

GX-CL140 ModbusTCP coupler with CoDeSys



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1. Solution

1.1 Install "CoDeSys V3"

Download "CoDeSys V3.5 Patch 4" demo version, available on:

http://www.3s-software.com/index.shtml?en_download

Start "setup.exe" and follow installation instructions.

Take care that both products "IDE" and "SoftPLC" will be installed.

1.2 Create a new project

Select "Menu -> File -> New Project..." or press [Ctrl] + N.

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	ojects	Empty project	HMI project	Standard project	Standard project w	
A project co	ontaining one device, one ap	plication, and an e	empty implement	tation for PLC_	PRG	
<u>N</u> ame	Untitled8					
<u>L</u> ocation	C:\Users\youdo.yu\Docum	ents			×	•
				ОК	Cancel	

Fig1.1 Create a new project

Select "Standard project" and assign name and storage folder.

Afterwards press button "OK"



Standard	Project		×
	You are abou objects withi - One program - A program F - A cyclic task - A reference	It to create a new standard project. This wizard will create the following n this project: mmable device as specified below PLC_PRG in the language specified below < which calls PLC_PRG to the newest version of the Standard library currently installed.	
	Device	CODESYS Control Win V3 x64 (3S - Smart Software Solutions GmbH)	\sim
	PLC_PRG in	Ladder Logic Diagram (LD)	~
		OK Cancel	

Fig1.2 Create a new project

Select "CoDeSys Control Win V3 x64" as target device and programming language for PLC_PRG. Afterwards press button "OK".



Fig1.3 Create a new project



1.3 Add ModbusTCP device

Open background menu with a right mouse button click on "Device(CoDeSys

Control Win V3 x64)"

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Fig1.4 Add ModbusTCP device

Select "Add Device ...".

ame Ethernet					
Action					
Append device) Plug device O	Update device			
String for a full text search	Vendor	<all vendors=""></all>			
Name	Vendor		Version	Description	
E Fieldbuses					
the CANbus					
Ethernet Adapter					
Ethernet	3S - Smart Softwar	re Solutions GmbH	3.5.16.0	Ethernet Link.	ľ
🛎 👄 EtherNet/IP					
Home&Building Automation					

Fig1.5 Add ModbusTCP device

Select "Ethernet" and press button "Add Device". Afterwards leave dialog with a click on button "Close".



The wizard adds the ModbusTCP device to control it.

Ethernet X			
General	Network interface		
Log	IP address	192 . 168 . 0 . 1	
Status	Subnet mask	255 . 255 . 255 . 0	
Ethernet Device I/O Mapping	Default gateway Adjust operating	0 . 0 . 0 . 0 system settings	
Ethernet Device IEC Objects			
Information			

Fig1.6 Add ModbusTCP device

Press browse to select the network adapter. Make sure the gateway is active and the path to the soft plc is activated.

Select Network Adapte	er	
MAC address	Name	Description
- B40EDE94585D	藍牙網路連線	Bluetooth Device (Personal Area Network)
F02F74A35E2B	乙太網路	Intel(R) Ethemet Connection (10) I219-V
B60EDE945859	\Device\NPF_{7D031008-3BDD-49B0-A52C-CEA3D657884E}	Microsoft
B40EDE945859	\Device\NPF_{0025F806-B98F-4003-B941-59F699CD658A}	Microsoft
		OK Abort

Fig1.7 Select Network Adapter



Open background menu with a right mouse button click on

"Ethernet(Ethernet)"

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File Edit Vie	w Pro	ject	Build Online	Debug	Tools	Window	Help								₹
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□ 🗿 Untitled8			•										-		
B- Device (Co	DESYS C	ontro	ol Win V3 x64)	General			Net	work interface							
	ogic policatio	n		Log			IP a	ddress	192 . 168 . (0.1					
-1	Library	Mani	ager	Onter			Sub	onet mask	255 . 255 . 2	55.0					
	PLC_PR	G (P	RG)	Status			Def	ault gateway	0.0.0	0.0					
	Task Co	nfigi	uration	Ethernet	Device I	/O Mapping		Adjust operating	evetem settings						
	- di	J	k (LEC-Tasks)			EC Objects		Aujust operating	system settings						
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	4		Properties		_										
	10	1 1 7 1	Add Object												
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			Disable Device												
			Update Device												
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Sevices 🗋 POUs			Import mappings fr	om CSV	e	rior(s), 0 warni	ing(s), 0 mes	saye(s)		 Owarning(s) 	0 message	a x x			
			Export mappings to	CSV				Las	t build: 🖸 0 🕐 0	Precompile		Project user: (nob	ody)	0	۵ 🕜

Fig1.8 Add ModbusTCP device

Select "Add Device ..."

f Add Device			×					
Name Modbus_TCP_Master Action Insert device Append device Insert device	ug device O Update device							
String for a full text search	Vendor <all vendors=""></all>		~					
Name Fieldbuses Chernet/IP Modbus Modbus Modbus TCP Master	Vendor	Version	Description					
Modbus TCP Master 3S - Smart Software Solutions GmbH 3.5.16.0 A device that we								
 ✓ Group by category □ Display all versio 	ns (for experts only) 🗌 Displa	ay outdated versions	>					

Fig1.9 Add ModbusTCP device

Select "Modbus TCP Master" and press button "Add Device".

Afterwards leave dialog with a click on button "Close".



1.4 Add ModbusTCP-Slave device

Open background menu with a right mouse button click on

"Modbus_TCP_Master (Modbus_TCP_Master)"

Untitled8.project* - CODESYS					-	٥	×
File Edit View Project Build	On	line	Debug Tools Window	Help			
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□ Untitled8		-		Madhur TCD			
Device (CODESYS Control Win V3 x6-	4)		General				
PLC Logic			ModbusTCPMaster I/O Mapping	Response timeout (ms) 1000 🚖			
Library Manager				Socket timeout (ms) 10 🜩			
PLC_PRG (PRG)			ModbusTCPMaster IEC Objects	Auto-reconnect			
🖃 🌃 Task Configuration			ModbusTCPMasterParameters				
🖻 🥩 MainTask (IEC-Task	s)						
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	6	Add	Folder				
	_	Add	Device				
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		Expo	ert mappings to CSV	Last build: O 0 1 0 Precompile V)	6	0

Fig1.10 Add ModbusTCP-Slave device

Select "Add Device ..."

Add Device				×
Name Modbus_TCP_Slave				
Action				
Append device	Plug device Ol	Jpdate device		
String for a full text search	Vendor	<all vendors=""></all>		~
Name	Vendor		Version	Description
Fieldbuses				
Modbus				
Modbus TCP Slave	3S - Smart Softwa	are Solutions GmbH	3.5.16.0	A generic Modbus c
				-
4		_		
Group by category Display all ver	sions (for experts o	only) 🗌 Display ou	tdated version	ns

Fig1.11 Add ModbusTCP-Slave device

Select "Modbus TPC Slave" and press button "Add Device".

Afterwards leave dialog with a click on button "Close".



1.5 Assign variables

Modbus Channel		×
Channel		
Name	Channel 2	
Access type	Read Holding Registers (Function Code 3) $\qquad \qquad \lor$	
Trigger	Cyclic ~ Cycle time (ms) 100	
Comment		
READ Register		
Offset	0x3000 ~	
Length	1	
Error handling	Keep last value \checkmark	
WRITE Register		
Offset	0x0000 ~	
Length	1	
	OK Cancel	

Choose the Modbus_TCP_Slave. Add ModbusTCP Slave Channel

Fig1.12 Add ModbusTCP Slave Channel

Assign variables to the ModbusTCP Slave Channel

evices - 4 ×	Ethernet Modbus	TCP_Master Mo	dbus_TCP_Slave 🗙	PLC_PRG		•	ToolBox
Untitled8 Via Untitled8 Via Via Via Via Via Via Via Via Via	General	Find Filter Show all					
BUCLogic Application	Modbus Slave Channel	Variable	Mapping	Channel Channel 0	Address %IW0	Type ARRAY [00] OF WO	
Library Manager Libr	Modbus Slave Init		in D.C. "	Channel 0[0]	%IW0	WORD	
Task Configuration	ModbusTCPSlave Parameters		JON.PLC Ø	Bit1	%IX0.1	BOOL	
PLC_PRG	ModbusTCPSlave I/O Mapping	- *		Bit2 Bit3	%IX0.2 %IX0.3	BOOL BOOL	
Ethernet (Ethernet)	ModbusTCPSlave IEC Objects	- *>		Bit4 Bit5	%IX0.4 %IX0.5	BOOL BOOL	
Modbus_TCP_Slave (Modbus TCP	Status	-*		Bit6	%IX0.6	BOOL	
	Information			Bit8	%IX0.7 %IX1.0	BOOL	
		- *>		Bit9 Bit10	%IX1.1 %IX1.2	BOOL BOOL	
		- *>		Bit11 Bit12	%IX1.3	BOOL	
				Bit13	%IX1.5	BOOL	
				Bit14 Bit15	%IX1.6 %IX1.7	BOOL	
		< K.		d	2/01/0		
			Reset Ma	apping Alw	ays update var	riables Use parent dev	

Fig1.16 Assign variables



2. Modbus rules

Function Code	Details	Unit	
0x01	Read Coils	byte	
0x02	Read Discrete Inputs	byte	
0x03	Read Holding Registers	Word	
0x04	Read Input Registers	Word	
0x05	Write Single Coil	byte	
0x06	Write Single Register	Word	
0x0F	Write Multiple Coils	byte	
0x10	Write Multiple registers	Word	

2.1 Modbus Function Code Information

2.2 Modbus Starting Address Allocation, Sizes and Corresponding FC

IO modules assigned by the coupler are sorted based on the module order. Digital and analog module's locations are assigned separately based on the module order with the station numbers assigned at the rail. Digital inputs and outputs have the initial value of 0x0000 and can read 8192bit of data. Analog input modules have the initial value of 0x3000 and can read 512Words of data while analog output modules have the initial value of 0x4000 and can read 512Words of data. Error codes' initial value is 0xE000 and can read 6Words of data.

Register	ADDR	Funtion Code(FC)	Size	
1x Discrete Input	0x0000	02	8192Bits	
Tx_Discrete input	0x1000	03 \ 04	512Words	
	0x0000	01 • 05 • 0F	8192Bits	
	0x2000	03 \ 10	512Words	
3x_Input Register	0x3000	03 • 04	512Words	
4x_Holding Register	0x4000	03 • 06 • 10	512Words	
System Diagnosis	0xE000	03 • 04	6 Words	



Register	ADDR	Corresponding Control Modules		
1x_Discrete Input	0x0000	DIxxN \ DIxxP \ CM111(SubM_read_xxBit \		
	0x1000	SubMS_Status_xxDev SubS_read_xxByte)		
	0x0000	DQxxN \ DQxxP \		
0x Coil		CM111(SubM_write_xxBit >		
	0x2000	SubM_Control_Output_xxDev >		
		SubS_write_xxByte)		
	0x3000	AIxxV 、 AIxxC 、 RT200 、 TC200 、 HC100 、 CM111(SubM_Read_xxWords 、 SubMS_ErrorInfo_xxDev 、		
3x Input Pagister				
5x_input Kegister				
		SubM_Polling_Time(ms) SubS_Read_xxWords)		
Av. Holding Degister	gister 0x4000	AQxxV · AQxxC · HC100 · CM111		
4x_notating Register		(SubM_Write_xxWords、SubS_Write_xxWords)		

Register Address and the List of Supported Control Modules:

Illustration: If the coupler scans and finds 9 modules on the rail as below:









Slot	Module	Data Length	Bit ADDR 排序		Bit ADDR Sorting Word ADDR Sorting		
ID			Input Address	Output Address	Input Address	Output Address	
1	DI	1	0x0000~ 0x000F		0x1000		
2	DQ	1		0x0000~ 0x000F		0x2000	
3	AI	4			(CH1) 0x3000 (CH2) 0x3001 (CH3) 0x3002 (CH4) 0x3003		
4	AQ	4				(CH1) 0x4000 (CH2) 0x4001 (CH3) 0x4002 (CH4) 0x4003	
5	DI	1	0x0010~ 0x001F		0x1001		
6	DQ	1		0x0010~ 0x001F		0x2001	
7	AI	4			(CH1) 0x3004 (CH2) 0x3005 (CH3) 0x3006 (CH4) 0x3007		
8	AQ	4				(CH1) 0x4004 (CH2) 0x4005 (CH3) 0x4006 (CH4) 0x4007	
9	СМ	1	0x0020~ 0x002F		0x1002		
	СМ	2		0x0020~ 0x003F		0x2002 0x2003	
	СМ	2			0x3008 0x3009		
	СМ	2				0x4008 0x4009	

Modules assignments are listed below based on different types of sorting: