User Manual

iR-ETN40R User Manual

This guide walks through important information about iR-ETN40R

UM021002E_20220901

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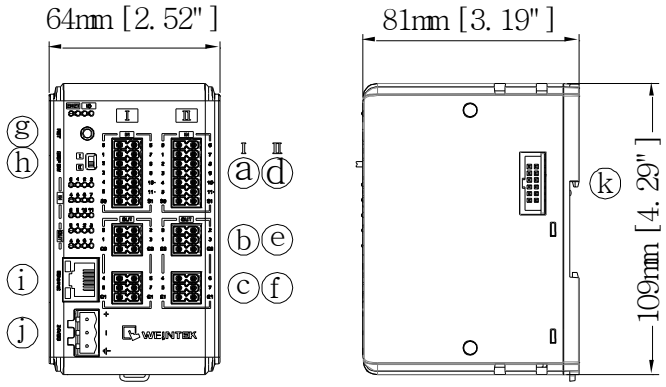
1. Product Overview



a.d	Input Terminal	*b.c.e.f*	Output Terminal
g	Reset Button	*h*	I/O Display Switch
I	Ethernet Port	*j*	Power Connector
k	Expansion Connector		

2. Specifications

Communication Interface Specifications			
No. of Ports	1		
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 Server, EtherNet/IP adapter		
Max. Number of TCP/IP Connections	8 connections		
Network to Logic Isolation	Yes		
Digital Output			
Total Number of Outputs	16		
Output Logic	Relay		
Output Voltage	250VAC/30VDC		
Output Current	2A per channel (Max 8A)		
Response Time	10ms		
Isolation	Yes, electromagnetic isolation		
Digital Input			
Total Number of Inputs	24		
Isolation	Yes, optical isolation		
General Input	Number of Inputs		20
	Input Logic		Sink or Source
	Logic 1 Input Voltage		15~28 VDC
	Logic 0 Input Voltage		0~5 VDC
	Response Time	OFF->ON	5 ms
		ON->OFF	1 ms
	Input Impedance		5.6 KΩ
High-speed Input	Number of Inputs		4
	Input Logic		SINK INPUT (PNP)*
	Logic 1 Input Voltage		15~28 VDC
	Logic 0 Input Voltage		0~5 VDC
	Max. Input Frequency		20KHz
	Input Impedance		3 KΩ
Expansion I/O Module			
Number of Bus Terminals	Depends on Power Consumption (Please see section 5 in this datasheet) The maximum allowable number of iR modules is 16 modules.		
Digital Input Point	Max. 224 (Including 24 built-in points and the max. allowable number is 248 points.)		
Digital Output Point	Max. 112 (Including 16 built-in points and the max. allowable number is 128 points.)		
Analog Input Channel	Max. 64		
Analog Output Channel	Max. 64		
Indicators			
ENET	Green		Device Status Indicator
	Red		Device Error Indicator
IO	Green		Module Status Indicator
	Red		Module Error Indicator
General Specification			
Power	Power Supply		24 VDC (-15%/+20%)
	Power Dissipation		Nominal 255mA@24VDC
	Current for-Internal Bus		Max 2A@5VDC

	Current Consumption	520mA@5VDC
	Electrical Isolation	Logic to Field Power Isolation: Yes
	Back-up Fuse	≤ 1.6A Self-recovery
Specification	PCB Coating	Yes
	Enclosure	Plastic
	Dimensions WxHxD	64 x 109 x 81 mm
	Weight	Approx. 0.27 kg
	Mount	35mm DIN rail mounting
Environment	Protection Structure	IP20
	Storage Temperature	-20° ~ 70°C (-4° ~ 158°F)
	Operating Temperature	-10° ~ 60°C (14° ~ 140°F)
	Relative Humidity	10% ~ 90% (non-condensing)
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

* Refer to wiring diagram - High Speed Input

3. LED Indicators

3.1 IO RUN/ERR LED

Display Module Status

RUN LED	ERR LED	Description
OFF	OFF	Power off or no expansion module is connected
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

3.2 ENET RUN/ERR

Run LED	Err LED	Description	
		Modbus TCP	EtherNet/IP
OFF	OFF	Power off or no power	
Blinking	OFF	Communicating	Pre-operational mode
ON	OFF	The device is in the OPERATIONAL state	
OFF	ON	Hardware error, communication fault	24V power error or hardware error, communication fault
ON	Blinking	Reset button is triggered	Reset button is triggered or a recoverable error has occurred

ENET Run/ERR indicator can be set to Modbus TCP mode (default) or EtherNet/IP mode. The communication address for Modbus TCP mode is 1013 (0x03F5 in Hex). Communication mode setting: In “Config Data” set 0 to use Modbus TCP mode or set 1 to use EtherNet/IP mode.

3.3 RJ45

LINK /ACT LED	
OFF	No communication
Green Blinking	There is activity on this port
Speed LED	
OFF	Connection speed: 10Mbps
Orange ON	Connection speed: 100Mbps

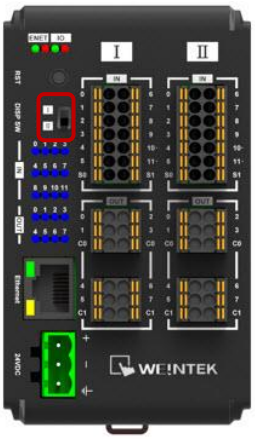
4. Reset Button

Press and hold the reset button for 2 seconds until ENET ERR LED blinks to reset network settings to default (see table below).
Press and hold the reset button for 5 seconds until ENET ERR LED turns ON to restore factory default.

Item	Description	Default
1	IP Address	192.168.0.212
2	Netmask	255.255.255.0

5. I/O Display Switch

The I/O on iR-ETN40R are split into two Terminals: Terminal Ⅰ and Terminal Ⅱ.
When the I/O Display Switch is flipped upward, the indicators show the states of I/O in Terminal Ⅰ, and when the switch is flipped downward, the indicators show the states of I/O in Terminal Ⅱ.



6. IP Address Setup

Network parameters can be configured using EasyRemote IO, and factory defaults can be restored by pressing the Reset Button. Please find the chapter about EasyRemote IO in this user manual for more information.

Item	Description	Default
1	IP Address	192.168.0.212
2	Netmask	255.255.255.0

7. MODBUS Mapping

7.1 Bit Mapping

Parameter	Start address		Read/Write	Function Code
	Dec	Hex		
Digital Input	0~511	0000~ 01FF	Read	2
Digital Output	0~511	0000~ 01FF	Read	1
			Write	5,15

7.2 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
Digital Input	800~863	0320~ 035F	Read	3,23
Digital Output	864~927	0360~ 039F	Read	3,23
			Write	6,16,23
Registers	----------		Read	3,4,23
	---------		Write	6,16,23

*The value in 32-bit register is placed in Little Endian Byte Order: the least significant byte of the data is placed at the byte with the lowest address.

Example: When the value is 100000 (0x0001 86A0), then the data is placed in the following way.

Function Code	Data Length	Low Byte	High Byte
03	04	86 A0	00 01

7.3 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
1011	03F3	Read	1word	Number of TCP/IP connections

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

7.4 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-ETN40R: 0x0A73
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	Read/Write	16word	Product name, default: “iR-ETN40R” (ASCII)

7.5 iBus Information Register

Address		Read/Write	Data size	Description
Dec	Hex			
10000	2710	Read	1word	Slot 0 iR-ETN40R Product code
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 of 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.

7.6 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
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 Output

30039	7557	Read	1word	Number of points of Digital Input
30040	7558	Read	1word	Number of Analog input channels of module
30041	7559	Read	1word	Number of Analog output channels of module

7.7 Module Register

Each module is configured with different 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

7.8 Product Code List

Item	Product	Code
1	iR-DI16-K	0154h
2	iR-DM16-P	0351h
3	iR-DQ16-P	0251h
4	iR-DM16-N	0352h
5	iR-DQ16-N	0252h
6	iR-DQ08-R	0243h
7	iR-AQ04-VI	0525h
8	iR-AI04-VI	0425h
9	iR-AM06-VI	0635h
10	iR-AI04-TR	0426h
11	iR-ETN	0702h
12	iR-ETN40R	0A73h

7.9 Special Register

Address		Read/Write	Data size	Description
Dec	Hex			
1013	03F5	Read/Write	1word	Indicator Mode: 0: Modbus TCP 1: EtherNet IP
1014	03F6	Read/Write	1word	Disable Reset Button 5AA5h：Reset Button is ineffective.
1015	03F7	Read/Write	1word	Register Save Setting 0: Parameters are saved when the value is changed in the register. 1: Parameters are not saved when the value is changed in the register. The value in the register is 0 after each boot.
5000	1388	Read	1word	Device Error Code
5001	1389	Read	1word	Reserved

5002	138A	Read	1word	Slot1~16 of Module disconnected
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：Set parameter to default without TCP/IP 0x5257：Device Reset Warm

7.10 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: Off 1: On
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

7.11 The Default Value

Address		Read/Write	Data size	Description	Default
Dec	Hex				
3008- 3023	0BC0- 0BCF	Read/Write	16word	Product name	“iR-ETN40R”
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 the corresponding registers.

7.12 Device Error Code List

Refer to 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	Max. number of TCP connections exceeded
Bit8	iBus is off
Bit9	A life guarding or EIP timeout event has occurred
Bit10	Modbus connection timed out
Bit11	EtherNet/IP Timeout
Bit12	Reserved
Bit13	Reserved
Bit14	Built-in I/O module error
Bit15	Reserved

7.13 Reading and Writing iR-PU01-P Objects

Please see iR-PU01-P user manual for more information about index, sub-index, and length.

<table>
<tr><th>R/W</th><th>Address (Hex)</th><th colspan="5">Description</th></tr>
<tr><td rowspan="5">Write Object</td><td>0xFFF0</td><td colspan="5">Index</td></tr>
<tr><td>0xFFF1</td><td colspan="5">Sub-index (High Byte)
Length (Low Byte)</td></tr>
<tr><td rowspan="2">0xFFF2</td><td>Hi Byte</td><td>0x56</td><td></td><td rowspan="2">WORD</td><td rowspan="3">DWORD</td></tr>
<tr><td>Lo Byte</td><td>0x78</td><td>BYTE</td></tr>
<tr><td>0xFFF3</td><td>Hi Byte</td><td>0x12</td><td></td><td></td></tr>
</table>

		Lo Byte	0x34			
	Sequentially writes data into 0xFFF0~0xFFF3. Data will be sent to iR-PU01-P when written into 0xFFF3.					
Read Object	0xFFF4	Index				
	0xFFF5	Sub-index (High Byte) Length (Low Byte)				
	0xFFF6	Hi Byte	0x56		WORD	DWORD
		Lo Byte	0x78	BYTE		
	0xFFF7	Hi Byte	0x12			
		Lo Byte	0x34			
	Step1: Sequentially writes data into 0xFFF4~0xFFF5. Reading iR-PU01-P object starts when data is written into 0xFFF5, and the data will be placed in 0xFFF6~0xFFF7. Step 2: Read data of 0xFFF6~0xFFF7 Object.					

7.14 iR-PU01-P NMT Control Address

NMT Address	State	Value
0xFFF8(65528)	Stop	0x0001
	Operation	0x0002
	Pre-operational	0x0080
	Reset application	0x0081
	Reset communication	0x0082

7.15 Run/Stop Register

The RunStop Pin function allows designation of an input as RunStop Input Point. In Run mode, the device can output value normally, and in Stop mode, the output value will be ineffective. When the mode is switched from Run to Stop, please find the description of error (Modbus address 6101~6232).

Address		Read/Write	Name	Value		
Dec	Hex					
1200	04B0	Read/Write	RunStop Mode	0	Not in use (Default)	
				1	Input: ON	Run
					Input: OFF	Stop
				2	Input: ON	Stop
					Input: OFF	Run
1201	04B1	Read/Write	RunStop Input Point	Value 0~255 = Input Point 0~255 The default is 0.		
1202	04B2	Read	RunStop State	0	STOP	
				1	Run	
				-1	Not in use	

				-2	Error in the setting of RunStop Mode
				-3	Error in the setting of RunStop input

7.16 Pulse Capture Feature

iR-ETN40R provides a pulse capture feature which can be used for the local digital inputs. This feature can be used to capture high-going pulses or low-going pulses that are of such a short duration that they would not always be seen when the controller reads the digital inputs at the beginning of the scan cycle. When pulse capture feature is enabled for an input, a change in state of the input is latched and held until the next input cycle update. This ensures that a pulse which lasts for a short period of time is caught and held until the controller reads the inputs.

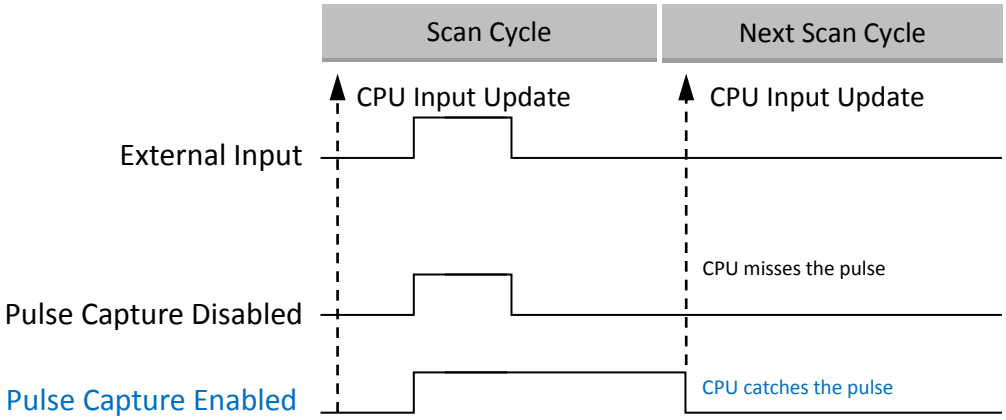


Illustration of Pulse Capture

Address		Read/Write	Name	Value
Dec	Hex			
6300	189C	Read/Write	Pulse capture feature for local digital inputs 0~11 in Terminal Ⅰ.	Bit0~Bit11 correspond to inputs 0~11. Bit12~15 are reserved. Bit value: 0:Disable 1:Enable
6301	189D	Read/Write	Pulse capture feature for local digital inputs 16~23 in Terminal Ⅱ.	

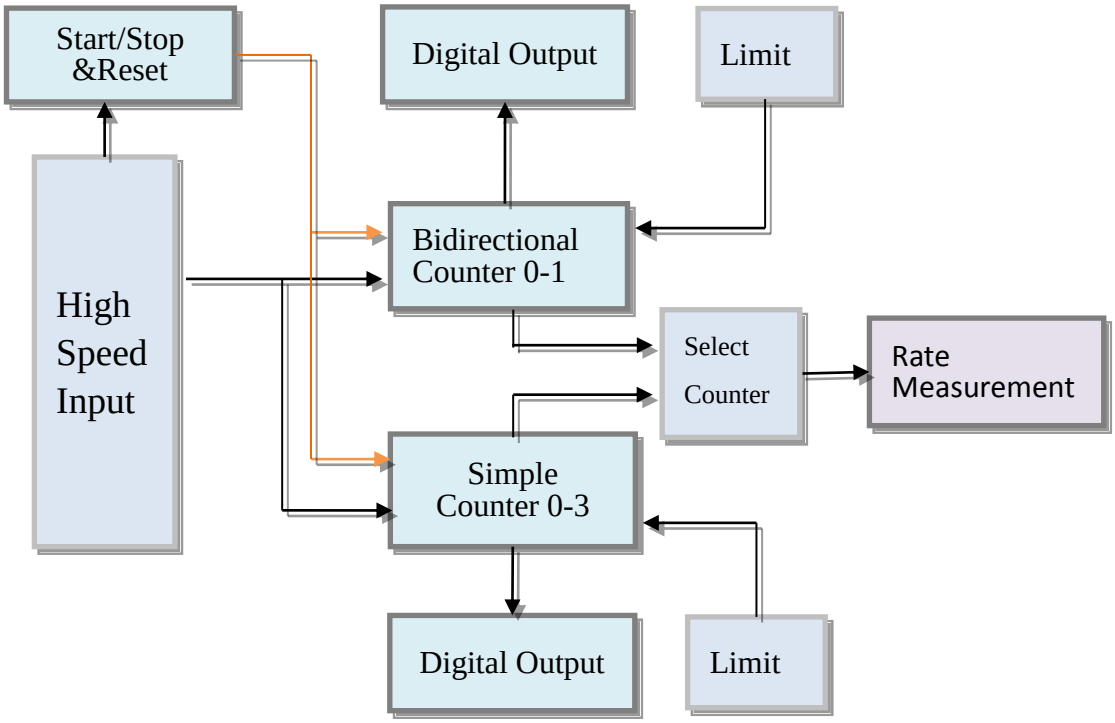
*This feature is only supported for the local digital inputs of IR-ETN40R.

7.17 High-speed Input Function

7.17.1 Function block

iR-ETN40R offers 4 high-speed inputs (Input Points 10, 11 of Terminal Ⅰ and Input Points 10, 11 of Terminal Ⅱ). These high-speed inputs can be flexibly configured, as the application may require, for high-speed counter use, for A/B phase encoder use,

or for measurement of high-speed pulse.



7.17.2 Register List

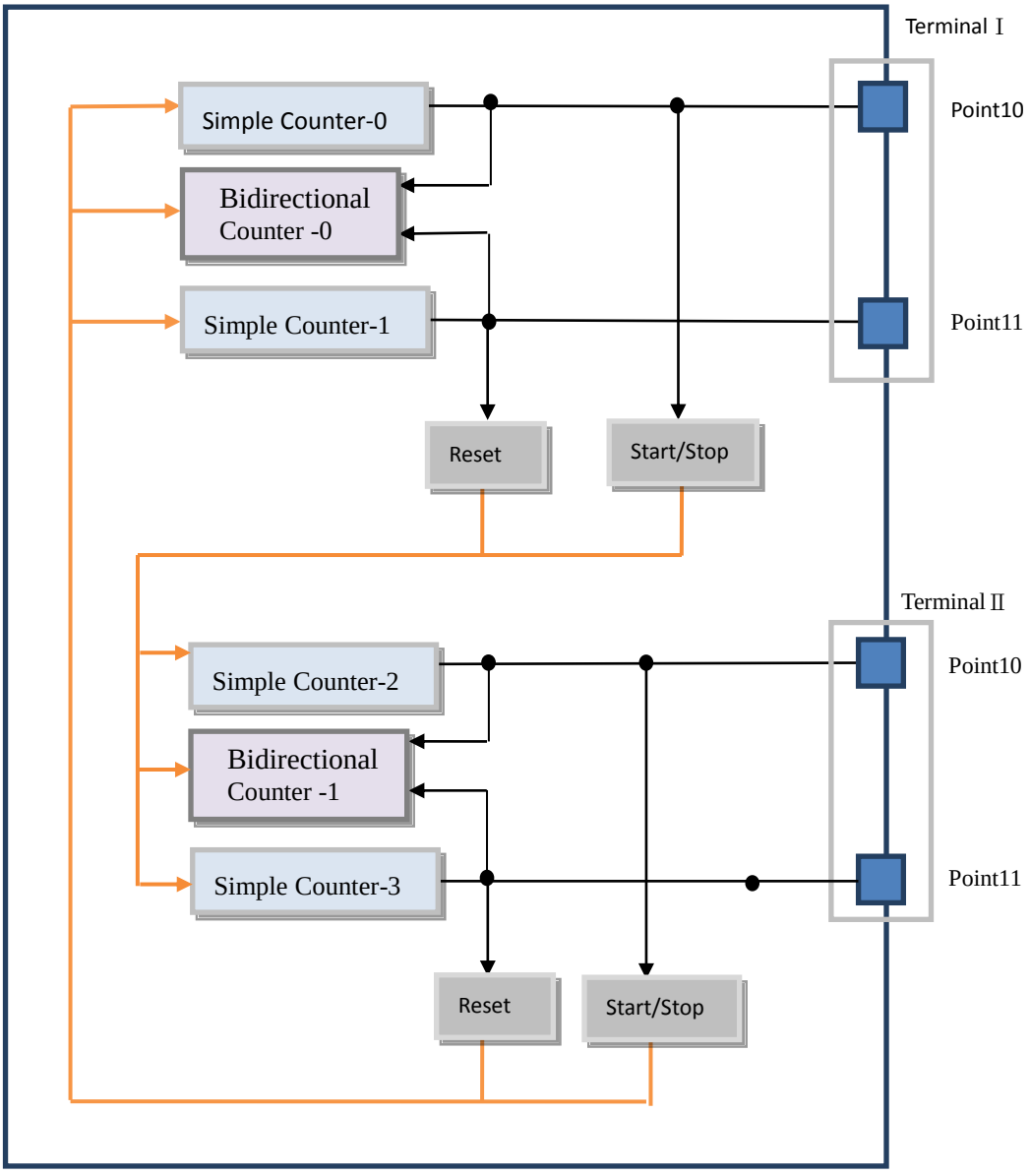
The maximum input frequency for a counter is 20 KHz. When the input points are configured for A/B phase (Quadrature 4X) encoder use, the maximum input frequency is 10 KHz.

Name				Address(Dec)
Input Function			Terminal Ⅰ High-speed Input Function	4044
			Terminal Ⅱ High-speed Input Function	4045
Rate Measurement			Time-Windows	4028
			Windows Channel	4029
			Rate Value	4030-4031
Simple Counter	**Simple Counter-0**		Counter Value	4000~4001
			Counter State	4008
			Counter Command	4012
			Upper Limit Value	4020~4021
		Digital Output	Point	4080
			ON-trigger Value	4084~4085
			OFF -trigger Value	4092~4093
	Simple Counter-1		Counter Value	4002~4003
			Counter State	4009
			Counter Command	4013
			Upper Limit Value	4022~4023

		Digital Output		Point	4081
				ON-trigger Value	4086~4087
				OFF -trigger Value	4094~4095
	Simple Counter-2	Counter Value			4004~4005
		Counter State			4010
		Counter Command			4014
		Upper Limit Value			4024~4025
		Digital Output		Point	4082
				ON-trigger Value	4088~4089
				OFF -trigger Value	4096~4097
	Simple Counter-3	Counter Value			4006~4007
		Counter State			4011
		Counter Command			4015
		Upper Limit Value			4026~4027
		Digital Output		Point	4083
				ON-trigger Value	4090~4091
				OFF-trigger Value	4098~4099
Bidirectional Counter	**Counter-0**	Counter Value			4046~4047
		Upper Limit			4050~4051
		Upper Limit Reload Value			4058~4059
		Lower Limit			4054~4055
		Lower Limit Reload Value			4062~4063
		Digital Output	0	Point	4200
				ON-trigger Value	4201~4202
				OFF-trigger Value	4203~4204
			1	Point	4205
				ON-trigger Value	4206~4207
				OFF-trigger Value	4208~4209
			2	Point	4210
				ON-trigger Value	4211~4212
				OFF-trigger Value	4213~4214
			3	Point	4215
				ON-trigger Value	4216~4217
				OFF-trigger Value	4218~4219
			4	Point	4220
				ON-trigger Value	4221~4222
				OFF-trigger Value	4223~4224
			5	Point	4225
				ON-trigger Value	4226~4227
				OFF-trigger Value	4228~4229
			6	Point	4230
				ON-trigger Value	4231~4232
				OFF-trigger Value	4233~4234
			7	Point	4235
				ON-trigger Value	4236~4237
				OFF-trigger Value	4238~4239
	Counter-1	Counter Value			4048~4049

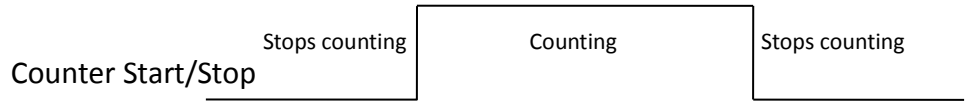
		Upper Limit			4052~4053
		Upper Limit Reload Value			4060~4061
		Lower Limit			4056~4057
		Lower Limit Reload Value			4064~4065
		Digital Output	0	Point	4240
				ON-trigger Value	4241~4242
				OFF-trigger Value	4243~4244
			1	Point	4245
				ON-trigger Value	4246~4247
				OFF-trigger Value	4248~4249
			2	Point	4250
				ON-trigger Value	4251~4252
				OFF-trigger Value	4253~4254
			3	Point	4255
				ON-trigger Value	4256~4257
				OFF-trigger Value	4258~4259
			4	Point	4260
				ON-trigger Value	4261~4262
				OFF-trigger Value	4263~4264
			5	Point	4265
				ON-trigger Value	4266~4267
				OFF-trigger Value	4268~4269
			6	Point	4270
				ON-trigger Value	4271~4272
				OFF-trigger Value	4273~4274
			7	Point	4275
				ON-trigger Value	4276~4277
				OFF-trigger Value	4278~4279

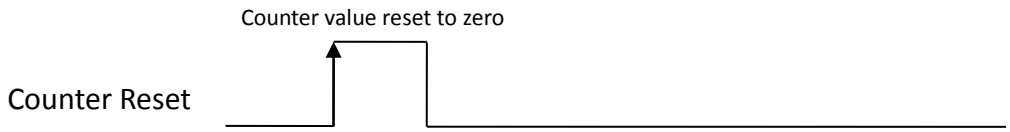
7.17.3 Input configuration



Signal Type		Terminal Ⅰ input (Address: 4044)		Terminal Ⅱ input (Address: 4045)	
		points 10	points 11	points 10	points 11
Counter	Simple	Simple Counter-0	Simple Counter-1	Simple Counter-2	Simple Counter-3
	A/B Phase	Bidirectional Counter-0 A Phase	Bidirectional Counter-0 B Phase	Bidirectional Counter-1 A Phase	Bidirectional Counter-1 B Phase
	Up & Down Pulse	Bidirectional Counter-0 Up pulse	Bidirectional Counter-0 Down pulse	Bidirectional Counter-1 Up pulse	Bidirectional Counter-1 Down pulse
	Pulse & Direction	Bidirectional Counter-0 pulse	Bidirectional Counter-0 direction	Bidirectional Counter-1 pulse	Bidirectional Counter-1 direction
Counter Control		Bidirectional Counter-1 Start/Stop Pin	Bidirectional Counter-1 Reset Pin	Bidirectional Counter-0 Start/Stop Pin	Bidirectional Counter-0 Reset Pin
		Simple Counter-2 Start/Stop Pin	Simple Counter-3 Start/Stop Pin	Simple Counter-0 Start/Stop Pin	Simple Counter-1 Start/Stop Pin

*The maximum input frequency for a counter is 20 KHz. When the input points are configured for A/B phase (Quadrature 4X) encoder use, the maximum input frequency is 10 KHz.
*When the input points are configured as Reset Pin, the counter value will be reset to 0 when the input point is triggered.





- Terminal Input register

Address		Read/Write	Name	Value
Dec	Hex			
4044	0FCC	Read/Write	Terminal Ⅰ Input Setting	Ref."Terminal Ⅰ input register"
4045	0FCD	Read/Write	Terminal Ⅱ Input Setting	Ref."Terminal Ⅱ input register"

- Terminal Ⅰ input register

Value	Mode	Terminal Ⅰ input	
		points 10	points 11
0	Counter stop	N/A	N/A

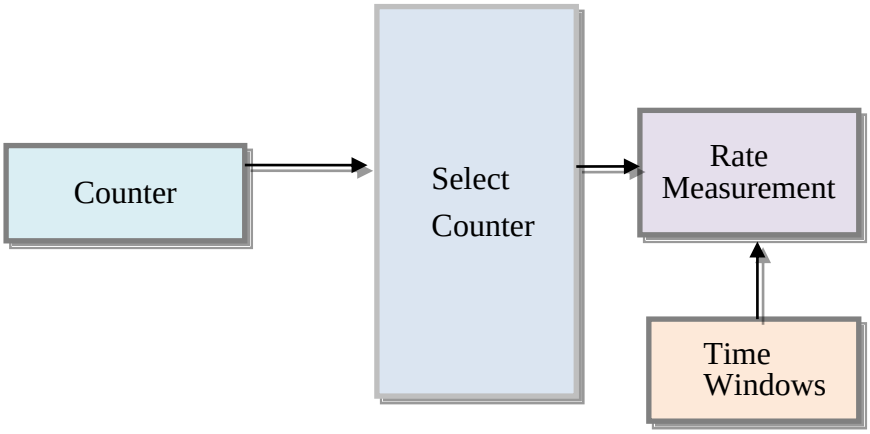
1	Single pulse only	Simple Counter-0	Simple Counter-1
2	A/B Phase Quadrature 1X	A Phase (Bidirectional Counter-0)	B Phase (Bidirectional Counter-0)
3	A/B Phase Quadrature 2X		
4	A/B Phase Quadrature 4X		
5	Up & down pulse	Up Pulse (Bidirectional Counter-0)	Down Pulse (Bidirectional Counter-0)
6	Pulse & Direction	Pulse (Bidirectional Counter-0)	Direction (Bidirectional Counter-0)
7	Counter Control	Start/Stop (Bidirectional Counter-1) (Simple Counter-2)	Reset (Bidirectional Counter-1) (Simple Counter-2)
8		Start/Stop (Simple Counter-2)	Start/Stop (Simple Counter-3)

- Terminal Ⅱ input register

Value	Mode	Terminal Ⅱ input	
		points 10	points 11
0	Counter stop	N/A	N/A
1	Single pulse only	Simple Counter-2	Simple Counter-3
2	A/B Phase Quadrature1X	A Phase (Bidirectional Counter-1)	B Phase (Bidirectional Counter-1)
3	A/B Phase Quadrature 2X		
4	A/B Phase Quadrature 4X		
5	Up & down pulse	Up Pulse (Bidirectional Counter-1)	Down Pulse (Bidirectional Counter-1)
6	Pulse & Direction	Pulse (Bidirectional Counter-1)	Direction (Bidirectional Counter-1)
7	Counter Control	Start/Stop (Bidirectional Counter-0) (Simple Counter-0)	Reset (Bidirectional Counter-0) (Simple Counter-0)
8		Start/Stop (Simple Counter-0)	Start/Stop (Simple Counter-1)

7.17.4 Rate Measurement

Rate = the number of pulses received within a period of time.

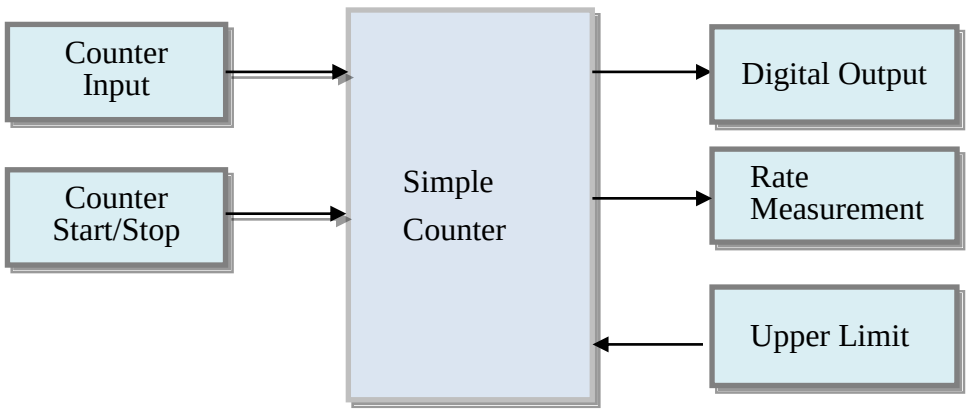


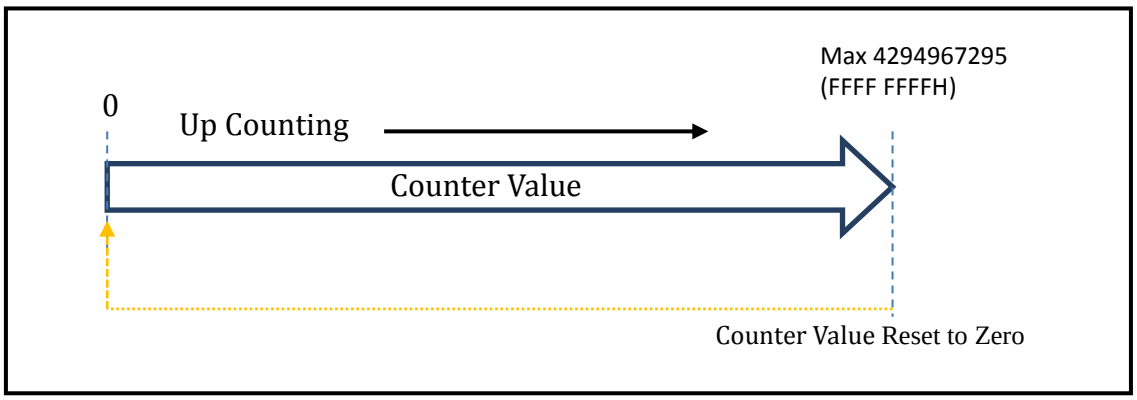
Address		Read/Write	Name	Value
Dec	Hex			
4028	0FBC	Read/Write	Time-Windows	1~1000, Unit: ms Default: 0
4029	0FBD	Read/Write	Windows Channel	0: disable 1: Simple Counter 0 2: Simple Counter 1 3: Simple Counter 2 4: Simple Counter 3 5: Bidirectional Counter 0 6: Bidirectional Counter 1
4030~ 4031	0FBE~ 0FBF	Read	Rate Value	32-bit Unsigned

Frequency [Hz] = Rate Value/ Time-Window [sec.]

7.17.5 Simple Counter

Function block





- Simple Counter Register

Address		Read/Write	Name	Value
Dec	Hex			
4000~ 4001	0FA0~ 0FA1	Read/Write	Simple Counter 0 value	32-bit Unsigned
4002~ 4003	0FA2~ 0FA3	Read/Write	Simple Counter 1 value	
4004~ 4005	0FA4~ 0FA5	Read/Write	Simple Counter 2 value	
4006~ 4007	0FA6~ 0FA7	Read/Write	Simple Counter 3 value	
4008	0FA8	Read/Write	Simple Counter 0 state	0: Counting 1: Stops Counting
4009	0FA9	Read/Write	Simple Counter 1 state	
4010	0FAA	Read/Write	Simple Counter 2 state	
4011	0FAB	Read/Write	Simple Counter 3 state	
4012	0FAC	Read/Write	Simple Counter 0 command	0:Keep Counting 1: Stop Counting 2: Clear Count Value
4013	0FAD	Read/Write	Simple Counter 1 command	
4014	0FAE	Read/Write	Simple Counter 2 command	
4015	0FAF	Read/Write	Simple Counter 3 command	
4020~ 4021	0FB4~ 0FB5	Read/Write	Simple Counter 0 Upper limit	The upper limit value is 32-bit unsigned. When the upper limit is reached, the counter will be reset to 0. Default: 4294967295
4022~ 4023	0FB6~ 0FB7	Read/Write	Simple Counter 1 Upper limit	
4024~ 4025	0FB8~ 0FB9	Read/Write	Simple Counter 2 Upper limit	
4026~ 4027	0FBA~ 0FBB	Read/Write	Simple Counter 3 Upper limit	

- Simple Counter Digital Output

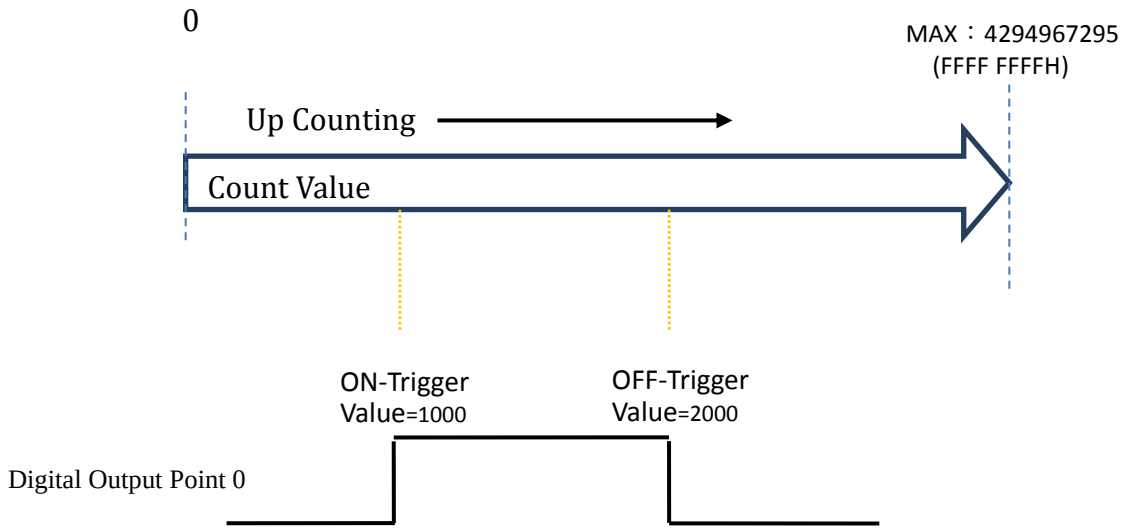
Each simple counter uses a digital output. When the ON-trigger value is reached, the digital output will be set ON; when the OFF-trigger value is reached, the digital output will be set OFF.

The digital outputs of iR-ETN40R are numbered from 0 to 15 (built-in), and the digital outputs of modules are numbered 16+. Setting a value greater than the current total number of outputs is ineffective.

Address		Read/Write	Name	Value
Dec	Hex			
4080	0FF0	Read/Write	Simple Counter 0 Digital Output Point	The value must be less than the current total number of outputs. Default:65535
4081	0FF1	Read/Write	Simple Counter 1 Digital Output Point	
4082	0FF2	Read/Write	Simple Counter 2 Digital Output Point	
4083	0FF3	Read/Write	Simple Counter 3 Digital Output Point	
4084~ 4085	0FF4~ 0FF5	Read/Write	Simple Counter 0 Digital Output ON-trigger Value	Range:0~4294967295 Default: 4294967295
4086~ 4087	0FF6~ 0FF7	Read/Write	Simple Counter 1 Digital Output ON-trigger Value	
4088~ 4089	0FF8~ 0FF9	Read/Write	Simple Counter 2 Digital Output ON-trigger Value	
4090~ 4091	0FFA~ 0FFB	Read/Write	Simple Counter 3 Digital Output ON-trigger Value	
4092~ 4093	0FFC~ 0FFD	Read/Write	Simple Counter 0 Digital Output OFF-trigger Value	Range:0~4294967295 Default: 0
4094~ 4095	0FFE~ 0FFF	Read/Write	Simple Counter 1 Digital Output OFF-trigger Value	
4096~ 4097	1000~ 1001	Read/Write	Simple Counter 2 Digital Output OFF-trigger Value	
4098~ 4099	1002~ 1003	Read/Write	Simple Counter 3 Digital Output OFF-trigger Value	

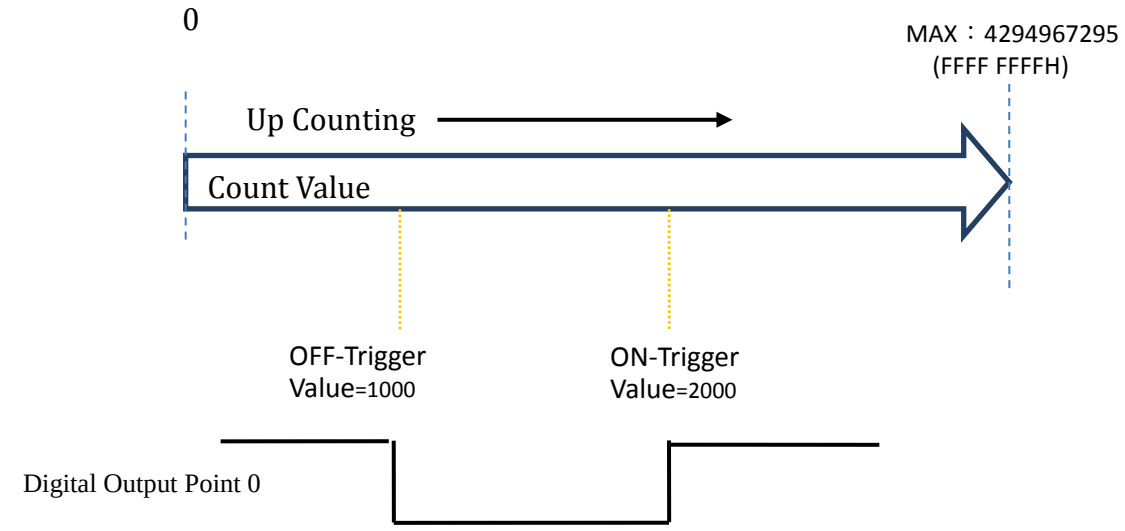
Example 1:

Digital Output Point	ON-Trigger Value	OFF -Trigger Value
0	1000	2000



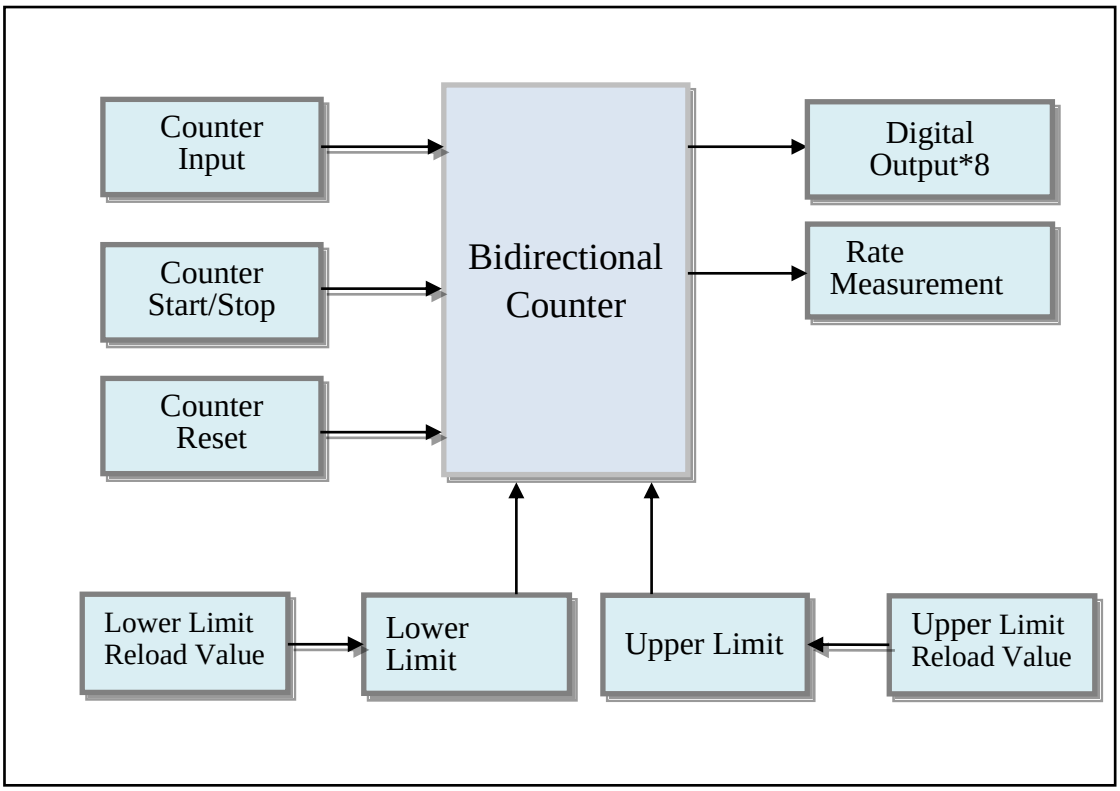
Example 2:

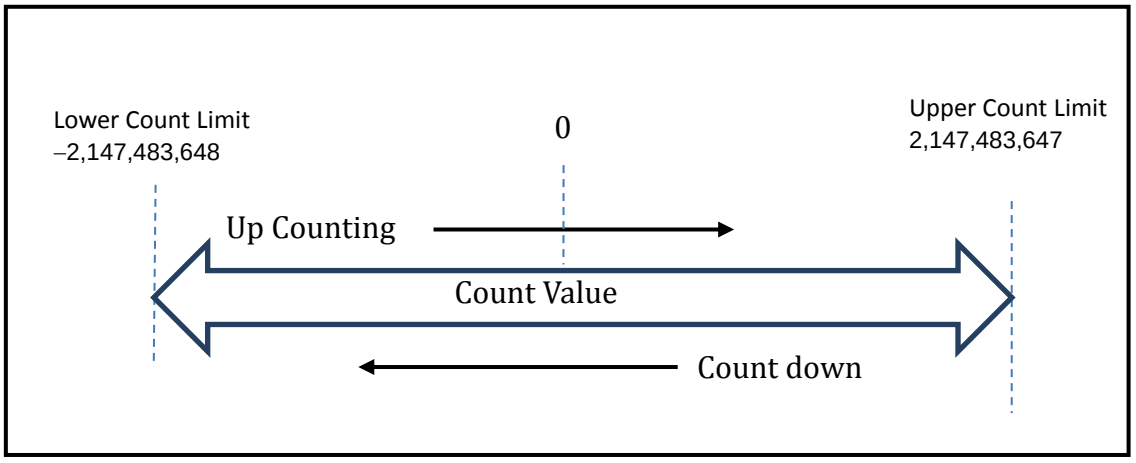
Digital Output Point	ON-Trigger Value	OFF-Trigger Value
0	2000	1000



7.17.6 High Speed Counter

Function Block





- High Speed Counter Register

Address		Read/Write	Name	Value
Dec	Hex			
4046~4047	0FCE~0FCF	Read/Write	Bidirectional Counter-0 Value	32bit signed Range:-2,147,483,648~2,147,483,647
4048~4049	0FD0~0FD1	Read/Write	Bidirectional Counter-1 Value	
4050~4051	0FD2~0FD3	Read/Write	Bidirectional Counter-0 Upper Limit	32bit signed Range:2,147,483,648~2,147,483,647

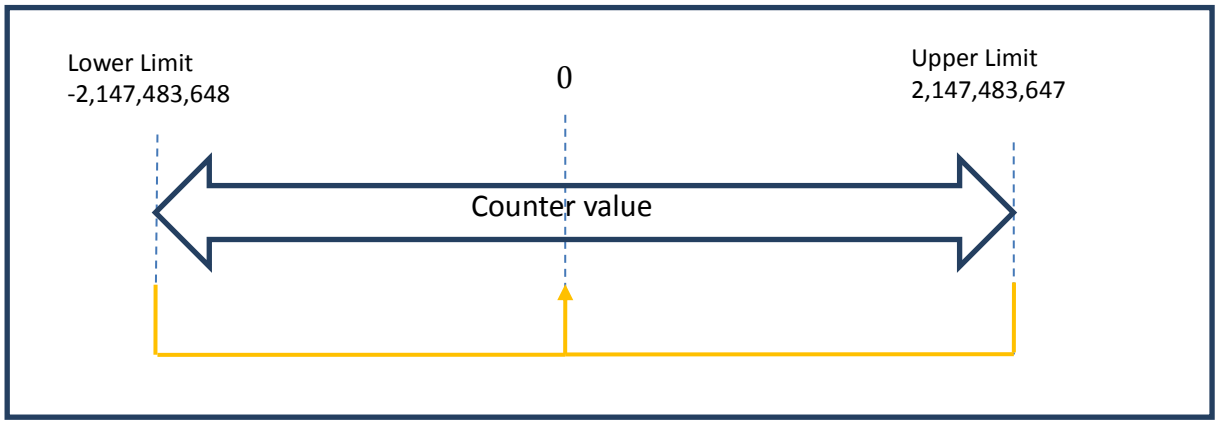
4052~ 4053	0FD4~ 0FD5	Read/Write	Bidirectional Counter-1 Upper Limit	default: 2,147,483,647
4054~ 4055	0FD6~ 0FD7	Read/Write	Bidirectional Counter-0 Lower Limit	32bit signed Range:-2,147,483,648~2,147,483,647 default：-2,147,483,648
4056~ 4057	0FD8~ 0FD9	Read/Write	Bidirectional Counter-1 Lower Limit	
4058~ 4059	0FDA~ 0FDB	Read/Write	Bidirectional Counter-0 Upper Limit Reload Value	32bit signed Range:-2,147,483,648~2,147,483,647 default：0
4060~ 4061	0FDC~ 0FDD	Read/Write	Bidirectional Counter-1 Upper Limit Reload Value	
4062~ 4063	0FDE~ 0FDF	Read/Write	Bidirectional Counter-0 Lower Limit Reload Value	
4064~ 4065	0FE0~ 0FE1	Read/Write	Bidirectional Counter-1 Lower Limit Reload Value	

When the Upper Limit is reached, the Counter Value will be Upper Limit Reload Value.

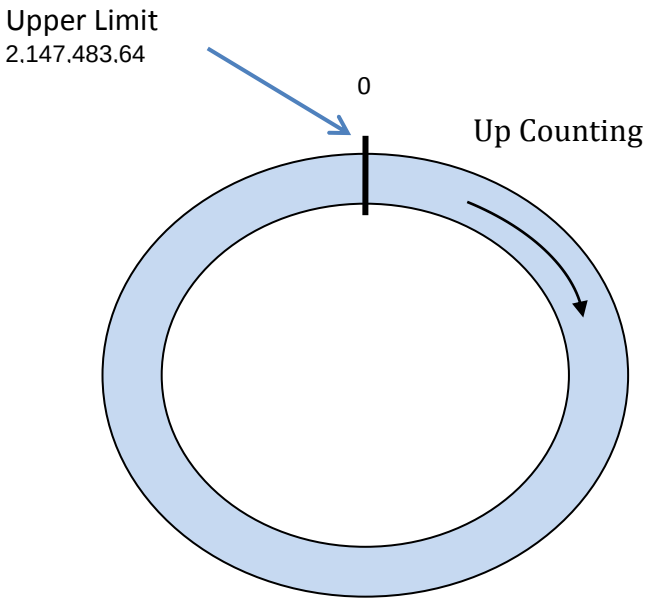
When the Lower Limit is reached, the Counter Value will be Lower Limit Reload Value.

Example 1:

Item	Value
Upper Limit	2,147,483,647
Upper Limit Reload Value	0
Lower Limit	-2,147,483,648
Lower Limit Reload Value	0

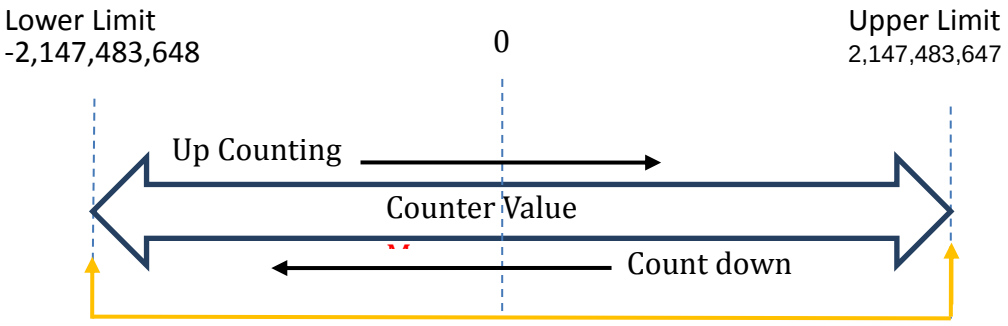


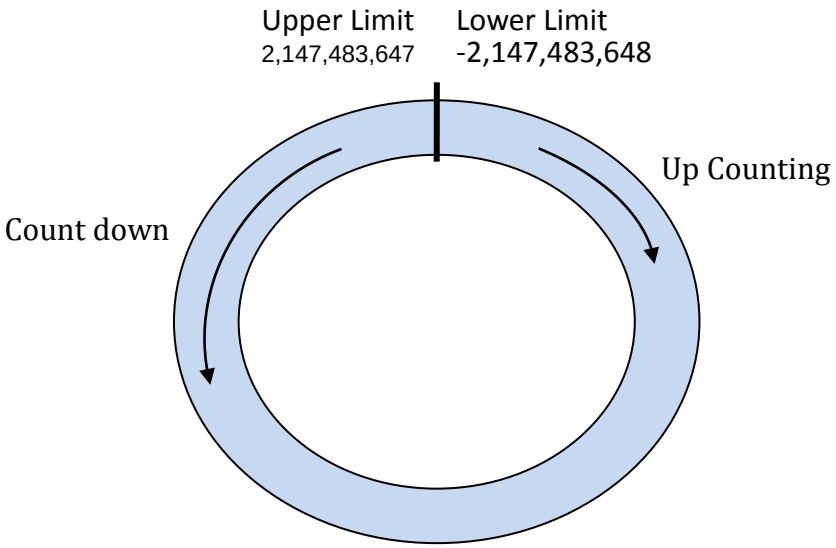
In single-pulse mode, when the upper limit is reached, the counter value will return to 0 (ring counter).



Example 2:

Item	Value
Upper Limit	2,147,483,647
Upper Limit Reload Value	-2,147,483,647
Lower Limit	-2,147,483,647
Lower Limit Reload Value	2,147,483,647



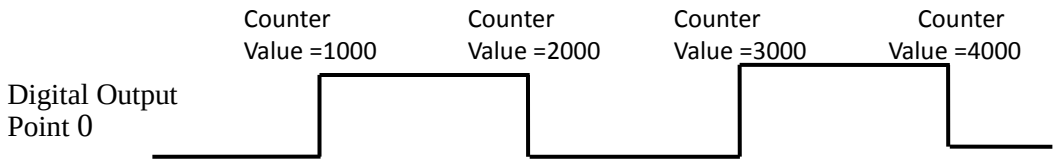


- Bidirectional Counter Digital Output

Each Bidirectional counter uses 8 digital outputs. When the ON-trigger Value is reached, the digital output will be set ON. When the OFF-trigger Value is reached, the digital output will be set OFF. The 8 digital outputs can be set as the same output point or different output points. The digital outputs of iR-ETN40R are numbered from 0 to 15 (built-in), and the digital outputs of modules are numbered 16+. Setting a value greater than the current total number of outputs is ineffective.

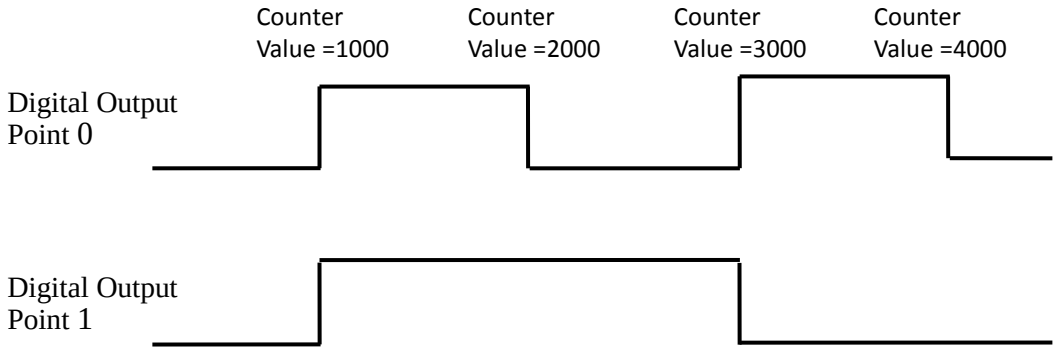
Example 1:

Number	Digital Output Point	ON-trigger Value	OFF-trigger Value
0	0	1000	2000
1	0	3000	4000



Example 2:

Number	Digital Output Point	ON-trigger Value	OFF-trigger Value
0	0	1000	2000
1	0	3000	4000
2	1	1000	3000



- Digital Output: Bidirectional Counter 0

Address		Read/Write	Number	Name	Value
Dec	Hex				
4200	1068	Read/Write	0	Digital Output Point 0	Default: 65535
4201~4202	1069~106A	Read/Write		Digital Output Point 0 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4203~4204	106B~106C	Read/Write		Digital Output Point 0 OFF-trigger Value	
4205	106D	Read/Write	1	Digital Output Point 1	Default: 65535
4206~4207	106E~106F	Read/Write		Digital Output Point 1 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4208~4209	1070~1071	Read/Write		Digital Output Point 1 OFF-trigger Value	
4210	1072	Read/Write	2	Digital Output Point 2	Default: 65535
4211~4212	1073~1074	Read/Write		Digital Output Point 2 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4213~4214	1075~1076	Read/Write		Digital Output Point 2 OFF-trigger Value	
4215	1077	Read/Write	3	Digital Output Point 3	Default: 65535
4216~4217	1078~1079	Read/Write		Digital Output Point 3 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4218~4219	107A~107B	Read/Write		Digital Output Point 3 OFF-trigger Value	
4220	107C	Read/Write	4	Digital Output Point 4	Default: 65535
4221~4222	107D~107E	Read/Write		Digital Output Point 4 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4223~4224	107F~1080	Read/Write		Digital Output Point 4 OFF-trigger Value	
4225	1081	Read/Write	5	Digital Output Point 5	Default: 65535
4226~4227	1082~1083	Read/Write		Digital Output Point 5 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4228~4229	1084~1085	Read/Write		Digital Output Point 5 OFF-trigger Value	
4230	1086	Read/Write	6	Digital Output Point 6	Default: 65535
4231~4232	1087~1088	Read/Write		Digital Output Point 6 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4233~4234	1089~108A	Read/Write		Digital Output Point 6 OFF-trigger Value	
4235	108B	Read/Write	7	Digital Output Point 7	Default: 65535
4236~4237	108C~108D	Read/Write		Digital Output Point 7 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4238~4239	108E~108F	Read/Write		Digital Output Point 7 OFF-trigger Value	

- Digital Output: Bidirectional Counter 1

Address		Read/Write	Number	Name	Value
Dec	Hex				
4240	1090	Read/Write	0	Digital Output Point 0	Default: 65535
4241~4242	1091~1092	Read/Write		Digital Output Point 0 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4243~4244	1093~1094	Read/Write		Digital Output Point 0 OFF-trigger Value	
4245	1095	Read/Write	1	Digital Output Point 1	Default: 65535
4246~4247	1096~1097	Read/Write		Digital Output Point 1 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4248~4249	1098~1099	Read/Write		Digital Output Point 1 OFF-trigger Value	
4250	109A	Read/Write	2	Digital Output Point 2	Default 65535
4251~4252	109B~109C	Read/Write		Digital Output Point 2 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4253~4254	109D~109E	Read/Write		Digital Output Point 2 OFF-trigger Value	
4255	109F	Read/Write	3	Digital Output Point 3	Default: 65535
4256~4257	10A0~10A1	Read/Write		Digital Output Point 3 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4258~4259	10A2~10A3	Read/Write		Digital Output Point 3 OFF-trigger Value	
4260	10A4	Read/Write	4	Digital Output Point 4	Default: 65535
4261~4262	10A5~10A6	Read/Write		Digital Output Point 4 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4263~4264	10A7~10A8	Read/Write		Digital Output Point 4 OFF-trigger Value	
4265	10A9	Read/Write	5	Digital Output Point 5	Default: 65535
4266~4267	10AA~10AB	Read/Write		Digital Output Point 5 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4268~4269	10AC~10AD	Read/Write		Digital Output Point 5 OFF-trigger Value	
4270	10AE	Read/Write	6	Digital Output Point 6	Default: 65535
4271~4272	10AF~10B0	Read/Write		Digital Output Point 6 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4273~4274	10B1~10B2	Read/Write		Digital Output Point 6 OFF-trigger Value	
4275	10B3	Read/Write	7	Digital Output Point 7	Default: 65535
4276~4277	10B4~10B5	Read/Write		Digital Output Point 7 ON-trigger Value	32-bit Signed Range: -2,147,483,648~2,147,483,647
4278~4279	10B6~10B7	Read/Write		Digital Output Point 7 OFF-trigger Value	

7.17.7 Application Examples

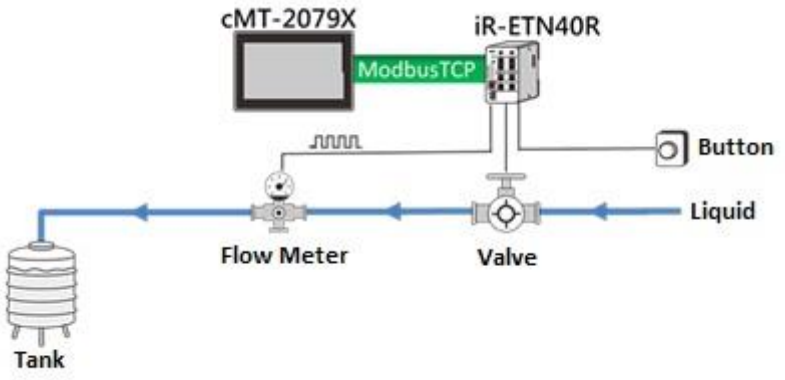
7.17.7.1 Flow Control

- Application Description

  Flow control is accomplished with a flow meter and a valve. As the liquid passes through the valve and the flow meter into the tank, the flow meter generates pulses that are proportional to the amount of liquid passed. Therefore, the tank will be filled with the desired amount of liquid if we can close the valve immediately when the number of pulses detected reaches the preset value.

  To implement flow control with iR-ETN40R, we make use of the high speed input/counter and a special feature of iR-ETN40R which sets digital outputs ON/OFF upon high-speed counters detecting a certain number of pulses. By connecting flow meter to the high-speed input and enabling the special feature, the valve can be closed in a timely manner, even without writing additional codes.

- Architecture



- iR-ETN40R Terminal

Object	iR-ETN40R Terminal	
Flow Meter	Input	High-speed input Ⅰ- 10
Button		High-speed input Ⅱ- 11
Valve	Output	Output Ⅰ- 0

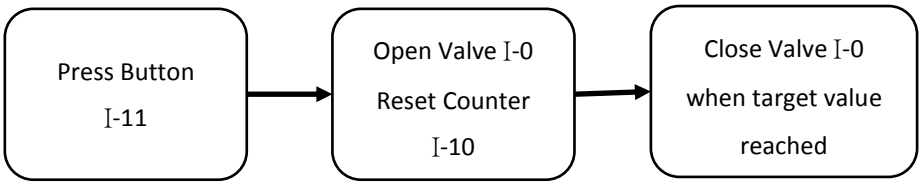
- Controlling the flow

When iR-ETN40R detects that button Ⅰ-11 is pressed, the HMI will reset the counter to 0, and then set output Ⅰ-0 on to open the valve. Pulses are generated as the liquid passes through the flow meter, and then the pulses are counted by iR-ETN40R's high-speed counter Ⅰ-10. When the number of pulses reach 100000 (target value), iR-ETN40R will automatically set output Ⅰ-0 off to close the valve.

- Parameters

Name	Address (Dec.)	Value
Terminal Ⅰ High Speed Input Setting	4044	When set to 1, the high-speed input Ⅰ-10 is used as a simple counter 0.
Terminal Ⅱ High Speed Input Setting	4045	When set to 0, controls to the counter are disabled.
Digital Output Setting	4080	0
OFF Trigger	4092~4093	100000 (target value)

- Flowchart

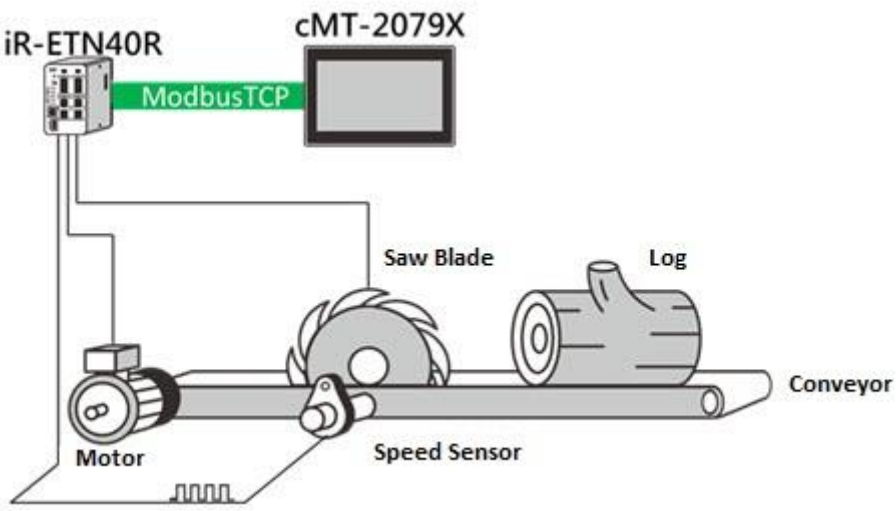


7.17.7.2 Speed Control

- Application Description

In this application the logs are fed into a saw blade, and a speed sensor detects the speed of the saw blade. When the saw blade passes through the log, its speed slows down. The sensor detects the deceleration, and the conveyer belt is switched to slow speed. Pulses are generated as the saw blade passes through the log, and the pulse speed is computed by iR-ETN40R.

- Architecture



- iR-ETN40R Terminal

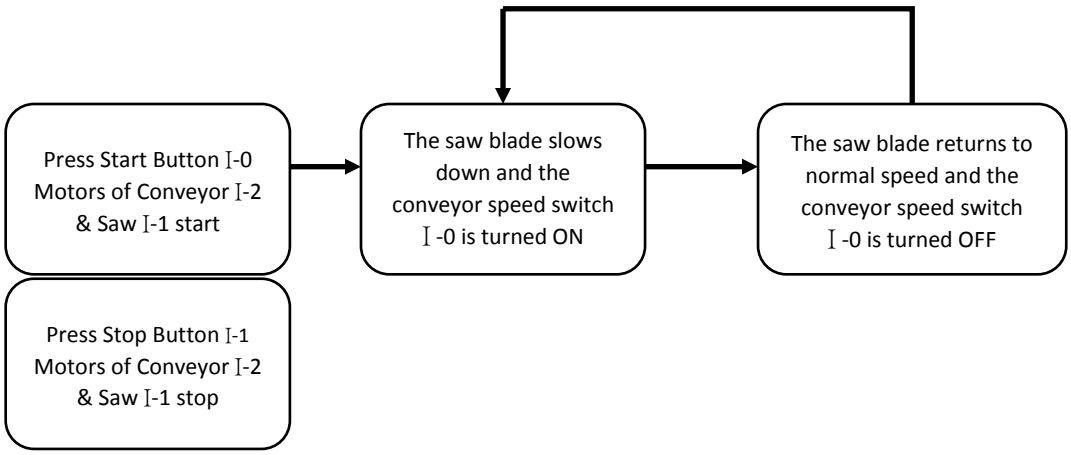
Object	iR-ETN40R Terminal	
Start Button	Input	Input I -0
Stop Button		Input I -1
Speed Sensor		High-speed Input I -10
Conveyor Speed Switch	Output	Output I -0
Saw Motor		Output I -1
Conveyor Motor		Output I -2

- Controlling the speed

In this application, the log feed speed is controlled.

The HMI sets iR-ETN40R's outputs I -1 and I -2 on to start the saw blade and the conveyer belt. The sensor detects the speed of the saw blade and outputs signal to iR-ETN40R. When the saw blade passes through the log, its speed slows down, and the conveyer belt is switched to slow speed (Output I -0 = TRUE). After the saw blade passes through the log and returns to its normal speed, the conveyer belt is switched to its normal speed (Output I -0 = FALSE).

- Flowchart



7.17.7.3 Length Measurement

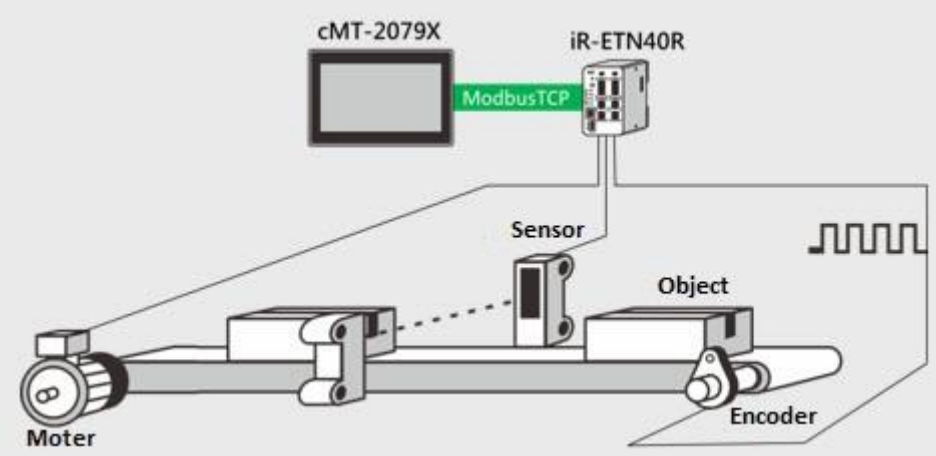
- Application Description

  Length measurement of a moving object on a conveyer belt requires a sensor and an encoder. As the object passes the sensor, the sensor outputs ON; after it leaves, the sensor output is OFF. Since the number of encoder pulses correlates

to the moving distance of the conveyer belt, the length of an object can be computed from the number of encoder pulses detected when the sensor is on.

In this example, of the four high-speed input channels of iR-ETN40R, we would connect two to the encoder. For the other two, we would connect both to the sensor output and designate one as counter Run/Stop and the other one as counter Reset in the program.

- Architecture



- iR-ETN40R Terminal

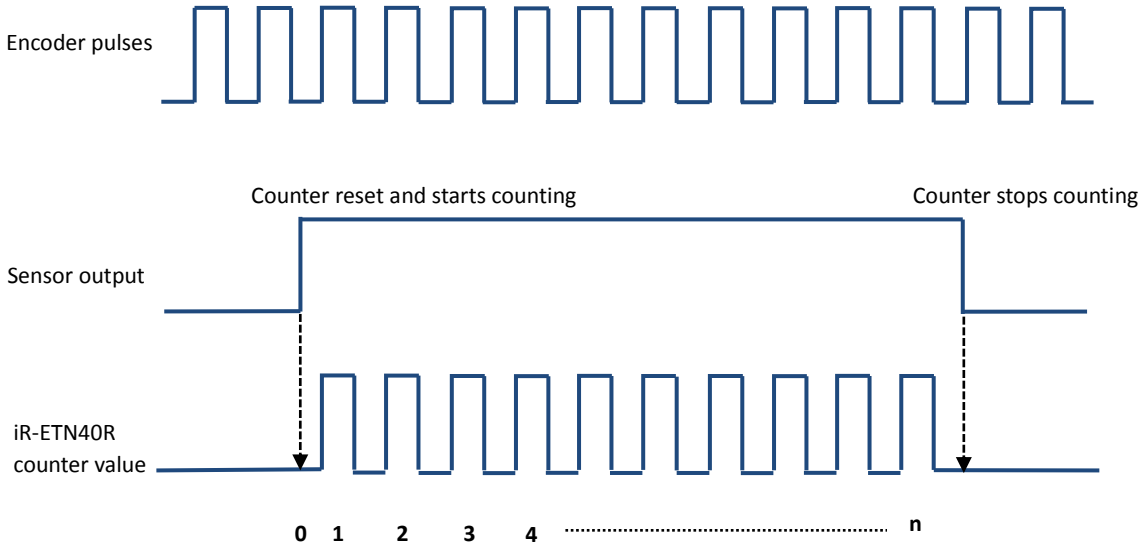
Object	iR-ETN40R Terminal	
Encoder-A Phase	Input	High-speed Input Ⅰ-10
Encoder-B Phase		High-speed Input Ⅰ-11
Sensor		High-speed Input Ⅱ-10
		High-speed Input Ⅱ-11
Conveyor Motor	Output	Output Ⅰ-0

- Measuring the length

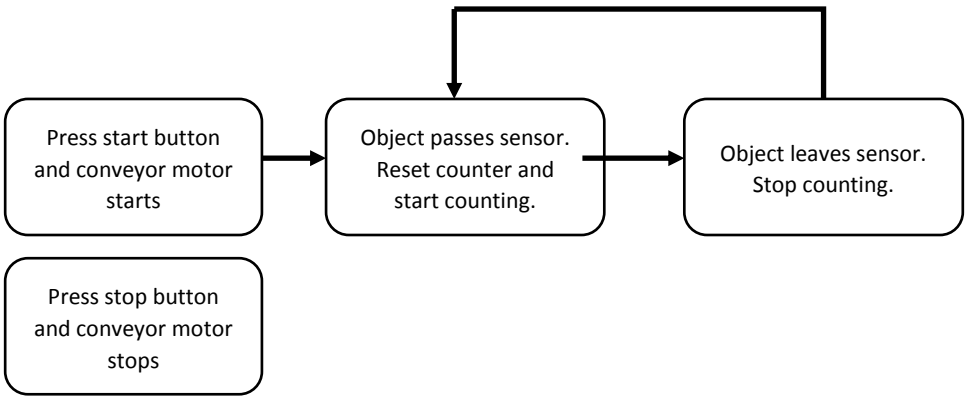
After power on, iR-ETN40R's output Ⅰ-0 is set on, and the conveyor belt starts running. When an object on the conveyor passes the sensor, the counter value is reset to 0 and the counter starts counting. After the object leaves the sensor, the counter stops and the length of the object is computedfrom the number of pulses detected.

- Parameters

Name	Address (Dec.)	Value
Terminal Ⅰ High Speed Input Setting	4044	When set to 3, the high-speed inputs Ⅰ-10/11 are configured for A/B phase encoder use.
Terminal Ⅱ High Speed Input Setting	4045	When set to 7, the high-speed inputs Ⅱ-10/11 are configured for starting / stopping the high-speed counter, and for resetting the counter value.



- Flowchart



8. Modbus Mapping

The following is an example showing that when connecting with multiple modules, the address mapping and input/output bit mapping are 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
Slot#7	iR-PU01-P
Slot#8	iR-PU01-P
Slot#9	iR-PU01-P
Slot#10	iR-PU01-P

8.1 iBus Information Register

Address		Description	Value	
Dec	Hex			
10000	2710	Slot 0 Product Code (Coupler)	0A73h (iR-ETN40R)	
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	10	
10035	2733	Points of Digital Input	24	56
10036	2734	Points of Digital Output	32	48
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	Function Code
		iR-ETN40R (0000h~0037h)	
Built-in	N/A	Terminal Ⅰ: 0000h~000Fh Terminal Ⅱ: 0010h~001Fh	2
Slot#1	iR-DI16-K	0020h~002Fh (Input points 0~15)	2

Slot#2	iR-DQ16-P	N/A	
Slot#3	iR-DM16-P	0030h~0037h (Input points 0~7)	2
Slot#4	iR-DQ08-R	N/A	

8.3 Digital Output Bit Mapping to Modbus

Slot	Module	Bit Offset	Function Code
		iR-ETN40R (0000h~0030h)	
Built-in	N/A	Terminal Ⅰ: 0000h~0007h Terminal Ⅱ:0008h~000Fh	5,15
Slot#1	iR-DI16-K	N/A	
Slot#2	iR-DQ16-P	0010h~001Fh (Module output 0~15)	5,15
Slot#3	iR-DM16-P	0020h~0027h (Module output 0~7)	5,15
Slot#4	iR-DQ08-R	0028h~002Fh (Module 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 1Input Mode	22021	21
		Channel 2Input Mode	22022	22
		Channel 3Input Mode	22023	23
		……	……..	……
Slot#6	iR-AQ04-VI	Channel 0 Output Mode	22500	0
		Channel 1Output Mode	22501	1
		Channel 2Output Mode	22502	2
		Channel 3Output Mode	22503	3
		……	……..	……
		16# Error Code	22516	16

8.7 iR-PU01-P Variable Instance Mapping

Slot	Module	Description	Address	Function Code
Slot#7 (Axis 0)	iR-PU01-P	Axis 0 variable instance input	40000~40015	23
		Axis 0 variable instance output	40500~40515	
Slot#8 (Axis 1)	iR-PU01-P	Axis 1 variable instance input	40016~40031	23
		Axis 1 variable instance output	40516~40531	
Slot#9 (Axis 2)	iR-PU01-P	Axis 2 variable instance input	40032~40047	23
		Axis 2 variable instance output	40532~40547	
Slot#10 (Axis 3)	iR-PU01-P	Axis 3 variable instance input	40048~40063	23
		Axis 3 variable instance output	40548~40563	

*The following are examples explaining variable instance mapping. In these examples, Axis 0 is used.

Axis 0 variable instance input:

Item	Address	Description		Data Type		Dec/Hex
1	40000	High Byte	Axis 0 Mode of Operation Display	USINT	Unsigned 8	Dec
		Low Byte	Axis 0 Digital Input	BYTE	Unsigned 8	Hex
2	40001	Axis 0 Status Word		UINT	Unsigned 16	Hex
3	40002	Axis 0 Position actual value (Lo word)		DINT	Signed 32	Dec
4	40003	Axis 0 Position actual value (Hi word)				
5	40004	Axis 0 Velocity actual value(Lo word)		DINT	Signed 32	Dec
6	40005	Axis 0 Velocity actual value(Hi word)				
7	40006	Axis 0 Position demand internal value(Lo word)		DINT	Signed 32	Dec
8	40007	Axis 0 Position demand internal value(Hi word)				
9	40008	High Byte	Axis 0 Digital Output Status	BYTE	Unsigned 8	Hex
		Low byte	Axis 0 Capture Channel Status	BYTE	Unsigned 8	Hex
10	40009	Axis 0 Error code		UINT	Unsigned 16	Hex
11	40010	Axis 0 2nd additional position actual value (Lo word)		DINT	Signed 32	Dec
12	40011	Axis 0 2nd additional position actual value(Hi word)				
	40012 ~40015	Reserved				

Axis 0 variable instance output:

Item	Address	Description		Data Type		Dec/Hex
1	40500	High Byte	Axis 0 Mode of Operation	USINT	Unsigned 8	Dec
		Low Byte	Axis 0 Digital Output	BYTE	Unsigned 8	Hex
2	40501	Axis 0 Control word		UINT	Unsigned 16	Dec

3	40502	Axis 0 Target Position (Lo word)	DINT	Signed 32	Dec
4	40503	Axis 0 Target Position (Hi word)			
5	40504	Axis 0 Profile velocity (Lo word)	DINT	Signed 32	Dec
6	40505	Axis 0 Profile velocity (Hi word)			
7	40506	Axis 0 Target velocity (Lo word)	DINT	Signed 32	Dec
8	40507	Axis 0 Target velocity (Hi word)			
9	40508	Axis 0 Profile acceleration (Lo word)	DINT	Signed 32	Dec
10	40509	Axis 0 Profile acceleration (Hi word)			
11	40510	Axis 0 Profile deceleration(Lo word)	DINT	Signed 32	Dec
12	40511	Axis 0 Profile deceleration (Hi word)			
	40512 ~40515	Reserved			

9. EtherNet/IP Object

9.1 Object List

Name	Object Type	Object Code (Hex)
Identity	Standard Object	01
Message Router	Standard Object	02
Assembly	Standard Object	04
Connection Manager	Standard Object	06
TCP/IP Interface	Standard Object	F5
Ethernet Link	Standard Object	F6
Module Register	Manufacturer Defined Object	70
iBus Object	Manufacturer Defined Object	71
AXIS Object	Manufacturer Defined Object	80~87

9.2 Identity Objects

Class Code: 01HEX

9.2.1 Service

Service Code	Class	Instance	Name	Value
0x01	●	●	Get Attribute All	
0x05	X	●	Reset	0: Reset
0x0E	X	●	Get Attribute Single	

9.2.2 Class Attributes

Instance ID	Attribute ID	Read/Write	Name	Data Type	Value
0	1	Read	Revision	UINT	1
	2	Read	Maximum Instance	UINT	1
	6	Read	Maximum ID Number Class Attributes	UINT	7
	7	Read	Maximum ID Number Instance Attributes	UINT	7

9.2.3 Instance Attributes

Instance ID	Attribute ID	Read/Write	Name		Data Type	Value
1	1	Read	Weintek Vendor ID		UINT	1596
	2	Read	Device Type- Communications Adapter		UINT	12
	3	Read	iR-ETN40R Product Code		UINT	1794
	4	Read	Revision	Major	USINT	1
				Minor	USINT	1
	5	Read	Device State		WORD	
	6	Read	Serial Number		UDINT	
	7	Read	Product Name		STRING	“R-ETN40R”

9.3 Message Router Object

Class Code: 02HEX

9.3.1 Class Attributes & Instance Attributes

None

9.4 Assembly Object

Class Code: 04HEX

9.4.1 InstanceAttributes

Instance ID	Attribute ID	Read/Write	Name	Data Type	Length
100	3	Read	Input	Byte	Changes according to module settings.
150	3	Read/Write	Output	Byte	Changes according to module settings.
151	3	Read/Write	Configuration	Byte	10

9.5 Connection Manager Object

Class Code: 06HEX

9.5.1 Class Attributes & Instance Attributes

None

9.6 Ethernet Link Object

Class Code: F6HEX

9.6.1 Services

Service Code	Class	Instance	Name
0x01	•	X	Get Attribute All
0x0E	•	•	Get Attribute Single

9.6.2 Class Attributes

Instance ID	Attribute ID	Read/Write	Name	Data Type	Value
0	1	Read	Revision	UINT	4
	2	Read	Max Instance	UINT	1

9.6.3 Instance Attributes

Instance ID	Attribute ID	Read/Write	Name	Data Type	Value
1	1	Read	Interface Speed	UDINT	100：Speed 100M
	2	Read	Interface Flags	DWORD	Bit 0 : Link Active Bit 1 : Full Duplex Bit 2~4 : Auto negotiation Bit 5 : Manual Setting required Reset Bit 6 : Local Hardware Fault Others : 0
	3	Read	Physical Address	6 USINTs	MAC address
	11	Read	Capability Bits	DWORD	Interface capabilities, other than speed/duplex
			Speed /	USINT	Number of elements

			Duplex Options	USINT	Interface Speed
				USINT	Interface Duplex Mode

9.7 TCP/IP Interface Object

Class Code: F5HEX

9.7.1 Service

Service Code	Class	Instance	Name
0x0E	●	●	Get Attribute Single
0x01	X	●	Set Attribute Single

9.7.2 Class Attributes

Instance ID	Attribute ID	Read/Write	Name	Data Type	Value
0	1	Read	Revision	UINT	4
	2	Read	Max Instance	UINT	1

9.7.3 Instance Attributes

Instance ID	Attribute ID	Read/Write	Name	Data Type	Value
1	1	Read	Interface Status	DWORD	
	2	Read	Configuration Capability	DWORD	0x00000020
	3	Read	Configuration Control	DWORD	0x00000000
	4	Read	Physical Link Path Size of Path	Padded-PATH	00 00 20 F6 24 01
	5	Read	Interface Configuration	UDINT	IP address
				UDINT	Network Mask
				UDINT	Gateway Address
				UDINT	Name Server
				UDINT	Name Server 2
				STRING	Domain Name
	6	Read	Host name	STRING	iR-ETN40R
	13	Read/Write	Encapsulation Inactivity Timeout	UINT	0 = Disable timeout 1-3600 = timeout in seconds Default = 120 seconds

9.7.4 Interface Status

Bit	Name	Definition
0-3	Interface Configuration Status	0 = The Interface Configuration attribute has not been configured. 1 = The Interface Configuration attribute contains

		configuration obtained from BOOTP, DHCP, or non-volatile storage. 2 = The Interface Configuration attribute contains configuration obtained from hardware settings.

9.7.5 Configuration Control Attribute

Value	Definition
0	The device shall use statically-assigned IP configuration values.
1	The device shall obtain the interface configuration values via BOOTP.
2	The device shall obtain the interface configuration values via DHCP.

9.8 Module Register object

Class Code: 70HEX

9.8.1 Service

Service Code	Class	Instance	Service Name
0x01	●	X	Set Attribute Single
0x0E	●	●	Get Attribute Single

9.8.2 Class Attribute

Instance ID	Attribute ID	Read/Write	Name	Data Type	Value
0	1	Read	Revision	UINT	1

9.8.3 Instance Attributes

Instance ID	Attribute ID	Read/Write	Name	Data Type	Value
Slot#	Module Register#	Read/Write	Module Register#	INT	

The following is an example showing the mapping of Instance ID and Attribute ID when iR-ETN40R is connected to the following modules.

Slot	Module Name
Slot#1	**iR-AI04-VI**
Slot#2	iR-DQ16-P
Slot#3	iR-DM16-P
Slot#4	iR-DQ08-R
Slot#5	**iR-AQ04-VI**

Slot	Module	Description	Instance ID	Attribute ID	Module Register
Slot#1	iR-AI04-VI	Channel 0 Input Mode	1	20	20
		Channel 1 Input Mode		21	21
		Channel 2 Input Mode		22	22
		Channel 3 Input Mode		23	23

		……		……	……
Slot#5	iR-AQ04-VI	Channel 0 Output Mode	5	0	0
		Channel 1 Output Mode		1	1
		Channel 2 Output Mode		2	2
		Channel 3 Output Mode		3	3
		……		……	……
		16# Error Code		16	16

*For more information about registers, please see the user manual for each module.

9.9 iBus Object

Class Code: 71HEX

9.9.1 Services

Service Code	Class	Instance	Service Name
0x01	●	X	Set Attribute Single
0x0E	●	●	Get Attribute Single

9.9.2 Class Attribute

Instance ID	Attribute ID	Read/Write	Name	Data Type	Value
0	1	Read	Revision	UINT	1

9.9.3 Instance Attributes

Instance ID	Attribute ID	Read/Write	Name	Data Type	Value
1	0	Read	Module number	UINT	
	1	Read	Digital Input point	UINT	
	2	Read	Digital Output point	UINT	
	3	Read	Analog Input point	UINT	
	4	Read	Analog Output point	UINT	
	5	Read	Axis point	UINT	
	6	Read	Byte size of Mapping Input Data	UINT	Unit: Byte
	7	Read	Mapping Input Data	Struct of Byte	
	8	Read	Byte size of Mapping Output Data	UINT	Unit: Byte
	9	Read/Write	Mapping Output Data	Struct of Byte	
	10~25	Read	Module Device Name	String	
	50~65	Read	Module Device Code	UINT	
	90~105	Read	Module Version	UINT	
2	0~255	Read/Write	Digital Input 0~255 filter time	UINT	
3	1	Read/Write	Digital Output Error Mode (bit15-0)	UINT	0: Keep Last Value 1: Incorrect Value
	2	Read/Write	Digital Output Error Mode (bit31-16)	UINT	

	.....	Read/Write	.....	UINT	
	32	Read/Write	Digital Output Error Mode(bit511-495)	UINT	
4	1	Read/Write	Digital Output Error Value (bit15-0)	UINT	0: Off 1: On
	2	Read/Write	Digital Output Error Value (bit31-16)	UINT	
	.....	Read/Write	.....	UINT	
	32	Read/Write	Digital Output Error Value (bit511-495)	UINT	
5	1	Read/Write	Analog Output Error Mode(channel 15-0)	UINT	0: Keep Last Value 1: Incorrect Value
	2	Read/Write	Analog Output Error Mode (channel 31-16)	UINT	
	3	Read/Write	Analog Output Error Mode(channel 47-32)	UINT	
	4	Read/Write	Analog Output Error Mode (channel 63-48)	UINT	
6	1~64	Read/Write	Analog Output Error Value (channel 0-63)	INT	

9.10 Axis Register Object

Class Code: 80HEX~87HEX

9.10.1 Services

Service Code	Class	Instance	Service Name
0x01	●	X	Set Attribute Single
0x0E	●	●	Get Attribute Single

9.10.2 Class Attributes

Instance ID	Attribute ID	Read/Write	Name	Data Type	Value
0	1	Read	Revision	UINT	1

9.10.3 Instance Attributes

Class ID	Axis Number	01PU Module	
		Index	Sub-index
80hex	Axis1	5500+ Instance ID (Range 5500h-55FFh)	Attribute ID
81hex	Axis2		
82hex	Axis3		
83hex	Axis4		
84hex	Axis1	6000+ Instance ID (Range 6000h-60FFh)	Attribute ID
85hex	Axis2		
86hex	Axis3		
87hex	Axis4		

9.11 High Speed Counter Object

Class Code: 72HEX

9.11.1 Services

Service Code	Class	Instance	Service Name
0x01	●	●	Set Attribute Single
0x0E	●	●	Get Attribute Single

9.11.2 Instance Attributes

Instance ID	Attribute ID	Read/Write	Name	Data Type	Value
1	1~4	Read/Write	Simple Counter 0~3 upper limit	UDINT	
2	1~4	Read/Write	Simple Counter 0~3 Digital Output Point	UINT	
3	1~4	Read/Write	Simple Counter 0~3 Digital Output High-trigger Value	UDINT	
4	1~4	Read/Write	Simple Counter 0~3 Digital Output Low -trigger Value	UDINT	
5	1~2	Read/Write	Bidirectional Counter 0~1 Upper Limit	DINT	
6	1~2	Read/Write	Bidirectional Counter 0~1 Upper Limit Reload Value	DINT	
7	1~2	Read/Write	Bidirectional Counter 0~1 Lower Limit	DINT	
8	1~2	Read/Write	Bidirectional Counter 0~1 Lower Limit Reload Value	DINT	
9	1~8	Read/Write	Bidirectional Counter-0 value Digital Output-0~7 Point	UINT	
10	1~8	Read/Write	Bidirectional Counter-0 value Digital Output-0~7 High-trigger Value	DINT	
11	1~8	Read/Write	Bidirectional Counter-0 value Digital Output-0~7 Low-trigger Value	DINT	
12	1~8	Read/Write	Bidirectional Counter-1 value Digital Output-0~7 Point	UINT	
13	1~8	Read/Write	Bidirectional Counter-1 value Digital Output-0~7 High-trigger Value	DINT	
14	1~8	Read/Write	Bidirectional Counter-1 value Digital Output-0~7 Low-trigger Value	DINT	
15	1	Read/Write	Rate – Time Windows	UINT	

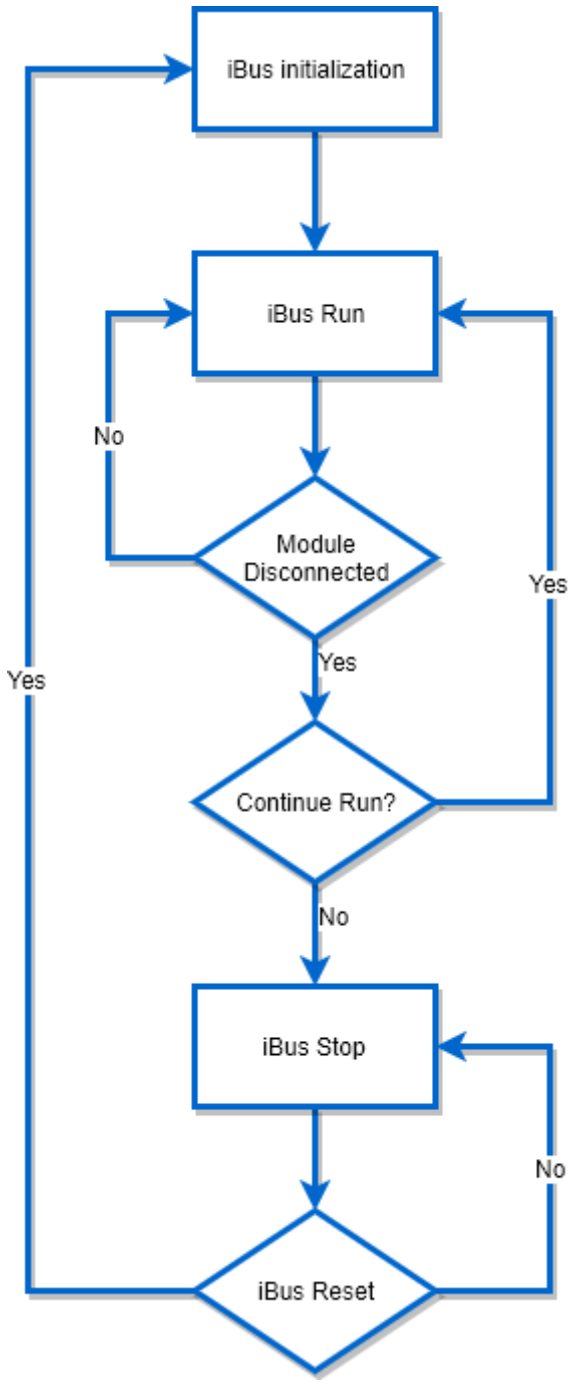
15	2	Read/Write	Rate –Windows Channel	UINT	
15	3	Read	Rate - Value	UDINT	
16	1~4	Read	Simple counter0~3 Value	UDINT	
16	5~6	Read	Bidirectional Counter0~1 Value	DINT	

10.iBus Error Handling

When communication with the module is lost, iR-ETN40R 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:



11.Power Consumption

Type	Device	Consumption(5V)	Power Supply(5V)	Power Consumption(24V)
Coupler	iR-ETN40R	520mA/2.6W	2A/10W	255mA/6.12W
Digital I/O	iR-DM16-P	130mA/0.65W	--	53mA/1.27W
	iR-DM16-N	130mA/0.65W	--	56mA/1.34W
	iR-DQ08-R	220mA/1.1W	--	84mA/2.02W
	iR-DQ16-N	205mA/1.02W	--	78mA/1.87W
	iR-DQ16-P	196mA/0.984W	--	75mA/1.80W
	iR-DI16-K	83mA/0.418W	--	31mA/0.74W
Analog I/O	iR-AQ04-VI	65mA/0.325W	--	25mA/0.60W
	iR-AI04-VI	70mA/0.35W	--	27mA/0.65W
	iR-AM06-VI	70mA/0.35W	--	27mA/0.65W
	iR-AI04-TR	65mA/0.325W	--	25mA/0.60W
Motion	iR-PU01-P	108mA/0.54W	--	85mA/2.04W

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

ex.1 Connecting six iR-DQ08-R, total number of points: 48+16(built-in) = 64 points, output logic: relay

Device	Name	Consumption (2A/5V)
Coupler	iR-ETN40R	520mA
Module	iR-DQ08-R *6	220mA*6=1.32A
System	Power consumption：$0.520A + 1.32A = 1.840$ A Power supply: $2A > 1.840A$	

ex.2 Connecting five iR-DI16-K and five iR-DQ16-P

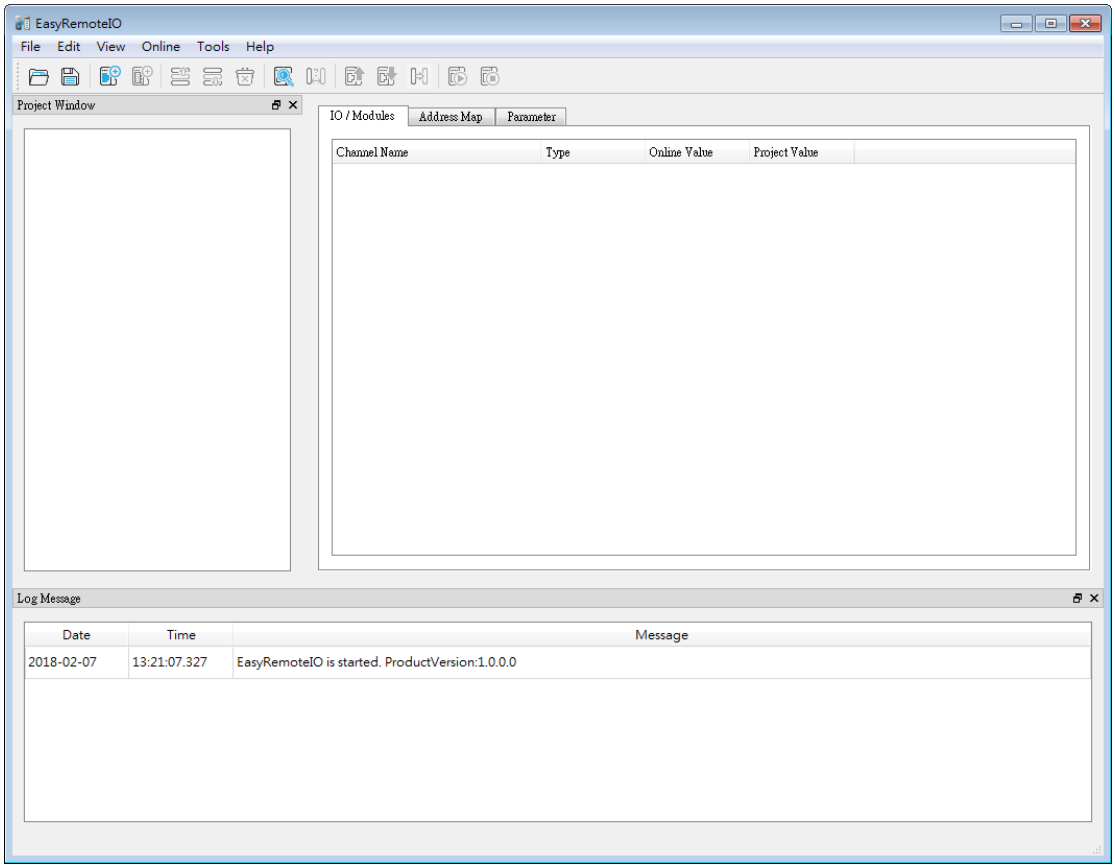
Total number of Input points: 80+24(built-in) = 104 points

Total number of Output points: 80+16(built-in) = 96 points

Device	Name	Consumption (2A/5V)
Coupler	iR-ETN40R	520mA
Module	iR-DI16-K *5	83mA*5=415mA
	iR-DQ16-P *5	196mA*5= 980mA
System	Power consumption：$520 + 415 + 980 = 1915$mA Power supply: $2A > 1.915A$	

12.EasyRemoteIO

EasyRemoteIO is an easy-to-use tool for configuring the parameters of iR-ETN40R. 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.

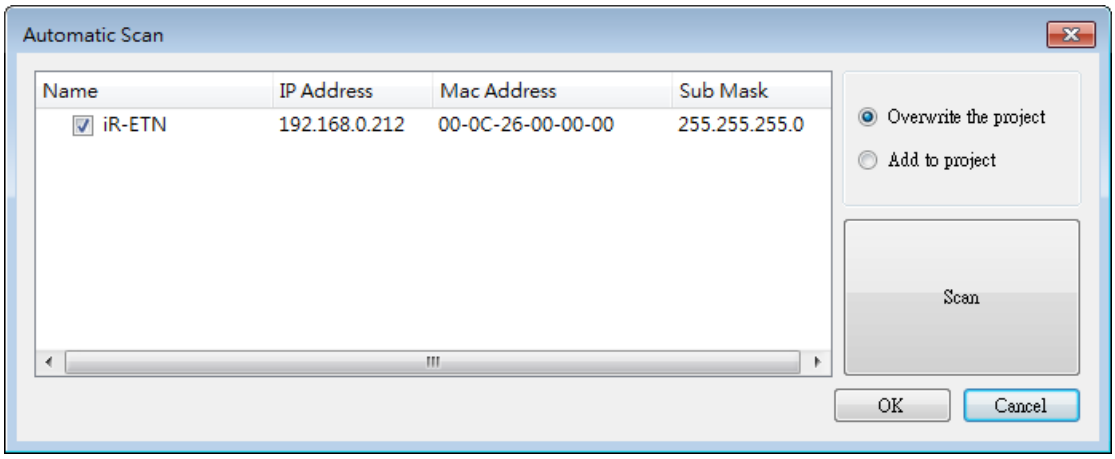


1. Preparation:

The default domain of iR-ETN40R is 192.168.0.212, please set computer's IP to 192.168.0.*.

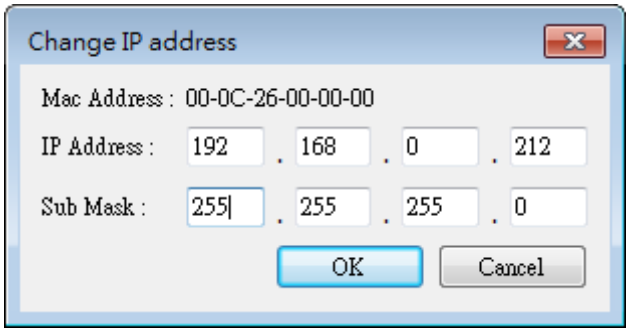
2. Scan iR-ETN40R:

Select [Online] » [Automatic Scan] or press Shift + S on the keyboard to open the following window to scan the iR-ETN40R connected with PC.



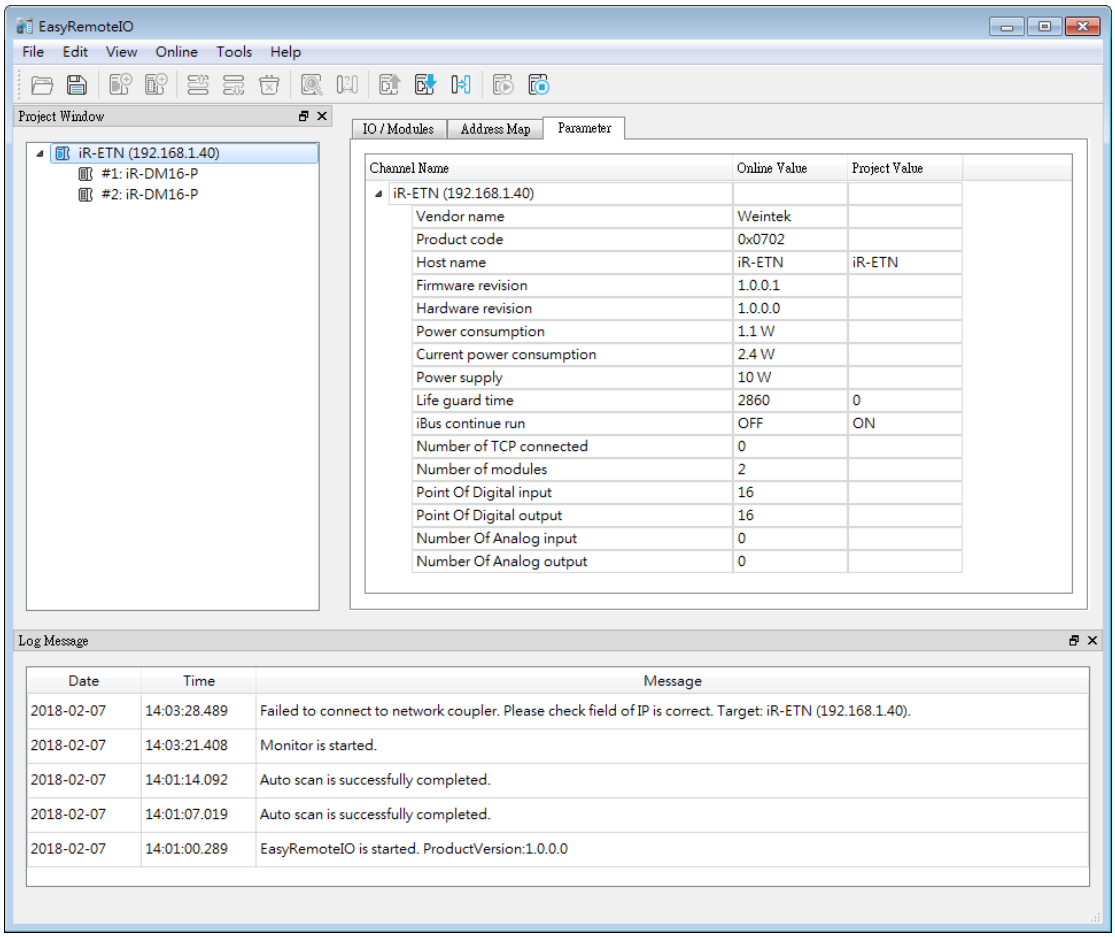
3. Change IP to Current Domain:

Select [Online] » [Change IP] to set the iR-ETN40R's IP address.



4. Check Parameter with Monitor:

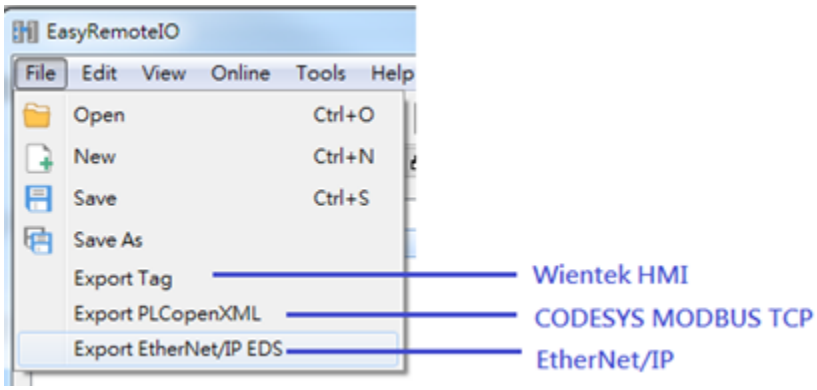
Select [Online] » [Start Monitoring] or press Shift + M on the keyboard to activate the connection with iR-ETN40R. The device status and module status can be viewed via EasyRemoteIO.



5. Export EtherNet/IP EDS file.

13.Description File

When using iR-ETN40R, three types of description files can be generated in EasyRemoteIO.



13.1 Weintek HMI Tag

The exported tags can be used for Weintek HMI. For more information about exporting tags, see PLC Connection Guide -> Weintek Remote IO (MODBUS TCP/IP).

13.2 EtherNet/IP EDS

The corresponding EDS file of the connected module can be exported in the software. The standard EDS file can be used for EtherNet/IP master.

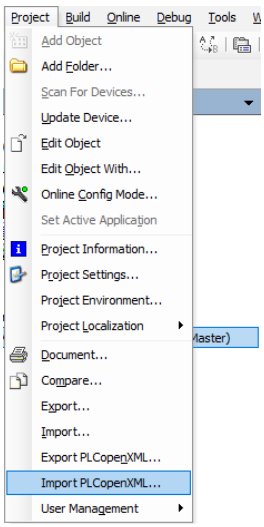
For more information about connecting and operating the module, see “iR-ETN EtherNet/IP Connection Guide”.

13.3 CODESYS PLCopen.XML

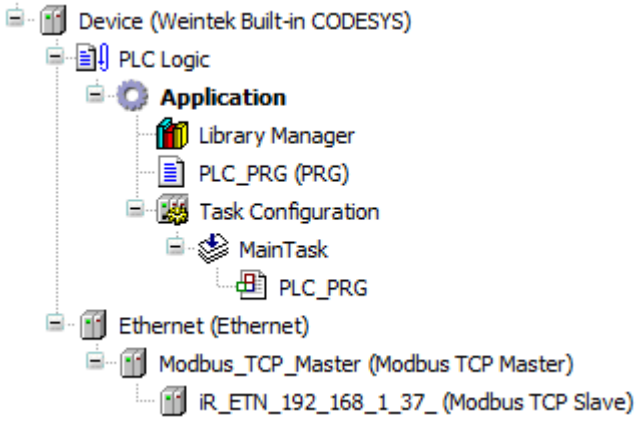
The PLCopen.XML file exported in EasyRemoteIO can be imported in CODESYS.

The import steps:

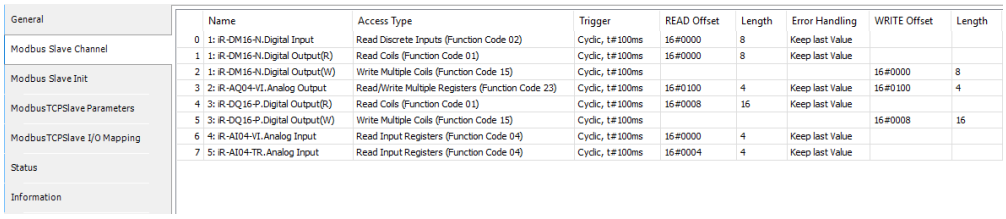
1. In CODESYS project add Modbus_TCP_Master device.
2. Click Modbus_TCP_Master, and then select [Project] » [Import PLCopenXML File].

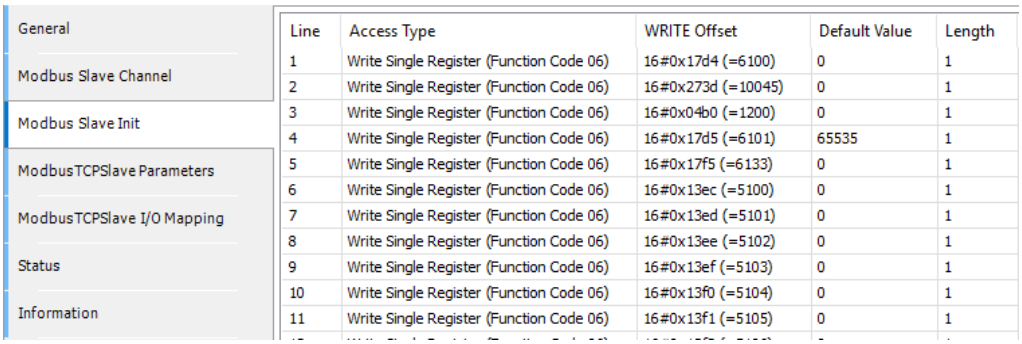


3. After importing the file, the iR-ETN40R added in CODESYS project can be found.

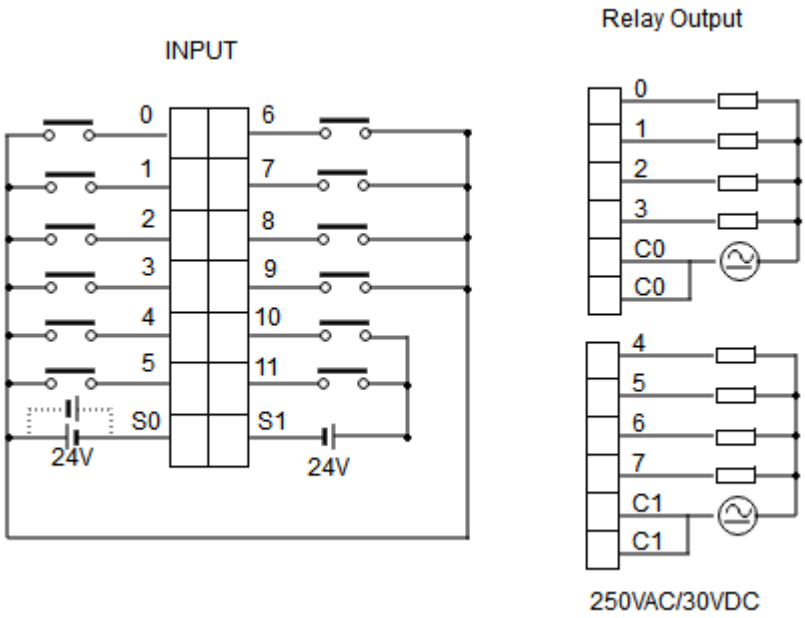


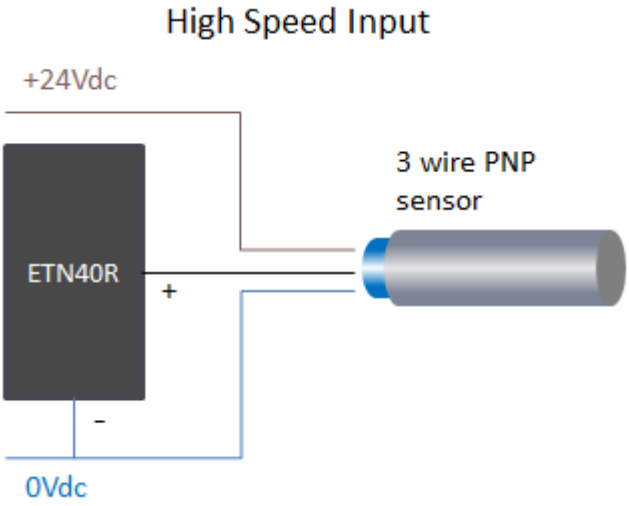
Read/Write channels and initial parameters are built.





14.iR-ETN40R IO Wiring





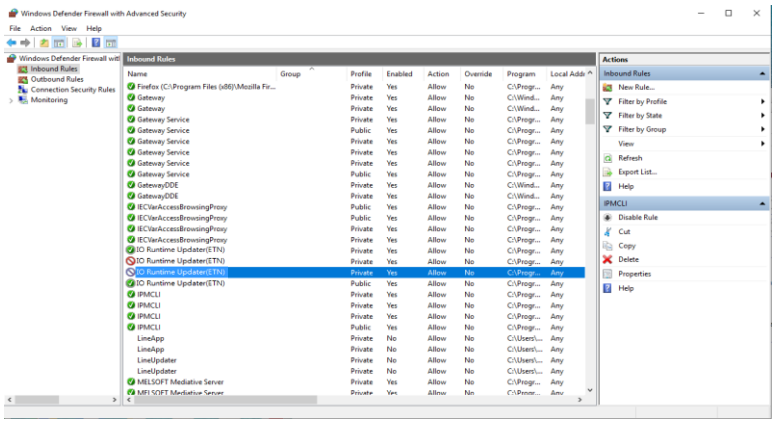
15.iR-ETN40R Firmware Update

15.1 Software

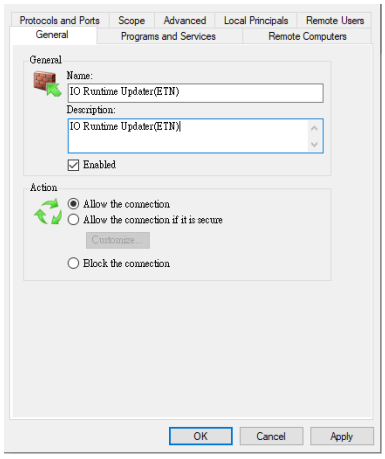
Required software: IO Runtime Updater (ETN)

When IO Runtime Updater (ETN) cannot connect to iR-ETN40R's IP, please check the firewall settings from the directory below:

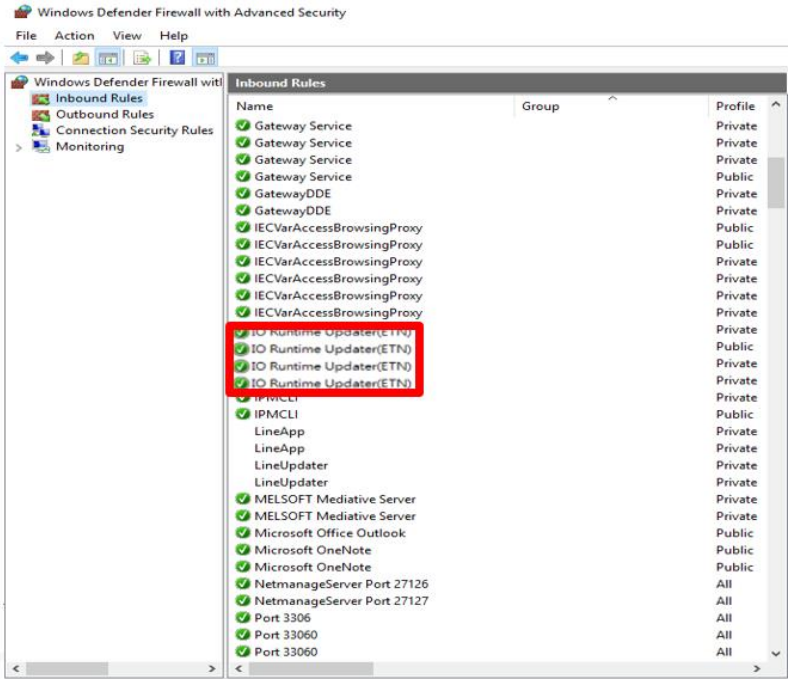
[Windows Defender Firewall] » [Advanced settings] » [Inbound Rules] » [IO Runtime Updater (ETN)]



1. Open the settings window of Windows® Firewall.

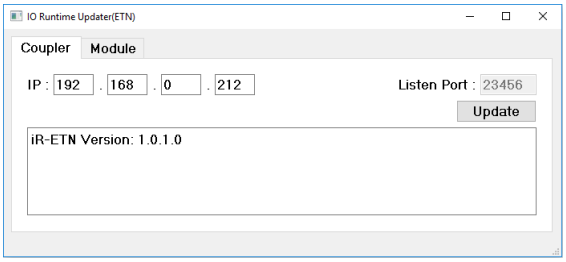


2. Select IO Runtime Updater and allow connections.

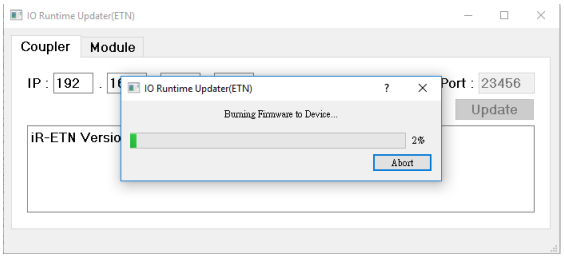


15.2 Firmware Update

1. Open Coupler tab, enter the coupler's IP address, and then click [Update].



2. Wait for the burning process to finish.



15.3 Notes on Updating Firmware

Please make sure there is no communication with iR-ETN40R when its firmware is being updated.