User Manual

iR-ETN

This guide walks through important information about iR-ETN

UM018002E_20191014

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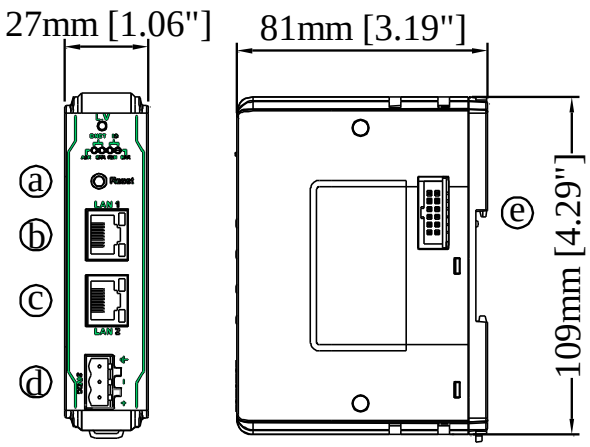
1. Product Overview



a	Reset Button	*e*	Expansion Connector
b	Ethernet Port LAN 1		
c	Ethernet Port LAN 2		
d	Power Connector		

2. Specifications

Communication Interface Specifications		
Model	iR-ETN	
Expansion I/O Module	Number of Bus Terminals	Depends on Power Consumption
	Digital Input Point	Max. 512
	Digital Output Point	Max. 256
	Analog Input Channel	Max. 64
	Analog Output Channel	Max. 64
Indicators	ENET ACK (Green)	Device Status Indicator
	ENET ERR (Red)	Device Error Indicator
	L.V (Red)	Low Voltage Status Indicator
	IO RUN (Green)	Module Status Indicator
	IO ERR (Red)	Module Error Indicator
Data Transfer Rate	10/100 Mbps	
Data Transfer Medium	4 x 2 twisted pair copper cable; category 3 (10 Mbps), category 5 (100 Mbps)	
Distance Between Stations	100 m between hub/switch and Bus Coupler or between Bus Coupler and Bus Coupler	
Protocol	Modbus TCP/IP	
Max. Number of TCP/IP Connections	8	
Topology	line or star wiring	
General Specification		
Power	Power Supply	24 VDC (-15%/+20%)
	Power Dissipation	Nominal 100mA @ 24VDC
	Current for-Internal Bus	Max 2A @ 5VDC
	Current Consumption	220mA @ 5VDC
	Electrical Isolation	Network to Logic : Isolation Logic to Field power : Isolation
	Back-up Fuse	≤ 1.6A Self-recovery
Specification	PCB Coating	Yes
	Enclosure	Plastic
	Dimensions WxHxD	27 x 109 x 81 mm
	Weight	Approx. 0.15 kg
	Mount	35mm DIN rail mounting
Environment	Protection Structure	IP20
	Storage Temperature	-20° ~ 70°C (-4° ~ 158°F)
	Operating Temperature	0° ~ 55°C (32° ~ 131°F)
	Relative Humidity	10% ~ 90% (non-condensing)
	Vibration Resistance	conforms to EN 60068-2-6 / EN 60068-2-27
Certification	EMC Immunity	Conforms to EN 55032: 2012+AC: 2013, Class A EN 61000-6-4: 2007+A1:2011 EN 55024: 2010+A1: 2015 EN 61000-6-2:2005

3. LED Indicators

3.1 L.V LED

L.V LED state	Description
OFF	24V power normal
Blinking	Detect 24V power
ON	24V power error

3.2 IO RUN/ERR LED

RUN LED	ERR LED	Description
OFF	OFF	Power off or no power
Blinking	OFF	IO initiating
Blinking	ON	IO initiation error
ON	OFF	IO working
ON	Blinking	IO module alarm
ON	ON	IO communication fault
Blinking	Blinking	Exceeding power limit or too many modules

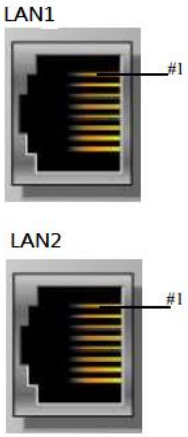
3.3 ENET RUN/ERR

Run LED	Err LED	Description
OFF	OFF	Power off or no power
Blinking	OFF	Modbus TCP communicating
ON	OFF	The device is in the OPERATIONAL state
OFF	ON	Hardware error, communication fault
ON	Blinking	Reset button is triggered

3.4 RJ45

Speed LED	
OFF	Operating as a 10-Mbps connection
Green ON	Operating as a 100-Mbps connection
LINK /ACT LED	
OFF	No link is established.
Blinking	There is activity on this port.

4. RJ45 Interface



RJ-45	Signal Name	Descriptions
1	TD+	Transmit +
2	TD-	Transmit +
3	RD+	Receive +
4	****	
5	****	
6	RD-	Receive -
7	****	
8	****	
Case	Shield	

5. Reset Button

Press and hold the reset button for more than 2 seconds after the unit starts running properly, and wait until ENET ERR LED blinks. The default parameters are shown below, the settings will take effect after cold reset.

Item	Description	Default
1	IP Address	192.168.0.212
2	Netmask	255.255.255.0

6. MODBUS/TCP IP Address Setup

6.1 Reset Button

Item	Description	Default
1	IP Address	192.168.0.212
2	Netmask	255.255.255.0

6.2 MODBUS Mapping

6.2.1 Bit Mapping

Parameter	Start address		Read/Write	Function Code
	Dec	Hex		
Digital Input	0~511	0000~ 01FF	Read	2
	800~863	0320~ 035F	Read	3,23
Digital Output	0~511	0000~ 01FF	Read	1
	0~511	0000~ 01FF	Write	5,15
	864~927	0360~ 039F	Write	6,16,23

6.2.2 Register Mapping

Parameter	Start address		Read/Write	Function Code
	Dec	Hex		

Analog Input	0~255	0000~ 00FF	Read	3,4,23
Analog Output	256~511	0100~ 01FF	Read	3,23
			Write	6,16,23
Registers	----------		Read	3,4,23
	---------		Write	6,16,23

7. Registers

7.1 TCP/IP Register

Address		Read/Write	Data Size	Description
Dec	Hex			
1000	03E8	Read	3word	(MAC-address).Ethernet physical address If 00-0C-26-01-02-03, then 0x000C, 0x2601, 0x0203.
1003	03EB	Read/Write	2word	IP address if 192.168.0.212, then 0xC0A8, 0x00D4.
1005	03ED	Read/Write	2word	subnet mask if 255.255.255.0, then 0xFFFF, 0xFF00

*TCP/IP Register Settings will take effect after cold reset or after giving Device Reset Warm command.

7.2 Device Information Register

Address		Read/Write	Data size	Description
Dec	Hex			
3000	0BB8	Read	4word	Vendor name string 8 char: “weintek” (ASCII)
3004	0BBC	Read	1word	Product Code of iR-ETN is 0x0702
3005	0BBD	Read	1word	Firmware revision V1.23.4, 0x1234
3006	0BBE	Read	1word	Hardware revision V1.23.4, 0x1234
3007	0BBF	Read	1word	Power consumption unit mW
3008- 3023	0BC0- 0BCF	R/W	16word	Product name, default=“iR-ETN” (ASCII)

7.3 iBus Information Register

Address		Read/Write	Data size	Description
Dec	Hex			
10000	2710	Read	1word	Slot 0 Product code (iR-ETN)
10001	2711	Read	1word	Slot 1 Module Product code
10001~ 10016	2712~ 2720	Read	1word	Slot 2~Slot 16 Module Product code
10033	2731	Read	1word	Number of modules
10035	2733	Read	1word	Number of points of Digital Input
10036	2734	Read	1word	Number of points Digital Output
10037	2735	Read	1word	Number of Analog channels of Input register
10038	2736	Read	1word	Number of Analog channels of Output register
10045	273D	Read/Write	1word	0: ibus stops when one of the modules is disconnected. 1: ibus continues running when one of the modules is disconnected.

7.4 Module Information Register

The data size of the information register of each module is 100word. If the first module starts from address 30000 to 30099, then the second module starts from address 30100 to 30199, and so on.

Address		Read/Write	Data size	Description
Dec	Hex			
30000 ~30099	7530~ 7594	Read	100word	Module information of Slot 1
30100 ~31599	7535~ 7B6F	Read	100word	Module information of Slot 2~16

Ex: Module information of slot 1

Address		Read/Write	Data size	Description
Dec	Hex			
30000	7530	Read	1word	Module product code, please see Product Code List.
30001	7531	Read	1word	Module firmware version V1.23.4, value 0x1234
30002	7532	Read	1word	Module hardware version V1.23.4, value 0x1234
30003	7533	Read	1word	Power consumption unit mW
30038	7556	Read	1word	Number of points of Digital Input
30039	7557	Read	1word	Number of points Digital Output
30040	7558	Read	1word	Number of Analog channels of module
30041	7559	Read	1word	Number of Analog channels of module

7.5 Module Register

Each module has its own parameters; please see the corresponding manual of the module used. The maximum total data size of the registers is 500word. If the first module starts from address 20000 to 20499, then the second module starts from address 20500 to 20999, and so on.

Address		Read/Write	Data size	Description
Dec	Hex			
20000 ~20499	4E20~ 5013	Read	500word	Module information of Slot 1
20500 ~27999	5014~ 6D5F	Read	500word	Module information of Slot 2~16

7.6 Product Code List

Item	Product	Code
1	iR-DI16-K	0x0154
2	iR-DM16-P	0x0351
3	iR-DQ16-P	0x0251
4	iR-DM16-N	0x0352
5	iR-DQ16-N	0x0252
6	iR-DQ08-R	0x0243
7	iR-AQ04-VI	0525h
8	iR-AI04-VI	0425h

9	iR-AM06-VI	0635h
10	iR-AI04-TR	0426h
11	iR-COP	0x0701
12	iR-ETN	0x0702

7.7 Special Register

Address		Read/Write	Data size	Description
Dec	Hex			
5000	1388	Read	1word	Device Error code
5001	1389	Read	1word	Reserved
5002	138A	Read	1word	Slot1~16 of Module disconnect
5100~ 5612	13EC~ 15EC	Read/Write	512word	Setting the time filter (digital input, unit: ms). The time filter is disabled when it is set to less than 5ms. The time filter remains at 1000ms when it is set to longer than 1000ms. (digital input 0-511)
6000	1770	Write	1word	Device Command 0x5269：Reset iBus 0x5250：Parameter to default without TCP/IP 0x5257：Device Reset Warm

7.8 Life Guarding Register

If the communication was missing for longer than the Life Guarding Time, a Life Guard Event is indicated. The output behavior is determined by whether Error Mode is enabled or disabled. Enabling Error Mode will output an Error Value when an event occurs. Disabling Error Mode will keep the last value (for both digital and analog).

Address		Read/Write	Data size	Description	
Dec	Hex				
6100	17D4	Read/Write	1word	Life Guarding Time, unit: ms, 0: Disabled	
6101	17D5	Read/Write	1word	Digital Output Error Mode (bit15-0)	0:Keep last value 1:Error value
6102	17D6	Read/Write	1word	Digital Output Error Mode (bit31-16)	
.....	.....	.....	.....	.....	
6132	17F4	Read/Write	1word	Digital Output Error Mode (bit511-495)	
6133	17F5	Read/Write	1word	Digital Output Error Value (bit15-0)	0:Low 1:High
6134	17F6	Read/Write	1word	Digital Output Error Value (bit31-16)	
.....	.....	.....	.....	.....	
6164	1814	Read/Write	1word	Digital Output Error Value (bit511-495)	
6165	1815	Read/Write	1word	Analog Output Error Mode (channel 15-0)	0:Keep last value 1:Error value
6166	1816	Read/Write	1word	Analog Output Error Mode (channel 31-16)	
6167	1817	Read/Write	1word	Analog Output Error Mode (channel 47-32)	
6168	1818	Read/Write	1word	Analog Output Error Mode (channel 63-48)	
6169~ 6232	1819~ 1858	Read/Write	64word	Analog Output Error Value (channel 63-0)	-32768~32768

7.9 The Default Value

Address		Read/Write	Data size	Description	Default
Dec	Hex				
3008-3023	0BC0-0BCF	Read/Write	16word	Product name	“iR-ETN”
5100~5612	13EC~15EC	Read/Write	512word	Setting the time filter (Digital input 0-511)	0
6100	17D4	Read/Write	1word	Life Guarding Time	0
6101-6132	17D4-17F4	Read/Write	32 word	Digital Output Error Mode	0xFF
6133-6164	17F5-1814	Read/Write	32 word	Digital Output Error Value	0
6165-6168	1815-1818	Read/Write	4word	Analog Output Error Mode	0xFF
6169-6232	1819~1858	Read/Write	64word	Analog Output Error Value	0

※ After pressing [Reset] button, the Default Value will be filled into corresponding registers.

7.10 Device Error Code List

Refer to 7.7 special register address 5000/1388H

Bit Number	Description
Bit0	Low power alarm
Bit1	iBus initialization fault
Bit2	Hardware error
Bit3	Module lost connection
Bit4	Module alarm
Bit5	Number of iBus exceeds 16
Bit6	Power consumption exceeded at iBus system
Bit7~15	Reserved

8. Example of Mapping

The following is an example showing that when iR-ETN is connected with multiple modules, the address mapping and input/output bit mapping can be as follows:

item	Product
Slot#1	iR-DI16-K
Slot#2	iR-DQ16-P
Slot#3	iR-DM16-P
Slot#4	iR-DQ08-R
Slot#5	iR-AI04-VI
Slot#6	iR-AQ04-VI

8.1 iBus Information Register

Address		Description	Value
Dec	Hex		
10000	2710	Slot 0 Product code (iR-ETN Device)	0x0702 (iR-ETN)
10001	2711	Slot 1 Product code (Module)	0x0154 (iR-DI16-K)
10002	2712	Slot 2 Product code (Module)	0x0251 (iR-DQ16-P)
10003	2713	Slot 3 Product code (Module)	0x0351 (iR-DM16-P)
10004	2714	Slot 4 Product code (Module)	0x0243 (iR-DQ08-R)
10005	2714	Slot 5 Product code (Module)	0243h (iR-AI04-VI)
10006	2714	Slot 6 Product code (Module)	0243h (iR-AQ04-VI)
10033	2731	Number of modules	6
10035	2733	Point of Digital Input	24
10036	2734	Point of Digital Output	32
10037	2735	Channels of register input	4
10038	2736	Channels of register output	4

8.2 Digital Input Bit Mapping to Modbus

Slot	Module	Bit offset (0x0000~0x0017)	Function Code
Slot#1	iR-DI16-K	0x0000~0x000F (Digital Input 0~15)	2
Slot#2	iR-DQ16-P	N/A	
Slot#3	iR-DM16-P	0x0010~0x0017 (Digital Input 0~7)	2
Slot#4	iR-DQ08-R	N/A	

8.3 Digital Output Bit Mapping to Modbus

Slot	Module	Bit offset (0x0000~0x0027)	Function Code
Slot#1	iR-DI16-K	N/A	
Slot#2	iR-DQ16-P	0x0000~0x000F (Digital Output 0~15)	5, 15
Slot#3	iR-DM16-P	0x0010~0x0017 (Digital Output 0~7)	5, 15
Slot#4	iR-DQ08-R	0x0018~0x001F (Digital Output 0~7)	5, 15

8.4 Analog Input Mapping to Modbus

Slot	Module	Description	Address	Function Code
Slot#5	iR-AI04-VI	Channel 0 analog input	0	3, 4, 23
		Channel 1 analog input	1	
		Channel 2 analog input	2	
		Channel 3 analog input	3	

8.5 Analog Output Mapping to Modbus

Slot	Module	Description	Address	Function Code
Slot#6	iR-AQ04-VI	Channel 0 analog output	256	6, 16, 23

		Channel 1 analog output	257	
		Channel 2 analog output	258	
		Channel 3 analog output	259	

8.6 Module Register Mapping to Modbus

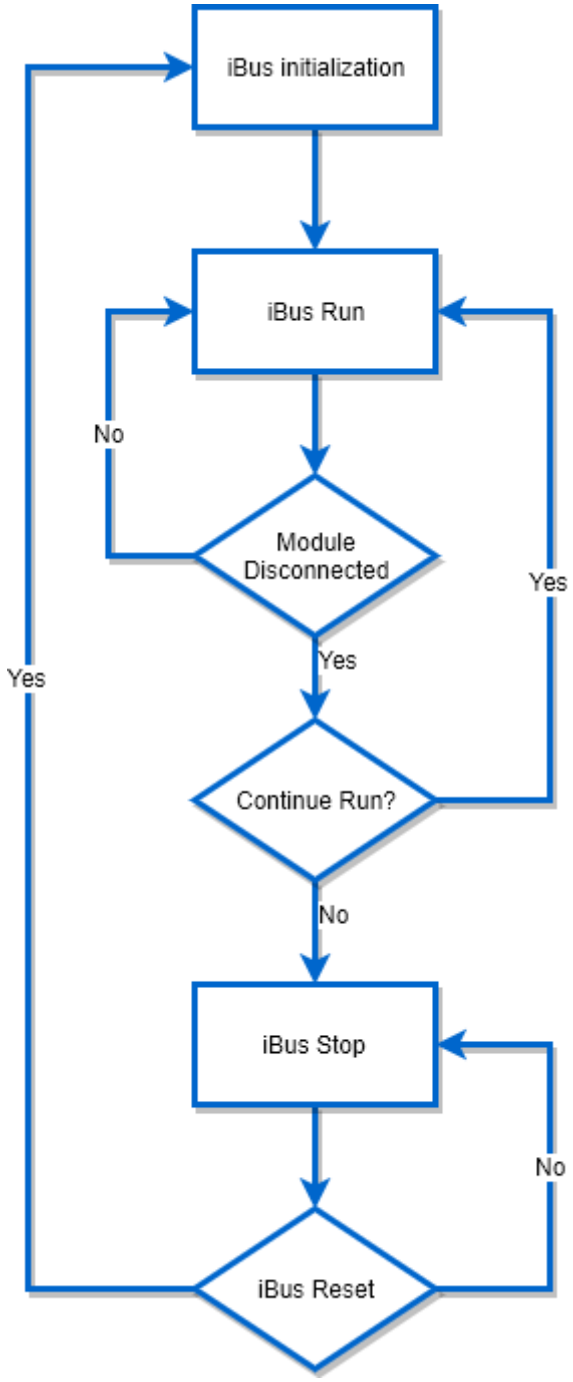
Slot	Module	Description	Modbus Address	Module Register
Slot#5	iR-AI04-VI	Channel 0 Input Mode	22020	20
		Channel 1 Input Mode	22021	21
		Channel 2 Input Mode	22022	22
		Channel 3 Input Mode	22023	23
		……	……..	……
Slot#6	iR-AQ04-VI	Channel 0 Output Mode	22500	0
		Channel 1 Output Mode	22501	1
		Channel 2 Output Mode	22502	2
		Channel 3 Output Mode	22503	3
		……	……..	……
		16# Error Code	22516	16

9. iBus Error Handling

When communication with the module is lost, iR-ETN can report an error and stop module communication. The following actions can be taken:

- Set Special Register #10045 (273Dh) to 1 to ignore this error.
- Set Special Register #10045 (273Dh) to 0 to report this error.
- Send Device Command Special Register #6000 (1770h) to reboot iBus.

iBus Error Flowchart:



10.Power Consumption

Type	Device	Consumption(5V)	Power Supply(5V)
Coupler	iR-ETN	220mA/1.1w	2A/10w
	iR-COP	170mA/0.85w	2A/10w
Digital I/O	iR-DM16-P	130mA/0.65w	--
	iR-DM16-N	130mA/0.65w	--
	iR-DQ08-R	220mA/1.1w	--
	iR-DQ16-N	205mA/1.02w	--
	iR-DQ16-P	196mA/0.984w	--
	iR-DI16-K	83mA/0.418w	--
Analogl I/O	iR-AQ04-VI	65mA/0.325w	--
	iR-AI04-VI	70mA/0.35W	--
	iR-AM06-VI	70mA/0.35W	--
	iR-AI04-TR	65mA/0.325w	--

Note:

The coupler is the only power supply for the modules in this system. Please consider power requirements when connecting multiple modules.

Example:

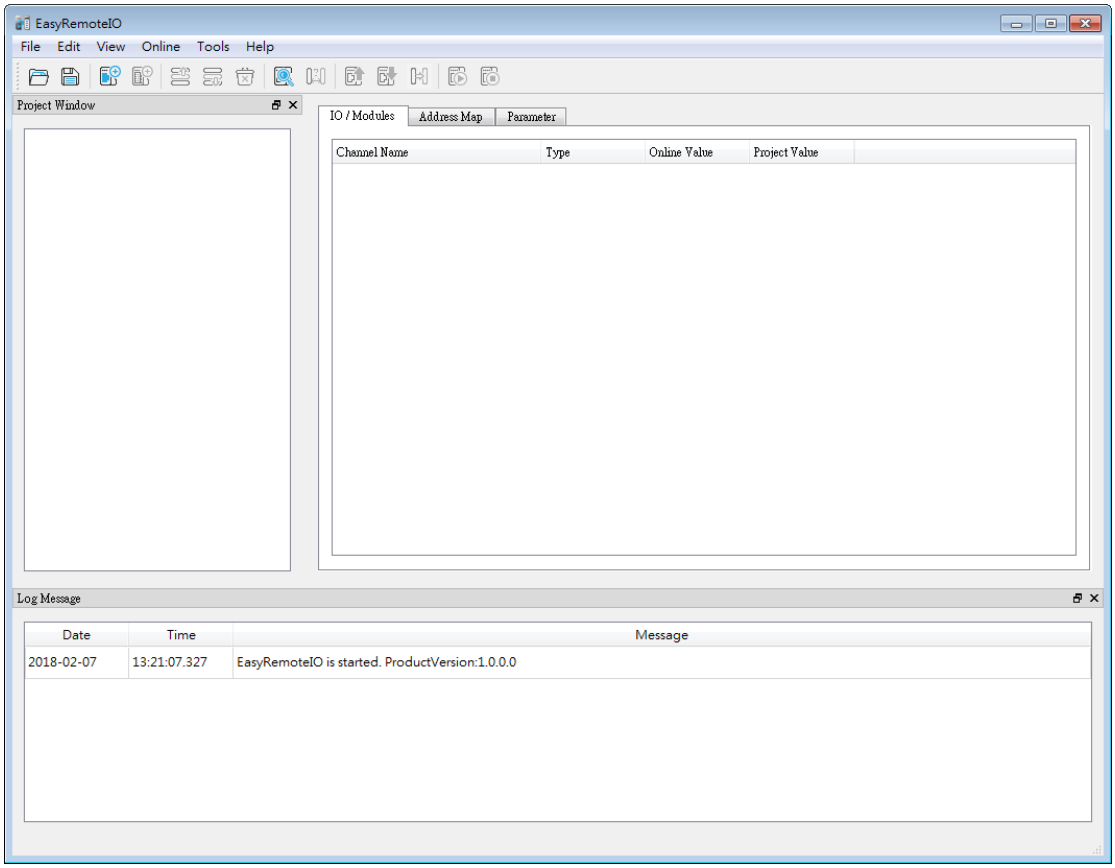
Device	Name	Consumption	Power Supply
Coupler	iR-ETN	220mA/1.1w	2A/10w
Module	iR-DM16-P *13	130mA*13=1.69A	X
System	Power consumption：220mA + 1.69A = 1.91 A Power supply: 2A > 1.91A		

11.Ethernet Cascading

- Daisy-chained your Ethernet devices
- Last Ethernet port can be used as a diagnosis port

12.EasyRemoteIO

EasyRemoteIO is an easy-to-use tool for configuring the parameters of iR-ETN. This tool can be found in the installation file of the latest version of EasyBuilder Pro. For more information on EasyRemoteIO, please see EasyRemoteIO User Manual.

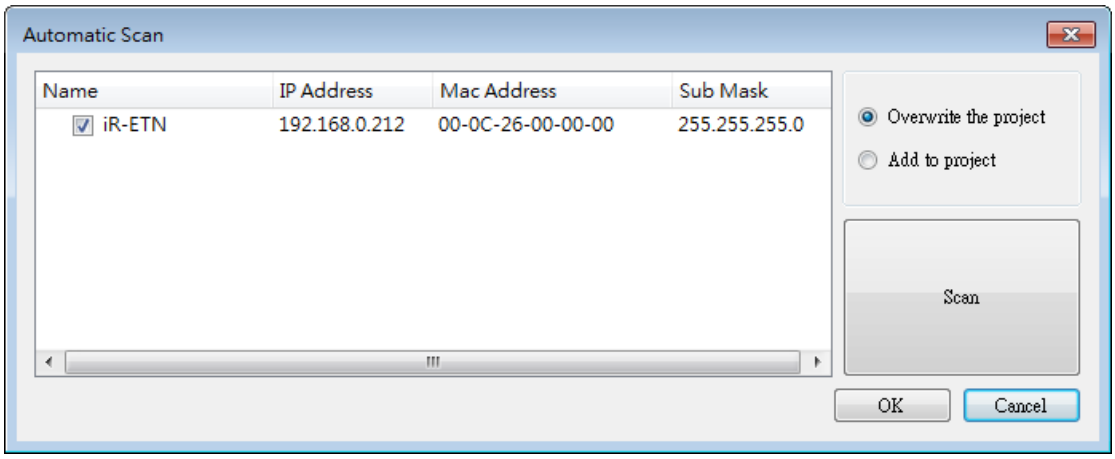


12.1 Preparation

The default domain of iR-ETN is 192.168.0.212, please set computer's IP to 192.168.0.**.

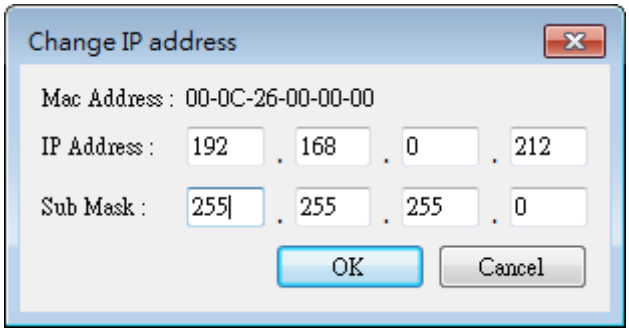
12.2 Scan iR-ETN

Select [Online] » [Automatic Scan] or press Shift + S on the keyboard to open the following window to scan the iR-ETN connected with PC.



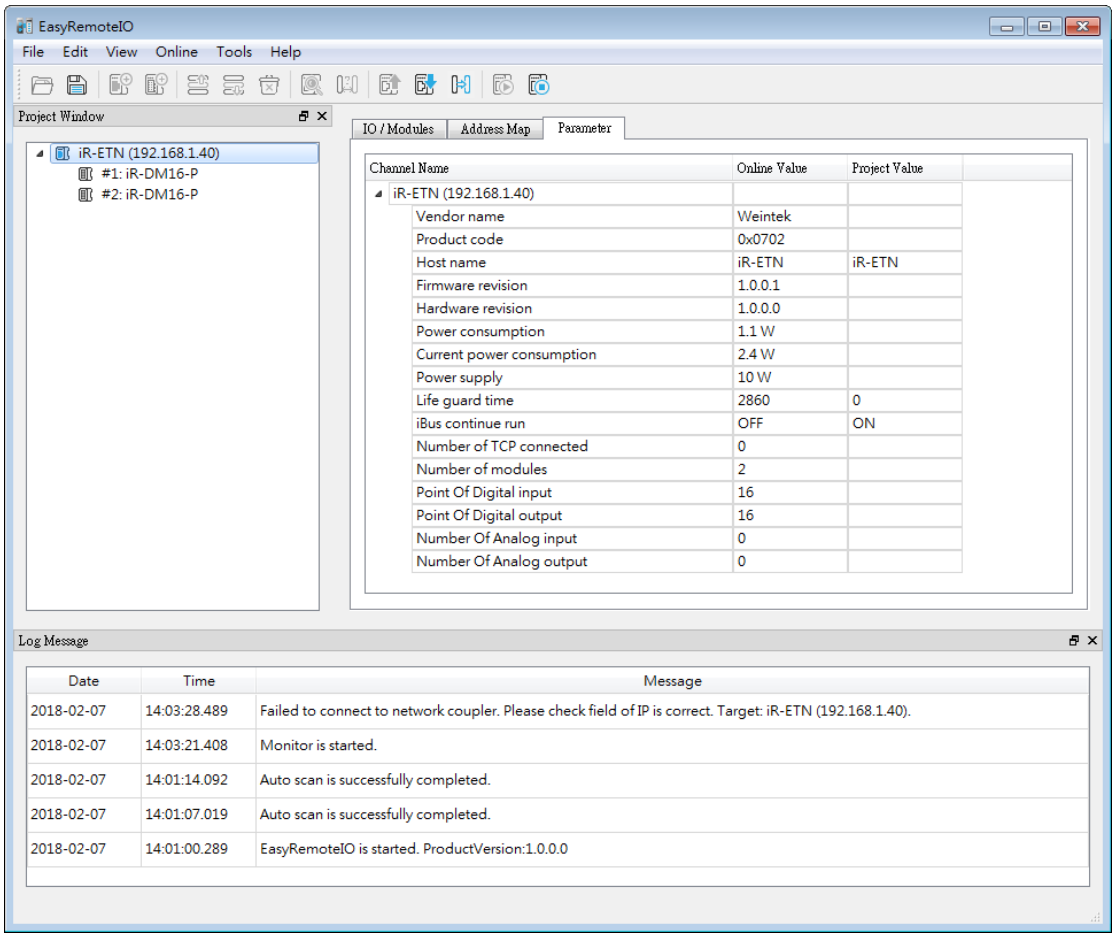
12.3 Change IP to Current Domain

Select [Online] » [Change IP] to set the iR-ETN's IP address.



12.4 Check Parameter with Monitor

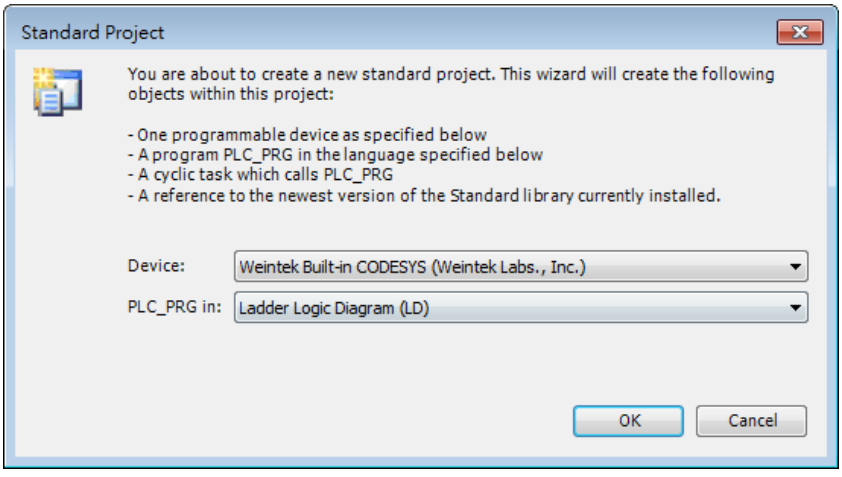
Select [Online] » [Start Monitoring] or press Shift + M on the keyboard to activate the connection with iR-ETN. The device status and module status can be viewed via EasyRemoteIO.



13.Connecting with CODESYS

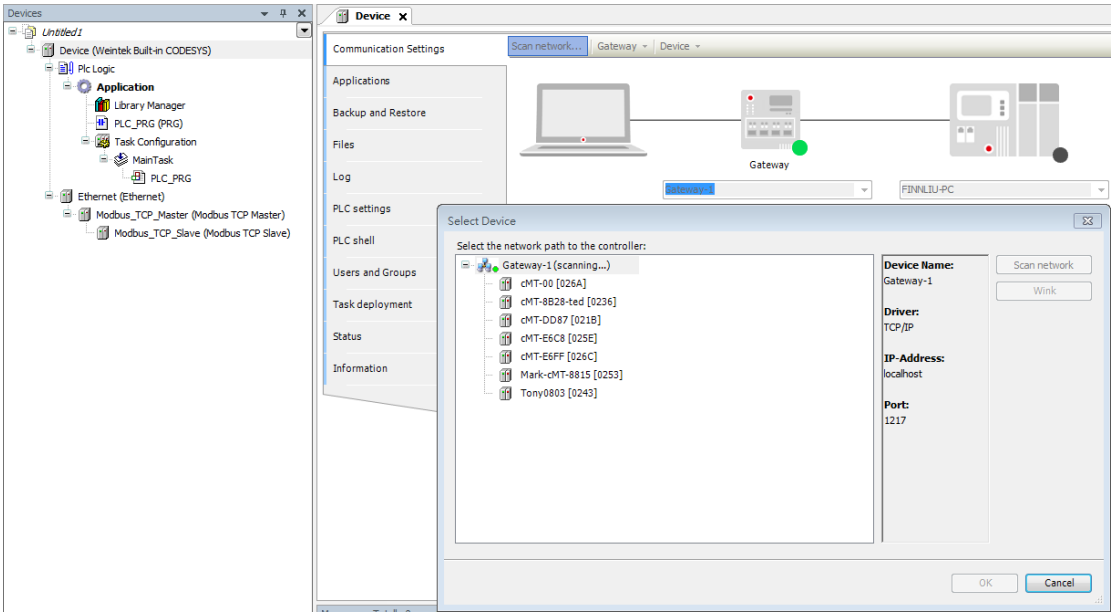
13.1 Preparation

Please add Weintek Built-in CODESYS device following the instructions in this document.



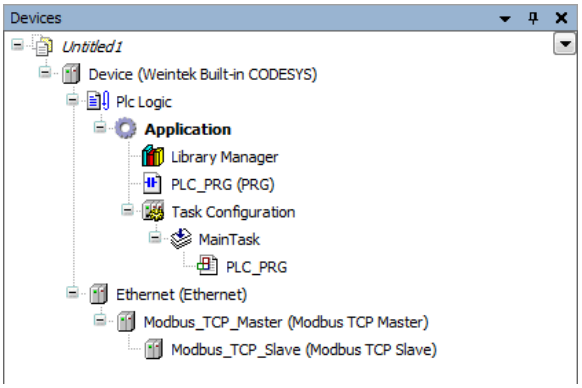
13.2 Connecting with CODESYS Device

Double click [Device] and select [Scan network] to find the cMT device you want to connect.



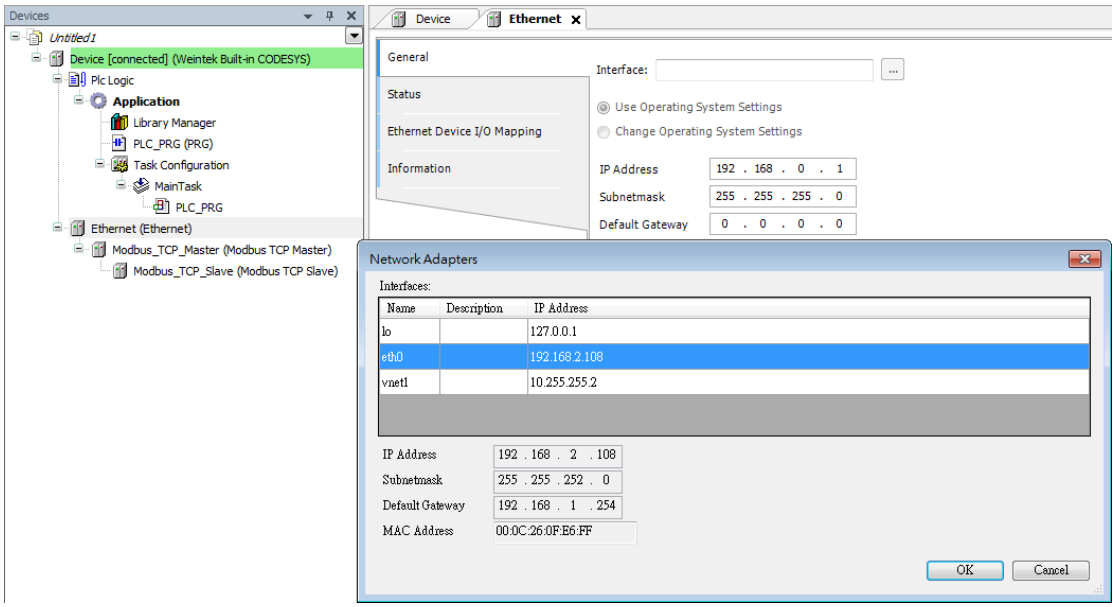
13.3 Creating Ethernet Device

Under Ethernet (Ethernet) create a Modbus_TCP_Master device which represents CODESYS Ethernet Port of the cMT device, and create a Modbus_TCP_Slave device which represents iR-ETN's Ethernet Port.



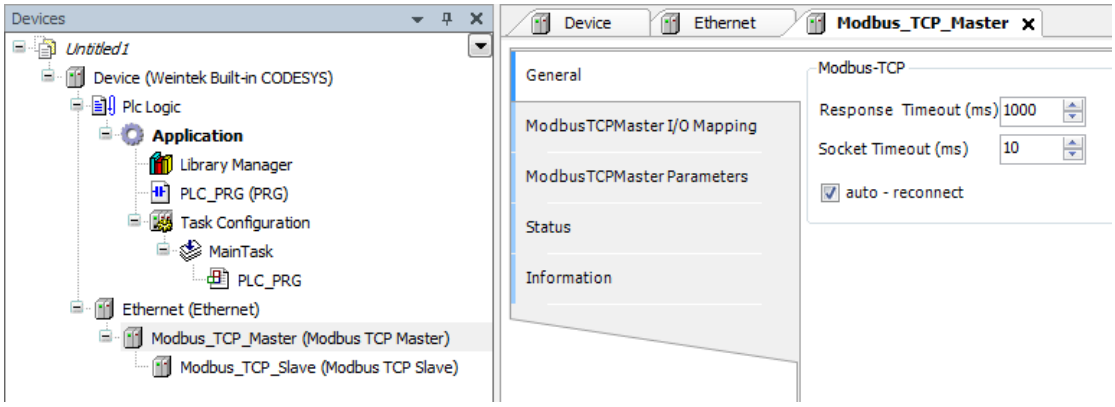
13.3.1 Parameter setting (Ethernet)

Double click [Ethernet] and select [Interface] to find the cMT device connected just now.



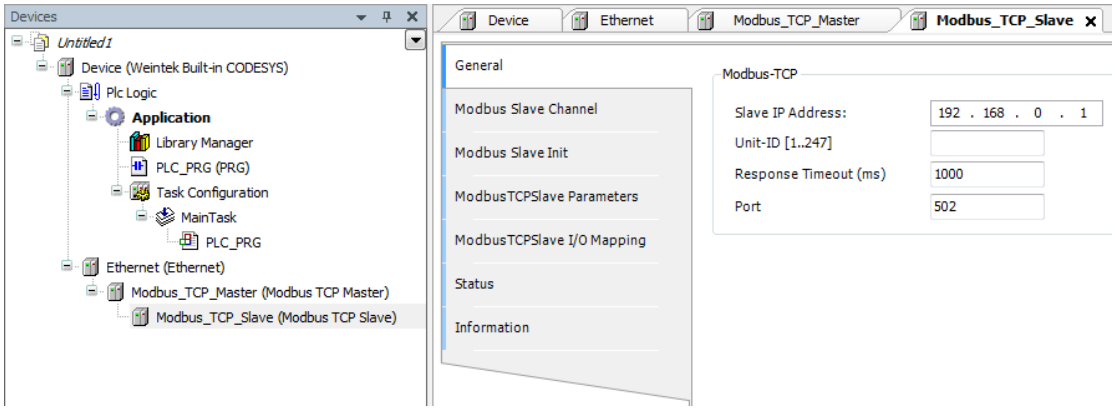
13.3.2 Parameter setting (Modbus_TCP Master)

Select auto-reconnect.



13.3.3 Parameter setting (Modbus_TCP Slave)

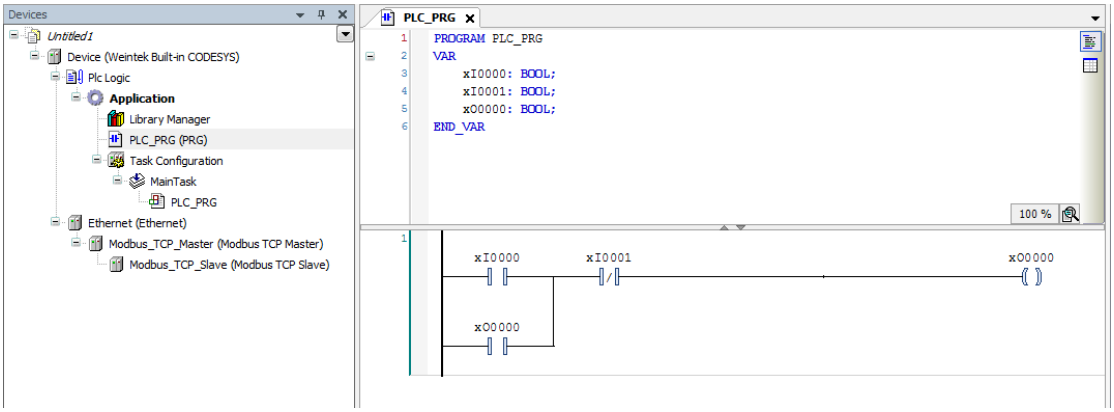
Set the iR-ETN IP and set Unit-ID to 1.



13.4 Modbus Slave Channel

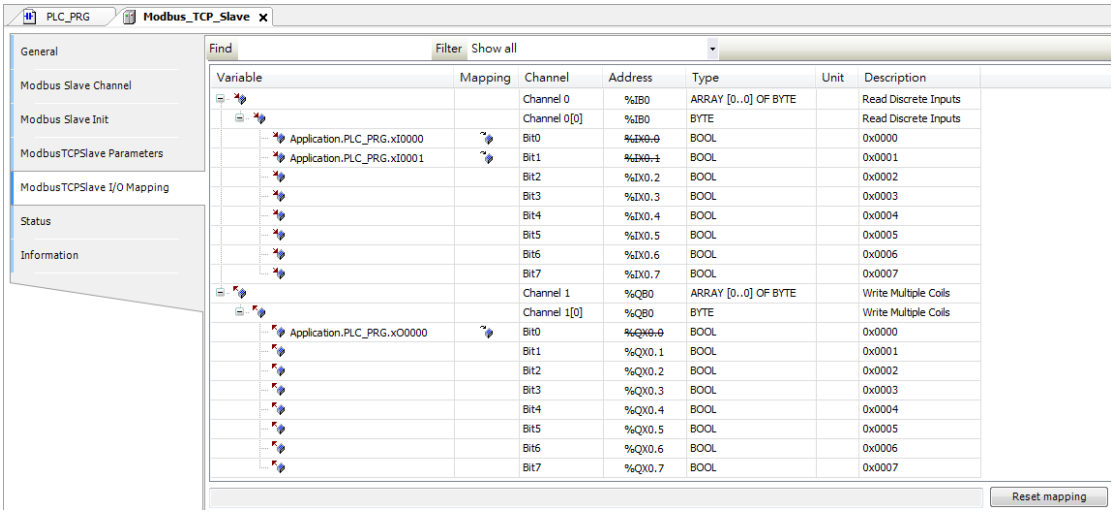
Add Remote I/O module channels here. Use Read Discrete Inputs (Function Code 2) for input and use Write Multiple Coils (Function Code 15) for output. Please set correct offset and length for each channel, or see an example shown in Chapter 8 in this manual.

13.5 Edit CODESYS Program



13.6 Modbus TCP Slave I/O Mapping

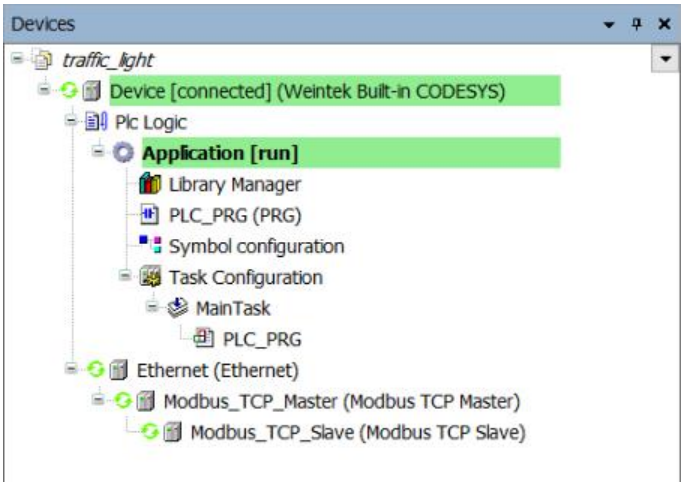
Variables specified here can map to Remote I/O.



Variable	Mapping	Channel	Address	Type	Unit	Description
		Channel 0	%IB0	ARRAY [0..0] OF BYTE		Read Discrete Inputs
		Channel 0[0]	%IB0	BYTE		Read Discrete Inputs
Application.PLC_PRG.xI0000		Bit0	~~%IX0.0~~	BOOL		0x0000
Application.PLC_PRG.xI0001		Bit1	~~%IX0.1~~	BOOL		0x0001
		Bit2	%IX0.2	BOOL		0x0002
		Bit3	%IX0.3	BOOL		0x0003
		Bit4	%IX0.4	BOOL		0x0004
		Bit5	%IX0.5	BOOL		0x0005
		Bit6	%IX0.6	BOOL		0x0006
		Bit7	%IX0.7	BOOL		0x0007
		Channel 1	%QB0	ARRAY [0..0] OF BYTE		Write Multiple Coils
		Channel 1[0]	%QB0	BYTE		Write Multiple Coils
Application.PLC_PRG.xO0000		Bit0	~~%QX0.0~~	BOOL		0x0000
		Bit1	%QX0.1	BOOL		0x0001
		Bit2	%QX0.2	BOOL		0x0002
		Bit3	%QX0.3	BOOL		0x0003
		Bit4	%QX0.4	BOOL		0x0004
		Bit5	%QX0.5	BOOL		0x0005
		Bit6	%QX0.6	BOOL		0x0006
		Bit7	%QX0.7	BOOL		0x0007

13.7 Download Program and Run

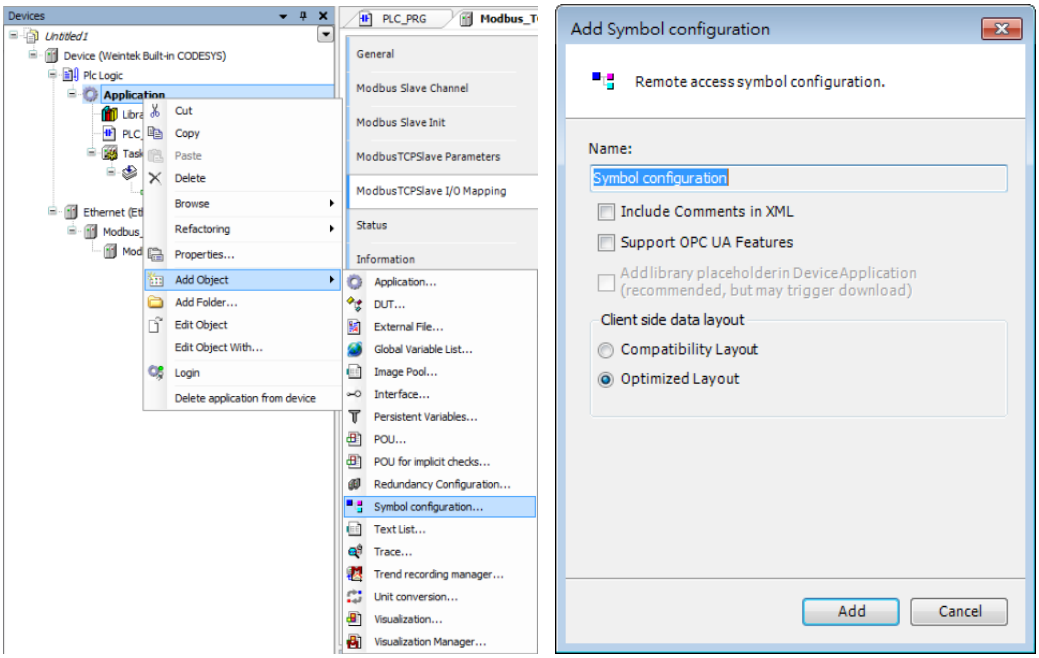
Follow the steps: [Build] » [Login] » [Run]. Devices successfully connected will have a green circle mark.



14.Connecting CODESYS with EasyBuilder Pro

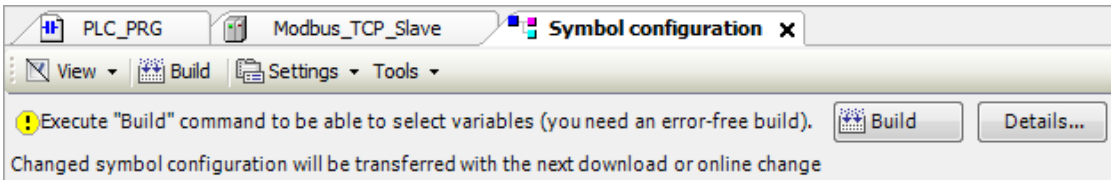
14.1 Symbol Configuration

Create a [Symbol configuration] object under Application.

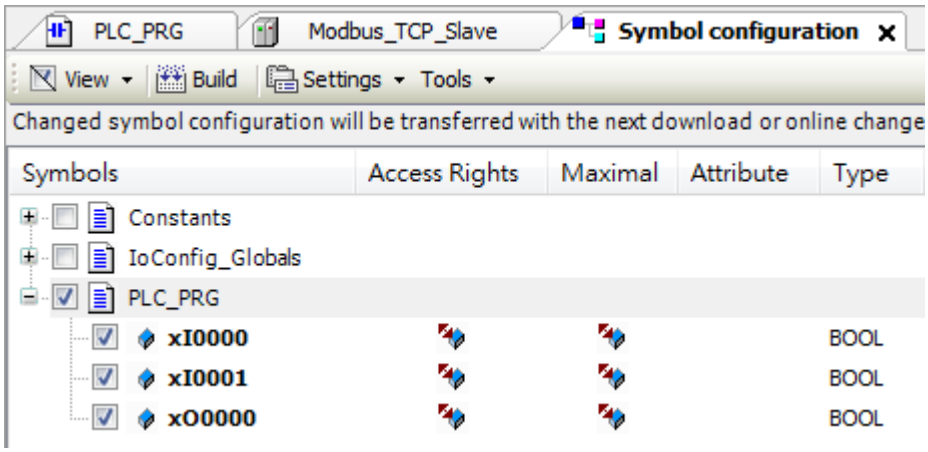


14.2 Creating .xml File

14.2.1 "Build" Command for Selecting Variables



14.2.2 Selecting PLC_PRG Variables



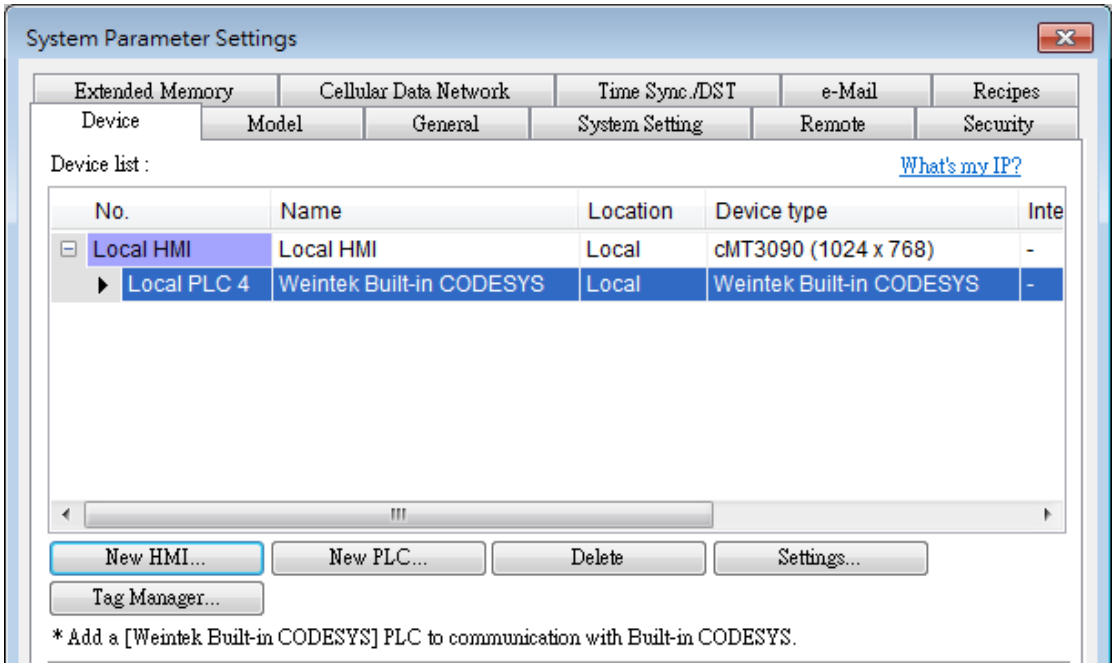
14.2.3 Creating .xml File

Click [Build] » [Generation code] and find the .xml file in program saving location.

14.3 Importing .xml File in EasyBuilder Pro

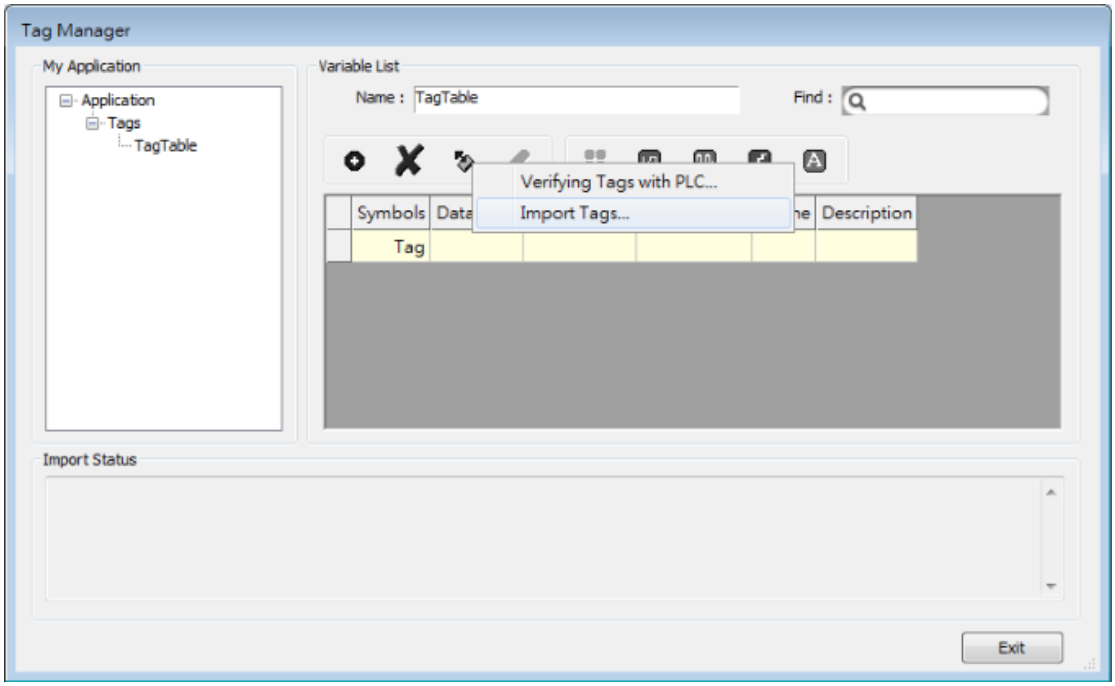
14.3.1 Adding a Device

Add Weintek Built-in CODESYS driver into the device list.



14.3.2 Importing Tags

Use Tag Manager to import .xml file.



14.3.3 Selecting Tag in Object Settings Dialog