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RemoDAQ-8351 Module User's Manual



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Chapter1 Products Introduction

1.1 General Introduction

RemoDAQ-8300 Ethernet-based data acquisition and control modules provide I/O, data acquisitions, and networking in one module to build a cost effective, distributed monitoring and control solution for a wide variety of applications. Through standard Ethernet networking, RemoDAQ-8300 retrieves I/O values from sensors, and can publish them as a real-time I/O values to networking nodes via LAN, Intranet, or Internet. With Ethernet-enabled technology, RemoDAQ-8300 series modules build up a cost-effective DA&C system for Building Automation, Environmental Monitoring, and Facility Management and Manufacturing applications.

The RemoDAQ-8351 is a high-density I/O module built-in a 10/100 based-T interface for seamless Ethernet connectivity. It provides 12 digital input, 2 digital output, and 2 counter channels with 2000 VDC isolation protection. All of the digital input channels support input latch function for important signal handling. Meanwhile, these DI channels allow to be used as 3 kHz counter and frequency input channels. Opposite to the intelligent DI functions, the digital output channels also support pulse output function.

1.2 Pin Assignment

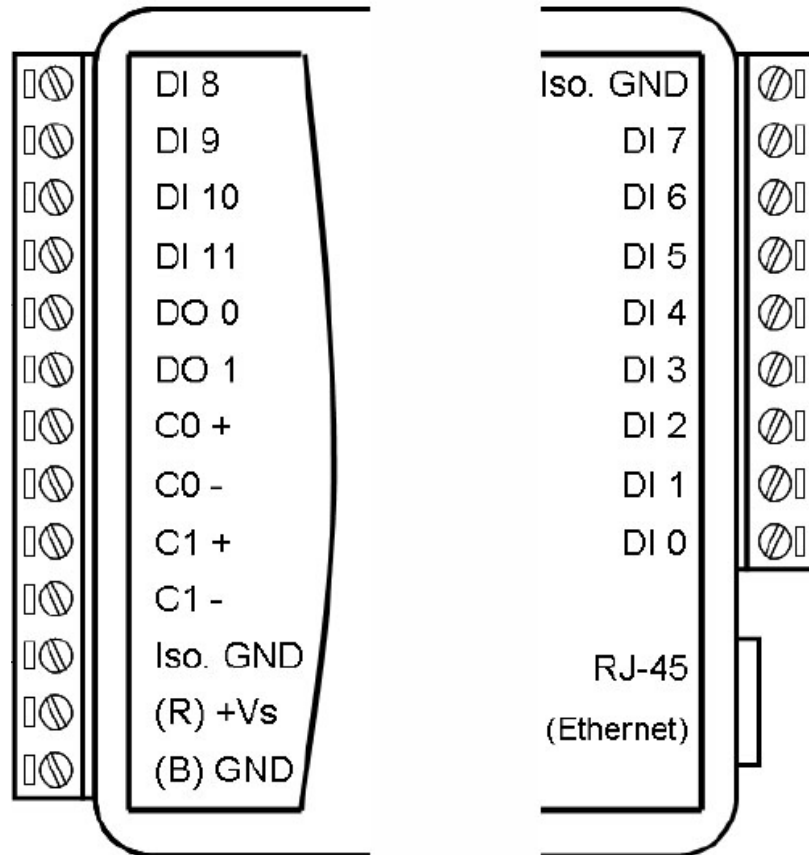


Figure 1.1

1.3 Specification

1.3.1 Brief Introduction

- Support 10/100M Ethernet
- Support Modbus/TCP
- Input voltage +10V~+30VDC
- Power dissipation: 1.5W
- Temperature: -20°C~70°C
- Temperature: 5%~90%, no condensing
- Isolation : 3000VDC

1.3.2 Digital Input

- Channels: 12

- Dry Contact:
 - Logic Level 0: Ground
 - Logic Level 1: Open
- Wet Contact:
 - Logic Level 0: 0 ~ 3 VDC
 - Logic Level 1: 10 ~ 30 VDC
- Support 3 kHz counter(32 位+ 1bit overflow)
- Support 3 kHz Frequency Measurement
- Support “High—Low” or “Low—High” Latch

1.3.3 Counter Input

- Channels : 2 (32 位+ 1bit overflow)
- Max count: 4,294,967,295
- Frequency measurement: 0.2 ~ 4500 Hz
- 0 ~ 4500 Hz (counter mode)

1.3.4 Digital Output

- Channels: 2
- Output Type: open collector, sink mode, MAX 30VDC 100mA
- Support 5 kHz pulse output

1.4 Wiring Instruction

1.4.1 DI Wiring Instruction

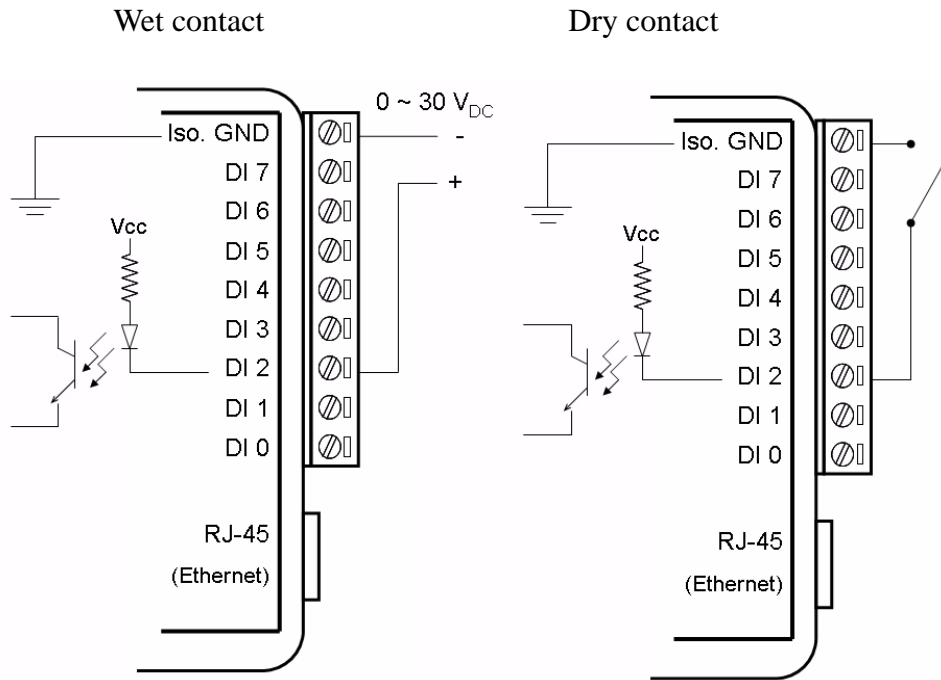


Figure1.2

1.4.2 Events Counter Input Wiring Instruction

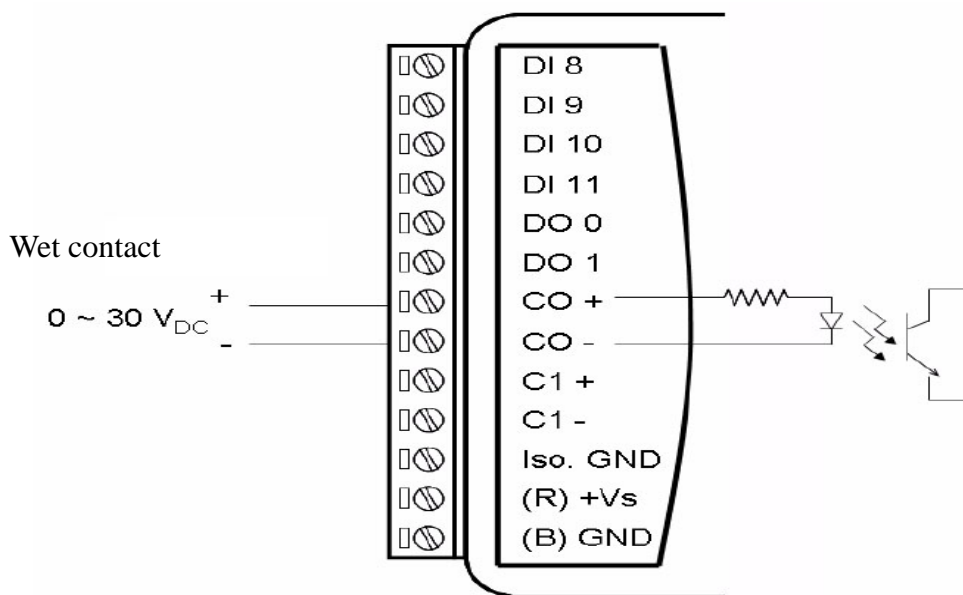


Figure1.3

1.4.3 Digital Output Wiring Instruction

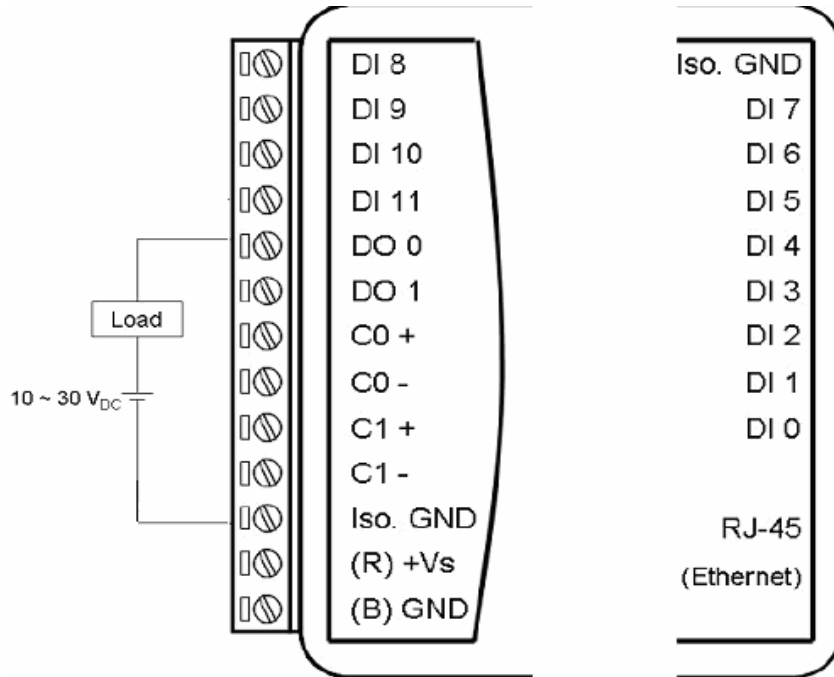


Figure1.4

1.5 Functional Introduction

1.5.1 Power-on initialization

After being power-on, the module will read out the data EEPROM, configuration-related registers, such as: pulse output width, absolute pulse, incremental pulse, module's name, module's version register, DI mode and DO Mode. Each of these registers is configured correctly by the user, and then the module will write this configuration information once for the corresponding EEPROM address.

1.5.2 DI Mode

1. DI (default)

When a DI channel Mode Register is set as 00 (see 2.3 RemoDAQ-8351 MODBUS RTU address of the image table), the channel is in Normal DI Mode. In this mode, the channel is only collected the current state of the DI.

2. Counter

When a DI channel Mode Register is set as 01 (see 2. 3 RemoDAQ-8351

MODBUS RTU address of the image table), the channel is in Counter Mode. In this mode, when "Counter Start (1)/Stop (0)" bit is 1, the counter will start counting, counts need to read the corresponding register. Users can set the "Clear Counters (1)" bit to 1, clear the current count.

3. Low to High Latch

When a DI channel mode register is set as 02 (see 2. 3 RemoDAQ-8351 MODBUS RTU address of the image table), the channel is in the Low - High Latch Mode. In this model, once the digital input channel detects logic level changes from low to high, the "DI Latch State" bit will remain the logic high. "DI Latch State" bit value will remain unchanged until the user reads this one before they are automatically cleared.

4. High to Low Latch

When a DI channel mode register is set as 03 (see 2. 3 RemoDAQ-8351 MODBUS RTU address of the image table), the channel is in the High - Low Latch Mode. In this model, once the digital input channel detects logic level changes from high to low, the "DI Latch State" bit will remain the logic high. "DI Latch State" bit value will remain unchanged until the user reads this one before they are automatically cleared.

5. Frequency

When a DI channel mode register is set as 04 (see 2. 3 RemoDAQ-8351 MODBUS RTU address of the image table), the channel is in the Frequency mode. When you choose Frequency mode, this channel could measure DI frequency(update every seconds), the frequency stores in the low byte of corresponding channel "counter value" register (such: 0 channel, counter value exists in 40001~40002, frequency exists in 40001).

1.5.3 DO Mode

1. DO (default)

When a DO channel mode register is set as 00 (see 2. 3 RemoDAQ-8351 MODBUS RTU address of the image table), the channel is in DO mode. In this mode, the operation of that channel will be the corresponding digital output.

2. Pulse Output

When a DO channel mode register is set as 01 (see 2. 3 RemoDAQ-8351 MODBUS RTU address of the image table), the channel is in Pulse Output mode. The pulse output is the same as PWR. After you choose the Pulse output mode, the selected digital output channel can generate continuous pulse train or finite pulses. The user can define the "Pulse Output Low Level Width," " Pulse Output High Level Width," "Set Absolute Pulse" and "Set Incremental Pulse," ,then a corresponding pulse will generate

Chapter 2 Command

RemoDAQ-8300 systems accept a command/response form with the host computer. When systems are not transmitting they are in listen mode. The host issues a command to a system with a specified address and waits a certain amount of time for the system to respond. If no response arrives, a time-out aborts the sequence and returns control to the host. This chapter explains the structure of the commands with Modbus/TCP protocol.

2.1 Command Structure

It is important to understand the encapsulation of a Modbus request or response carried on the Modbus/TCP network. A complete command is consisted of command head and command body. The command head is prefixed by six bytes and responded to pack Modbus format; the command body defines target device and requested action. Following example will help you to realize this structure quickly.

Example:

If you want to read the first two values of RemoDAQ-8352 (address:40001~40002), the request command should be:

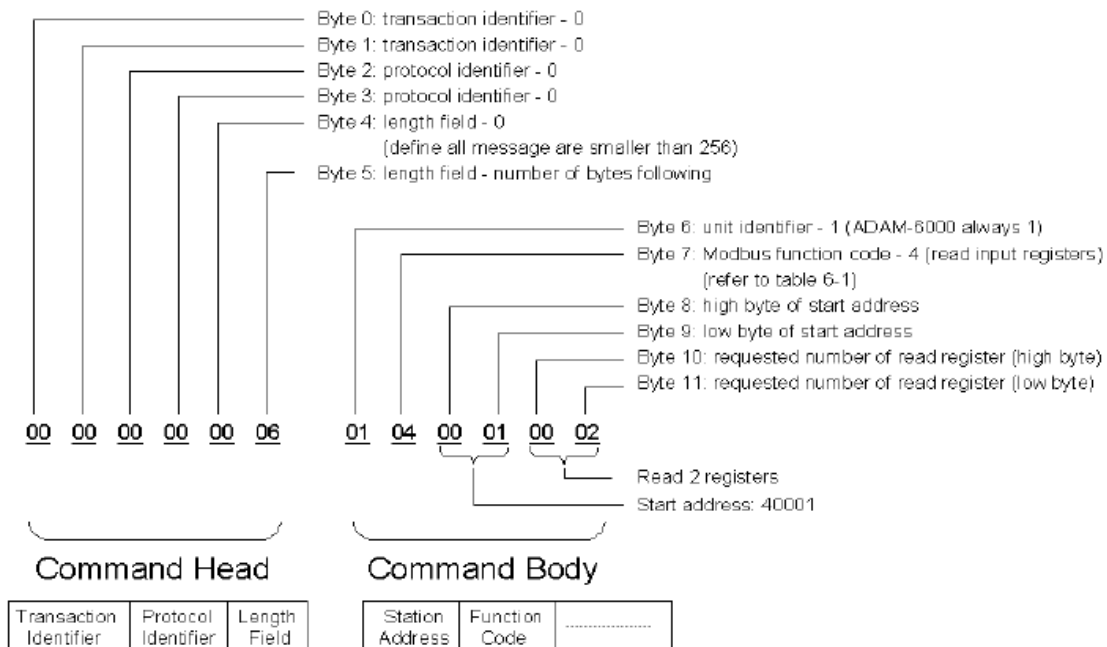


Figure2.1 Request Comment Structure

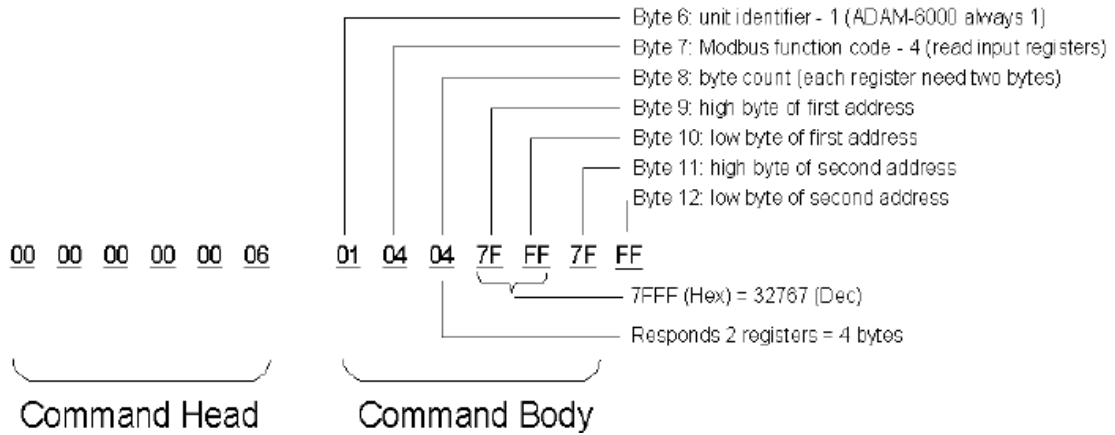


Figure2.2 Response Comment Structure

2.2 Modbus Function Code Introductions

To full-fill the programming requirement, there is a series of function code standard for user's reference...

Function Code 01

The function code 01 is used to read the discrete output's ON/OFF status of RemoDAQ-8300 modules in a binary data format.

Request message format for function code 01:

Command Body					
Station Address	Function Code	Start Address High Byte	Start address Low Byte	Requested Number of Coil High Byte	Requested Number of Coil Low Byte

Example: Read coil number 1 to 8 (address number 00017 to 00024) from RemoDAQ-8300 Modules

01 01 00 10 00 08

Response message format for function code 01:

Command Body					
Station Address	Function Code	Byte Count	Data	Data	...

Example: Coils number 2 and 7 are on, all others are off.

01 01 01 42

In the response the status of coils 1 to 8 is shown as the byte value 42 hex, equal to 0100 0010 binary.

Function Code 02

The function code 02 is used to read the discrete input's ON/OFF status of RemoDAQ-8300 in a binary data format.

Request message format for function code 02:

Command Body					
Station Address	Function Code	Start Address High Byte	Start address Low Byte	Requested Number of Coil High Byte	Requested Number of Coil Low Byte

Example: Read coil number 1 to 8 (address number 00001 to 00008) from RemoDAQ-8300 modules

01 01 00 01 00 08

Response message format for function code 01:

Command Body					
Station Address	Function Code	Byte Count	Data	Data	...

Example: input number 2 and 3 are on, all others are off.

01 01 01 60

In the response the status of input 1 to 8 is shown as the byte value 60 hex, equal to 0110 0000 binary.

Function Code 03/04

The function code 03 or 04 is used to read the binary contents of input Registers.

Request message format for function code 03 or 04:

Command Body					
Station Address	Function Code	Start Address High Byte	Start address Low Byte	Requested Number of Register High Byte	Requested Number of Register Low Byte

Example: Read register 40002 to 40003 hex in RemoDAQ-8300 module

01 04 00 01 00 02

Response message format for function code 03 or 04:

Command Body					
Station Address	Function Code	Byte Count	Data	Data	...

Example: Values where register 40002= 0043H and register 40003= 21H
01 04 04 00 43 00 21

Function Code 05

Force a single coil to either ON or OFF. The requested ON/OFF state is specified by a constant in the query data field. A value of FF 00 hex requests it to be ON. A value of 00 00 hex requests it to be OFF. And a value of FF FF hex requests it to release the force.

Request message format for function code 05:

Command Body					
Station Address	Function Code	Coil Address High Byte	Coil address Low Byte	Force Data High Byte	Force Data Low Byte

Example: Force coil 3 (address 00003) ON in RemoDAQ-8300 module
01 05 00 03 FF 00

Response message format for function code 05:

The normal response is an echo of the query, returned after the coil state has been forced.

Command Body					
Station Address	Function Code	Coil Address High Byte	Coil address Low Byte	Force Data High Byte	Force Data Low Byte

Function Code 06

Presets integer value into a single register.

Request message format for function code 06:

Command Body					
Station Address	Function Code	Register Address High Byte	Register address Low Byte	Preset Data High Byte	Preset Data Low Byte

Example: Preset register 40002 to 00 04 hex in RemoDAQ-8300 module
01 06 00 02 00 04

Response message format for function code 06:

The normal response is an echo of the query, returned after the coil state has been preset.

Function Code 15 (0F hex)

Forces each coil in a sequence of coils to either ON or OFF.

Request message format for function code 15:

Command Body								
Station Address	Function Code	Start Address High Byte	Start Address Low Byte	Requested Number of Coil High Byte	Requested Number of Coil Low Byte	Byte Count	Force Data High Byte	Force Data Low Byte

Example: Request to force a series of 10 coils starting at address 00017 (11 hex) in RemoDAQ-8300 module.

01 0F 00 11 00 0A 02 CD 01

The query data contents are two bytes: CD 01 hex, equal to 1100 1101 0000 0001 binary. The binary bits are mapped to the addresses in the following way.

Bit: 1 1 0 0 1 1 0 1 0 0 0 0 0 0 0 1

Address (000XX): 24 23 22 21 20 19 18 17 - - - - - 26 25

Response message format for function code 15:

The normal responses return the station address, function code, start address, and requested number of coil forced.

Command Body					
Station Address	Function Code	Start Address High Byte	Start Address Low Byte	Requested Number of Coil High Byte	Requested Number of Coil Low Byte

Example: 01 0F 00 11 00 0A

Function Code 16 (10 hex)

Preset values into a sequence of holding registers.

Request message format for function code 16:

Command Body							
Station Address	Function Code	Start Address High Byte	Start Address Low Byte	Requested Number of Register High Byte	Requested Number of Register Low Byte	Byte Count	Data

Example: Preset address 40001 to 1234H and address 40002 to 5678H in RemoDAQ-8300 module.

01 10 00 00 00 02 04 12 34 56 78

Response message format for function code 08:

The normal responses return the station address, function code, start address, and requested number of registers preset.

Command Body					
Station Address	Function Code	Start Address High Byte	Start Address Low Byte	Requested Number of Register High Byte	Requested Number of Register Low Byte

Example: 01 10 00 00 00 02

2.3 RemoDAQ-8351 MODBUS RTU Address Image Table

Table 2-1

Address 0X(Decimal)	Hex	Channel Number	Content	Attribute	Description
0001	00H	0	current value	read	DI0
0002	01H	1	current value	read	DI1
.....
0012	0BH	11	current value	read	DI11
0013	0CH	12 ^⑦	current value	read	C0
0014	0DH	13 ^⑦	current value	read	C1
0017	10H	0	current value	read/write	DO0
0018	11H	1	current value	read/write	DO1
0033	20H	0		read/write	counter start/stop
0034	21H			write	clear counter
0035	22H			read/write	counter overflow ^③
0036	23H			read/write	input latch status ^④
0037	24H	1		read/write	counter start/stop
0038	25H			write	clear counter
0039	26H			read/write	counter overflow ^③
0040	27H			read/write	input latch status ^④
0041	28H	2		read/write	counter start/stop
0042	29H			write	clear counter
0043	2AH			read/write	counter overflow ^③
0044	2BH			read/write	input latch status ^④
0045	2CH	3		read/write	counter start/stop

0046	2DH			write	clear counter
0047	2EH			read/write	counter overflow ^③
0048	2FH			read/write	input latch status ^④
0049	30H	4		read/write	counter start/stop
0050	31H			write	clear counter
0051	32H			read/write	counter overflow ^③
0052	33H			read/write	input latch status ^④
0053	34H	5		read/write	counter start/stop
0054	35H			write	clear counter
0055	36H			read/write	counter overflow ^③
0056	37H			read/write	input latch status ^④
0057	38H	6		read/write	counter start/stop
0058	39H			write	clear counter
0059	3AH			read/write	counter overflow ^③
0060	3BH			read/write	input latch status ^④
0061	3CH	7		read/write	counter start/stop
0062	3DH			write	clear counter
0063	3EH			read/write	counter overflow ^③
0064	3FH			read/write	input latch status ^④
0065	40H	8		read/write	counter start/stop
0066	41H			write	clear counter
0067	42H			read/write	counter overflow ^③
0068	43H			read/write	input latch status ^④
0069	44H	9		read/write	counter start/stop
0070	45H			write	clear counter
0071	46H			read/write	counter overflow ^③
0072	47H			read/write	input latch status ^④

0073	48H	10		read/write	counter start/stop
0074	49H			write	clear counter
0075	4AH			read/write	counter overflow ^③
0076	4BH			read/write	input latch status ^④
0077	4CH	11		read/write	counter start/stop
0078	4DH			write	clear counter
0079	4EH			read/write	counter overflow ^③
0080	4FH			read/write	input latch status ^④
0081	50H	12 ^⑦		read/write	counter start/stop
0082	51H			write	clear counter
0083	52H			read/write	counter overflow ^③
0084	53H			read/write	input latch status ^④
0085	54H	13 ^⑦		read/write	counter start/stop
0086	55H			write	clear counter
0087	56H			read/write	counter overflow ^③
0088	57H			read/write	input latch status ^④
Address 4X(Decimal)	Hex	Channel Number	Content	Attribute	Description
40001 ~ 40002	0H ~ 1H	0	current counter value	read	counter value ^①
40003 ~ 40004	2H ~ 3H	1	current counter value	read	
.....	
40023 ~ 40024	16H ~ 17H	11	current counter value	read	
40025 ~ 40026	18H ~ 19H	12 ^⑦	current counter value	read	C0
40027 ~ 40028	1AH ~ 1BH	13 ^⑦	current counter value	read	C1

40029 ~ 40030	1CH 1DH	~ 0	pulse width	read/write	low level width of pulse output②
40031 ~ 40032	1EH 1FH	~ 1		read/write	
40033 ~ 40034	20H 21H	~ 0	pulse width	read/write	high level width of pulse output
40035 ~ 40036	22H 23H	~ 1		read/write	
40037 ~ 40038	24H 25H	~ 0	pulse width counting	read/write	Pulse output quantity⑤
40039 ~ 40040	26H 27H	~ 1		read/write	
40041 ~ 40042	28H ~29H	0	pulse width counting	read/write	Additional pulse quantity⑥
40043 ~ 40044	2AH 2BH	~ 1		read/write	
40211	D2		name	read	83H, 51H
40213	D4		version	read/write	A1H, 00H
40257	100H	0	DI mode register	read/write	00H, VVH⑧
40258	101H	1	DI mode register	read/write	00H, VVH⑧
.....
40268	10BH	11	DI mode register	read/write	00H, VVH⑧
40269	10CH	12⑦	C0mode register	read/write	00H, VVH⑧
40270	10DH	13⑦	C1mode register	read/write	00H, VVH⑧
40273	110H	0	DO mode register	read/write	00H, SSH⑨
40274	111H	1	DO mode register	read/write	00H, SSH⑨
40301	12CH	ALL	DI value	read	

40303	12EH	ALL	DO value	read/write	

Note:

- ① How to retrieve the counter/frequency value:
Counter (decimal) = (value of 40002) * 65536 + (value of 40001)
Frequency (decimal) = value of 40001
- ② Time Unit: 0.1ms。
- ③ If the count number is overflow, this bit will be 1. Once this bit is read, the value will return to 0.
- ④ When DI channel is configured as “High to low latch” or “Low to high latch”, this bit will be 1 if the latch condition occurs. After that, value of this bit will keep 1 until user writes 0 to this bit (clear the latch status).
- ⑤ Decide how many pulses will be generated. When user writes 0 to this bit, it will continuously generate pulse.
- ⑥ During the pulse generation, user can use this bit to generate more pulses. For example, “Absolute pulse” is set as 100. During its generation, user can set “Incremental pulse” as 10. After the 100 pulses are generated, the extra 10 pulses will continue to be generated.
- ⑦ Events counting channel。
- ⑧ **The current mode of corresponding DI channel**

VV	00	01	02	03	04
DI mode	Ordinary DI	Counting mode	Low to high latch	High to low latch	Frequency measurement

⑨The current mode of corresponding DI channel:

SS	00	01
DI mode	Ordinary DO	Pulse output mode

Chapter3 Software Instruction

1,Click RemoDAQ-8300 Series Ethernet IO Module Utility.exe installation software.

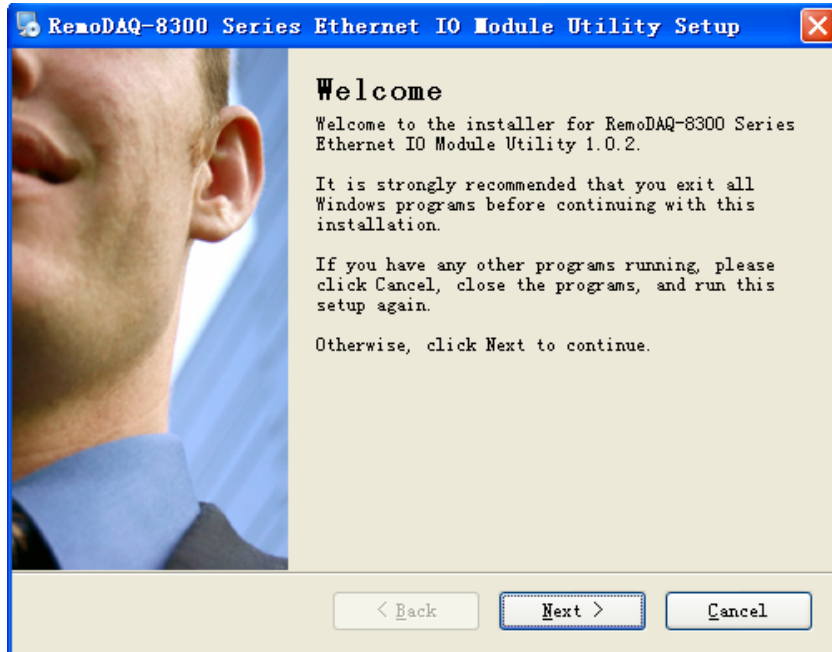


Figure3.1

2,Click "Next", install according to the instruction

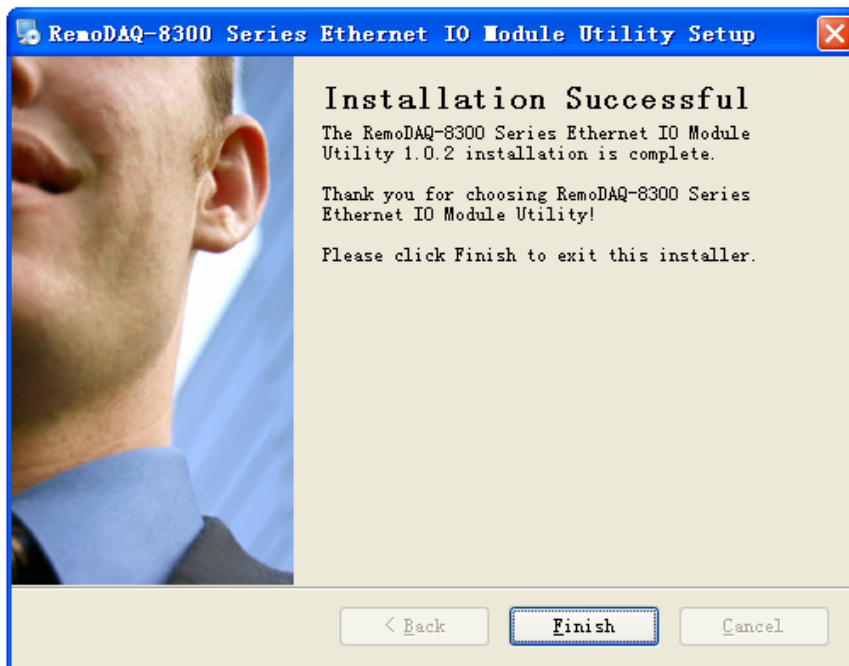


Figure3.2

3, Click “Finish”. The installation is completed.

4, There will be one shortcut icon on the desktop.

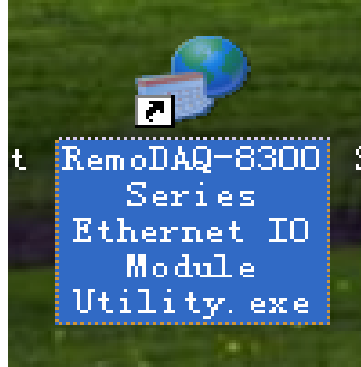


Figure3.3

5, Enter Figure to the interface

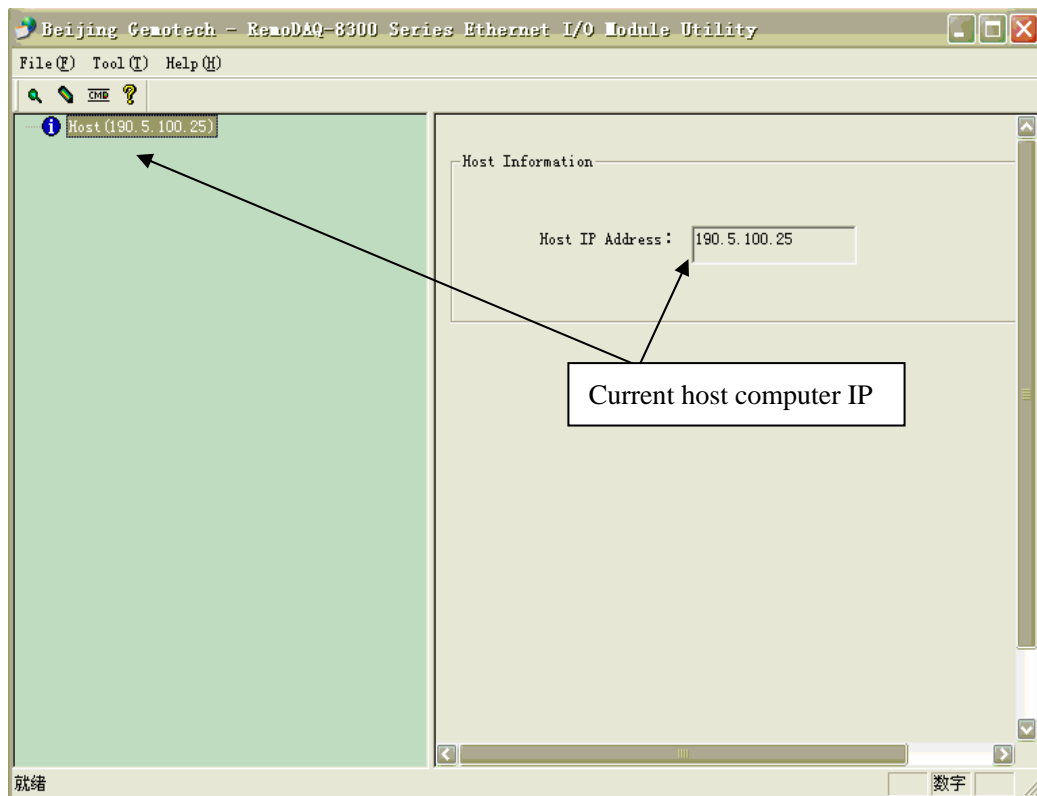


Figure3.4

6, Click the magnifying glass icon, RemoDAQ-8300 Series Ethernet IO Module Utility will then search all RemoDAQ-8300 modules on the Ethernet network. If your RemoDAQ-8300 modules is used the first time, its IP will be 192.168.0.1 by default .

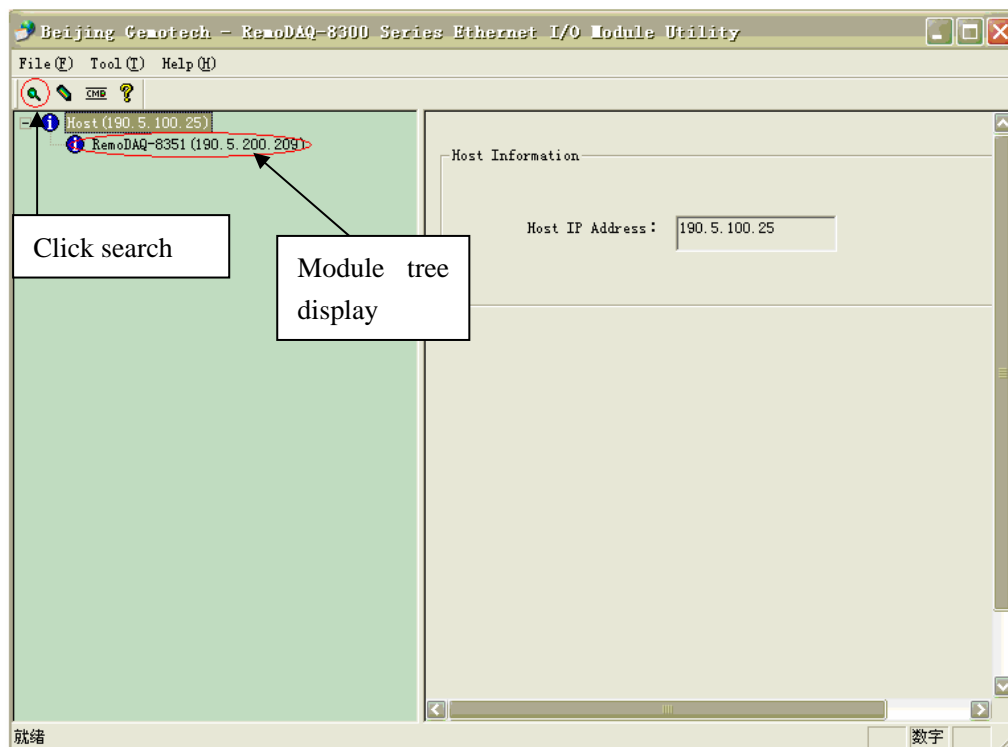


Figure3.5

7, Click RemoDAQ-8351, enter Network Setting.

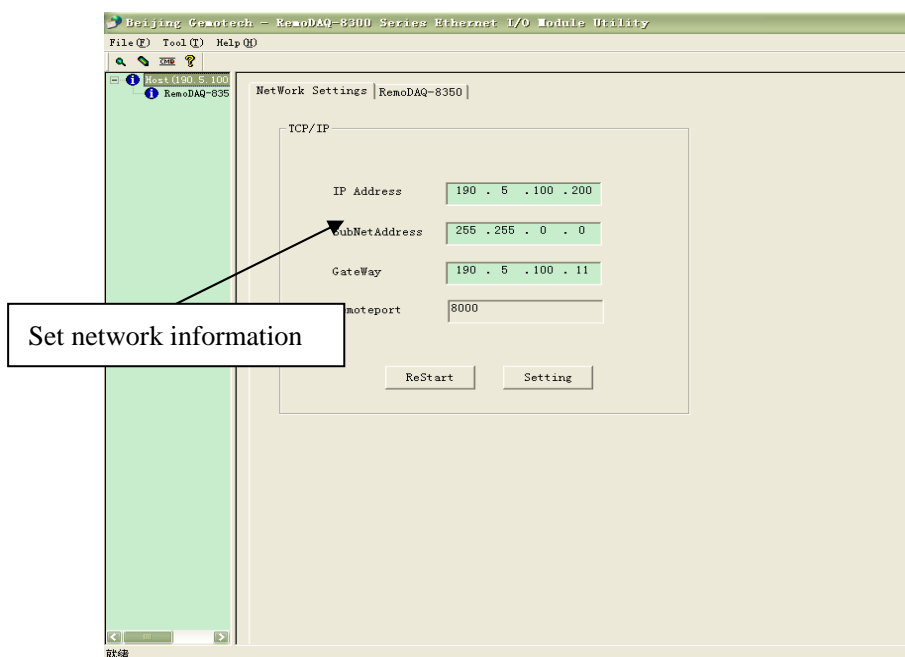


Figure3.6

8, You need to change IP of the RemoDAQ-8300 modules the same subnet with the host PC. Type the correct **IP address**, **Subnet address**, and **Gateway** on the Status Display area. After complete setting, click the **Setting** button. When you finish the Network Settings, please click the **ReStart** Button to restart the module. After that, you must search for the module again. The port of RemoDAQ-8300 modules are 8000.

9, Click RemoDAQ-8351.

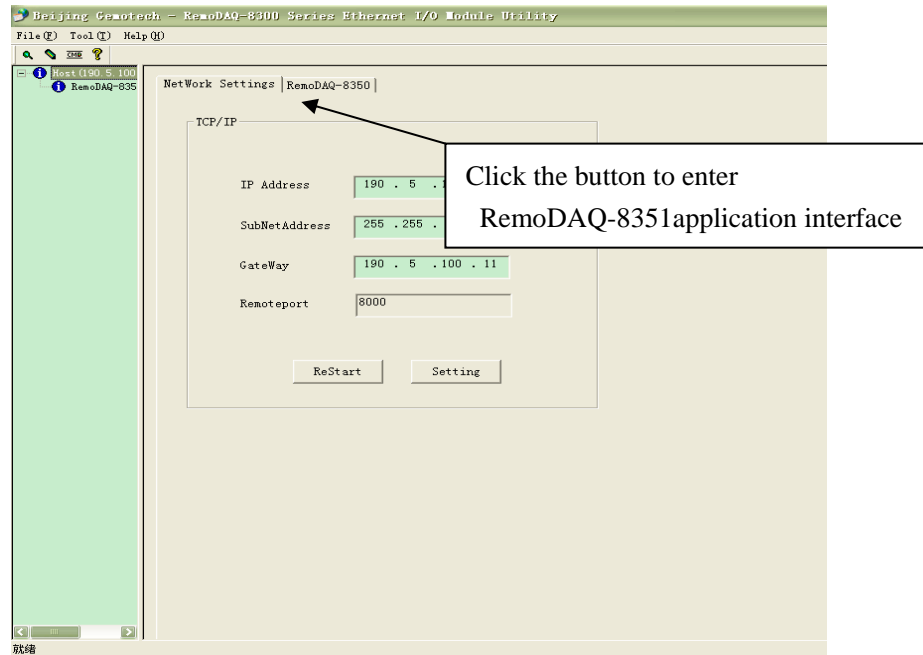
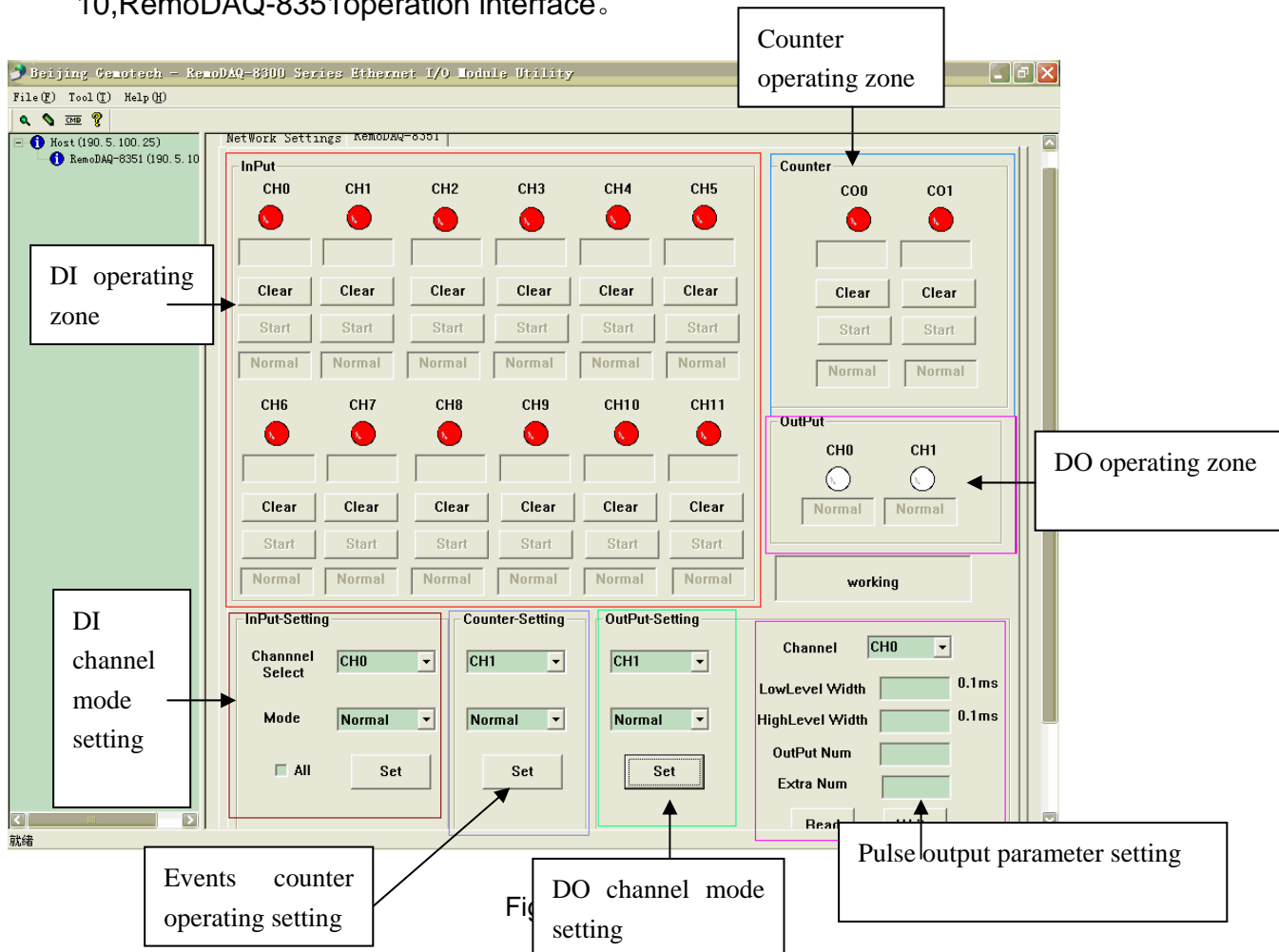


Figure3.7

10, RemoDAQ-8351 operation interface.



Enter RemoDAQ-8351 operational interface. Could control the relative function of RemoDAQ-8351 as DI (Including 2-channel events counter) and 2-channel DO

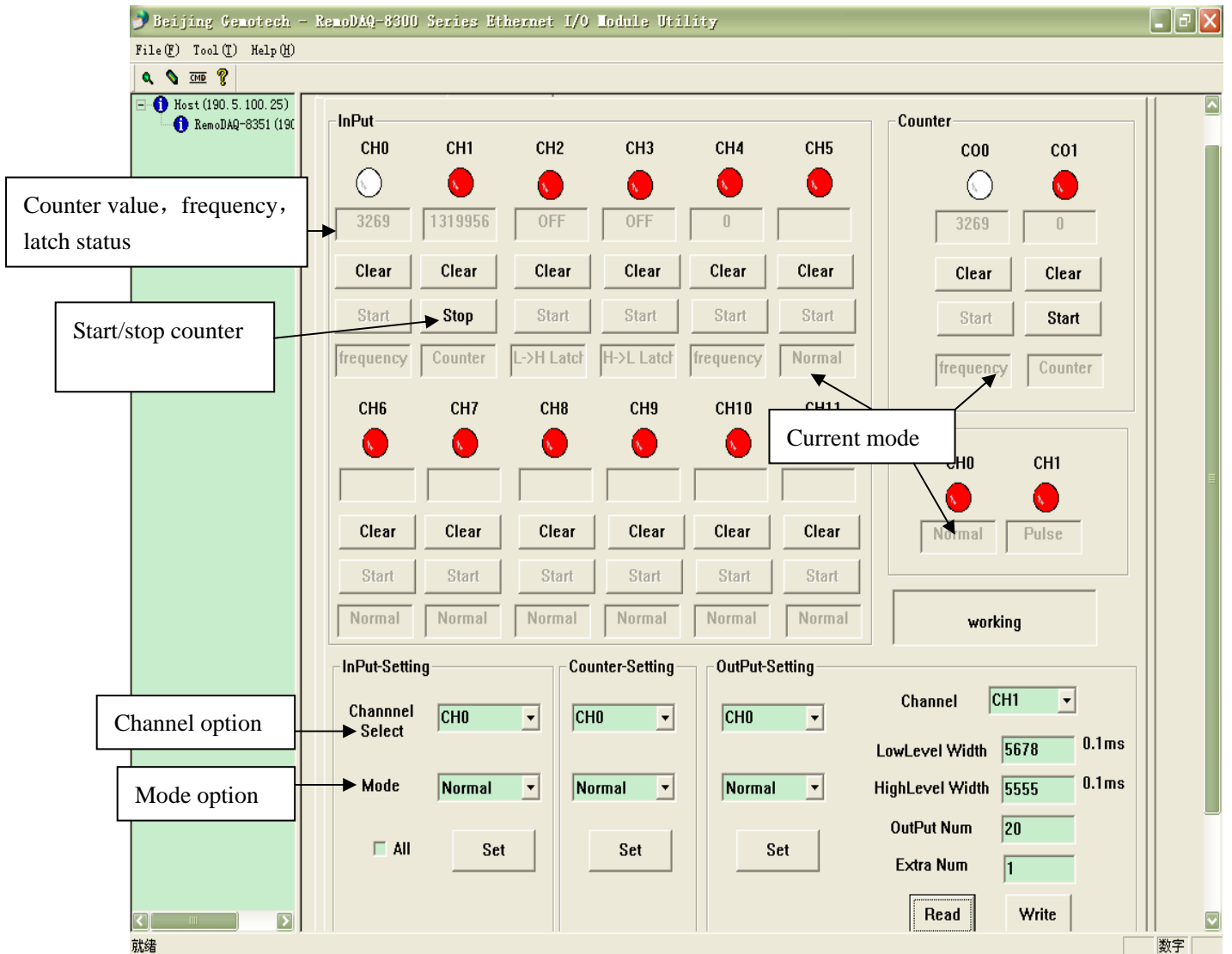


Figure3.9

Instructions:

1. When set channel output as Pulse output, the software could configure the high/low pulse width, pulse quantity, additional pulse quantity in real time. Write the configured pulse information to the module, like: clicking "Read" could show the information of this channel's pulse setting information.
2. When set DI channel as H-L or L-H latch, and turn "low" to "high", "input latch status" will be 1, at this time, the status will display L-H ON or H-L ON. Only when the user click "Clear", could stop latch as OFF.