X20(c)IF10D3-1

1 General information

The interface module is equipped with an EtherNet/IP adapter interface. This allows the B&R system (I/O modules, POWERLINK, etc.) to be connected to systems from other manufacturers and makes it possible to quickly and easily transfer data in both directions.

The interface module can be operated in X20 CPUs or in the expandable POWERLINK bus controller X20BC1083.

The interface is equipped with 2 RJ45 connections. Both connections result in an integrated switch. This makes it easy to implement daisy chain cabling.

- EtherNet/IP adapter (slave)
- Integrated switch for efficient cabling

1.1 Coated modules

Coated modules are X20 modules with a protective coating for the electronics component. This coating protects X20c modules from condensation and corrosive gases.
The modules' electronics are fully compatible with the corresponding X20 modules.

> **For simplification purposes, only images and module IDs of uncoated modules are used in this data sheet.**

The coating has been certified according to the following standards:

- Condensation: BMW GS 95011-4, 2x 1 cycle
- Corrosive gas: EN 60068-2-60, method 4, exposure 21 days

1.1.1 Starting temperature

The starting temperature describes the minimum permissible ambient temperature in a voltage-free state at the time the coated module is switched on. This is permitted to be as low as -40°C. During operation, the conditions as specified in the technical data continue to apply.

> **Information:**
>
> **It is important to absolutely ensure that there is no forced cooling by air currents in the closed control cabinet, e.g. due to the use of a fan or ventilation slots.**

2 Order data

Order number	Short description	Figure
	X20 interface module communication	
X20IF10D3-1	X20 interface module, for DTM configuration, 1 EtherNet/IP adapter (slave) interface, electrically isolated	
X20cIF10D3-1	X20 interface module, coated, for DTM configuration, 1 Ether-Net/IP adapter (slave) interface, electrically isolated	

Table 1: X20IF10D3-1, X20cIF10D3-1 - Order data

Optional accessories

Model number	Short description
X20CA0E61.xxxxx	POWERLINK/Ethernet connection cable, RJ45 to RJ45, 0.2 to 20 m
X20CA0E61.xxxx	POWERLINK/Ethernet connection cable, RJ45 to RJ45, 20 m and longer

3 Technical data

Order number	X20IF10D3-1	X20cIF10D3-1
Short description		
Communication module	EtherNet/IP Adapter (slave)	
General information		
B&R ID code	0xA71C	0xE237
Status indicators	Module status, network status, data transfer	
Diagnostics		
Module status	Yes, using LED status indicator and software	
Network status	Yes, using LED status indicator and software	
Data transfer	Yes, using LED status indicator	
Power consumption	2 W	
Additional power dissipation caused by actuators (resistive) [W]	-	
Certifications		
CE	Yes	
ATEX	Zone 2, II 3G Ex nA nC IIA T5 Gc IP20, Ta (see X20 user's manual) FTZÚ 09 ATEX 0083X	
UL	cULus E115267 Industrial control equipment	
HazLoc	cCSAus 244665 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5	
DNV GL	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **B** (4 g) EMC: **B** (bridge and open deck)	
LR	ENV1	
KR	Yes	
ABS	Yes	
EAC	Yes	
KC	Yes	-
Interfaces		
Fieldbus	EtherNet/IP Adapter (slave)	
Variant	2x shielded RJ45 (switch)	
Line length	Max. 100 m between 2 stations (segment length)	
Transfer rate	10/100 Mbit/s	
Transfer		
Physical layer	10BASE-T/100BASE-TX	
Half-duplex	Yes	
Full-duplex	Yes	
Autonegotiation	Yes	
Auto-MDI/MDIX	Yes	
Controller	netX100	
Electrical properties		
Electrical isolation	PLC isolated from EtherNet/IP (IF1 and IF2)	
Operating conditions		
Mounting orientation		
Horizontal	Yes	
Vertical	Yes	
Installation elevation above sea level		
0 to 2000 m	No limitation	
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m	
Degree of protection per EN 60529	IP20	
Ambient conditions		
Temperature		
Operation		
Horizontal mounting orientation	-25 to 60°C	
Vertical mounting orientation	-25 to 50°C	
Derating	-	
Starting temperature	-	Yes, -40°C
Storage	-40 to 85°C	
Transport	-40 to 85°C	
Relative humidity		
Operation	5 to 95%, non-condensing	Up to 100%, condensing
Storage	5 to 95%, non-condensing	
Transport	5 to 95%, non-condensing	
Mechanical properties		
Slot	In the X20 CPU and expandable bus controller X20BC1083	In the X20c CPU and expandable bus controller X20cBC1083

Table 2: X20IF10D3-1, X20cIF10D3-1 - Technical data

4 Operating and connection elements
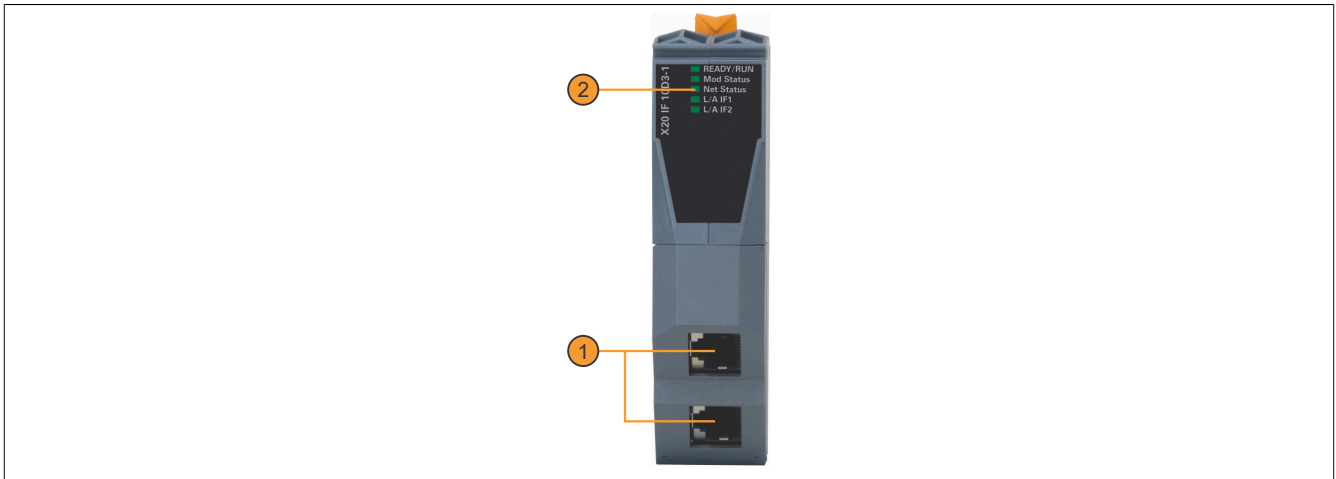
| 1	EtherNet/IP connection with 2x RJ45 for simple wiring	2	LED status indicators

4.1 LED status indicators

Figure	LED	Color	Status	Description
	READY/RUN	Green/red	Off	No power to module
		Green	On	PCI bus communication in progress
		Red	Blinking	Boot error
			On	Communication on the PCI bus has not yet been started
	Mod status[1]	Green	Blinking	Interface module not yet configured
			On	Adapter (Slave) is operational
		Red	Blinking	Recoverable hardware error
			On	Irrecoverable hardware error
		Green/red	Blinking	Initialization / Self-test
			Off	No power to module
	Net status[1]	Green	Blinking	No active connection
			On	Indicates at least one active connection
		Red	Blinking	Timeout occurred on at least one connection
			On	An IP address has been used repeatedly
		Green/red	Blinking	Initialization / Self-test
			Off	No IP address assigned or module not supplied
	L/A IF1/IF2	Green	Off	No link to remote station
			Flickering	A link to the remote station has been established. The LED blinks when Ethernet activity is taking place on the bus.
			On	A link to the remote station has been established.

1) This LED is a green/red dual LED.

4.2 Ethernet interface

For information about wiring X20 modules with an Ethernet interface, see section "Mechanical and electrical configuration - Wiring guidelines for X20 modules with Ethernet cables" in the X20 user's manual.
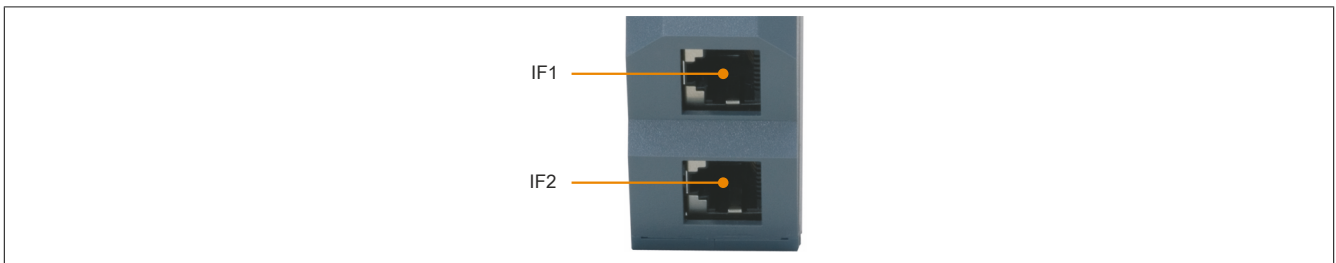
Interface	Pinout		
	Pin	Ethernet	
Shielded RJ45	1	RXD	Receive data
	2	RXD\	Receive data\
	3	TXD	Transmit data
	4	Termination	
	5	Termination	
	6	TXD\	Transmit data\
	7	Termination	
	8	Termination	

5 Use in the expandable X20BC1083 POWERLINK bus controller

5.1 Cyclic data

If this module is connected to the expandable POWERLINK bus controller, the amount of cyclic data is limited by the POWERLINK frame to 1488 bytes in each direction (input and output).
When using multiple X20IF10xx-1 interfaces or other X2X modules with a POWERLINK bus controller, the 1488 bytes are divided between all connected modules.

5.2 Operating netX modules

It is important to note the following in order to operate netX modules with the bus controller without problems:

- A minimum revision ≥ E0 is required for the bus controller.
- netX modules can only be operated with the POWERLINK V2 setting. V1 is not permitted.
- With SDO access to POWERLINK object 0x1011/1 on the bus controller, the netX firmware and the configuration stored on the bus controller are not reset. They can only be overwritten by accessing them again. This affects objects 0x20C0 and 0x20C8, subindexes 92 to 95.

5.3 Timing characteristics

The internal data transfer results in an additional runtime shift of one cycle per direction.

> **Information:**
>
> **For additional information about runtime behavior, see section "Runtime shift" in X20BC1083.**

6 netX error codes

netX modules return an error code when an error occurs. These error codes are fieldbus-specific. A complete list of all error codes in PDF format is available in Automation Help in section "Communication / Fieldbus systems / Support with FDT/DTM / Diagnostic functions / Diagnostics on the runtime system / Master diagnostics" under item "Communication_Error".

7 Firmware

The module comes with preinstalled firmware. The firmware is part of the Automation Studio project. The module is automatically brought up to this level.

To update the firmware contained in Automation Studio, a hardware upgrade must be performed (see "Project management / Workspace / Upgrades" in Automation Help).

8 Minimum DTM version for coated modules

> **Information:**
>
> **The minimum DTM version required for coated modules is 1.0370.140220.12186. This version is included starting with Automation Studio upgrade packs V4.0.18.x and V3.0.90.29.**

9 EtherNet/IP interface

Two steps are generally necessary for connecting module X20IF10D3-1 to an external master environment.

1) Add and configure the X20 interface module in B&R's Automation Studio.

2) Add the EtherNet/IP adapter (slave) EDS device description file in the external master environment, e.g. Rockwell RSLogix 5000. The interface module must then be configured.

> **Information:**
>
> **To ensure error-free EtherNet/IP communication between master and slave, the settings for the interface module in Automation Studio must match the settings of the EDS device description file in the master environment.**

9.1 Settings in Automation Studio

The interface module can be operated in the slot of a CPU or in the slot of an expandable POWERLINK bus controller.

To do this, a new Automation Studio project is created and the suitable settings are made on the module.

9.1.1 Creating an Automation Studio project

● Create a new Automation Studio project by selecting "New project".
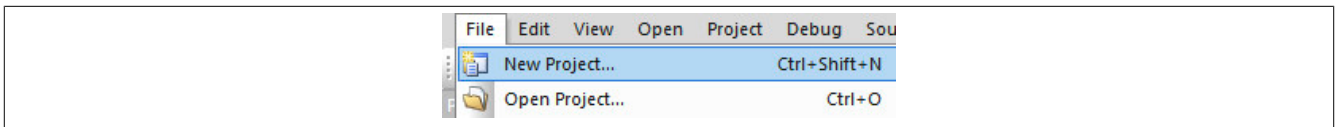
● Assign a project name and set up the project path.
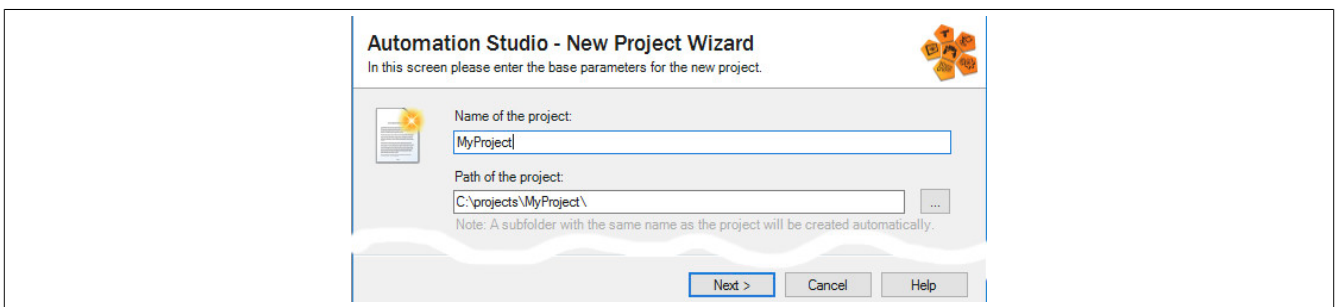
● Assign the hardware configuration type and configuration name.
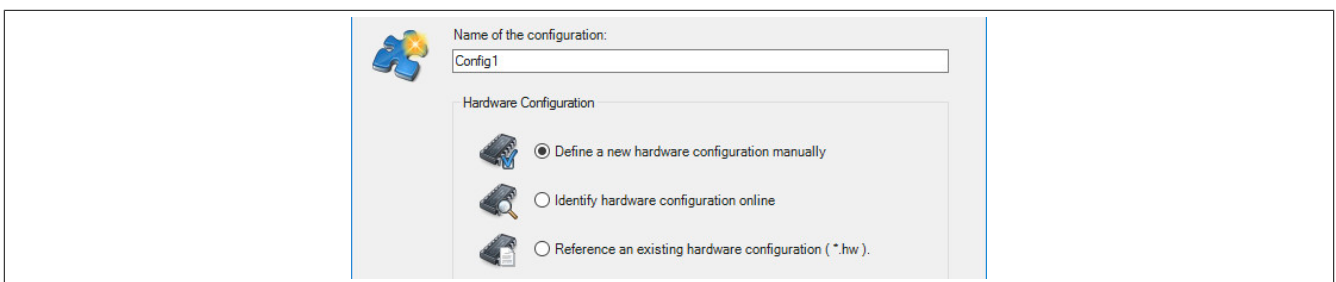
● Select the hardware in the next step if "Define a new hardware configuration manually" was selected.
In order to simplify the search, different filters can be set in the Hardware Catalog. Lastly, highlight the required hardware and create the Automation Studio project by clicking on "Finish".
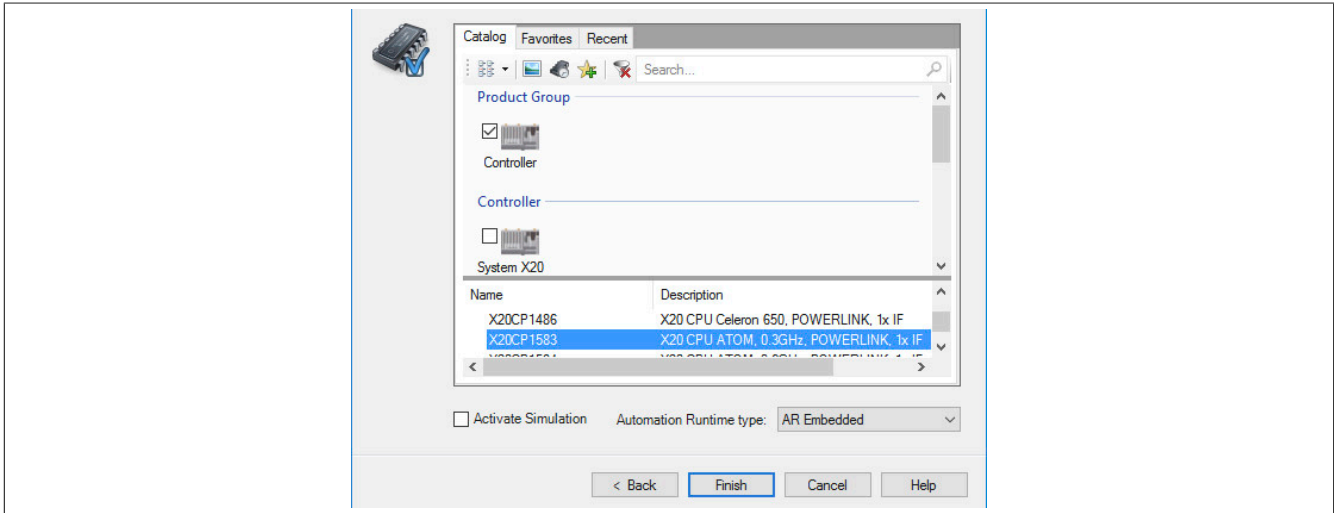
9.1.2 Adding and configuring the interface module

● In this example, the interface card is connected in the slot of a CPU. Right-clicking on the slot and selecting "Add hardware module" opens the Hardware Catalog.
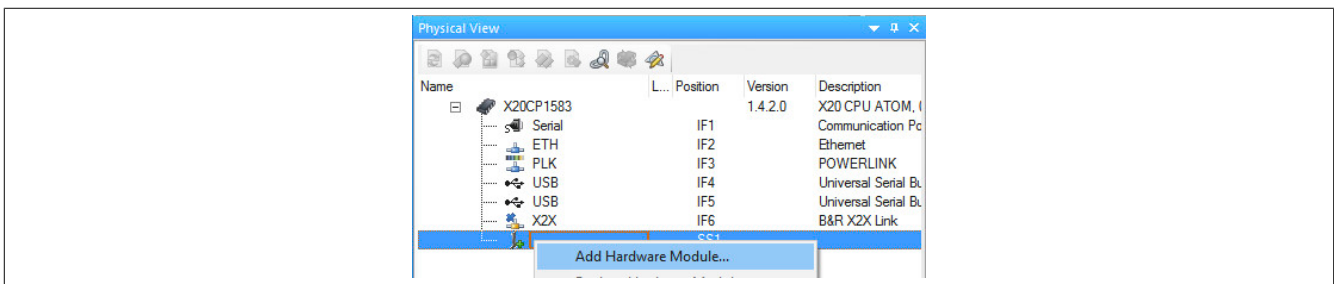
● The module is added to the project via drag-and-drop or by double-clicking on the interface card.
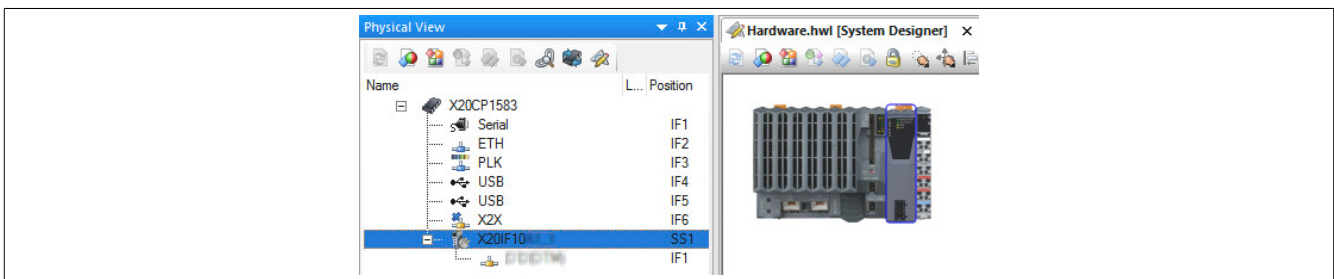
● Additional module settings can be made under "Device configuration". This configuration environment is opened by right-clicking on the IF interface and selecting "Device configuration".
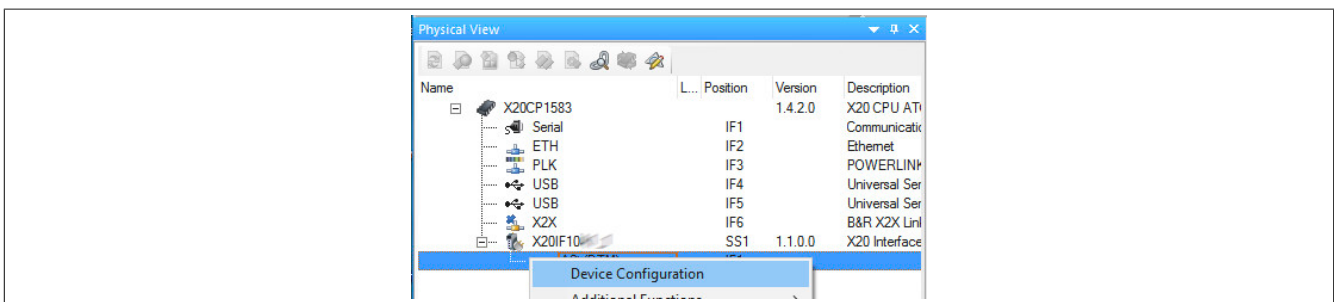
● General settings are made in the device configuration.
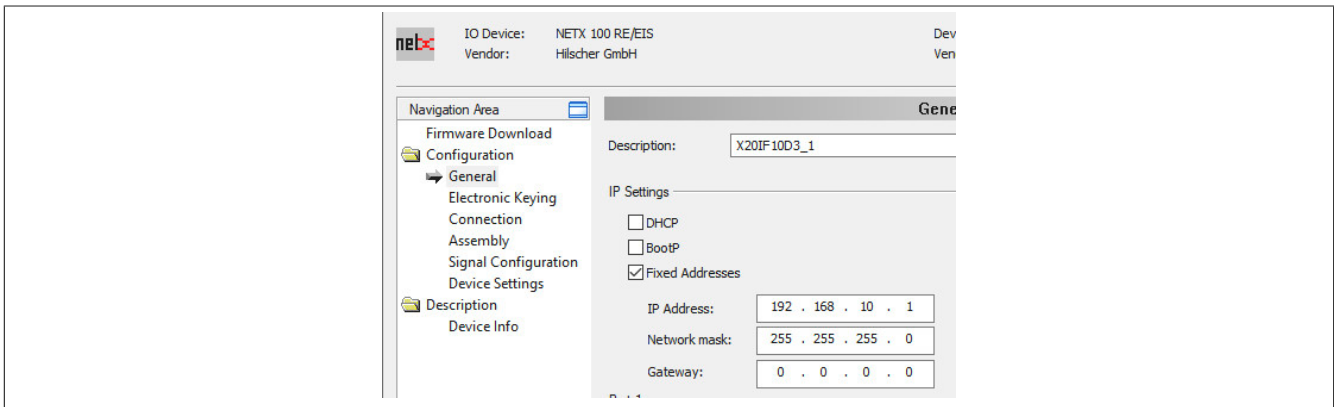
9.1.2.1 General

The IP settings and operation modes of the ports are set here. Only one of the IP settings can be enabled on the adapter (slave).

Contains the symbolic name of the module.

Parameter	Explanation
Description	Module name of the adapter

- IP settings

The IP addresses and operation modes of the Ethernet interface are set here.

Parameter	Explanation
DHCP	IP address determined via DHCP protocol.
BootP	IP address determined via BootP protocol.
Fixed addresses	The IP address is static. The IP address is defined by the following 3 parameters.
IP address	IP address of the EtherNet/IP adapter
Network mask	Network mask of the EtherNet/IP adapter
Gateway address	Gateway address of the EtherNet/IP adapter

- Port 1

Parameter	Explanation
Operating mode	Operating mode of the EtherNet/IP adapter (slave)
MDI mode	Configure cable type
	• **Auto MDI-X:** Detect cable type automatically
	• **MDI-X:** Use crossover cable.
	• **MDI:** Use straight-through cable.

- Port 2

Identical to port 1

9.1.2.2 Electronic keying

Here, it is possible to set which parameters on the device and in the master's device description file must match exactly.

A connection between the EtherNet/IP scanner and the adapter can only be established if the parameter settings for the interface module in Automation Studio defined by the keying method match those in the EDS device description file.

Method	Explanation
Exact match	When validating an EtherNet/IP adapter connected to the network, all attributes of the electronic identity must correspond to the attributes for an expected device.
Custom keying	When validating an EtherNet/IP adapter connected to the network, all attributes must correspond to the configured keying.
No keying	The device identity is not validated.

If "Custom keying" is selected, the following parameters can be checked.

Parameter	Explanation
Relaxed match	Devices can verify their electronic identity in a restricted form.
Match minor revision	Checks for compliance with the secondary revision
Match major revision	Checks for compliance with the main revision
Match product code	Checks for compliance with the product code
Match product type	Checks for compliance with the product type
Match vendor	Checks for compliance with the vendor ID

9.1.2.3 Connection

- Connection name

The name of the connection can be assigned here.

Parameter	Explanation
Connection name	Name of the connection

- Originator to target

The transfer format from the scanner to the adapter can be assigned here.

Parameter	Explanation
RT transfer format	Transfer format • Connection is pure data and is modeless • 32-bit run/idle header

- Target to originator

The transfer format from the adapter to the scanner can be assigned here.

Parameter	Explanation
RT transfer format	Transfer format • Connection is pure data and is modeless • 32-bit run/idle header

Information:

The default settings for "RT transfer format" can differ depending on the Automation Studio version / DTM version used.

The device description file package available on the B&R website contains 2 different EDS device description files:

- RT_Transfer_format_OT_32bit_TO_32bit
- RT_Transfer_format_OT_32bit_TO_modeless

The settings must be adjusted depending on the EDS file used. Inconsistencies will occur in the I/O image if the settings for the interface module do not match the settings in the EDS device description file in Automation Studio.

9.1.2.4 Assembly

Here is a list of input and output connections. The data length and the instance ID can be adjusted. If the instance ID or the length of the data is changed, this setting must also be adjusted in the master environment. Otherwise, no connection can be established from the scanner to the adapter.

Parameter	Explanation	Values
In/Out	Input/Output connections of the EtherNet/IP adapter	
Connection name	Name of the input or output connection of the EtherNet/IP adapter	
Instance ID	Instance ID of the connection (editable)	1 to 65535
Data length	Data length in bytes (editable)	0 to 504
Min. length	Minimum data length in bytes	0
Max. length	Maximum data length in bytes	

9.1.2.5 Signal configuration

The data structure of the individual modules can be defined here; the name and data type of the inputs and outputs can also be adjusted. Data types can also be combined.

Parameter	Explanation
Slot	Position of the slot
Name	Name of the slot
Module type	Data type of the slot

After selecting a slot, the type of the assembly (input or output), data type and offset are displayed in another table below.

After right-clicking on the signal to be configured, the following options can be selected in the shortcut menu:

- **Edit signal**
  This allows the currently selected signal to be edited.

Parameter	Explanation
Name	The new name for the signal
New type	The new data type for the signal
Count	Number of individually listed data type elements for the signal. Only the data of the original type is restructured; the quantity is not adjusted. - The maximum number corresponds to the quantity that the new data type requires to display the original type. - If fewer elements are selected, the last data type element is listed as an array of all remaining elements.
Apply as array	If selected, the new data type is displayed as an array. Otherwise, the data type elements set under "Count" are displayed.

- **Reset**
  This can be used to undo the signal change or a merge previously completed with "Merge signal".

- **Merge signal**
  This allows all signals between "First in group" and "Last in group" to be merged to form a new group. The same settings can be made for the new group as under "Edit signal".

The settings made are reflected in the process image (I/O mapping).

Configuring the signal   Process image

9.1.2.6 Device settings

- Start of bus communication

It is possible to select how data exchange is started on the module.

Parameter	Explanation
Automatically by device	Data exchange is started automatically after initializing this module.
Controlled by application	Data exchange is started by Automation Runtime.

- Application monitoring

The module-internal watchdog time can be set here. If the watchdog has been enabled (watchdog time not equal to 0), the hardware watchdog must be reset after the set time at the latest.

Parameter	Explanation	Values
Watchdog time	Watchdog software disabled	0 ms
	Permissible range of values Default value: 1000 ms	20 to 65535 ms

Information:

The watchdog time is reset automatically by Automation Runtime.

- Process image storage format

This parameter is not supported.

9.1.2.7 Description

General device information and the entire GSDML file can be read here.

9.2 EDS device description file

The module description is made available to the master in an EDS file. This file contains the description of the slave's complete range of functions. The EDS file can be downloaded from the B&R website (www.br-automation.com) in the Downloads section for the interface module and then imported into the respective master environment.

10 Rockwell RSLogix5000

Software and hardware used for this example:

- X20IF10D3-1 B&R EtherNet/IP adapter interface module
- EDS file from the B&R website
- Rockwell CompactLogix_1769_L35E CPU as EtherNet/IP scanner
- Rockwell RSLogix5000 V20

10.1 Creating a new project

● If necessary, a new project can be created after opening the RSLogix5000 development environment.

To do this, *File → New* is selected; CPU type, CPU revision, name and path of the new project are specified.
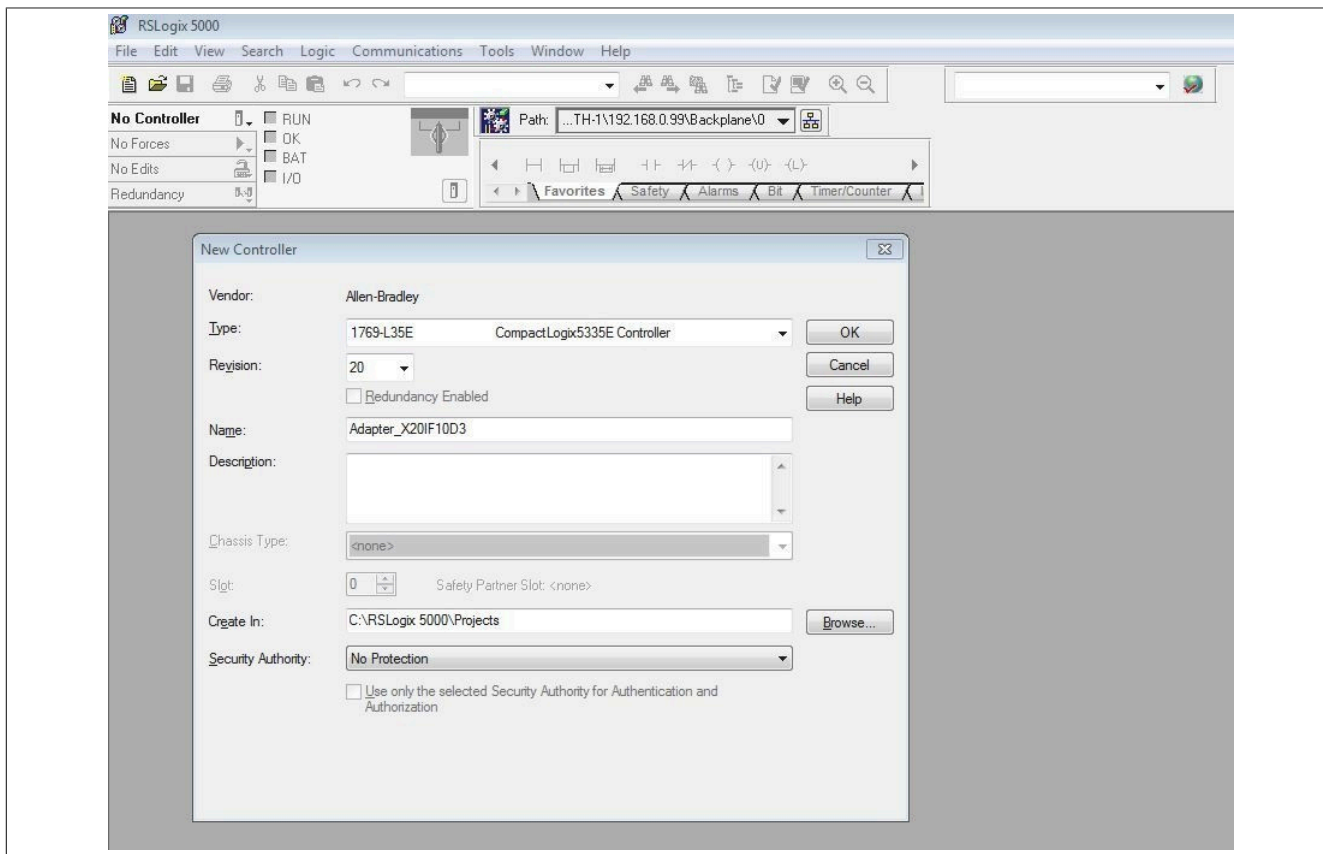
10.2 Import EDS device description file

● The EDS device description file of the interface module must then be imported into the development environment. The device description file for interface module X20IF10D3-1 is available for download on the B&R website (www.br-automation.com).

● The EDS import wizard can be started via *Tools → EDS hardware installation tool*.

1. Select the EDS file registration.

2. Specify the EDS file name.
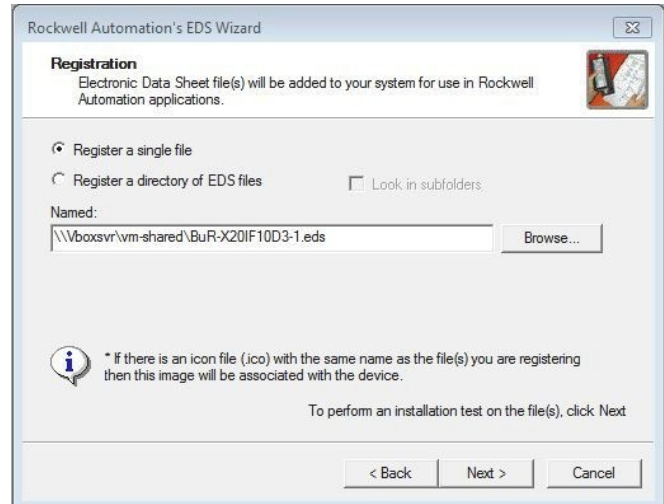
3. Test the installation.
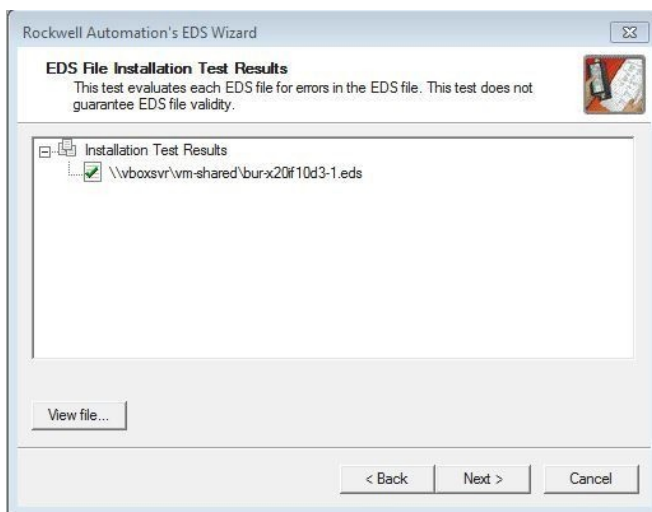
4. Select a graphic symbol.
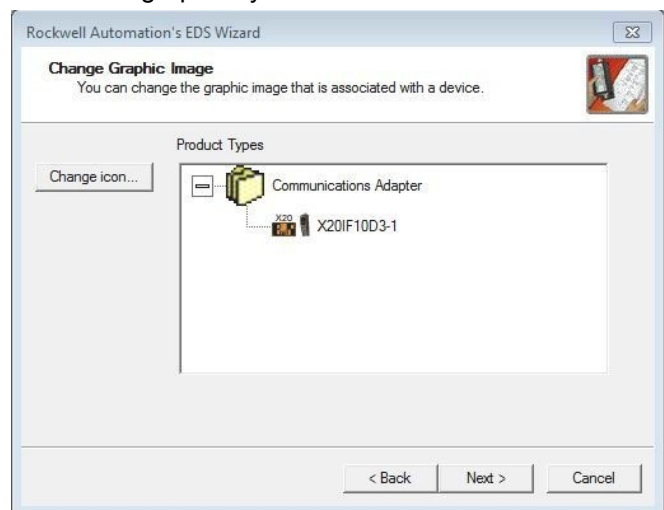
5. Summary
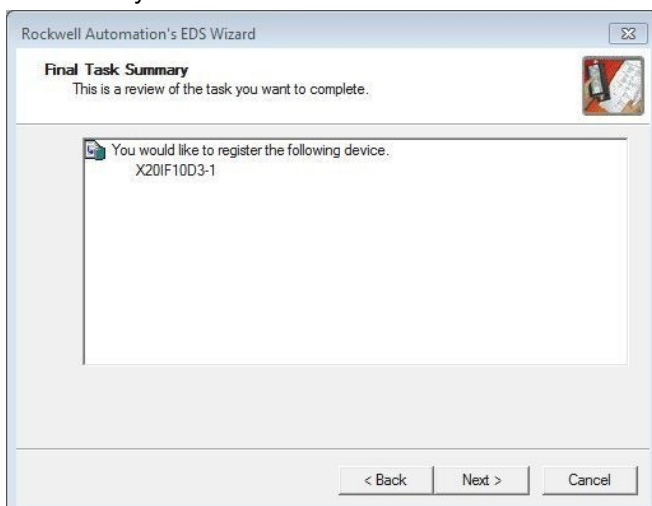
6. Completing the import

10.3 Adding and configuring the EtherNet/IP adapter

● A new module can be added by right-clicking on the Ethernet section of the CPU and selecting "New module".
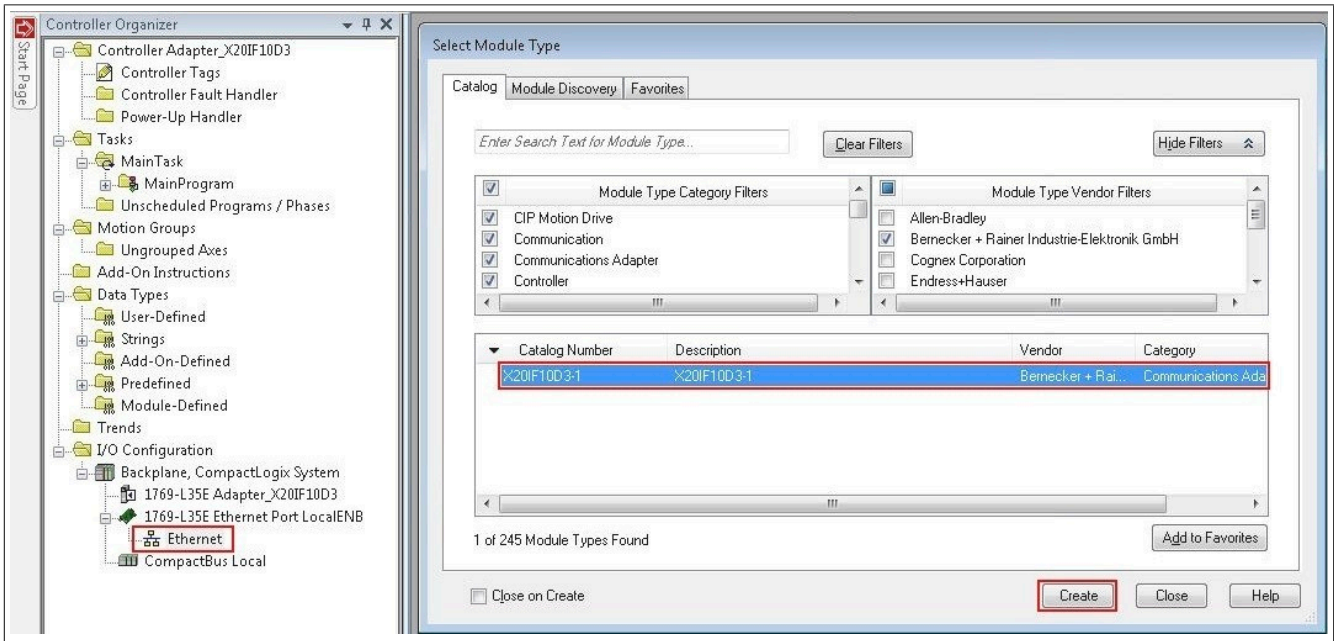
● After clicking on **Create**, various basic settings can be made in the next dialog box under *General*.

- Define the name and IP address.
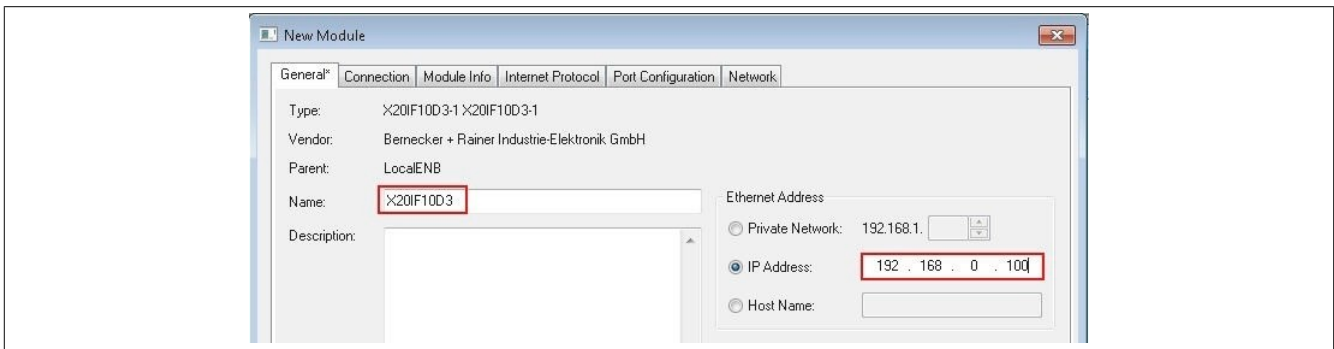
- Select the connection and "Electronic keying". The name of the connection (e.g. Exclusive owner) and "Electronic keying" must be identical to the interface settings in Automation Studio. Otherwise, no connection is established between the EtherNet/IP scanner and adapter.
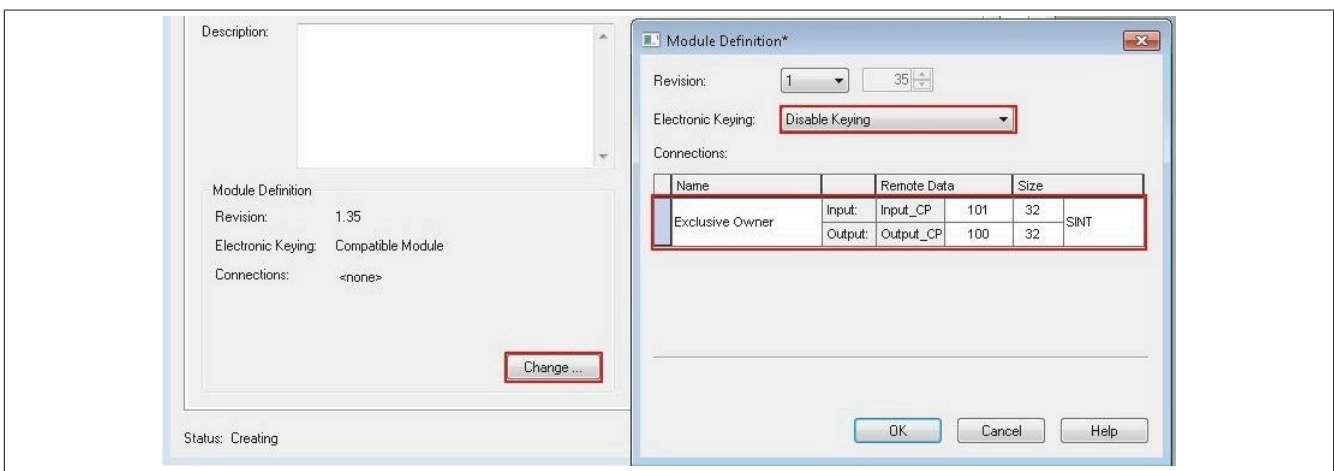
10.4 Assigning the IP address of an EtherNet/IP scanner

● Right-click on the local Ethernet port of the CPU to open the Properties window. The IP address of the EtherNet/IP scanner is assigned here. This IP address must be identical to the local IP address of the CPU.
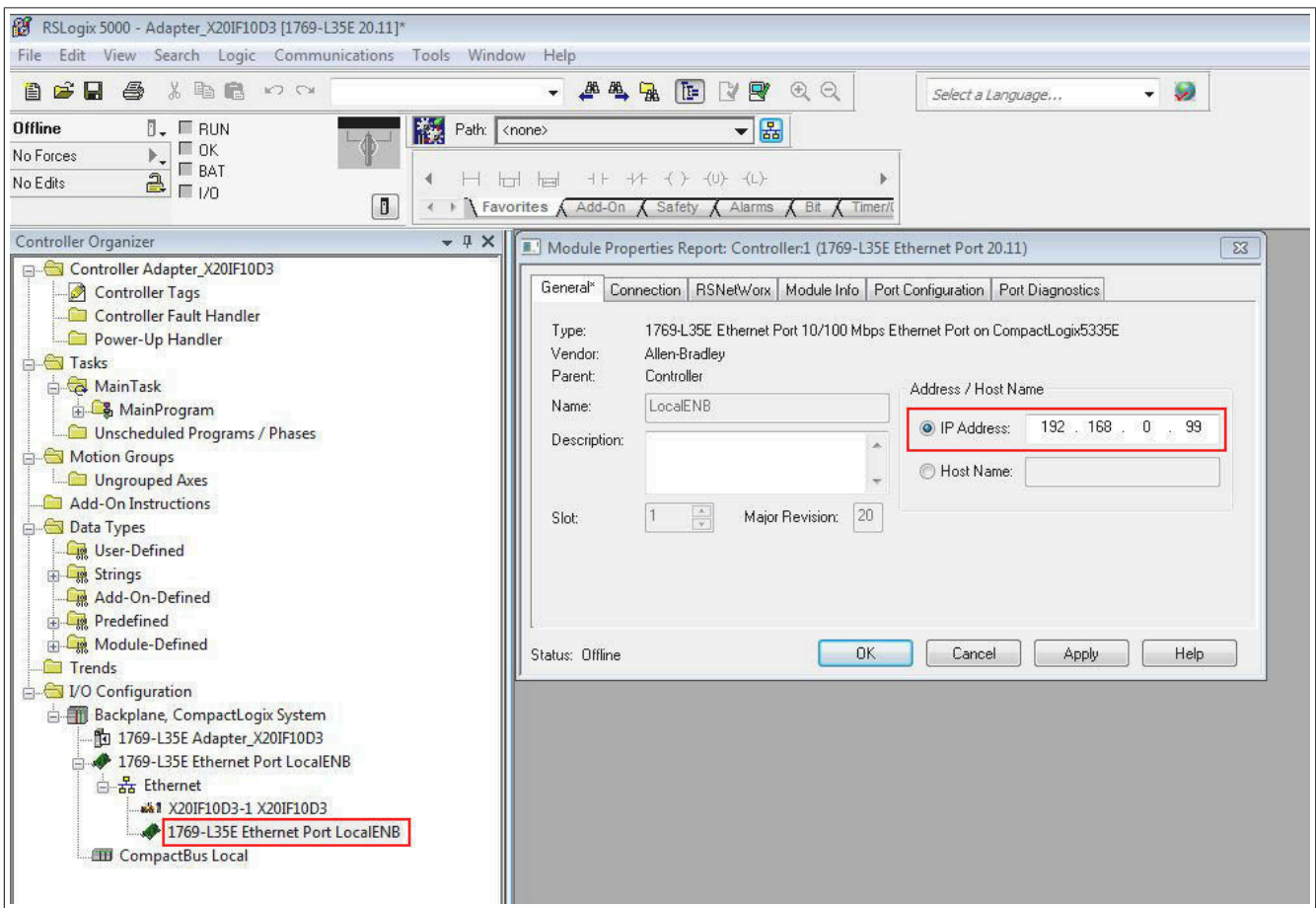
10.5 Establishing a connection to the CPU and downloading the configuration

> **Information:**
>
> **To connect the CPU to RSLogix, the CPU must already have a valid IP address. Setting the IP address of the CPU is done according to the CPU used and must be looked up in the respective CPU documentation.**

● To connect RSLogix to the CPU, the path to the CPU must be defined in RSLogix.

If the path to the CPU has not yet been created, it must be created using RSLinx. For details, see "Creating a path with RSLinx" on page 17.
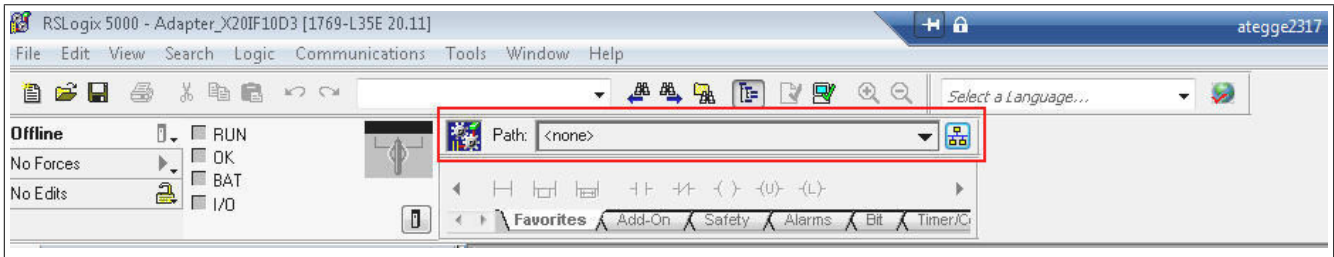

● If the path is valid, the addresses of all available EtherNet/IP scanners (CPU) and adapters become visible after clicking on button **Who active**.

Open the desired EtherNet/IP scanner wide enough so that the corresponding processor is visible; mark it, click on **Set project path** and download the project.
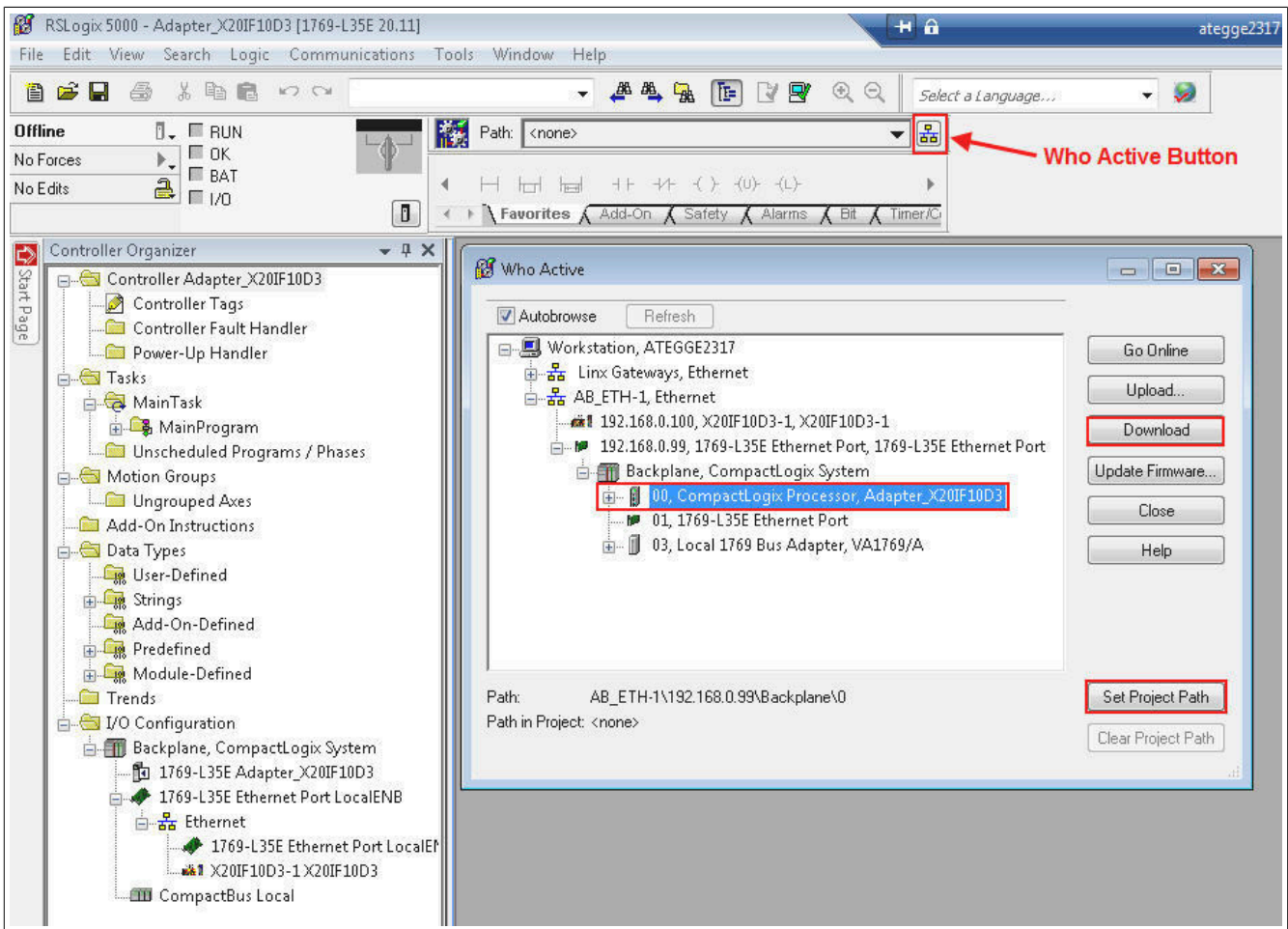
10.5.1 Creating a path with RSLinx

The RSLinx application is installed with the RSLogix 5000 installation.
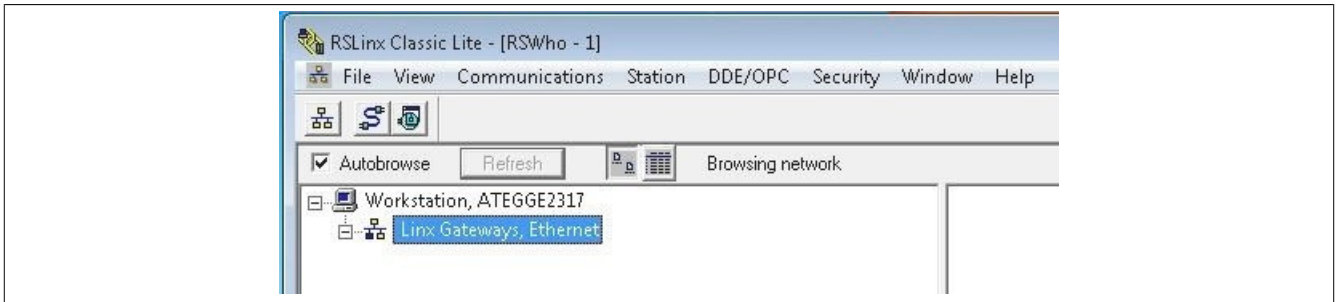
Starting the graphical user interface

> # Information:
>
> **The RSLinx graphical user interface might not start in certain operating systems such as Windows Vista, Windows 7 and Server 2008.**

If RSLinx Classic is running as a server, it is not possible to start the graphical user interface. This is only available if RSLinx Classic is in application mode.
To toggle between execution as a service and application mode, use the RSLinx Classic launch control panel. For this, see:
*Start → Programs → Rockwell software → RSLinx → RsLinx Classic launch control panel*

In order to disable **Always run as service**, you must first click on button **Stop**. Other Rockwell software may need to be closed before the service is ended.
Finally, **Always run as service** can be disabled and RSLinx can be started as an application by clicking on **Start**.

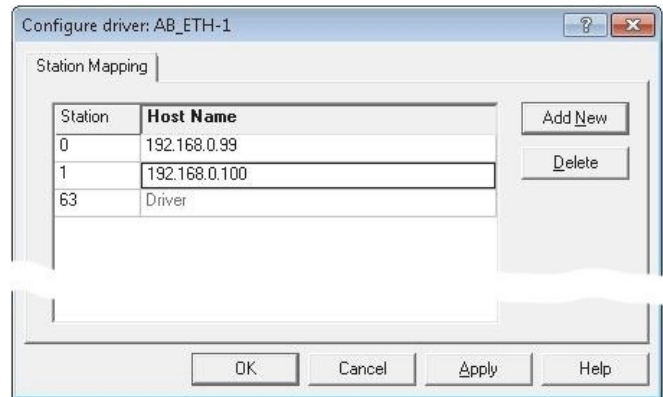● To create the path, open **Configure drivers** and select "Ethernet devices" as the driver type.
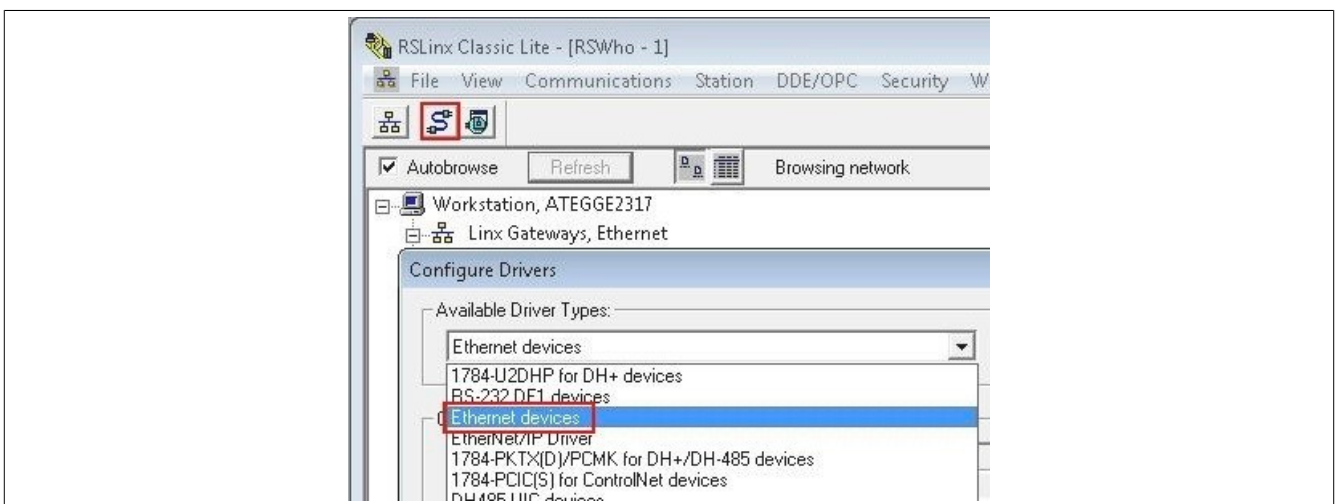
● Right-click on the newly added driver type (AB_ETH1, Ethernet) and select **Configure driver**. In the configuration dialog box, enter the IP addresses of the EtherNet/IP scanner (CPU) and the adapter.
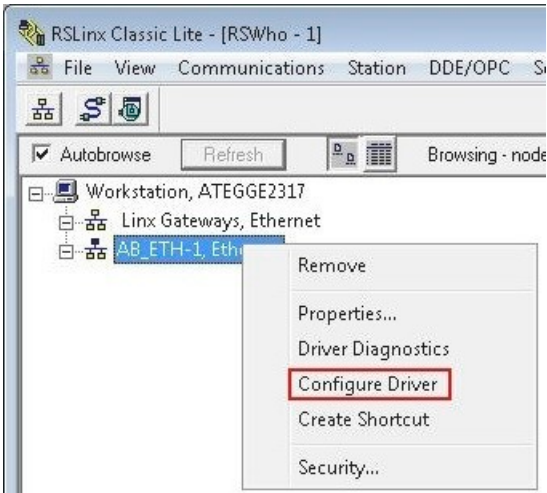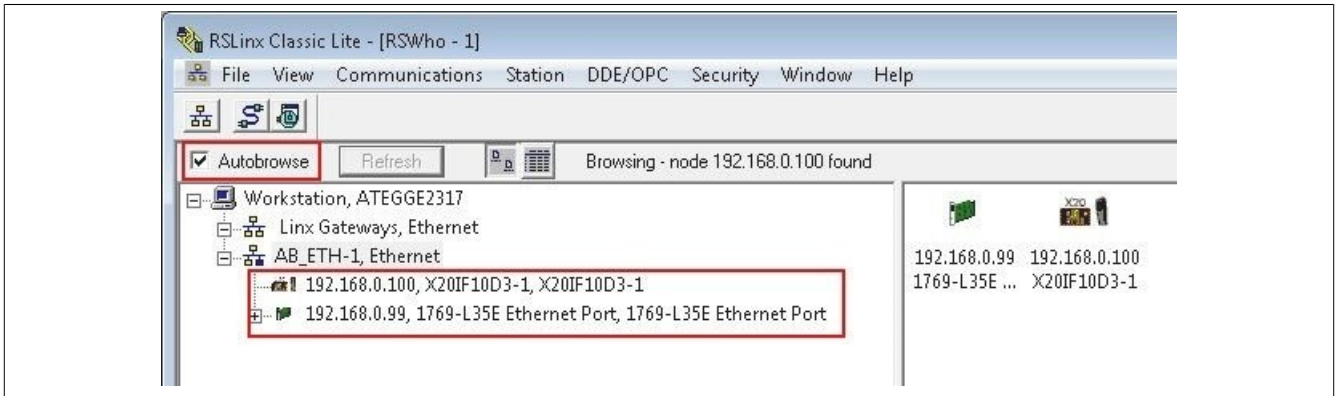
Select driver   Enter IP address

● If "Autobrowse" is enabled, both devices should be found shortly thereafter and displayed in RSLinx.

● Close RSLinx again and continue working with RSLogix 5000.
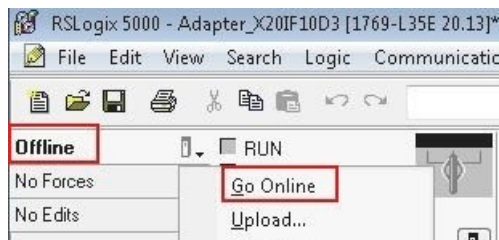
10.6 Reading and setting inputs/outputs of the EtherNet/IP adapter

● The configured outputs of the Ethernet/IP adapter can now be set and the inputs can be read under "Controller tags".
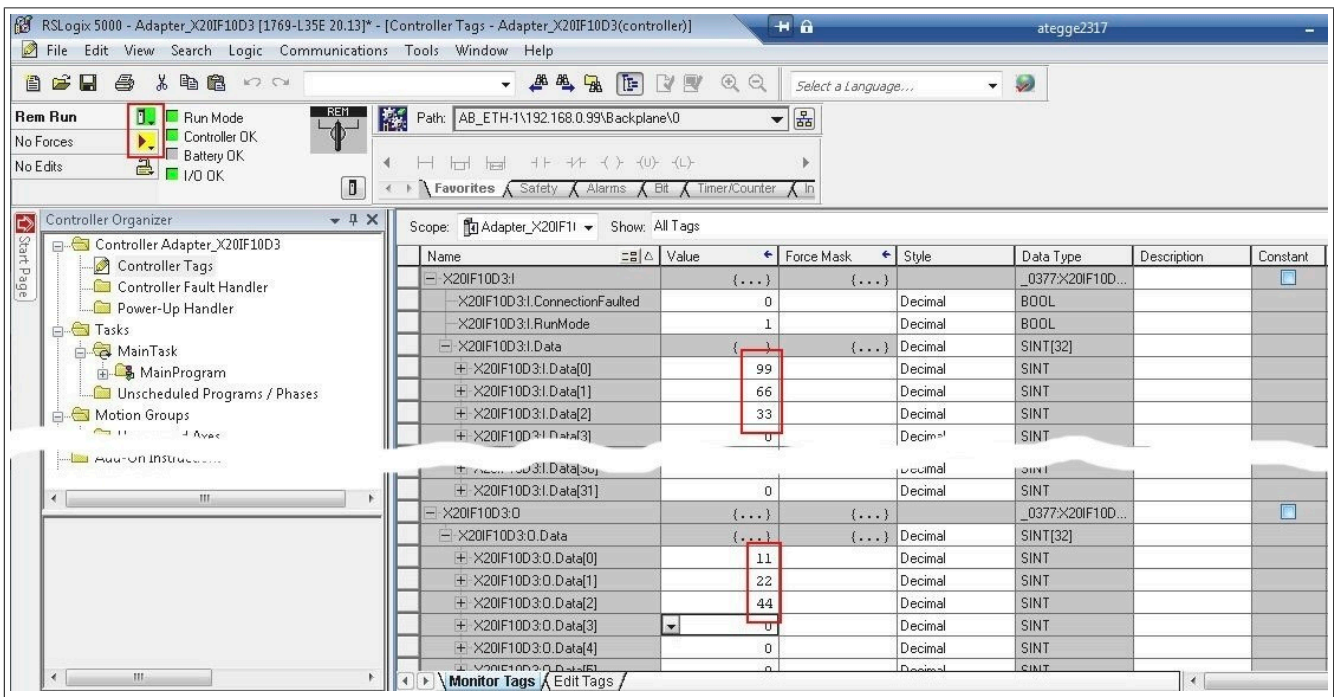
The online mode must be enabled as well. In order to force outputs, **Enable all I/O forces** must also be enabled.

Enable the online mode   Enable "Force"