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

Hazard with high risk of death or serious injury.	
Hazard with medium risk of death or serious injury.	
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 Documentation issue status

Version	Comment	
6.1.0	5.1.0 • 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 What are the System requirements?

- Windows 7 SP1 or Windows 10
- 25 MB Hard disk space
- · You need the administration rights on your operating system

Supported products

All Beckhoff Bus coupler, produced since October 1996, do support the KS2000:

- 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"

Please check the <u>link [> 33]</u> to find out, which firmware version is required to support the special features of the KS2000.

3 QuickStart



Fig. 1: KS2000 Configuration Software

3.1 How to install the KS2000 software?

System requirements

- Windows 7 SP1 or Windows 10
- 25 MB Hard disk space
- You need the 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*.

Name	Größe	Тур
Momentan auf der CD vorhandene	Dateien	
		Dataiando an
Document		Dateioroner
i html		Dateiordner
🛅 InfoSystem		Dateiordner
C Supplement		Dateiordner
Cols Cols		Dateiordner
C TwinCAT		Dateiordner
AUTORUN.INF	1 KB	Setup-Informationen
🕘 default.htm	1 KB	HTML Document
🕘 german.htm	1 KB	HTML Document
🙆 ks2000.htm	1 KB	HTML Document
shele Select ?	19 KB	Anwendung
🙊 Tcat.ico	1 KB	Symbol
🕘 twincat.htm	1 KB	HTML Document
i ∨4.32	1 KB	32-Datei

step 2: double-click KS2000_v4.exe



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

KS	2000 v4 - InstallShield Wizard		
`	Vählen Sie eine Setup-Sprache aus Wählen Sie die Sprache für die Installation aus der unten aufgeführten Auswahl aus.		No.
1	Deutsch Englisch		
Inst	allShield	Weiter >	Abbrechen

The following window will appear.



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

KS2000_V4 Setup		×
	Welcome to the InstallShield Wizard for KS2000_V4	
	The InstallShield® Wizard will install KS2000_V4 on your computer. To continue, click Next.	
	< Back Next > Cancel	

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

KS2000_V4 Setup	×
License Agreement Please read the following license agreement carefully.	
Press the PAGE DOWN key to see the rest of the agreement.	
Software Usage Agreement for Beckhoff Software Products Domestic Customers § 1 Subject Matter of This Agreement (1) LICENSOR grants CUSTOMER a non-transferable, non-exclusive right to use the data processing applications specified in Appendix 1 hereto (hereinafter called "SOFTWARE") within the Federal Republic of Germany under the conditions specified hereinafter. (2) The SOFTWARE shall be delivered to CUSTOMER on machine readable recording media as specified in Appendix 1, on which it is recorded as Do you accept all the terms of the preceding License Agreement? If you select No, the will close. To install KS2000_V4, you must accept this agreement.	setup
InstallShield Kes	10

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*.

KS2000_V4 Setup	×
Customer Information Please enter your information.	
Insert the Soft-Key. (No trial version available for now)	
User Name:	
1 test	
Company Name:	
(2) test	
Serial Number:	
3	
InstallShield	
< Back Next >	Cancel

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.

Installing C:\wINDOWS\System32\MSCOMCTL.OCX	
Cancel	

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.

KS2000_V4 Setup	
	InstallShield Wizard Complete Setup has completed installing. • Yes, I want to restart my computer now. • No, I will restart my computer later. Click Finish to exit setup.
	< Back Finish Cancel

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 <u>KS2000-Zx-USB drivers</u> 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.

Installing device driver software 🔌 🗙 Click here for status.	
-	1

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,

Co	ntrol Panel 🕨	•	← Search Control Panel	Q
Adjust y	/our computer's sett	tings	View by: Category	-
P	System and Securi Review your computer's Back up your computer Find and fix problems Network and Intern	ty status 🏭	User Accounts and Family Safety Add or remove user accounts Set up parental controls for any user	
.	View network status and Choose homegroup and sharing options	l tasks I	Appearance and Personalization	E
	Hardware and Sou View devices and printer Add a device	Hardware and So Add or remove p	Change the theme <u>Change desktop</u> background ound solution rinters and other	
	Programs Uninstall a program	hardware, chang play CDs automa power, update de more.	e system sounds, age, and tically, conserve evice drivers, and ds or other	
			Change display language	-

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.

G I	Update Driver Software - USB Serial Port	×
Но	w do you want to search for driver software?	
•	Search automatically for updated driver software Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.	
•	B <u>r</u> owse my computer for driver software Locate and install driver software manually.	
		Cancel

Fig. 9: Browse my computer for driver software

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

	×
Update Driver Software - KS2000-Zx-USB.	
Browse for driver software on your computer	
Search for driver software in this location:	
C:\Driver\KS2000_USB_CDM_2.06.02 ■	
✓ Include subfolders	
Let me pick from a list of device drivers on my computer This list will show installed driver software compatible with the device, and all driver software in the same category as the device.	
Next Ca	ncel

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.

Windows Security
Would you like to install this device software?
Name: CDM Driver Package Publisher: Future Technology Devices International
Always trust software from "Future Technology Devices International".
You should only install driver software from publishers you trust. How can I decide which device software is safe to install?

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.

	×
🕞 🧕 Update Driver Software - USB Serial Converter	
Windows has successfully updated your driver software	
Windows has finished installing the driver software for this device:	
USB Serial Converter	
	ie 🗌

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.

	×
🕒 🗕 Update Driver Software - USB Serial Port	
Browse for driver software on your computer	
Search for driver software in this location:	
C:\Driver\KS2000_USB_CDM_2.06.02	
✓ Include subfolders	
Let me pick from a list of device drivers on my computer This list will show installed driver software compatible with the device, and all driver software in the same category as the device.	
Next Cance	el

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.

💽 Windows Security	×
Would you like to install this device software?	
Name: CDM Driver Package Publisher: Future Technology Devices International	
<u>A</u> lways trust software from "Future Technology <u>Install</u> <u>Don't Install</u> <u>Don't Install</u>	כ
You should only install driver software from publishers you trust. How can I decide which device software is safe to install?	2

Fig. 16: Click Install

 $\overline{}$

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

G I Update Driver Software - USB Serial Port (COM3)	×
Windows has successfully updated your driver software	
Windows has finished installing the driver software for this device:	
USB Serial Port	
Clos	

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.

Beckhoff KS2000				
ns Help				
nguage German mmunication channel able graphical display able setup mode w eate new XML device files				

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

🖃 – 🕌 Pos 0: BC9000-0000 ()	
A Save station-settings in file	
Restore station-settings from file	
2 Reports	
Part list	
Terminal: Register Documentation	
3 = E Settings	
Common: Settings	
Common: Local user-mapping	
🔁 Fieldbus: Settings	
🔁 Fieldbus: Security settings	
Controller: Settings	
🔔 🕂 🕂 Process Data	
4 Tables	
🔁 📲 Pos 1: KL1xx2-0000 (2 channel dig. input) 🤅 🤱)
🚽 象 Channel (in) 1	
🔤 象 Channel (in) 2	
🗄 📲 Pos 2: KL1xx2-0000 (2 channel dig. input)	
🕀 📲 Pos 3: KL2xx2-0000 (2 channel dig. output)	
🔁 📲 Pos 4: KL2xx2-0000 (2 channel dig. output)	
🗄 📲 Pos 5: KL2xx8-0000 (8 channel dig. output) 🚬	
📄 📲 Pos 6: KL3002-0016 (2 channel ana. input) 🌔)
E Schannel 1	
Register	
🔁 Settings	
🚽 <table-cell-rows> Process Data</table-cell-rows>	
🛨 😽 Channel 2	
Pos 7: KL4032-0000 (2 channel ana. output)	
Pos 8: KL9010-0000 (End terminal) (7)

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.

🚮 Beckhol	f <mark>f KS2</mark> 0	00		
Project Onli	ine Optio	ons Help		_
	En Er	anguage ommunication channel nable graphical display nable setup mode	•	
View Create		ew reate new XML device file	• •5	✓ Reportbox ✓ Treeview

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 our home page at <u>www.beckhoff.com</u>.

Fieldbus System	Bus Coupler / Bus Terminal Controller	Firmware version required on the Bus Cou- pler / Bus Terminal Controller for the Com- missioning 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	В0				
	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				
СХ	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 <u>www.beckhoff.com</u>.

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

s	Туре	I-Ado	tress	Bitsize	O-Ad	dress	Bitsize
1	KL1xx2-0000			la contra como			
-	Channel 1						
	St Input		16.0	1			
	Channel 2		-0.0				
	♦ Input		16.1	1			
2	KI 1yy2-0000			•			
-	Channel 1						
			16.2	1			
	Channel 2		1016	•			
	♦ Channer 2		16.3	1			
3	KI 2vv2-0000		10.0	•			
	Channel 1						
	Output					16.0	1
	Channel 2					10.0	*
	Output					16.1	1
4	KI 2xx2-0000					10.1	•
1	Channel 1						
						16.2	1
	Channel 2					1012	=
	Output					16.3	1
5	KI 3002-0000					10.5	1
	Channel 1						
			0.0				
	Onata In	5- 8 -1	2.0	16			
	Ctd	under	2.0	10		0.0	8
	Data Out				544	2.0	16
	Channel 2				mode	2.0	10
	♦ Channor 2		4.0	8			
	Data In	i-t-l	6.0	16			
	Ctd	aver	0.0	10		4.0	8
	Data Out				intel.	6.0	16
6	KI 4032-0000				mode	0.0	
	Channel 1						
			8.0	8			
	Chata In	المغير	10.0	16			
	Ctvl	unter	10.0	10		8.0	8
	Data Out				intel.	10.0	16
	Channel 2				nurër	10.0	10
			12.0	8			
	Data In	pet d	14.0	16			
	↓ Cbd	intër	14.0	10		12.0	8
	Data Out				and all	14.0	16
7					inter	14.0	10
ſ.,	= KE9010-0000			∑ 100			∑ 100

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:

COM Port		
		<u>0</u> K
COM-Port	COM1 💌	<u>C</u> ancel
Baud	19200 💌	
Databits	8	
Parity	Even	
Stopbits	1	
ВКх Туре	RS232 💌	
Timeout	500	Test
Multipoint		

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.

COM Port		
		<u>0</u> K
		Cancel
COM-Port		
Baud	COM3	
Databits	8	
Parity	Even	
Stopbits	1	
ВКх Туре	R\$232 💌	
Timeout	500	Test
Multipoint	0	

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

COM Port	٦	
		<u> </u>
COM-Port		<u>C</u> ancel
Baud	3 19200	
Databits	19200	
Parity	38400 Even	
Stopbits	1	
ВКх Туре	RS232 💌	Test
Timeout	500	1630
Multipoint	0	

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

COM Port		
		<u>0</u> K
COM-Port	COM1 -	<u>C</u> ancel
Baud	19200 💌	
Databits	8	
Parity	Even	
Stopbits	1	
ВКх Туре	4 RS232	
Timeout	RS232	l est
Multipoint	0	

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

COM Port			
			<u> </u>
COM-Port	COM1	•	<u>C</u> ancel
Baud	19200	•	
Databits	8	_	
Parity	Even	V	
Stopbits	1	V	
ВКх Туре	RS232	•	
Timeout		500	Test
Multipoint	(5)		

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...

COM Port			
			<u>0</u> K
COM-Port	COM1	•	<u>C</u> ancel
Baud	19200		
Databits	8	-	
Parity	Even	-	
Stopbits	1	V	
ВКх Туре	RS232	•	
Timeout		500	Test
Multipoint		0	

The reason why you could get the following message:

Test	communication 🛛 🔀
	No communication with coupler!
	Code: 1
	ок

- · 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.

Test con	nmunication 🛛 🔀
(į)	Communication with coupler successful
	OK

step 7: click OK to save the settings.

COM-Port	COM1 -	<u>C</u> ancel
Baud	19200 💌	1
Databits	8	1
Parity	Even	1
Stopbits	1	1
ВКх Туре	RS232]
Timeout	500) Test
Multipoint		- - -

```
step 8:<u>Go online [▶ 47]</u>
```

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.

ADS		AMSROUTER
1 Name:		<u>0</u> K
CX_00762C: 5.0.118.44.1.1	•	<u>C</u> ancel
2 AmsServerNetId	5.0.118.44.1.1	
3 AdsPort	28928	
Timeout	500	
Multipoint	0	Test 4
Route	C Direct TCP/IP	

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:

Test	communication 🛛 🔀
	No communication with coupler!
	Code: 1
	OK

- 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*.

Untitled - TwinCAT System Manage	r - 'CX_00762C'	
Datei Bearbeiten Aktionen Ansicht Option	ven <u>?</u>	
	🗟 🏘 👌 🔜 📾 🗸 🏙 🧟 🧟 🇞 🌂 🚳 🖹 🔍 🖓 🚳 🙎 🔊	🧶 😰 🤻
SYSTEM - Konfiguration NC - Konfiguration SPS - Konfiguration SPS - Konfiguration ElA - Konfiguration ElA Geräte ElA Geräte Gerät 2 (CX1100) Gerät 2 (CX1100) Gerät 2 -Prozeßabbid Elngänge ElA Ausgänge CX1100-KB El Ausgänge ElA Ausgänge	Allgemein CK1100-BK ADS ADS Kommunikation aktivieren Port: 28928 (0x7100) Andern Max Timeout: 5 s	
Klemme 2 (KL1002) Klemme 3 (KL1002) Klemme 4 (KL2114)		
Klemme 5 (KL2114)	Nummer Klemmenbezeichnung Typ Eing, Größe Ausg, Größe	
Klemme 7 (k1.9002)	1 Klemme 2 (KL1002) KL1002 0.2 0.0 2 Klemme 3 (KL1002) KL1002 0.2 0.0 3 Klemme 3 (KL1002) KL1002 0.2 0.0 3 Klemme 4 (KL2114) KL2114 0.0 0.4 4 Klemme 5 (KL2012) KL3002 6.0 6.0 6 Klemme 7 (KL3002) KL3002 6.0 6.0 7 Klemme 8 (KL4002) KL4002 6.0 6.0 8 Klemme 9 (KL4002) KL4002 6.0 6.0 9 End-Klemme (KL9010) KL9010 0.0 0.0	2
Bereit	CX_00762C (5.0.118.44.1.1)	nfig Mode

Dialog: See this topic $[\blacktriangleright 47]$ 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.

ADS	· · · · ·	AMSROUTER
1 Name:		<u>0</u> K
CX_00762C: 5.0.118.44.1.1	•	<u>C</u> ancel
2 AmsServerNetId	5.0.118.44.1.1	
3 AdsPort	28928	
Timeout	500	
Multipoint	0	Test 4
Route TwinCAT AMS Router	C Direct TCP/IP	

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:<u>Go online [▶ 47]</u>.

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 [84] for further information



Example with BC/BK

Beckhoff KS2000 - [StationGraph]										
Broject Ogline Options Help										_ @ X
		Transminia (m	rteterir		(theoretic	ana iniz	ting ta	ana da B	ekstrie	unit bilana
Pos 0: BC5000-0000 () Save station-settings from file Reports Settings Tables Pos 1: KL1xx2-0000 (2 channel dig. input) Pos 2: KL1xx2-0000 (2 channel dig. input) Pos 3: KL2xx2-0000 (2 channel dig. input) Pos 4: KL2xx2-0000 (2 channel dig. input) Pos 5: KL3002-0016 (2 channel dig. output) Pos 5: KL3002-0016 (2 channel dig. output) Pos 6: KL4032-0000 (2 channel ans. input) Pos 7: KL9010-0000 (End terminal)										
	IP-Adt. : 172.16.17.1	12		in 0x0	in 0x0	out 0x0	out 0x0	in 0x0000 out 0x0000 out 0x0000	in 0x0000 out 0x0000 out 0x0000	
Status					(an an a	Online	2	20.07.2004	11:23	

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

Beckhoff KS2000 - [StationGraph]				<u>_ ×</u>
Projekt Online Optionen Hilfe				<u>_8×</u>
	4 9			
Pos 0: CX1100-0001 () Stations-Einstellung speichern in Datei Stations-Einstellung naus Datei übertragen Reports Tabellen Pos 1: KL2xx2-0000 (2 Kanal dig. Ausgang) Pos 2: KL2xx2-0000 (4 Kanal dig. Ausgang) Pos 4: KL9010-0000 (Endklemme)	BECKHOFF CX1100-0001 PWR V0 RN V0 ERR V0 ERR V0 ERR V0 ERR V0 ERR V0 ERR V0 ERR V0 ERR V0 ERR V0 ERR	+ 244 = + UPS -		
Status		Onli	ne 19.05.2004	18:18

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.

Beckhoff	KS2000 - [StationGraph]		
Project On	line Options Help		
	Login	F11	8 8
	Logout	F12	
	Process-image(cycl.)		
	Terminal	•	
I IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Coupler	•	
	Station	►	
	Dev_only	F	
🛨 📲 Pos 🤇	Firmware Load		
🕂 🕂 Pos 🧉	Conversion of script files in XML		
	······································		
🕂 🕂 Pos 6: Kl	.4032-0000 (2 channel ana. output)		

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:

Actions			Exit
Write protection set	Reboot	Factory settings	
Write protection abolished	Reset KBus	Get Checksum	
Status			
<u> </u>			

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...

🚺 Be	ckho	ff KS200	0 - [Statio	nGraph]			
🔲 Pro	oject	Online Op	tions Help				
	Posí	Login Logout		F11 F12		<u> </u>	
		Process-	image(cycl.)				
		Terminal			•		
	÷	Coupler			•	Services	l
÷.	1	Station			•	Script-Init	l
+	Pos : Pos 2	Dev_only	/			Firmware Update	
	Pos (Pos (Pos (Firmware Conversi	e Load on of script file	s in XML			
÷	Pos 6 Pos 7	5: KL4032-00 7: KL9010-00	00 (2 channel 00 (End termir	ana. output) nal)			

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

Select a firmw	rare-file	? 🗙
Look jn:	: 🔁 BC9000B900 💽 🗢 🖻 📸 📰 -	
My Recent Documents	Click Here	
Desktop		
My Documents		
My Computer		
My Network Places	File name: BC9000B900.hex	<u>O</u> pen
	Files of type: Firmware *.hex	Lancel

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

Firmware Update		Exit
C:\Dokumente und Einstellungen\	Eigene Dateien'Daten'Dokumentation\Temp'BC9	
Label1		Select
Log		
		Start
		1

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

Firmware Update		Exit
C:\Dokumente und Einstellungen\	Eigene Dateien Daten Dokumentation \Temp BC9	
Label1		<u>S</u> elect
Las		
		St <u>a</u> rt
	05 %	
Starting downloadplease wait	^	
	v	

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.

Version: 6.1.0

step 1: click Online

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

Beckhof	ff KS2000 - [StationGraph]			
📄 Project	Online Options Help			
D 💕 日	Login Logout	F11 F12	<u>* ?</u>]
2 2 6	Process-image(cycl.) Terminal			Ethernet TCP/IP
±	Coupler Station	•	Services Script-Init	
	Dev_only		Firmware Update 🤻	
	Firmware Load Conversion of script files in XML			PLC
	: KL4032-0000 (2 channel ana. output : KL9010-0000 (End terminal))		

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

Select a script-	file	? 🔀
Look <u>i</u> n:	🔁 Coupler 💽 🗢 🖻 📸 📰 -	
My Recent Documents Desktop	TemplateScriptCoupler.xml	
My Documents My Computer		
- S		
My Network Places	File name: TemplateScriptCoupler.xml Files of type: Coupler XML Script *.xml	<u>O</u> pen Cancel

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

step 5: click start

Script	Exit
C:/Dokumente und Einstellungen\ 1 ene Dateien'/Daten'/Dokumentation\Temp\Ten	
Template for coupler-script-initialialisation	<u>Select</u>
Log	Start

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



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

				Temp\Ten	
emplate for cou	pler-script-initialialisation				Select
emprate for coa	pror -son pr-in interioristici n				
				~	
og					Start
abelle: 000					
Register: 250	Datum : 0000 (00000)	Verify : OK	product extension		
Register: 032	Datum : 0123 (00291)	Verity : DK	test2		
abelle: 100	D. 1. 0000 (00000)	N X OK	T 1 1 1		
fegister: UUU	Datum : 0000 (00000)	Venity : UK	l ypdescription		
				2	
0				5	
<u></u>				<u> </u>	

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-initialialisation</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.

Beckhoff KS2000				
Project Online Options Help				_ 8 ×
	88			
Pos 0: BC9000-0000 () Save station-settings in file Restore station-settings from file Reports Settings	List of accessibility Com	ity settings	(IP/UDP):	
Common: Settings	Device Name: IP ad	dress: Flag	gs: 🔼 🔨	Exit
Common: Local user-mapping Fieldbus: Settings Fieldbus: Settings Fieldbus: Security settings (IP/LDP) Controller: Settings Process Data Tables Pos 1: KL2xx2-0000 (2 channel dig. output) Pos 3: KL9010-0000 (End terminal)	PC 1 172. PC 2 0.0.0 PC 3 0.0.0 PC 4 0.0.0 PC 5 0.0.0 PC 6 0.0.0 PC 7 0.0.0 PC 8 0.0.0 PC 9 0.0.0 PC 10 0.0.0 PC 11 0.0.0	L6.2.114 TCI .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	₽/IP	3 Clean all
	Settings			
	Device Name: PC 1	•	4)	5
	IP address: 172	16 2 114		Remove
	Flags © ТСР/IР С	UDP/IP С ТСРЛ	P&UDP/IP	Add
Status		Online	24.01.2005	14:22

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.

	X
Reboot	to take settings ?
<u>a</u>	Nein

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)

Select a script-	file	? 🔀
Look jn:	🗁 Terminal 💽 🗢 🛍 🐨	
My Recent Documents	TemplateScriptTerm.xml Click Here	
Desktop		
My Documents		
My Computer		
My Network	File name: TemplateScriptTerm.xml	<u>O</u> pen
FIACES	Files of type: Terminal XML Script *.xml	Cancel

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

Program Files/KS2000_V4/Resour		<u>E</u> xit
emplate for terminal-script-initialisation	2	<u>S</u> elect
Settings		
Start script with terminal 1 - 3 V Resume on ignore		
ind script with terminal 2 - 4		
9		Start

step 6: Click Exit to leave the menu.

Program File	WS2000 V4Resource\S	cript\Terminal\Te	mplateScriptTerm.xml	_	Exit
ar rogrammas		erspect er trimmitte	and and a second s		Select
emplate for termi	nal-script-initialisation				
Settings					
Start script with te	erminal 1	÷	esume on ignore		
End script with te	rminal 2	.			
og					Start
Terminal position:	09				
Channel: 00					
Register: 031	Datum : 1235 (04661)	Verify : DK	Set codeword		
Register: 035 Register: 031	Datum : 0016 (00022) Datum : 0000 (00000)	Verity: DK	feature-register: select typ x		
negistel. 031	D'akam . 0000 (00000)	Velly OK	Teset Codeword		
Channel: 01	D				
Hegister: 031	Datum : 1235 (04661)	Verity : UK	Set codeword		
Register: 035	Datum : 0000 (00022) Datum : 0000 (00000)	Verify: OK	reset codeword		
Terminal position:	10				
Channel: 00					
Register: 031	Datum : 1235 (04661)	Verify: OK	Set codeword		
Register: 035	Datum : 0016 (00022)	Verify: OK	feature-register: select typ x		
negister: 031	Datum : 0000 (00000)	Verity : UK	reset codewold		
Channel: 01					
Register: 031	Datum : 1235 (04661)	Verify : OK	Set codeword		
Register: 035	Datum : 0016 (00022)	Verify : OK	feature-register: select typ x		
Senister (131	 Datum : 0000 (00000) 	Verify: UK	reset codeword	Comp.	
register. con	,			10	

Note :

i

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</p>
 <!-- 17.10.2000 StH
                         -->
<Script>
   <!-- Optional entry for description</pre>
                                            -->
   <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

0	🔿 🔽 1 Channel	C 3 Channel	5 Chappel	T 7 Channel
Terminal 1 9	3 Channel		E 6 Channel	R Channel
	j 2. crialite			
Register (2) 17	+ to 40 +			
arget				
Save in xml file				
				o
I C C C C C C C C C C C C C C C C C C C				
L:\2-Channel 3062-000	JU.xml			Set target file
C Send as email	C. Conv.to clipboard			Set target hie
C Send as email	C Copy to clipboard			Set target file
C Send as email	C Copy to clipboard			Set target file
C Send as email	C Copy to clipboard			Set target file
C Send as email	C Copy to clipboard			Set target file
C Send as email tatus	C Copy to clipboard			Set target file
C Send as email tatus 2-Channel 3062	C Copy to clipboard			Set target file
C Send as email tatus 2-Channel 3062	Copy to clipboard Copy to clipboard 2-0000 on position 9 Start	export		Set target file

NOTICE Wait for the process to finish Wait until the process has finished before starting something else.

64

Terminal	9		₩ 1.0	hannel hannel	III 3. Channe III 4. Channe	i □ 5.0	Channel Channel	7. Channel
Register	17	to	40	÷				
arget								
~ ~ `	1.00							
(• Save in xr	ni hile						_	.
C:\2-Channel	ni file 3062-000)0.xml						Set target file
C Send as e	ni file 3062-000 mail	00.xml C Co	py to clipb	oard			_	Set target file
 Save in xr C:\2-Channel C: Send as e Status 	ni file 3062-000 mail	00.xml C Co	py to clipb	oard				Set target file
 Save in xr C:\2-Channel C: Send as e Status 	ni file 3062-000 mail	00.xml	py to clipb	oard				Set target file
Getting	ni hile 13062-000 mail registe	0.xml C Co r values	py to clipb	oard				Set target file
Getting	ni hile 13062-000 mail	0.xml C Co r values	py to clipb	oard Start e	export			Set target file

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).

Save As		? 🗙
1 Savejn:	🔁 K\$2000_V4 💽 🗲 🗈 📸 📰 •	
My Recent Documents Desktop	CResource TcTerminals.xml TcTerminals.xml test2b.xml TwinCATTerminals.xml	
My Documents		
My Computer		
S		
My Network Places	File name: 2 backup.xml	<u>S</u> ave
	Save as type: XML Files (*.xml)	Cancel

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.

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
Close

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...

	Pos 0: BC9000-0000 ()
	🙀 Save station-settings in file
	Restore station-settings from file
+	Reports
+	🔁 Settings
+	Tables
<u>ب</u>	Pos 1: KL1××2-0000 (2 channel dig. input)
÷	Pos 2: KL1xx2-0000 (2 channel dig. input)
÷	Pos 3: KL2xx2-0000 (2 channel dig. output)
÷	Pos 4: KL2xx2-0000 (2 channel dig. output)
÷	Pos 5: KL3002-0016 (2 channel ana. input)
÷	Pos 6: KL4032-0000 (2 channel ana. output)
i <mark></mark>	Pos 7: KL9010-0000 (End terminal)

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).

Open		? 🛛
1 Look in:	🕞 KS2000_V4 💽 🗢 🖻 📸 📰 🗸	
My Recent Documents Desktop	Resource TcTerminals.xml test2.xml test2b.xml TwinCATTerminals.xml	
(My Documents		
My Computer		
My Network Places	File name: backup.xml Files of type: XML Files (*.xml)	<u>O</u> pen Cancel

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.



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

Script		E-9
C:\Dokumente und Einstellungen\	ene Dateien Daten Dokumentation \Temp \Ter	
Templete far opunlar opvist initialiation		2 <u>S</u> elect
remplate for coupler-script-initialialisation	<u>^</u>	
1	×	
Log		Charle 1
	~	Sigit
-		
	~	
<	>	

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



step 6: Click *Exit* to leave the menu.
				Temp\Ten	Select
emplate for cou	pler-script-initialialisation			-	2000
og					Start
abelle: 000 legister: 250 legister: 032	Datum : 0000 (00000) Datum : 0123 (00291)	Verify:0K Verify:0K	product extension test2		
abelle: 100 legister: 000	Datum : 0000 (00000)	Verify: 0K	Typdescription		
				>	



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-initialialisation</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 ...

🚮 Beckho	ff KS2	2000	- [Stati	onGraph]		
Project	Online	Option	is Help			
	Logir Logo	ut			F11 F12	8
	Proc	ess-ima	ge(cycl.)	1		
	Term	inal			•	Script-Init
	Coup	bler			>	
	Stati	on			F	
🕀 🔁 S	Dev_	only			F	
	Firm. Conv	vare Lo version (ad of script fil	es in XML		

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

		<u>E</u> xit
Program Files WS2000_V4Wesour	(2)	Select
emplate for terminal-script-initialisation	<u> </u>	
Settings		
Start script with terminal 1 🗧 3 🔽 Resume on ignore		
and script with terminal		
g		Start
	- 2	Sight
	<u> </u>	

step 6: Click Exit to leave the menu.

					Exit
					Select
emplate for terr	ninal-script-initialisation				<u>J</u> 6600
Settings					
Start script with	terminal 11	- - -	esume on ignore		
End script with t	erminal 2				
og					St <u>a</u> rt
erminal position	: 09				
Channel: 00					
Register: 031	Datum : 1235 (04661)	Verify : OK	Set codeword		
Register: 035 Register: 031	Datum : 0016 (00022) Datum : 0000 (00000)	Verity : UK Verity : OK	reset codeword		
Channel: 01					
Register: 031	Datum : 1235 (04661)	Verify : OK	Set codeword		
Register: 035 Register: 031	Datum : 0016 (00022) Datum : 0000 (00000)	Verity: UK Verity: OK	reset codeword		
Terminal position	c 10				
Channel: 00					
Register: 031	Datum : 1235 (04661)	Verify: OK	Set codeword		
Register: 035 Register: 031	Datum : 0016 (00022) Datum : 0000 (00000)	Verify: DK Verify: DK	feature-register: select typ x reset codeword		
Channel: 01					
Register: 031	Datum : 1235 (04661)	Verify : OK	Set codeword		
Register: 035	Datum : 0016 (00022)	Verify : DK	reature-register: select typ x	· · · ·	
	Datum : 0000 [00000]	Veriry : UK	leset codemotd	12-12-1	
hegister: 031				30	

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</pre>
 <!-- 17.10.2000 StH
                        --->
- <Script>
   <!-- Optional entry for description</pre>
                                            -->
   <Desc>Template for terminal-script-initialisation</Desc>
 - <Reaister>
     <Offset>31</Offset>
     <Value>0x1235</Value>
     <!-- optional: description -->
     <Desc>Set codeword</Desc>
   </Register>
 - <Reaister>
     <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).

Conversion of Script Files (Version 3) in XML Script Files (Version 4)

	Terminal:
1	Open Terminal Script File V3 (*.tsi)
	Save Terminal Script File V4 (*.xml)
	Coupler:
	Open Coupler Script File V3 (*.csi)
	Save Coupler Script File V4 (*.xml)
	<u>E</u> xit

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

Open						? 🗙
Look jn:	C Script		•	+ 🗈 e	* 🎟 🕶	
My Recent Documents Desktop	Coupler Terminal Script_T.TSI					
My Documents						
My Computer						
My Network Places	File <u>n</u> ame: Files of <u>t</u> ype:	Script_T.TSI Terminal Script Ini(*.tsi) Open as read-only		<u>.</u>	• 2 •	<u>O</u> pen Cancel

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

XML-syntax for terminal script init	>	Terminal:
Since Syntax for communication permit and senter and	Η	
Terminal: Script T		Open Terminal Script
<script></script>		

Conversion of Script Files (Version 3) in XML Script Files (Version 4)

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*.

Save As						? 🔀
Savejn:	C Script		•	+ 🗈 🖸	* 🎟 🕶	
My Recent Documents Desktop My Documents	Coupler Coupler					
My Computer						
S	File <u>n</u> ame:	Script_T.TSI			- 4	<u>S</u> ave
My Network Places	Save as <u>t</u> ype:	Terminal script XML(*.xml)			-	Cancel

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*.

Reference

BECKHOFF

IUTER
172.16.1; 172.16.1; Cancel

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

TwinCAT System Properties
General System AMS Router PLC Registration
Local Computer
AMS Net Id: 172.16.2.114.1.1
Remote Computers
BC9000-112 BC9000-113
Add Remove Properties
OK Cancel Apply

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.

Beckhoff KS2000								
🦳 Project Online	Options	Help						
	Langu Comm V Enable Enable View	age unication channel e graphical display e setup mode						
	✓ Create	e 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.

Create r	new XML device files 🛛 🔀
2	Create new XML device files. Delete really old XML device files?
	Cancel

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)

SPS Interface	K-Bus]	
ProcData1	ProcData2	ProcData3	ProcData4
 Process image activ Auto configuration Analyze complex te Motorola (complex te Motorola format (dig Word alignment Free run input imag Free run output imag 	/ rminals erm.) . term.) e ge	In case of fieldbus error C Leave K-bus cycle C Clear output C Output as is In case of K-bus error Leave data-exchat C Inputs reset C Inputs as is	nge

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.

Mapping	Info Plc cycle time
erface	128
	16
Ibusinterface	
nterface	128
interface	16
	64
	20
	10
ion Link for	minal
PLC terminal (complex) (Defau	
PLC terminal (complex) (Defau	lt)
PLU terminal (complex) (Defau	litj
	Interface tion Link ter PLC terminal (complex) (Defau PLC terminal (complex) (Defau

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)

	 Into Pic cycle time
Enable cycletime measurement	
Minimal PLC-Cycletime [ms]	524,280
Maximum PLC-Cycletime [ms]	00,000
Current PLC-Cycletime [ms]	00,000
Average PLC-Cucletime [ms]	00,000

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 (<u>Documentation</u>).

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 <u>firmware [▶ 9]</u> or <u>graphical view [▶ 35]</u>)?

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More Information: www.beckhoff.com/KS2000

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