

# GEN... Ethernet Gateway

Getting Started



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# 1 About these instructions

These instructions describe the setup, functions and use of the product and help you to operate the product according to its intended purpose. Read these instructions carefully before using the product. This will prevent the risk of personal injury and damage to property. Keep these instructions safe during the service life of the product. If the product is passed on, pass on these instructions as well.

#### 1.1 Target groups

These instructions are written for specific qualified personaland must be read carefully by anyone entrusted with the installation, commissioning, operation, maintenance, disassembly or disposal of the device.

When using the device in Ex areas, the user must also have knowledge of explosion protection (IEC/EN 60079-14 etc.).

#### 1.2 Explanation of symbols

The following symbols are used in these instructions:

	<b>DANGER</b> DANGER indicates a hazardous situation with a high level of risk, which, if not avoided, will result in death or serious injury.
	WARNING WARNING indicates a hazardous situation with a medium level of risk, which, if not avoided, will result in death or serious injury.
	<b>CAUTION</b> CAUTION indicates a hazardous situation with a medium level of risk, which, if not avoided, will result in moderate or minor injury.
!	<b>NOTICE</b> CAUTION indicates a situation which, if not avoided, may cause damage to property.
i	<b>NOTE</b> NOTE indicates tips, recommendations and important information about special ac- tion steps and issues. The notes simplify your work and help you to avoid additional work.
	MANDATORY ACTION This symbol denotes actions that the user must carry out.
ц>	<b>RESULT OF ACTION</b> This symbol denotes the relevant results of an action.

# 1.3 Other documents

Besides this document, the following material can be found on the Internet at www.turck.com:

- excom manual
- Integration manuals
- Data sheet
- EU Declaration of Conformity (current version)
- Approvals

## 1.4 Feedback about these instructions

We make every effort to ensure that these instructions are as informative and as clear as possible. If you have any suggestions for improving the design or if some information is missing in the document, please send your suggestions to **techdoc@turck.com**.



# 2 Notes on the product

#### 2.1 Product identification

These instructions apply to the following multiprotocol Ethernet gateways for excom:

- GEN-N (gateway firmware  $\geq$  V1.6.0.0)
- GEN-3G (gateway firmware  $\geq$  V1.6.0.0)

#### 2.2 Turck service

Turck supports you in your projects – from the initial analysis right through to the commissioning of your application. The Turck product database at www.turck.com offers you several software tools for programming, configuring or commissioning, as well as data sheets and CAD files in many export formats.

The contact data for Turck branches is provided at [> 70].



# 3 For your safety

The product is designed according to state of the art technology. Residual hazards, however, still exist. Observe the following safety instructions and warnings in order to prevent danger to persons and property. Turck accepts no liability for damage caused by failure to observe these safety instructions.

#### 3.1 General safety instructions

- The device must only be fitted, installed, operated, parameterized and maintained by trained and qualified personnel.
- Only use the device in compliance with the applicable national and international regulations, standards and laws.
- The device meets the EMC requirements for the industrial areas. When used in residential areas, take measures to prevent radio frequency interference.

#### 3.2 Intended use

The gateway must only be used in the excom I/O system with the appropriate module racks. The gateway forms the interface between the excom I/O system and the higher-level fieldbus system. The gateway supports the industrial Ethernet protocols PROFINET, EtherNet/IP and Modbus TCP.

A ring master enables gateways to be networked in a ring topology.

Any other use is not in accordance with the intended use. Turck accepts no liability for any resulting damage.



# 4 Commissioning

#### Requirements

- All the required modules must be fitted.
- The device must be connected to the power supply.
- The screws of the power supply modules must have been tightened.
- The gateway must be connected to a PC.
- The Turck Service Tool or TAS (Turck Automation Suite) must be installed on the PC.

As an alternative to the Turck Service Tool or TAS, an FDT frame (e.g. PACTware) can be used with an excom DTM or the web server.

The device is operational automatically once the power supply is switched on.

The status LEDs on the modules flash red when an unconfigured excom station is first commissioned. If no modules are inserted during initial commissioning, the status LED on the gateway flashes red.

# 4.1 Commissioning via the Turck Service Tool

#### 4.1.1 Setting the IP address

The following example shows the setting of the IP address via the Turck Service Tool. The Turck Service Tool can be downloaded free of charge at www.turck.com.

The device is factory set to IP address 192.168.1.254.



The PC and the gateway must be located in the same IP network.

- Connect the device to a PC via the Ethernet interface.
- Launch the Turck Service Tool.
- Click Search or press [F5].

NOTE

⇒ The Turck Service Tool displays the connected devices.

🔳 Turck	Service Tool, Vers.	3.2.2														-		×
Yc	our Global Au	tomation	ı Partner											-	U	RC	>K	K
Search (	<b>F5)</b> Change (F2)	Wink (F3) A	kctions (F4) Cli	ipboard Langu	Jage Exper	t view ON Sta	art DHCP (F6) Configurat	P ion (F7)	ARGEE (F8) B	EEP (F9)	- CI	K ose					Co	€ Jumns
No 1 2	MAC address 00:07:46:84:08:4F 00:07:46:84:19:07	Name	IP address <u>10.17.110.138</u> <u>192.168.1.254</u>	Netmask 255.255.255.0 255.255.255.0	Gateway 10.17.110.1 0.0.0.0	Mode PGM_DHCP PGM_DHCP	Device TN-UHF-Q300-EU-CDS GEN-N	Version 1.1.1.9 1.2.6.0	Adapter 10.17.110.25 192.168.1.95	A - -	Pr	Ke	BE - -	Turck, Turck Turck				
Found 2 D	evices																	

Fig. 1: Turck Service Tool



- Click the gateway (example: **GEN-N**).
- Click Change or press [F2].
- Set the IP address and if necessary the network mask and gateway.
- Accept the changes by clicking **Set in device**.

Change device configuration					
Device name:					
IP configuration					
MAC address	IP address				
00:07:46:84:19:07	192.168.1.25				
Netmask	Gateway				
255.255.255.0	0.0.0.0				
Set IP configuration	n temporarily				
Status messages:					
Set in device	Cancel	]			

Fig. 2: Setting the IP address



#### 4.1.2 Assigning a PROFINET device name

A PROFINET device name must be assigned in order to identify the excom system.

Observe the following requirements for assigning the PROFINET name:

- Numbers between 0...9
- Lower case letters from a...z
- Dashes "-" and dots "."
- Max. 63 characters in succession without permissible special characters "-" and "."
- Max. 127 characters
- Spaces not allowed
- "Port (0...999)" not allowed
- Starting with a number not allowed
- Number (sequences) similar to IP addresses not allowed (n.n.n.n (n = 0 to 9))
- Dashes "-" and dots "." at the beginning or end not allowed

The Turck Service Tool must be open and located in the same PROFINET network.

- Click on Search or press [F5].
- ⇒ The Turck Service Tool displays the connected devices.
- Select the device and click [F2] or the Change icon.
- Assign a device name.
- Click Set in device.

Yc	our Global Aut	comation Partner				TURCH
Search (	F5) Change (F2)	Wink (F3) Actions (F4)	- Clipboard L	EN . anguage Exp	ert view ON Star	t DHCP (F6) Configuration (F7) ARGEE (F8) BEEP (F9)
No. 💌 1	MAC address 00:07:46:86:93:8F	Name excom-108	IP address 192 168 1 108	Netmask 255 255 255 0	Gateway	✓ Change device co — □ × 172.17.1.1
- 2	00:07:46:8D:BB:25		0.0.0.0	0.0.00	0.0.0.0	Device name: 192.168.0
3	00:1B:1B:E6:52:8F	pn-io-x8	<u>192.168.1.1</u>	255.255.255.0	192.168.1.1	excom-1
4	00:50:56:86:9F:93 00:18:18:E6:52:95	admin-pc-ie-allgemein	<u>192.168.168.244</u> 192.168.1.2	255.255.255.0	192.168.168.1	excom-108
6	00:1B:1B:E2:8F:4F	pn-io	192.168.167.41	255.255.255.0	192.168.167.41	70
7	00:1B:1B:E2:8F:55	pn-io-1	<u>192.168.167.40</u>	255.255.255.0	192.168.167.40	MAC address         IP address         70           00:07:46:8D:BB:25         192.168.1.254         192.168.1.254           Netmask         Gateway         255.255.255.0           0.0.0.0         Sat IR configuration temporarily
						Status messages:
						Set in device Cancel

Fig. 3: Assigning a PROFINET device name



# 4.2 Commissioning via the TAS

#### 4.2.1 Setting the IP address

The following example shows the setting of the IP address via the TAS. The TAS can be downloaded free of charge at www.turck.com.

The device is factory set to IP address 192.168.1.254.

- Connect the device to a PC via the Ethernet interface.
- Open the TAS.
- ► Under Network, click Scan network.
- ⇒ The TAS displays the connected devices. If the IP address is highlighted in orange, this is the default IP address.

TAS – Turck Automatio	n Suite							TU	JRC	<b>.K</b>
DEVICE LIST DOCUMENTATION										
VIEW / FEATURE (@) Nelwork (@) ARGEE	Network	<b>₽</b> Add device	D Edit device Cl	₽ hange PW	FW Update Ex	<b>[→ </b> port CSV Impo	rt CSV Print	<b>?</b> Help		
ලා BEEP ලා IO-Link	Actions	?	Device type / feature	Pevice? name?	IP address	Adapter address	Address mode	MAC address	Subnet mask / Gateway	Version
	000	≌Ω©⊗	GEN-3G		192.168.1.254	192.168.1.10	PGM_DHCP	00:07:46: 86:93:56	255.255.255.0 / 0.0.0.0	1.6.0.0

Fig. 4: Scanning the network

- Check the checkbox next to the gateway.
- Click the Edit icon in the menu bar.

TAS – Turck Automatior	ı Suite	TURCK
DEVICE LIST DOCUMENTATION		
VIEW / FEATURE	Network	
S Network	Q 👧 🥖 🔑 🌐 🔿 🖉	<b>e</b> ?
စြဲ ARGEE	Scan network Add device Edit device Change PW FW Update Export CSV Import CSV I	Print Help
(∅) BEEP	Device ? Device Device Adapter Addres	s MAC Subnet mask Version
စြဲ IO-Link	feature name address address mode	address / Gateway
	✔ @ 2 査 C ③ ⊗ GEN-3G 192.168.1.254 192.168.1.10 PGM_D	HCP 00:07:46: 255.255.255.0 86:93:56 / 0.0.0.0 1.6.0.0

Fig. 5: Click the Edit icon



- Set the IP address, gateway and, if necessary, the network mask.
- Click **SET NETWORK DATA** to apply the changes.

# Edit network settings

Device name	
IP address	192.168.1.254
Default gateway	0.0.0.0
Subnet mask	255.255.255.0

Take care, that the IP address isn't used by any other devices or switches!



Fig. 6: Setting the IP address



#### 4.2.2 Assigning a PROFINET device name

A PROFINET device name must be assigned in order to identify the excom system.

Observe the following requirements for assigning the PROFINET name:

- Numbers between 0...9
- Lower case letters from a...z
- Dashes "-" and dots "."
- Max. 63 characters in succession without permissible special characters "-" and "."
- Max. 127 characters
- Spaces not allowed
- "Port (0...999)" not allowed
- Starting with a number not allowed
- Number (sequences) similar to IP addresses not allowed (n.n.n.n (n = 0 to 9))
- Dashes "-" and dots "." at the beginning or end not allowed

To assign the PROFINET device name, the TAS must be open.

- Under Network, click Scan network.
- ⇒ The TAS displays the connected devices.

**TAS – Turck Automation Suite** URCI DEVICE LIST DOCUMENTATION VIEW / FEATURE Network 0 **•** P ? [⇒ ->] -စြဲ ARGEE Scan network Add device Edit device Change PW FW Update Export CSV Import CSV Print Help Device ? Device ලි BEEP Subnet mask Version Adapter Address MAC Actions ? type / IP address address address / Gateway mode name feature 255.255.255.0 1.6.0.0 00:07:46: (■ / 沓 ∩ () ⊗ GEN-3G 192.168.1.254 192.168.1.10 PGM\_DHCP 86:93:56 / 0.0.0.0

Fig. 7: Scanning the network

- Check the checkbox next to the gateway.
- Click the Edit icon in the menu bar.

TAS – Turck Automation	Suite						TU	JRC	<b>.</b>
DEVICE LIST DOCUMENTATION									
VIEW / FEATURE	Network								
ලි Network	Q 👥	0	2		( <del>-</del> ) -	) 🖶	?		
ලි ARGEE	Scan network Add device	Edit device	Change PW	FW Update Ex	port CSV Impo	rt CSV Print	Help		
ල BEEP	Actions 2	Device	e 📍 Device	ID addross	Adapter	Address	MAC	Subnet mask	Vorsion
ල IO-Link	Actions :	featur	e name	IF dutiess	address	mode	address	/ Gateway	version
	✓ < <p>Ø 當 O</p>	GEN-3	G	192.168.1.25	4 192.168.1.10	PGM_DHCP	00:07:46: 86:93:56	255.255.255.0 / 0.0.0.0	1.6.0.0

Fig. 8: Click the Edit icon



- Assign a PROFINET device name.
- Click **SET NETWORK DATA** to apply the changes.

# Edit network settings

Device name	gen-3g
IP address	192.168.1.254
Default gateway	0.0.0.0
Subnet mask	255.255.255.0

Take care, that the IP address isn't used by any other devices or switches!



Fig. 9: Set a PROFINET device name



# 4.3 Commissioning via the web server



The web server 2.0 is available from firmware version 1.6.0.0.

The currently used modules can be transferred with their basic configuration via the integrated web server and their parameters changed. In order to be able to open the web server with a PC, the device and the PC must be in the same IP network.

#### 4.3.1 Opening a web server

The device is factory set to IP address 192.168.1.254. To open the web server via a web browser, enter 192.168.1.254 in the address bar of the web browser.

Alternatively, double-click on the IP address in the Turck Service Tool or the TAS.



#### 4.3.2 Setting the login and password

A login is required in order to edit settings via the web server. The default password is "password".



NOTE

To ensure greater security, Turck recommends changing the password after the first login.

- Enter the password in the Login field on the start page of the web server.
  - Click **Login**.

MAIN DOCUMENTATION		LOGIN •••••	?
EXCOM GEN-N	excom GEN-N - Gateway - I	nfo	
(i) Info			
ξ <sup>2</sup> β <sup>2</sup> Parameter			
୍ଦ୍ୟୁ ଅiagnosis	<b>TELETITI</b>		
 ∿ Status			
ా 			
	Multiprotocol-Interface for GEN		
Ex- / Import	Device		
🔍 Change Password	Station information		
	Туре	GEN-N	
Finiware	ldent. no.	100000129	
SLOT 1: EMPTY SLOT N	Firmware revision	1.6.0.9	]
SLOT 2: EMPTY SLOT N	Bootloader revision	10.0.1.0	]
SLOT 3: EMPTY SLOT N	Firmware revision (CPU 2)	1.6.0.0	]
SLOT 4: EMPTY SLOT N	Bootloader revision (CPU 2)	0.0.0	]
SLOT 5: EMPTY SLOT N	EtherNet/IP revision	2.7.55.0	]
	PROFINET revision	1.7.27.0	
SLOT 6: EMPTY SLOT N	Modbus/TCP revision	2.4.9.0	1
SLOT 7: EMPTY SLOT N	WEB revision	1.4.18.0	
SLOT 8: EMPTY SLOT N	Software build number	1117	
SLOT 9: EMPTY SLOT N			-

Fig. 10: Login field on the start page of the web server



#### In the query window, click **Yes** to change the password.





Observe the following requirements for assigning the password:

- At least one upper case letter
- At least one lower case letter
- At least one number
- Between 6...15 characters
  - Assign the new password.
  - Confirm the password change by clicking CHANGE PASSWORD.
  - Changing the password at a later date: Select **EXCOM GEN**...  $\rightarrow$  **Change Password**.



Fig. 12: Assigning the password

# 4.3.3 Setting the IP address

The device is factory set to IP address 192.168.1.254.

- Log into the web server.
- Select EXCOM GEN-...  $\rightarrow$  Parameters.
- Under Network  $\rightarrow$  IP address, adjust the IP address.
- Click SET NETWORK CONFIGURATION.
- $\Rightarrow$  The new IP address is accepted. The web page is reloaded.

#### MAIN DOCUMENTATION

LOGOUT

EXCOM GEN-3G	excom GEN-3G - Gateway	y - Parameter
j Info		
နိုတ္ခ်ို Parameter	Read Write Tab view Print	
😳 Diagnosis	GEN Settings	
 √√⊊ Status	Line Frequency	50 Hz 🍷
ా చింది Control	Analog Data Format	Status LSB 🔹
ے۔ جب Evention	CAN Redundancy	on 🔹 🥐
pla Ex /Import	Redundancy Mode	off 🔹 ?
	Power Supply	single 🔹 🥐
Change Password	Network	
🛄 Firmware	Network	
SLOT 1: EMPTY SLOT EX	MAC address	00:07:46:86:93:56
	Addressing mode	PGM-DHCP ?
SLOT 2: EMPTY SLOT EX	Addressing method	DHCP
SLOT 3: EMPTY SLOT EX	IP address	192.168.1.254
SLOT 4: EMPTY SLOT EX	Netmask	255.255.255.0
SLOT 5: EMPTY SLOT EX	Default gateway	0.0.0.0
SLOT 6: EMPTY SLOT EX	SNMP Public Community	public
SLOT 7: EMPTY SLOT EX	Set network configuration	SET NETWORK CONFIGURATION
SLOT 8: EMPTY SLOT EX	SNMP Private Community	private
SLOT 9: EMPTY SLOT EX	LLDP status	Running
SLOT 10: EMPTY SLOT EX	LLDP MAC address 1	00:07:46:86:93:57
SLOT 11: EMPTY SLOT EX	LLDP MAC address 2	00:07:46:86:93:58

Fig. 13: Changing the IP address



#### 4.3.4 Assigning a PROFINET device name

A PROFINET device name must be assigned in order to identify the excom system.

Observe the following requirements for assigning the PROFINET name:

- Numbers between 0...9
- Lower case letters from a...z
- Dashes "-" and dots "."
- Max. 63 characters in succession without permissible special characters "-" and "."
- Max. 127 characters
- Spaces not allowed
- "Port (0...999)" not allowed
- Starting with a number not allowed
- Number (sequences) similar to IP addresses not allowed (n.n.n.n (n = 0 to 9))
- Dashes "-" and dots "." at the beginning or end not allowed

You must have logged in as an administrator.

- Select EXCOM GEN-...  $\rightarrow$  Parameters.
- Under **PROFINET configuration**  $\rightarrow$  **Device name**, adapt the PROFINET device name.
- Write changes to the device via the Write icon.

MAIN DOCUMENTATION			LOGOUT
EXCOM GEN-3G	excom GEN-3G - Gateway	/ - Parameter	
j Info	₽▶ ▶₽		
ट्रिंट्रे Parameter	Read Write Tab view Print		
🕑 Diagnosis 🚹	Watchdog time	500 ms	2 ^
ູ √∽ຼ Status	PROFINET configuration		<b>_</b>
 ج <sup>†</sup> ب Control	Device name	excom	/ ?
Event log	Deactivate all diagnostics	no	_
, Г∱∃ Ex- / Import	Deactivate I/O-ASSISTANT Force	no	
Change Password	Mode Startup even if configuration does	no	
Firmware	not match		
	Resets		2
SLOT 1: EMPTY SLOT EX	Rebool	EXECUTE REBOOT	•
SLOT 2: EMPTY SLOT EX	Network reset and reboot	EXECUTE RESET	?
SLOT 3: EMPTY SLOT EX	Factory reset and reboot		2
SLOT 4: EMPTY SLOT EX	r dotory roote and robote	EXECUTE RESET	•
SLOT 5: EMPTY SLOT EX	GEN C. W		
SLOT 6: EMPTY SLOT EX	Line Frequency	50 Hz *	?
SLOT 7' EMPTY SLOT EX	Analog Data Format	Status LSB 🔹	
	CAN Redundancy	on 🔻	?
SLOT 8: EMPTY SLOT EX	Redundancy Mode	off •	?
SLOT 9: EMPTY SLOT EX	Power Supply	single •	?
SLOT 10: EMPTY SLOT EX	Network		
SLOT 11: EMPTY SLOT EX	Network		~

Fig. 14: Assigning a device name

⇒ The PROFINET device name is adopted.



#### 4.3.5 Preparing the GEN... gateway for integration over Ethernet/IP

The gateway and the desired I/O modules are inserted into the module rack. The module rack is supplied with power.

- Open the web server.
- Log into the web server.
- Expand the Gateway in the left-hand sidebar.
- Under Parameters, click UPDATE MODULE LIST.

DOCUMENTATION MAIN EXCOM GEN-3G excom GEN-3G - Gateway - Parameter Ð **P** ▶ 🖡 Write Print Read Tab view Configuration Ů, Diagnosis Set default IO configuration UPDATE MODULE LIST

- Fig. 15: Click UPDATE MODULE LIST
  - Click YES to confirm the window querying whether you wish to load the default configuration.





- Fig. 16: Confirm the query window
- ⇒ The default configurations are loaded for all inserted I/O modules.



The inserted I/O modules can then be configured in the web server. To find all information about the EtherNet/IP mapping of all signals and diagnostics, proceed as follows:

- Click **DOCUMENTATION** in the main bar.
- Click EtherNet/IP Memory Map in the left-hand sidebar.
- All information for the signals and diagnostics for processing in the control system is displayed.

MAIN DOCUMENTATION				LOG	OUT
DOCUMENTATION	excom GEN-3G				
Licenses Online Documentation	vy tr E				
EtherNet/IP Memory Map	Input Output Print Err. internal bus pas.(CAN-err.)	4	0	1	^
excom temperature / power	Err. internal bus (CAN-error) Slot 1 - DM80Ex S	4	1	1	
	Description	Word Offset	Bit Offset	Bit Length	
	Digital in-/output 1: Value	5	0	1	
	Digital in-/output 1: Status	5	8	1	
	Digital in-/output 2: Value	5	1	1	
	Digital in-/output 2: Status	5	9	1	
	DESCRIPTION OF A DESCRIPTION	-	~		

Fig. 17: Access information about Ethernet/IP



#### 4.3.6 Preparing the GEN... gateway for integration over Modbus TCP

The gateway and the desired I/O modules are inserted into the module rack. The module rack is supplied with power.

- Open the web server.
- Log into the web server.
- Expand the Gateway in the left-hand sidebar.
- Under Parameters, click UPDATE MODULE LIST.

DOCUMENTATION MAIN EXCOM GEN-3G excom GEN-3G - Gateway - Parameter Ð **P** ▶ 🖡 Write Print Read Tab view Configuration Ů, Diagnosis Set default IO configuration UPDATE MODULE LIST

Fig. 18: Click UPDATE MODULE LIST

 Click YES to confirm the window querying whether you wish to load the default configuration.





YES

⇒ The default configurations are loaded for all inserted I/O modules.

NO



The inserted I/O modules can then be configured in the web server. To find all information about the Modbus TCP mapping of all signals and diagnostics, proceed as follows:

- Click **DOCUMENTATION** in the main bar.
- Click Modbus TCP Memory Map in the left-hand sidebar.
- All information for the signals and diagnostics for processing in the control system is displayed.

MAIN DOCUMENTATION			••••		?
DOCUMENTATION	excom GEN-3G				
Licenses Online Documentation EtherNet/IP™ Memory Map	રુપ્ડ ક્ર∱ટે 🕞 Input Output Print				^
excom temperature / power	Slot 0 - Station				
	Description	Register	Bit Offset	Bit Length	
	Gateway active	0×0000 (0)	0	1	
	Gateway slot left	0×0000 (0)	1	1	
	Gateway redundancy available	0×0000 (0)	2	1	
	Right supply module available	0×0000 (0)	3	1	
	Left supply module available	0×0000 (0)	4	1	

Fig. 20: Access information about Modbus TCP



# 5 Connecting excom to a Modbus master

The following example shows the integration of excom with CODESYS. The configuration and parameterization are carried out separately via the DTM or the web server.

#### Naming convention

Turck uses the terms "Modbus client" and "Modbus server" according to Modbus Organization. The following description uses the terms "Modbus TCP Master" and "Modbus TCP Slave" only because of the naming in CODESYS.

#### Hardware used

This example uses the following hardware components:

- Gateway GEN-N
- Ethernet cable with RJ45 connector
- PC

#### Software used

This example uses the following software:

CODESYS version 3.5.12 (download free of charge from www.turck.com)

#### Requirements

- The programming software has been opened.
- A new project has been created.
- Codesys PLC has been started via CODESYS Control Win SysTray.



# 5.1 Modbus register access

The Modbus data model has four basic data types:

Data type	Object type	Access	Description
Discrete inputs	Bit	Read only	Data is provided by the I/O system.
Coils	Bit	Read/write	Data is changed and written by the application program. Data can also be read back.
lnput register	16-bit (word)	Read only	Data is provided by the I/O system.
Holding registers	16-bit (word)	Read/write	Data is changed and written by an application program. Data can also be read back.

All data transferred via Modbus (bits and registers) must be stored in the application memory of the device. This data is accessed via defined Modbus Registersaccess addresses.

The excom gateway supports the following functions for accessing process data, parameters, diagnostics and other services:

Function code	Function	Description
1	Read coils	Read multiple output bits
2	Read discrete inputs	Read multiple input bits
3	Read holding registers	Read multiple output registers
4	Read input registers	Read multiple input registers
5	Write single coil	Write single output bits
6	Write single registers	Write single output registers
15	Write multiple coils	Write multiple output bits
16	Write multiple registers	Write multiple output registers
23	Read/write multiple registers	Read and write multiple registers

Multiple Modbus TCP connections are possible at the same time. Only the Exclusive owner connection can write and read data. The Exclusive owner connection is defined by the active fieldbus protocol after the power supply is switched on or via an appropriate entry in register 0x1140. Each I/O connection has complete read and write access to the configuration settings. Only the Exclusive owner connection has access to the I/O register.



After the Exclusive owner connection has timed out, the I/O data is set to the defined substitute value. Only read access is provided if Modbus is not the active fieldbus protocol. The following table explains the meaning of the registers:

Address	Access	Meaning
0x00000x01FF	Read only	Process data of the inputs (slots 024 are linked to form a data block)
0x04000x07FF	Read only	Diagnostics (gateway firmware ≥ V1.6.0.0)
0x08000x09FF	Read/write	Process data of the outputs (slots 024 are linked to form a data block)
0x10000x1006	Read only	Module ID
0x100C	Read only	Module status
0x1017	Read only	Register mapping revision (must always be 3 otherwise the register mapping is not compatible with this de-scription)
0x1020	Read only	Watchdog, current time in ms
0x1120	Read/write	Watchdog, preset time in ms (default: 500 ms)
0x1130	Read/write	Modbus connection mode register
0x1131	Read/write	Modbus connection timeout in s (default: 300 s)
0x113C0x113D	Read/write	Modbus parameter restore (reset the parameters to the default settings)
0x113E0x113F	Read/write	Modbus parameter save (save non-volatile parameters)
0x1140	Read/write	Deactivate protocol Explicitly deactivates the selected Ethernet protocol: Bit 0: Deactivate EtherNet/IP Bit 1: Deactivate Modbus TCP Bit 2: Deactivate PROFINET Bit 15: Deactivate the web server
0x1141	Read only	Active protocol Bit 0: EtherNet/IP active Bit 1: Modbus TCP active Bit 2: PROFINET active Bit 15: Web server active
0x80000x8320	Read only	Process data of the inputs (max. 25 modules per station, 32 registers per module)
0x90000x9320	Read/write	Process data of the outputs (max. 25 modules per station, 32 registers per module)
0xA0000xA320	Read only	Diagnostics
0xB0000xB320	Read/write	Parameter



#### The gateway status word is in register 0x100C:

Gateway status word															
Byte 1					Byte 0										
res	FM	Par	MB Wdg	l/O cfg	l/O com	res	res	res	res	res	res	l/O cfg w	FS	res	l/O diag

Meaning of the gateway status bits

Designation	Meaning
res	Reserved
FM	Force mode in the DTM active
Par	I/O parameter error
MB Wdg	Modbus watchdog error
I/O cfg	Configuration error (missing or incorrectly fitted modules)
I/O cfg w	Warning: I/O configuration was changed
I/O com	No communication with the I/O module bus
FS	Warning – Fail-safe mode active
I/O diag	I/O diagnostics active

#### 5.1.1 Example: Modbus registers

Proceed as follows to call up the assignment of the Modbus registers:

- Open the web server.
- Under Documentation, click Modbus TCP Memory Map.

# Input registers: Slot 0 – Station

Description in the web server	Register	Bit offset	Bit length
Gateway active	0x0000 (0)	0	1
Gateway slot left	0x0000 (0)	1	1
Gateway redundancy available	0x0000 (0)	2	1
Right supply module available	0x0000 (0)	3	1
Left supply module available	0x0000 (0)	4	1



# Input registers: Slot 1 – DM80-N S

Description in the web server	Register	Bit offset	Bit length
Digital in-/output 1: Value	0x0001 (1)	0	1
Digital in-/output 1: Status	0x0001 (1)	8	1
Digital in-/output 2: Value	0x0001 (1)	1	1
Digital in-/output 2: Status	0x0001 (1)	9	1
Digital in-/output 3: Value	0x0001 (1)	2	1
Digital in-/output 3: Status	0x0001 (1)	10	1
Digital in-/output 4: Value	0x0001 (1)	3	1
Digital in-/output 4: Status	0x0001 (1)	11	1
Digital in-/output 5: Value	0x0001 (1)	4	1
Digital in-/output 5: Status	0x0001 (1)	12	1
Digital in-/output 6: Value	0x0001 (1)	5	1
Digital in-/output 6: Status	0x0001 (1)	13	1
Digital in-/output 7: Value	0x0001 (1)	6	1
Digital in-/output 7: Status	0x0001 (1)	14	1
Digital in-/output 8: Value	0x0001 (1)	7	1
Digital in-/output 8: Status	0x0001 (1)	15	1

# Input registers: Slot 3 – AIH40-N

Description in the web server	Register	Bit offset	Bit length
Analog input 1: Value	0x0002 (2)	0	15
Analog input 1: Status	0x0002 (2)	15	1
Analog input 2: Value	0x0003 (3)	0	15
Analog input 2: Status	0x0003 (3)	15	1
Analog input 3: Value	0x0004 (4)	0	15
Analog input 3: Status	0x0004 (4)	15	1
Analog input 4: Value	0x0005 (5)	0	15
Analog input 4: Status	0x0005 (5)	15	1



# Input registers: Gateway status word

Description in the web server	Register	Bit offset	Bit length
Module Diagnostics Available	0x0006 (6)	0	1
Modulebus Failsafe Mode Enabled	0x0006 (6)	2	1
Station Configuration Changed	0x0006 (6)	3	1
Overcurrent lsys	0x0006 (6)	5	1
Overvoltage Field Supply UI	0x0006 (6)	6	1
Undervoltage Field Supply UI	0x0006 (6)	7	1
Overvoltage Field Supply Usys	0x0006 (6)	8	1
Undervoltage Field Supply Usys	0x0006 (6)	9	1
Modulebus Communication Lost	0x0006 (6)	10	1
Modulebus Configuration Error	0x0006 (6)	11	1
Modulebus Status Error	0x0006 (6)	12	1
Modulebus Parameter Error	0x0006 (6)	13	1
Force Mode Enabled	0x0006 (6)	14	1

# Output registers: Slot 0 – Station

Description in the web server	Register	Bit offset	Bit length
Red switching	0x0800 (2048)	0	2

# Output registers: Slot 1 – DM80-N S

Description in the web server	Register	Bit offset	Bit length
Digital in-/output 1: Value	0x0801 (2049)	0	1
Digital in-/output 2: Value	0x0801 (2049)	1	1
Digital in-/output 3: Value	0x0801 (2049)	2	1
Digital in-/output 4: Value	0x0801 (2049)	3	1
Digital in-/output 5: Value	0x0801 (2049)	4	1
Digital in-/output 6: Value	0x0801 (2049)	5	1
Digital in-/output 7: Value	0x0801 (2049)	6	1
Digital in-/output 8: Value	0x0801 (2049)	7	1

# Output registers: Slot 2 – DO40-N

Description in the web server	Register	Bit offset	Bit length
Digital output 1: Value	0x0802 (2050)	0	1
Digital output 2: Value	0x0802 (2050)	1	1
Digital output 3: Value	0x0802 (2050)	2	1
Digital output 4: Value	0x0802 (2050)	3	1



# Output registers: Slot 4 – AOH40-N

Description in the web server	Register	Bit offset	Bit length
Analog output 1: Value	0x0803 (2051)	0	15
Analog output 2: Value	0x0804 (2052)	0	15
Analog output 3: Value	0x0805 (2053)	0	15
Analog output 4: Value	0x0806 (2054)	0	15



# 5.2 Connecting the device with the controller

#### Prerequisites

- The programming software has been started.
- A new project has been created.
- The PLC has been added to the project.

# Scanning the PLC

- Double-click **Device**.
- Click Scan network....
- Select the interface and confirm with **OK**.

excom ethernet  ethernet ethernet ethernet ethernet ethernet ethernet  ethernet ethernet ethernet etherne	Communication Settings Scan network Gateway - Device - Applications	
■ ♥ MainTask (EC-Tasks) □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	Backup and Restore     Select Device       Files     Select the network path to the controller:       Log     Image: Control of the control of	Device Name:     MH-EHLAPUS     Device Address:     0019     Block driver:     UDP     Encrypted     Communication:     TLS supported     Number of     channels:     4     Serial number:     E852750C-     8396683A-     D38EE7996-     37=473908     Target ID:     V

Fig. 21: Scanning the network

# Adding an Ethernet adapter

- ► Right-click **Device** in the project tree.
- Select Add device.
- Select the Ethernet port.
- Click Add device.
- ⇒ The Ethernet port appears as **Ethernet** in the project tree.

ring for a fulltext search		Vendor: <all th="" v<=""><th>endors&gt;</th><th></th><th></th></all>	endors>		
Name	Vendor		Version	Description	
Miscellaneous					
🗄 🔟 Fieldbusses					
E CANbus					
🖻 📴 🗄 EtherCAT					
Ethernet Adapt	er				
🔟 Ethernet	Turck	_	3.5.11.0	Ethernet Link.	
Ethernet	3S - Smart So	oftware Solutions Gmb	H 3.5.14.0	Ethernet Link.	
😐 😁 EtherNet/IP					
Modbus					
Group by category	Display all versions	(for experts only) [	Display outdat	ed versions	
Name: Ethernet	: Software Solutions ( net Adapter, Etherne	SmbH •t Adapter, Ethernet A	dapter		<b>*</b>
Vendor: 35 - Smart Categories: Ethen Version: 3.5.14.0 Order Number: - Description: Ether	net Link.				~

Fig. 22: Adding an Ethernet adapter



Setting the IP address

- Double-click Ethernet adapter (here: double-click Ethernet (Ethernet).
- Set the IP address: (in this case: 192.168.1.1).



Fig. 23: Setting the IP address



#### Adding a Modbus master

- ▶ Right-click **Ethernet** in the project tree.
- Select Append device.
- Double-click the Modbus TCP Master.
- ⇒ The Modbus TCP master appears as **Modbus\_TCP\_Master** in the project tree.

String for a fulltext sea	rch	Vendor:	<all vendors=""></all>		
Name □ ∰ Fieldbusses □ ← EtherNet/I □ ₩₩ Modbus	P	Vendor		Version	Description
🕀 – 💷 Profinet IC	odbus TCP Master ISTCP Slave Device	3S - Smart Soft	ware Solutions GmbH	3.5.14.0	A device that works as a Mo
< C					
Group by category           Oroup by category           Name: Modbus           Vendor: 35 - 5	Display all versio	ns (for experts o	nly) 🗌 Display outc	lated versions	_

Fig. 24: Adding a Modbus master

 $\times$ 

# Adding a Modbus slave

- ▶ Right-click Modbus TCP Master in the project tree.
- Select Append device.
- Double-click Modbus TCP slave.
- ⇒ The Modbus slave appears as **Modbus\_TCP\_Slave** in the project tree.

#### 🚹 Add Device

Name: Modbus_TC	P_Slave							
Action:	-							
Append device	O Insert device	) Plug device (	ΟU	pdate device				
-								
String for a fulltext	search	Vendo	or:	<all vendors=""></all>	1			~
Name		Vendor			Versio	on De	scription	
Ereldbusses	S							
Modbu	s							
	Modbus TCP Slave	35 - Smart Sof	fhwa	re Solutions GmbH	3 5 12	0 40	eneric Modhu	s device that is (
	inoubus for slave	55 - Smart 301	- cwa		5.5.12	Ay	enene modulu:	s device that is t
<								>
Group by categ	ory 🔄 Display all ver	sions (for exper	ts o	nly) 📃 Display out	tdated v	ersions		
Name: Mod Vendor: 3 Categorie Version: 3 Order Nur Descriptio	dbus TCP Slave 5 - Smart Software Solu 5: Modbus TCP Slave 5.12.0 nber: - on: A generic Modbus de	tions GmbH evice that is confi	îgure	ed as Slave for a Mod	bus TCP	Master.		
Append selected Modbus_TCP_Ma ① (You can sele	device as last child o Ister ect another target nod	of e in the navigato	or w	hile this window is o	pen.)			
						Add	Device	Close

Fig. 25: Adding a Modbus slave



# Renaming a Modbus slave

- Click Modbus slave in the project tree.
- Press [F2].
- Adjust the name of the slave in the project tree of the application.

Devices 👻 👎 🗙
🖃 🎒 excom ethernet 🖉 💌
🖮 🔟 Device (CODESYS Control Win V3)
🖹 🗐 PLC Logic
🖻 🍈 Application
📶 Library Manager
PLC_PRG (PRG)
🖹 🎆 Task Configuration
🖮 🍪 MainTask (IEC-Tasks)
PLC_PRG
🖮 🔟 Ethernet (Ethernet)
Modbus_TCP_Master (Modbus TCP Master)
Modbus_TCP_Slave

Fig. 26: Renaming a Modbus slave





Fig. 27: Setting the Modbus slave IP address



The Modbus register mapping can be viewed via the web server. The mapping of the input and output data must be known. [> 25].

The communication between Modbus TCP master and Modbus slaves is performed using defined function calls (Modbus communication channels). These channels are set up with the relevant Modbus slaves in the **Modbus Slave Channel** tab via the **Add channel** button.

The Modbus communication channels are defined by:

Access type	Modbus function code that defines the type and method of function calls (bitwise, word- wise, read or write)
READ registers and WRITE registers Offset	Start address of the registers of the Modbus slave registers to be read or written. Refer to the Modbus mapping of the excom system for the relevant information (see web server or manual).

The signal in the following figure creates the entire input register (**Read input registers**) of a DM80 module via **READ register** with offset 0x0005.

eneral	Name Access	ype Trig	ger READ Of	fset Length	Error Handling
dbus Slave Channel	ModbusChannel				>
dbus Slave Init	Channel				
dbusTCPSlave Parameters	Name	Channel 1		]	
busTCPSlave I/O Mapping	Access Type	Read Input	Registers (Functio	on Code 4)	~
	Trigger	Cyclic	~	Cycle Time (ms)	100
S	Comment				
nation	READ Register				
	Offset				~
	Length	1		1	
	Error Handling	Keep last va	aiue 🗸		
	-WRITE Register -				
	Offset				~
	Length	1			
				OK	Cancel

Fig. 28: Reading input data via READ register


The I/O mapping is created under **ModbusTCPSlave I/O image**. The status of process values is only displayed in the I/O mapping if a program accesses the process values or if the function **Enabled 2 (always in bus cycle task)** is activated in the **ModbusTCPSlave I/O image**.

Variable	Mapping	Channel	Address	Туре	Unit	Description
⊟¥ø		Channel 1	%IW0	ARRAY [00] OF WORD		Read Input Registers
🖻 🍬		Channel 1[0]	%IW0	WORD		0x0005
🍫		Bit0	%IX0.0	BOOL		
🍬		Bit1	%IX0.1	BOOL		
<b>*</b> >		Bit2	%IX0.2	BOOL		
🍫		Bit3	%IX0.3	BOOL		
		Bit4	%IX0.4	BOOL		
- *		Bit5	%IX0.5	BOOL		
🍫		Bit6	%IX0.6	BOOL		
🍫		Bit7	%IX0.7	BOOL		
<b>*</b>		Bit8	%IX1.0	BOOL		
🍫		Bit9	%IX1.1	BOOL		
<b>*</b>		Bit10	%IX1.2	BOOL		
🍫		Bit11	%IX1.3	BOOL		
		Bit12	%IX1.4	BOOL		
🍫		Bit13	%IX1.5	BOOL		
<b>*</b> >		Bit14	%IX1.6	BOOL		
<b>X</b>		Bit15	%IX1.7	BOOL		
		Reset r	mapping	Always update variables:	Use parent	device setting
Objects					Use parent	device setting
ariable	Mapping	Туре			Enabled 2 (	always in bus cycle task)
Modbus_TCP_Slave	*	ModbusTCPSlave				

Fig. 29: Updating variables



## Loading and starting CODESYS projects



**NOTE** The WIN V3-PLC must be started.



Fig. 30: Starting the WIN V3-PLC

► Compile the project via Create → Compile or press [F11].

Edit View Project Build Online Debug Ic	ols <u>W</u> indow <u>H</u> elp								
😂 🖬 🖾 🗠 🖓 🛗 Build	F11	() · · · · · · · · · · · · · · · · · · ·	3   ¢	# <b> </b> =   1/2					
Rebuild									
Generate code									
es — Generate runtime syste	dbus_TCP_Slave X								
excom ethernet		Find		Filter Show all		-			
Device (CODESYS C Qean									_
E BI PLC Logic Clean all	Slave Channel	Variable	Mapping	Channel	Address	Туре	Unit	Description	
= Q Application		B-¥≱		Channel 1	%IW0	ARRAY [00] OF WORD		Read Input Registers	
Library Manager	Modbus Slave Init	🖻 - 🦄		Channel 1[0]	%IW0	WORD		0x0005	
E PLC_PRG (PRG)		*•		Bit0	%IX0.0	BOOL			
Task Configuration	ModbusTCPSlave Parameters	🍫		Bit1	%IX0.1	BOOL			
MainTask (IEC-Tasks)				Bit2	%IX0.2	BOOL			
	ModbusTCPSlave I/O Mapping	🍫		Bit3	%IX0.3	BOOL			
Ethernet (Ethernet)	Charles -	*>		Bit4	%IX0.4	BOOL			
Modbus_TCP_Master (Modbus TCP Master) Modbus_TCP_Slave (Modbus TCP Slave)	r, Status	*•		Bit5	%IX0.5	BOOL			
	Information	¥ø		Bit6	%IX0.6	BOOL			
		- *		Bit7	%IX0.7	BOOL			
		*>		Bit8	%IX1.0	BOOL			
		- *		Bit9	%IX1.1	BOOL			
		🍫		Bit10	%IX1.2	BOOL			
		🍫		Bit11	%IX1.3	BOOL			
				Bit12	%IX1.4	BOOL			
		*•		Bit13	%IX1.5	BOOL			
				Bit14	%IX1.6	BOOL			
		L. 🍬		Bit15	%IX1.7	BOOL			
				Reset	mapping	Always update variables:	Enabled 2	(always in bus cycle task)	
		IEC Objects							
		Variable	Mapping	Туре					
		- @ Modbus_TCP_Slave	**	ModbusTCPSlave	•				
		🍫 = Create new variable	🎲 = M	ap to existing varia	ble				

Fig. 31: Compiling the project





excom ethernet.project* - CODESYS	;				
<u>File E</u> dit <u>V</u> iew <u>P</u> roject <u>B</u> uild <u>O</u> nl	ine <u>D</u> ebug <u>T</u> ools <u>W</u> indow <u>H</u> elp				
🗎 🚔 🔚 ၊ 🚭 ၊ က က 🐰 🛯 👹	Login Alt+F8	🏦   🥵 👒	🕞 👘 🕺 l Çili 🖓 👘 📲	8   0   1 = 1 = 1	/
Oğ	Logout Ctrl+F8				
Devices	Create boot application	Slave 🗙			
excom ethernet	Download		E. J	Filme of	
🖻 👔 Device (CODESYS Control V	Online Cha <u>ng</u> e		Find	Filter Show a	all
PLC Logic	Source download to connected device	el	Variable	Mapping Channel	
Application	Multiple Download		⊟ 🍫	Channel 1	
Library Manage		-	🖮 🍫	Channel 1[0]	1
PLC_PRG (PRG	Reset warm		<b>*</b> >	Bit0	
Iask Configura	Res <u>e</u> t cold	ameters	₩ 	Bit1	
	Rese <u>t</u> origin	Manaina	· · · · · · · · · · · · · · · · · · ·	Bit2	
Ethernet (Ethernet)	Simulation	mapping	· · · · · · · · · · · · · · · · · · ·	Bit3	
Modbus TCP Mast	Security			Bit4	
Modbus TCP	Operating Mode		₩ 	BITS Bitc	
			₩ 	Bit7	
			₩ 	Bit8	
				510	

Fig. 32: Online – logging in





• Start the program via **Debug**  $\rightarrow$  **Start**.

Fig. 33: Starting the program



# 6 Connecting excom to a PROFINET master

The following example shows the integration of excom with CODESYS. The configuration and parameterization is carried out via the configuration tool and the GSDML file.

#### Hardware used

This example uses the following hardware components:

- Gateway GEN-N
- Ethernet cable with RJ45 connector
- PC

#### Software used

This example uses the following software:

- CODESYS version 3.5.12 (download free of charge from www.turck.com)
- GSDML file version 2.3 (download free of charge from www.turck.com)

#### Requirements

- The PROFINET name is set.
- The programming software has been opened.
- A new project has been created.
- Codesys PLC has been started via CODESYS Control Win SysTray.

### 6.1 Installing a GSDML file

The GSDML file is available free of charge for download from www.turck.com.

- Include the GSDML file: Click Tools  $\rightarrow$  Device Repository.
- Install a GSDML file: Specify the storage location of the GSDML file and click Install.
- ⇒ The device is included in the hardware catalog.

excom ethernet.project* - CODESYS				
<u>File Edit View Project Build Online Debug Tools</u>	<u>W</u> indow <u>H</u> elp			
衛 📽 🖬 🕘 🗠 여 🐰 🖻 🛍 🗙 🛤 🕼 🌺	🍇   📾   🎘 🖌 🗳   🎬   💘 💖 🕠	* (I % 4 +1 %	이 [黑] 글 [ 장]	
Devices	2 Device Repository			×
Device (CODESYS Control Win V3)	Location: System Repository		×	Edit Locations
PLC Logic	(C:\ProgramData\CODESYS\De	evices)		
= Q Application				
	Installed device descriptions:			
Task Configuration	String for a fulltext search	Vendor: <all vendors=""></all>	v.	Install
🖮 🍪 MainTask		Children Children	-	
PLC_PRG	Name	Vendor	Version	Uninstall
	EXCOM			Export
	P excom GEN-N	Turck	SW=SW V 1.6.7, HW=HW 1	
	CDS3 PN Device	TURCK	SW=SW V 1.3.0, HW= SW=SW V 1.3.22, HW=HW 1	
			· · · · · · · · · · · · · · · · · · ·	
			-	
	K:\BUAS\PM_PA\excom\Tools\GSD	ML\EXCOM_GSDML\GSDML-V2.3-Tur	rck-ExcomV2-20190429-010607.xml	
b l	Device "excom GEN-N" installed	to device repository.		
				Details
	L			Deconom
				Close
				.:

#### Fig. 34: Installing a GSDML file



## 6.2 Connecting the device with the controller

- ▶ Right-click **Device** in the project tree.
- Select Add device.
- Select the Ethernet port.
- Click Add device.
- ⇒ The Ethernet port appears as **Ethernet** in the project tree.

) Append device 🔵 In	isert device 🔵 Plug	device O Updat	e device		
ring for a fulltext search	1	Vendor: <all< th=""><th>vendors&gt;</th><th></th><th></th></all<>	vendors>		
Vame	Vendor		Version	Description	
🖳 詽 Miscellaneous					
🗉 🔟 Fieldbusses					
E CAN CANbus					
🗄 🔐 🔐 EtherCAT					
🖃 🕮 Ethernet Ada	pter				
👚 🔟 Ethernet	Turck		3.5.11.0	Ethernet Link.	
Ethernet	3S - Smart So	oftware Solutions Gr	nbH 3.5.14.0	Ethernet Link.	
🖲 👄 EtherNet/IP					
۰ Modbus 🗈 🖿 🖿					
Group by category	Display all versions	(for experts only)	Display outdat	ed versions	
		(			
Vendor: 3S - Sma Categories: Ethe Version: 3.5.14.0	rt Software Solutions G rnet Adapter, Etherne ) - ernet Link.	SmbH t Adapter, Ethernet	Adapter		- Contraction of the second se
Order Number: Description: Eth					

Fig. 35: Adding an Ethernet adapter



## Adding a PROFINET master

- ► Right-click Device in the project tree.
- Select Append device.
- Double-click on **PROFINET-Controller**.
- ⇒ The PROFINET master appears as **PN\_Controller** in the project tree.

Iame: PN_Controller Action: Append device	device O Plug (	device OU	Ipdate device			
String for a fulltext search		Vendor:	<all vendors=""></all>			`
Name	Vendor	_	-	Version	Description	
EtherNet/IP     Modbus     Profinet IO     Profinet IO De     Profinet IO De	vice					
PN-Contro	oller 3S - Sma	rt Software S	olutions GmbH	3.5.14.20	Profinet IO Cont	roller
Group by category Di Name: PN-Controller Vendor: 35 - Smart Sc Categories: Profinet : Version: 3.5.14.20 Order Number: 1 Description: Profinet	splay all versions ( ftware Solutions Gr IO Master IO Controller	for experts o	nly) 🗌 Displa	y outdated ver	sions	2
Append selected device as Ethernet (You can select another	last child of target node in the	navigator w	hile this window	/is open.)		

Fig. 36: Adding a PROFINET master



### Adding a PROFINET device

- In the project tree, right-click on **PN\_Controller (PN-Controller)**.
- Select Append device.
- ► Double-click PROFINET-Device.
- Select excom GEN-N.
- ⇒ The PROFINET device appears as **excom\_GEN\_N** in the project tree.

String for a fulltext search Vendor: <all vendors=""></all>								
Name		Vendor	Version	D f				
<b> </b>	🗐 excom GEN-3G	Turck	SW=SW V 1.6.7, HW=HW 1	R				
	excom GEN-N	Turck	SW=SW V 1.6.7, HW=HW 1	R				
	TBEN-L4-16DIN	Turck	SW=SW V 1.5.0, HW=HW 1	PI				
···· •	TBEN-L4-16DIP	Turck	SW=SW V 1.5.0, HW=HW 1	PI				
<b>•</b>	TBEN-L4-16DON	Turck	SW=SW V 1.5.0, HW=HW 1	PI				
•••••	TBEN-L4-16DOP	Turck	SW=SW V 1.5.0, HW=HW 1	PI,				
<		•		>				
✓ Group by category □ Display all versions (for experts only) □ Display outdated versions         ✓ Group by category □ Display all versions (for experts only) □ Display outdated versions         ✓ Name: excom GEN-N Vendor: Turck Categories: Profinet IO Slave Version: SW=SW V 1.6.7, HW=HW 1 Order Number: 100000129 Description: Remote I/O System								

Fig. 37: Adding a PROFINET device

Optional: Renaming the PROFINET device

- Click on the PROFINET device in the project tree.
- Press [F2].
- Adapt the name of the device in the project tree.



#### Adding excom modules

- ▶ Right-click an empty slot in the project tree.
- Double-click to add the required module.



Fig. 38: Adding modules



### Parameterizing excom modules

- Double-click the required module in the project tree.
- Set the parameters.

excom ethernet.project* - CODESYS						
File Edit View Project Build Online Debug Tool	s <u>W</u> indow <u>H</u> elp					
管 ☞ ■   ●   □ □ ↓ ■ ● ▲ ×   ● ↓	🖌 🌜 i 📾 i 🌆 🖓 😚 i 🎬 i 🞯 🤇	8 🕞 🖌 😽 1 🗇 🕾	i 4a +a 8	¢   <b>"</b> ∦  <b>≓</b>	12	
			- v			
Devices		N				
	Device excom_gen	_N X				
excomethemet	General	Chatting Marries .				7
E BI RICLOSIS CONTO WITVS)		Station Name tur	ck-excom			
	Options	Station Status				
Library Manager						1
	IOxS					
		IP Parameter				
AninTask	PNIO I/O Mapping	IP Address	192 . 168	. 1 . 25		
PLC PRG	Status	Cub and March	255 255	055 0		
Profinet_CommunicationTask		Subnet Mask	200 . 200	. 235 . U		
PN_Controller.CommCycle	Information	Default Gateway	0.0	. 0 . 0		
Profinet_IOTask						
Ethernet (Ethernet)		Communication				
🖃 🗊 PN_Controller (PN-Controller)		Send clock (ms)	1 ~	Watchd	log (ms)	3 🌩
excom_GEN_N (excom GEN-N)		Reduction ratio	1 ~	VLAN I	D	0 🚔
🖬 🗐 Slot_1 (AIH40. 4H)			-	1		
🖬 🗐 Slot_2 (AOH40. 4H)		Phase	- ~			
🖬 🗊 Slot_3 (DM80)						
🖬 🗊 Slot_4 (DO40.)		RT Class	RT Class 1		~	
Slot_5 ( <empty>)</empty>						
Slot_6 ( <empty>)</empty>		User-Defined Parar	meters			
Slot_7 ( <empty>)</empty>		🛌 Set All Default	Values	🛌 🕜 Read All Va	lues	Mrite All Values
Slot_8 ( <empty>)</empty>						
Slot_9 ( <empty>)</empty>		Parameters		Value	Allowed valu	es
Slot_10 ( <empty>)</empty>		PROFINET configura	tion			
Slot_11 ( <empty>)</empty>		Deactivate all dia	agnostics	no	01	
Slot_12 ( <empty>)</empty>		Deactiv. load vo	ltage diagn.	no	01	
Slot_13 ( <empty>)</empty>		Deactivate I/O-A	ASS. Force Mod	e no	01	
Slot_14 ( <empty>)</empty>		GEN settings				
Slot_15 ( <empty>)</empty>		module paramet	erization	activate	01	
Slot_16 ( <empty>)</empty>		line frequency		50 Hz	01	
Slot_17 ( <empty>)</empty>		analog data form	nat	Status MSB	03	
Slot_18 ( <empty>)</empty>		CAN redundancy	/	on	01	
Slot_19 ( <empty>)</empty>		power supply		simple	01	
Slot_20 ( <empty>)</empty>						
Slot_21 ( <empty>)</empty>						
Slot_22 ( <empty>)</empty>						

Fig. 39: Changing the gateway and PROFINET parameters

 In order to parameterize I/O modules select the particular slot (in this case: Slot\_1 (AIH40.)).



#### excom ethernet.project\* - CODESYS

Elle Edit View Project Build Online Debug Iook 管 🗃 💭 🕼 🕼 🗠 🖓 🖓 🕼	: <u>Wi</u> ndow <u>H</u> elp 4 44   12   12 - 17   129   05 05	▶ ■ X   [= ~] ~] ~] ×]	¢   🔏   1	#17/	
Devices – 🕂 🗙	1 ■ Slot_1 X				
excom ethernet     excom ethernet     excom ethernet     end     price (CODESYS Control Win V3)     end     price Logic     end     end     end     fill     ubrary Manager     end     e	General PNIO Module I/O Mapping Status Information	Module Information: Ident Number 16#4CA Slot Number User-Defined Parameters:	1		
🖨 😻 MainTask		Set All Default Values	Read #	All Values	Write All Values
Profinet_CommunicationTask		Parameters Station parameter module parameterization	Value	Allowed values	
PN Controller (PN-Controller)		Filter(PT1) CH1	0,1s	03	
excom_GEN_N (excom GEN-N)		Failsafe mode CH1	Min. value	02	
🖬 🗊 Slot_1 (AIH40. 4H)		Open line detection CH1 Short circuit detection CH1	on	0.1	
🛱 🗐 Slot_2 (AOH40. 4H)		Primary variable (PV) CH1	on	01	
🖬 🗐 Slot_3 (DM80)		Secondary variable (SV) CH1	off	01	
🖬 🗐 Slot_4 (DO40.)		Tertiary variable (TV) CH1	off	01	
Slot_5 ( <empty>)</empty>		Ouartary variable (OV) CH1	off	01	
Slot_6 ( <empty>)</empty>		Filter(PT1) CH2	0,1s	03	
Slot_7 ( <empty>)</empty>		Failsafe mode CH2	Min. value	02	
Slot_8 ( <empty>)</empty>		Open line detection CH2	on	01	
Slot_9 ( <empty>)</empty>		Short circuit detection CH2	on	01	
Slot_10 ( <empty>)</empty>		Primary variable (PV) CH2	on	01	
Slot_11( <empty>)</empty>		Secondary variable (SV) CH2	off	01	
Slot_12 ( <empty>)</empty>		Tertiary variable (TV) CH2	off	01	
Slot_13 ( <empty>)</empty>		Quartary variable (QV) CH2	off	01	
Slot_14 ( <empty>)</empty>		Filter (PT1) CH3	0,1s	03	
Slot_15 ( <empty>)</empty>		Failsafe mode CH3	Min. value	02	
Slot_10 ( <empty>)</empty>		Open line detection CH3	on	01	
Slot 19 ( <empty>)</empty>		Short circuit detection CH3	on	01	
Slot_10 ( <empty>)</empty>		Primary variable (PV) CH3	on	01	
Slot_19 ( <empty>)</empty>		Secondary variable (SV) CH3	off	01	
Slot_20 ( <empty>)</empty>		Tertiary variable (TV) CH3	off	01	
Slot_21( <empty>)</empty>		Quartary variable (QV) CH3	off	01	
Slot_22 ( <empty>)</empty>		Filter(PT1) CH4	0,1s	03	
Slot 24 (ZEmpty>)		Failsafe mode CH4	Min. value	02	
SIDE_2+( <empty>)</empty>		Open line detection CH4	on	01	
		Short circuit detection CH4	on	01	
		Primary variable (PV) CH4	on	01	
		Secondary variable (SV) CH4	off	01	
		Tertiary variable (TV) CH4	off	01	
		Quartary variable (QV) CH4	off	01	

Fig. 40: Parameterize modules according to the AIH40... example



## Updating the PROFINET master variables

- Double-click **Device**.
- Click PLC settings.
- At Always refresh variables: Set Activated 2 (always in the bus cycle task).
- Confirm the following prompt with **Yes**.

```
excom ethernet.project* - CODESYS
```

Elle Edit View Project Build Online Debug To 10 12 IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	ools <u>Window H</u> elp		\$  +   <b>∭ </b> ≓ ∛
Devices 🗸 🗸 🗡	C Device X		
excom ethernet	Communication Settings	Application for I/O handling:	Application
		Di C cottione	
Application	Applications	PLC settings	
Library Manager	Backup and Restore	Behaviour for outputs in Stop	Keen a mentuching
PLC_PRG (PRG)		benaviour for outputs in stop.	Keep current values V
Task Configuration	Files	Always update variables:	Disabled (update only if used in a task)
⇒ ⊗ MainTask	1	Edit Licenses	Disabled (update only if used in a task) Enabled 1 (use bus cycle task if not used in any task)
Profinet CommunicationTask	Log	Rus suda antiana	Enabled 2 (always in bus cycle task)
PN Controller.CommCycle	PLC Settings	Bus cycle task:	<upsecified></upsecified>
Profinet_IOTask			(disperied)
Ethernet (Ethernet)	PLC Shell	Addtional settings	
PN_Controller (PN-Controller)	Users and Groups	Generate force variables for	IO mapping EnableDiagnosis for devices
= • • excom_GEN_N (excom GEN-N)	· · · · · · · · · · · · · · · · · · ·	Show I/O warnings as errors	
	Access Rights		
■ Slot 3 (DM80)	Task Daslaumant		
🖬 🗊 Slot_4 (DO40.)	Task Deployment		
Slot_5 ( <empty>)</empty>	Status		
Slot_6 ( <empty>)</empty>	· · · · · · · · · · · · · · · · · · ·		
Slot_7 ( <empty>)</empty>	Information		
Slot_8 ( <empty>)</empty>			
Slot_9 ( <empty>)</empty>			
Slot_10 ( <empty>)</empty>			
<pre>Slot_11(<empty>) </empty></pre>			
Slot_12 ( <empty>)</empty>			
Slot 14 ( <empty>)</empty>			
Slot 15 ( <empty>)</empty>			
Slot_16 ( <empty>)</empty>			
Slot_17 ( <empty>)</empty>			
Slot_18 ( <empty>)</empty>			
Slot_19 ( <empty>)</empty>			
Slot_20 ( <empty>)</empty>			
Slot_21 ( <empty>)</empty>			
Slot_22 ( <empty>)</empty>			
Slot_23 ( <empty>)</empty>			
Siot_24 ( <empty>)</empty>			

Fig. 41: Updating variables



## Loading and starting CODESYS projects



The WIN V3-PLC must be started.



Fig. 42: Starting the WIN V3-PLC

► Compile the project via Create → Compile or press [F11].

excom ethernet.project* - CODESY	ſS								
e Edit <u>V</u> iew Project <u>B</u> uild <u>O</u> r	nline <u>D</u> ebug <u>T</u> ools	Window Help							
) 🚔 🔛   🚳   🗠 🗛 🛗 Build	ł	👎 💶 📊 🦌 👘 🖓 🗎 👘 🖓 🕻	淡 🕞 📲 💘 🗐 短 短 5	18 ¢	#  <del></del>				
<u>R</u> ebu	uild								
Gene	erate code	dhura TCD chura ta							
Gene	erate runtime system fi	les							
i excom ethernet	-	-	Find		Filter Show all		-		
BIL DI CLASIA					<i>a</i>		-		<b>D</b> 1.4
Clea	in <u>a</u> ll	Slave Channel	Variable	Mapping	Channel	Address	lype	Unit	Description
			<b>■</b> • <b>₩</b>		Channel 1	%IW0	ARRAY [00] OF WORD		Read Input Registers
		Modbus Slave Init	H- 19		Channel 1[0]	%IW0	WORD		0x0005
Task Configuration			- *		Bit0	%IX0.0	BOOL		
MainTack /IEC	Tacke)	ModbusTCPSIave Parameters			Bit1	%IX0.1	BOOL		
	-10060)	MedhusTCDSIave I/O Magazing	- · · · · ·		Bit2	%IX0.2	BOOL		
Ethernet (Ethernet)		Houbus revisive the mapping			Bit3	%IX0.3	BOOL		
Coverier (Coverier)     Modbus_TCP_Master (Modbus TCP Master)     Modbus_TCP_Slave (Modbus TCP Slave	Status			Bit4	%IX0.4	BOOL			
	Information			Bit5	%IX0.5	BOOL			
				Bitb	%LX0.6	BOOL			
					Bit/	%LX0.7	BOOL		
					Bit8	%IX1.0	BOOL		
					Bit9	%IX1.1	BOOL		
					Bit10	%IX1.2	BOOL		
					Bit11	%IX1.3	BOOL		
					Bit12	%IX1.4	BOOL		
					Bit13	%IX1.5	BOOL		
					BIT14	%IX1.6	BOOL		
			····· ···		BIT15	%IX1.7	BOOL		
					Reset	mapping	Always update variables:	Enabled 2	(always in bus cycle task)
			IEC Objects						
			Variable	Mapping	Туре				
			@ Modbus_TCP_Slave	**	ModbusTCPSlave	•			
Auders C BOUL	>		🌾 = Create new variable	~ <b>i</b> ∌ = M:	ap to existing varia	able			
POUs			L						

Fig. 43: Compiling the project





excom ethernet.project* - CODESY	S			
<u>File E</u> dit <u>V</u> iew <u>P</u> roject <u>B</u> uild <u>O</u> n	line <u>D</u> ebug <u>T</u> ools <u>W</u> indow <u>H</u> elp	_		
🎦 🖆 🔚 🗐 🗠 여 🐰 🛙	Login Alt+F8	🎬   😋 🍳	🕴 🕞 📲 💐 l 🖓 👘 📲 👘	8   0   🛒   🐨 /
03	Logout Ctrl+F8			
Devices	Create boot application	Slave 🗙		
excom ethernet	Download		E. J.	Filter of a l
🖻 👔 Device (CODESYS Control V	Online Cha <u>n</u> ge		Find	Filter Show all
PLC Logic	Source download to connected device	el	Variable	Mapping Channel
Application	Multiple Download	Ci	<b>□</b>	Channel 1
Library Manage		-	🖹 🍬	Channel 1[0]
PLC_PRG (PRG	<u>R</u> eset warm			Bit0
Task Configura	Res <u>e</u> t cold	ameters	- *	Bit1
⊟ ⊗ MainTask (	Rese <u>t</u> origin		↓	Bit2
	Simulation	Mapping	¥	Bit3
Ethernet (Ethernet)	Security		]*	Bit4
Modbus_TCP_Mast	Sec <u>u</u> nty .		•	Bit5
Modbus_TCP_	Operating Mode		•	Bit6
			│ · · · *	Bit7
			₩	Bit8
			II : ¥&	040

Fig. 44: Online – logging in





• Start the program via **Debug**  $\rightarrow$  **Start**.

Fig. 45: Starting the program



# 7 Connecting excom to an EtherNet/IP scanner

The following example shows the integration of excom with CODESYS. The configuration and parameterization are carried out separately via the DTM or the web server.

Hardware used

This example uses the following hardware components:

- Gateway GEN-N
- Ethernet cable with RJ45 connector
- PC

#### Software used

This example uses the following software:

- CODESYS version 3.5.12 (download free of charge from www.turck.com)
- EDS file (available as a download at www.turck.com)

#### Requirements

- The programming software has been opened.
- A new project has been created.
- Codesys PLC has been started via CODESYS Control Win SysTray.

## 7.1 EtherNet/IP data mapping

Two different EDS files are available for EtherNet/IP for excom:

- Consolidated IO
- CIP bridging

#### Consolidated IO

"Consolidated IO" uses a single connection for the group of I/O modules. The Consolidated IO file optimizes the network bandwidth since the data for all I/O modules is transferred via a single connection.

If the assembly instances 107 (input) and 104 (output) are used, the connection parameters must be set according to the actual module configuration. The amount of input and output data must match the actual data size of the excom station exactly.

An Exclusive owner connection is in place if the EtherNet/IP is the active fieldbus protocol or the active fieldbus protocol was not defined. If EtherNet/IP is not the active fieldbus protocol, a read-only connection is in place.



Data	Mapping	Process data	Meaning
Input data	Permanent	Gateway status word	Gateway status
	Permanent	Local process data	All process input data is shown in 246 units of 16 bits each.
	Optional	Summarized diagnostics module bus	Summarized diagnostics activ- ated or deactivated VSC 102 instance 3 attribute 104
		1 bit for each module	_
	Optional	Manufacturer specific module bus diagnostics	Manufacturer specific dia- gnostics (scheduled diagnostics) activated or deactivated VSC
		12 bytes for diagnostics	102 instance 3 attribute 105
Output data	Permanent	Gateway control word	Without function
	Permanent	Local process data	All output process data is shown in 246 units of 16 bits each.

The data mapping with "Consolidated IO" is structured as follows:

The gateway status word is mapped in the input data mapping on the first word:

Gateway status word														
Byte 1							Byte 0							
res	FM	Par	res	l/O cfg	res	res	res	res	res	res	l/O cfg w	FS	res	I/O diag

Designation	Meaning
res	Reserved
FM	Force mode in the DTM active
Par	I/O parameter error
I/O cfg	Configuration error (missing or incorrectly fitted modules)
I/O cfg w	Warning that the I/O configuration was changed
FS	Warning – Fail-safe mode active
I/O diag	I/O diagnostics active

The optional diagnostics can be activated or deactivated in the web server at **Gateway Configuration**. If the summarized diagnostics are activated, 1 bit is returned for each module in the station. If no diagnostics are present on the device, the bit for the particular module is set to 0. If diagnostic messages are present, this bit is set to 1. The diagnostic bits are mapped to the end of the input data of the station.

If the scheduled diagnostics are activated, the scheduled diagnostics bits are mapped to the process data of the station. The scheduled diagnostics are mapped at the end of the input data behind the summarized diagnostics. The scheduled diagnostics are continuous diagnostics. The diagnostics window shows the specific diagnostics data of a module for approx. 125 ms and then changes to the next module. The mechanism is controlled by the gateway.



## CIP bridging

The CIP bridging function uses one connection for each I/O module. The CIP bridging file maps the data of the excom station as follows:

Data	Mapping	Process data		
Input data	Slot 0	Gateway status word		
	Permanent	Process data for slot 024 (wordwise)		
		Diagnostics data for slot 024 (wordwise)		
Output data	Slot 0	Gateway control word		
	Permanent	Process data for slot 024 (wordwise)		



## 7.2 Installing an EDS file

- Include an EDS file: Click Tools  $\rightarrow$  Device Repository.
- ► Installing an EDS file: Click Install.
- Select the storage location of the EDS file.

cation:	System Repository				$\sim$	Edit Locations
	(C:\ProgramData\CODESYS\Device	es)				
stalled d	evice descriptions:					
tring for a	a fulltext search	Vendor:	<all vendors=""></all>		$\sim$	Install
Name		Ver	ndor	Version	^	Uninstall
8	Ethernet Adapter					Export
8	🔍 👄 EtherNet/IP Local Adapter					
	E GetherNet/IP Module					
	EtherNet/IP Remote Adapter					
	CDS3 EthernetIP Slave	Ture	ck	Major Revision=16#2, Minor Revision		
	1000 DM80-N	Ture	ck	Major Revision=16#2, Minor Revision		
	EtherNetIP Adapter	3S -	- Smart Software Solutions GmbH	Major Revision=16#1, Minor Revision		
	GEN-3G	Ture	dk	Major Revision=16#2, Minor Revision		
	GEN-N	Ture	dk	Major Revision=16#2, Minor Revision		
	Generic EtherNet/IP device	e 3S -	- Smart Software Solutions GmbH	3.5.8.0	×	
<				>		Details

Fig. 46: Installing an EDS file

 $\Rightarrow$  The device is entered in the hardware catalog.

Most EtherNet/IP controllers operate with the Consolidated IO EDS file. This example therefore uses Consolidated IO.

With the CIP Bridging EDS file, the appropriate EDS file must be read for each slot in the module rack and added in sequence as EtherNet/IP adapters as is the case here with the GEN-N. The gateway here is called a "station".



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## 7.3 Connecting the device with the controller

To connect the device to the controller, the following components must be added in CODESYS first of all:

- Ethernet adapter
- EtherNet/IP scanner
- EtherNet/IP adapter

#### Adding an Ethernet adapter

- ▶ Right-click **Device** in the project tree.
- Select Append device.
- Select the **Ethernet port**.
- Click Append device.

#### Add Device

Name: EtherNet_IP_Scanner							
Action:							
Append device      Insert device      Plu	n device OU	ndate device					
String for a fulltext search	Vendor:	<all vendors=""></all>			~		
Name	Vendor		Version	Description	1		
🖃 🕤 Fieldbusses							
🚔 👄 EtherNet/IP							
🗉 👄 EtherNet/IP Local Adapter							
😑 👄 EtherNet/IP Scanner							
EtherNet/IP Scanner	3S - Smart Sof	tware Solutions GmbH	3.5.14.10	EtherNet/IP	Scanner		
🗈 - 📖 Modbus							
🗷 ··· 🛲 Profinet IO							
Crown by category Display all version	s (for evoerts o	nly) 🔲 Display outdat	ad versions				
	s (i oi experts o		eu versions				
<ul> <li>Name: EtherNet/IP Scanner</li> <li>Vendor: 35 - Smart Software Solutions</li> <li>Categories: EtherNet/IP Scanner</li> <li>Version: 3.5.14.10</li> <li>Order Number: 1</li> <li>Description: EtherNet/IP Scanner</li> </ul>	GmbH			W/O			
Append selected device as last child of Ethernet							
			bbA	Device	Close		

#### Fig. 47: Adding an Ethernet adapter

⇒ The Ethernet port appears as **Ethernet** in the project tree.



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## Adding an EtherNet/IP scanner

- ▶ Right-click **Ethernet** in the project tree.
- Select Append device.
- Double-click EtherNet/IP Scanner.

#### Add Device

<ul> <li>Append device</li></ul>	Plug device 🔘 U	pdate device				
String for a fulltext search	Vendor:	<all vendors=""></all>			`	
Name	Vendor		Version	Description		
🖃 🖬 Fieldbusses						
🚔 - 👄 EtherNet/IP						
🗉 👄 EtherNet/IP Local Adapte	er					
🖮 👄 EtherNet/IP Scanner						
🛄 EtherNet/IP Scanner	3S - Smart Sof	tware Solutions GmbH	3.5.14.10	EtherNet/IP Scanner		
🗈 - 📖 Modbus						
🗉 🛲 Profinet IO						
🛛 Group by category 🔲 Display all v	ersions (for experts o	nly) 🗌 Display outda	ated versions			
Name: EtherNet/IP Scanner Vendor: 3S - Smart Software Sol Categories: EtherNet/IP Scanne Version: 3.5.14.10 Order Number: 1 Description: EtherNet/IP Scanne	utions GmbH rr			Ň		
Append selected device as last child of Ethernet  (You can select another target node in the navigator while this window is open.)						

Fig. 48: Adding an EtherNet/IP scanner

➡ The EtherNet/IP scanner appears as EtherNet\_IP\_Scanner (EtherNet/IP Scanner) in the project tree.

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#### Adding an Ethernet/IP adapter

- ▶ Right-click EtherNet\_IP\_Scanner (EtherNet/IP Scanner) in the project tree.
- Select Append device.
- Double-click **GEN-N**.

#### Add Device

tring for a fulltext search	Vendor:	<all vendors=""></all>		
Name	Vendor		Version	,
	Vendor		Version	
EtherNet/IP				
CDS2 Ethernet D Slave	Turck		Major Dovision - 16#2, Misor Do	
	Turck		Major Revision=16#2, Minor Re	vi
EtherNetID Adapter	26 - Smor	t Softwara Solutions CmbH	Major Revision=16#2, Minor Re	
	JJ - Jindi Turck	Contware Solutions GIIDH	Major Revision = 16#1, Minor Re	vi
	Turck		Major Revision - 16#2, Minor Re	vi
	Turck	an air air	Major Revision=10#2, Minor Re	VI
				۶.
Group by category 📃 Display all version	ns (for experts o	nly) 🗌 Display outdated v	ersions	
Name: GEN-N Vendor: Turck Categories: EtherNet/IP Remote Ada Version: Major Revision = 16#2, Minor Order Number: 100000129 Description: EtherNet/IP Target impo GEN-N	apter Revision = 16# orted from EDS Fi	7  e: GEN-N_03072019.eds Dev	vice:	
ppend selected device as last child of therNet_IP_Scanner				

Fig. 49: Adding an Ethernet/IP adapter

⇒ The Ethernet/IP adapter appears as **GEN-N** in the project tree.

The device is automatically created with an I/O data width of 492 bytes. The creation of input and output data to be exchanged with the CODESYS controller is not required. The controller tags are automatically created.



#### Setting the IP address of the EtherNet/IP adapter

- Double-click **GEN-N**.
- Set the IP address in the mask.

excom ethernet.project* - CODESYS			
<u>File Edit View Project Build Online Debug Tool</u>	s <u>W</u> indow <u>H</u> elp		
🎦 🖆 📕 🕘 🗠 여 김 🖻 🖻 🗙 🕍 😘 🕯	🎍 🌿   📾   🛅 - 🗗   🎬   😋 🥞	Ř → ■ 🕊 (j≡ f≡ č≡ t= Š   ⇔   🛣   ≓	- N.
Devices – 🖣 🗙	GEN_N X		
excom ethernet     excom ethernet     for the second	General Connections	Address Settings IP Address: 192 , 168 , 1 , 25	EthorNot/IP
Library Manager	Assemblies		Luenevir
🖻 🎆 Task Configuration	User-Defined Parameters	Electronic Keying Keying Options	
EtherNet_IP_Scanner.IOCycle 🗟 🕸 ENIPScannerServiceTask	EtherNet/IP I/O Mapping	Compatibility Check     Strict Identity Check	
EtherNet_IP_Scanner.Service	Status	Check Device Type 12	
	Information	Check Vendor Code 48	
EtherNet_IP_Scanner (EtherNet/IP Scanne		Check Product Code 20005	
		Check Major Revision 2	
		Check Minor Revision 7	
		Restore default values	

Fig. 50: Setting the IP address of the EtherNet/IP adapter

Reading out the signal



### NOTE

All signals are mapped under EtherNet/IP I/O Mapping in CODESYS and do not have to be created separately. The updating of the Enabled 2 (always in the bus cycle task) variables must be set.

To call up the I/O mapping, proceed as follows:

- Open the web server.
- Under Documentation, click EtherNet/IP Memory Map.



## Input data: Gateway – Status word

Description in the web server	Word offset	Bit offset	Bit length
Module Diagnostics Available	0	0	1
Modulebus Failsafe Mode Enabled	0	2	1
Station Configuration Changed	0	3	1
Overcurrent Isys	0	5	1
Overvoltage Field Supply UI	0	6	1
Undervoltage Field Supply UI	0	7	1
Overvoltage Field Supply Usys	0	8	1
Undervoltage Field Supply Usys	0	9	1
Modulebus Communication Lost	0	10	1
Modulebus Configuration Error	0	11	1
Modulebus Status Error	0	12	1
Modulebus Parameter Error	0	13	1
Force Mode Enabled	0	14	1

## Input data: Slot 0 – Station

Description in the web server	Word offset	Bit offset	Bit length
Gateway active	1	0	1
Gateway slot left	1	1	1
Gateway redundancy available	1	2	1
Right supply module available	1	3	1
Left supply module available	1	4	1
Starting up after watchdog-reset	2	1	1
ROM error	2	2	1
RAM error	2	3	1
EEPROM error	2	4	1
Err. power supply module 1	2	5	1
Err. power supply module 2	2	6	1
Starting up after a cold start	2	7	1
Red. switch has taken place	3	0	1
Redundant gateway is missing	3	1	1
Redundant gateway is not ready	3	2	1
Redundant gateway has an error	3	3	1
Red. gateway has no DP comm.	3	4	1
Different conf. (with red.)	3	5	1
Different fw (with redundancy)	3	6	1
Err. internal bus pas. (CAN-err.)	4	0	1
Err. internal bus (CAN error)	4	1	1



## Input data: Slot 1 – DM80-N S

Description in the web server	Word offset	Bit offset	Bit length
Digital in-/output 1: Value	5	0	1
Digital in-/output 1: Status	5	8	1
Digital in-/output 2: Value	5	1	1
Digital in-/output 2: Status	5	9	1
Digital in-/output 3: Value	5	2	1
Digital in-/output 3: Status	5	10	1
Digital in-/output 4: Value	5	3	1
Digital in-/output 4: Status	5	11	1
Digital in-/output 5: Value	5	4	1
Digital in-/output 5: Status	5	12	1
Digital in-/output 6: Value	5	5	1
Digital in-/output 6: Status	5	13	1
Digital in-/output 7: Value	5	6	1
Digital in-/output 7: Status	5	14	1
Digital in-/output 8: Value	5	7	1
Digital in-/output 8: Status	5	15	1
Module error	6	0	1
Wrong module	6	1	1
Missing module	6	2	1
Parameter not plausible (inconsistent)	6	6	1
Error channel 1	6	8	1
Error channel 2	6	9	1
Error channel 3	6	10	1
Error channel 4	6	11	1
Error channel 5	6	12	1
Error channel 6	6	13	1
Error channel 7	6	14	1
Error channel 8	6	15	1

## Input data: Slot 2 – D040-N

Description in the web server	Word offset	Bit offset	Bit length
Module error	7	0	1
Wrong module	7	1	1
Missing module	7	2	1
Parameter not plausible (inconsistent)	7	6	1
Error channel 1	7	8	1
Error channel 2	7	9	1
Error channel 3	7	10	1
Error channel 4	7	11	1



## Input data: Slot 3 – AIH40-N

Description in the web server	Word offset	Bit offset	Bit length
Analog input 1: Value	8	0	15
Analog input 1: Status	8	15	1
Analog input 2: Value	9	0	15
Analog input 2: Status	9	15	1
Analog input 3: Value	10	0	15
Analog input 3: Status	10	15	1
Analog input 4: Value	11	0	15
Analog input 4: Status	12	15	1
Module error	12	0	1
Wrong module	12	1	1
Missing module	12	2	1
Parameter not plausible	12	6	1
(inconsistent)			
Error channel 1	12	8	1
Error channel 2	12	9	1
Error channel 3	12	10	1
Error channel 4	12	11	1
Error HART channel 1	12	12	1
Error HART channel 2	12	13	1
Error HART channel 3	12	14	1
Error HART channel 4	12	15	1

## Input data: Slot 4 – AOH40-N

Description in the web server	Word offset	Bit offset	Bit length	
Module error	13	0	1	
Wrong module	13	1	1	
Missing module	13	2	1	
Parameter not plausible (inconsistent)	13	6	1	
Error channel 1	13	8	1	
Error channel 2	13	9	1	
Error channel 3	13	10	1	
Error channel 4	13	11	1	
Error HART channel 1	13	12	1	
Error HART channel 2	13	13	1	
Error HART channel 3	13	14	1	
Error HART channel 4	13	15	1	

## Output data: Slot 0 – Station

Description in the web server	Word offset	Bit offset	Bit length
Red switching	1	0	2



## Output data: Slot 1 – DM80-N S

Description in the web server	Word offset	Bit offset	Bit length
Digital in-/output 1: Value	2	0	1
Digital in-/output 2: Value	2	1	1
Digital in-/output 3: Value	2	2	1
Digital in-/output 4: Value	2	3	1
Digital in-/output 5: Value	2	4	1
Digital in-/output 6: Value	2	5	1
Digital in-/output 7: Value	2	6	1
Digital in-/output 8: Value	2	7	1

## Output data: Slot 2 – DO40-N

Description in the web server	Word offset	Bit offset	Bit length
Digital output 1: Value	2	8	1
Digital output 2: Value	2	9	1
Digital output 3: Value	2	10	1
Digital output 4: Value	2	11	1

## Output data: Slot 4 – AOH40-N

Description in the web server	Word offset	Bit offset	Bit length
Analog output 1: Value	3	0	15
Analog output 2: Value	4	0	15
Analog output 3: Value	5	0	15
Analog output 4: Value	6	0	15



## Loading and starting CODESYS projects



The WIN V3-PLC must be started.

	Start PLC
9	Stop PLC
I	Exit PLC Control
,	About
m	•
	^

Fig. 51: Starting the WIN V3-PLC

► Compile the project via Create → Compile or press [F11].

excom ethernet.project* - CODESY	ſS								
e Edit <u>V</u> iew Project <u>B</u> uild <u>O</u> r	nline <u>D</u> ebug <u>T</u> ools	Window Help							
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Clea	in <u>a</u> ll	Slave Channel	Variable	Mapping	Channel	Address	lype	Unit	Description
			<b>■</b> • <b>₩</b>		Channel 1	%IW0	ARRAY [00] OF WORD		Read Input Registers
		Modbus Slave Init	H- 19		Channel 1[0]	%IW0	WORD		0x0005
Task Configuration			- *		Bit0	%IX0.0	BOOL		
MainTack /IEC	Tacks	ModbusTCPSIave Parameters			Bit1	%IX0.1	BOOL		
	-10060)	MedhusTCDSIave I/O Magazing	- · · · · ·		Bit2	%IX0.2	BOOL		
Ethernet (Ethernet)		Houbus revisive the mapping			Bit3	%IX0.3	BOOL		
Modus TCP Master (	(Modbue TCP Maeter	Status			Bit4	%IX0.4	BOOL		
Modbus TCP Slav	e (Modbus TCP Slave	Information			Bit5	%IX0.5	BOOL		
					Bitb	%LX0.6	BOOL		
					Bit/	%LX0.7	BOOL		
					Bit8	%IX1.0	BOOL		
					Bit9	%IX1.1	BOOL		
					Bit10	%IX1.2	BOOL		
					Bit11	%IX1.3	BOOL		
					Bit12	%IX1.4	BOOL		
					Bit13	%IX1.5	BOOL		
					BIT14	%IX1.6	BOOL		
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Fig. 52: Compiling the project





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Fig. 53: Online – logging in





• Start the program via **Debug**  $\rightarrow$  **Start**.

Fig. 54: Starting the program



# 8 Redundancy strategies

### 8.1 Topology

The general topology of the Turck-specific system redundancy with the Ethernet protocols EtherNet/IP, Modbus TCP and PROFINET is structured as follows:





Fig. 55: System redundancy with one master and two gateways

Fig. 56: System redundancy with two masters and two gateways

The system redundancy with one master and two gateways is a Turck-specific, parameterizable redundancy function of the excom system. The two gateways are provided here with separate IP addresses. The separate IP addresses are used to set up independent communication. The gateways communicate the input data and receive the output data via the IP addresses. One gateway is the primary gateway while the second gateway acts as a backup. If the primary gateway fails, a bumpless switchover to the backup gateway is carried out automatically. The redundancy function makes it possible to implement interruption-free communication. The output word of the gateway enables the forcing of a redundancy switchover.

When system redundancy is implemented with two masters and two gateways, two independent Ethernet masters communicate with the associated gateway. Both masters can be controlled via one or two process control system controllers. The process data is processed via two separate and independent Ethernet connections to the excom system.

### PROFINET system redundancy

The PROFINET system redundancies are specified by the PNO (PROFIBUS user organization). The specification distinguishes between the following redundancy topologies which are currently available for the Turck-excom system:

- PROFINET S1 represents system redundancy with one master and one gateway. A ring topology can be set up via the two Ethernet interfaces of the gateway for increased availability.
- PROFINET S2 represents system redundancy with two masters and one gateway. Each individual Ethernet interface of the gateway can be connected to a master.



## 8.2 Redundancy setup



Both gateways must have the same configuration, parameterization and firmware.

The Redundancy mode gateway parameter must be set for system redundancy.

### 8.3 System redundancy



NOTE

System redundancy via PROFINET is in the form of application redundancy.



Both gateways must have the same configuration, parameterization and firmware.

If the **Redundancy mode** parameter is set to **System redundancy** in the DTM, web server or control system, the excom station operates in system redundancy mode. Both gateways communicate with their respective master. The PRIO LED is lit on the active gateway. The active gateway takes over the output data transferred by the master and sends this to the output modules.

The gateway communicating with the secondary master ignores the received output data as the secondary module does not have write access to the output modules.

The gateway is provided with one input word and one output word for monitoring redundancy. The input word describes the current state of the gateway.

The output word is used for the manual redundancy switchover in the master. It is possible to switch in the process control system from the primary gateway to the secondary gateway. A switchover is carried out in response to the following events:

- The primary gateway was removed.
- Communication to the primary gateway was interrupted. The outputs are set to 0 until the switchover to the other gateway is completed. After the timer for interrupted connections has elapsed, the switchover to the other gateway is carried out.

After a switchover, an automatic switchover to the former primary gateway is no longer carried out.

When the excom system is started, the gateway on the left starts to operate as the primary gateway. If communication with the left gateway fails, the gateway on the right tries to establish primary communication.

#### Assignment of the gateway process data bits

1

The input word of the gateway process data is used to view the gateway and system redundancy of the excom station:

	BIT	JIC						
Status bit	7	6	5	4	3	2	1	0
0	Not used			Left power sup- ply module	Right power sup- ply module	Gateway redund- ancy	Gateway slot	Redund- ancy status
1	Not used							

Т



### Meaning of the gateway process data bits

Designation	Meaning				
Left power supply unit	0: Left power supply unit not present				
	1: Left power supply unit fitted				
Right power supply unit	0: Right power supply unit not present				
	1: Right power supply unit fitted				
Gateway redundancy	0: Redundant gateway or redundant communication not available				
	1: Redundancy available				
Slot	0: Gateway is located on the right slot (GW2)				
	1: Gateway is located on the left slot (GW1)				
Active/ passive	0: Gateway is passive				
	1: Gateway is active				

## Assignment of the command bits

The output word of the gateway makes it possible to force a redundancy switchover in the "Red switching" web server:

	Bit	Bit									
Byte	7	6	5	4	3	2	1	0			
0	Not used					Control bit	Redund- ancy switchover is initiated	Activation of the right or left gate- way			
						Control bits change	for edge				
1	Not used					÷					

Meaning of the command bits

Designation	Meaning	
Bit 2 = 0 Redundancy switchover is initiated	11 $\rightarrow$ 01: Receiver is the passive gateway. The passive gateway requests control from the active gateway and becomes active.	
	11 $\rightarrow$ 10: Receiver is the active gateway. The active gateway gives control to the passive gateway and becomes passive.	
Bit 2 = 1 Activation of the right or left gateway	11 $\rightarrow$ 01: Receiver is the left gateway. The left gateway requests control from the right gateway and becomes active.	
	11 $\rightarrow$ 10: Receiver is the right gateway. The right gateway requests control from the left gateway and becomes active.	

From gateway firmware version 1.4, the gateways support PROFINET S2 redundancy.



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