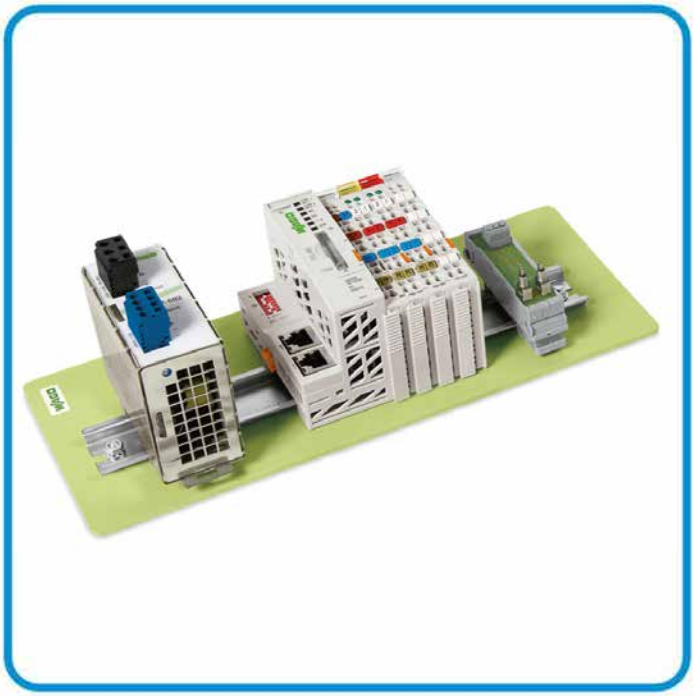
Quickstart Reference



WAGO-I/O-SYSTEM 750

ETHERNET Programmable Fieldbus

750-880

10/100 Mbit/s; digital and analog signals

Version 1.0.0

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Every conceivable measure has been taken to ensure the accuracy and completeness of this documentation. However, as errors can never be fully excluded, we always appreciate any information or suggestions for improving the documentation.

E-Mail: documentation@wago.com

We wish to point out that the software and hardware terms as well as the trademarks of companies used and/or mentioned in the present manual are generally protected by trademark or patent.

Table of Contents

1 Notes about this Documentation

1.1 Validity of this Documentation

This documentation is only applicable to the 750-880 ETHERNET Programmable Fieldbus of the WAGO-I/O-SYSTEM 750 series.

1.2 Copyright

1.3 Symbols

DANGER

Personal Injury!
Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.

DANGER

Personal Injury Caused by Electric Current!
Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Personal Injury!
Indicates a moderate-risk, potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Personal Injury!
Indicates a low-risk, potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

Damage to Property!
Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.

NOTICE

Damage to Property Caused by Electrostatic Discharge (ESD)!
Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.

Note

Important Note!
Indicates a potential malfunction which, if not avoided, however, will not result in damage to property.

Information

Additional Information:
Refers to additional information which is not an integral part of this documentation (e.g., the Internet).

1.4 Number Notation

Table 1: Number Notation

Number code	Example	Note
Decimal	100	Normal notation
Hexadecimal	0x64	C notation
Binary	'100' '0110.0100'	In quotation marks, nibble separated with dots (.)

1.5 Font Conventions

Table 2: Font Conventions

Font type	Indicates
italic	Names of paths and data files are marked in italic-type. e.g.: *C:\Programme\WAGO-I/O-CHECK*
Menu	Menu items are marked in bold letters. e.g.: **Save**
>	A greater-than sign between two names means the selection of a menu item from a menu. e.g.: **File** > **New**
Input	Designation of input or optional fields are marked in bold letters, e.g.: **Start of measurement range**
“Value”	Input or selective values are marked in inverted commas. e.g.: Enter the value “4 mA” under **Start of measurement range**.
[Button]	Pushbuttons in dialog boxes are marked with bold letters in square brackets. e.g.: **[Input]**
[Key]	Keys are marked with bold letters in square brackets. e.g.: **[F5]**

2 Important Notes

This section includes an overall summary of the most important safety requirements and notes that are mentioned in each individual section. To protect your health and prevent damage to devices as well, it is imperative to read and carefully follow the safety guidelines.

2.1 Legal Bases

2.1.1 Subject to Changes

WAGO Kontakttechnik GmbH & Co. KG reserves the right to provide for any alterations or modifications that serve to increase the efficiency of technical progress. WAGO Kontakttechnik GmbH & Co. KG owns all rights arising from the granting of patents or from the legal protection of utility patents. Third-party products are always mentioned without any reference to patent rights. Thus, the existence of such rights cannot be excluded.

2.1.2 Personnel Qualifications

All sequences implemented on Series 750 devices may only be carried out by electrical specialists with sufficient knowledge in automation. The specialists must be familiar with the current norms and guidelines for the devices and automated environments.

All changes to the coupler or controller should always be carried out by qualified personnel with sufficient skills in PLC programming.

2.1.3 Use of the 750 Series in Compliance with Underlying Provisions

Couplers, controllers and I/O modules found in the modular WAGO-I/O-SYSTEM 750 receive digital and analog signals from sensors and transmit them to the actuators or higher-level control systems. Using programmable controllers, the signals can also be (pre-) processed.

The components have been developed for use in an environment that meets the IP20 protection class criteria. Protection against finger injury and solid impurities up to 12.5 mm diameter is assured; protection against water damage is not ensured. Unless otherwise specified, operation of the components in wet and dusty environments is prohibited.

Operating 750 Series components in home applications without further measures is only permitted if they meet the emission limits (emissions of interference) according to EN 61000-6-3. You will find the relevant information in the section on "WAGO-I/O-SYSTEM 750" → "System Description" → "Technical Data" in the manual for the used fieldbus coupler/controller.

Appropriate housing (per 94/9/EG) is required when operating the WAGO-I/O-SYSTEM 750 in hazardous environments. Please note that a prototype test certificate must be obtained that confirms the correct installation of the system in a housing or switch cabinet.

2.1.4 Technical Condition of Specified Devices

The components to be supplied Ex Works, are equipped with hardware and software configurations, which meet the individual application requirements. WAGO Kontakttechnik GmbH & Co. KG will be exempted from any liability in case of changes in hardware or software as well as to non-compliant usage of components.

Please send your request for modified and new hardware or software configurations directly to WAGO Kontakttechnik GmbH & Co. KG.

2.2 Safety Advice (Precautions)

For installing and operating purposes of the relevant device to your system the following safety precautions shall be observed:

DANGER

Do not work on components while energized!
All power sources to the device shall be switched off prior to performing any installation, repair or maintenance work.

DANGER

Installation only in appropriate housings, cabinets or in electrical operation rooms!
The WAGO-I/O-SYSTEM 750 and its components are an open system. As such, install the system and its components exclusively in appropriate housings, cabinets or in electrical operation rooms. Allow access to such equipment and fixtures to authorized, qualified staff only by means of specific keys or tools.

NOTICE

Replace defective or damaged devices!
Replace defective or damaged device/module (e.g., in the event of deformed contacts), since the long-term functionality of device/module involved can no longer be ensured.

NOTICE

Protect the components against materials having seeping and insulating properties!
The components are not resistant to materials having seeping and insulating properties such as: aerosols, silicones and triglycerides (found in some hand creams). If you cannot exclude that such materials will appear in the component environment, then install the components in an enclosure being resistant to the above-mentioned materials. Clean tools and materials are imperative for handling devices/modules.

NOTICE

Cleaning only with permitted materials!
Clean soiled contacts using oil-free compressed air or with ethyl alcohol and leather cloths.

NOTICE

Do not use any contact spray!
Do not use any contact spray. The spray may impair contact area functionality in connection with contamination.

NOTICE

Do not reverse the polarity of connection lines!
Avoid reverse polarity of data and power supply lines, as this may damage the devices involved.

NOTICE

Avoid electrostatic discharge!
The devices are equipped with electronic components that you may destroy by electrostatic discharge when you touch. Pay attention while handling the devices to good grounding of the environment (persons, job and packing).

3 Quickstart Description

3.1 Hardware Design

The fieldbus node is to be structured as follows (viewed from left to right):

Table 3: Fieldbus Node Structure

Position	I/O-Modul	
1	PLC ETHERNET	750-880
2	Digital input module	750-400
3	Digital output module	750-501
4	End module	750-600

The 24VDC power supply unit is linked to the power (24V and 0V) for the fieldbus controller and for the power jumper contacts (see No. 5 in the figures of the PLC views and connections below).

For the application used in the example, it is sufficient to connect a jumper between "24V" and "+" (see No. 6) or between "0V" and "-" (see No. 9).

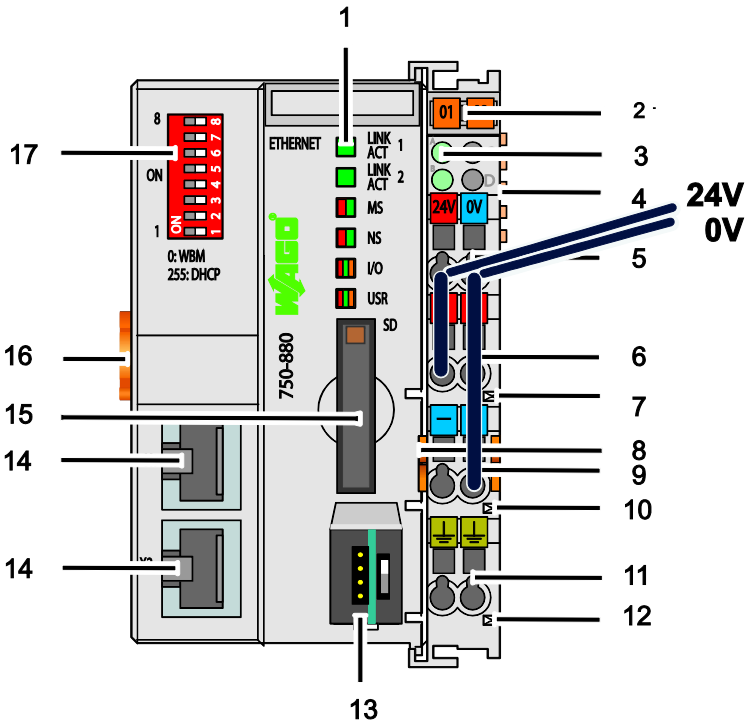

Figure 1: View and 24V/0V connection of the ETHERNET-TCP/IP fieldbus controller

Table 4: Legend to the View ETHERNET TCP/IP Fieldbus Controller

No.	Designation	Meaning	Details see Chapter:
1	LINK ACT 1, 2, MS, NS, I/O, USR	Status LEDs Fieldbus	"Device Description" > "Display Elements"
2	---	Group marking carrier (retractable) with additional marking possibility on two miniature WSB markers	---
3	A, B or C	Status LED's System/Field Supply	"Device Description" > "Display Elements"
4	---	Data Contacts	"Connect Devices" > "Data Contacts/Internal Bus"
5	24 V, 0 V	CAGE CLAMP® Connections System Supply	"Connect Devices" > "Connecting a conductor to the CAGE CLAMP®"
6	+	CAGE CLAMP® Connections Field Supply DC 24 V	"Connect Devices" > "Connecting a conductor to the CAGE CLAMP®"
7	---	Power Jumper Contact 24 V DC	"Connect Devices" > "Power Contacts/ Field Supply"
8	---	Unlocking Lug	"Assembly" > "Inserting and Removing Devices"
9	-	CAGE CLAMP® Connections Field Supply 0 V	"Connect Devices" > "Connecting a conductor to the CAGE CLAMP®"
10	---	Power Jumper Contact 0 V	"Connect Devices" > "Power Contacts/ Field Supply"
11	(Earth)	CAGE CLAMP® Connections Field Supply (Earth)	"Connect Devices" > "Connecting a conductor to the CAGE CLAMP®"
12	---	Power Jumper Contact (Earth)	"Connect Devices" > "Power Contacts/ Field Supply"
13	---	Service Interface (open flap)	"Device Description" > "Operating Elements"
14	X1, X2	Fieldbus connection 2 x RJ-45 as 2-Port ETHERNET Switch	"Device Description" > "Connectors"
15	---	SD card slot with cover lid	„Device Description“ > „Operating Elements“
16	---	Locking Disc	"Assembly" > "Inserting and Removing Devices"
17	---	Address Selection Switch	"Device Description" > "Operating Elements"

Note

Set the operating mode switch to the top position!
Set the operating mode switch to the top position. At this setting, the firmware and application program are executed (Activate program execution / "RUN").

The mode selector switch is located behind the cover flap (see No. 13 in the Figure above).

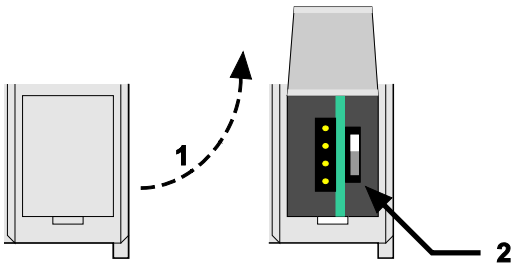

Figure 2: Mode selector switch (closed and open damper of the service port)

Table 5: Mode selector switch

Number	Description
1	Open the damper
2	Operating mode switch

Note

Only use recommended memory cards!
Only use the SD memory card available from WAGO (Item No. 758-879/000001) because it is specified for industrial applications under harsh environmental conditions and for use in the fieldbus controller.
Compatibility with other commercially available storage media cannot be guaranteed!

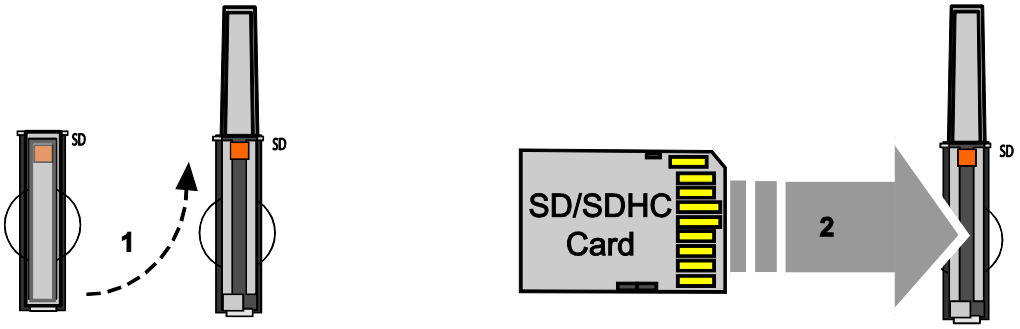

Figure 3: (1) Open the memory card slot, (2) insert the SD card

3.2 Preparatory Measures

3.2.1 Download documentation and sample projects

Note

Download documentation and sample projects!
Extensive documentation and sample projects for this Starterkit are available at the WAGO homepage. You will find these at www.wago.com/startkits.

Description	Version	Link
Installation Guide German/English	1.0.0	
Quick-Start Guide German	1.0.0	
Quick-Start Guide English	1.0.1	
German Manual	1.0.0	
English Manual	1.0.0	

Applications

Name	Description	Version	Download
Application 1 (Function Plan)	This application example, including visualization, shows how to control and process digital inputs and outputs.	1.0	
Application 1	This application example, including visualization, shows how to control and process digital inputs and outputs.	Ladder diagram	

Figure 4: Download possibilities at the WAGO homepage

3.2.2 Installing WAGO-I/O-*PRO*

The Starterkit ETHERNET 750-880 includes a CD with the development topology WAGO-I/O-*PRO*. This CD is also available individually under item number 759-333.

WAGO-I/O-*PRO* is a programming and visualization tool for control programs. This software is used to develop PLC applications for WAGO I/O SYSTEM 750 programmable fieldbus controllers. WAGO-I/O-PRO runs in compliance with the

IEC 61131-3 standard, which specifies the requirements for a programming system.

You can use this programming tool to develop application programs in the programming languages AWL, KOP, FUP, CFC, ST and AS.

Proceed as follows to perform the installation:

1. Insert the WAGO-I/O-*PRO* CD into your CD-ROM drive.

2. If the installation does not begin automatically, start the file Setup.exe.

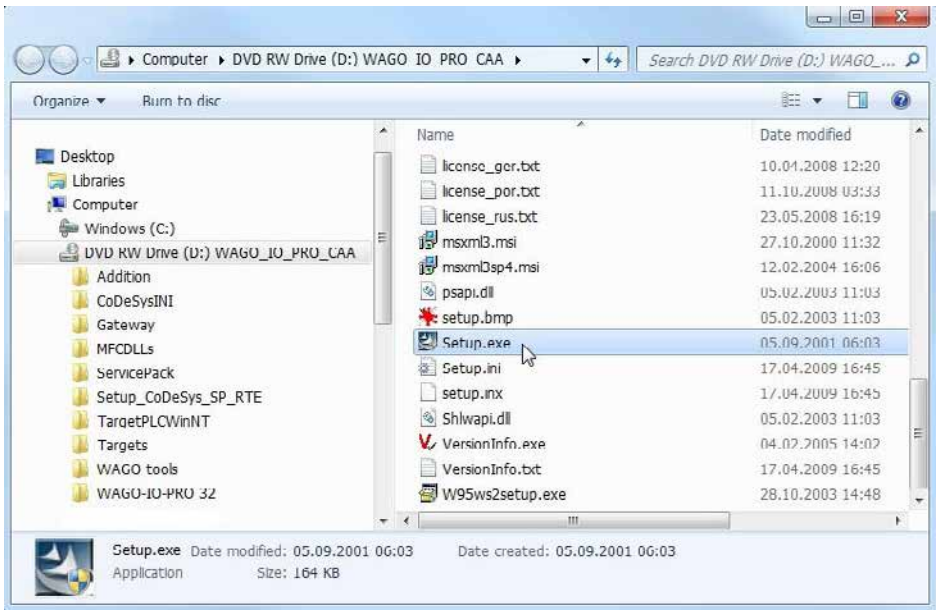

Figure 5: Contents of the WAGO-I/O-*PRO* CD (folder view), *Setup.exe* file

3. Select the language. Then confirm this selection by clicking **[OK]**.

Figure 6: Selecting the setup language

4. Click the **[Next]** button in order to start setup using the "InstallShield Wizard".

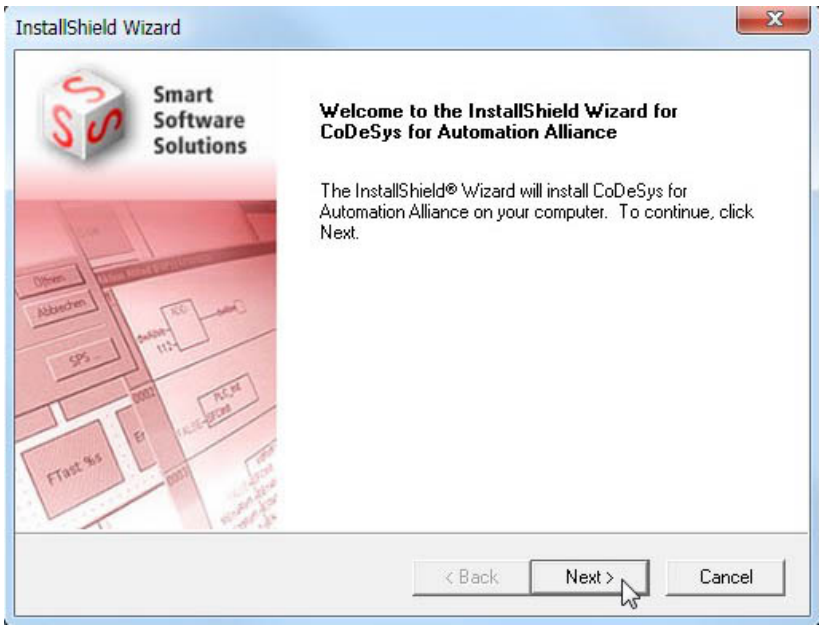

Figure 7: Starting the setup

5. Click on the **[OK]** button in order to accept the license agreement.

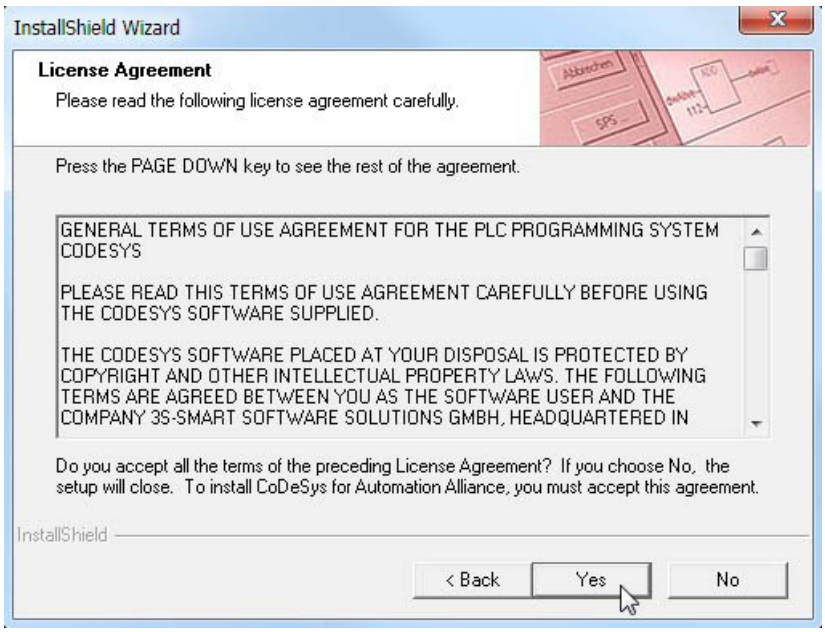

Figure 8: License agreement

6. Select the target directory. Then confirm this selection by clicking **[Next]**.

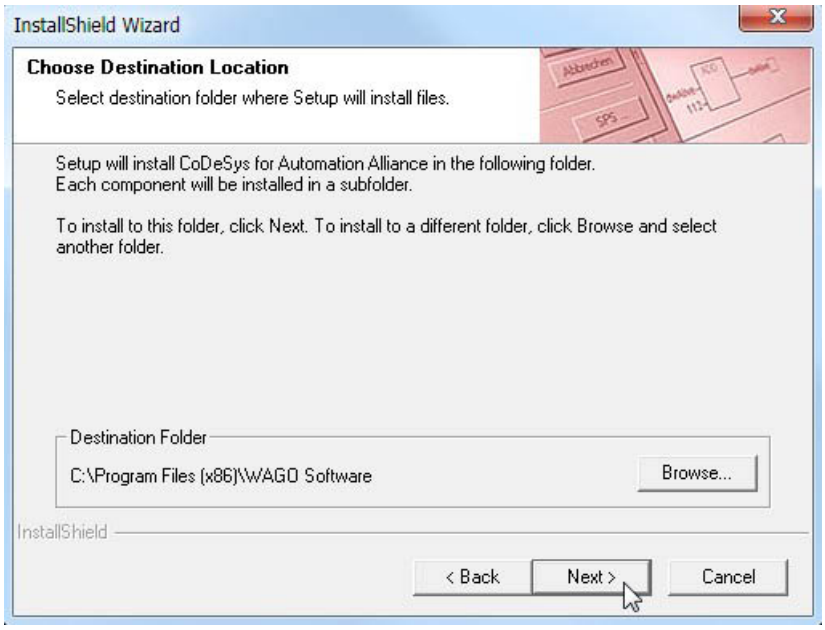

Figure 9: Selecting the target directory

7. Select the components to be installed. Then confirm this selection by clicking **[Next].**

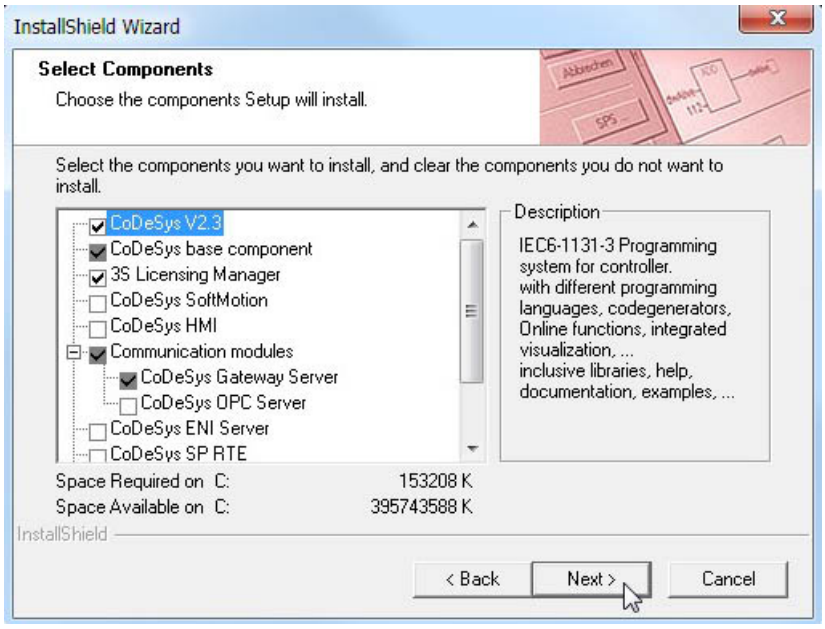

Figure 10: Selection of components

8. Select the program folder. Then confirm this selection by clicking **[Next]**.

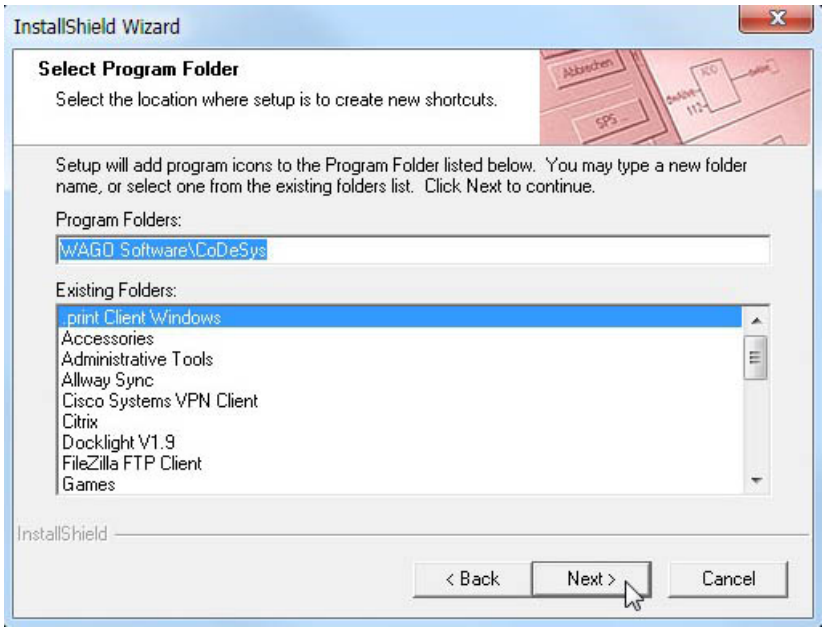

Figure 11: Selection of program folder

9. Check the settings you have defined. Then confirm this selection by clicking **[Next]**.

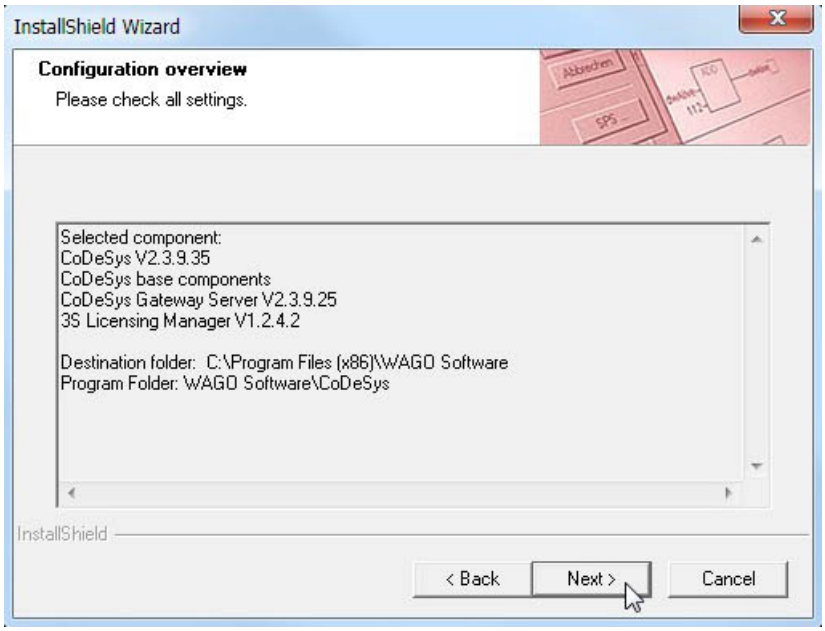

Figure 12: Overview of configuration

This opens the pdf document "EA_ConfigurationReleaseInfo.pdf", which has information about the new version of the WAGO-I/O Configurator dialog.

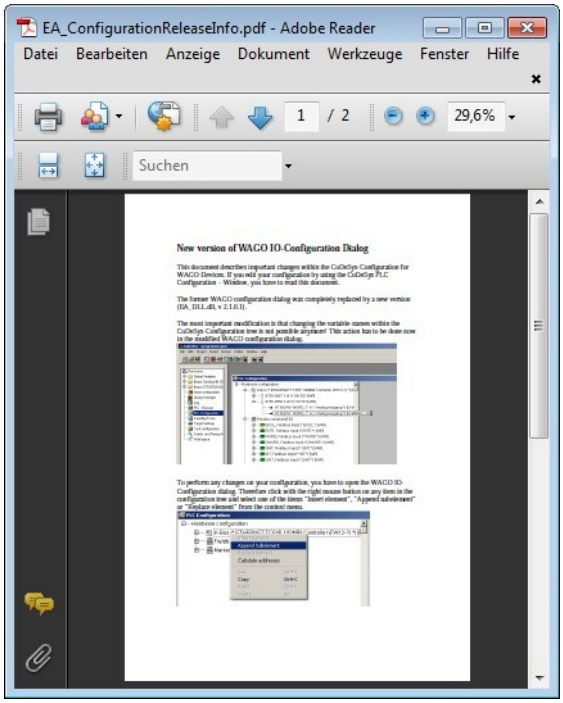

Figure 13: Pdf document "EA_ConfigurationReleaseInfo.pdf"

10. Click **[Complete]** to end setup.

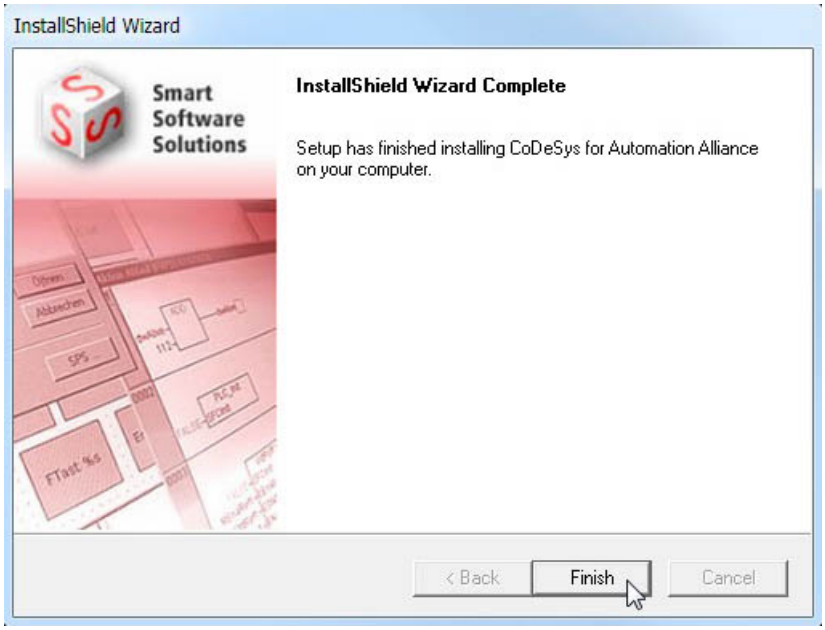

Figure 14: Completing the setup

3.2.3 Starting Up the ETHERNET Network

This section provides you with a step-by-step sample procedure for starting up the ETHERNET network.
You must perform three steps to start up the network:

- **Determine the IP address of your PC and change it if required**
- **Assign an IP address to the fieldbus controller**
- **Test the ETHERNET link**

The description of these individual steps can be found in the corresponding following sections.

Note

Sample description!
This description is just an example. It only describes the procedure for local startup of a single fieldbus controller using a non-networked computer running Windows.

3.2.3.1 Determine the IP address of your PC and change it if required

The explanation below describes how to determine the IP address currently set for your PC and how to change it if required.

1. Connect the ETHERNET port of your PC to one of the two ETHERNET ports of the fieldbus controller using the patch cable provided with the system in order to set up an ETHERNET link.

2. The IP address for your computer can be determined in Windows at:
Start > Control panel > Network and release center > Change adapter settings > LAN connection.
Right click on the option **PROPERTIES** for the network you are currently using (LAN connection X).

3. Mark the item "Internet Protocol Version 4 (TCP/IPv4)" in the popup list and confirm by clicking **[PROPERTIES]**.

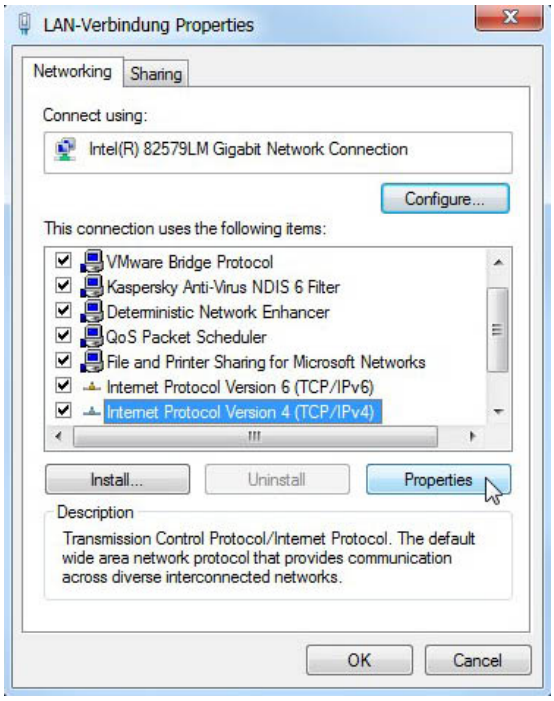

Figure 15: Properties of your LAN connection

4. Check whether the current IP address is set within the address range **192.168.1.1** to **192.168.1.254**. If not, change it accordingly.

Note

Do not use IP address 192.168.1.100!
Do not use the IP address **192.168.1.100**, however, as this network address is reserved for the fieldbus controller in the present example.

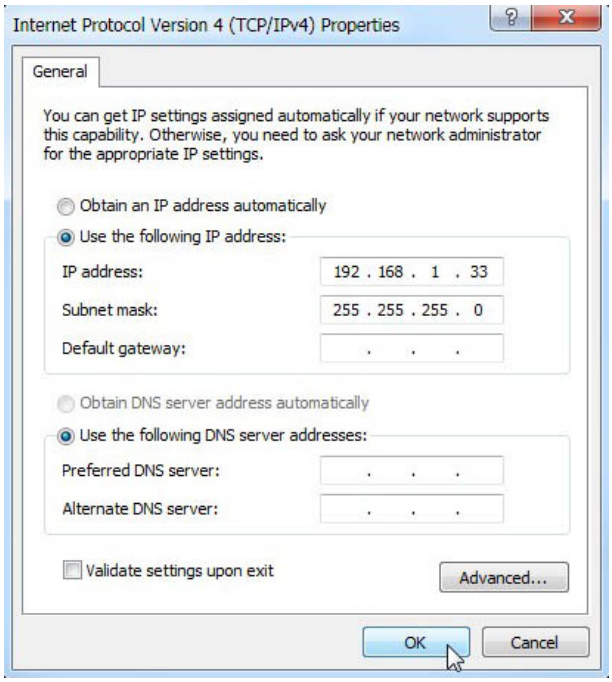

Figure 16: Properties of the TCP/IP Internet protocol

3.2.3.2 Assigning an IP address to the fieldbus controller

Note

The IP address must be unique in the network!
To ensure error-free network communication, the IP addresses assigned to the PC and to the fieldbus controller must be unique within the network!
In the event of an error, the following error message "IP address configuration error" (error code 6 - error argument 6) is indicated by the I/O LED at the fieldbus controller restart.

An IP address for the fieldbus controller can be assigned using the following setting possibilities:

- Address selection switch (DIP switch),
- WebBasedManagement (WBM),
- DHCP,
- BootP or
- WAGO ETHERNET settings.

The option for using the address selection switch is detailed in this QuickStart Guide. The other options are not described here, as these are explained completely in the manual for the "750-880 ETHERNET Programmable Fieldbus Controller".

Use the address selection switch to set the host ID (the last byte of the IP address), which is binary encoded in the range between 1 and 254.

The network address consists of the first three bytes of the IP address; the factory default setting for this is **192.168.1**. You can change this network address in the WebBasedManagement system under menu item **TCP/IP** in the dialog input field "**Switch IP address**."

Table 6: IP Address Structure

Network Address							Host ID
192	.	168	.	1	.	100	

The IP address statically set previously by WebBasedManagement will be overwritten with the address assigned by the address selection switch.

Note

Values 0 and 255 are predefined!
Set the values 0 or 255 using the address selection switch. This activates the IP modes provided. When a value of 0 is set, the IP configurations executed by WebBasedManagement will apply. Setting a value of 255 will activate address allocation by DHCP.

1. To assign a value (except for 0/255) for the host ID using the address selection switch, you must first convert the host ID value to a binary numeral.
   In the configuration example shown here, the host ID 100 is used for the fieldbus controller. The decimal value of "100" converts to a binary code of "01100100."

Table 7: Binary Coding of Decimal Number 100

MSB							**LSB**
0	1	1	0	0	1	0	0

2. Set the bits in order using the 8 DIP switches. Begin with DIP switch 1 to set Bit 0 (LSB) and continue up to DIP switch 8 for Bit 7 (MSB).

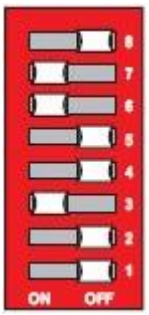

Figure 17: Address selection switch with set IP address (192.168.1.100)

3. Implement a restart of the fieldbus controller if you have adjusted the address selection switch, so that the changed IP configuration will be adopted.
   To do this, open the cover for the service interface and press the mode switch down (e.g., using an actuation tool, Item No.: 210-720).

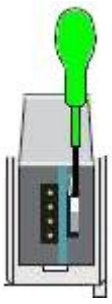

Figure 18: Restarting the fieldbus controller via hardware reset

3.2.3.3 Testing the ETHERNET link

1. Open the command line interpreter by entering "cmd" at **Start > Execute…** in Windows.

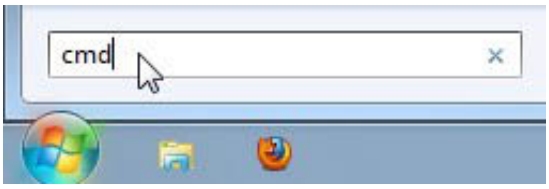

Figure 19: Dialog box "Execute ...."

2. Enter the command "ping 192.168.1.100."

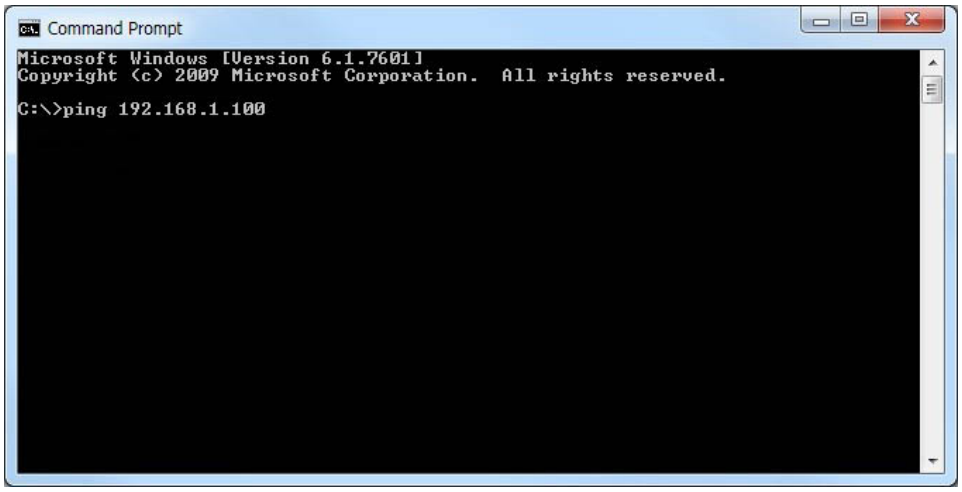

Figure 20: Command line interpreter with ping command

When the ETHERNET link is error free, you will receive the following ping statistics:
"Packets: Sent=4, Received=4, Lost=0 (0% loss)."

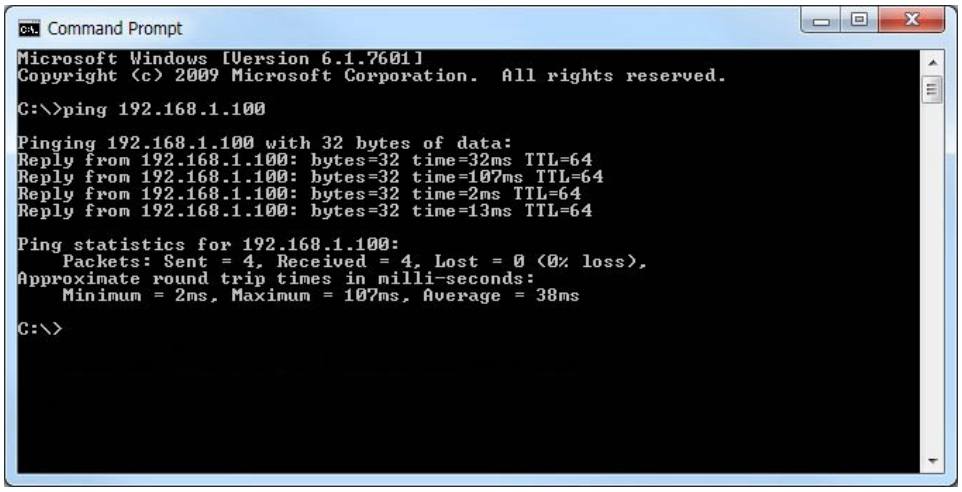

Figure 21: Command line interpreter with ping statistics

3.2.4 Installing the USB Driver

The "WAGO USB Service Cable" (Item No.: 750-923) provides a simple option for communication with WAGO software tools (WAGO-ETHERNET-Settings, WAGO-I/O-*CHECK* 3, etc.) and with the IEC-61131 programming topology (WAGO-O/O-*PRO*).

Proceed as follows to install the USB driver:

1. Place the "AUTOMATION Tools and Docs" CD into your CD drive.

2. In the "Software" folder, open the archive file *750-923.zip* and execute the file *Setup.exe* in the "USB driver 759-923" folder.

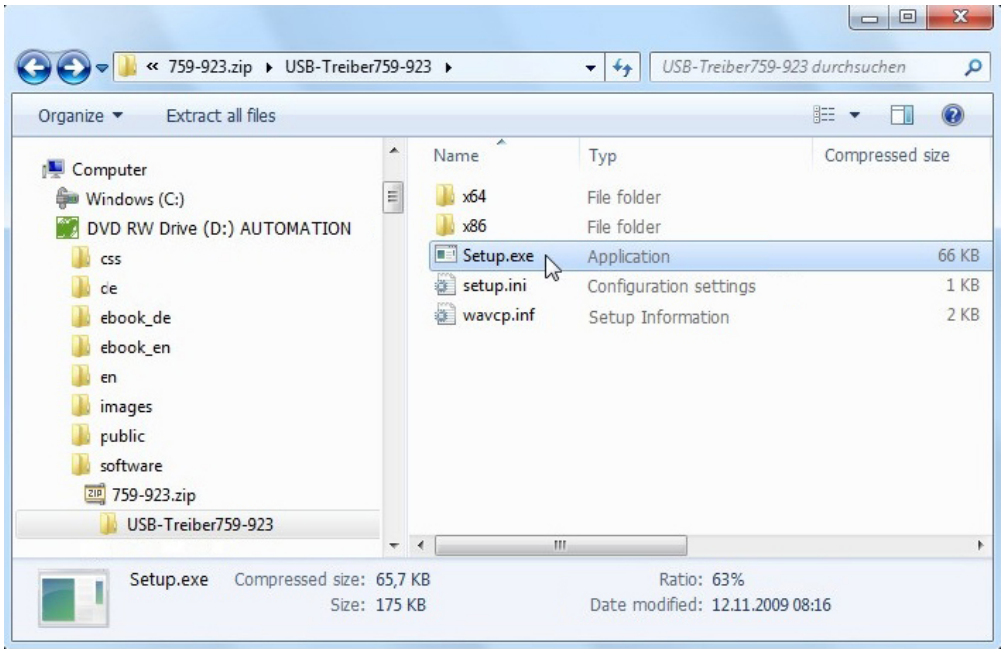

Figure 22: Installing the USB Driver

3. Select the installation directory and start the setup.

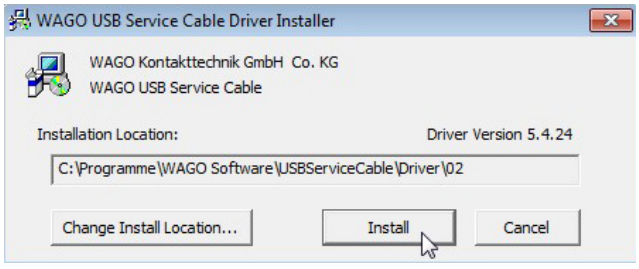

Figure 23: Selecting the target directory

4. Click on the **[OK]** button to finish the installation.

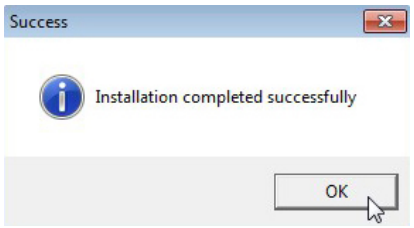

Figure 24: Finishing the Installation

5. Plug the USB cable into an available USB port on your PC.

4 Application example: Starterkit880_App1_FUP.pro

The WAGO-I/O-*PRO* project *"Starterkit880_App1_FUP.pro*" clearly outlines how the digital inputs and outputs are activated and processed.
Setting and resetting of the digital outputs and indication of the signal statuses of the digital inputs is shown by visualization.
The WAGO-I/O-*PRO* project *"Starterkit880_App1_FUP.pro*" has been written in the programming languages FUB, KOP, and ST. All three versions of the program have the same functions and differ only in the programming language that is used.

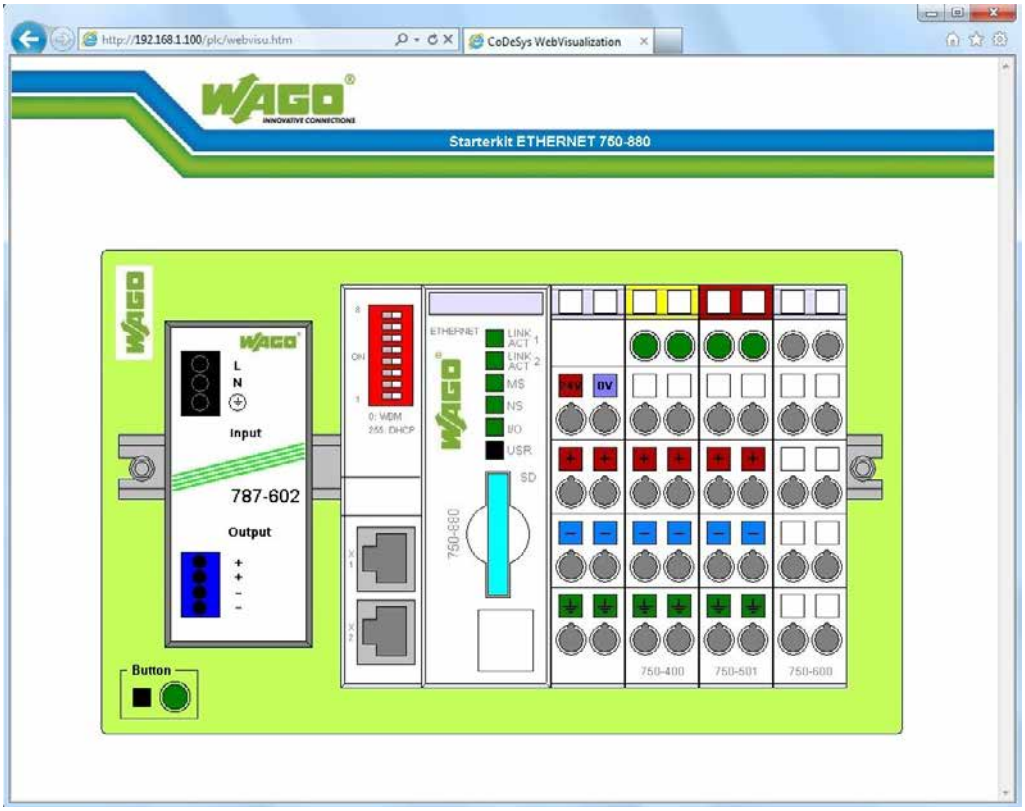

Figure 25: Web visualization

Note

Check steps that are already completed!
The steps described below require that all the steps cited previously have been successfully completed.

1. Documentation and sample projects are downloaded,
2. WAGO-I/O-*PRO* software and USB cable driver are installed,
3. Link between fieldbus controller and PC is established.

4.1 Open project

1. Start WAGO-I/O-*PRO*:
   Start > All Programs > WAGO-Software > CoDeSys > CoDeSys V2.3 > CoDeSys V2.3.

2. In the WAGO-I/O-*PRO* software, select **File > Open ...** in the menu and open the CoDeSys project "*Starterkit880_App1_FUB.pro*".

4.2 Configure hardware

1. Select **PLC configuration** in the tree structure in the **Resources** tab in order to access hardware configuration.

2. Double-click "PLC configuration" to open the dialog box.

3. In this dialog, open the complete tree structure for the **K-Bus**[1] entry.
   The 750-400 and 750-501 I/O modules will appear. The associated channels are listed below the I/O module entries.

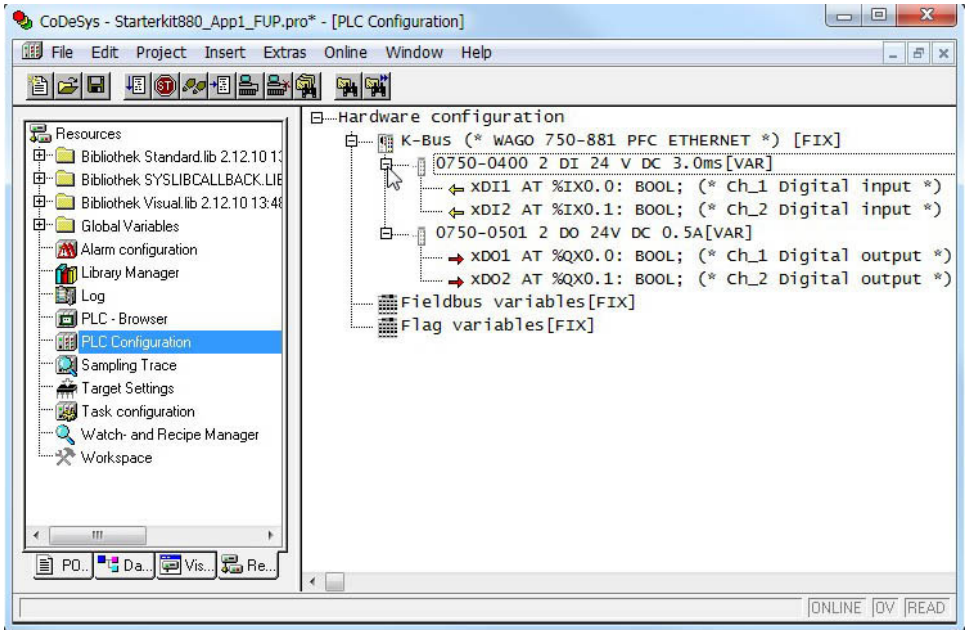

Figure 26: PLC configuration

[1] *K-Bus = internal data bus

4. Select **K-Bus** in the tree structure. Then right-click to open the context menu and select **Add sub-module**. You can change the current PLC configuration.

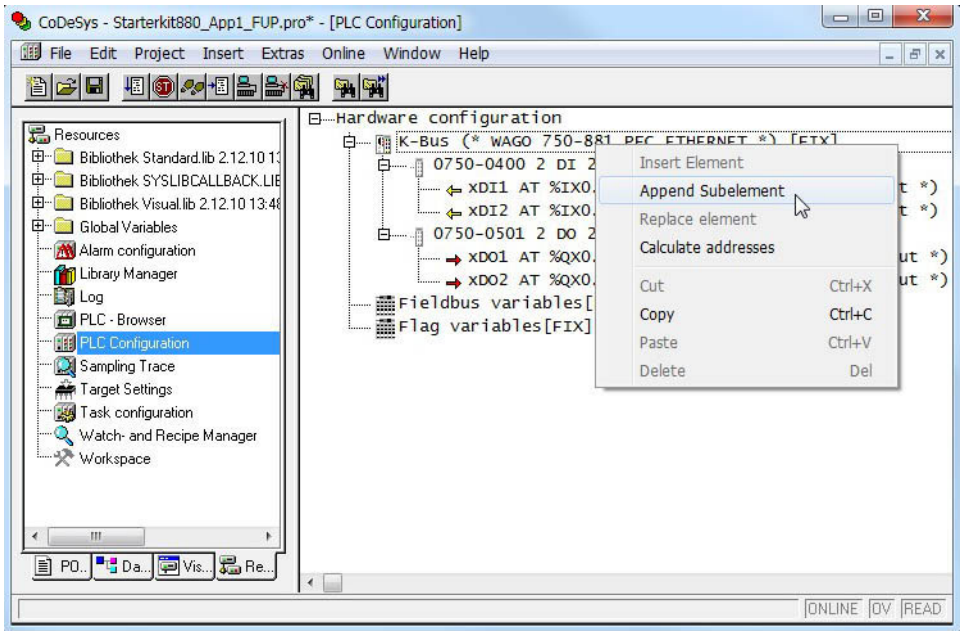

Figure 27: PLC Configuration – Add sub-module

5. Select the **Inputs/Outputs** tab in the "I/O Configurator" dialog. Then click on the **[+]** button in this tab.

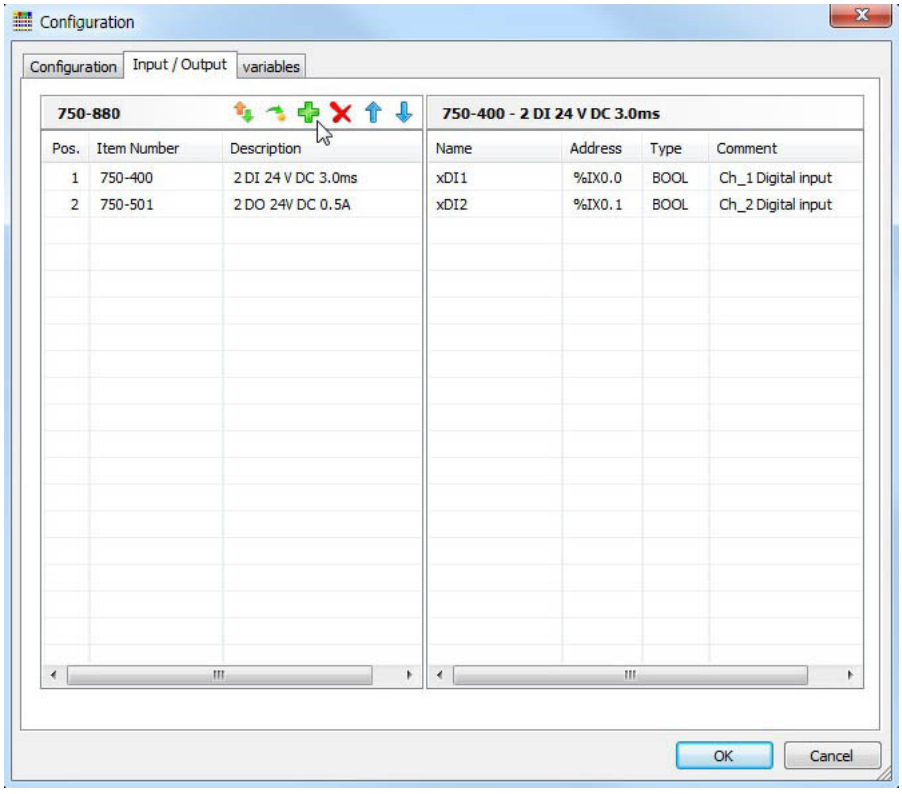

Figure 28: PLC configuration – "Inputs/Outputs" tab

6. In the left window, select the I/O modules based on your hardware setup. Click on the **[>>]** button to add the selected modules.

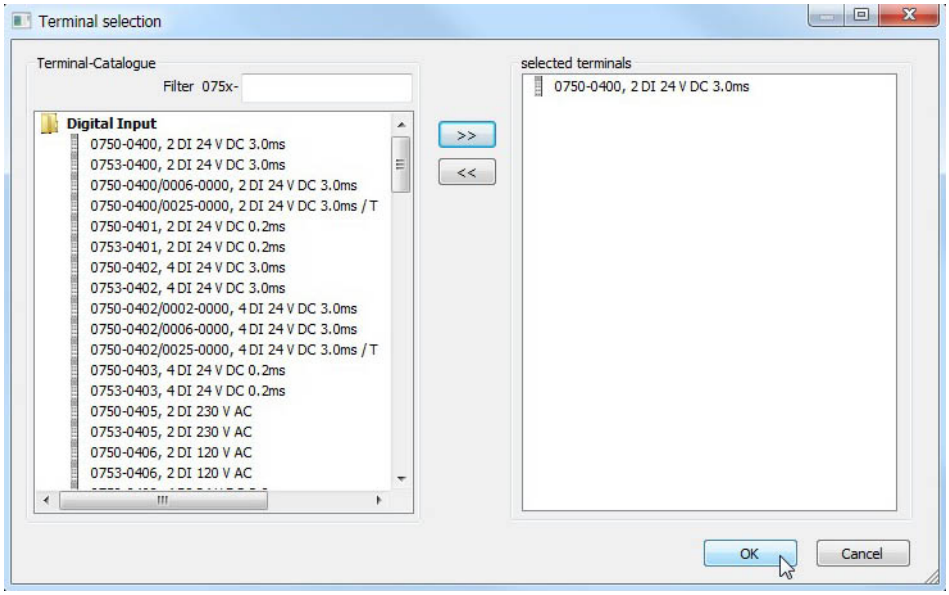

Figure 29: PLC configuration – Select I/O modules

Note

The end module is not specified!
Please note that the 750-600 end module is not specified when configuring the PLC.

7. Assign corresponding variables to the digital input/output modules in the right window of the I/O Configurator. This symbolic name will then be available as a global variable in the overall WAGO-I/O-*PRO* project. The variables are structured as follows: symbolic name, IEC address, data type, associated comments.

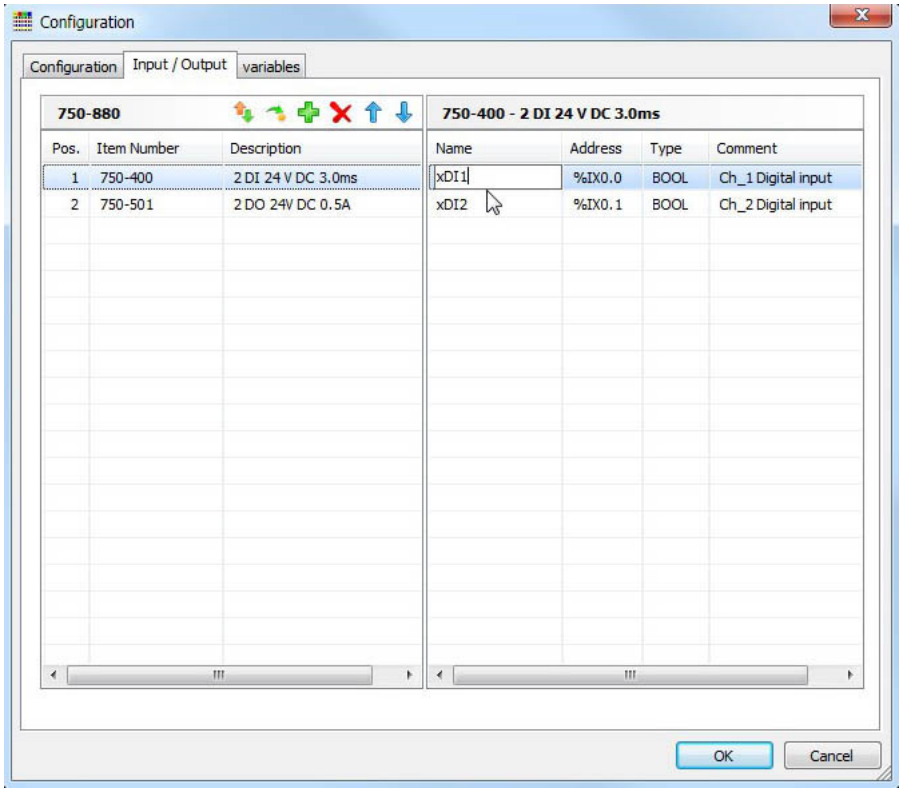

Figure 30: PLC configuration – Assign variables

4.3 Main Program "PLC_PRG"

Select the object **PLC_PRG** in the **Modules** tab in order to open the main program.

You will see the variable declaration in the upper part of the dialog box. The individual FUB networks are displayed in the lower part. You can activate the digital outputs (Network 1 and Network 2) and call up the subprograms "UserLED" and "Blink" (Network 3 and Network 4) in the main program.

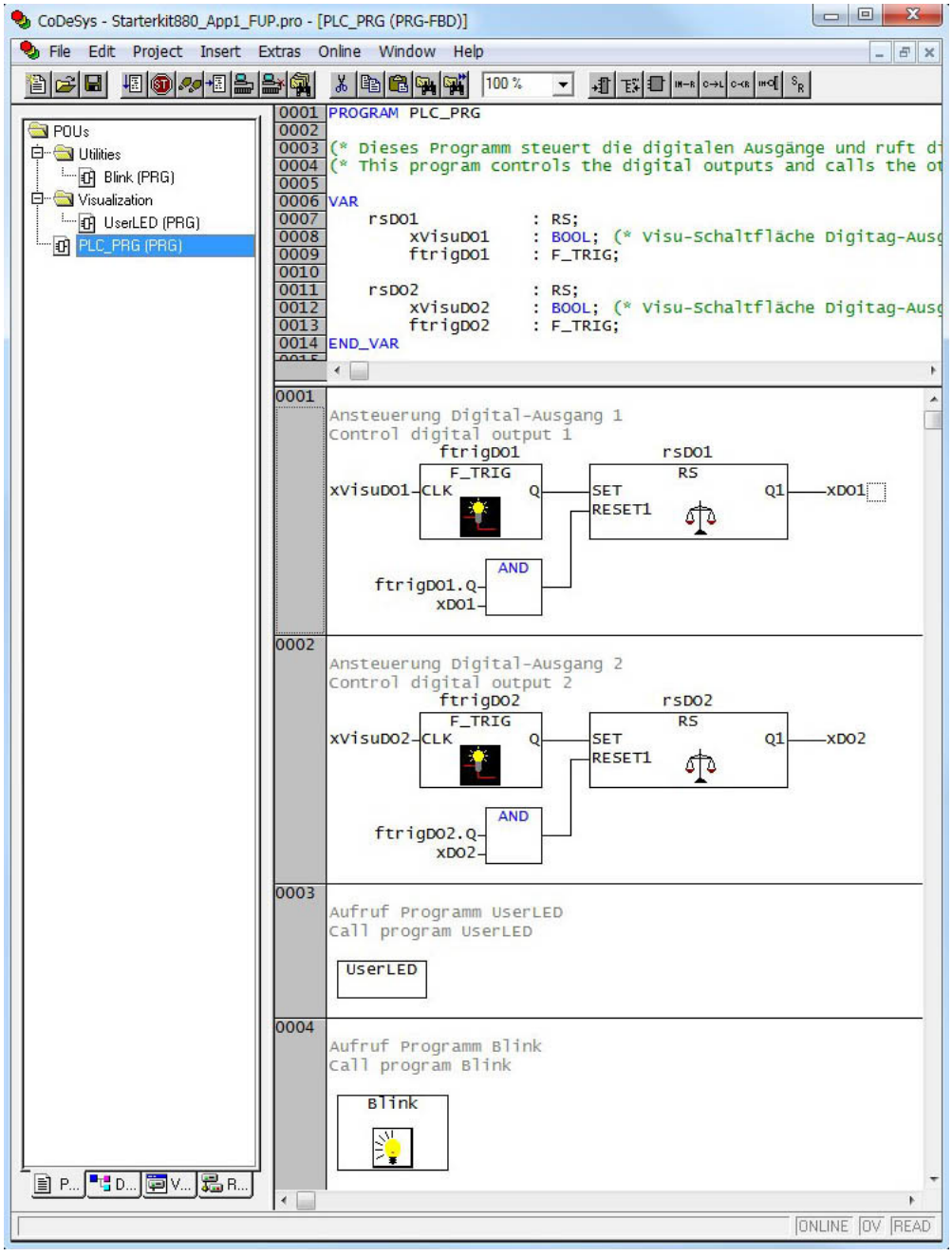

Figure 31: "PLC_PRG" program

You can activate the first digital output using a bistable function block "rsDO1" applying RS logic (reset = dominant).

The "SET" input of the "rsDO1" function block is linked to a flank-detecting function block "ftrigDO1", which detects the falling flank for "xVisuDO1".

The "RESET1" input is linked via a logical AND gate that evaluates the signal for flank detection "ftrigDO1.Q" and the status of the first digital output "xDO1."

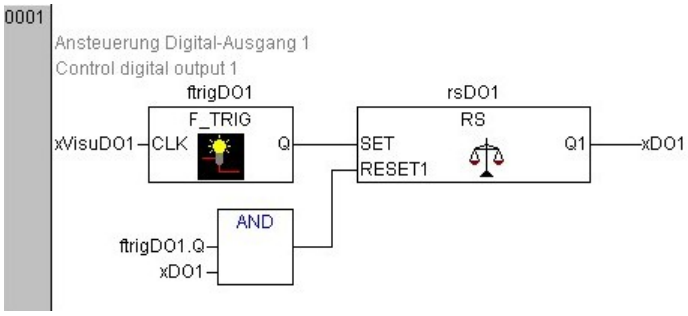

Figure 32: Network 1 (PLC-PRG)

This linking of flank detection, AND gate, and bistable flip-flop yields the following function:

- If the digital output "xDO1" has not been set, then clicking the corresponding visualization button **[xVisuDO1]** will set the digital output "xDO1."
- If the digital output "xDO1" has already been set, then clicking the visualization button **[xVisuDO1]** will result in the digital output "xDO1" being reset.

4.4 Subprogram "Blink"

The "Blink" subprogram is located in the **Utilities** folder.

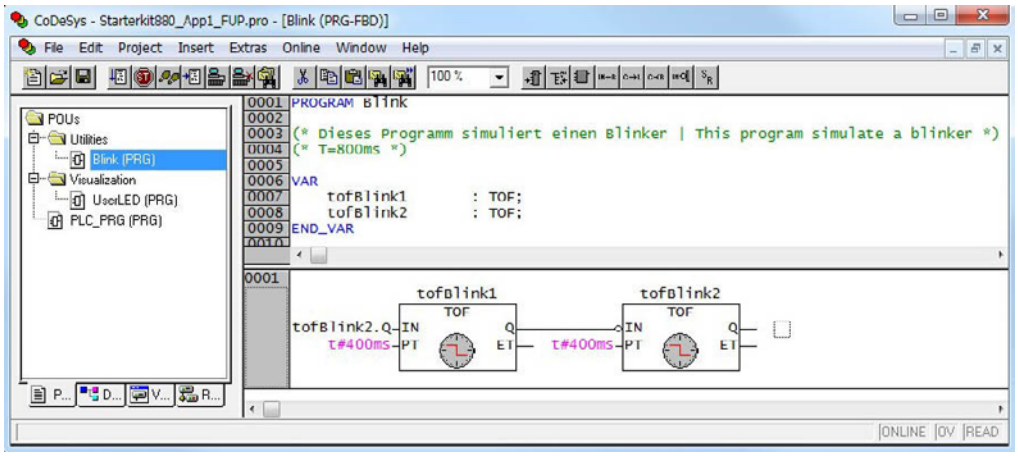

Figure 33: "Blink" program

A pulsing signal is generated in the "Blink" subprogram. This blink signal "tofBlink2.Q" is required for the flashing frame around the buttons in the display. The pulse period for this signal is 800 ms, which corresponds to a frequency of 1.25 Hz.

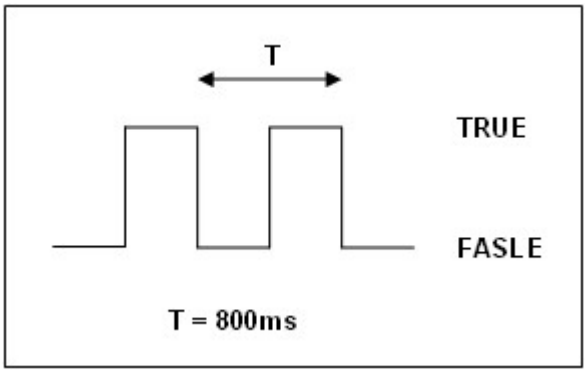

Figure 34: Blink signal

The clock-pulse generator is implemented using two OFF delays connected in series, "tofBlink1" and "tofBlink2." This is achieved by linking the output "Q" of "tofBlink1" to the negated input "IN" of "tofBlink2." In addition, the output "Q" of "tofBlink2" is also linked back to the input "IN" of "tofBlink1."

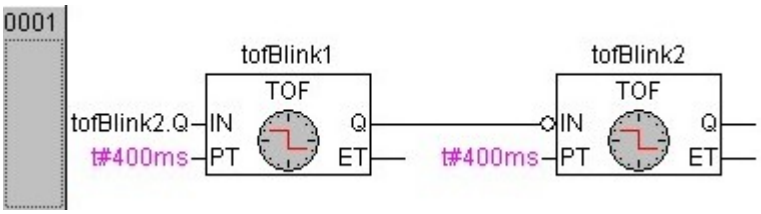

Figure 35: Network 1 (Blink)

The signal status sequence for the two OFF delays "tofBlink1.Q" and "tofBlink2.Q" is illustrated as follows:

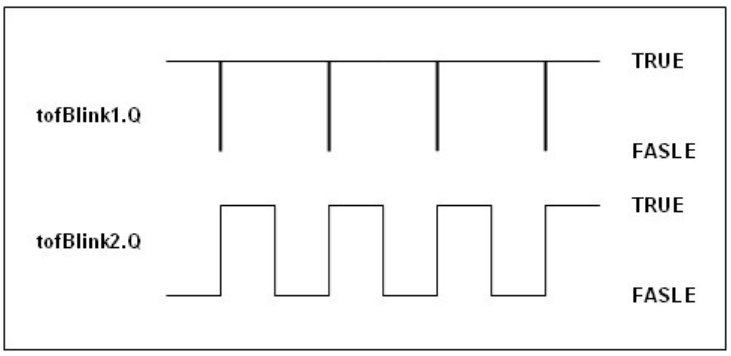

Figure 36: Output signals for OFF delays

4.5 Subprogram "UserLED"

Note

Required library *"Visual.lib"*!
You must have the "*Visual.lib"* library to activate the USR-LED using the functions described below.
This library is located in the directory:
WAGO Software > CoDeSys V2.3 > Targets > WAGO > Libraries > 32_Bit

The "UserLED" subprogram is located in the **Visualization** folder. The "UserLED" subprogram activates the USR-LED fieldbus controller. Changing the USR-LED colors is carried out using a button in the visualization. This LED can be displayed in green, red and orange.

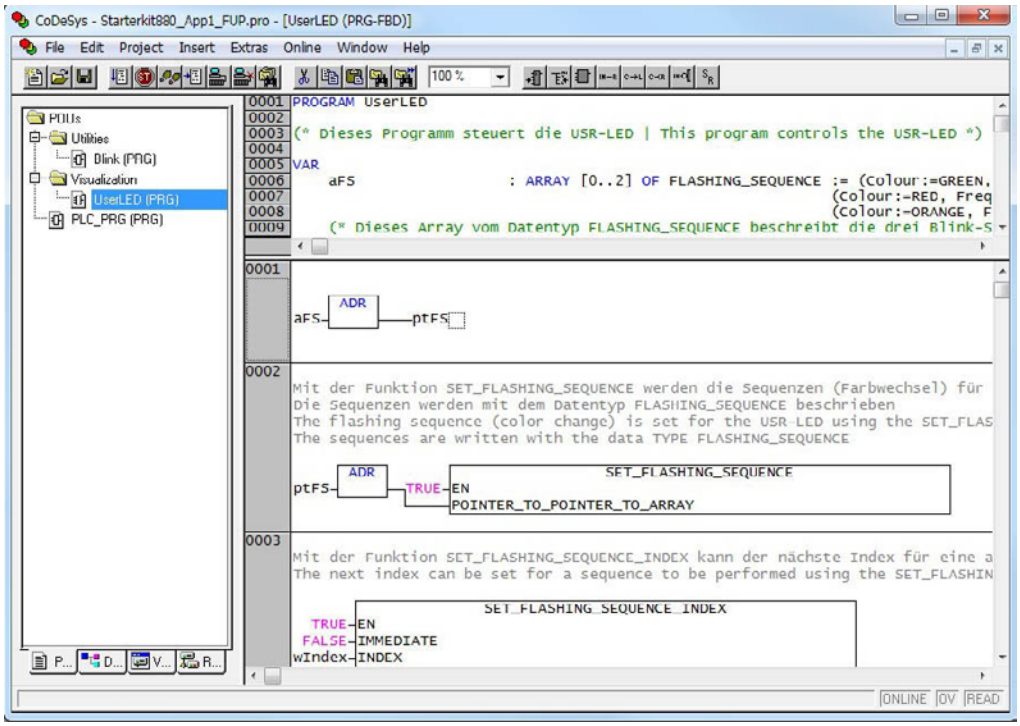

Figure 37: "UserLED" program

Information

Further information for activation of the USR-LED
Activation of the USR-LED is only explained with an example in this section. For more detailed information about USR-LED signaling and about using the *"Visual.lib"*, the corresponding library description will be of assistance.
The help file for this description is located in the WAGO-I/O-*PRO* directory:
WAGO Software > CoDeSys V2.3 > Targets > WAGO > Help > German > CAA-WAGO_Visual.chm.

In the first network, the address operator "ADR" supplies the address for the variable "aFS" and stores this in the pointer variable "ptFS." The individual blinking sequences for the USR-LED (LED colors) are defined by the array variables "aFS."

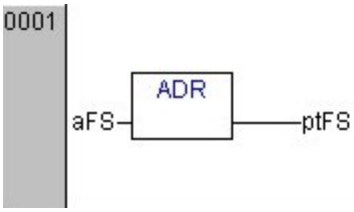

Figure 38: Network 1 (USR-LED)

In the second network, the flashing sequences for the USR-LED are set by the function "SET_FLASHING_SEQUENCE." The input parameter "EN" (Enable) enables execution of this function. The input parameter "POINTER_TO_POINTER_TO_ARRAY" transfers the address of the pointer variables "ptFS" and by this means the individual flashing sequences as well.

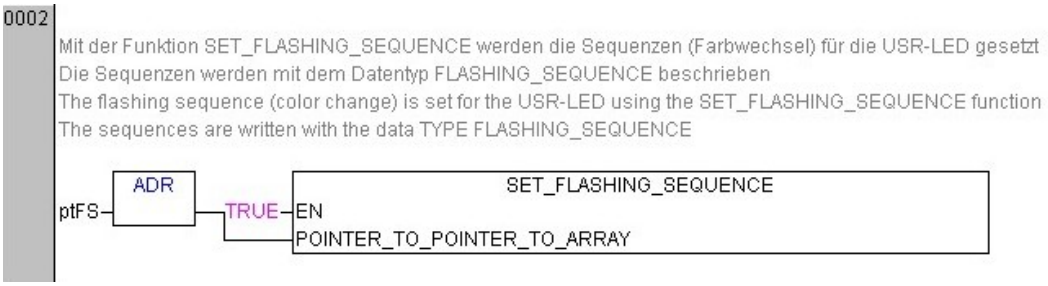

Figure 39: Network 2 (USR-LED)

In the third network, the next index is set for a flashing sequence to be executed using the function "SET_FLASHING_SEQUENCE_INDEX." The input parameter "IMMEDIATE" determines when the new flashing sequence should start:

- **FALSE:** the new sequence is initiated after the end of the current sequence
- **TRUE:** the new sequence begins immediately. The parameter "INDEX" defines the index for the new flashing sequence.

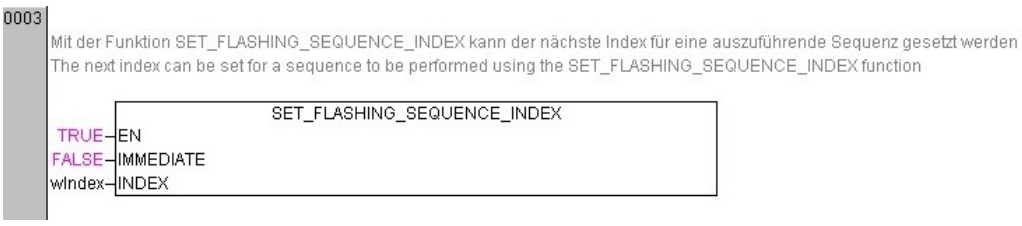

Figure 40: Network 3 (USR-LED)

The function "START_FLASHING_SEQUENCE" starts the sequences set previously using the function "SET_FLASHING_SEQUENCE." Index 0 (USR-LED = green) is executed first, as the variable "wIndex" was initialized with this value in the variable declaration.

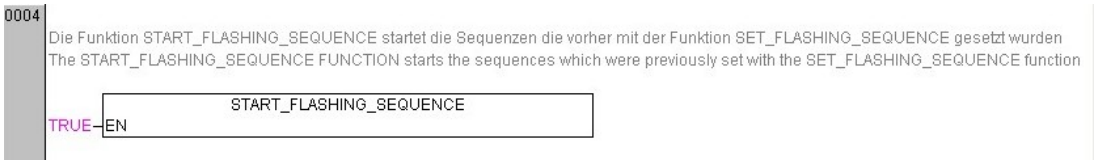

Figure 41: Network 4 (USR-LED)

Clicking the visualization button **[USR-LED]** increases the value of "wIndex" by "1" (from 0 to a maximum of 3).
To accomplish this, the variable "xVisuUserLed" for the visualization button **[USR-LED]** is initially processed via flank detection "ftrigVisuUserLed" and then evaluated as follows via selection (SEL):

- If "ftrigVisuUserLed.Q" = **TRUE**, the selection result is `1'.
- If "ftrigVisuUserLed.Q" = **FALSE**, the selection result is `0'.

This result is subsequently added to the value of "wIndex" (ADD), then compared to the value "3" (GT = greater than) and finally evaluated as follows via selection:

- If the addition result is greater than "3", then "wIndex" is assigned the value "0".
- If the addition result is lower than or equal to "3", then "wIndex" is assigned the result of this addition.

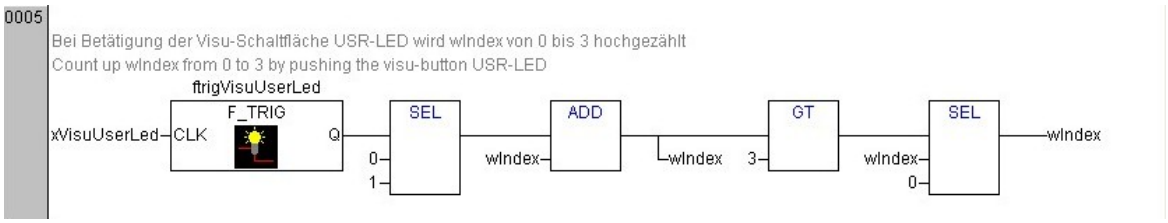

Figure 42: Network 5 (USR-LED)

In the sixth Network, the visualization button **[USR-LED]** is assigned a color as a function of "wIndex." This ensures that the **[USR-LED]** button has the same color in the display as the physical USR-LED for the fieldbus controller. This value is assigned via a multiplexer (MUX).

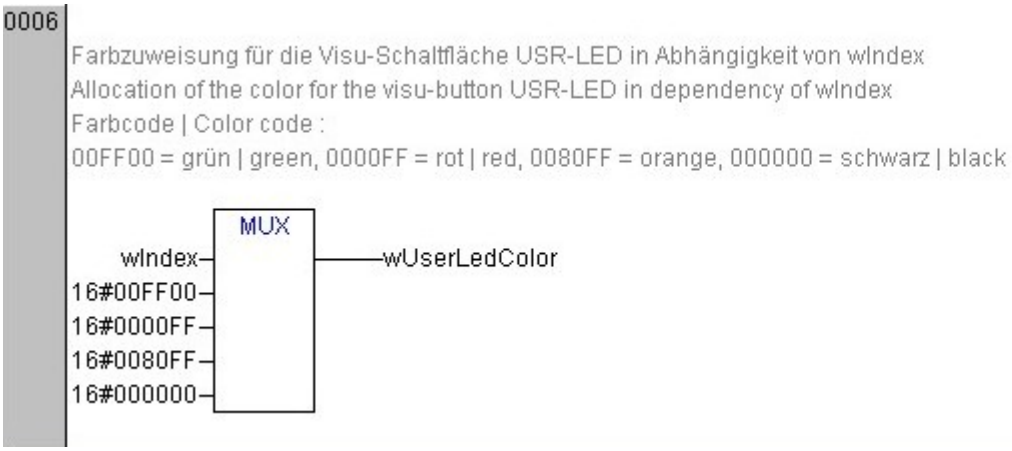

Figure 43: Network 6 (USR-LED)

Table 8: Button Color Allocation **[USR-LED]**

"wIndex"	"wIndex"	"wIndex"
0	0	0
1	1	1
2	2	2
3	3	3

4.6 Commissioning

The following section provides a step-by-step description of how to load the WAGO-I/O-*PRO* project *"Starterkit880_App1_FUB.pro"* to your fieldbus controller, how to start program execution, and how to create a boot project.

4.6.1 Configuring a Communication Driver for an ETHERNET Link

1. To configure the communication driver for the ETHERNET link, click the option **Communication parameters** in the **Online** menu.

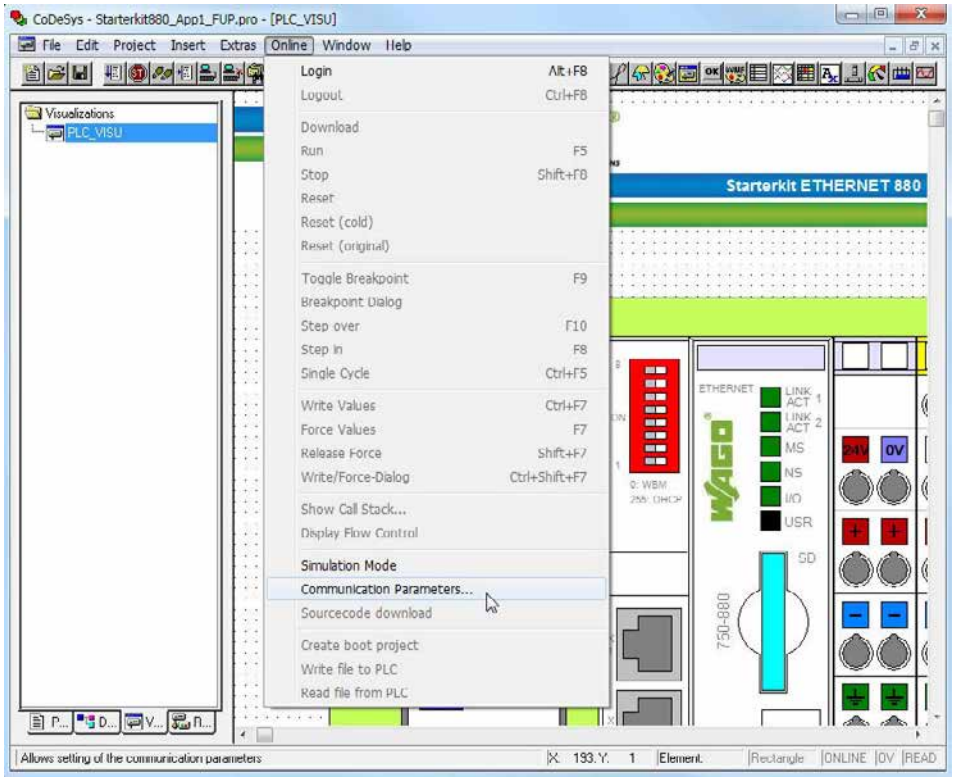

Figure 44: Communication parameters

2. Then click the **[NEW…]** button in the "Communication parameters" dialog box to create a new communication channel.

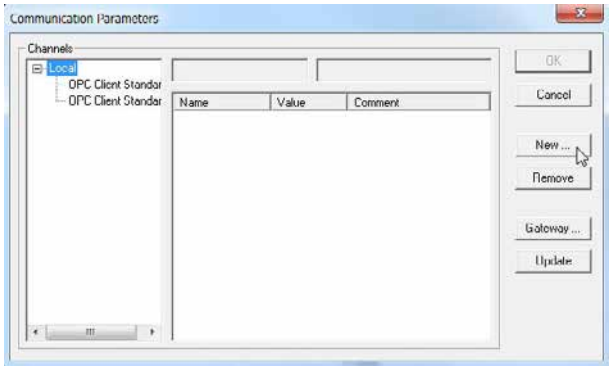

Figure 45: Communication Parameters – Create communication channel

3. Enter a name for the ETHERNET link in the **Name** field.

4. Select the "Tcp/Ip 3S Tcp/Ip driver" and confirm your input by clicking **[OK]**.

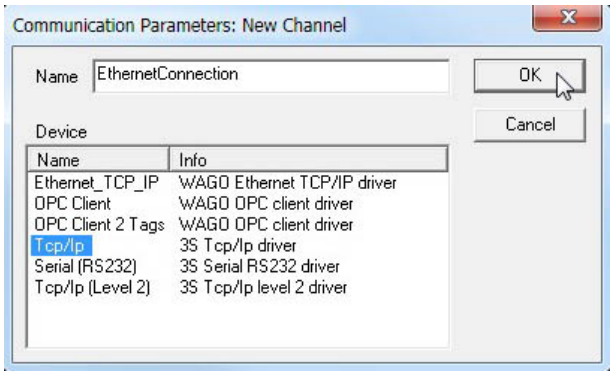

Figure 46: New communication channel via ETHERNET

5. Double-click on the address field **localhost** in the column "Value" in the "Communication parameters" dialog box.

6. Here, enter the IP address of your fieldbus controller "192.168.1.100" and confirm this using **[Enter]**.
You do not need to make any changes to the other parameters (Port, Motorola byteorder) or to the gateway settings. Confirm your input by clicking **[OK]**.

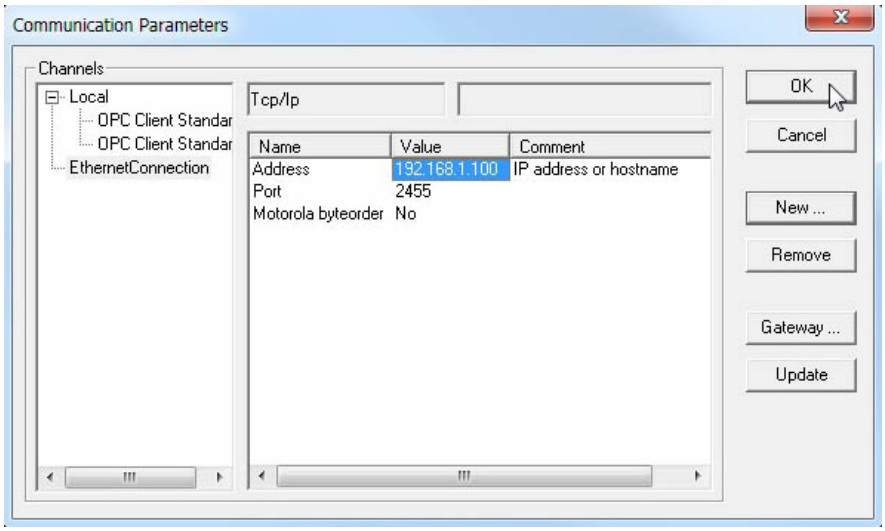

Figure 47: ETHERNET communication parameters

4.7 Configuring a Communication Driver for a USB Link

1. In Windows, you can check which port of your PC has been assigned to the USB cable at:
Start > Control panel > System > Device manager.

2. Add the group **Ports (COM and LPT)** to the tree structure.
The entry **WAGO USB Service Cable (COMX)** is given within this group. The designation in parentheses indicates the assigned COM port; in this example "COM3".

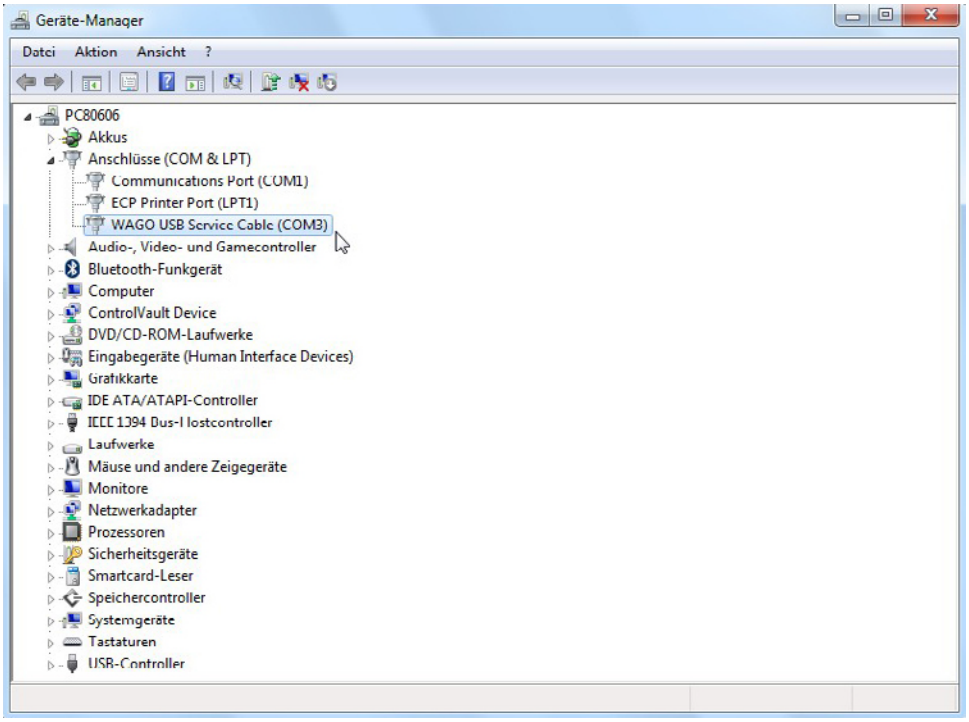

Figure 48: Device manager using Windows

3. To configure the communication parameters for the USB link, click the item **Communication parameters** in the **Online** menu.

4. In the "Communication Parameters" dialog, click the **[NEW…]** button to create a new communication channel.

5. Enter a name for the USB link in the **Name** field.

6. Select the driver "Serial (RS232) 3S Serial RS232 driver" and confirm your input by clicking **[OK]**.

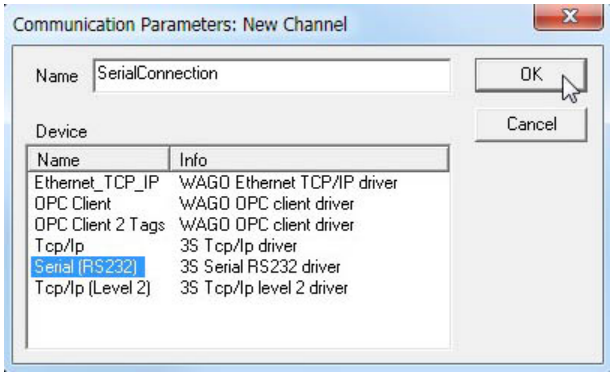

Figure 49: New communication channel via USB

7. Double-click on the address field **COM1** in the column "Value" in the "Communication parameters" dialog box. The field is highlighted in gray.

8. Press the **[↓]** or **[↑]** arrow to increase or decrease the COM port number by one. Adjust the COM port, which was previously identified in the Device Manager (in this example "COM3"), accordingly in the Communication Parameters.
You can leave all other parameters (Baudrate, Parity, Stop bits, Motorola byteorder, Flow Control) and the gateway settings as they are. Confirm your input by clicking **[OK]**.

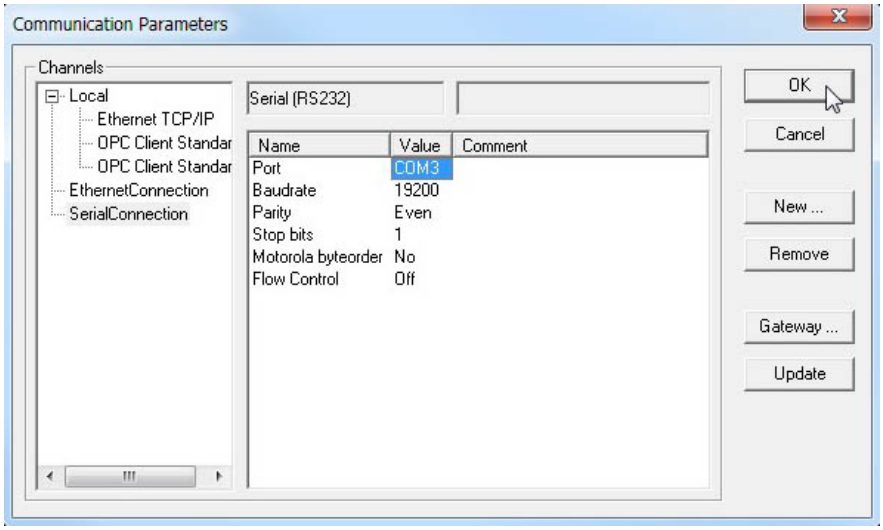

Figure 50: USB communication parameters

4.7.1 Starting the Program

1. Click **Login** in the **Online** menu to load this program to your fieldbus controller.

2. Then start program execution in the fieldbus controller via the menu item **Online > Start**.

3. Now select the menu item **Online > Create bootproject** to create a boot project. The program is now automatically loaded when restarting the fieldbus controller.

4. Switch the Operating mode switch for the fieldbus controller to the top position (RUN) so that the fieldbus controller automatically starts up during a restart.

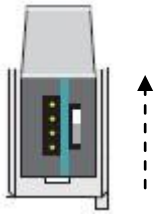

Figure 51: Operating mode switch in RUN position

4.8 Visualization

Two options are available for visualization operation:

- You can directly control the visualization via the WAGO-I/O-*PRO* software after you have loaded and started the program on the fieldbus controller.
- You can also call up and control the process in an Internet browser as a Web visualization.

The function and presentation are identical for both visualization options.

4.8.1 Opening Visualization via the WAGO-I/O-*PRO* Software

1. Select the **Visualizations** tab in the left column and open the **Visualization** folder.
2. In this folder select the object "PLC_VISU."

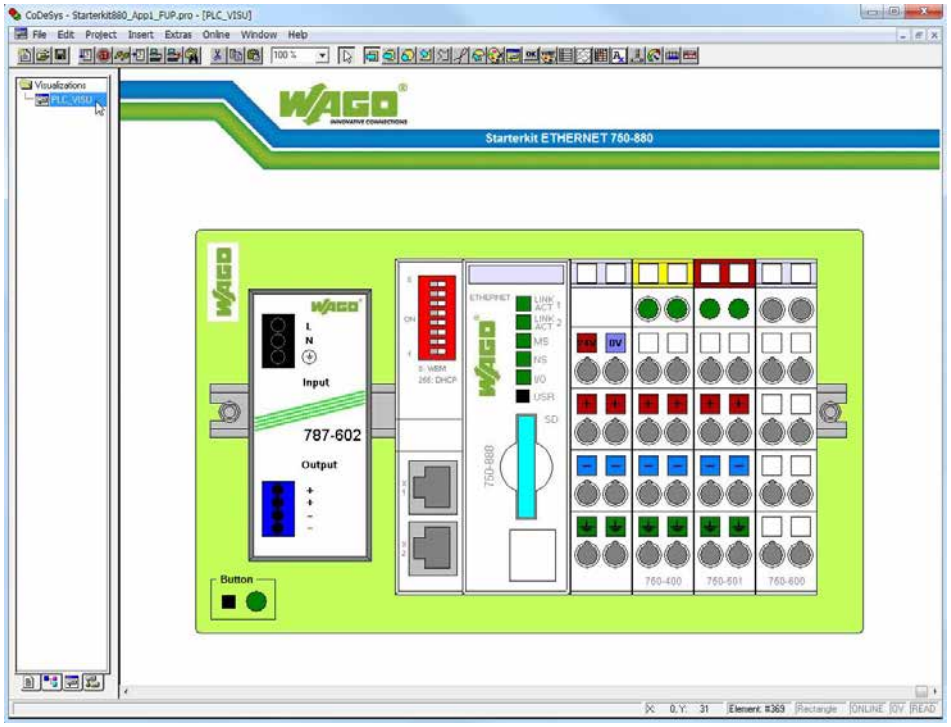

Figure 52: Visualization via WAGO-I/O-*PRO* software

4.8.2 Opening Web Visualization in the Internet Browser

1. Enter the IP address for your fieldbus controller (192.168.1.100) in the address line of your browser. You are then transferred to WebBasedManagement for your fieldbus controller.

2. After this, select the menu item **WebVisu** at the left in the navigation area. You can also call up Web visualization directly via *http://192.168.1.100/plc/webvisu.htm*.

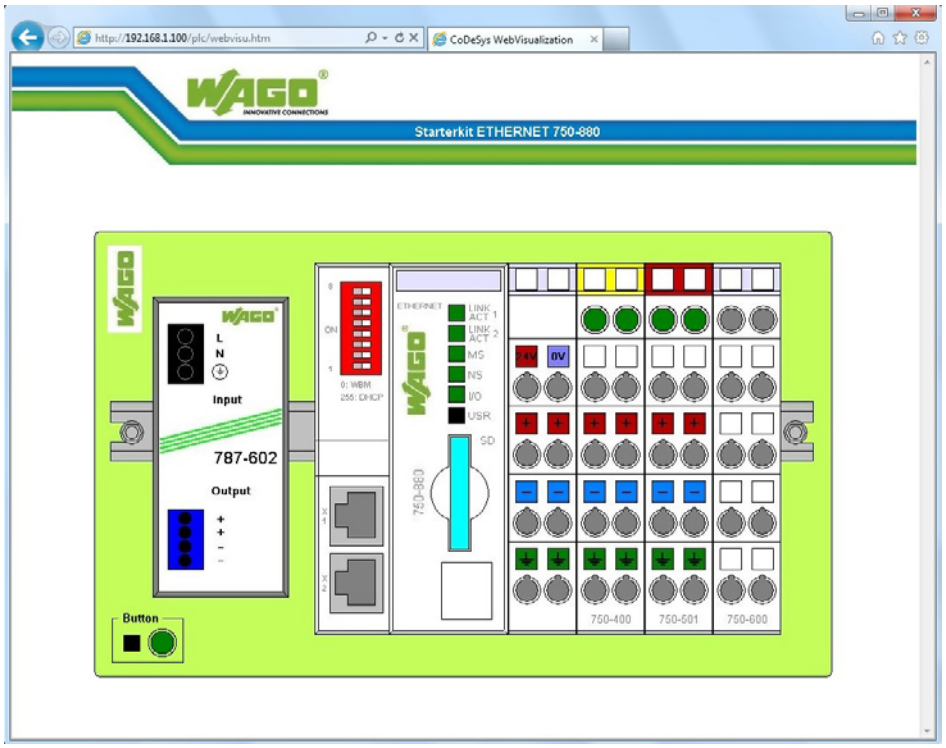

Figure 53: Web visualization with an Internet browser

Note

Java runtime environment must be installed for this!
You must have a Java runtime environment installed on your PC to use Web visualization in your Internet browser.
You can download the Java runtime environment ("JRE") free of charge at: *http://java.com/de/download/index.jsp*.

4.8.3 Operating the Visualization

Actuatable buttons in the visualization are indicated by a blinking frame. In addition, your mouse pointer changes when you move it over these buttons. Hovering for a short period will call up a yellow box, in which you can read the button function.

You can control the digital output channels via the two buttons displayed for the 750-501 digital output module.

If you use the switch module provided (Item no. 288-863) to control a digital output channel, then the corresponding LED changes its color to the 750-400 digital input module.

The color of the USR-LED can be changed using the **[USR-LED]** button. Each click of the button will change the USR-LED color.

List of Figures

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