

# **SOYAL<sup>®</sup>**

**701 Server Access Control Equipment & IO Modules**

**Modbus Integration and Case Study Tutorial**

Version 1.02

Date 29 May 2024

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**Example1:** The compatible controller devices include SOYAL Home H series controller, Enterprise E series controller ( we will use IP-based LCD Controller AR-837-E-A as example )

## Home Version (H) Series Controller



### Applicable Product Models:

AR-723-H / AR-331-H / AR-321-H / AR-721-H / AR-725-H / AR-888-H

## Enterprise Version (E) Series Controller



### Applicable Product Models:

AR-331-E / AR-727-E / AR-327-E / AR-363-E / AR-725-E / AR-837-E  
AR-837-EF9DO / AR-837-P / AR-837-EL / AR-837-EA

## 2.2 Modbus TCP/IO Series Products

**Example2:** The compatible Modbus Gateway Serial-to-Ethernet Server with I/O module include the model of AR-727-CM-IO-0804M and AR-401-IO-0808R-U2(we will use AR-727-CM-0804M as example )



### TCP I/O

AR-401-IO-0808R / AR-727-CM-IO-0804R  
AR-727-CM-IO-0804M / AR-727-CM-485

## 2.3 RS485 IO Series Products

**Example3:** SOYAL universal I/O modules(we will use AR-403-IO-0404M as example)



### RS485 I/O

AR-401-IO-1608R / AR-401-IO-1616M / AR-401-IO-0016R / AR-403-IO

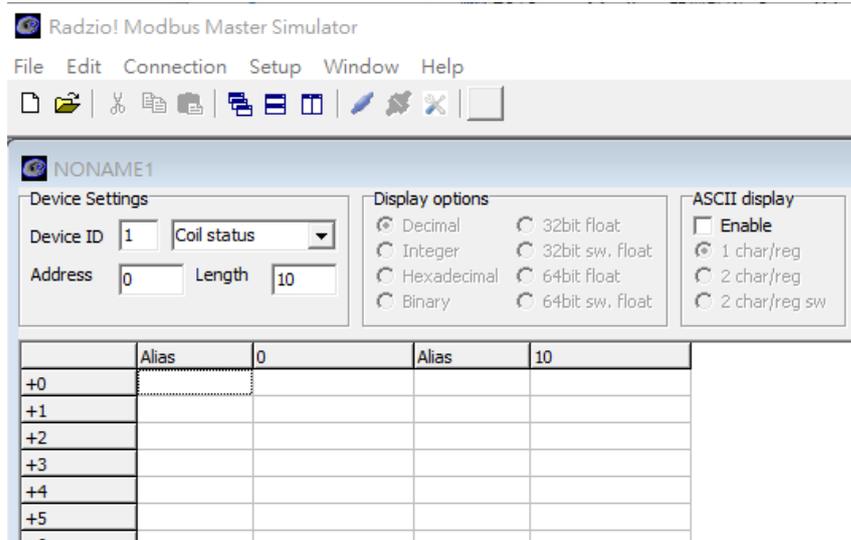
### 3. Software Preparation

#### 3.1 701Server SQL 10V5

SOYAL 701Server/ 701Client software 10V2 (Both File base mode and SQL Database mode support Modbus command)

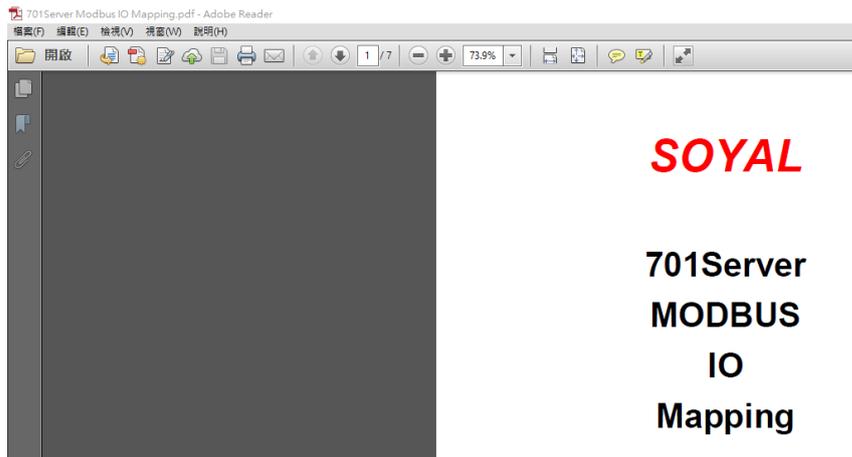


#### 3.2 RMMS Modbus Testing Software



#### 3.3 Protocol Document: 701Server Modbus IO Mapping.pdf

701Server Modbus IO Mapping.pdf

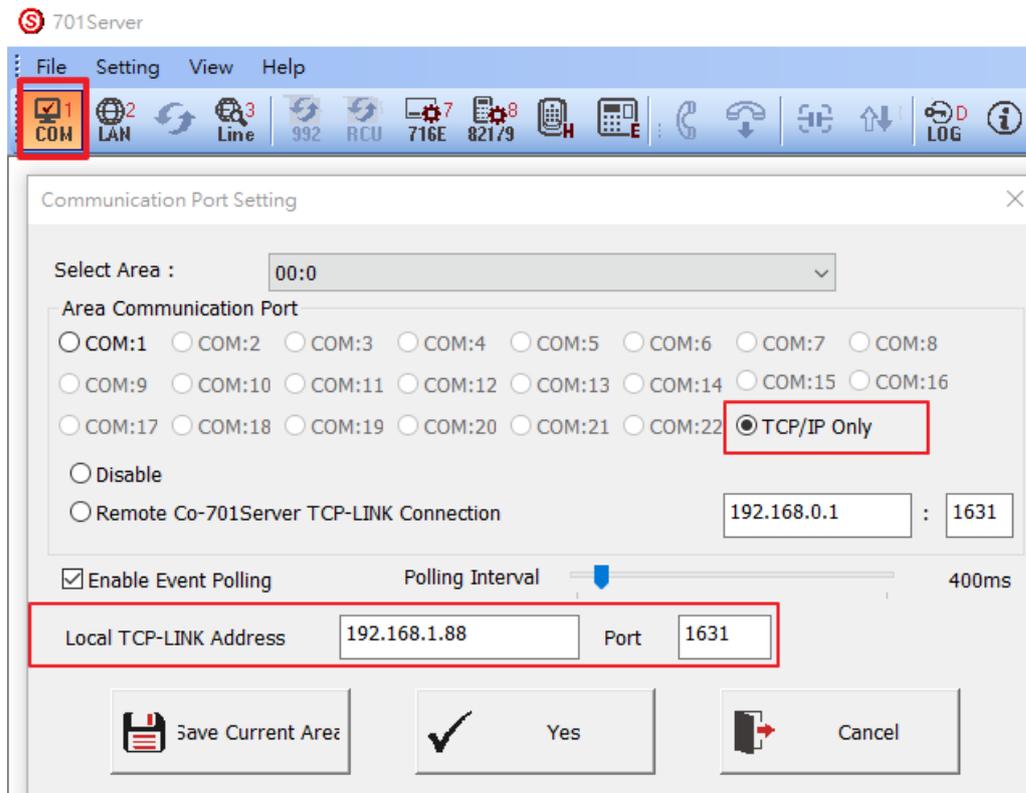


## 4. Example 1: Enterprise Version Network LCD Controller

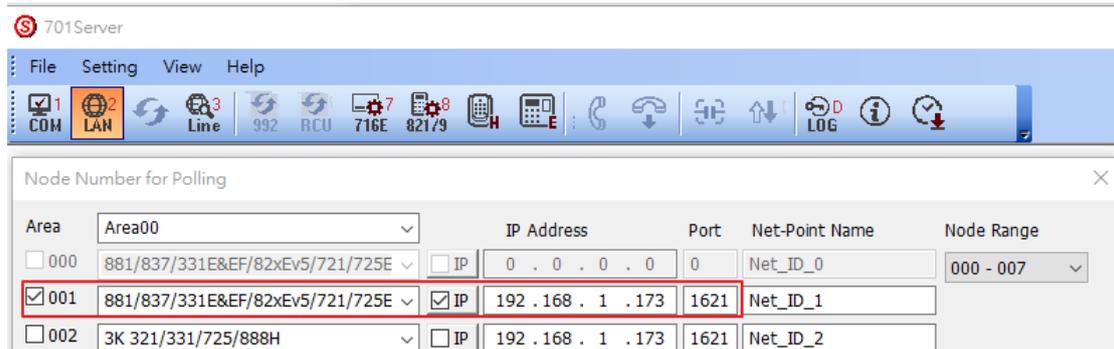
### AR-837-E-A

#### 4.1 AR-837-E-A and 701Server Communication Settings

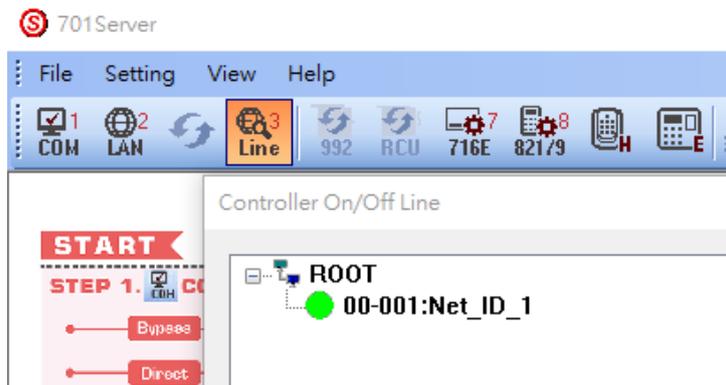
1. Select "TCP/IP Only", Enter IP Address of the PC and Port Number



- 2 Select Model name of 881/837/331E&EF/82xEv5/721/725Ev2/727/327Hv5, Enter IP Address and **Port 1621**

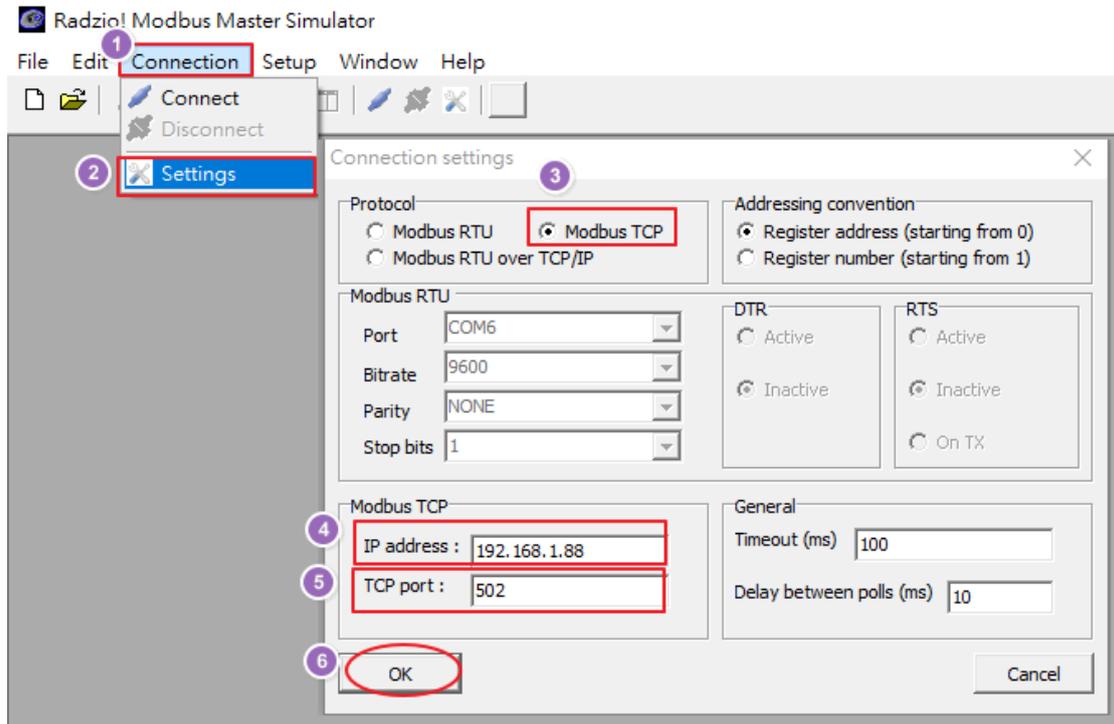


3 Check the communication is well or not



## 4.2 RMMS Modbus Software Settings

Open the RMMS software, firstly select Connection----> Settings, after enter the Settings window, follow the figure below, select Modbus TCP, enter the PC's IP Address, and TCP Port Number 502, click OK to exit.



### 4.3 Modify 701Server Modbus Port (Default is 502, can be changed)



## 4.4 Read AR-837-E-A Controller Door Lock Relay and Alarm

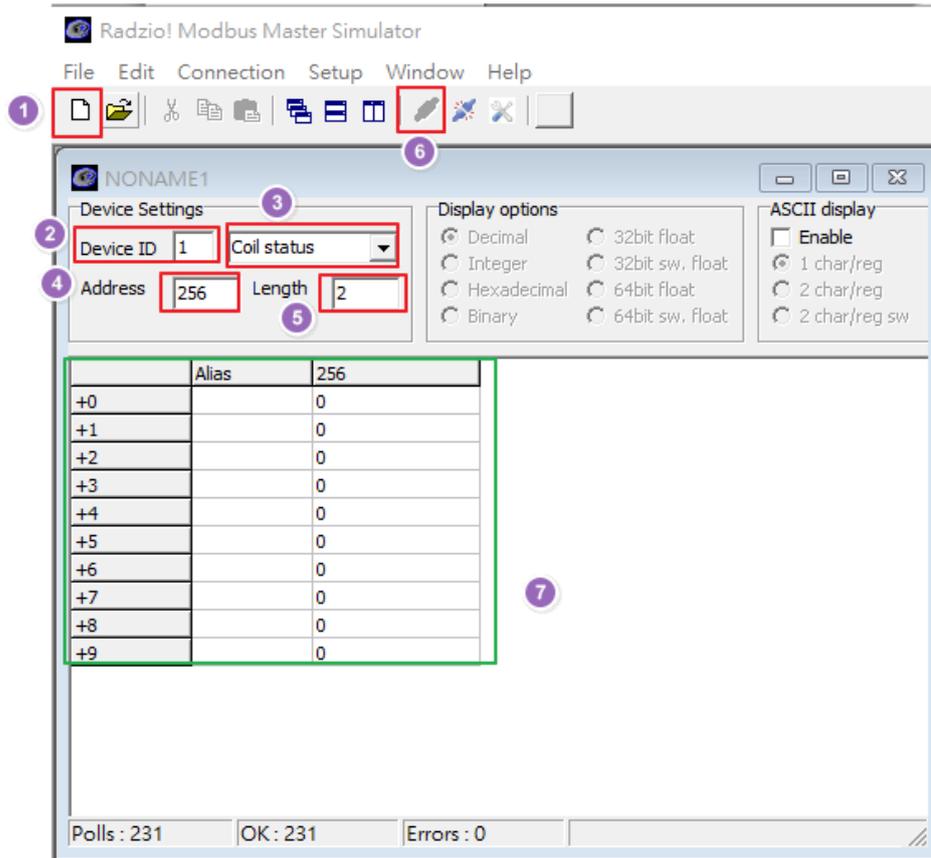
### Relay On/Off Status

#### Create a new file for DO status test

1. Click  icon to create a new file
2. Enter **Device ID** (The device Node ID we use is 001 as example)
3. Select “**Coil Status**” (this option is for read/write DO status)
4. Enter Start DO number in Address( check the protocol document of Modbus I/O mapping, DO number of Enterprise E controller start from 256)
5. Enter the number of points to be checked in Length field. Enter length 2 here in this case. We will monitor, read and write two DO points: Door Relay On/Off and Alarm Relay On/Off.

AR725E & AR837E & AR716E16 Controller IO Modbus IO Mapping Chart: DO										
Main	WG							Function	Status	Value
256	272							Door Relay	On/Off	1/0
257	273							Alarm Relay	On/Off	1/0

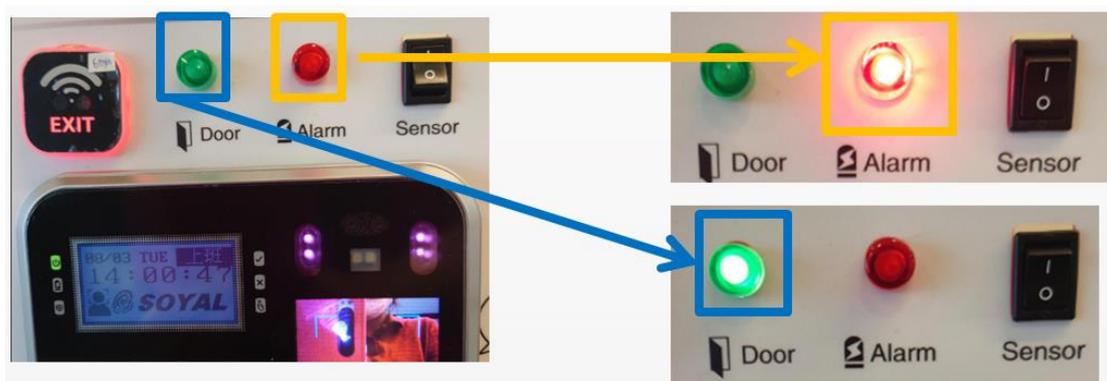
6. Click  icon to Connect
7. Check DO status in list column



### 8. Test to read DO On / Off status

The first DO point 256 mean Door relay status; when the Door Relay change status from off to on, the value will change from 0 to 1;

The second DO point 257 mean Alarm Relay status; when the Alarm relay change status from off to on, the value will change from 0 to 1;



	Alias	256
+0		0
+1		0
+2		0
+3		0
+4		0
+5		0
+6		0
+7		0
+8		0
+9		0

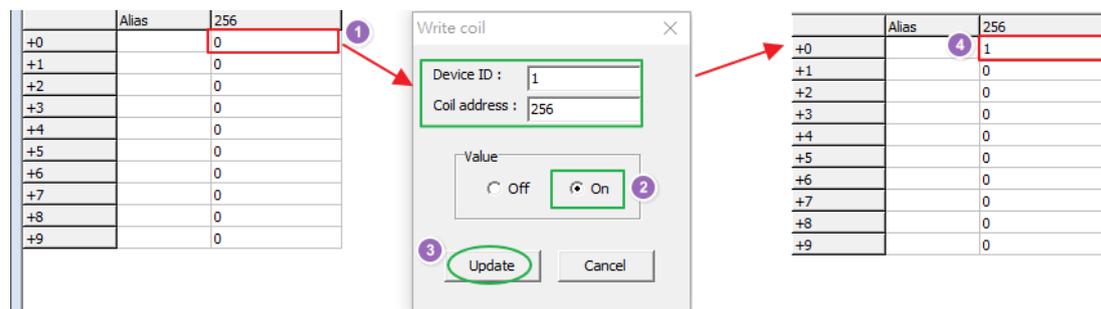
  

	Alias	256
+0		1
+1		1
+2		0
+3		0
+4		0
+5		0
+6		0
+7		0
+8		0
+9		0

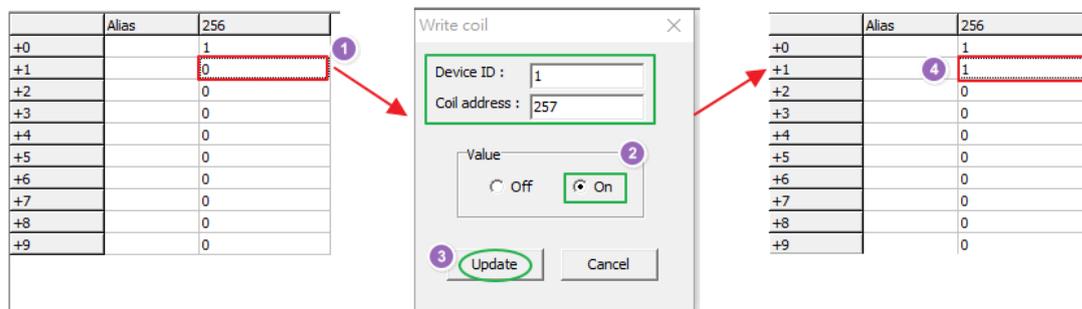
## 4.5 Remote Control Door Lock Relay and Alarm Relay On/Off

### Remote Control (Write) DO On / Off status

- 1 Double-click the mouse in the +0 control column, the Write Coil window will pop up
- 2 Select Off or On in Value field and we select On here as test
- 3 Click Update to confirm
- 4 We see that the state value changes from 0 to 1, and the door lock relay on AR-837-E is also triggered, in which mean we can remote control the door lock open / close



- 5 The same operation can remotely control Alarm relay at the point 257 in the +1 control column



## 4.6 Read AR-837-E-A Controller Door Magnetic Sensor

### Open/Close Status

1. Click  icon to create a new file
2. Enter **Device ID** (The device Node ID we use is 001 as example)
3. Select "**Input Status**" (this option is for read DI status)
4. Enter Start DI number in Address( check the protocol document of Modbus I/O mapping, DI number of Enterprise E controller start from 256)

5. Enter the number of points to be checked in Length field. Enter length 7 here in this case. We will check 7 DI points: Door Sensor, Arm Status, Egress, Alarm Status (Force / Open too long), Door Open too long, Force Open Alarm and Duress Alarm

AR725E & AR837E & AR716E16 Controller IO Modbus IO Mapping Chart: DI										
Main	WG							Function	Status	Value
256	272							Door Sensor	On/Off	1/0
257	273							Arm Status	On/Off	1/0
258	274							Egress		1/0
259	275							Alarm Status (Force /Open too long)		1/0
260	276							Door Open too Long		1/0
261	277							Force Open Alarm		1/0
262	278							Duress Alarm		1/0
263	279								On/Off	1/0
264	280									
265	281									
266	282									
267	283									
268	284									
269	285									
270	286									
271	287							On Line / Off Line	On/Off	1/0

511								Fire Alarm State		1/0
-----	--	--	--	--	--	--	--	------------------	--	-----

6. Click  icon to Connect

7. Check DO status in list column

Radzio! Modbus Master Simulator

File Edit Connection Setup Window Help

1 [New] [Open] [Save] [Print] [Refresh] [Stop] [Help]

NONAME1

2 Device Settings 3

Device ID 1 Input status

4 Address 256 5 Length 7 6

Display options

- Decimal  32bit float
- Integer  32bit sw. float
- Hexadecimal  64bit float
- Binary  64bit sw. float

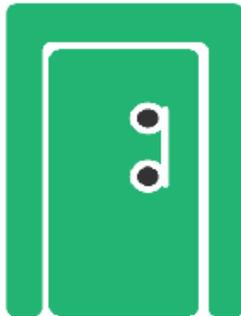
ASCII display

- Enable
- 1 char/reg
- 2 char/reg
- 2 char/reg sw

	Alias	256
+0		0
+1		0
+2		1
+3		1
+4		0
+5		1
+6		0
+7		0
+8		0
+9		0

7

Door Sensor Close



Door Sensor Open



	Alias	256
+0		0
+1		0
+2		1
+3		1
+4		0
+5		1
+6		0
+7		0
+8		0
+9		0

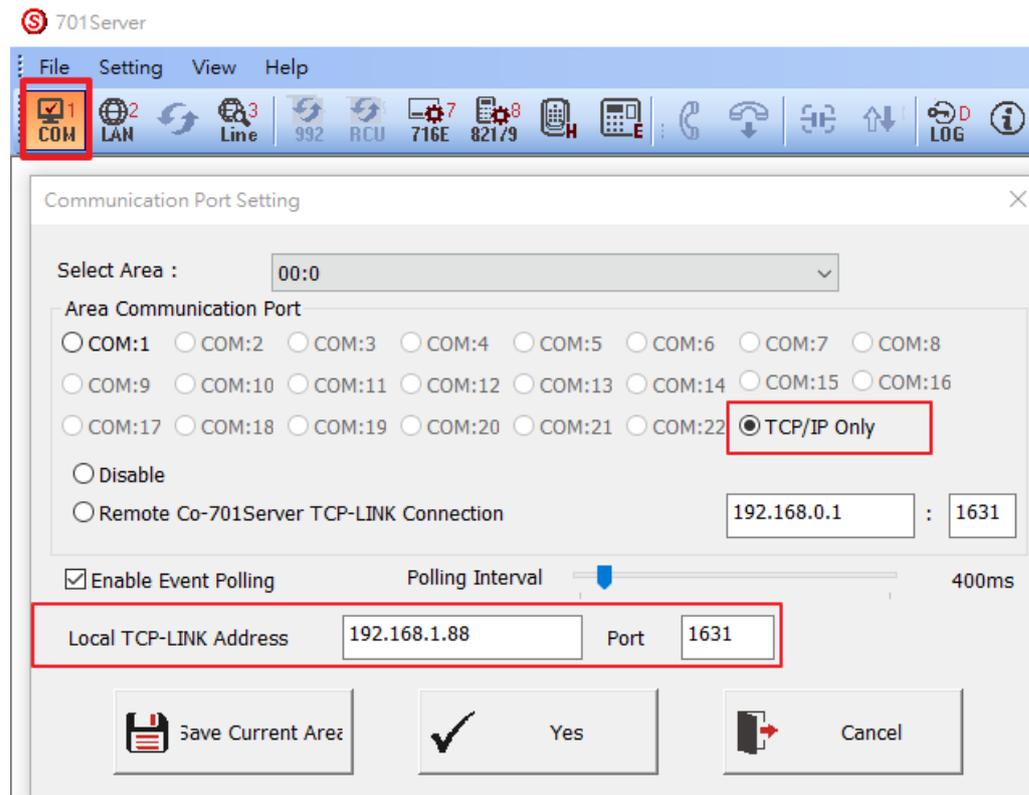
	Alias	256
+0		1
+1		0
+2		1
+3		1
+4		0
+5		1
+6		0
+7		0
+8		0
+9		0

## 5. Example 2: Modbus TCP/IP Device AR-727-CM-IO-0804M

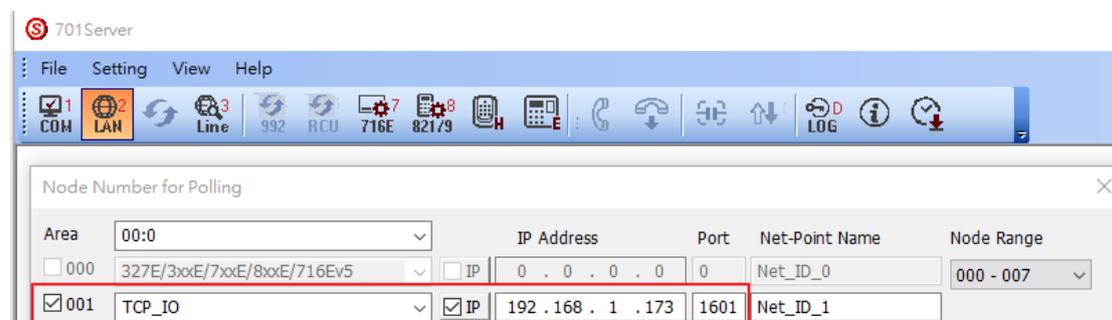
We will use Modbus Gateway Serial-to-Ethernet Server with I/O module include the model of AR-727-CM-IO-0804M as example

### 5.1 AR-727-CM-IO-0804M and 701Server Communication Settings

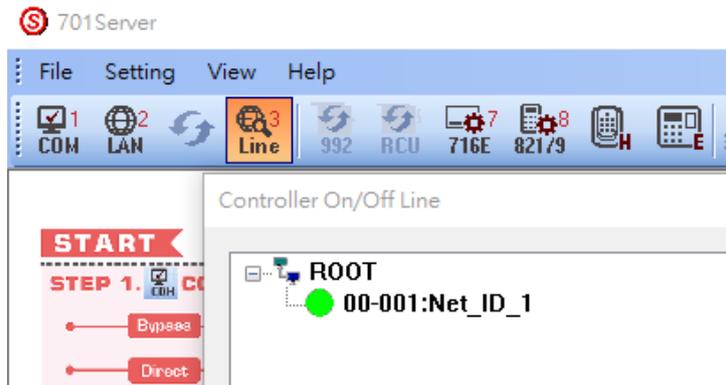
1 Select "TCP/IP Only", Enter IP Address of the PC and Port Number



2 Select Model name of TCP\_IO and enter **Port 1601**

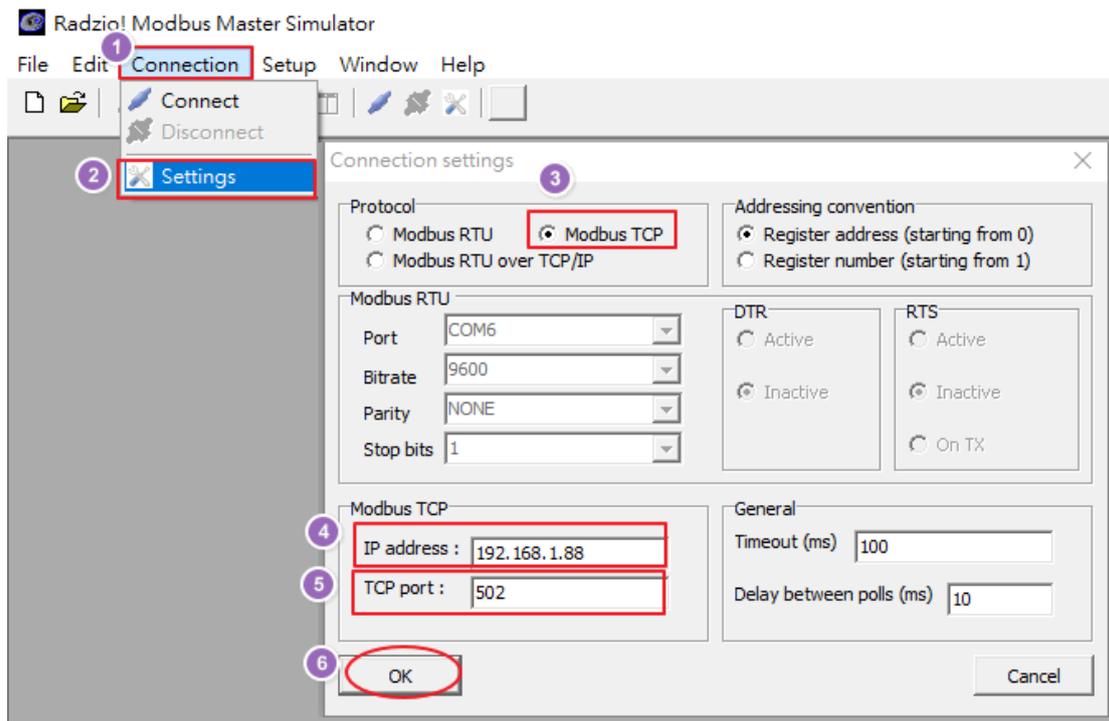


3 Check the communication is well or not



## 5.2 RMMS Modbus Software Settings

Open the RMMS software, firstly select Connection----> Settings, after enter the Settings window, follow the figure below, select Modbus TCP, enter the PC's IP Address, and TCP Port Number 502, click OK to exit.



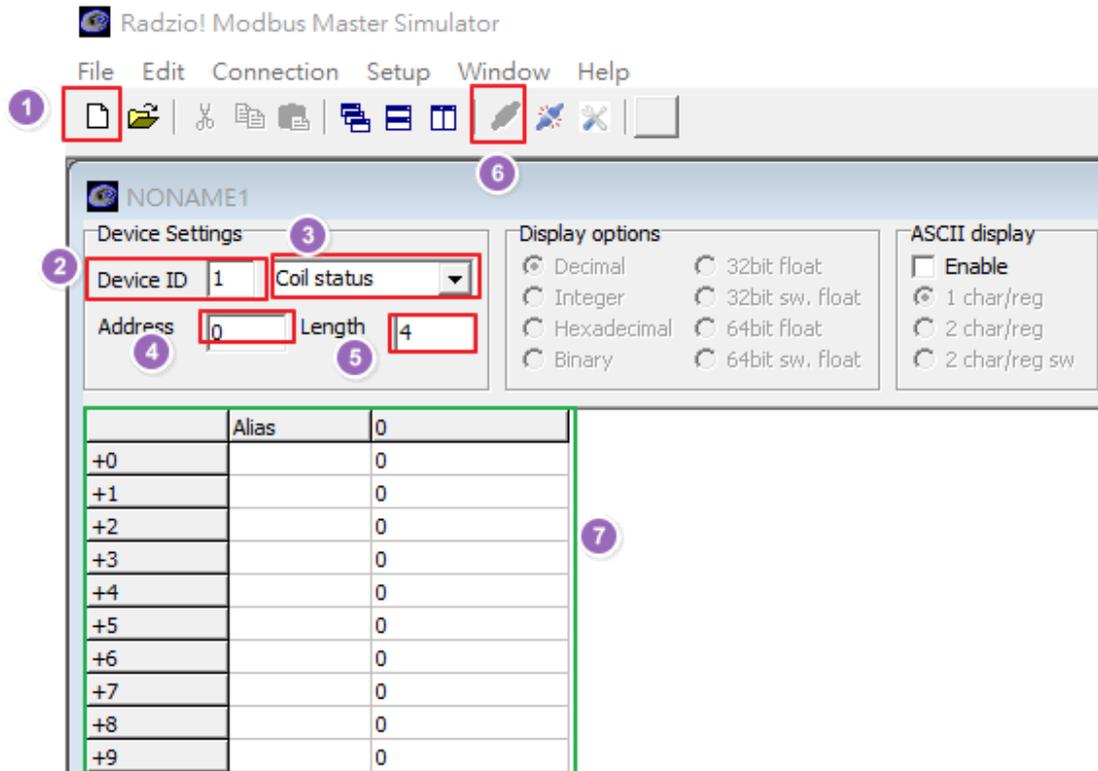
### 5.3 Read AR-727-CM-IO-0804M Built-in DO On/Off Status

1. Click  icon to create a new file
2. Enter **Device ID** (The device Node ID we use is 001 as example)
3. Select “**Coil Status**” (this option is for read/write DO status)
4. Enter Start DO number in Address( check the protocol document of Modbus I/O mapping, DO number of AR-727-CM is from 00)
5. Enter the number of points to be checked in Length field. Enter length 4 here in this case. We will check 4 DO points

AR727CM-IO (TCP Port 1601) IO & Modbus IO Mapping Chart

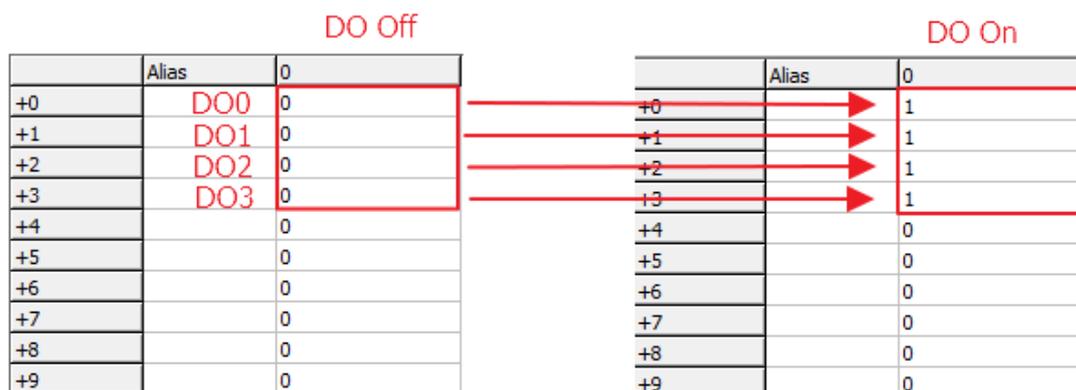
DO-0			
Pp	Function Location Number	Status	Value
00	DO-0	On/Off	1/0
01	DO-1	On/Off	1/0
02	DO-2	On/Off	1/0
03	DO-3	On/Off	1/0
04	DO-4	On/Off	1/0
05	DO-5	On/Off	1/0
06	DO-6	On/Off	1/0
07	DO-7	On/Off	1/0

6. Click  icon to Connect
7. Check DO status in list column



#### 8. Test to read DO On / Off status

+0~+3 means DO0~DO3; when DO status change status from off to on, the value will change from 0 to 1;



#### 5.4 Remote Control (Write) DO On/Off Status

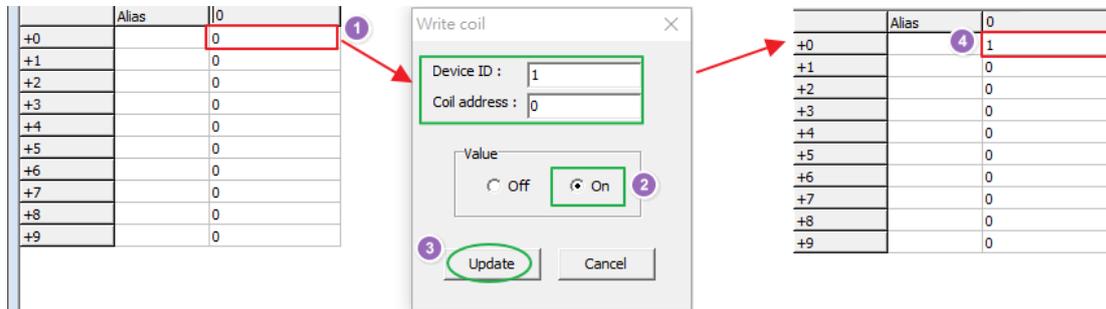
1 Double-click the mouse in the +0 control column, the Write Coil window will pop up

2 Select Off or On in Value field and we select On here as test

3 Click Update to confirm

4 We see that the state value changes from 0 to 1, and the output device connected

via the DO 0 will be triggered, in which mean we can remote control the output device.

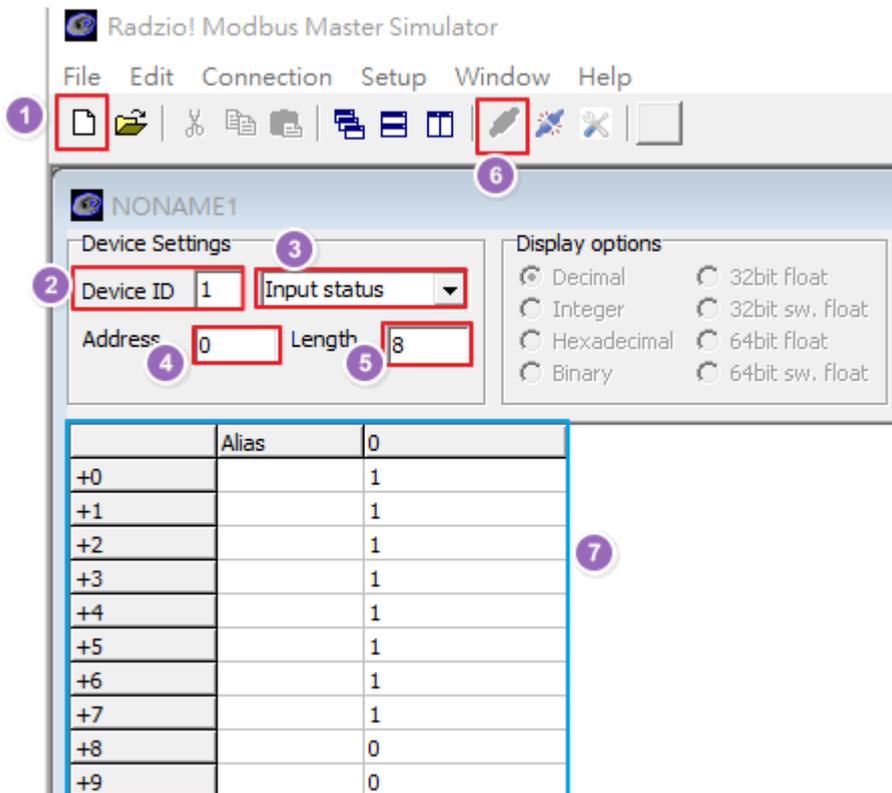


## 5.5 Read AR-727-CM-IO-0804M Built-in DI Open/Close Status

1. Click  icon to create a new file
2. Enter **Device ID** (The device Node ID we use is 001 as example)
3. Select **“Input Status”** (this option is for read DI status)
4. Enter Start DI number in Address( check the protocol document of Modbus I/O mapping, DI number of AR-727-CM start from 00)
5. Enter the number of points to be checked in Length field. Enter length 8 here in this case. We will check 8 DI points DI0~DI7.

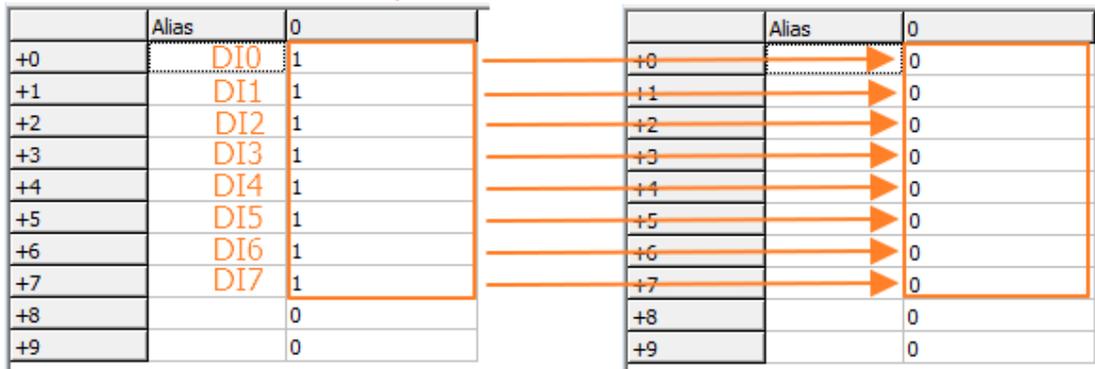
DI-0			
Pp	Function Location Number	Status	Value
00	DI-0	Open/Close	1/0
01	DI-1	Open/Close	1/0
02	DI-2	Open/Close	1/0
03	DI-3	Open/Close	1/0
04	DI-4	Open/Close	1/0
05	DI-5	Open/Close	1/0
06	DI-6	Open/Close	1/0
07	DI-7	Open/Close	1/0

6. Click  icon to Connect
7. Check DO status in list column



DI Open

DI Close

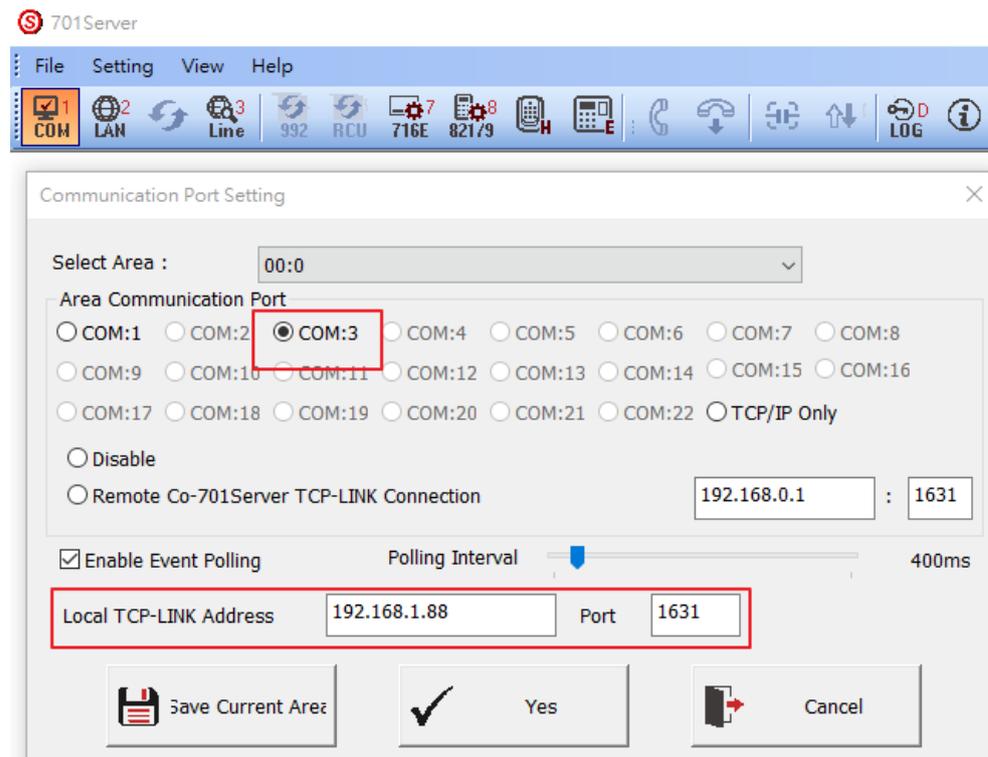


## 6. Example 3: RS485 IO Device AR-403-IO-0404M

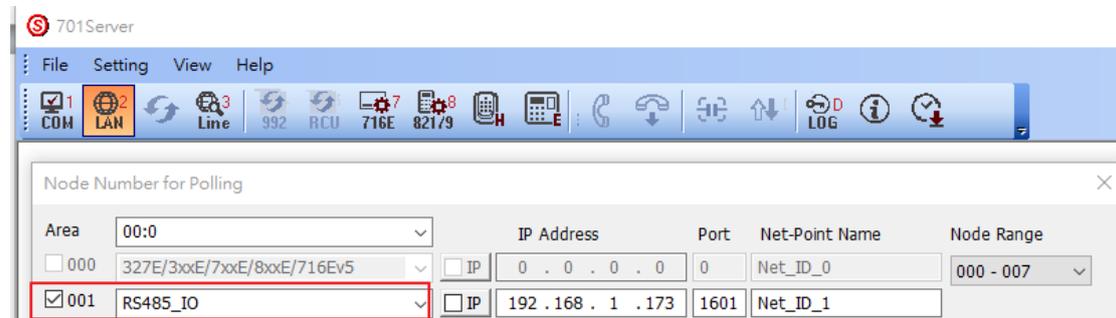
We will use universal I/O modules (we will use AR-403-IO-0404M as example, we will connect use AR-403-IO-0404M to computer via USB Converter AR-321CM

### 6-1 701Server Setting and make sure AR-403-IO-0404M communicate well with 701Server software

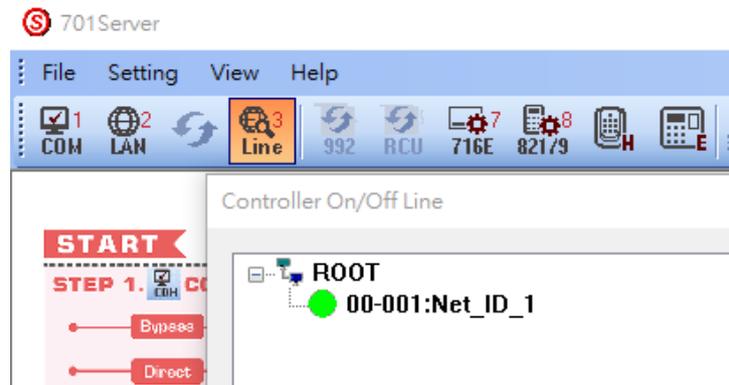
1 Select "Com Port Number", Enter IP Address of the PC and Port Number



2 Select Model name of RS485\_IO

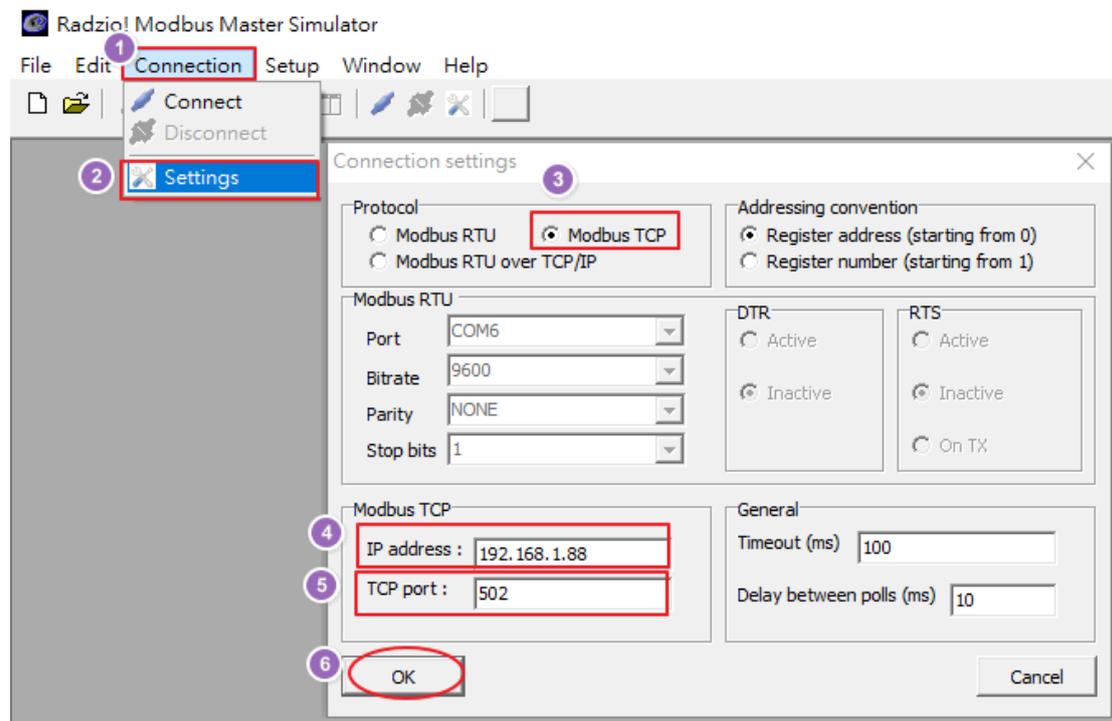


### 3 Check the communication is well or not



## 6.2 RMMS Modbus Software Settings

Open the RMMS software, firstly select Connection----> Settings, after enter the Settings window, follow the figure below, select Modbus TCP, enter the PC's IP Address, and TCP Port Number 502, click OK to exit.



### 6.3 Read AR-403-IO-0404M Built-in DO On/Off Status

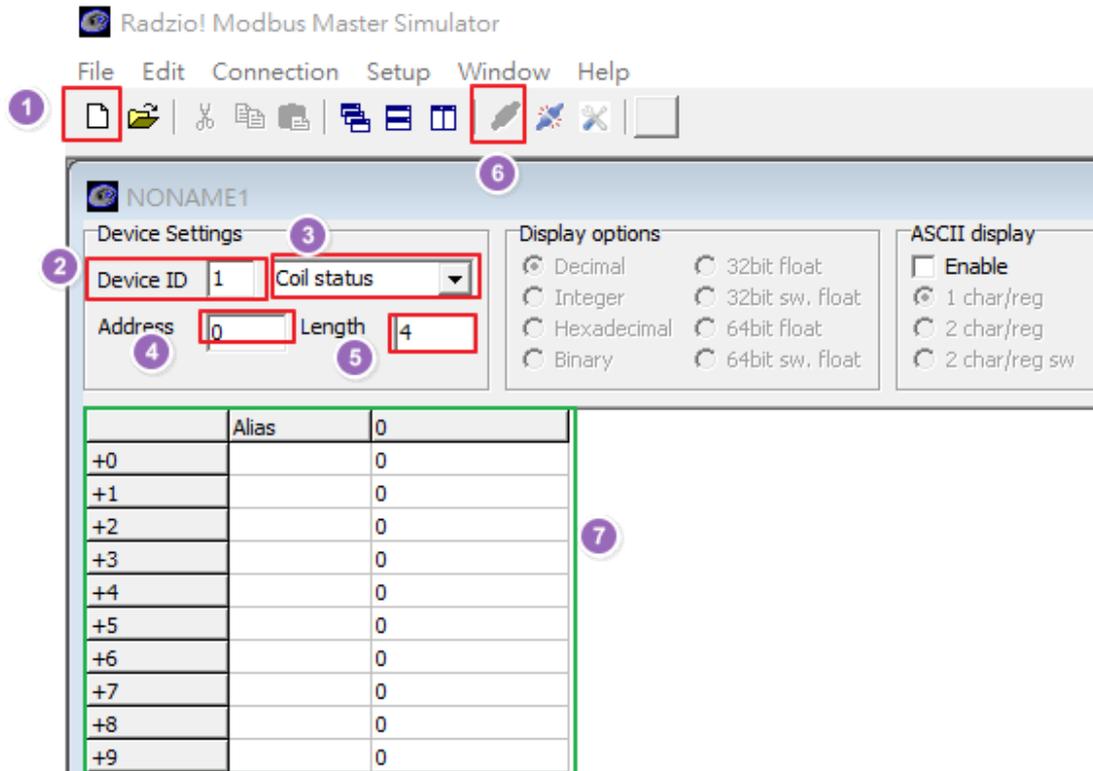
#### Create a new file for DO status test

1. Click  icon to create a new file
2. Enter **Device ID** (The device Node ID we use is 001 as example)
3. Select “**Coil Status**” (this option is for read/write DO status)
4. Enter Start DO number in Address( check the protocol document of Modbus I/O mapping, DO number of AR-403-IO-0404M is from 00)
5. Enter the number of points to be checked in Length field. Enter length 4 here in this case. We will check 4 DO points

AR403MO (RS-485) IO & Modbus IO Mapping Chart

DO-0			
Pp	Function Location Number	Status	Value
00	DO-0	On/Off	1/0
01	DO-1	On/Off	1/0
02	DO-2	On/Off	1/0
03	DO-3	On/Off	1/0

6. Click  icon to Connect
7. Check DO status in list column



## 8. Test to read DO On / Off status

+0~+3 means DO0~DO3; when DO status change status from off to on, the value will change from 0 to 1;

DO Off			DO On		
	Alias	0		Alias	0
+0	DO0	0	→	+0	1
+1	DO1	0	→	+1	1
+2	DO2	0	→	+2	1
+3	DO3	0	→	+3	1
+4		0		+4	0
+5		0		+5	0
+6		0		+6	0
+7		0		+7	0
+8		0		+8	0
+9		0		+9	0

## 6.4 Remote Control (Write) DO On/Off Status

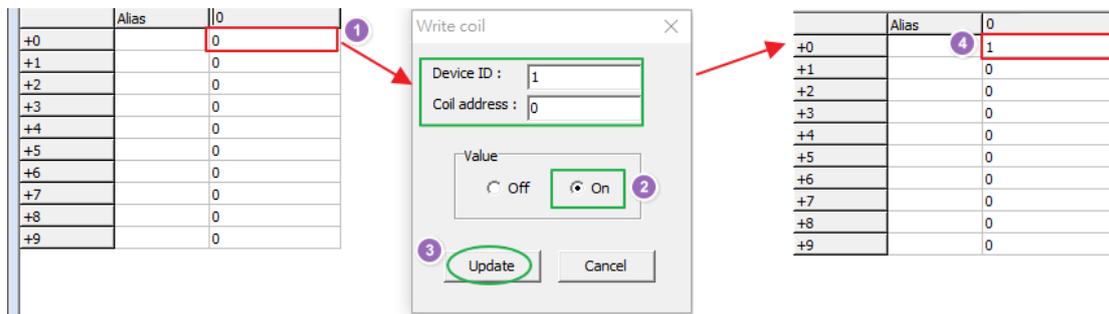
1 Double-click the mouse in the +0 control column, the Write Coil window will pop up

2 Select Off or On in Value field and we select On here as test

3 Click Update to confirm

4 We see that the state value changes from 0 to 1, and the output device connected via the DO 0 will be triggered, in which mean we can remote control the output

device.



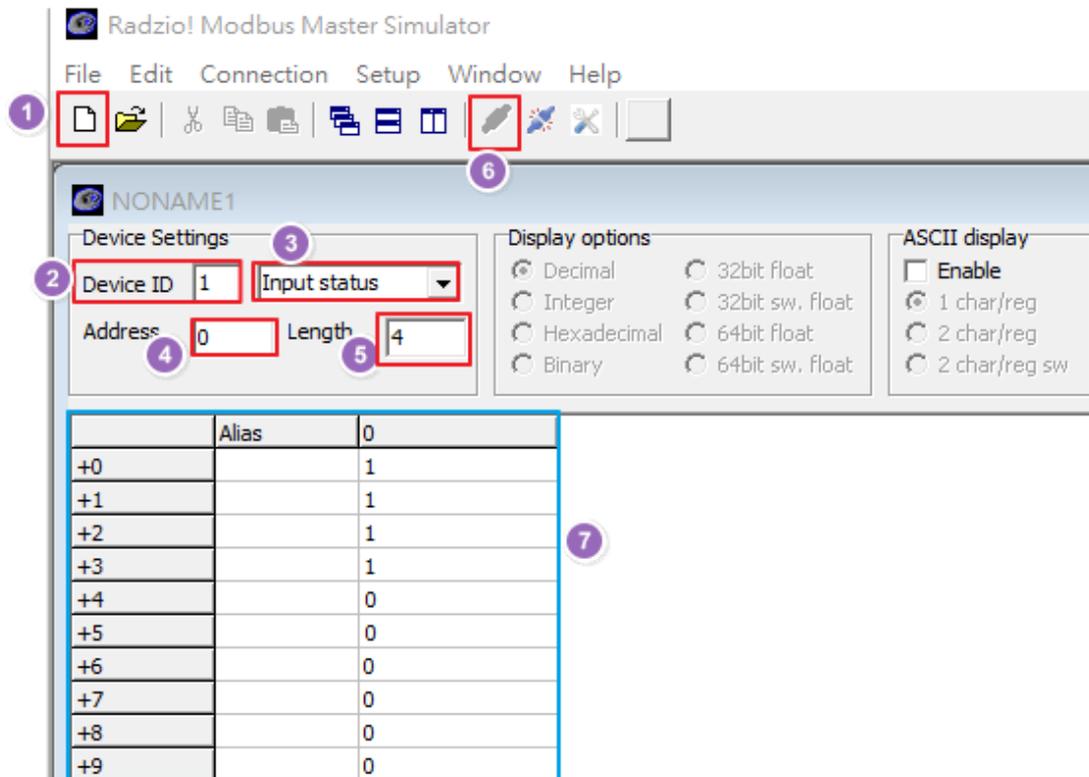
## 6.5 Read AR-403-IO-0404M Built-in DI Open/Close Status

### Create a new file for DI status test

1. Click  icon to create a new file
2. Enter **Device ID** (The device Node ID we use is 001 as example)
3. Select **“Input Status”** (this option is for read DI status)
4. Enter Start DI number in Address( check the protocol document of Modbus I/O mapping, DI number of AR-403-IO-0404M start from 00)
5. Enter the number of points to be checked in Length field. Enter length 4 here in this case. We will check 4 DI points DI0~DI3.

DI-0			
Pp	Function Location Number	Status	Value
00	DI-0	Open/Close	1/0
01	DI-1	Open/Close	1/0
02	DI-2	Open/Close	1/0
03	DI-3	Open/Close	1/0

6. Click  icon to Connect
7. Check DI status in list column



DI Open

DI Close

	Alias	0
+0	DI1	0
+1	DI2	0
+2	DI3	0
+3	DI4	0
+4		0
+5		0
+6		0
+7		0
+8		0
+9		0

	Alias	0
+0		1
+1		1
+2		1
+3		1
+4		0
+5		0
+6		0
+7		0
+8		0
+9		0

