BECKHOFF New Automation Technology

Manual | EN

TS6280

TwinCAT 2 Ethernet/IP Slave

Supplement | Communication

2023-08-10 | Version: 1.1

Table of contents

1 Foreword

1.1 Notes on the documentation

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with applicable national standards.
It is essential that the documentation and the following notes and explanations are followed when installing and commissioning the components.
It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

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.

Trademarks

Beckhoff®, TwinCAT®, TwinCAT/BSD®, TC/BSD®, EtherCAT®, EtherCAT G®, EtherCAT G10®, EtherCAT P®, Safety over EtherCAT®, TwinSAFE®, XFC®, XTS® and XPlanar® are registered trademarks of and licensed by Beckhoff Automation GmbH.
Other designations used in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owners.

Patent Pending

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents:
EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702
with corresponding applications or registrations in various other countries.

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany

Copyright

1.2 For your safety

Safety regulations

Read the following explanations for your safety.
Always observe and follow product-specific safety instructions, which you may find at the appropriate places in this document.

Exclusion of liability

All the components are supplied in particular hardware and software configurations which are 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 technology who are familiar with the applicable national standards.

Signal words

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

Personal injury warnings

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

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

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

Warning of damage to property or environment

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

Information on handling the product

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

1.3 Notes on information security

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

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

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

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

2 Configuration

The TwinCAT EtherNet/IP Slave enables EtherNet/IP Connectivity to the TwinCAT System.

Requirements:

- **Win2000 / Windows XP**: TwinCAT 2.10 Build 1309 or newer
- **Windows CE**: Windows CE 5.0 (Beckhoff Windows CE image Build version 2.16) or newer
- License Key for TwinCAT EtherNet/IP Slave Supplement product
- Intel PRO Network Interface Card (Ethernet Controller Intel 825X)

Installation

Download TwinCAT Supplement Installer for EtherNet/IP connectivity.

Operating System:

Windows 2000 / XP/ Windows XP Embedded:
TwinCAT Supplement System

Windows CE:
TwinCAT Supplement System

Run the Installer on your programming PC and follow its instructions.

If the target operating system is Windows 2000 / Windows XP or Windows XP Embedded, the TwinCAT EtherNet/IP-Slave is now ready for Start-Up (go on with chapter "Start-Up"!).

If the target operating system is Windows CE, please follow the instructions below:

- The folder **..\TwinCAT\CE\TwinCAT EtherNetIP Slave CE\Install\ARM** contains a Cabinet-File (CAB file) for ARM-based CE runtime systems (e.g. CX9001, CX9010, CP66xx,...).
  The folder **..\TwinCAT\CE\TwinCAT EtherNetIP Slave CE\Install\X86** contains a Cabinet-File for X86-based CE runtime systems (e.g. CX1000, CX1020, CP77xx, CP62xx, CP72xx, C69xx,....)
- Copy the file: **TcEtherNetIP_S_Ce.XXXXX.CAB** into a folder on the CE runtime system.
- On the CE system: Please install (double-click the CAB file) the CE components.
- **IMPORTANT**: Please suspend the CE device once after installation via "Start-> Suspend"!

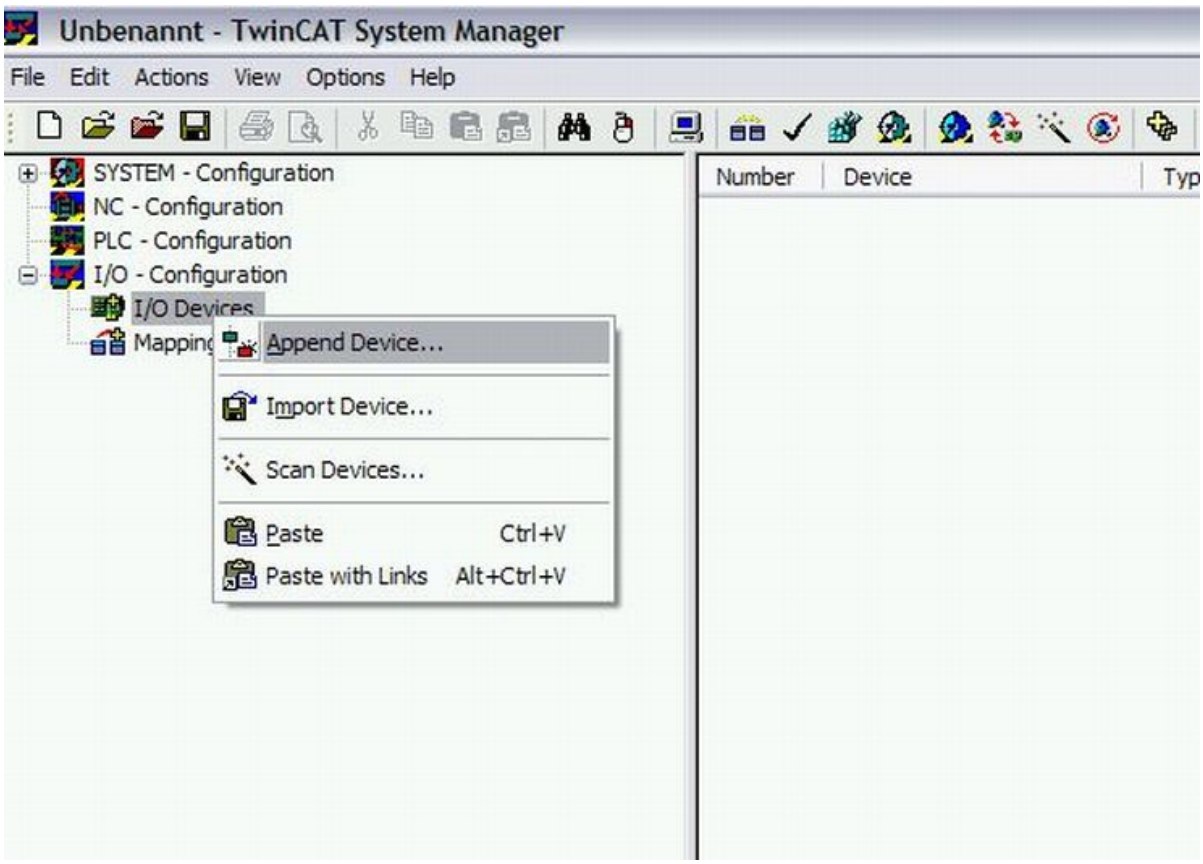
Start-Up

General information

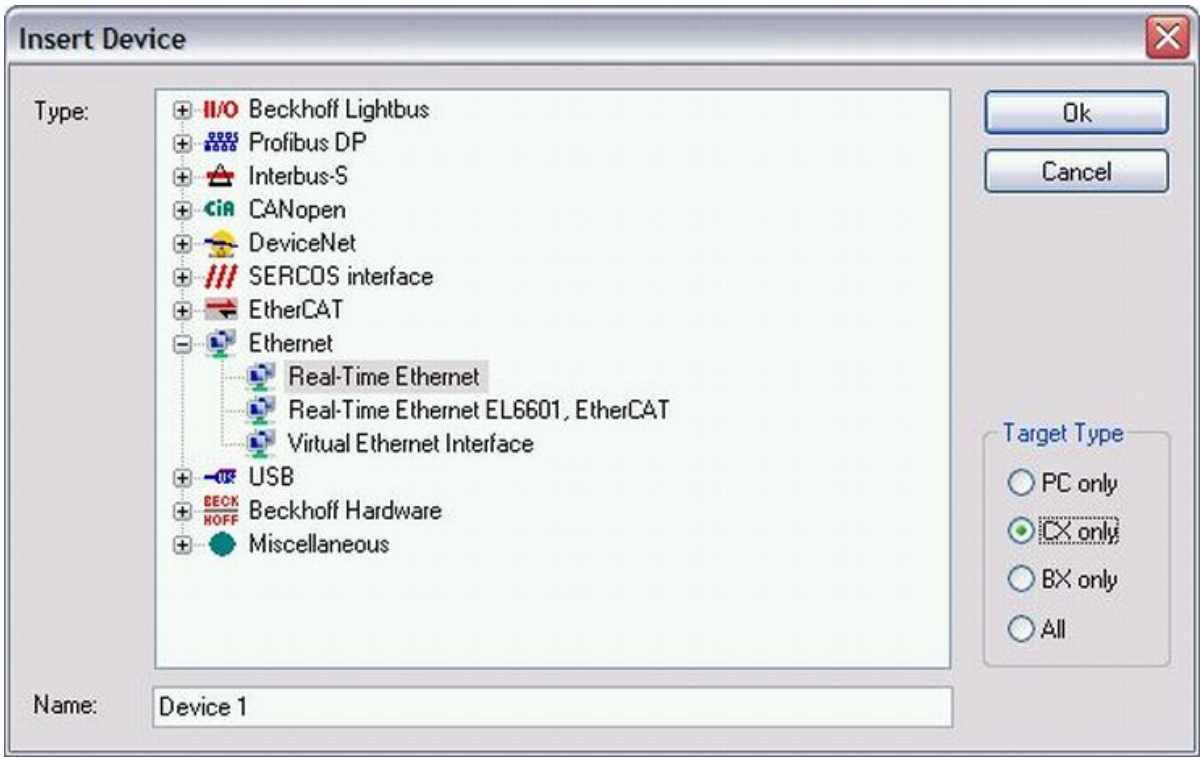
- At the moment, the TwinCAT EtherNet/IP Slave does only support static IP-Address configurations. When the TwinCAT EtherNet/IP Slave configuration is beeing activated, the System is only going to start up
  in RUN-Mode if the actual address settings match the stored configuration.

First Steps

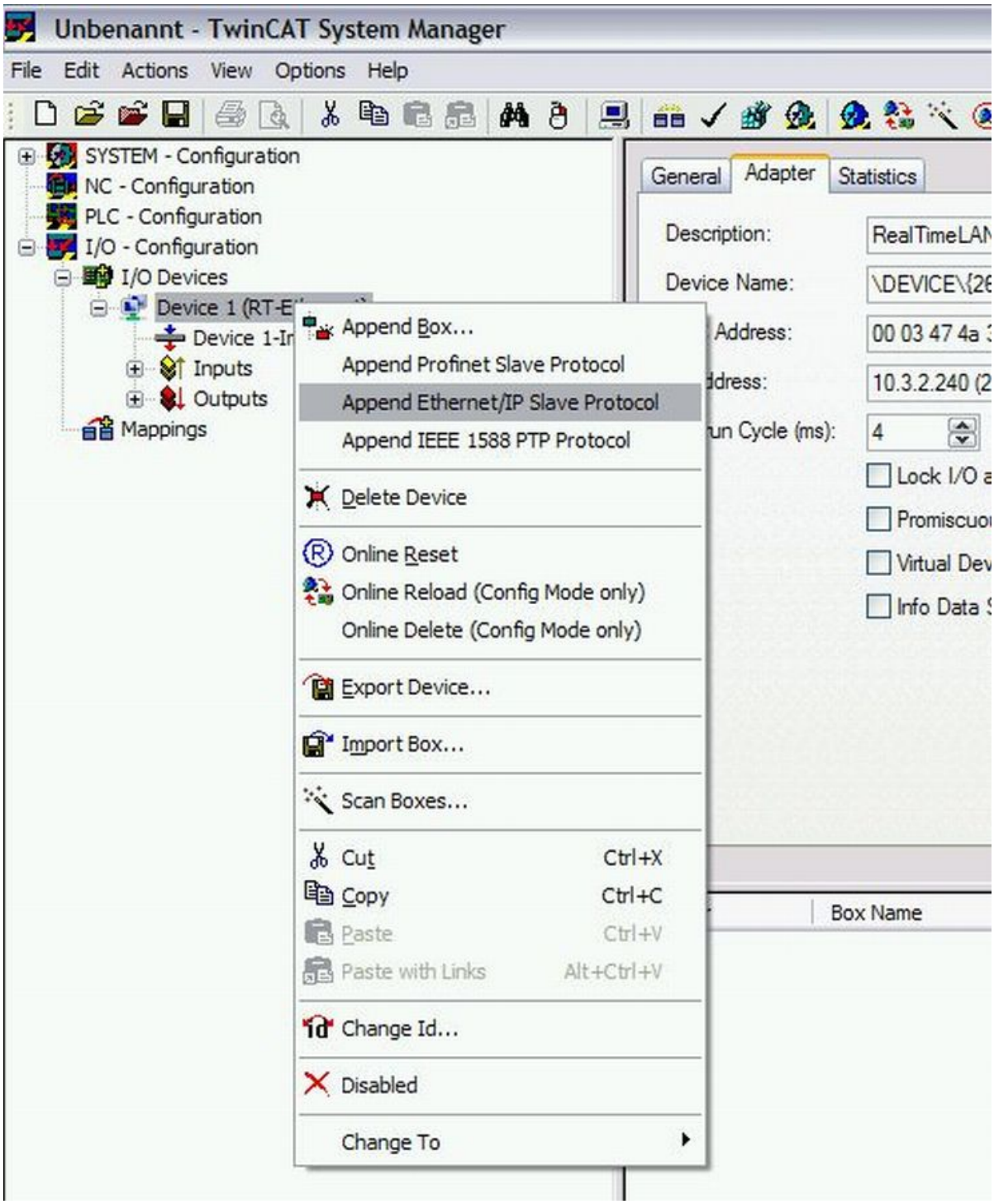
1. Start the TwinCAT System Manager, create a new project and use the context menu after a mouse-click on "I/O Devices", to append a device in the I/O-Configuration



2. Choose "Real-Time Ethernet" from the Ethernet device type section as shown below



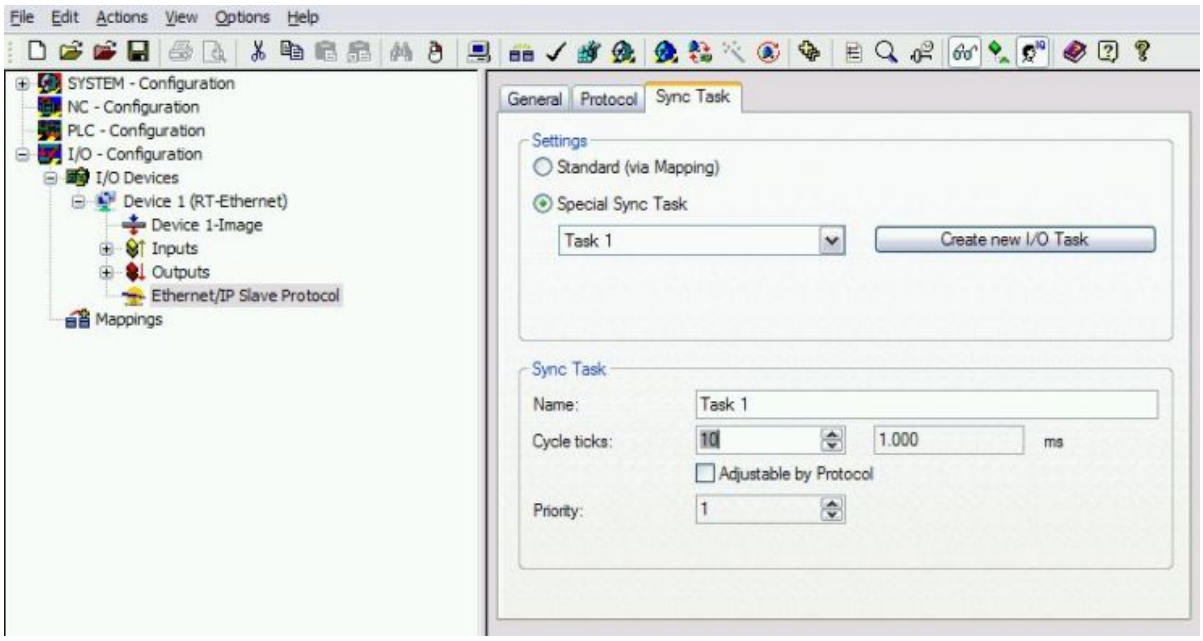
3. On the newly added "Real-Time Ethernet" device, append the "EtherNet/IP Slave Protocol" via the context menu.



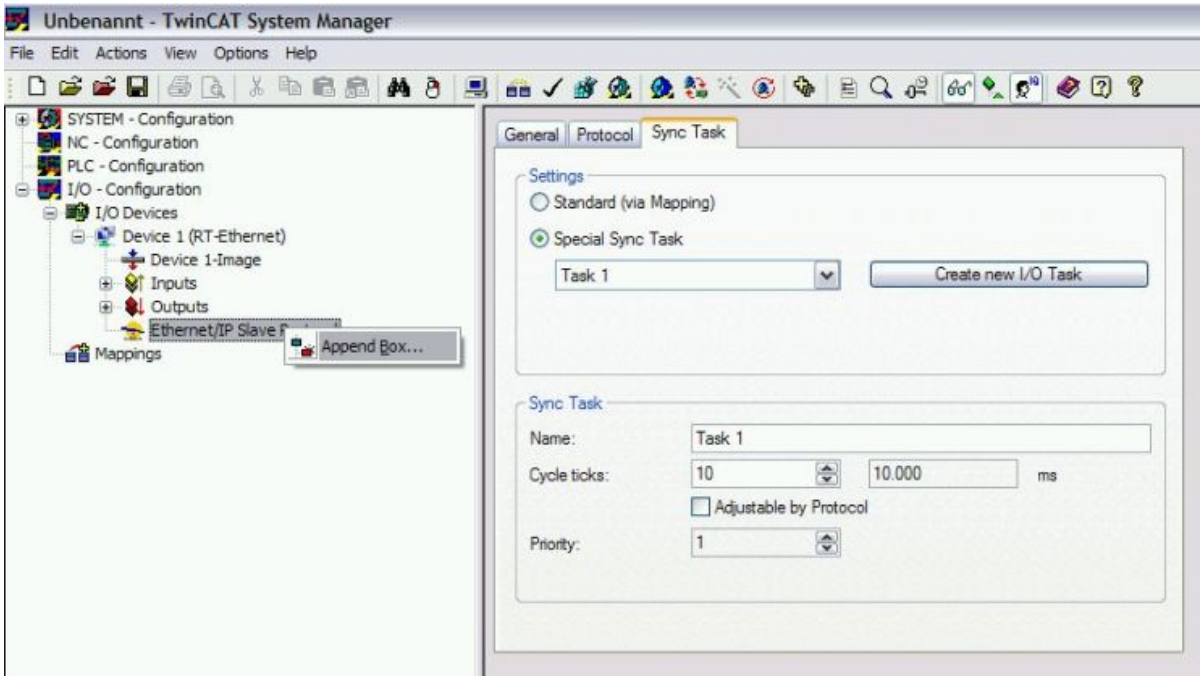
4. It's necessary to define a sync master for triggering EtherNet/IP Slave Protocol.
   - Option "Standard": the sync master has to be defined manually by the user. (f. e. PLC Task) (this option is not supported by CX9000series)
   - Option "Special Sync Task": a additional task will be created automatically

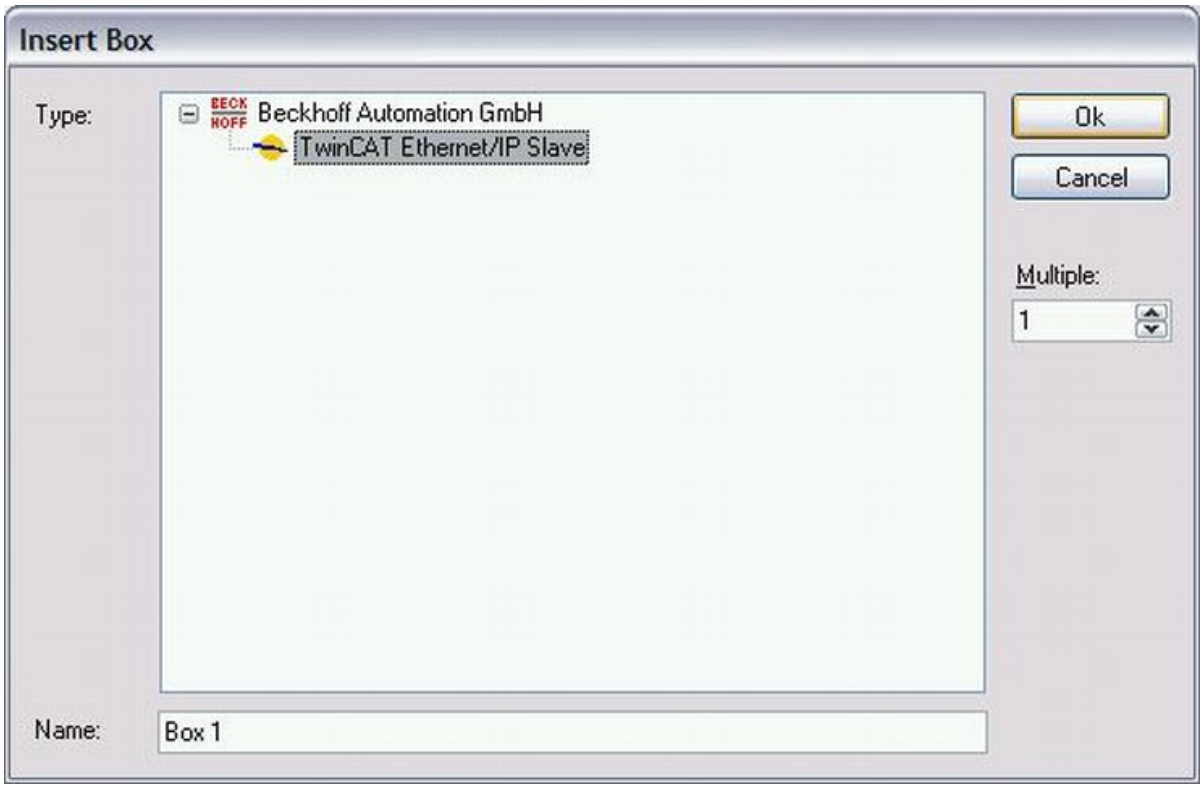
   Important: The Sync Tasks Cycle Time represents the lowest border of the EtherNet/IP cycle time (RPI)

(e.g. task cycle time = 10ms ==> EtherNet/IP RPI_{min}=10ms)

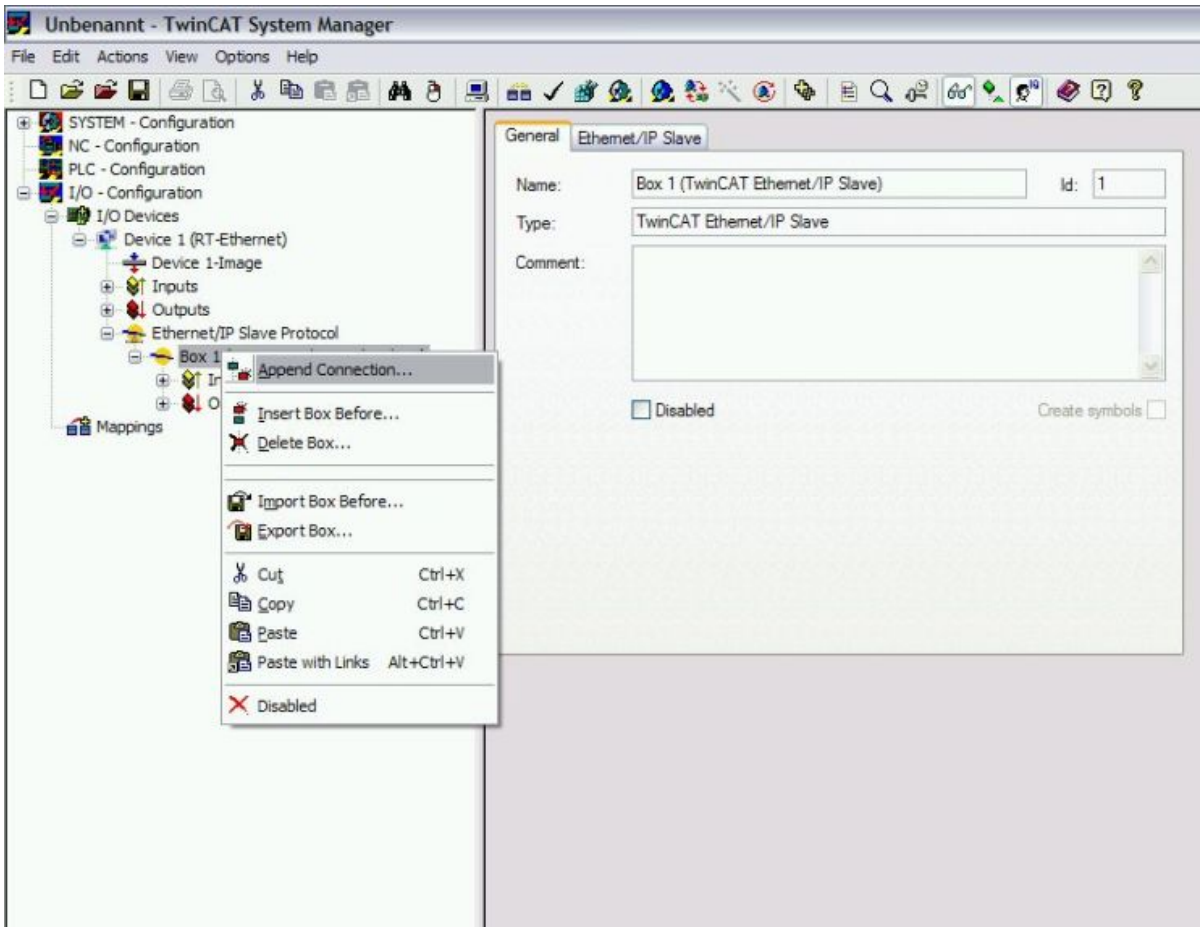


5. Append an EtherNet/IP Slave Box as shown below

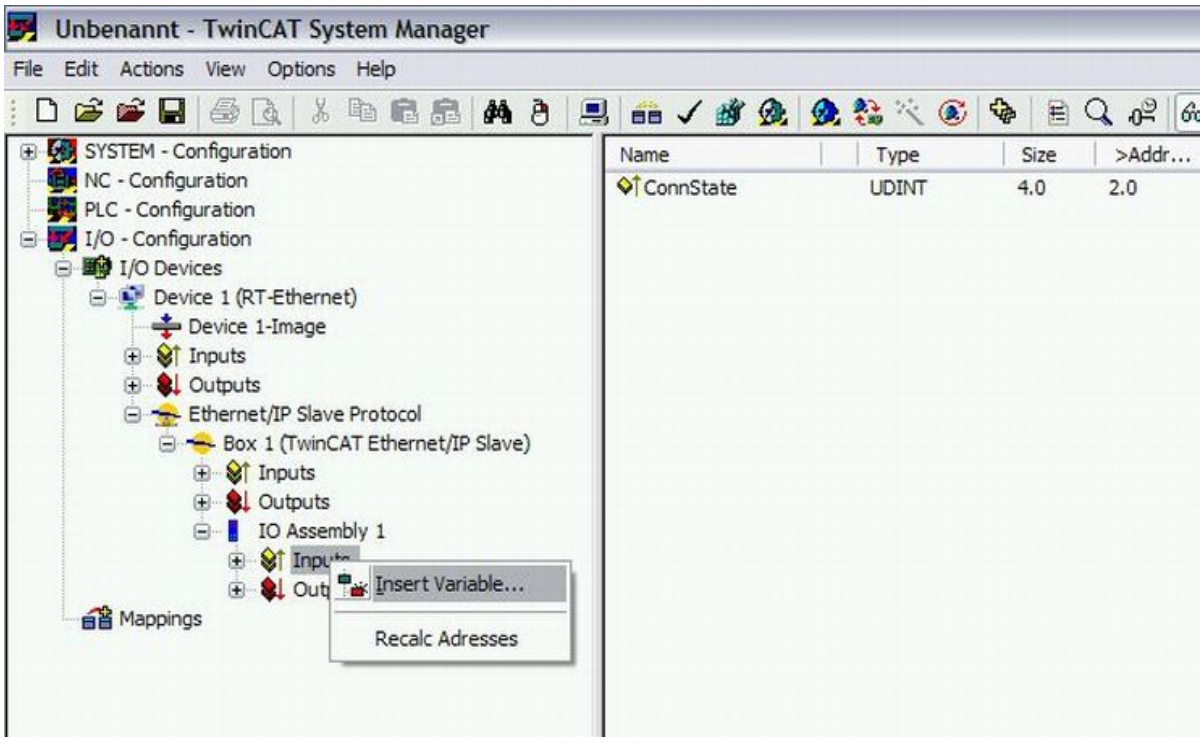


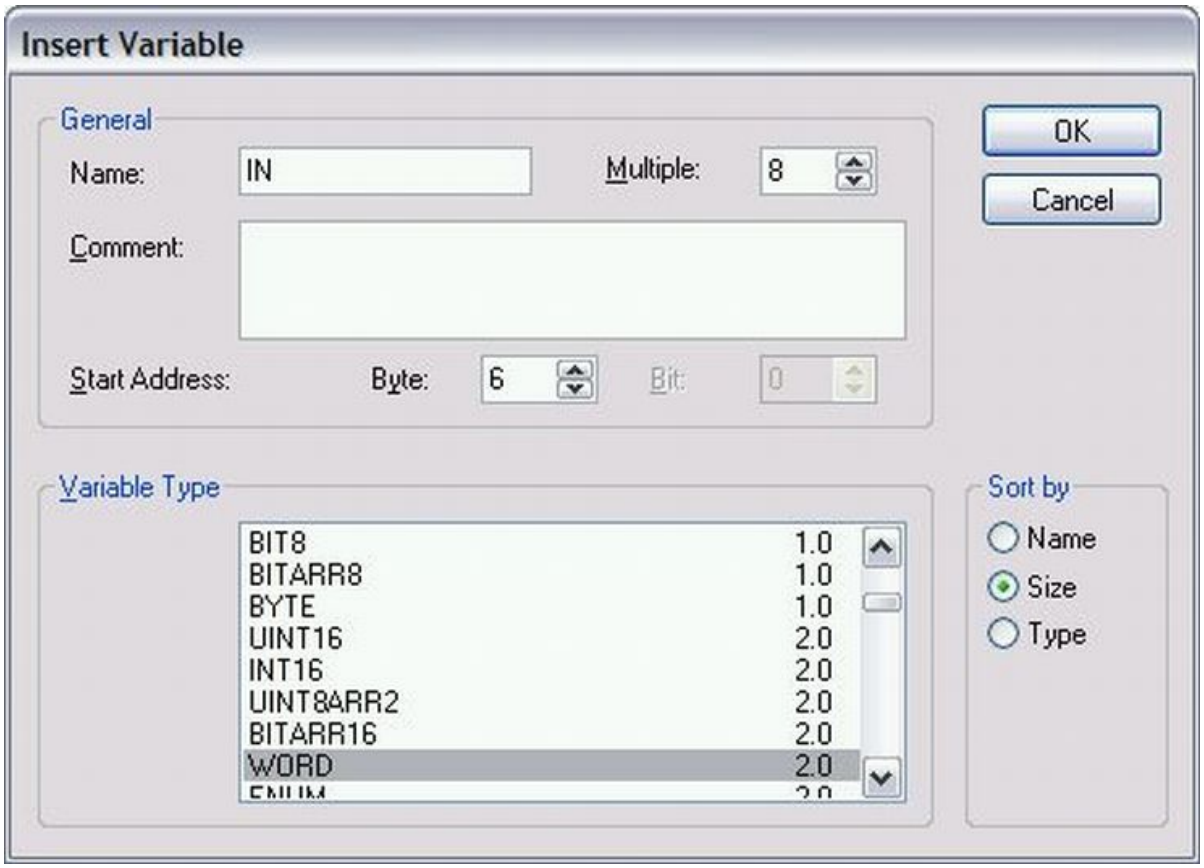


6. Append a Connection (Assembly) on the EtherNet/IP Slave Box as shown below

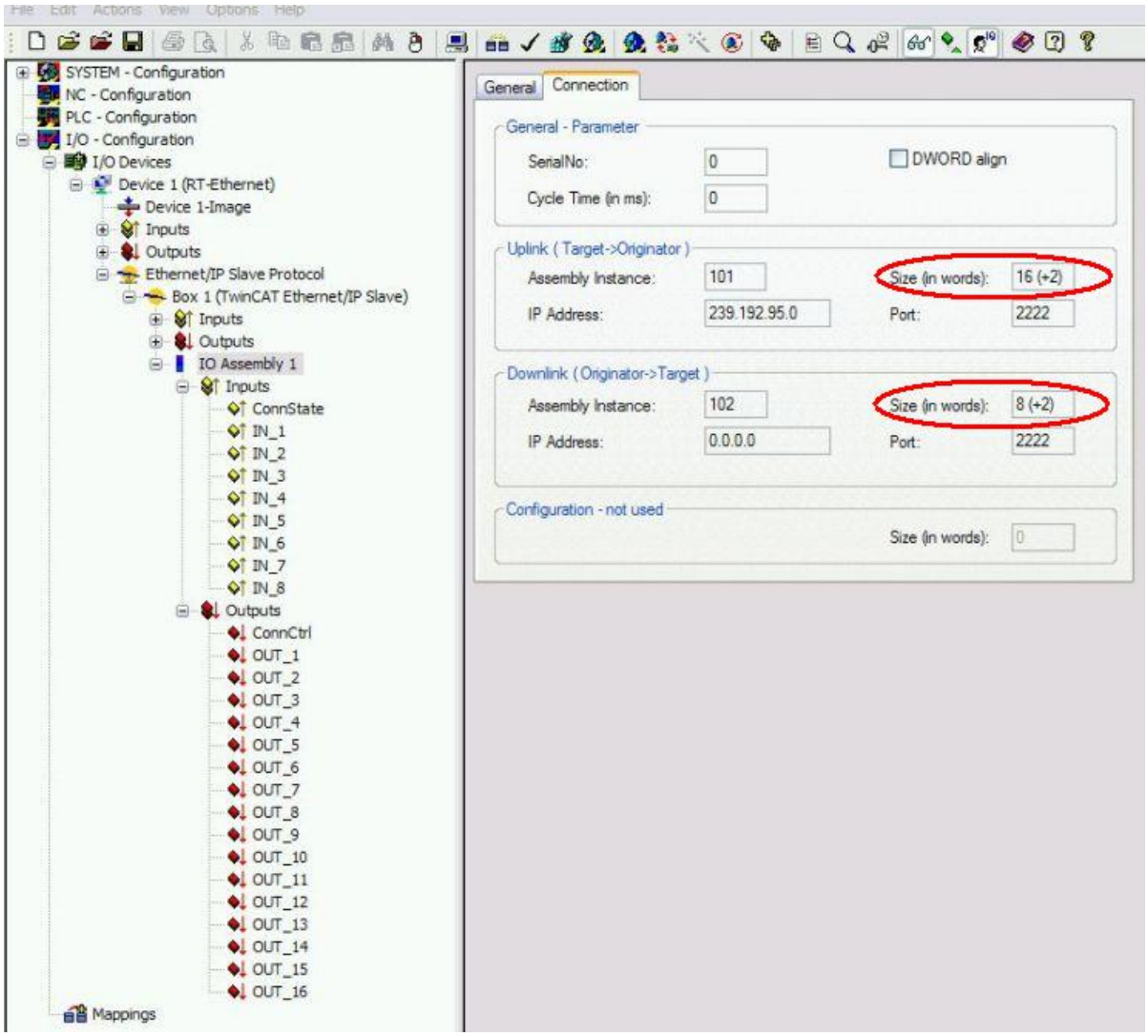


7. Depending on application requirements it's possible to define the size of Processdata Image separately for inputs
and outputs from 1 up to 502 bytes. Please find an example for defining 8 Word Input Processdata as shown below.




Insert Variable
General
Name:
IN
Multiple:
8
Comment:
Start Address:
Byte:
6
Bit:
0
OK
Cancel
Variable Type
BIT8 1.0
BITARR8 1.0
BYTE 1.0
UINT16 2.0
INT16 2.0
UINT8ARR2 2.0
BITARR16 2.0
WORD 2.0
Sort by
Name
Size
Type

8. A valid EtherNet/IP Configuration is shown below



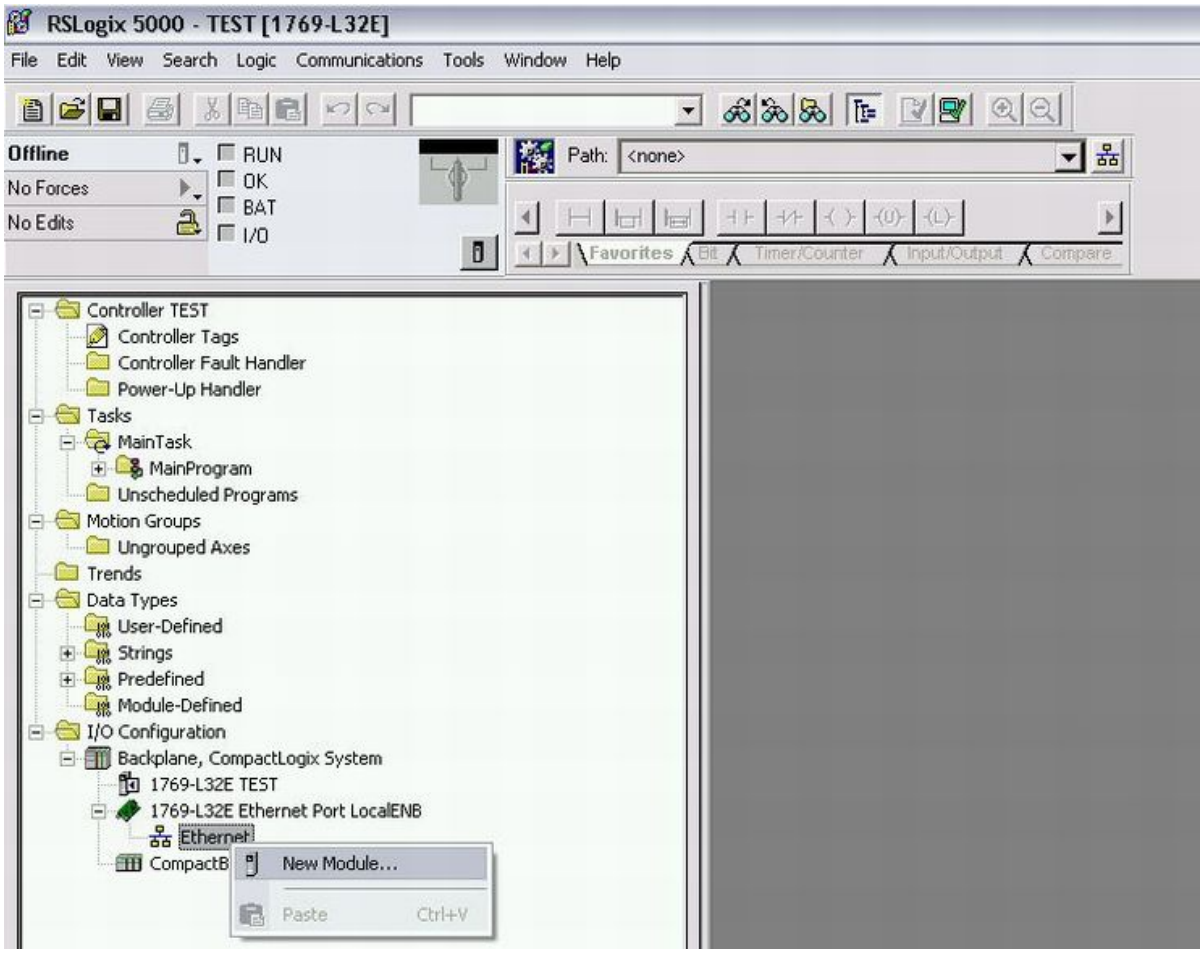
9. The Pre-Configuration of TwinCAT EtherNet/IP Slave is finished now. Activate the configuration and go on with Integration in RSLogix5000.

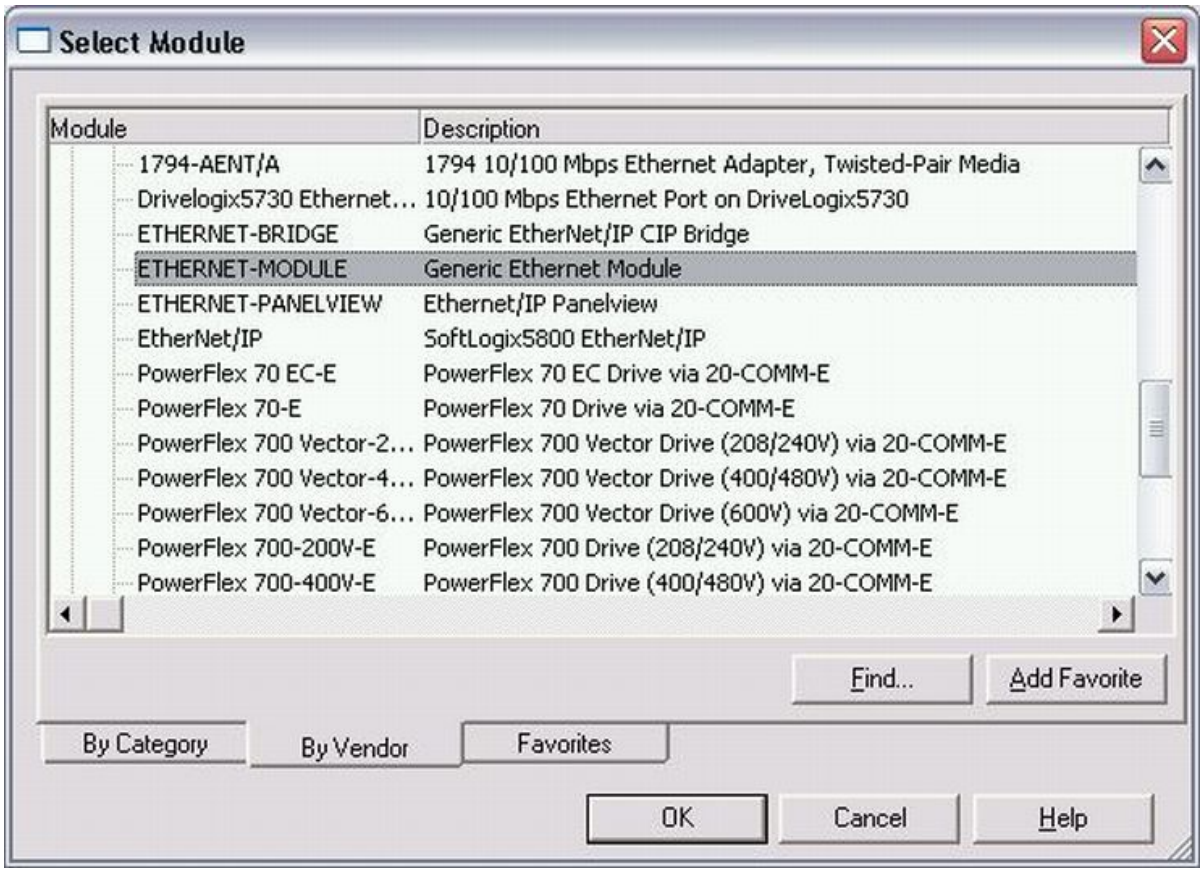
Integration in RSLogix5000

1. Open RSLogix 5000 and Create a new PLC project. When creating a new project make sure to select the correct controller type and
controller settings. This example uses a CompactLogix (L32E) with the TwinCAT EtherNet/IP Slave

Example configured as shown above.

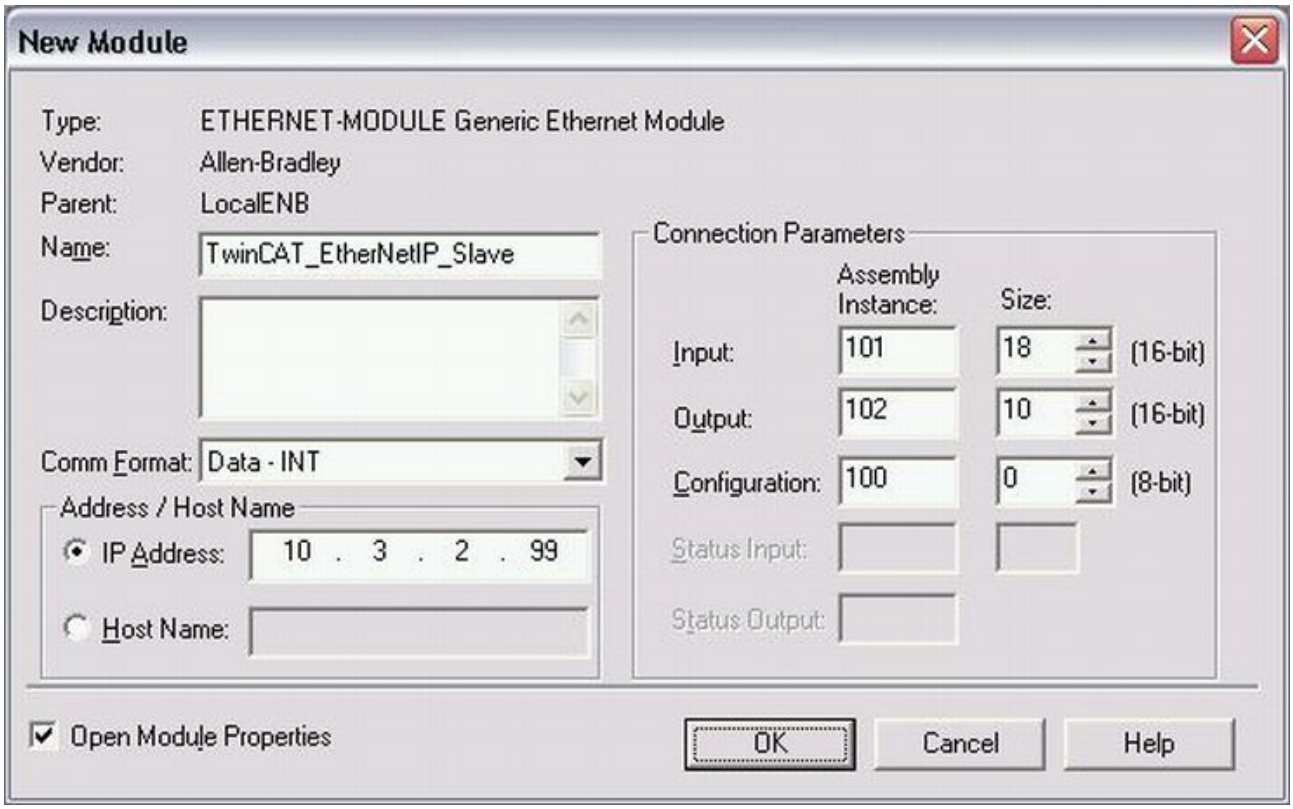
2. Add a new module. When adding the TwinCAT EtherNet/IP Slave box, select the "ETHERNET-MODULE", since it is a generic Ethernet/IP
device, and it will be configured to work with the TwinCAT EtherNet/IP Slave


RSLogix 5000 - TEST [1769-L32E]
File Edit View Search Logic Communications Tools Window Help
Offline
No Forces
No Edits
RUN
OK
BAT
I/O
Path: <none>
Favorites Bit Timer/Counter Input/Output Compare
Controller TEST
Controller Tags
Controller Fault Handler
Power-Up Handler
Tasks
MainTask
MainProgram
Unscheduled Programs
Motion Groups
Ungrouped Axes
Trends
Data Types
User-Defined
Strings
Predefined
Module-Defined
I/O Configuration
Backplane, CompactLogix System
1769-L32E TEST
1769-L32E Ethernet Port LocalENB
Ethernet
CompactB
New Module...
Paste Ctrl+V

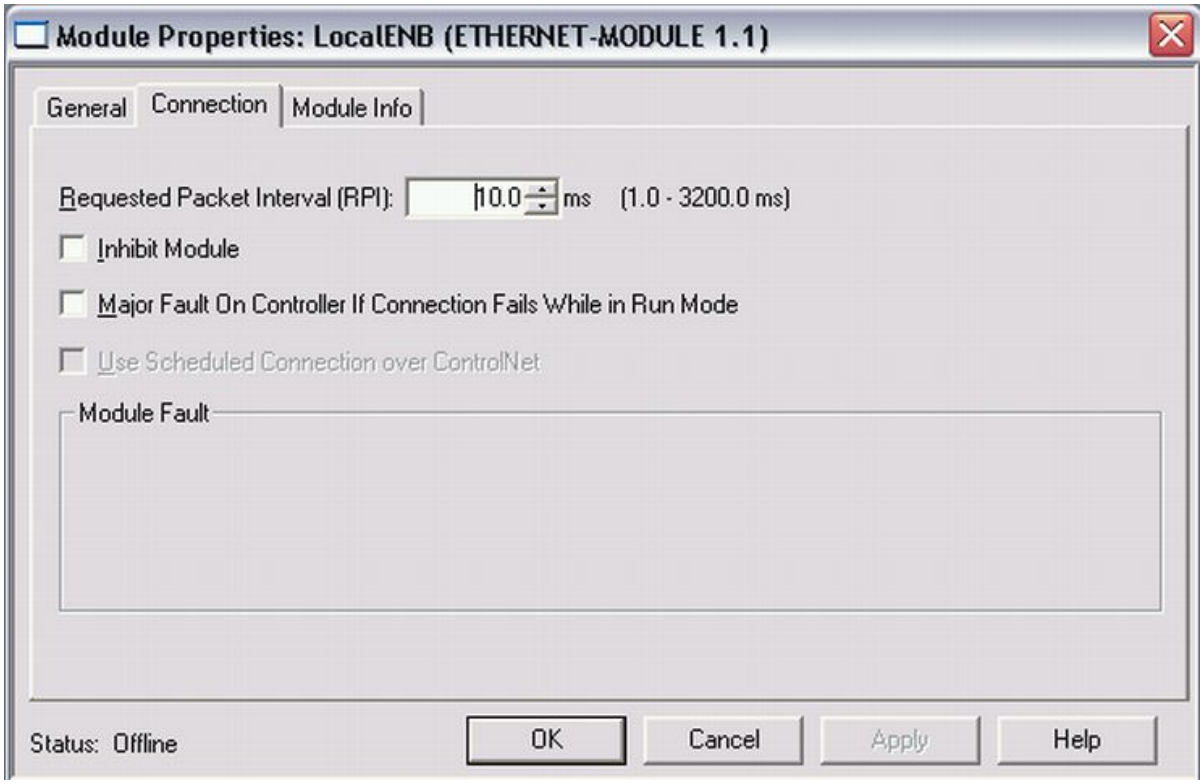

Select Module
Module
Description
1794-AENT/A
1794 10/100 Mbps Ethernet Adapter, Twisted-Pair Media
Drivelogix5730 Ethernet...
10/100 Mbps Ethernet Port on DriveLogix5730
ETHERNET-BRIDGE
Generic EtherNet/IP CIP Bridge
ETHERNET-MODULE
Generic Ethernet Module
ETHERNET-PANELVIEW
Ethernet/IP Panelview
EtherNet/IP
SoftLogix5800 EtherNet/IP
PowerFlex 70 EC-E
PowerFlex 70 EC Drive via 20-COMM-E
PowerFlex 70-E
PowerFlex 70 Drive via 20-COMM-E
PowerFlex 700 Vector-2...
PowerFlex 700 Vector Drive (208/240V) via 20-COMM-E
PowerFlex 700 Vector-4...
PowerFlex 700 Vector Drive (400/480V) via 20-COMM-E
PowerFlex 700 Vector-6...
PowerFlex 700 Vector Drive (600V) via 20-COMM-E
PowerFlex 700-200V-E
PowerFlex 700 Drive (208/240V) via 20-COMM-E
PowerFlex 700-400V-E
PowerFlex 700 Drive (400/480V) via 20-COMM-E
Find...
Add Favorite
By Category
By Vendor
Favorites
OK
Cancel
Help

3. **Configuring the TwinCAT EtherNet/IP Slave in RSLogix:**

- Enter IP-Address of TwinCAT EtherNet/IP Slave
- Choose Data Type (Comm Format)
- The Assembly Instances will be as follows:
  - Input(Target->Originator: 101
  - Output(Originator->Target: 102
  - Configuration: 100
- Things to keep in mind when entering the data size for I/O:
  - There will always be 4 bytes of input and 4 bytes of output data used for diagnostics.
  - The EtherNet/IP Slave Dialog View in TwinCAT Systemmanager (Subchapter "First Steps", Picture 8)
    assist you to find the correct data sizes.



1. Choose Requested Packet Interval in ms (shall not be lower than TwinCAT EtherNet/IP Slave Sync Task Cycle Time)
   (Cycle Time in the TwinCAT Slave Example was set to 10ms)



3 Configuration TwinCAT 2.11 R3

The TwinCAT EtherNet/IP Slave enables EtherNet/IP Connectivity to the TwinCAT System.

Requirements:

- **Win2000 / Windows XP**: TwinCAT 2.11 R3
- If you use CE, the image must be also a TwinCAT 2.11 R3
- License Key for TwinCAT EtherNet/IP Slave Supplement product
- Intel PRO Network Interface Card (Ethernet Controller Intel 825X)

Installation

https://download.beckhoff.com/download/document/Application_Notes/DK9121-0111-0026.pdf

Download TwinCAT Supplement Installer for EtherNet/IP connectivity.

Operating System:

- Windows 2000 / XP/ Windows XP Embedded: TS6280 | TwinCAT EthernetIP Slave
- Windows CE: TS6280-0030 | TwinCAT EthernetIP Slave CE

Run the Installer on your programming PC and follow its instructions.

If the target operating system is Windows 2000 / Windows XP or Windows XP Embedded, the TwinCAT EtherNet/IP-Slave is now ready for Start-Up (go on with chapter "Start-Up"!).

If the target operating system is Windows CE, please follow the instructions below:

- The folder **..\TwinCAT\CE\TwinCAT EtherNetIP Slave CE\Install\ARM** contains a Cabinet-File (CAB file) for ARM-based CE runtime systems (e.g. CX9001, CX9010, CP66xx,...).
  The folder **..\TwinCAT\CE\TwinCAT EtherNetIP Slave CE\Install\X86** contains a Cabinet-File for X86-based CE runtime systems (e.g. CX1000, CX1020, CP77xx, CP62xx, CP72xx, C69xx,....)
- Copy the file: **TcEtherNetIP_S_Ce.XXXXX.CAB** into a folder on the CE runtime system.
- On the CE system: Please install (double-click the CAB file) the CE components.
- **IMPORTANT**: Please suspend the CE device once after installation via "Start-> Suspend"!

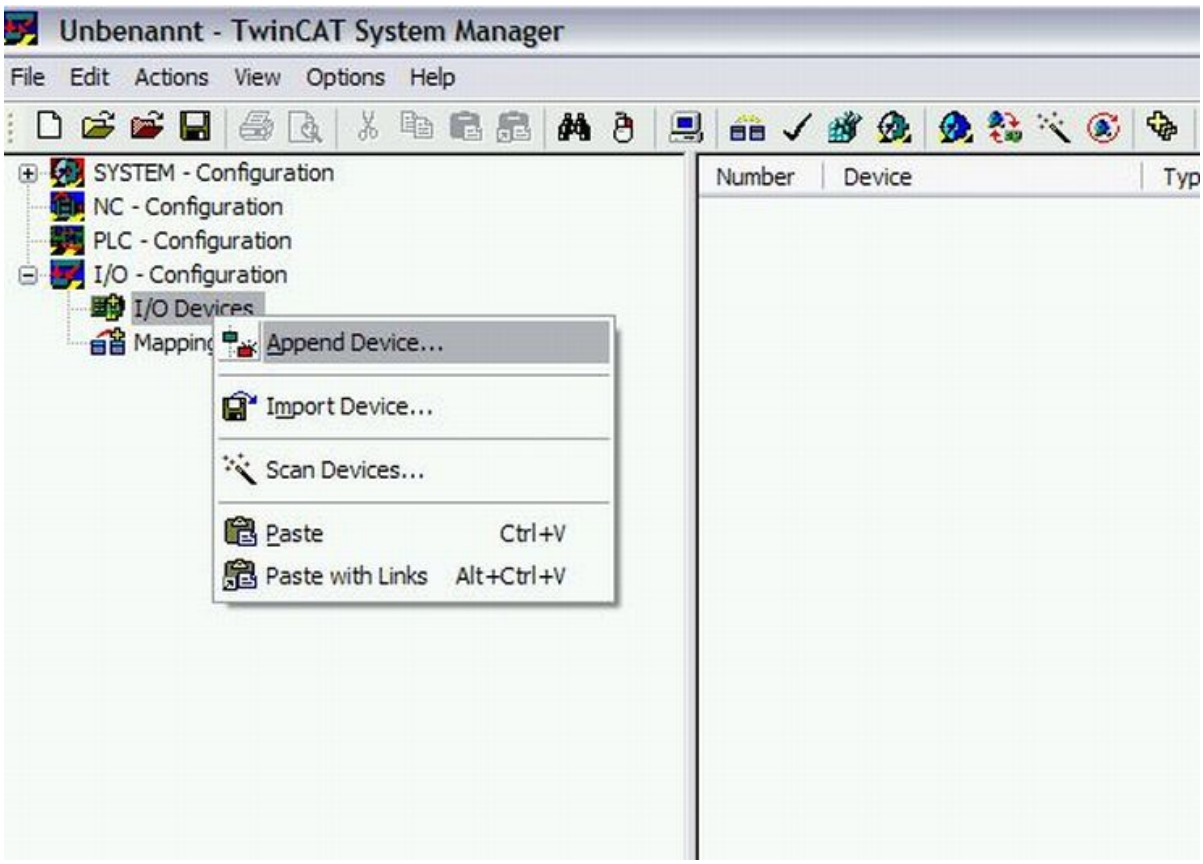
Start-Up

General information

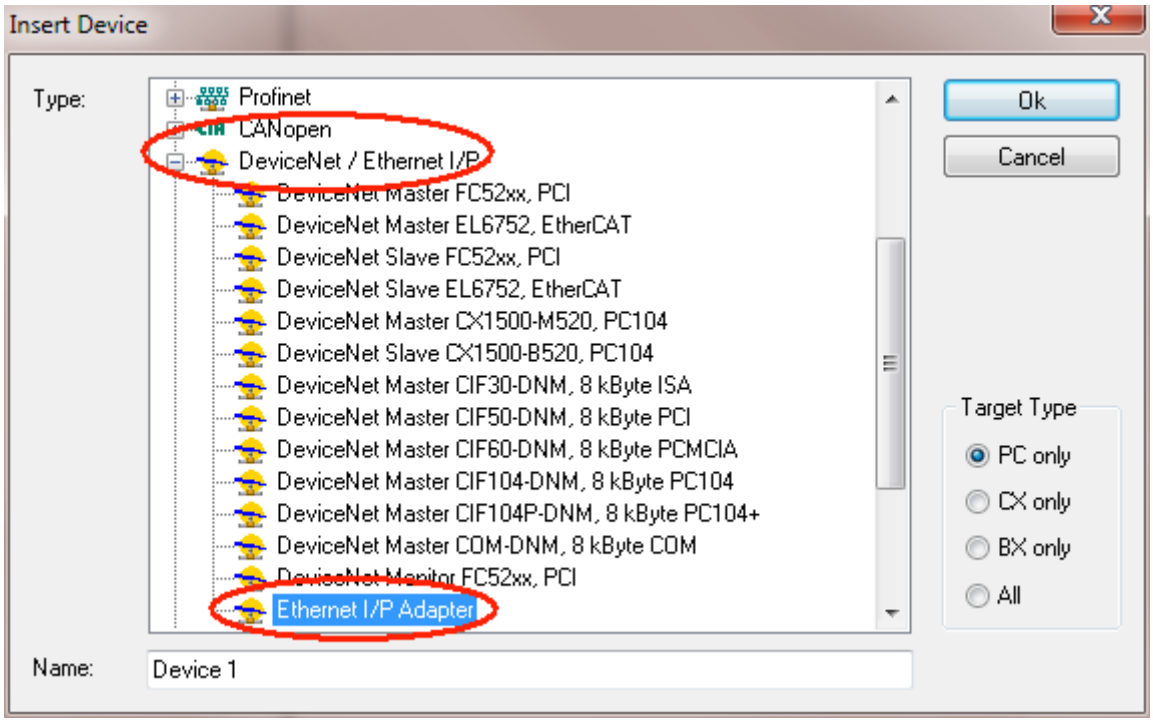
- At the moment, the TwinCAT EtherNet/IP Slave does only support static IP-Address configurations. When the TwinCAT EtherNet/IP Slave configuration is beeing activated, the System is only going to start up
  in RUN-Mode if the actual address settings match the stored configuration.

First Steps

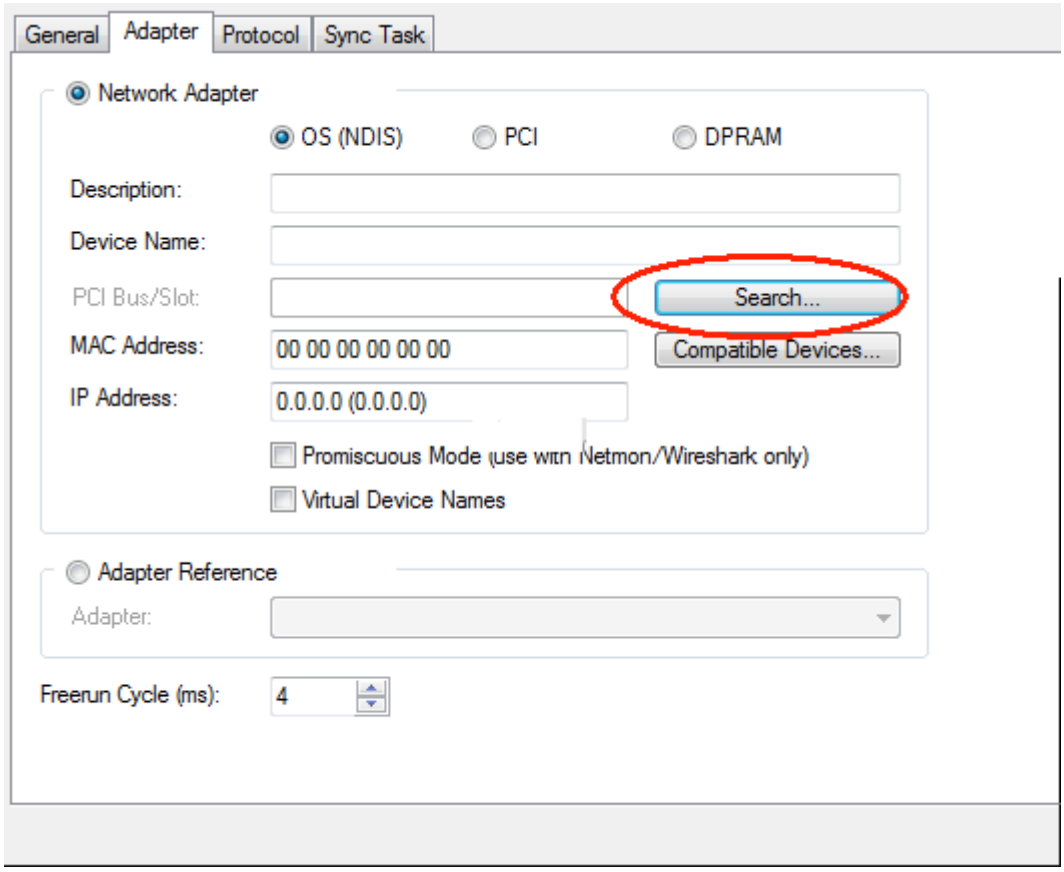
1. Start the TwinCAT System Manager, create a new project and use the context menu after a mouse-click on "I/O Devices", to append a device in the I/O-Configuration



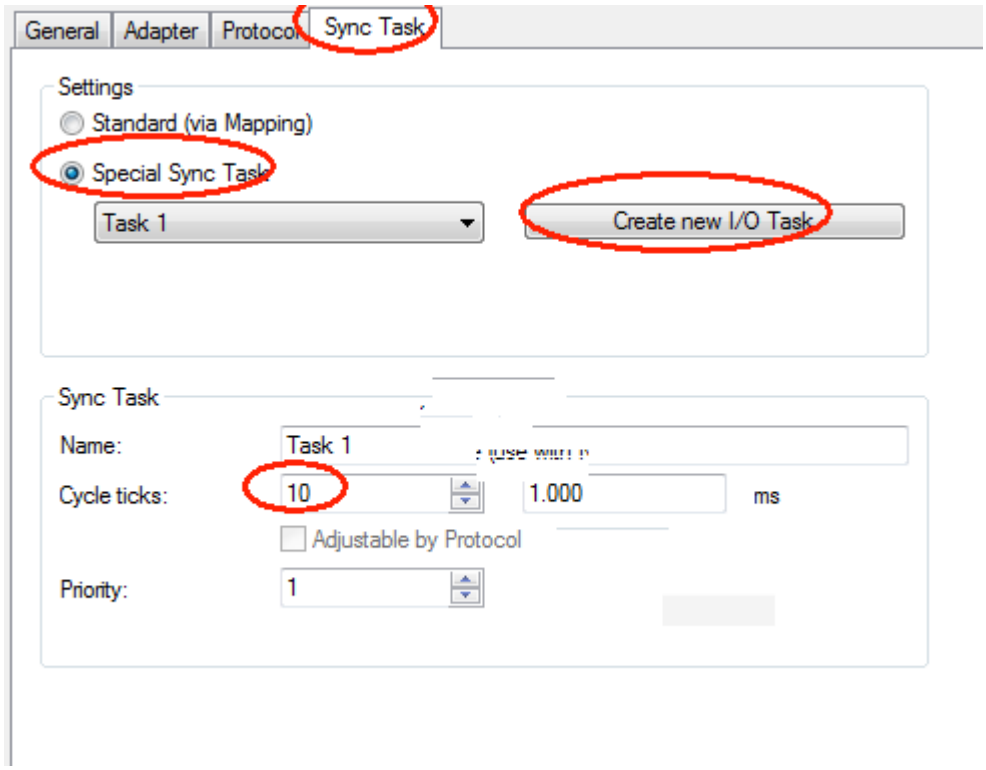
2. Choose "DeviceNet/Ethernet/IP" as shown below



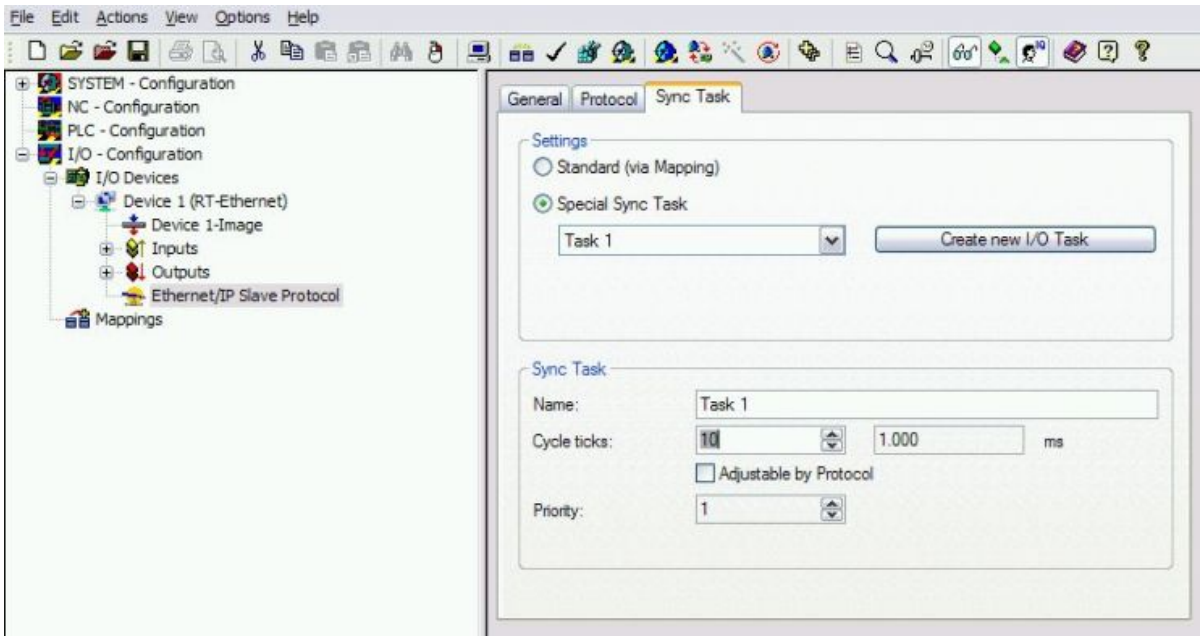
3. Serach the Ethernet Interface, if you don't find a interface you havn't install the RT-Ethernet driver!



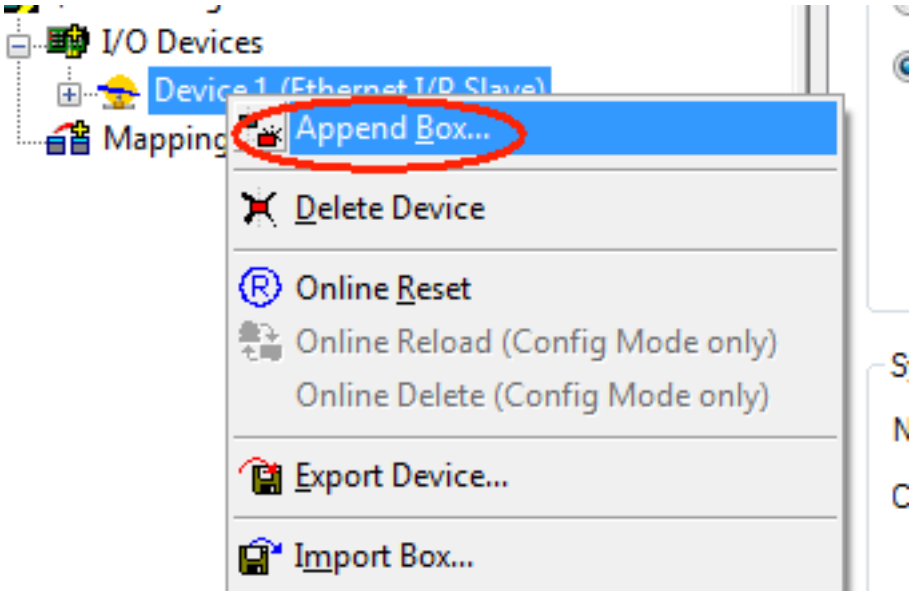
4. Change to Sync Task, Create a new Task and change the Cycle Ticks to 10 ms.
Important: The Sync Tasks Cycle Time represents the lowest border of the EtherNet/IP cycle time (RPI)
(e.g. task cycle time = 10ms ==> EtherNet/IP RPI_{min}=10ms)

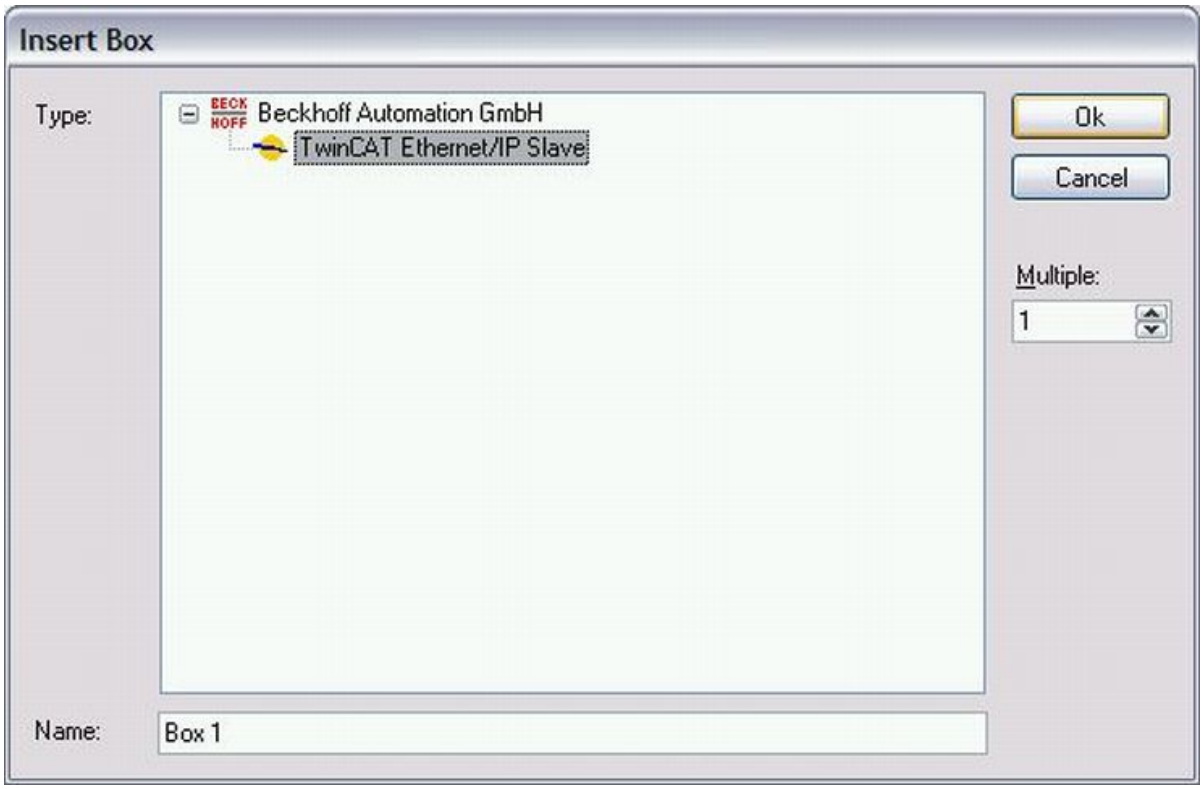


5. It's necessary to define a sync master for triggering EtherNet/IP Slave Protocol.
   - Option "Standard": the sync master must be defined manually by the user. (f. e. PLC Task) (this option is not supported by CX9000series)
   - Option "Special Sync Task": a additional task will be created automatically

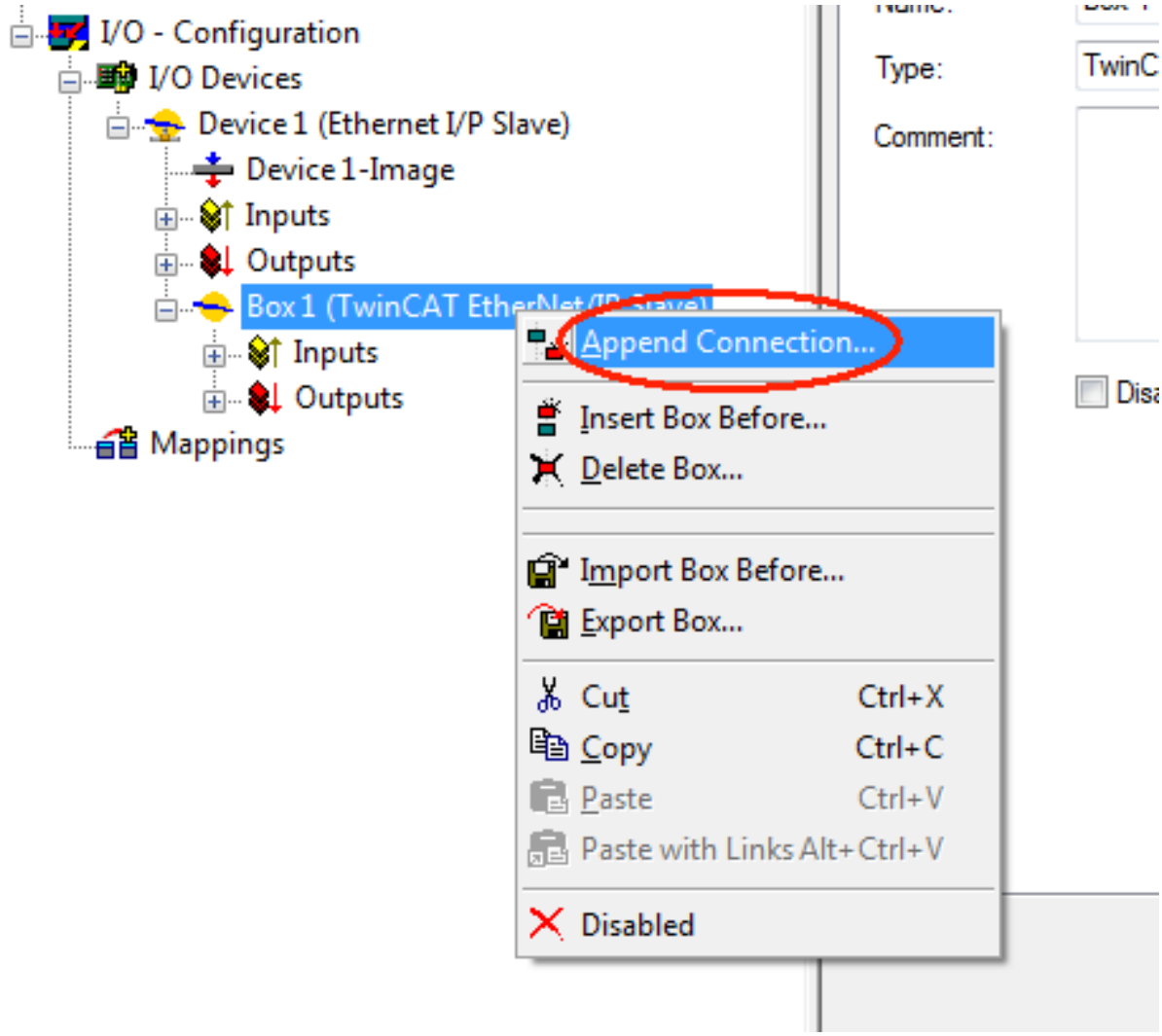


6. Append an EtherNet/IP Slave Box as shown below





7. Append a Connection (Assembly) on the EtherNet/IP Slave Box as shown below



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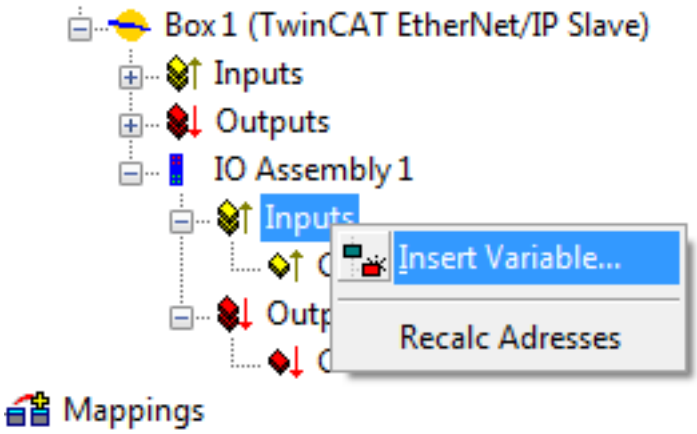
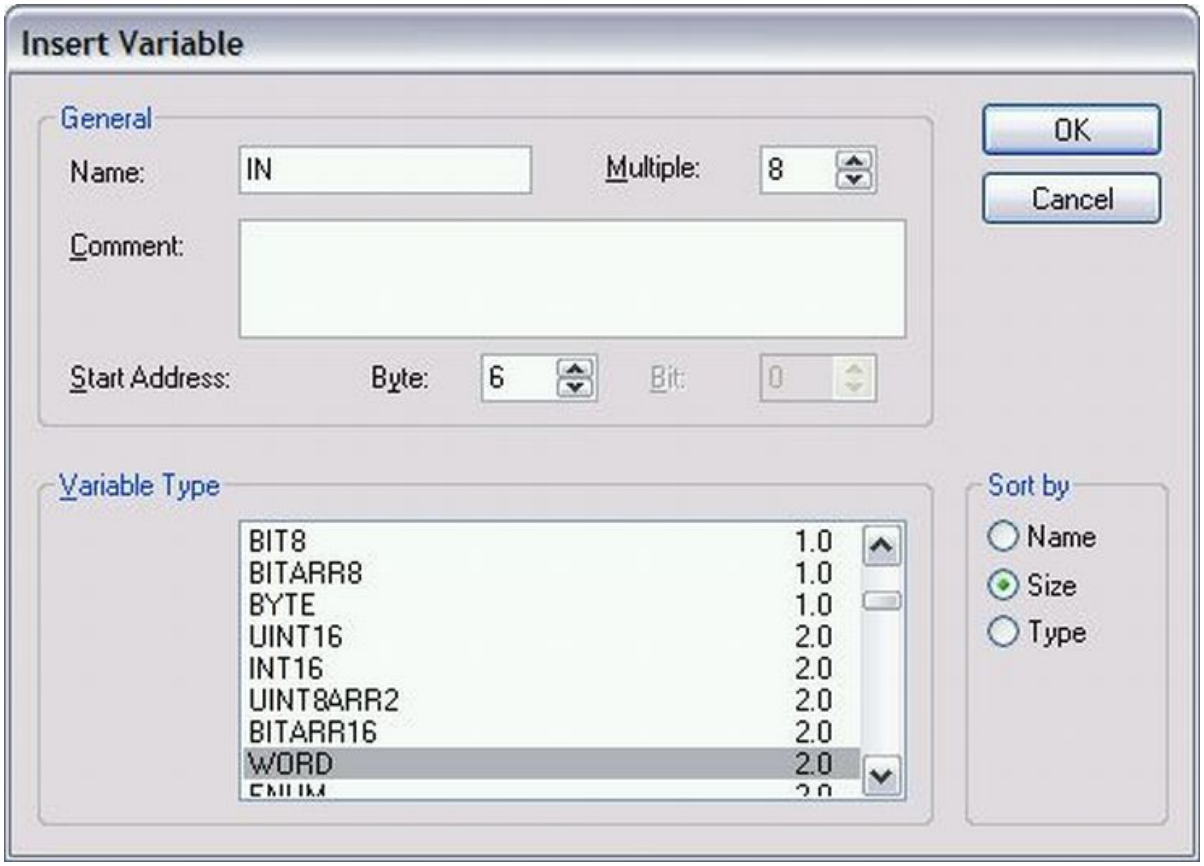
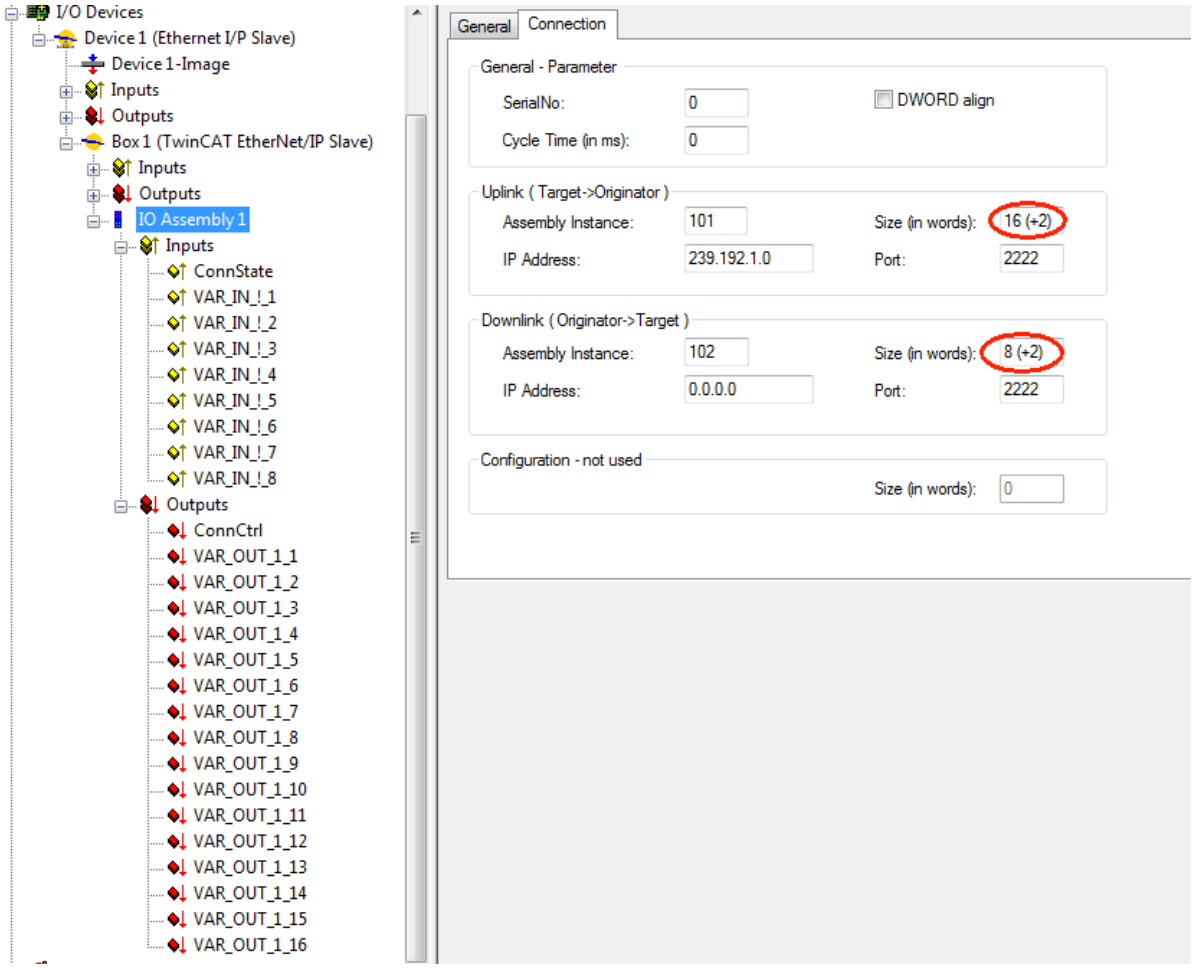

Box 1 (TwinCAT EtherNet/IP Slave)
Inputs
Outputs
IO Assembly 1
Inputs
Insert Variable...
Recalc Adresses
Mappings


Insert Variable
General
Name: IN
Multiple: 8
Comment:
Start Address:
Byte: 6
Bit: 0
OK
Cancel
Variable Type
BIT8 1.0
BITARR8 1.0
BYTE 1.0
UINT16 2.0
INT16 2.0
UINT8ARR2 2.0
BITARR16 2.0
WORD 2.0
Sort by
Name
Size
Type

9. A valid EtherNet/IP Configuration is shown below



10. The Pre-Configuration of TwinCAT EtherNet/IP Slave is finished now. Activate the configuration and go on with Integration in RSLogix5000.

Integration in RSLogix5000

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Example configured as shown above.

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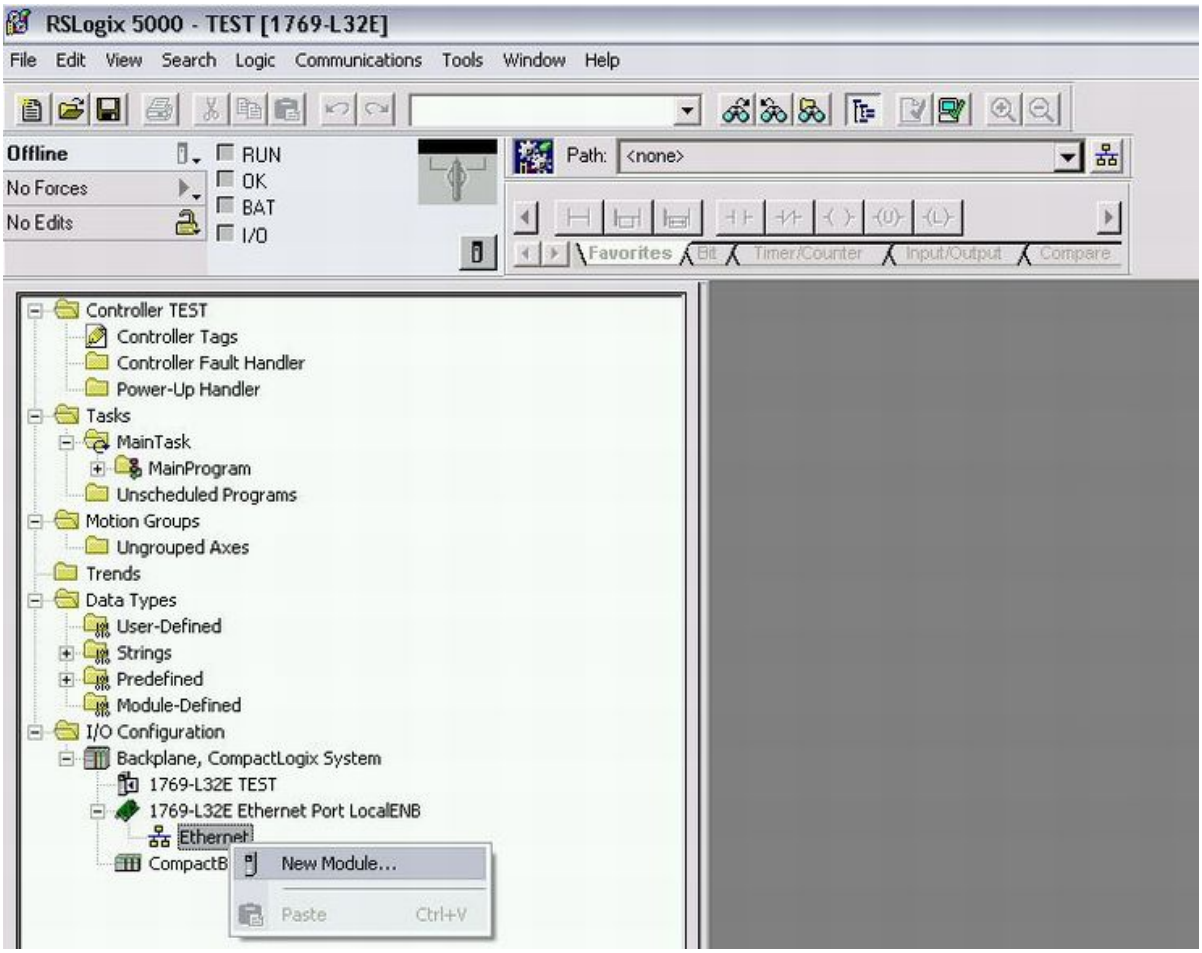
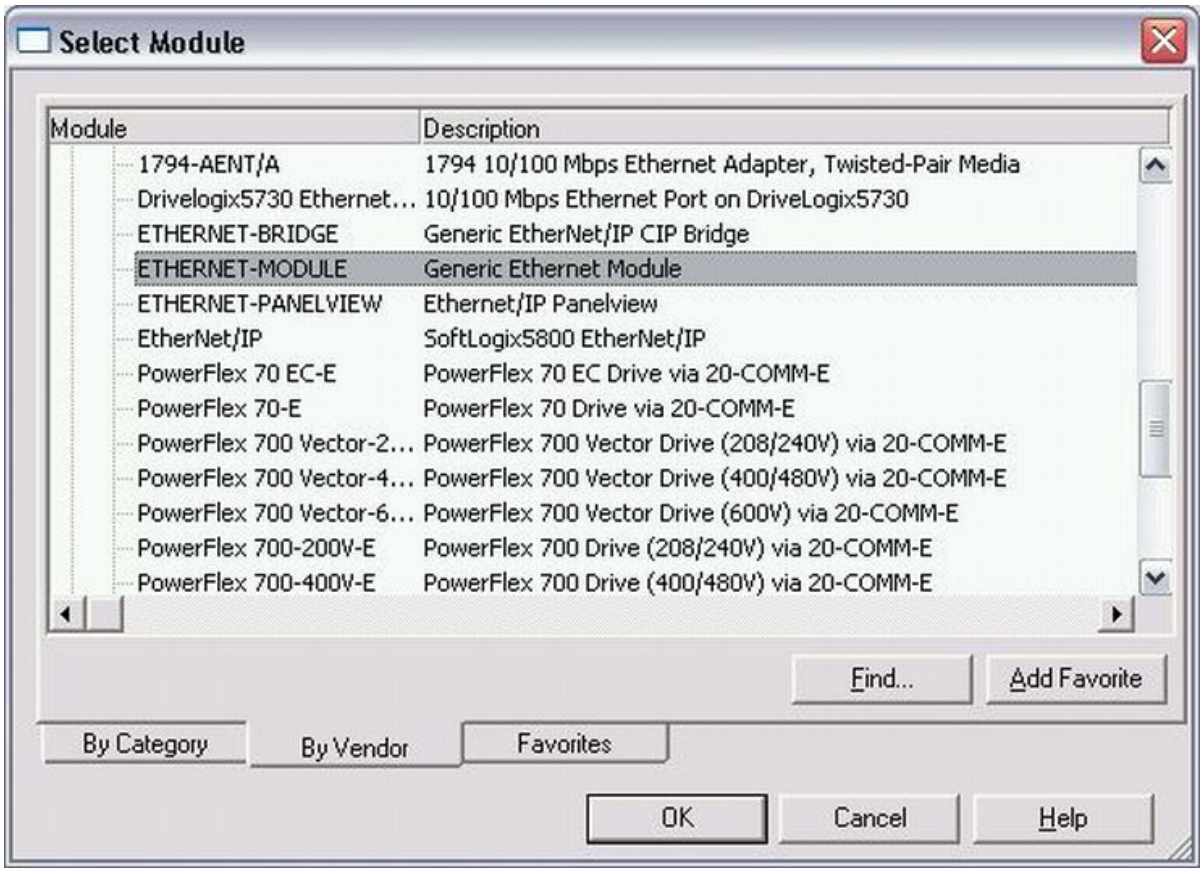

RSLogix 5000 - TEST [1769-L32E]
File Edit View Search Logic Communications Tools Window Help
Offline
No Forces
No Edits
RUN
OK
BAT
I/O
Path: <none>
Favorites
Bit
Timer/Counter
Input/Output
Compare
Controller TEST
Controller Tags
Controller Fault Handler
Power-Up Handler
Tasks
MainTask
MainProgram
Unscheduled Programs
Motion Groups
Ungrouped Axes
Trends
Data Types
User-Defined
Strings
Predefined
Module-Defined
I/O Configuration
Backplane, CompactLogix System
1769-L32E TEST
1769-L32E Ethernet Port LocalENB
Ethernet
CompactB
New Module...
Paste Ctrl+V


Select Module
Module
Description
1794-AENT/A
1794 10/100 Mbps Ethernet Adapter, Twisted-Pair Media
Drivelogix5730 Ethernet...
10/100 Mbps Ethernet Port on DriveLogix5730
ETHERNET-BRIDGE
Generic EtherNet/IP CIP Bridge
ETHERNET-MODULE
Generic Ethernet Module
ETHERNET-PANELVIEW
Ethernet/IP Panelview
EtherNet/IP
SoftLogix5800 EtherNet/IP
PowerFlex 70 EC-E
PowerFlex 70 EC Drive via 20-COMM-E
PowerFlex 70-E
PowerFlex 70 Drive via 20-COMM-E
PowerFlex 700 Vector-2...
PowerFlex 700 Vector Drive (208/240V) via 20-COMM-E
PowerFlex 700 Vector-4...
PowerFlex 700 Vector Drive (400/480V) via 20-COMM-E
PowerFlex 700 Vector-6...
PowerFlex 700 Vector Drive (600V) via 20-COMM-E
PowerFlex 700-200V-E
PowerFlex 700 Drive (208/240V) via 20-COMM-E
PowerFlex 700-400V-E
PowerFlex 700 Drive (400/480V) via 20-COMM-E
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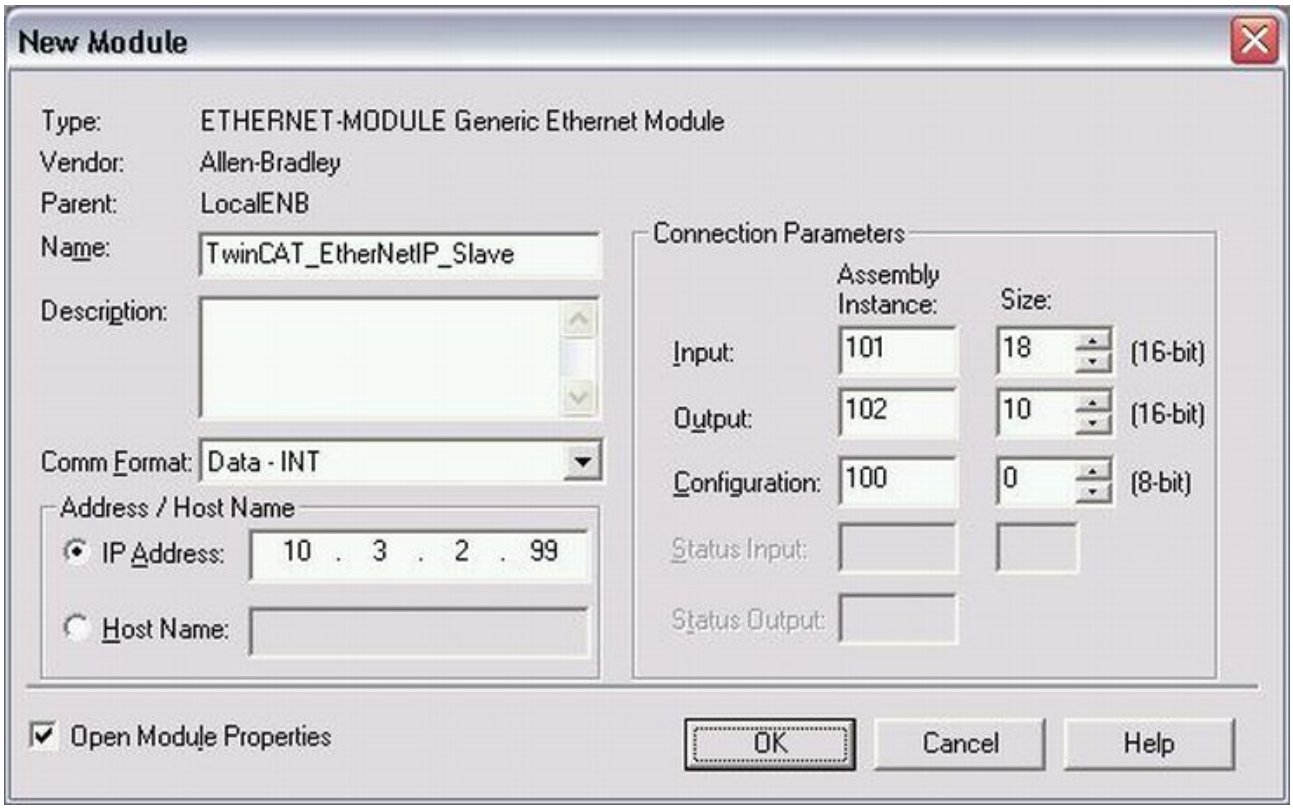
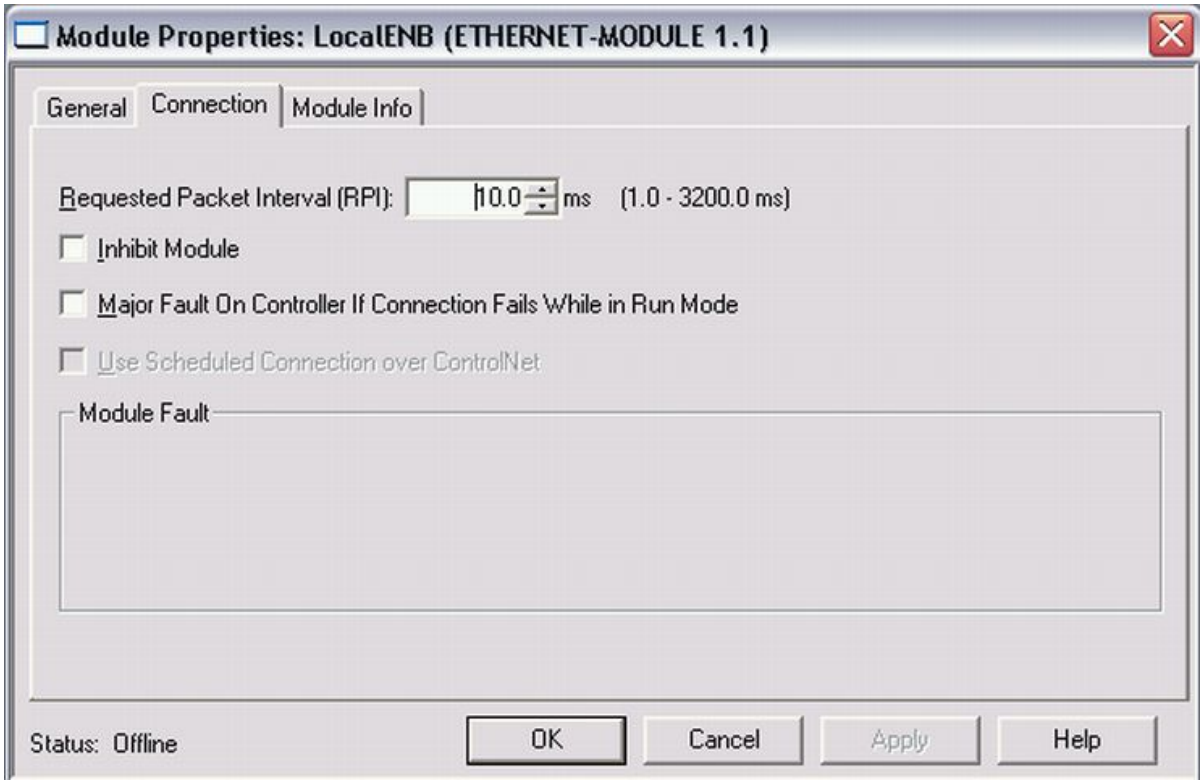
3. **Configuring the TwinCAT EtherNet/IP Slave in RSLogix:**

- Enter IP-Address of TwinCAT EtherNet/IP Slave
- Choose Data Type (Comm Format)
- The Assembly Instances will be as follows:
  - Input(Target->Originator: 101
  - Output(Originator->Target: 102
  - Configuration: 100
- Things to keep in mind when entering the data size for I/O:
  - There will always be 4 bytes of input and 4 bytes of output data used for diagnostics.
  - The EtherNet/IP Slave Dialog View in TwinCAT Systemmanager (Subchapter "First Steps", Picture 8) assist you to find the correct data sizes.



1. Choose Requested Packet Interval in ms (shall not be lower than TwinCAT EtherNet/IP Slave Sync Task Cycle Time)
   (Cycle Time in the TwinCAT Slave Example was set to 10ms)



4 Error Codes

CN_ORC_ALREADY_USED 0x100 /* Connection already in use

CN_ORC_BAD_TRANSPORT 0x103 /* Transport type not supported

CN_ORC_OWNER_CONFLICT 0x106 /* More than one guy configuring

CN_ORC_BAD_CONNECTION 0x107 /* Trying to close inactive conn

CN_ORC_BAD_CONN_TYPE 0x108 /* Unsupported connection type

CN_ORC_BAD_CONN_SIZE 0x109 /* Connection size mismatch

CN_ORC_CONN_UNCONFIGURED 0x110 /* Connection unconfigured

CN_ORC_BAD_RPI 0x111 /* Unsupportable RPI

CN_ORC_NO_CM_RESOURCES 0x113 /* Conn Mgr out of connections

CN_ORC_BAD_VENDOR_PRODUCT 0x114 /* Mismatch in electronic key

CN_ORC_BAD_DEVICE_TYPE 0x115 /* Mismatch in electronic key

CN_ORC_BAD_REVISION 0x116 /* Mismatch in electronic key

CN_ORC_BAD_CONN_POINT 0x117 /* Nonexistant instance number

CN_ORC_BAD_CONFIGURATION 0x118 /* Bad config instance number

CN_ORC_CONN_REQ_FAILS 0x119 /* No controlling connection open

CN_ORC_NO_APP_RESOURCES 0x11A /* App out of connections

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