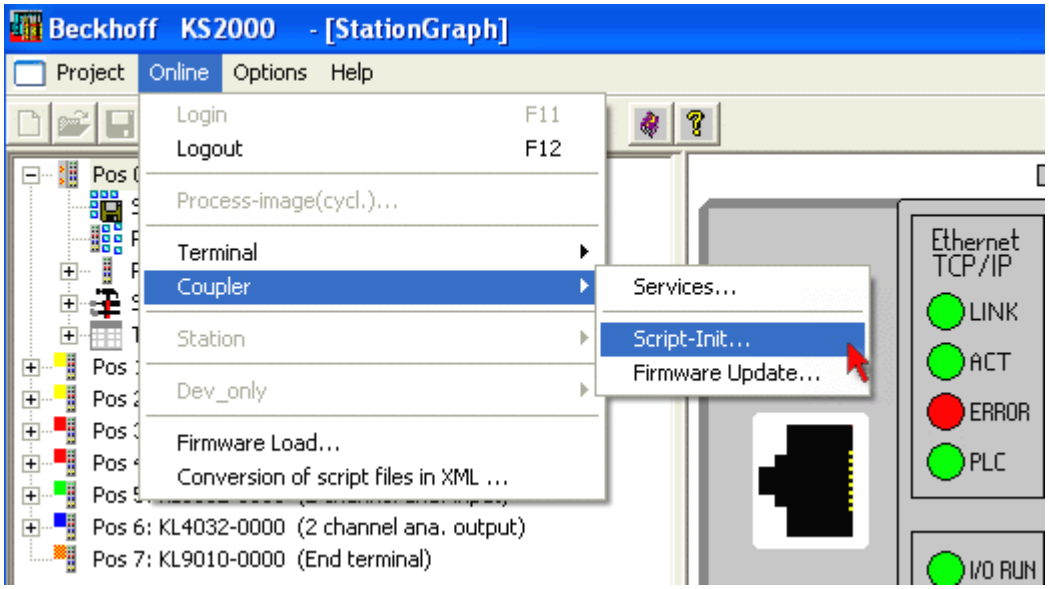


3.9.3 How to write a script into a coupler or controller?

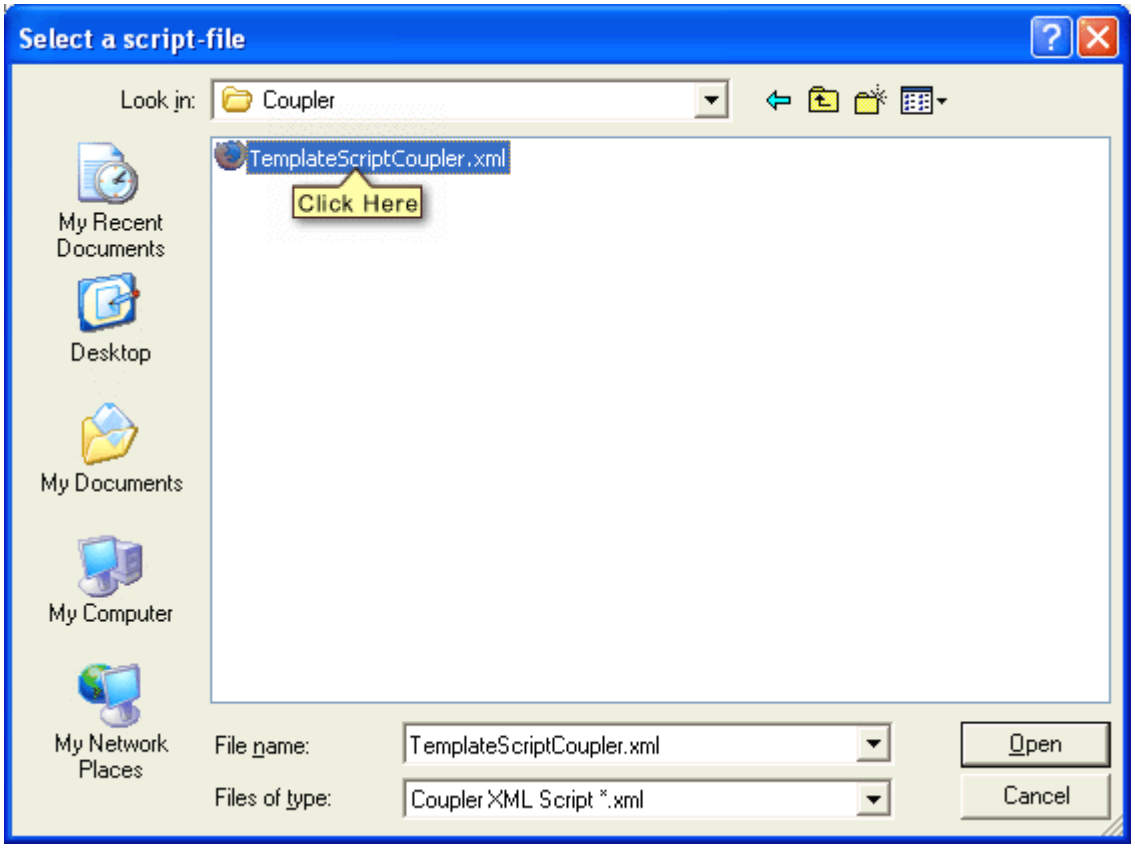
If you use standard configurations for your coupler or controller, then script writing is a feature that can save you time and money. Because with a few clicks, you can do the configuration the way you want to have it.

step 1: click *Online*

step 2: hover onto *Coupler* and click *Script-Init...*

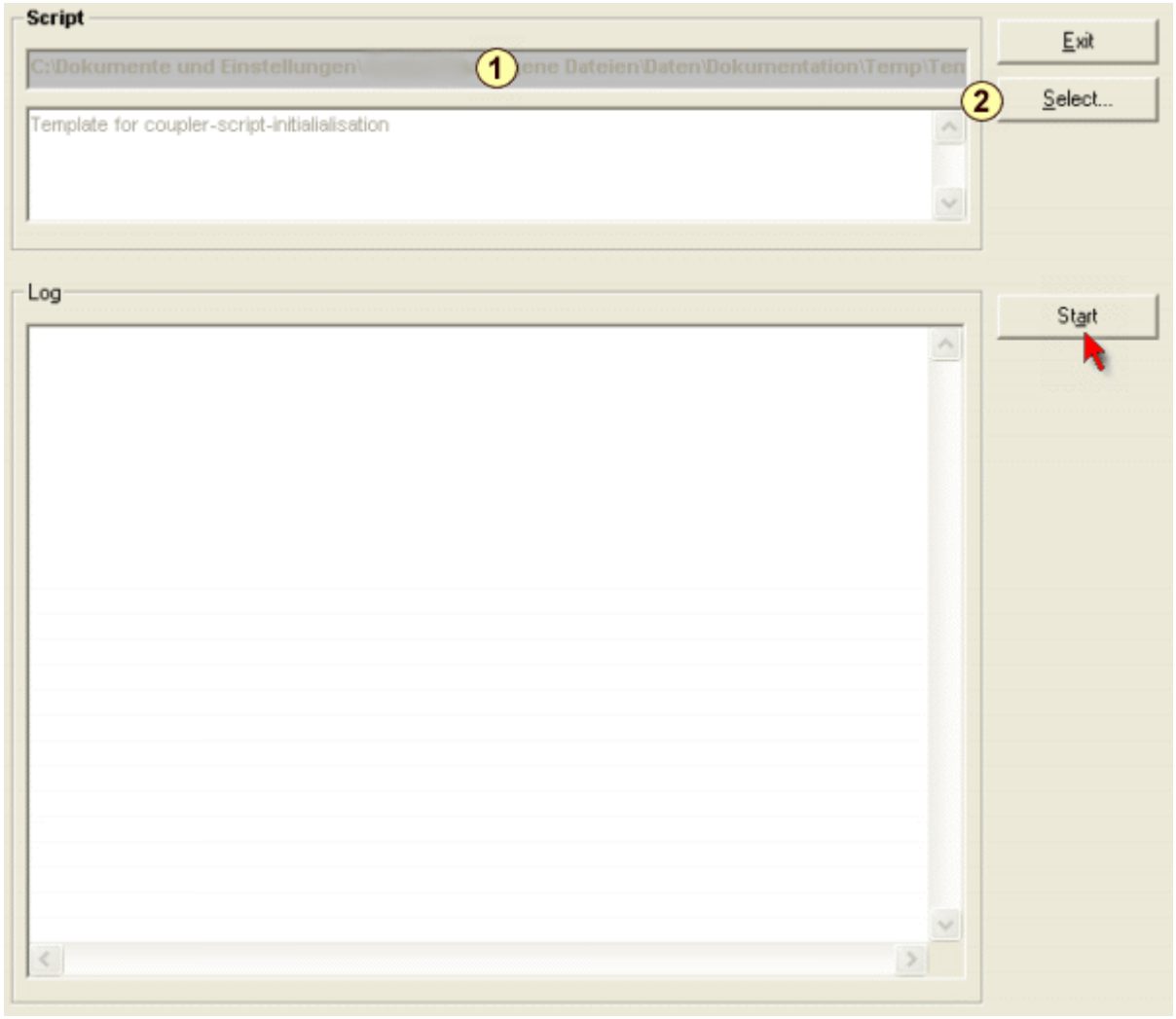


step 3: choose a script file and click *open (öffnen)*. (example file: TemplateScriptCoupler.xml)

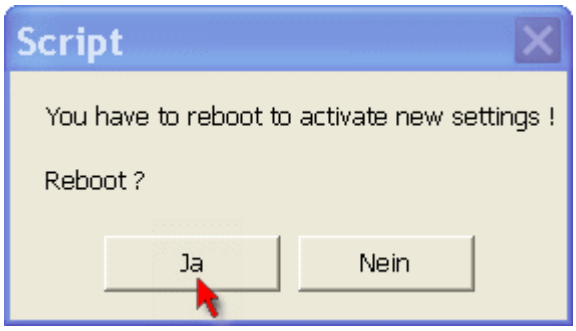


step 4: the following menu will appear. If you have chosen the wrong file (1) click *Select...* (2)

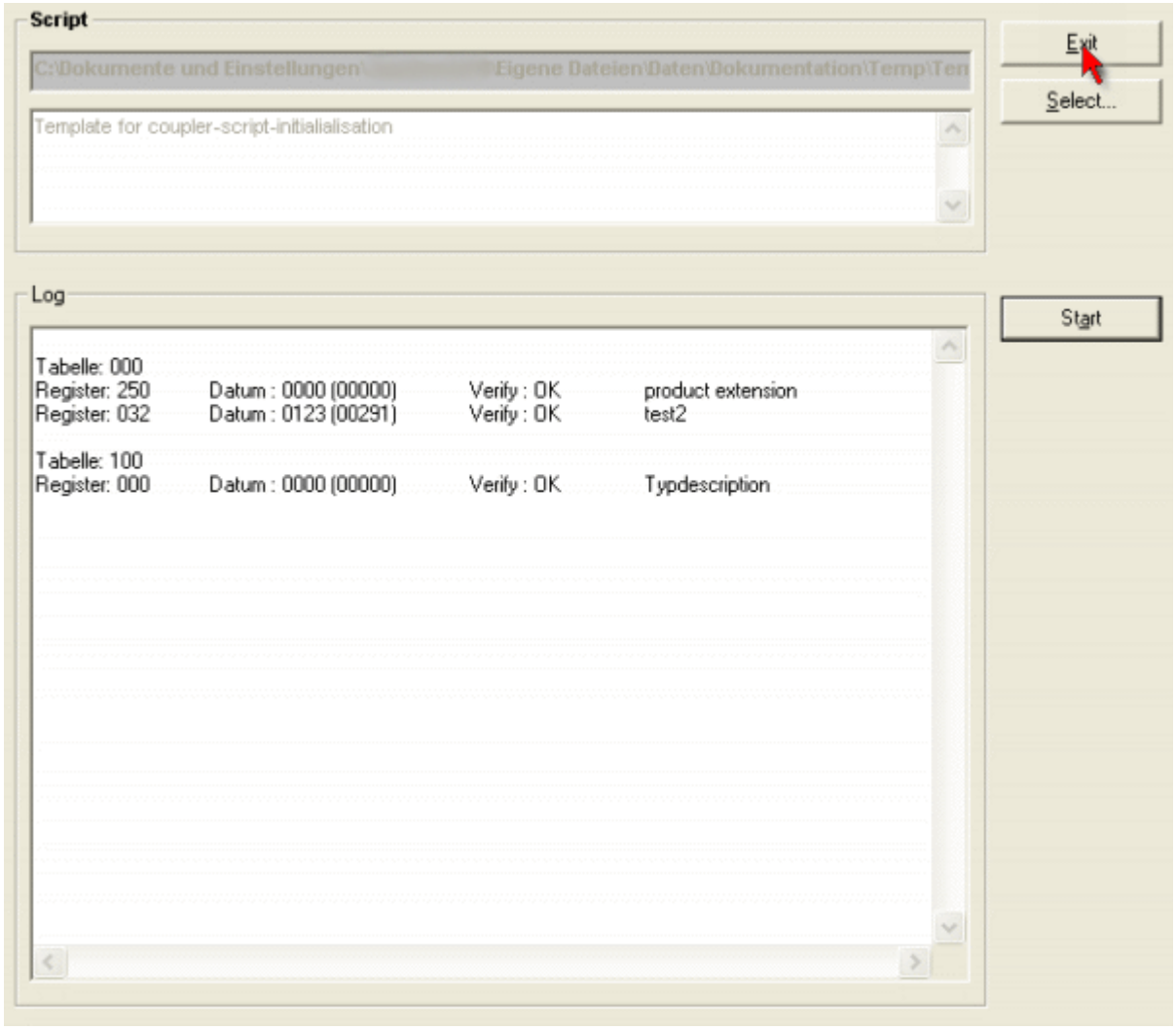
step 5: click *start*



step 5: the process is completed. click *OK (JA)*



step 6: Click *Exit* to leave the menu.



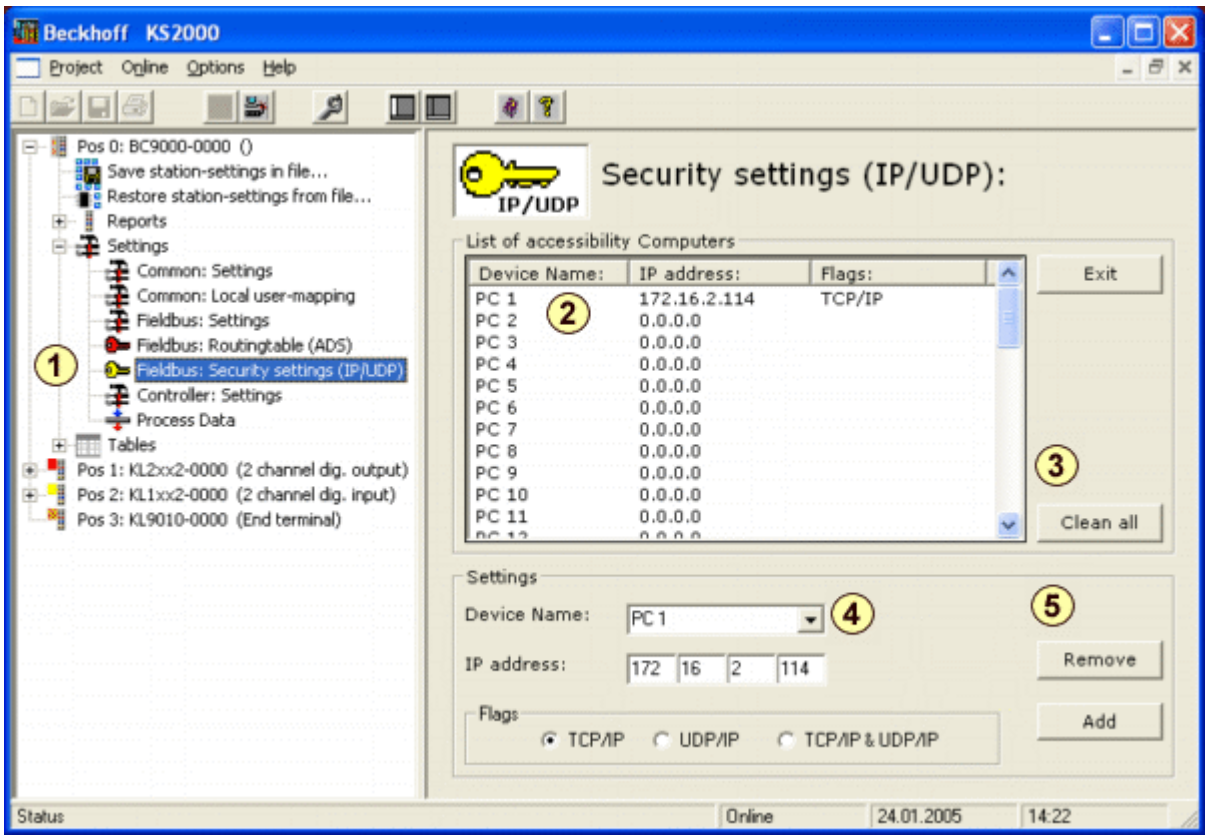
Devices require reboot to enable new settings, so please power cycle the station.

For definition of the schema of script-file for buscontrollers and buscouplers see sample file under "...\KS2000\Resource\Scripts\Coupler\TemplateScriptCoupler.xml"

```
<!-- XML-syntax for coupler script init -->
<!-- 17.10.2000 StH -->
- <Script>
  <!-- Optional entry for description -->
  <Desc>Template for coupler-script-initialisation</Desc>
  <!-- Coupler-tables -->
  - <Table>
    <Nummer>0</Nummer>
    - <Register>
      <Offset>250</Offset>
      <Value>0x0</Value>
      <!-- optional: description -->
      <Desc>product extension</Desc>
    </Register>
    - <Register>
      <Offset>32</Offset>
      <Value>123</Value>
      <Desc>test2</Desc>
    </Register>
  </Table>
  - <Table>
    <Nummer>100</Nummer>
    - <Register>
      <Offset>0</Offset>
      <Value>0</Value>
      <Desc>Typdescription</Desc>
    </Register>
  </Table>
</Script>
```

3.9.4 BC9000 Security settings (IP/UDP)

The *Security settings* are used for the restriction to access a BC9000 inside a network. With the restriction you can define a maximum of 10 computers, which have the permission to access the BC9000. The required settings can only be done via a serial connection.



Configuration

step 1: Double click *Fieldbus: Security settings*

step 2: On the right hand a list of computers will open, which have the permission to access. These computers are identified via their IP address.

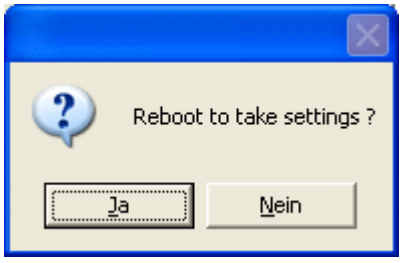
step 3: Click *Clean all* to define no restrictions to access a BC9000.

step 4: Changing entries

Device Name: Choose a device name from the list (PC 1 bis PC 10). This is only a synonym and must not be the name of a computer inside the network.
IP address: Type in the IP address of the computer, which shall get the permission to access.

The *Remove* button removes a selected computer from the list. The *Add* button adds a computer to the list.

You must reboot after you did changes like *Clean all, Remove* or *Add*. Click *Yes (Ja)* to reboot.



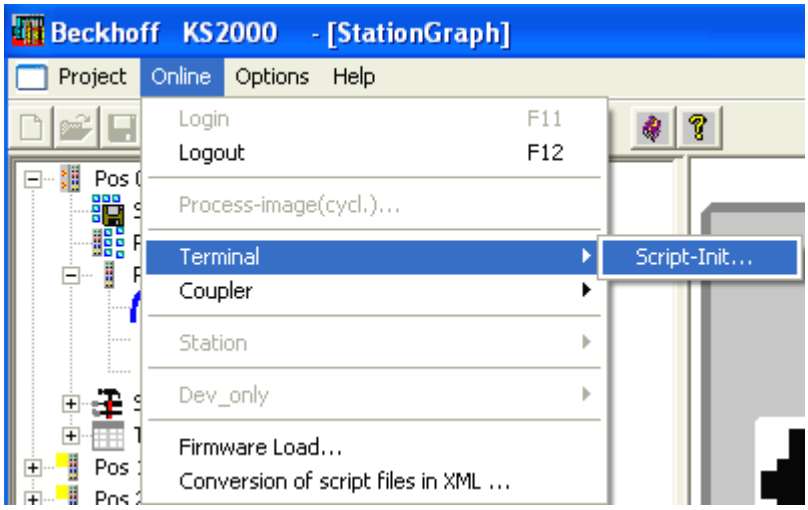
3.10 Terminal and Extension Box

3.10.1 How to write a script into a terminal?

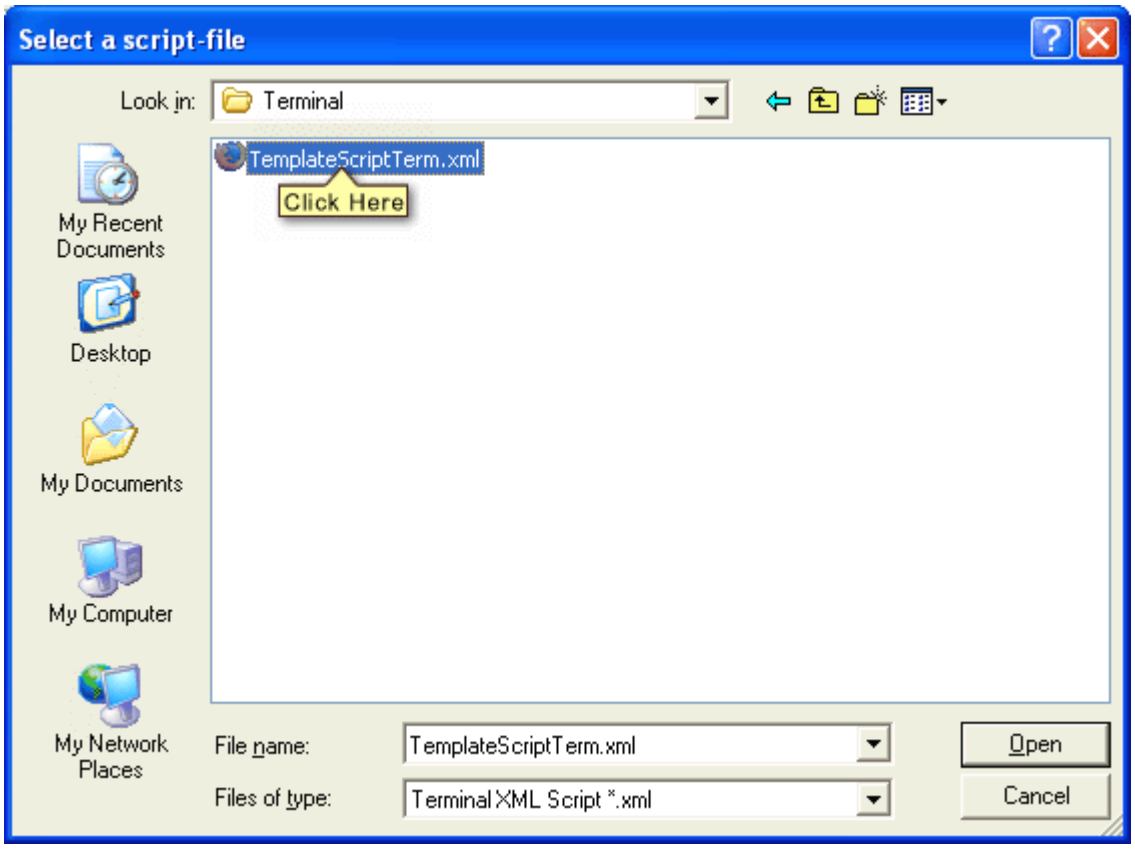
f you use standard configurations for your terminals, than script writing is a feature that can save you time and money. Because with a few clicks, you can do the configuration for all your terminals.

step 1: click *Online*

step 2: hover onto *Terminal* and click *Script-Init...*



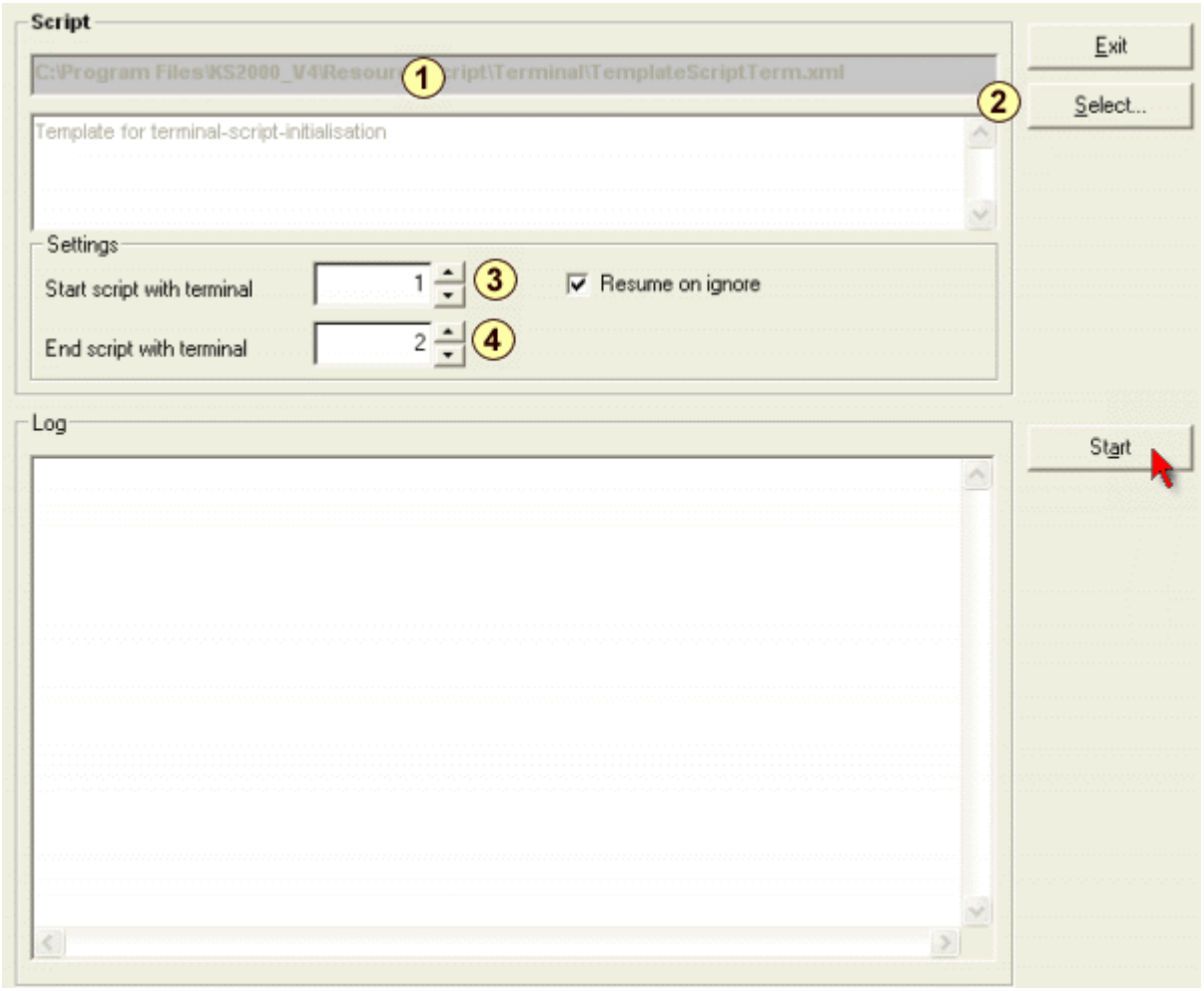
step 3: choose a script file and click *open (öffnen)*. (example file: TemplateScriptTerm.xml)



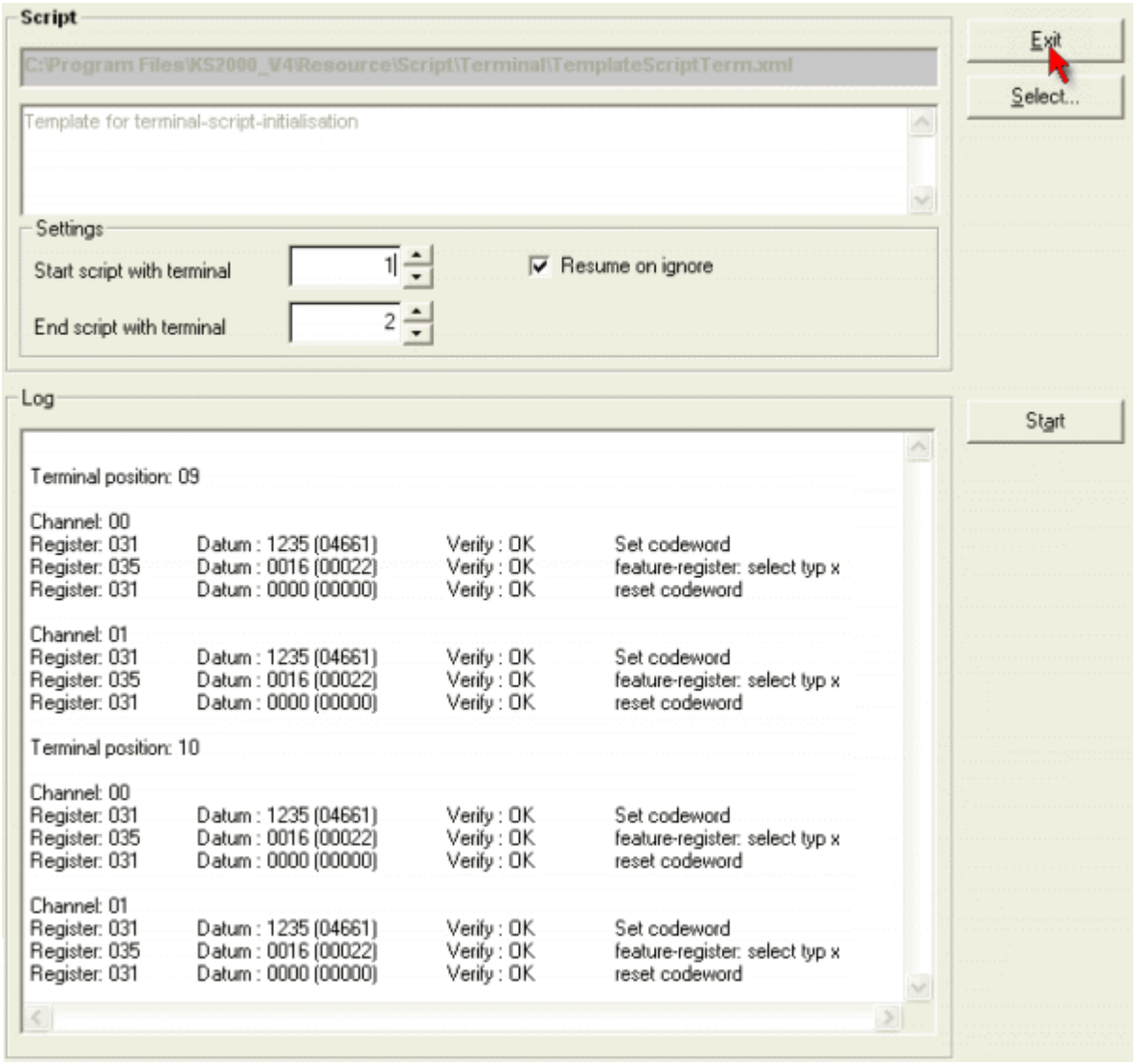
step 4: the following menu will appear. If you have chosen the wrong file (1) click *Select...* (2)

step 5: choose the start (3) and the end (4) terminal where the script should be written in.

step 6: click *start*



step 6: Click *Exit* to leave the menu.



Note :

Some terminals require reboot to enable new settings, so please power cycle the station.

For definition of the schema of script-file for terminals see sample file under "... \KS2000\Resource\Scripts\Coupler\TemplateScriptTerm.xml"

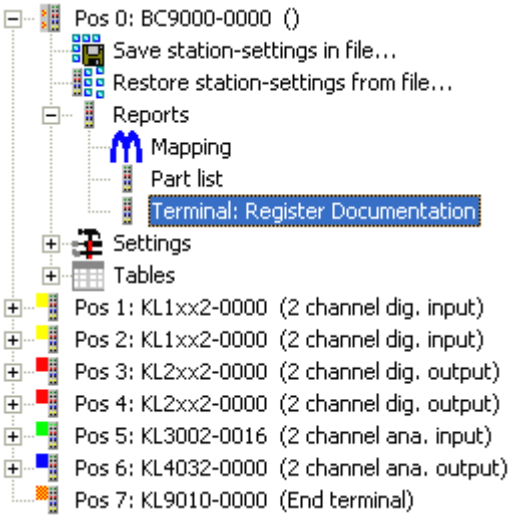
```
<!-- XML-syntax for terminal script init -->
<!-- 17.10.2000 StH -->
- <Script>
  <!-- Optional entry for description -->
  <Desc>Template for terminal-script-initialisation</Desc>
  - <Register>
    <Offset>31</Offset>
    <Value>0x1235</Value>
    <!-- optional: description -->
    <Desc>Set codeword</Desc>
  </Register>
  - <Register>
    <Offset>35</Offset>
    <Value>16</Value>
    <Desc>feature-register: select typ x</Desc>
  </Register>
  - <Register>
    <Offset>31</Offset>
    <Value>0x0000</Value>
    <!-- optional: description -->
    <Desc>reset codeword</Desc>
  </Register>
</Script>
```

3.10.2 How to export a terminal script?

The export feature is a needful tool to save the register of a terminal into a script file.

Exception: Not every terminal provides the export feature. Only terminals who have a microprocessor can exchange bidirectional data with the higher-level control system.

step 1: click onto *Reports - Terminal:Register Documentation*



step 2: with the up/down button you can choose the *Terminal* you want to save

step 3: tick the *Channel* you want to save

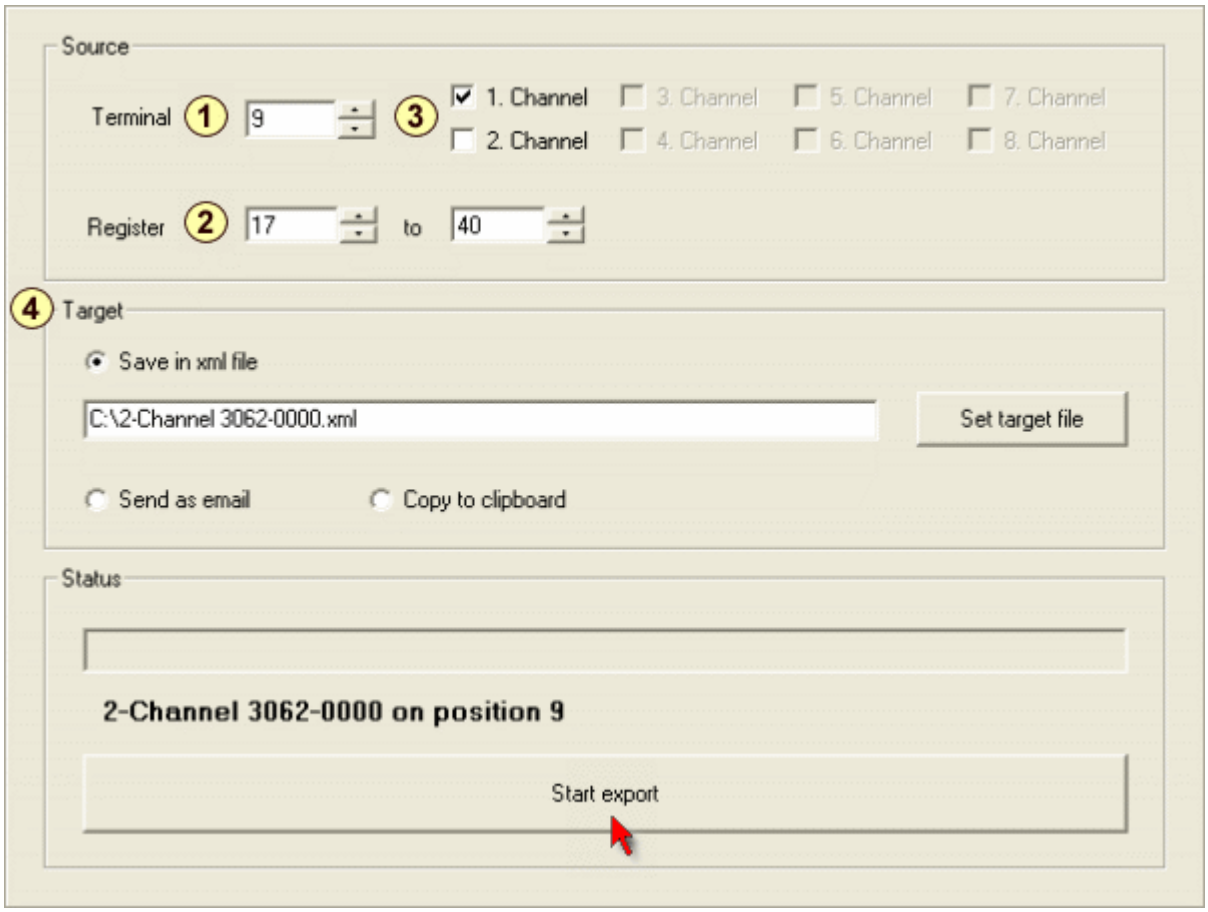
step 4: with the up/down button you can choose the beginning and ending of the *Register* you want to save

step 5: with a tick you can choose the *Target* where you want to save the file to

- Save in xml file (click *Set target file* for a easier handling)

- Send as email
- Copy to clipboard

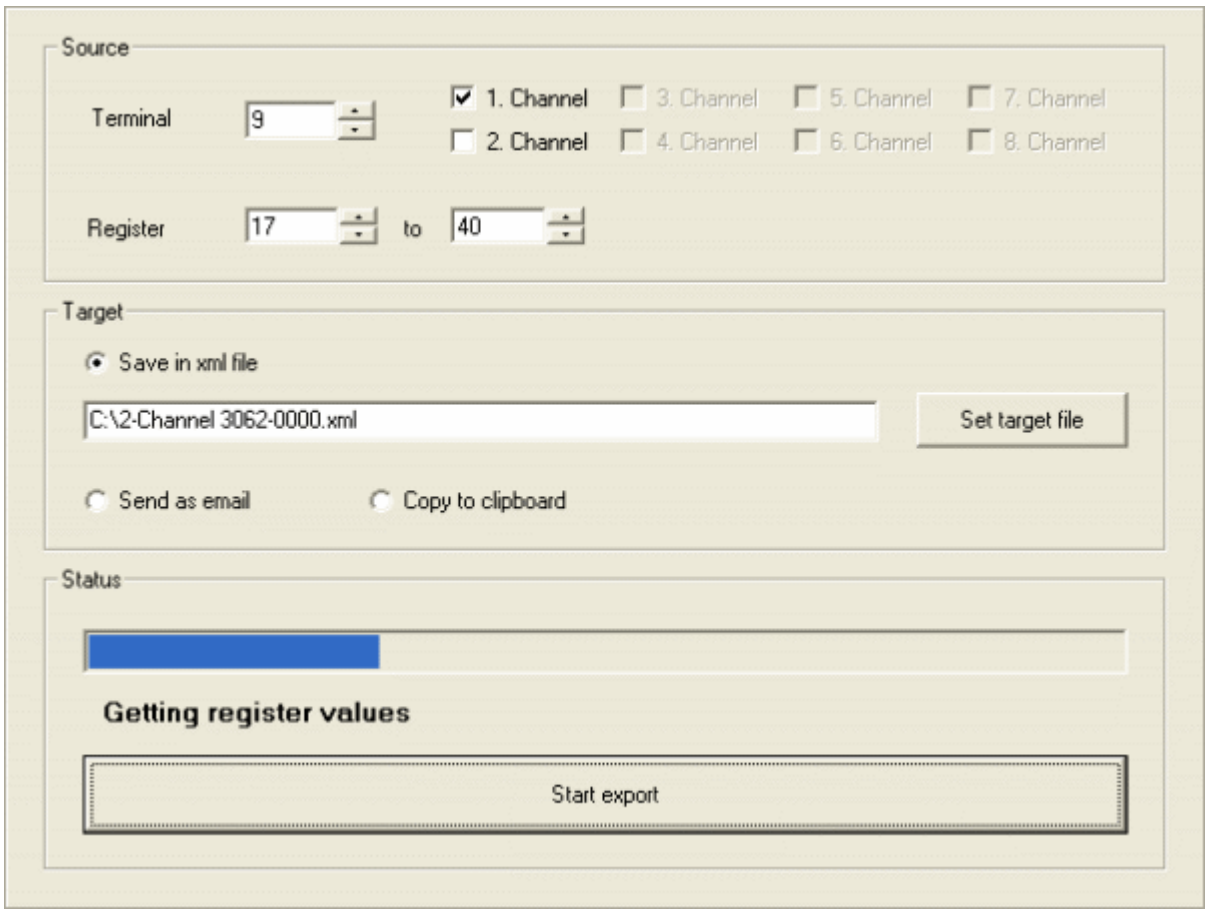
step 6: click *Start export*



NOTICE

Wait for the process to finish

Wait until the process has finished before starting something else.

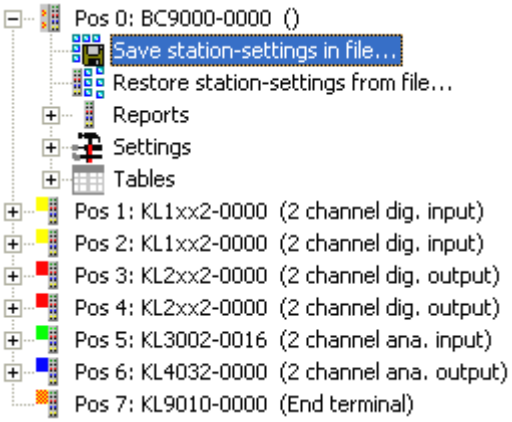


3.11 How to save and restore a terminal station

3.11.1 How to save a terminal station?

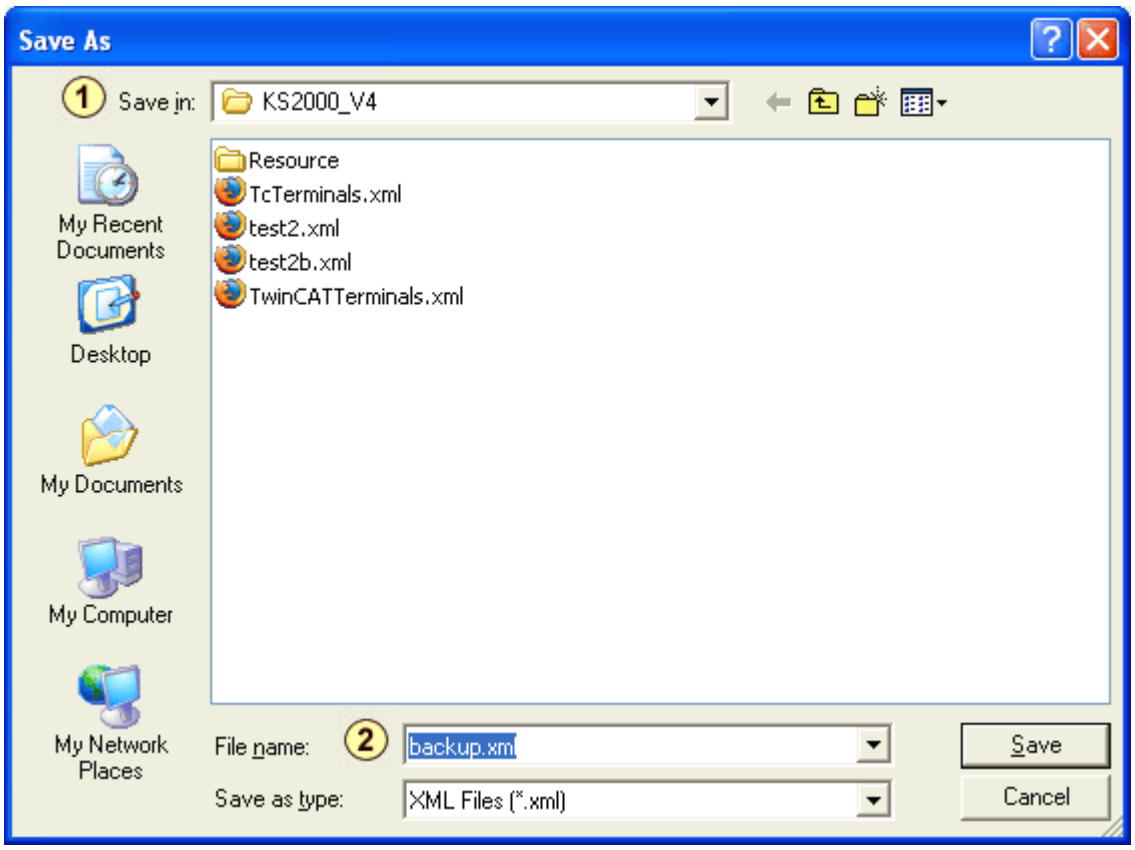
The *Save station-settings in file...* feature can be used to save a complete terminal station.

step 1: Double click *Save station-settings in file...*



step 2: The following window will open.

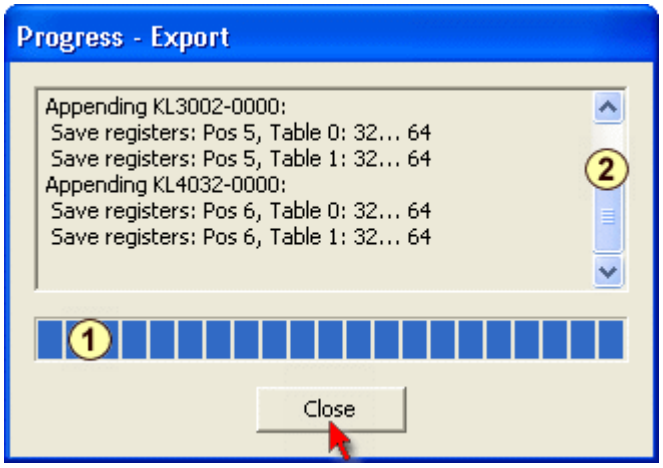
1. You can change the target folder if you want to.
2. Change the file name into a suitable name, which makes it easier for you to bring the file in relation to the hardware you want to save.
3. Click *Save (Speichern)*.



step 3 : Now the export process starts.

1. Shows you the progress status. During the export progress the *Close* Button is blanked out.
2. With the scoll bar you can scroll through the protocoll.

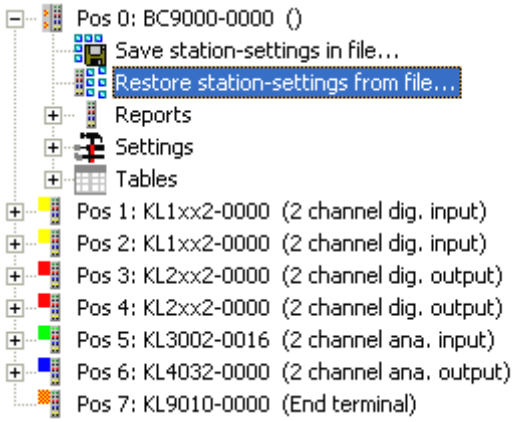
When you are finished click *Close* to close the window.



3.11.2 How to restore a terminal station?

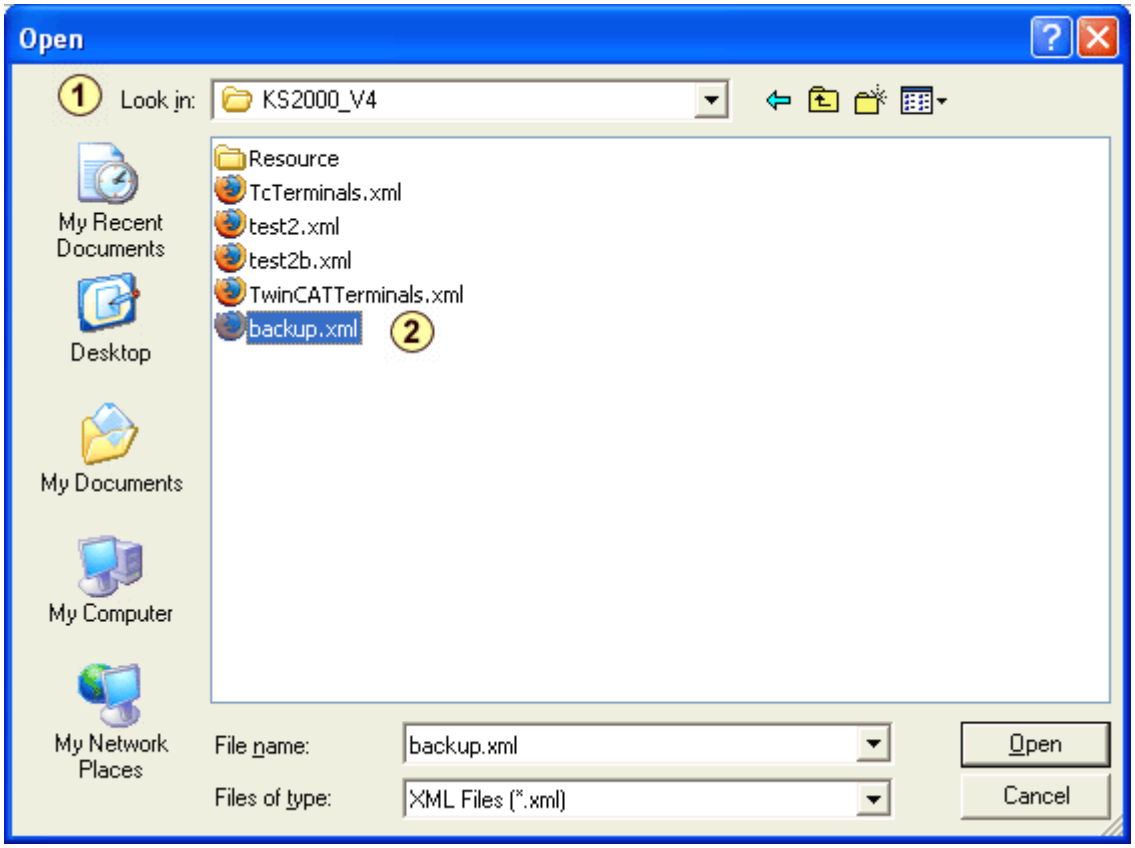
The *Restore station-settings from file*... can upload the total terminal station setting.

step 1: Double click *Restore station-settings from file*...

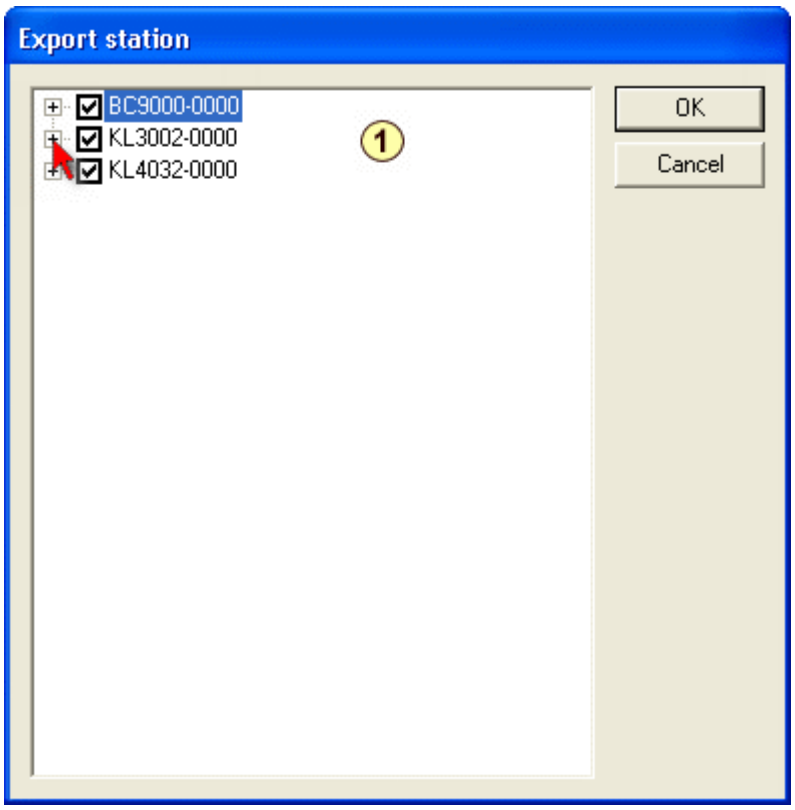


step 2: The following window will open.

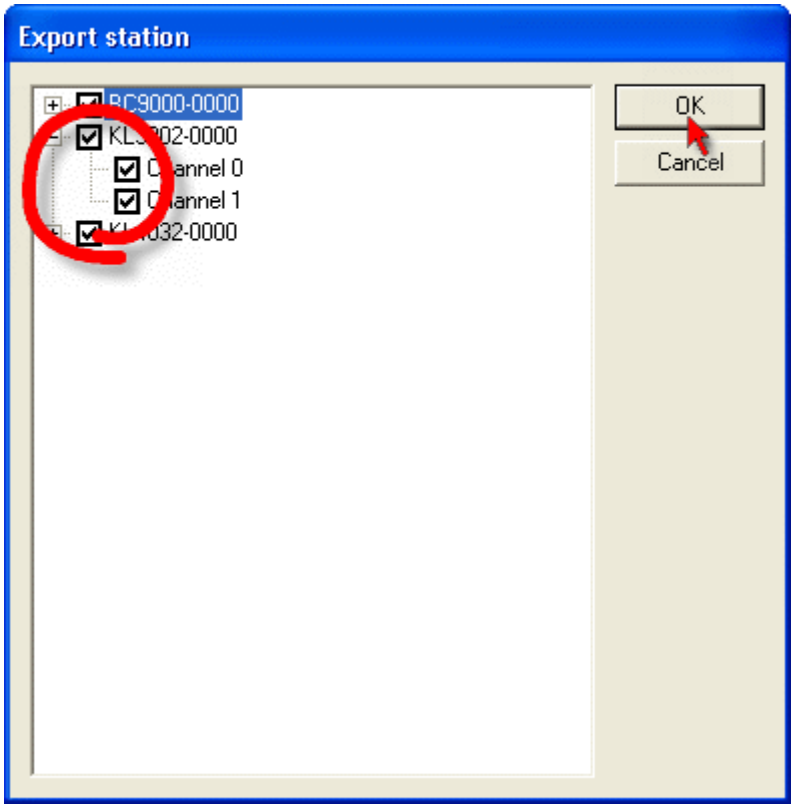
1. Select the folder where you have saved your configuration file.
2. Select the configuration file. *(e.g. Backup.xml)*
3. Click *Open (Öffnen)*.



step 3: The following window will open. If you click onto the "+" more selections are possible. Please have a look onto the next picture to get an better idea.



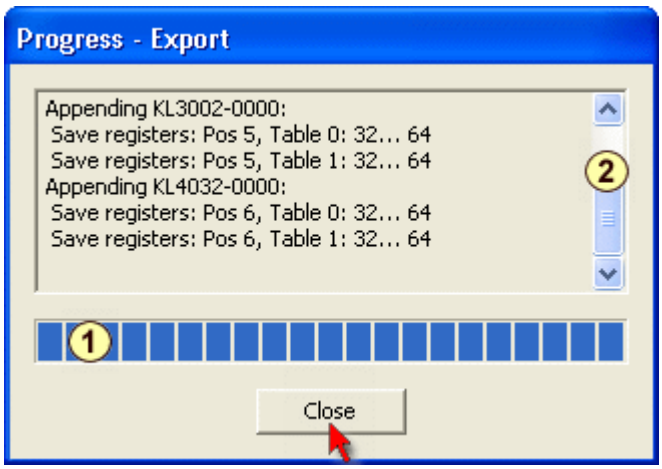
By selecting or deselecting the box you can decide, which information is getting saved. When your selection is finished click *OK*.



step 4: Now the export process starts.

1. Shows you the progress status. During the export progress the *Close* Button is blanked out.
2. With the scroll bar you can scroll through the protocol.

When you are finished click *Close* to close the window.


Progress - Export
Appending KL3002-0000:
Save registers: Pos 5, Table 0: 32... 64
Save registers: Pos 5, Table 1: 32... 64
Appending KL4032-0000:
Save registers: Pos 6, Table 0: 32... 64
Save registers: Pos 6, Table 1: 32... 64
1
2
Close

4 Reference

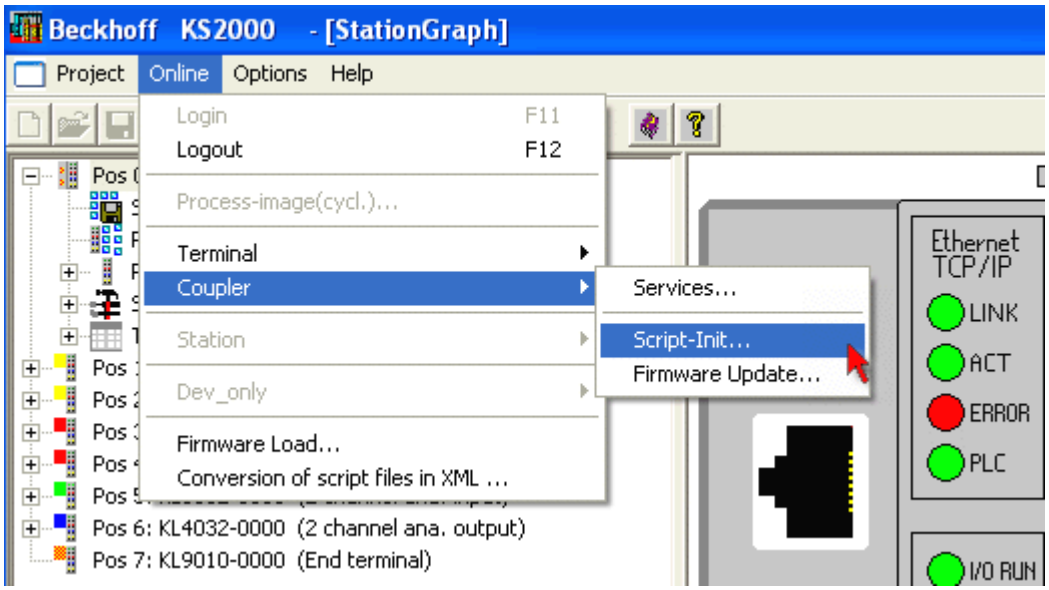
4.1 General dialogs

4.1.1 How to write a script into a coupler or controller?

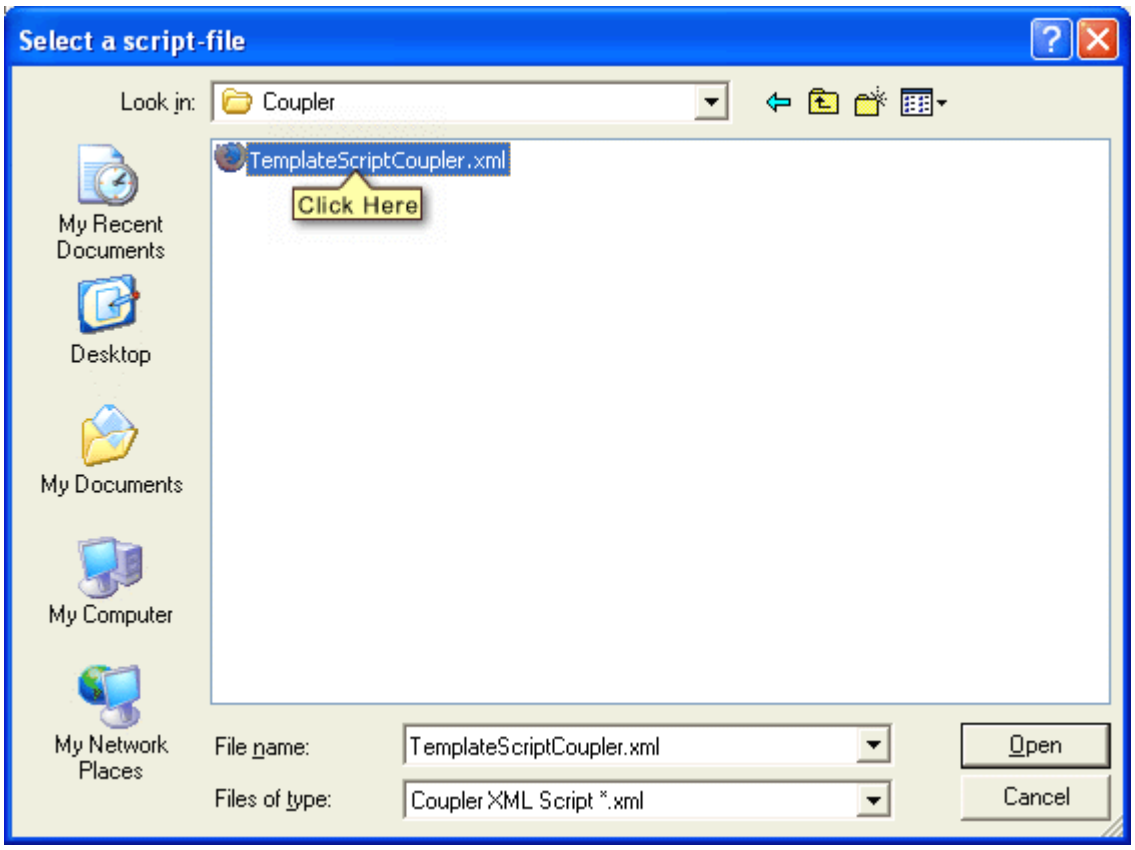
Let me first discuss "Why script writing?" If you use standard configurations for your coupler or controller, than script writing is a feature that can save you time and money. Because with a few clicks, you can do the configuration the way you want to have it.

step 1: click *Online*

step 2: hover onto *Coupler* and click *Script-Init...*

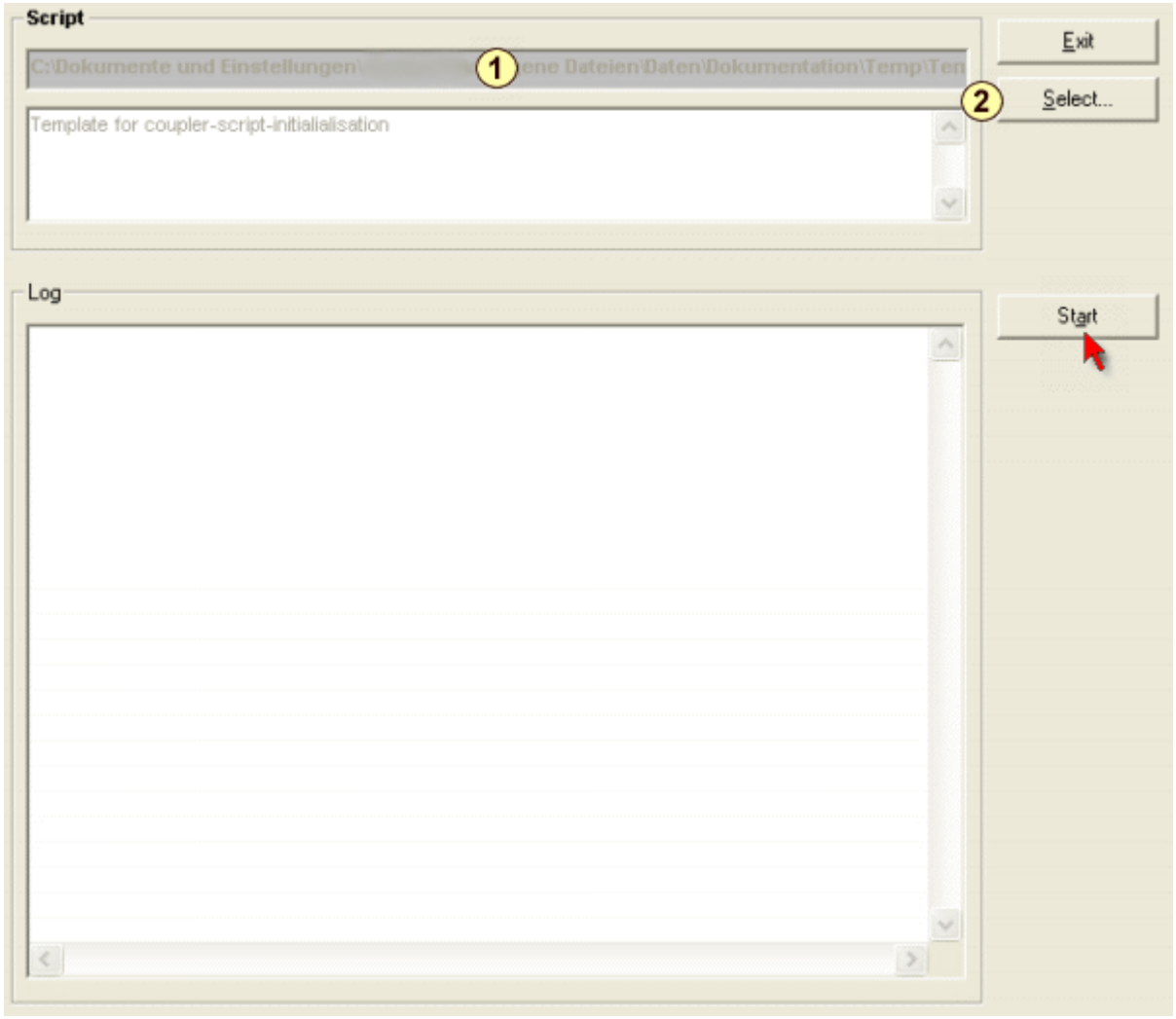


step 3: choose a script file and click *open (öffnen)*. (example file: TemplateScriptCoupler.xml)

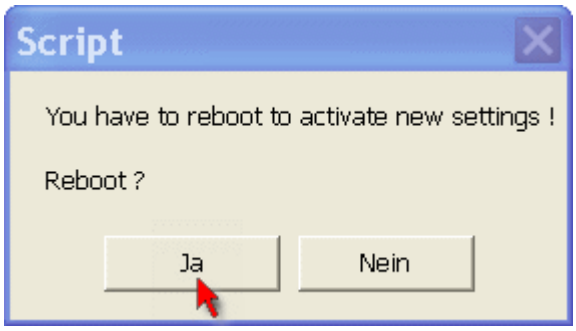


step 4: the following menu will appear. If you have chosen the wrong file (1) click *Select...* (2)

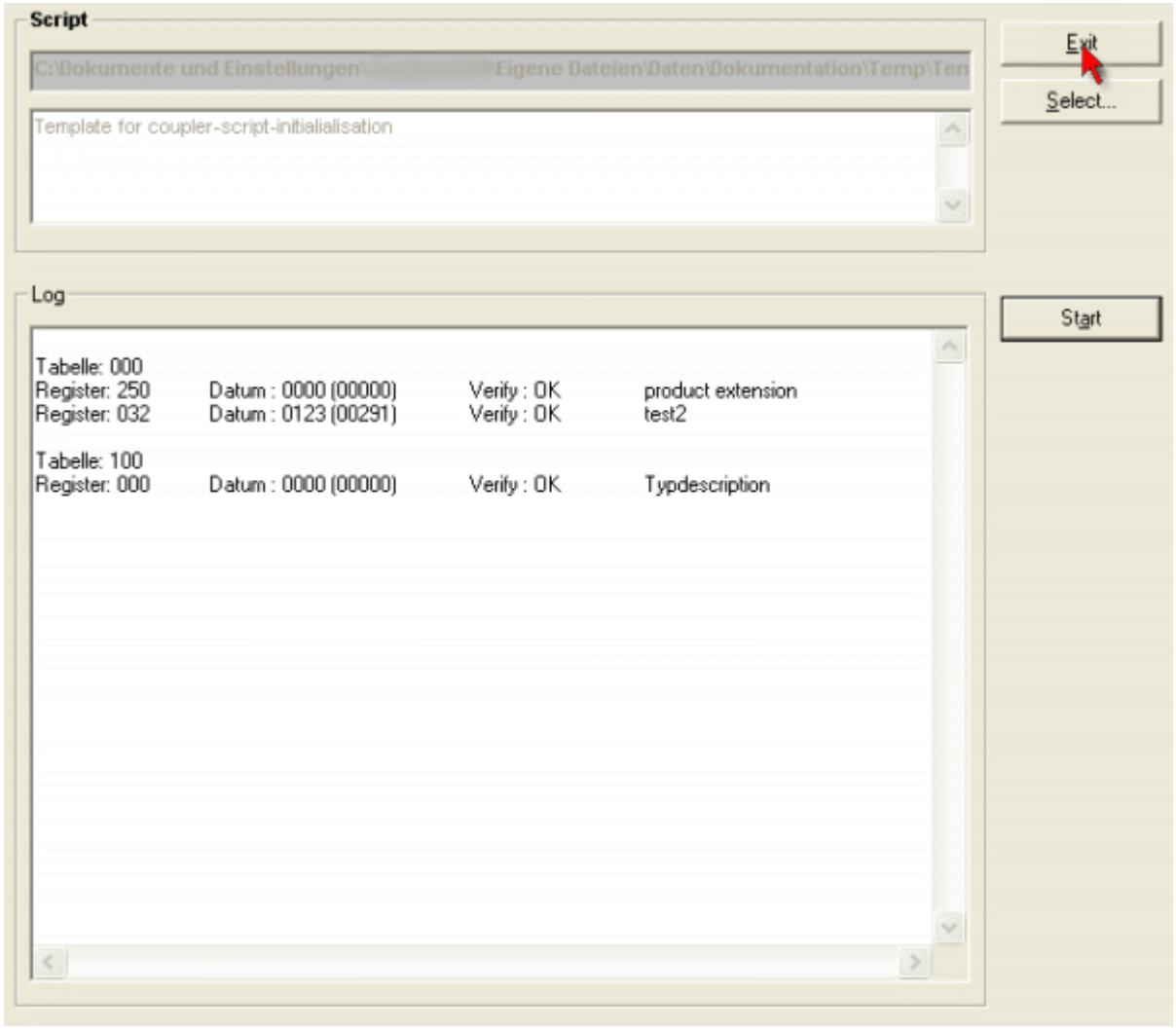
step 5: click *start*



step 5: the process is completed. click *OK (JA)*



step 6: Click *Exit* to leave the menu.



Reboot required

A reboot of the bus coupler is required to accept these parameters.

For definition of the schema of script-file for buscontrollers and buscouplers see sample file under "...\KS2000\Resource\Scripts\Coupler\TemplateScriptCoupler.xml"

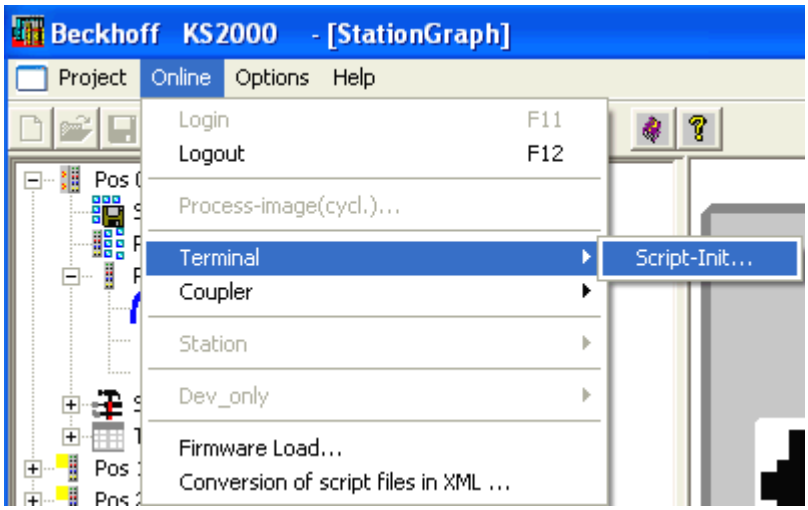
```
<!-- XML-syntax for coupler script init -->
<!-- 17.10.2000 StH -->
- <Script>
  <!-- Optional entry for description -->
  <Desc>Template for coupler-script-initialisation</Desc>
  <!-- Coupler-tables -->
  - <Table>
    <Nummer>0</Nummer>
    - <Register>
      <Offset>250</Offset>
      <Value>0x0</Value>
      <!-- optional: description -->
      <Desc>product extension</Desc>
    </Register>
    - <Register>
      <Offset>32</Offset>
      <Value>123</Value>
      <Desc>test2</Desc>
    </Register>
  </Table>
  - <Table>
    <Nummer>100</Nummer>
    - <Register>
      <Offset>0</Offset>
      <Value>0</Value>
      <Desc>Typdescription</Desc>
    </Register>
  </Table>
</Script>
```

4.1.2 How to write a script into a terminal?

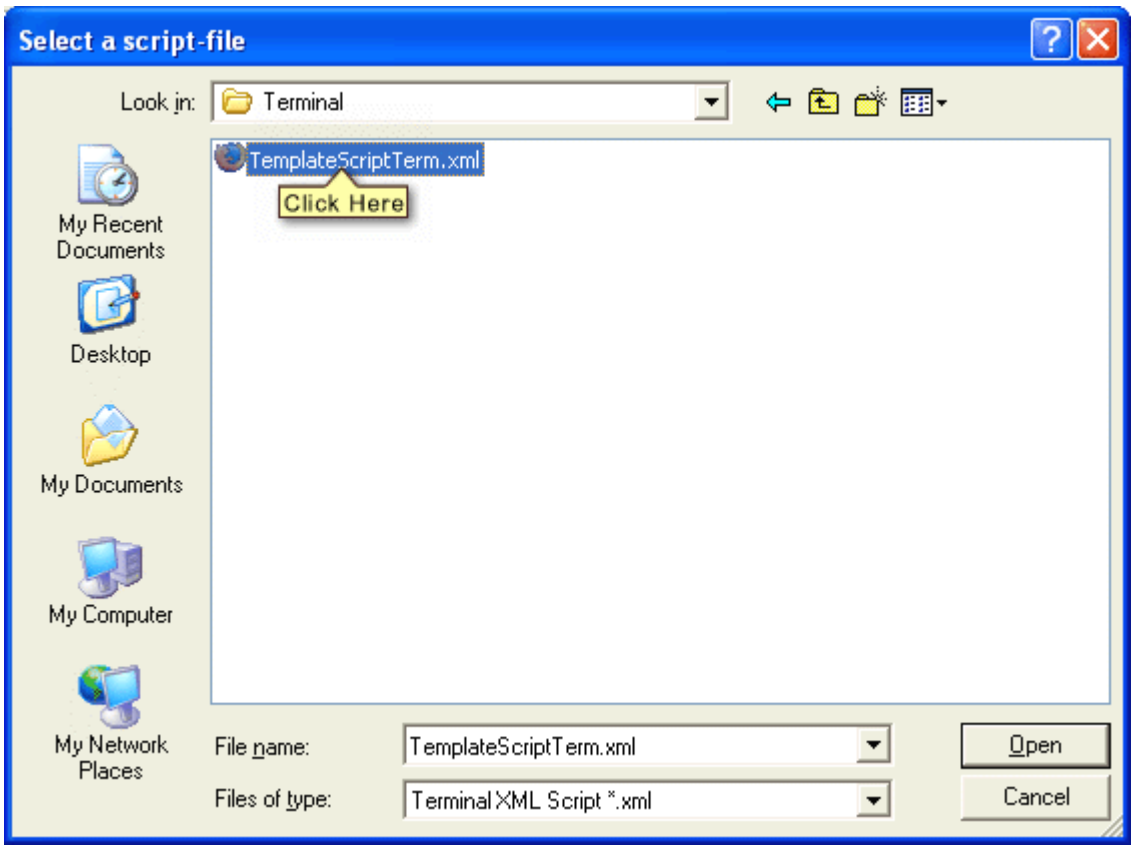
If you use standard configurations for your terminals, then script writing is a feature that can save you time and money. Because with a few clicks, you can do the configuration for all your terminals.

step 1: click *Online*

step 2: hover onto *Terminal* and click *Script-Init...*



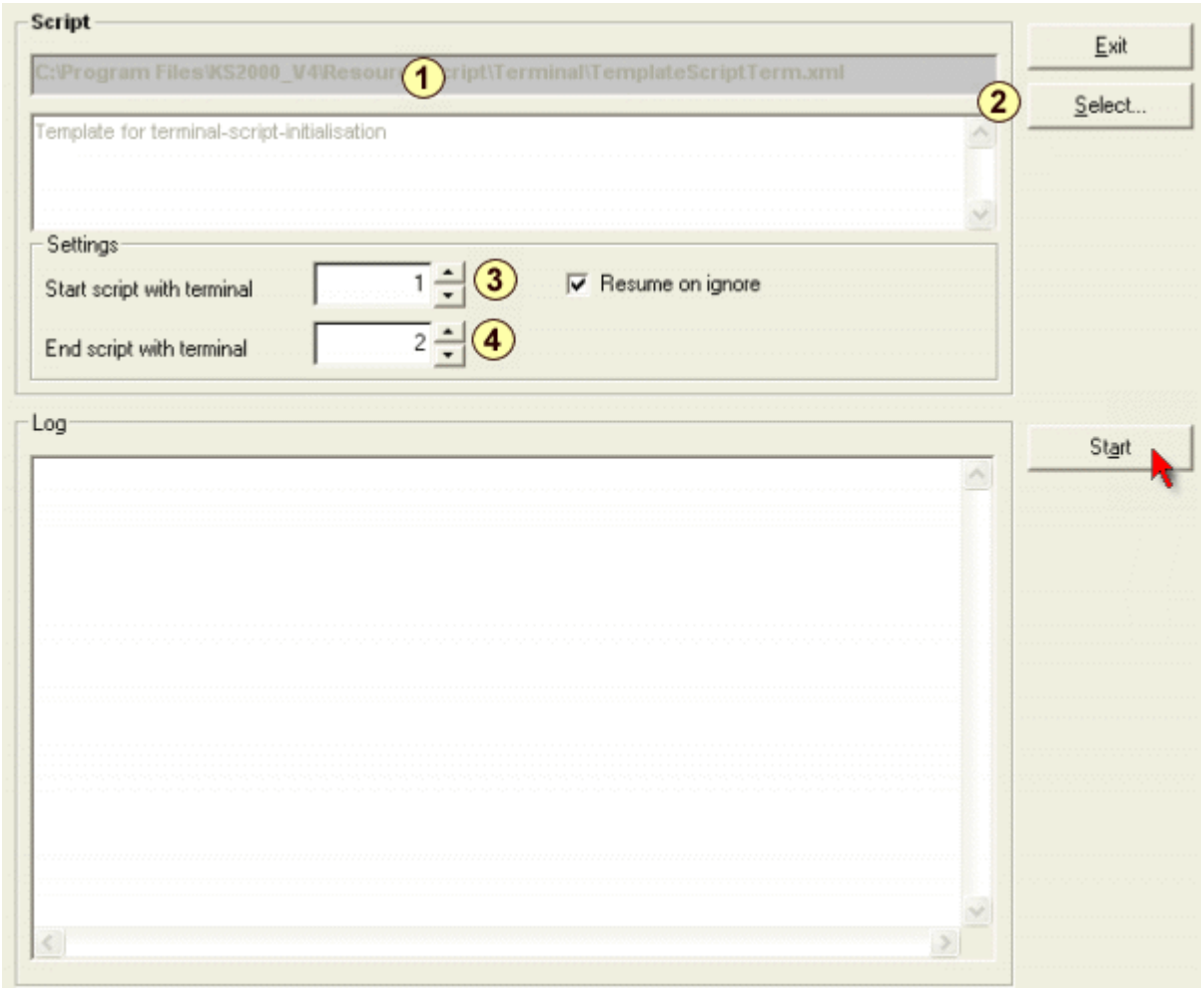
step 3: choose a script file and click *open (öffnen)*. (example file: TemplateScriptTerm.xml)



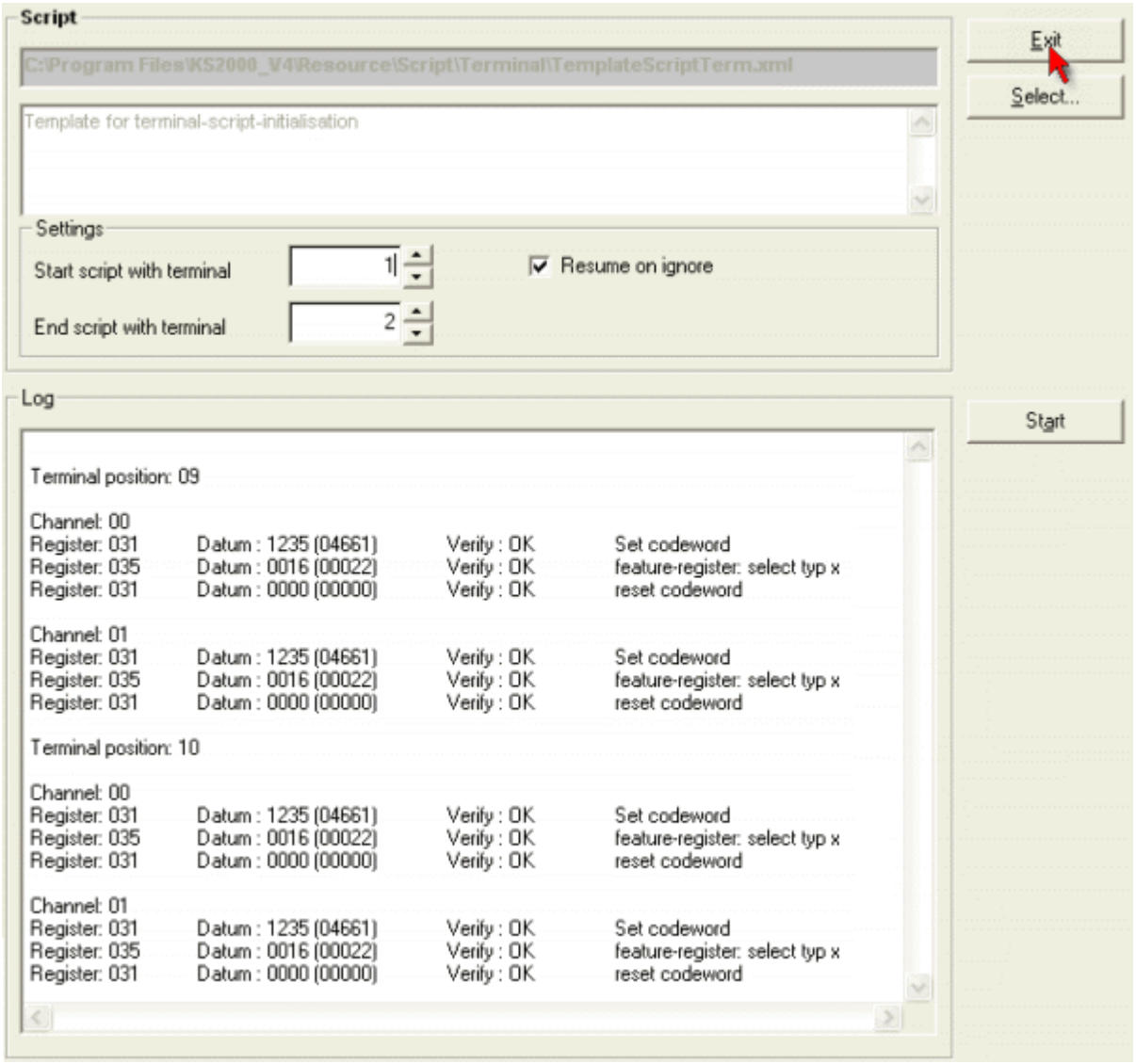
step 4: the following menu will appear. If you have chosen the wrong file (1) click *Select...* (2)

step 5: choose the start (3) and the end (4) terminal where the script should be written in.

step 6: click *start*



step 6: Click *Exit* to leave the menu.



Reboot may be necessary

In some cases, a reboot of the Bus Coupler is required to accept these parameters. If, for example, the byte size is modified in the process image for KL60xx serial Bus Terminals, the Bus Coupler only adopts this information with the next reboot.

For definition of the schema of script-file for terminals see sample file under "...\KS2000\Resource\Scripts\Coupler\TemplateScriptTerm.xml"

```
<!-- XML-syntax for terminal script init -->
<!-- 17.10.2000 StH -->
- <Script>
  <!-- Optional entry for description -->
  <Desc>Template for terminal-script-initialisation</Desc>
  - <Register>
    <Offset>31</Offset>
    <Value>0x1235</Value>
    <!-- optional: description -->
    <Desc>Set codeword</Desc>
  </Register>
  - <Register>
    <Offset>35</Offset>
    <Value>16</Value>
    <Desc>feature-register: select typ x</Desc>
  </Register>
  - <Register>
    <Offset>31</Offset>
    <Value>0x0000</Value>
    <!-- optional: description -->
    <Desc>reset codeword</Desc>
  </Register>
</Script>
```

4.1.3 How to convert script files?

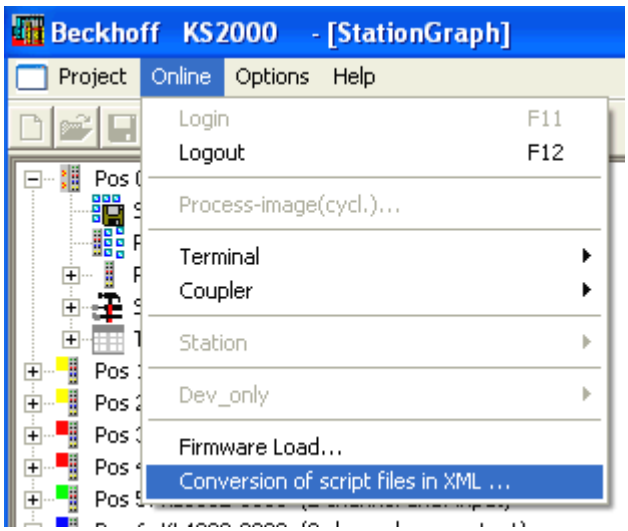
Why to do a conversion?

In the older version of KS2000 (version 3) the settings were saved into two file formats (*.csi and *.tsi). Since version 4, we only have one format (*.xml) for all coupler and terminal settings. This makes it easier to handle the files.

The function *Conversion of scipt files in XML...* gives you the possebility to transfer the old format into the new format to use your old backup also for the future.

step 1: Click onto *Online* in the menu bar

step 2: Click *Conversion of scipt files in XML...*

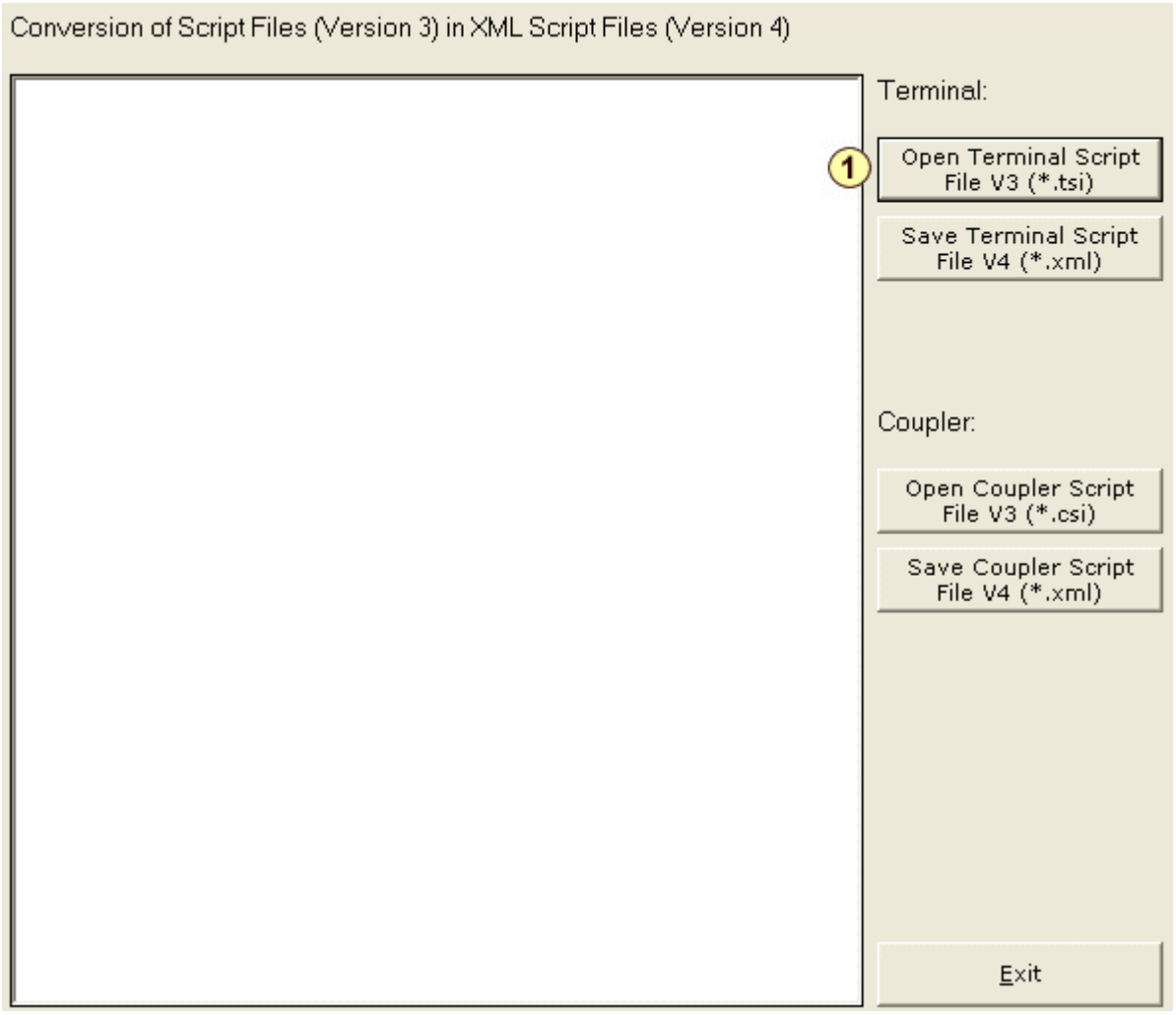


step 3: When the following window opens, you have the choice between the conversion of terminal and coupler script files.

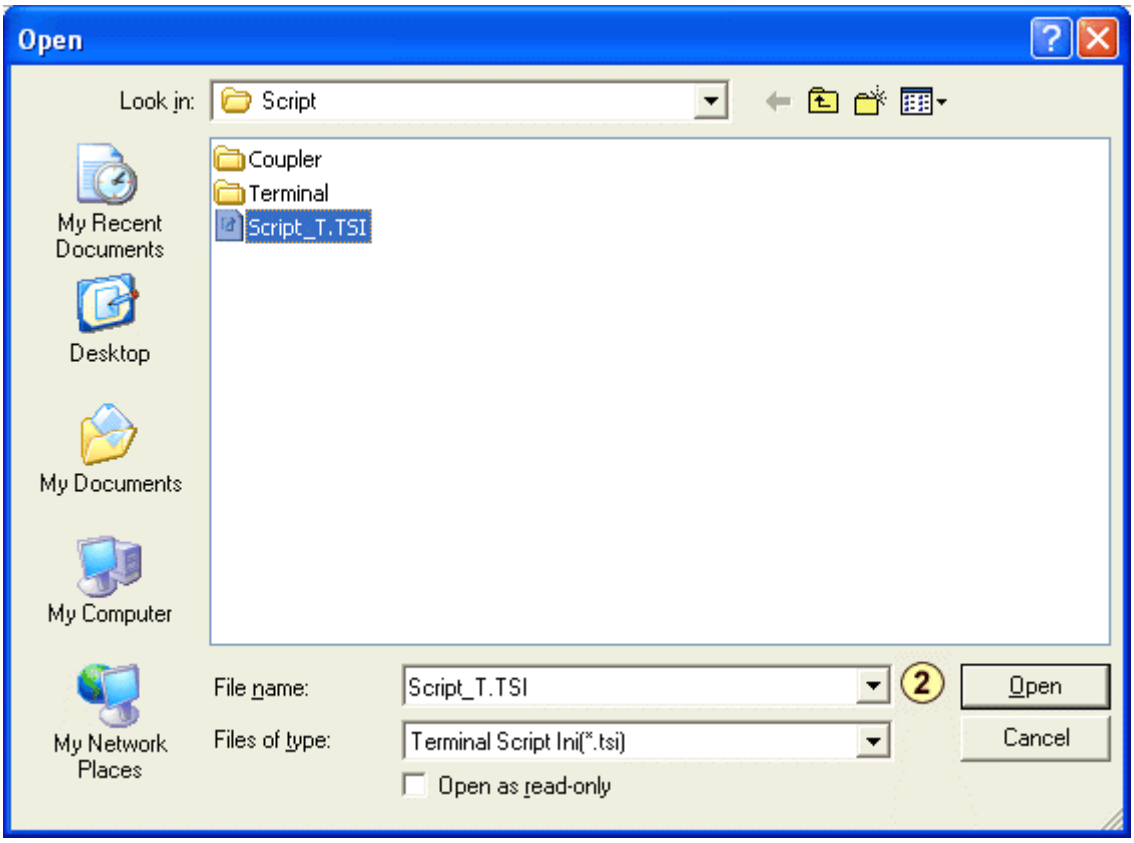
- terminal script files (*.tsi)
- coupler script files (*.csi)

In the e.g. we will show you how to transfer a terminal script file. The procedure of a coupler script file conversion is the same.

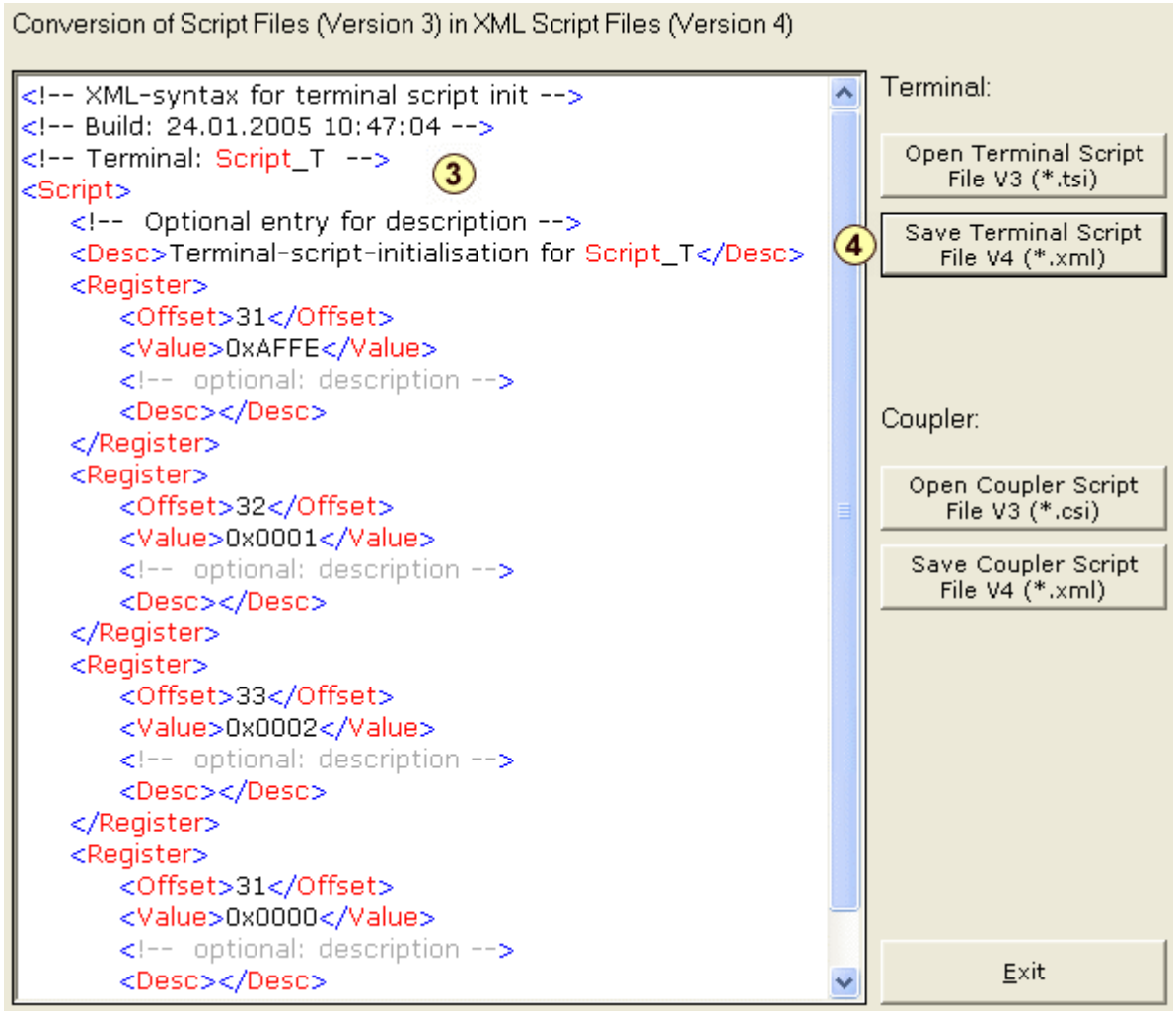
Click onto *Open terminal script file V3 (*.tsi)***(1)**.



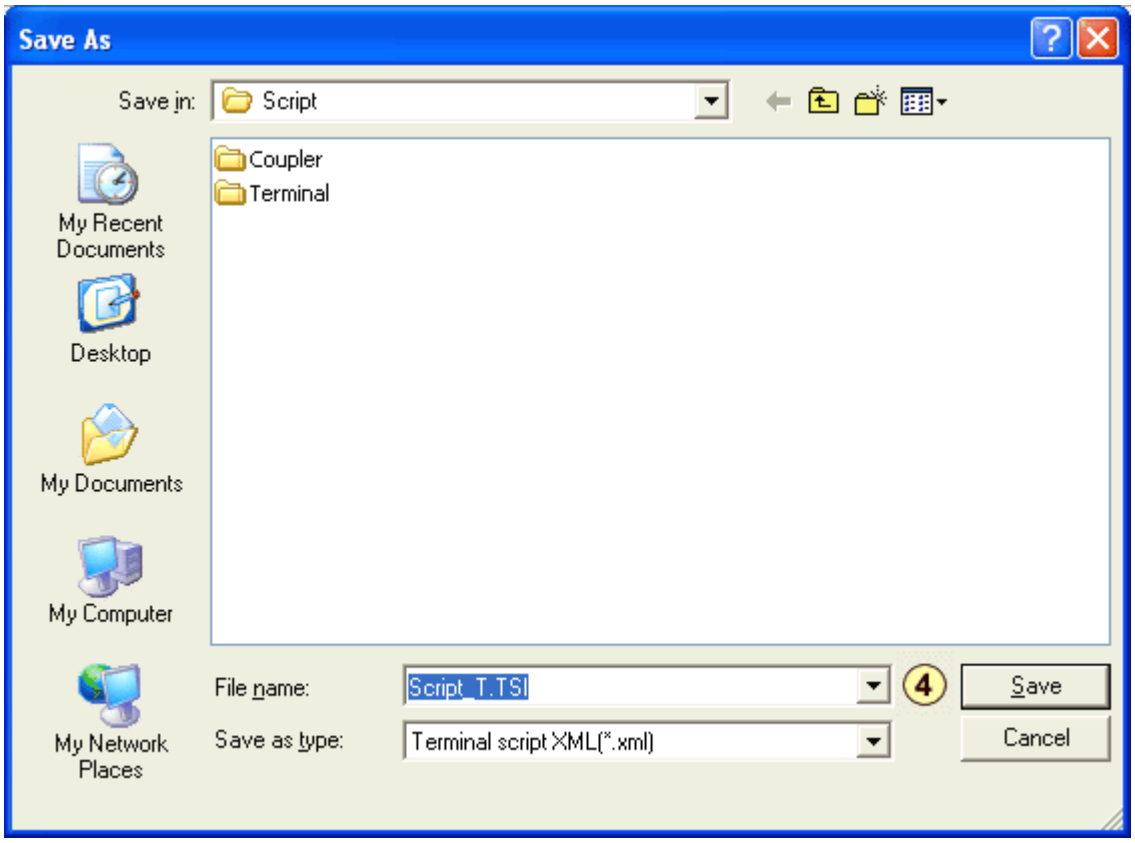
step 4: The following window will open. Select the file you want to transfer and click *open*. (e.g: Script_T.TSI)



step 5: In **(3)** you can see the already transferred script file. Click *Save terminal script file V4 (*.xml)***(4)** to save the file.



step 6: The following window will open. Select the format *Terminal script XML(*.xml).* Now you must decide about the name (file name) and the place (folder) to save the file. When you are finished click onto *Save.* To close the dialog you have to click *Exit*.

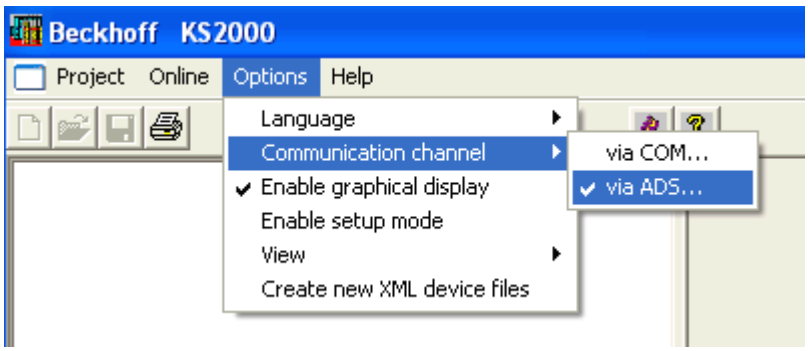


4.1.4 AMS Router

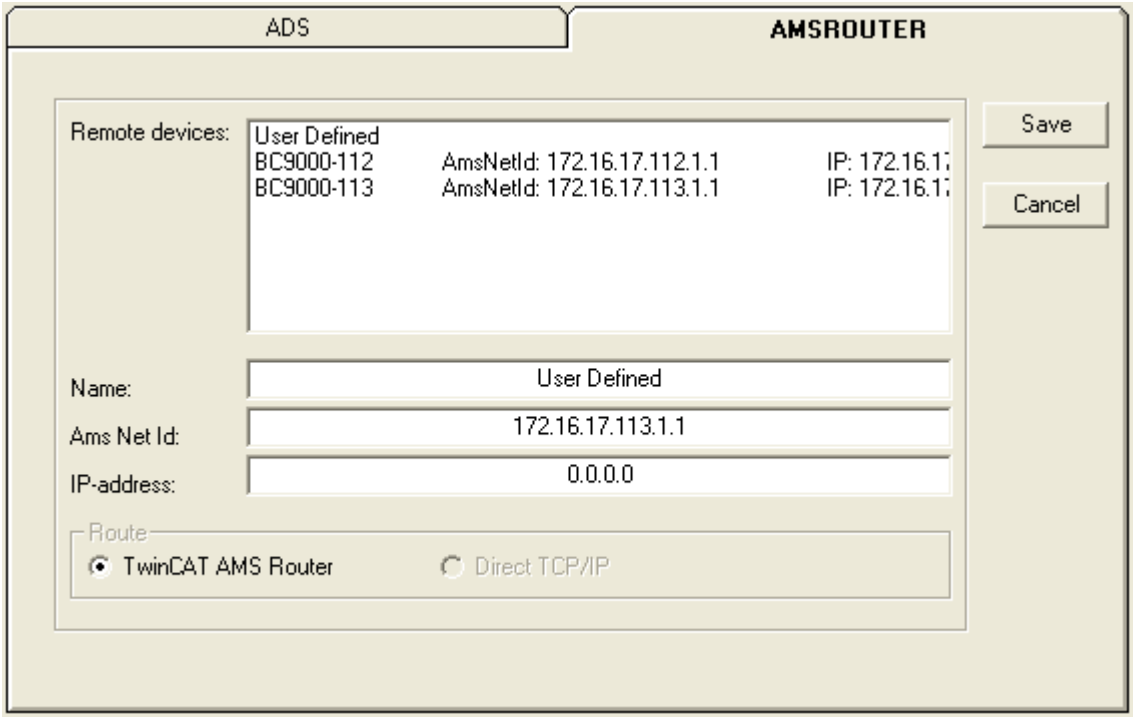
The AMS router administered the TCP/IP connections to other target systems.

step 1: Click onto *Options* in the menu bar.

step 2: Hover onto *Communication channel* and click onto *via ADS...*



step 3: The following menu will open. Devices, which already had been configured in TwinCAT *AMS Router*, will be shown in the list. Manually, you can add new devices by entering their *Name, AmsNetId* and *IP-Adress* and click on *Save*.



Name

Name of the target system.

AmsNetID

AmsNetId of the target system

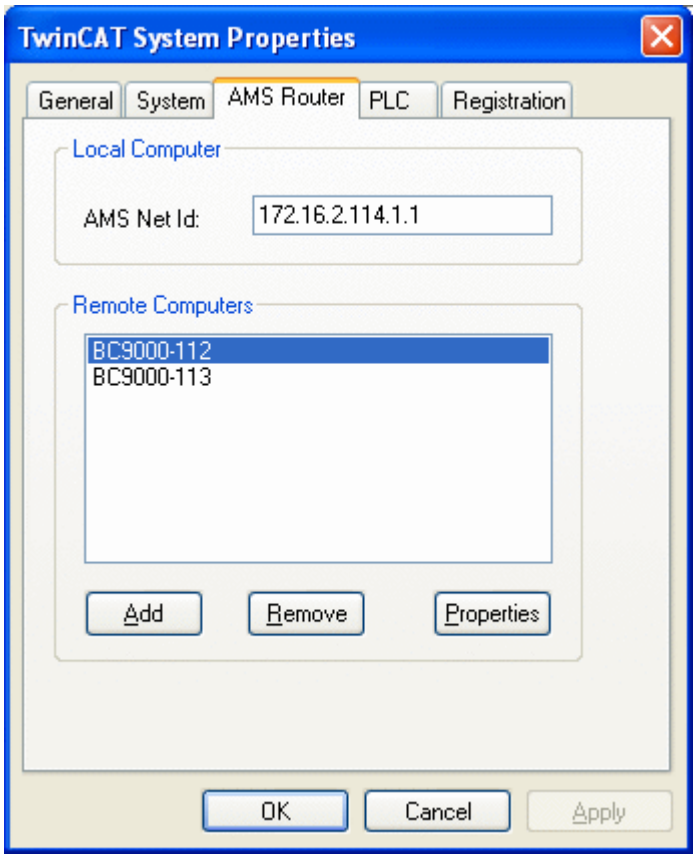
IP-Adress

Address of the target system. These are depending on the transfer protocol you are using. Next to TCP/IP also Profibus and other devices, which support the ADS protocol are possible.

Save

Saves the entries into the list of *Remote Devices*.

Also have a look in TwinCAT AMS Router

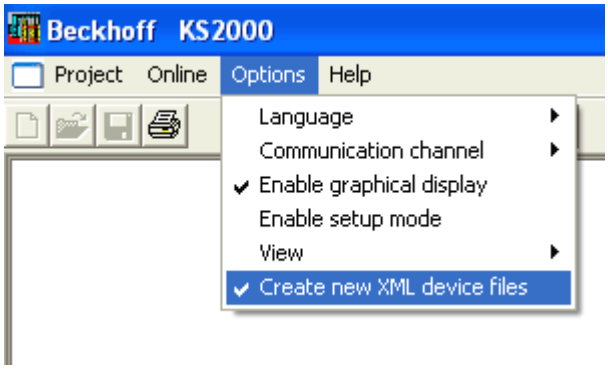


4.1.5 How to make and delete XML device files

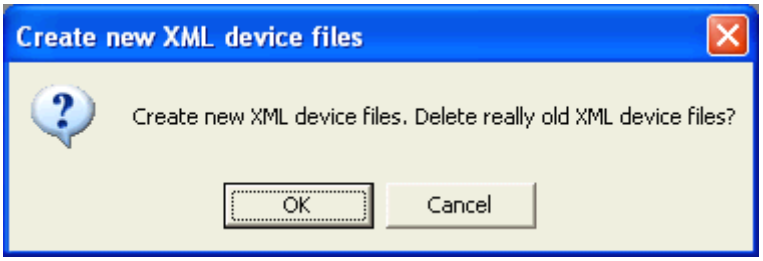
This option should only be used when after the login when a terminal has not been detected correctly. When it is activated, then while the login processes the old files are getting deleted and the new files written. This causes a delay during the booting.

step 1: To activate or deactivate the option you must click onto *Options* in the menu bar.

step 2: Click onto *Create new XML device files*.



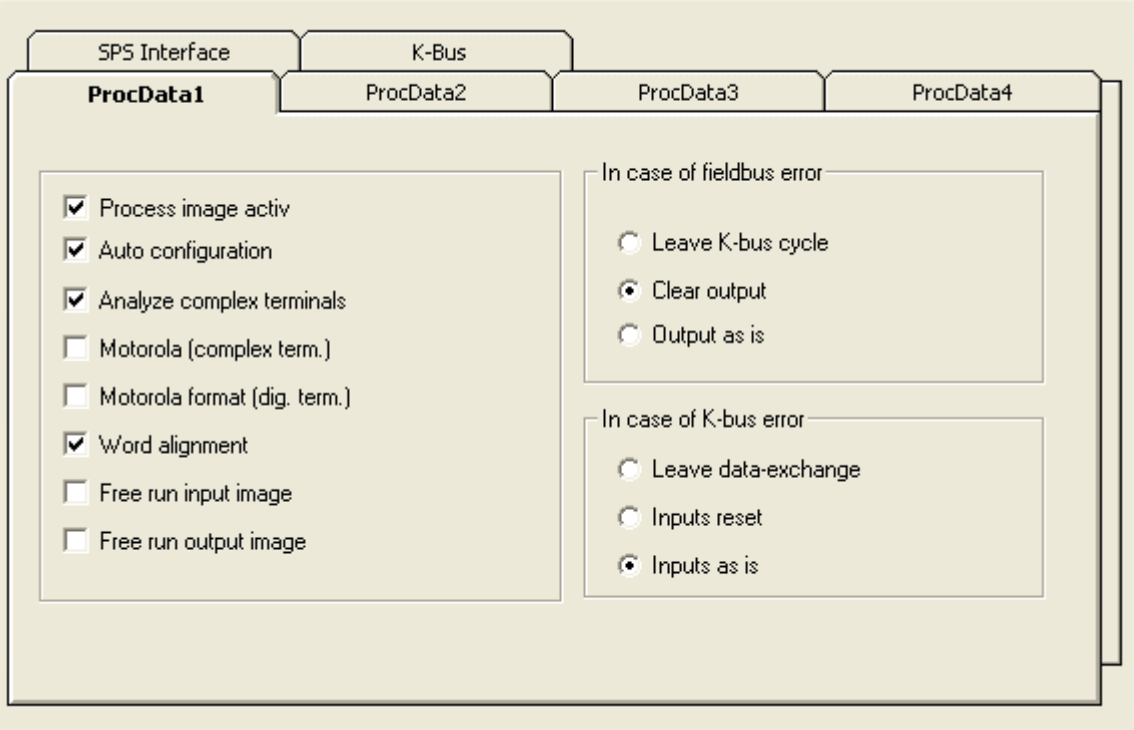
It is activated when the following popup window will open during the login. You now either have the choice to click *OK* to delete the old files or to click *cancel* to keep the old files.



To edit or delete the files manually you must change into the corresponding folder. In a standard installation of KS2000 this folder can be found in *C:\Programs\KS2000_V4\Resource\Devices.* If you chose a different installation folder, then you must search for *"...KS2000_V4\Resource\Devices"*.

4.2 Settings Coupler: General

4.2.1 General settings (bus coupler)



Process image aktiv:

You can run a maximum of 4 process images depending on the bus coupler. Each process image has it's own menu to do the configuration. With a tick in the check box "process image active" you can activate the process image.

Auto-configuration:

During the boot process, the bus coupler is creating the I/O process image of the connected bus terminals. With a tick in the check box, the auto-configuration can be activated. If it is deactivated, the bus coupler is booting with a configurated process image of the bus terminals defined at "programmed configuration".

Analysis of complex bus terminals:

Beckhoff provides a wide product range of different bus terminals to control sensors and actors. In general you can differentiate between digital and complex bus terminals. Each bus terminal that is exchanging byte information with a bus coupler is belonging to the group of complex bus terminals. This could be for example analogue but terminals, communication bus terminals or incremental encoder. With a tick in the check box "analysis complex terminals" you can activate the analysis which means, each complex bus terminal connected to this coupler is sending all its data. Example: A KL3002 would also send the control and status byte. Further information about the complex bus terminals you will get from the specific documentation.

Motorola complex bus terminals:

This option is needed to select the required process image. With a tick in the check box, you select the Motorola format without, you select the Intel format. The Motorola format is using the high data byte of the word at the lowest address offset of the storage space. By using the Intel format it is the other way around.

e.g.:
Adress Offset High Byte Low Byte
Motorola Format: $0 D0 D1
Intel Format $0 D1 D0

Motorola-Format (digital bus terminals):

By selecting the Motorola format with digital bus terminals, the high byte together with the low byte of two back-to-back "digital bytes" are getting twisted (in consumption 16 consecutive digital channels).

Word Alignment:

By selecting "word alignment" you define the length of a word (even byte address) in the memory of the process image.

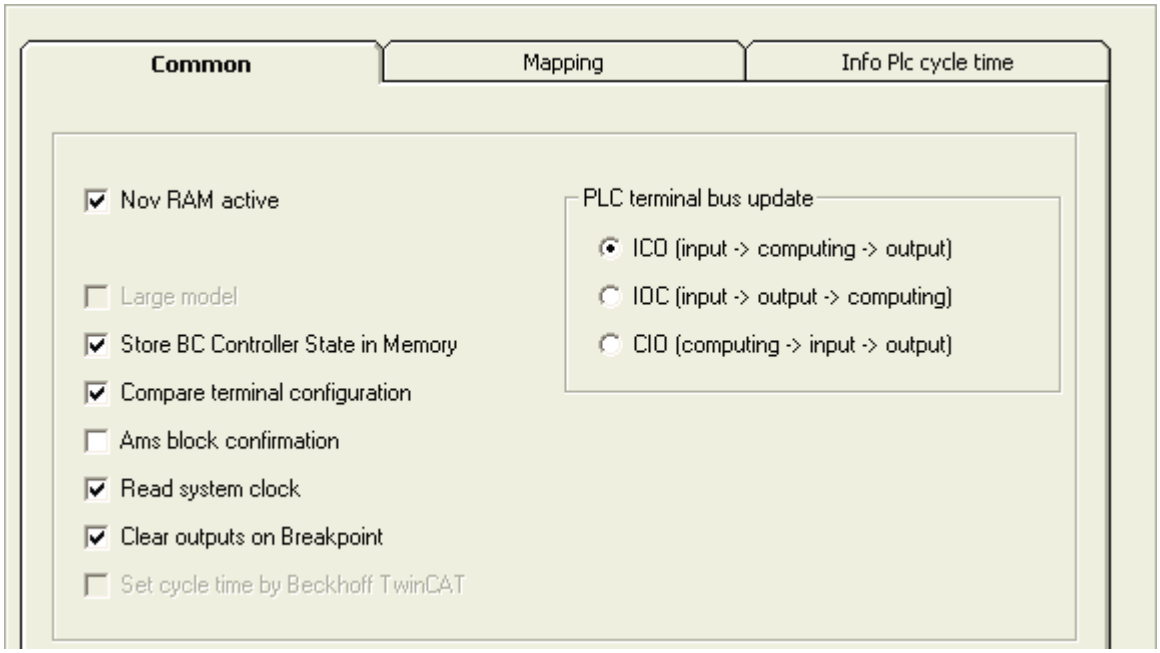
Free run input image:

The bus coupler is exchanging the process image of input bus terminals automatically. The free run of the process image asynchronous to the field bus.

Free run output image:

The bus coupler does an automatic asynchronous exchanging of the output terminal's process image. A synchronization with the field bus does not taken place, which can lead to an inconsistency of the bus coupler data (e.g. BK2000).

4.2.2 Controller: Common settings



Nov Ram active

If checked, retain data (VAR_GLOBAL RETAIN *var1* AT%MB… END_VAR) gets copied to the NOVRAM of the BC/BX controller.

Store BC Controller State in Memory

If this box is checked, the K-Bus and fieldbus status information get copied into the memory area (%MB…) of the BC/BX controller. *See* Beckhoff Information System: "GetFBusStatus" resp. "GetTBusStatus".

Compare terminal configuration

The Bus Terminal configuration gets stored during boot project creation. If the physical Bus Terminal configuration gets changed after boot project creation, the boot project wouldn't start. If this box is unchecked, the boot project would start even with changed hardware configuration [default = checked].

Ams block confirmation

If a TwinCAT version >= 2.9 gets used, this box needs to be checked for compatibility reasons.

Read system clock

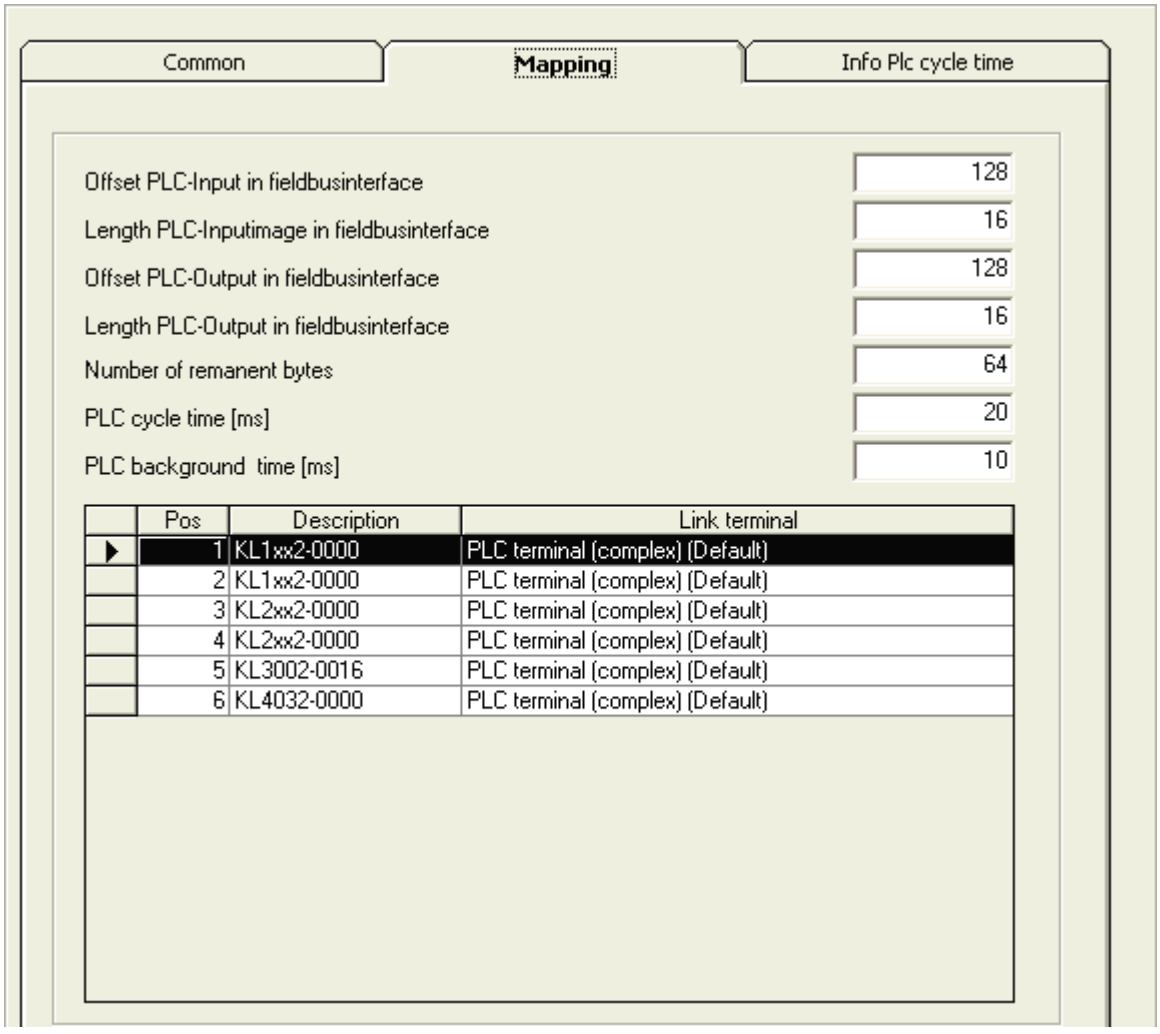
The cycle tick counter gets copied into the memory range (%MB…) of the BC/BX controller. *See* Beckhoff Information System: "GetSysTick"

Clear outputs on breakpoint

Outputs get cleared when the PLC program hits a Breakpoint.

PLC terminal bus update

ICO: inputs get read prior to the PLC cycle. Outputs get written after the PLC cycle [default].
IOC: inputs get read and outputs get written prior to the PLC cycle.
CIO: inputs get read and outputs get written after the PLC cycle.



Offset PLC-input in fieldbus interface

Fieldbus input data are mapped starting from PLC variable offset (Default %IX128)

Length PLC-inputimage in fieldbus interface

Length of fieldbus input data (Default 16 Byte)

Offset PLC-output in fieldbus interface

Fieldbus output data are mapped starting from PLC variable offset (Default %QX128)

Length PLC-output image in fieldbus interface

Length of fieldbus output data (default 16 Byte)

Number of remanent bytes

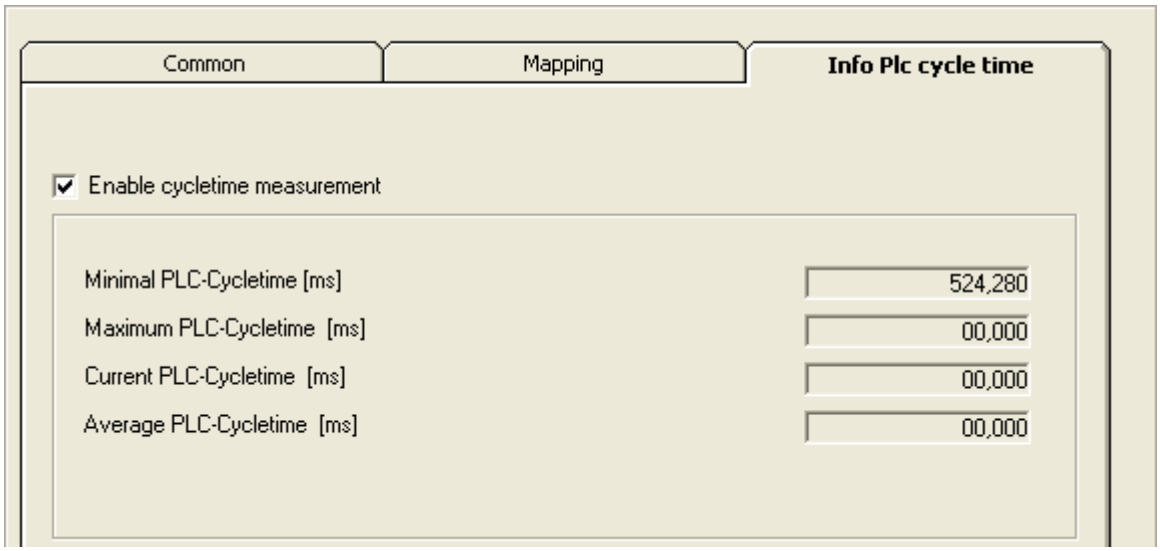
Number of remanent data (default 64 - %MB0-%MB63)

PLC cycle time [ms]

PLC cycle time (default BCxx00 : 5 ms, BC9000 : 20 ms)

PLC background time [ms]

PLC background time (Default BCxx00 : 2 ms, BC9000 : 10 ms)



Enable cycle time measurement

With this checkbox, the cycle time measurement on the BC/BX can be activated.

Minimal PLC cycle time [ms]

Displays the min. measured PLC cycle time of the controller.

Maximal PLC cycle time [ms]

Displays the max. measured PLC cycle time of the controller.

Current PLC cycle time [ms]

Displays the currently measured PLC cycle.

Average PLC cycle time [ms]

Displays the average PLC cyle time (average cycle time of the last 200 measurements) of the BC/BX controller.

5 Appendix

5.1 Help and support

Help

Further information about the usage of the KS2000 you will find in the following documentation:

- The KS2000 documentation is split into the parts QuickStart and Reference. Here you will find information from the first steps up to registry communication.
- Further detailed information you will also find in the hardware documentation.

The latest version of all documentation can also be found on the internet. Please use the link to get there (Documentation).

Support

Contact the Support if you still have further questions. This preparation you can do to get a quick and prizes answer from our support:

- Give a precise description of the error and of your last steps before the error had happened.
- What kind of hardware are you using?
- What kind of operating system are you using?
- How are you connected (COM or ADS)?
- What kind of KS2000 software version are you using (You find this information if you click onto Help in the menu bar and then onto Info)?
- In which order your terminal station is assembled?
- Which firmware is on the bus coupler or controller (Further information you will find in supported firmware [▶ 9] or graphical view [▶ 35])?

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