User Manual

Version 1.0.1 October 2021

GRP-500M

Ethernet / Serial / CAN to Ethernet / 4G Gateway

Written by Selby Chen
Edited by Kalia Huang

Table of Contents

Important Information

Warranty

All products manufactured by ICP DAS are under warranty regarding defective materials for a period of one year, beginning from the date of delivery to the original purchaser.

Warning

ICP DAS assumes no liability for any damage resulting from the use of this product.ICP DAS reserves the right to change this manual at any time without notice. The information furnished by ICP DAS is believed to be accurate and reliable. However, no responsibility is assumed by ICP DAS for its use, not for any infringements of patents or other rights of third parties resulting from its use.

Copyright

Trademark

Names are used for identification purpose only and may be registered trademarks of their respective companies.

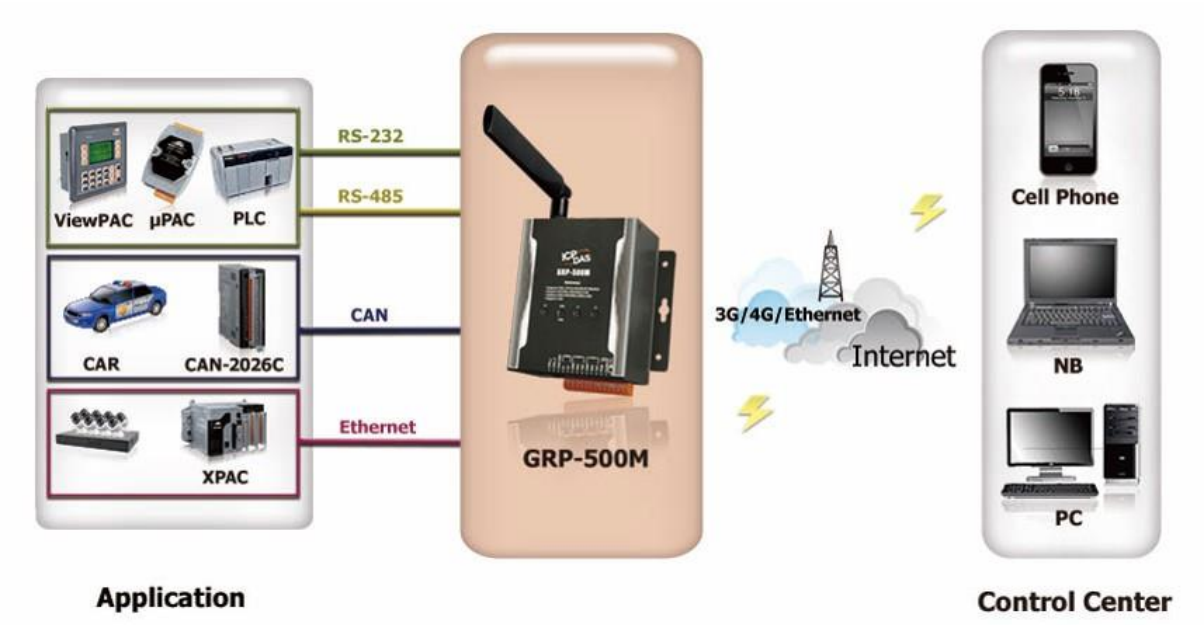
Contact us

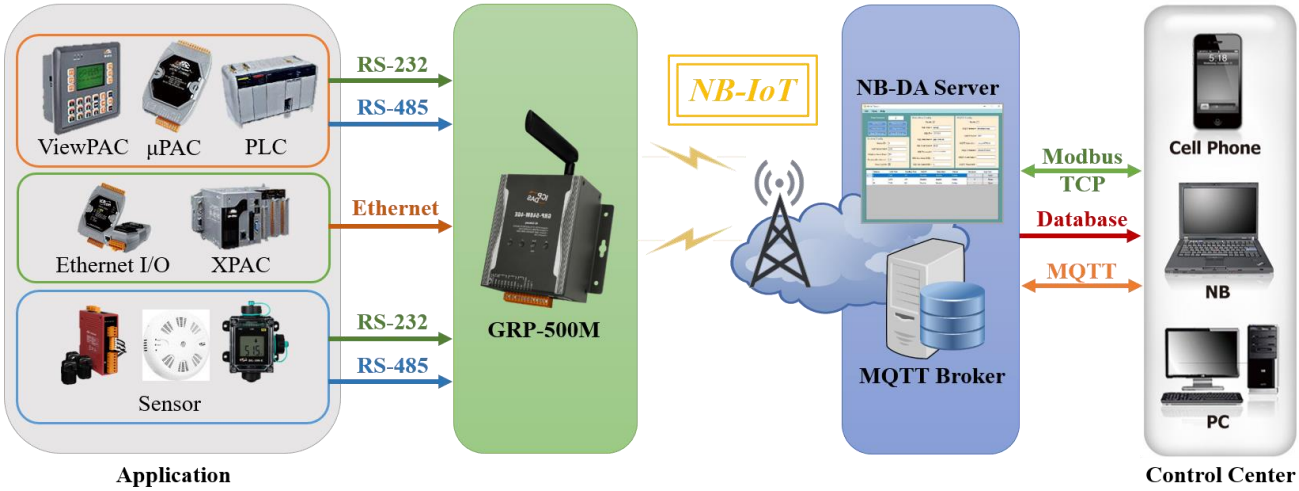
If you have any problem, please feel free to contact us. You can count on us for quick response.

Email: service@icpdas.com

1. Introduction

The GRP-500M provided by ICP DAS is a gateway for Ethernet, serial port and CAN. With the optional 4G / NB communication module, the GRP-500M can be used for wireless data transmission. With the optional GPS module, the GRP-500M can also be used as a GPS tracking system for vehicle management or maritime system. The GRP-500M can be used in M2M application to transmit remote I/O, Modbus data or camera video. Within the high-performance CPU, the GRP-500M can process large amounts of data and is suitable for harsh industrial environments.





2. Hardware Specification

2.1 GRP-500M Specifications

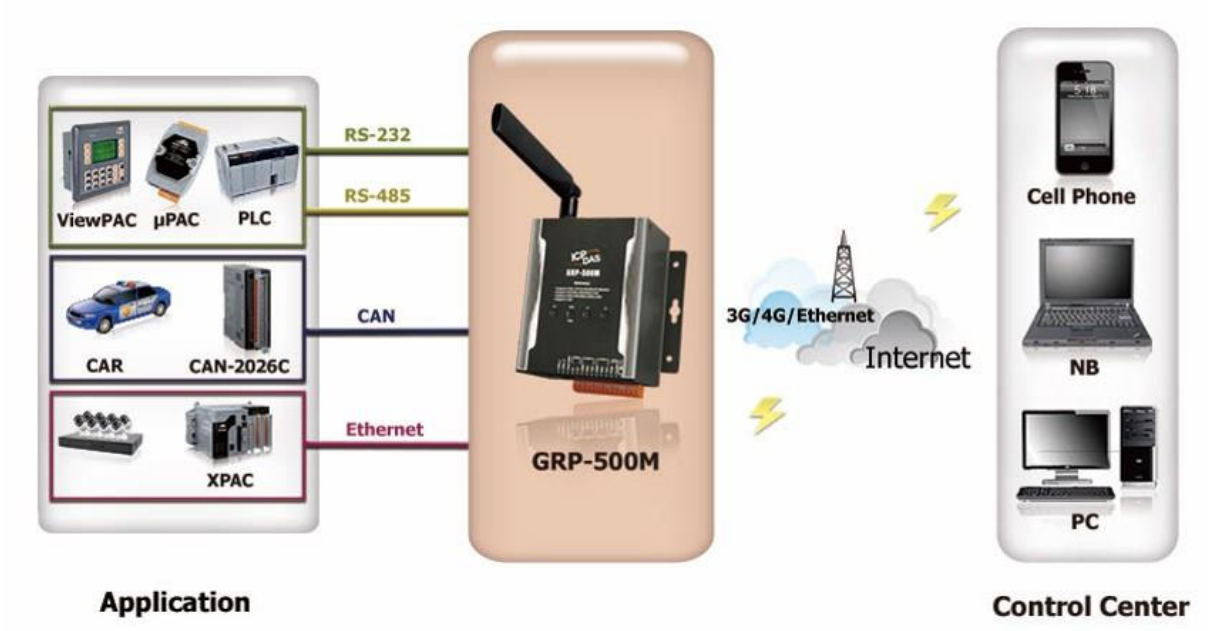
Item	GRP-500M
Software	
Gateway Function	Ethernet and Serial port (RS-232 x1, RS-485 x1) to Ethernet / 4G / NB-IoT
Embedded service	Web Server, Router function
System	
CPU	ARM CPU
EEPROM	16 KB (Data Retention: 40 years; 1,000,000 erase/write cycles)
Expansion Flash Memory	SD Card (Max. 32GB SDHC)
RTC (Real Time Clock)	Provide seconds, minutes, hours, day of week/month, month and year
64-bit Hardware Serial Number	Yes
Watchdog Timer	Yes
LED Indicator	4 LEDs (RUN/PWR, L1, L2, L3)
Rotary Switch	Yes (0~9)
Comm. Interface	
Ethernet	RJ-45, 10/100 Base-TX (Auto-negotiating, Auto MDI/MDI-X, LED indicators)
COM1	RS-232 (RxD, TxD and GND); Non-isolated (Console, Debug)
COM2	RS-232 (RxD, TxD and GND); Non-isolated
COM3	RS-485 (D2+, D2-); 3000 VDC isolated
CAN	CAN Bus (CAN_H, CAN_L)
Mechanism	
Casing	Metal
Dimensions(W x L x H)	117 mm x 126 mm x 58 mm (W x L x H)
Installation	DIN-Rail / Screw
Power	
Protection	Power reverse polarity protection
Frame Ground Protection	ESD, Surge, EFT, Hi-Pot
Required Supply Voltage	+10 V_{DC} ~ +48 V_{DC}
Power Consumption	4.8W (200 mA @ 24 V_{DC})
Environment	
Operation Temp.	-25℃ to 75℃
Storage Temp.	-30℃ to 80℃
Humidity	5~95% non-condensing

2.2 Accessories Specifications

Module (Optional)	LE910C4-AP	EC25-E	BG96
Category	LTE category 4	LTE category 4	LTE Cat-M1/NB1/EGPRS
Frequency Bands			
LTE-FDD	B1/B3/B5/B8/B9/B18/B19/ B26/B28	B1/B3/B5/B7/B8/B20	B1/B2/B3/B4/B5/B8/B12/B 13/B18/B19/B20/B26/B28
LET-TDD	-	B38/B40/B41	B39 (For Cat M1 Only)
WCDMA	B1/B5/B6/B8/B19	B1/B5/B8	-
GSM/EGPRS	-	900/1800Mhz	850/900/1800/1900MHz
Area			
Region	Asia-Pacific	EMEA, Korea, Thailand, India	Global
Certification	Carrier: NTT Docom, au KDDI, Telstra Regulatory: JRL / JTBL, RCM, CE	Carrier: Vodafone, Deutsche Telekom, SKT, Telefónica, T-Mobile, KT / LGU+ Regulatory: GCF, CE, KC, NCC, RCM, FAC, NBTC, ICASA Others: WHQL	Carrier: Vodafone, Deutsche Telekom, Telefónica, Verizon, AT&T, T-Mobile, Sprint, Telus, U.S. Celluar, Rogers, Bell, SKT, LGU+, NTT DOCOMO, SoftBank, KDDI, Telstra Regulatory: GCF, CE, FCC, PTCRB, IC, IFETEL, CCC, KC, NCC, JATE, TELEC, RCM, NBTC, IMDA Others: RoHS Compliant
Environment			
Temperature Range	-40°C ~ +85°C	-40°C ~ +85°C	-40°C ~ +80°C
Dimensions	51.0mm × 30.0mm × 4.9mm		

3. Application Architecture

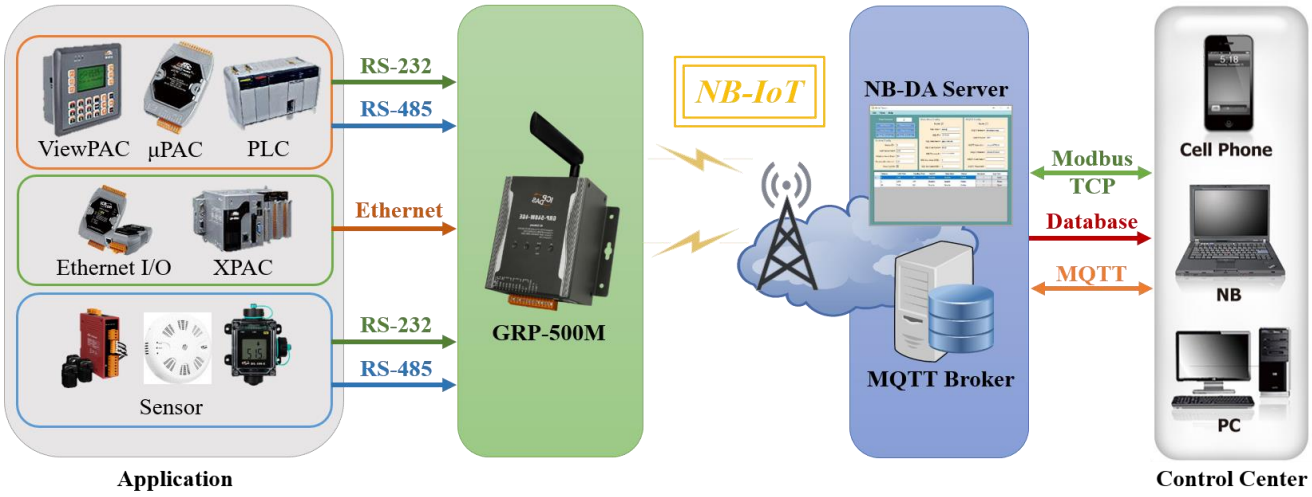
3.1 4G / Ethernet Gateway



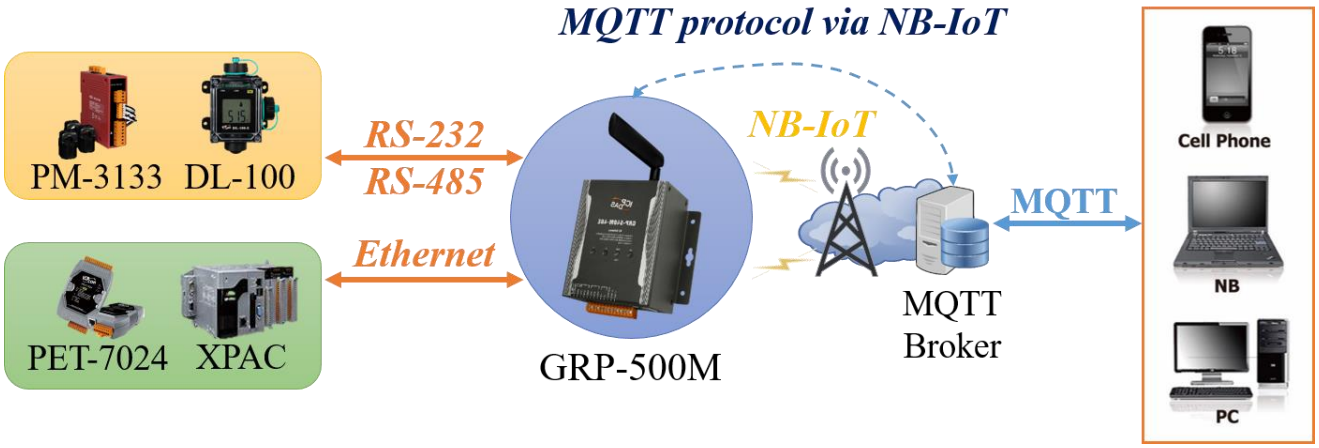
3.2 Remote Video Monitor

3.3 Serial Port to 4G / Ethernet Gateway Application

3.4 Data Collection and Remote Control (with NB-DA Server)

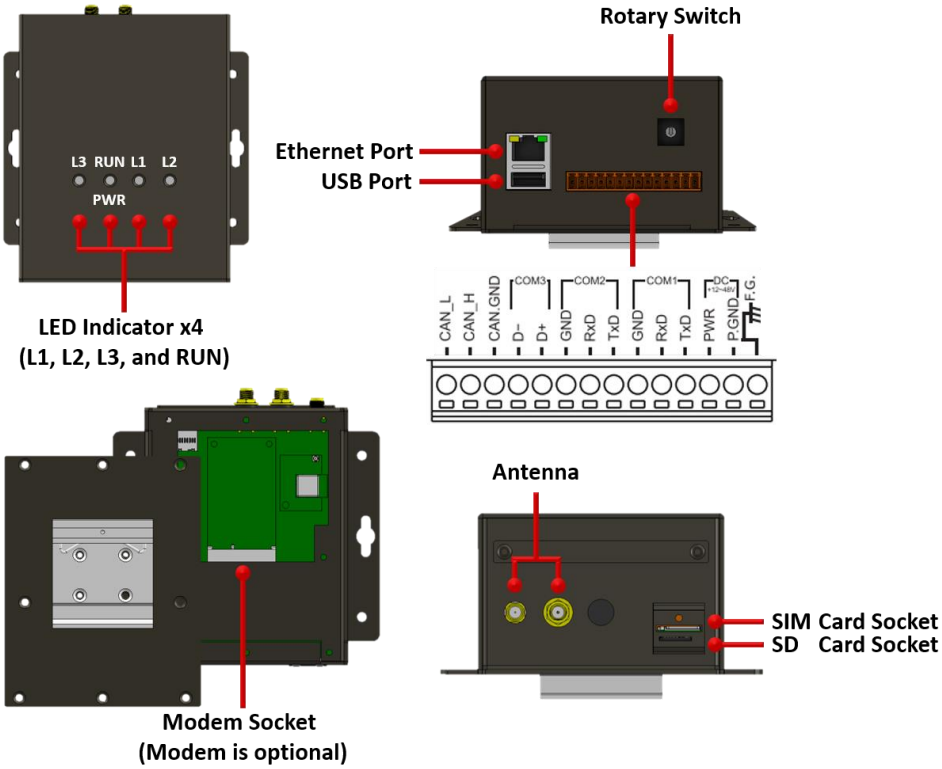


3.5 Data Collection and Remote Control (with MQTT Broker)

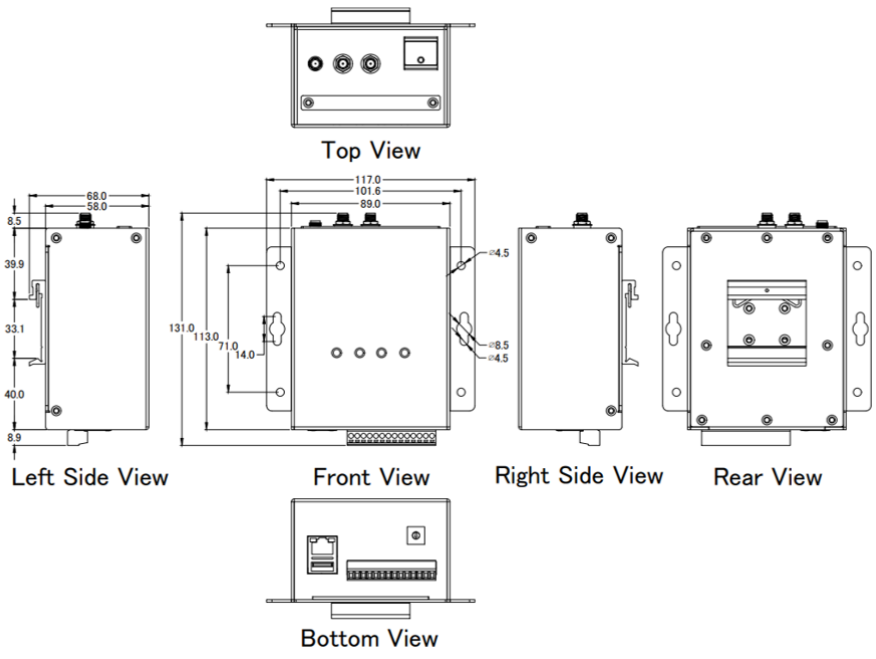


4. Hardware

4.1 Pin Assignment



4.2 Dimension



4.3 LED Indicators

There are four LED indicators to help users to judge the various conditions of device. The description is as follows ：

A. **PWR** (Green) ： Indicates whether there is an external power input.

Normal	Abnormal
Always ON	Always OFF

B. **RUN** (Red) ： Indicates whether the operating system is normal.

Normal	Abnormal
250ms ON / 250ms OFF	Always ON / OFF

C. **L1** (Green/Red) ： Indicates the status of RTU Client.

Normal	Abnormal
500ms ON / 500ms OFF	Always ON / OFF

D. **L2** (Green / Red) ： Reserve.

E. **L3** (Green / Red) ： Indicates the status of optional communication module.

Optional Module : LE910C4-AP

Registered	Unregistered
1800ms ON / 200ms OFF	Always ON

Optional Module : EC25-E

Registered	Network Search	Data Transmission
1800ms ON / 200ms OFF	200ms ON / 1800ms OFF	125ms ON / 125ms OFF

Optional Module : BG96

Registered	Network Search	Data Transmission
1800ms ON / 200ms OFF	200ms ON / 1800ms OFF	125ms ON / 125ms OFF

4.4 Rotary Switch

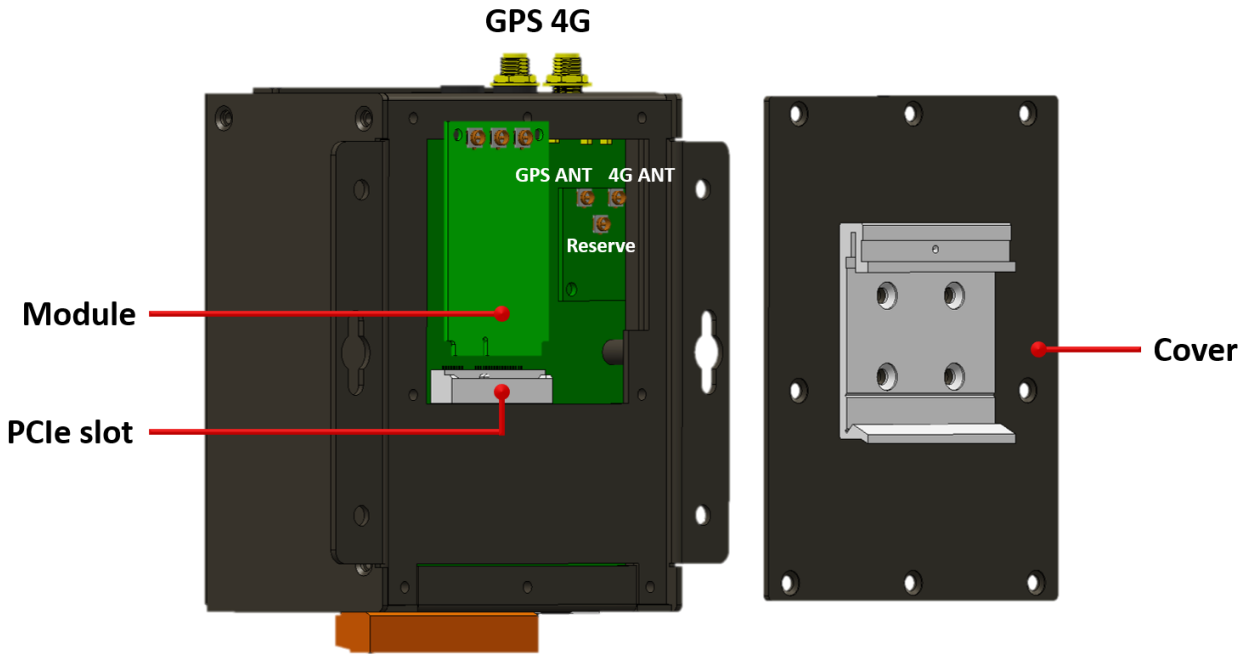
There are some functions of rotary switch. The description is as follows :

(1) **0** : Normal mode, default position.

(2) **9** : If the user sets the rotary switch to 9 and then restarts the device, the Ethernet IP will be set to "192.168.255.1". It is useful when users forget the Ethernet IP.

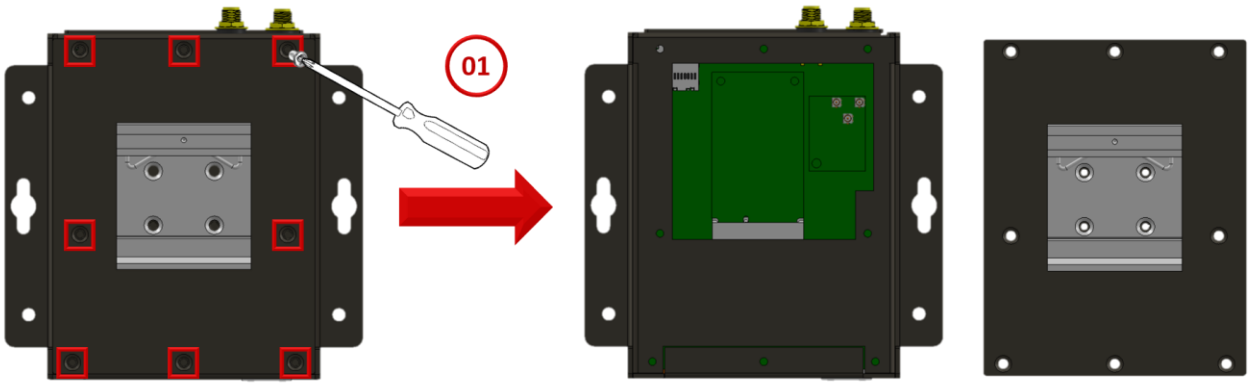
4.5 Mounting the Accessories

GRP-500M has one PEIe socket to expand the wireless communication function.



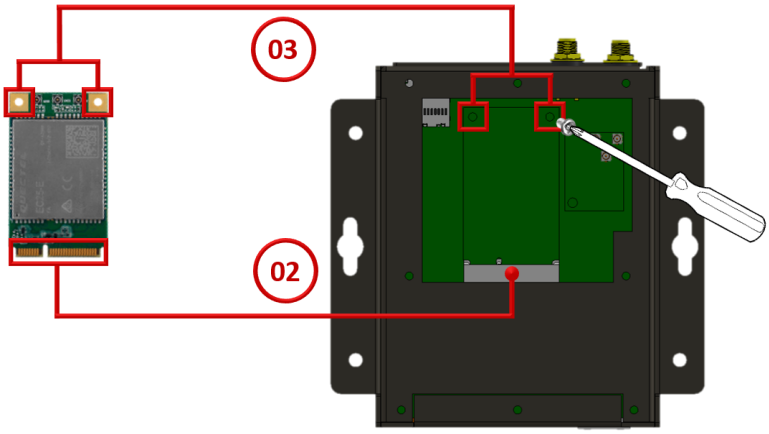
4.5.1 Mounting the communication module

(1) Remove stripped screws and then remove the cover

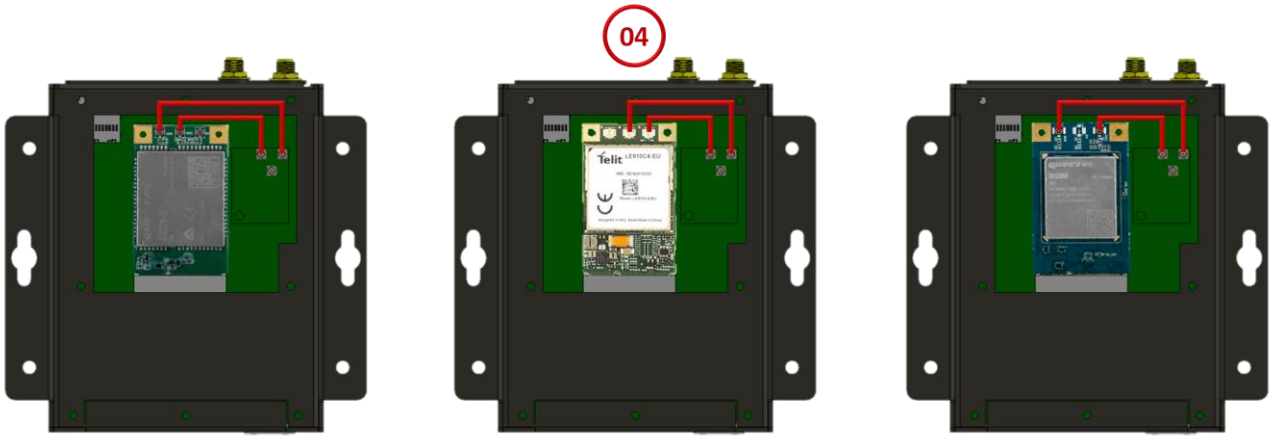


(2) Hold the communication module , and then carefully insert it into the PCIe slot.

(3) Fasten the communication module using the screws supplied.

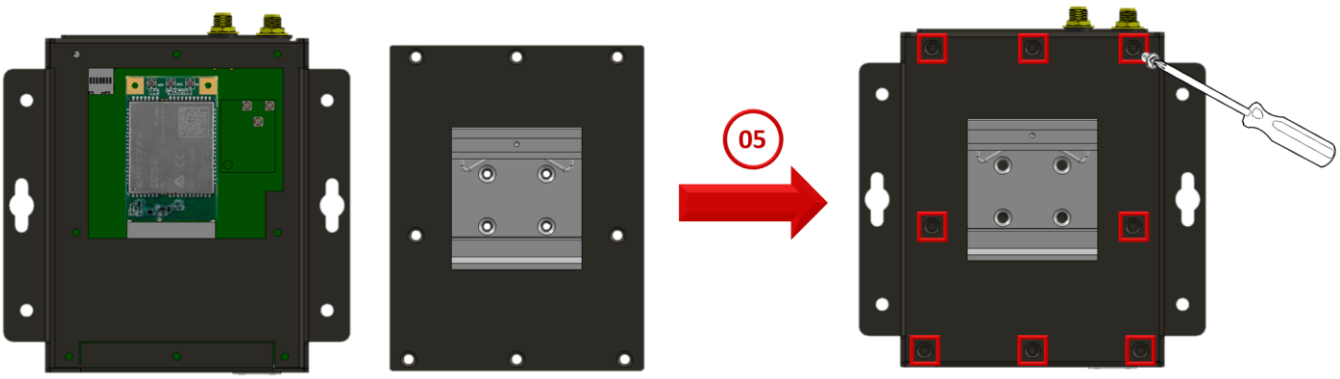


(4) Connect the communication module using the ipex connector supplied



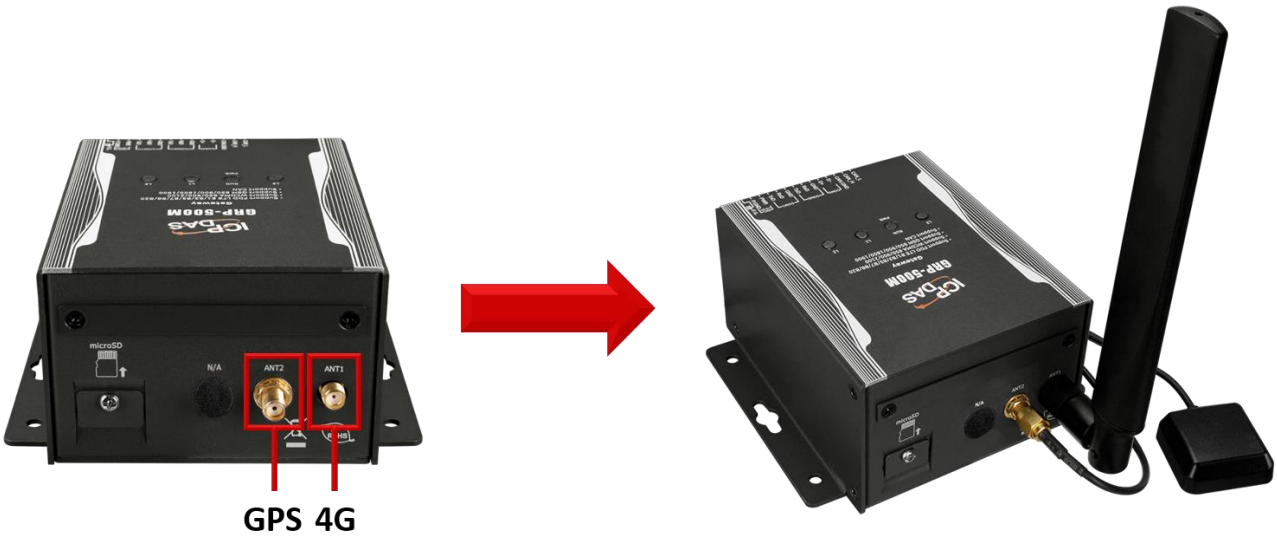
Module: EC25 Module: LE910C4-AP Module: BG96

(5) Close the cover and then fasten the screws.



4.5.2 Installing the antenna

The Mobile network expansion card has two antenna connector that can be used to connect the 3G/4G and GPS antenna. To install the antenna, just screw the antenna tightly into the connector, and put the antenna in the purpose place.



5. Web Utility

5.1 Login the Utility

Please login before using the web utility:

- Default IP is “192.168.255.1”.
- Default Mask is “255.255.0.0”.
- Default username & password is “admin”.

The web page after login is as follows.

Ethernet	
Mode	static
MAC address	68:c9:0b:7c:37:89
IP Address	192.168.255.1
Mask	255.255.0.0

WLAN information	
Mode	Closed

Mobile Network information	
Status	connected
IP Address	10.97.25.192
P-t-P	10.64.64.64

Modem information	
IMEI	861075022019632
PIN Code	+CPIN: READY
Register Status	Registered
Signal Quality	68%

GPS information	
GPS Status	GPS is ready, @(22.6202772833, 120.30106635) --> show map
GPS Data	$GPRMC,012958.0,A,2237.216637,N,12018.063981,E,0.0,84.8,150917,,,A*5A

5.2 Information

5.2.1 Device Information

The “Device Information” page provides basic device information.

Device Information	
Serial Number	9F6E4BA10000
Kernel Version	3.2.14
Firmware Version	GRP-500M_V1.2.2_20200415

- Serial Number: Serial number of ICPDAS product.
- Kernel Version: Linux kernel version.
- Firmware Version: Firmware version.

5.2.2 Network Information

The “Network Information” page provides basic network information.

Ethernet	
Mode	static
MAC address	68:c9:0b:7c:37:89
IP Address	192.168.255.1
Mask	255.255.0.0

WLAN information	
Mode	Closed

Mobile Network information	
Status	connected
IP Address	10.97.25.192
P-t-P	10.64.64.64

Modem information	
IMEI	861075022019632
PIN Code	+CPIN: READY
Register Status	Registered
Signal Quality	68%

GPS information	
GPS Status	GPS is ready, @(22.6202772833, 120.30106635) --> show map
GPS Data	$GPRMC,012958.0,A,2237.216637,N,12018.063981,E,0.0,84.8,150917,,,A*5A

◆

・Ethernet: Ethernet information

- ■ Mode: Only support static IP.
- ■ MAC Address: Unique identifier assigned to the network interface.
- ■ IP Address: Computer address under Internet protocol.
- ■ Mask: The mask will be provided by the gateway provider.

・WLAN information[1]

・Mobile Network information[2]

- ■ Status: "connected" means the modem dialed successfully.
- ■ IP Address: IP address provided by ISP provider.
- ■ P-t-P: Gateway IP provided by ISP provider.
- ■ IP Address for VPN: IP address provided by VPN Server.
- ■ P-t-P for VPN: Gateway IP provided by VPN Server.

・Modem information[3]

- ■ IMEI: IMEI number of communication module.
- ■ PIN Code: The status of the PIN code.
  - ◆READY: PIN code is ready.
  - ◆SIM PIN: Need PIN code.
  - ◆SIM PUK: Need PUK code.
  - ◆SIM failure: Access to SIM card failure.
- ■ Register Status: Indicates whether the machine is successfully connected to the mobile network.
- ■ Signal Quality: 3G / 4G signal quality.

・GPS information

- ■ GPS Status: GPS positioning status.
  - ◆GPS is ready: Click "Show Map" to show the location of the GRP device.
  - ◆No GPS data: Unable to locate.
- ■ GPS Data: The “GPRMC” data of GRP device.

※ [1] GRP-500M does not support WLAN

※ [2] Display information after dialing.

※ [2] Display information after installing the communication module.

5.2.3 Storage Information

The “Storage Information” page provides information about "SD Card" and "USB Disk".

USB Disk	
Size	3936220 KB
used	2584 KB
Available	3933636 KB
Path (Mount Point)	/media/usbhd-sda1

Micro SD Card	
Size	31154688 KB
used	25344 KB
Available	31129344 KB
Path (Mount Point)	/media/mmcblk0p1

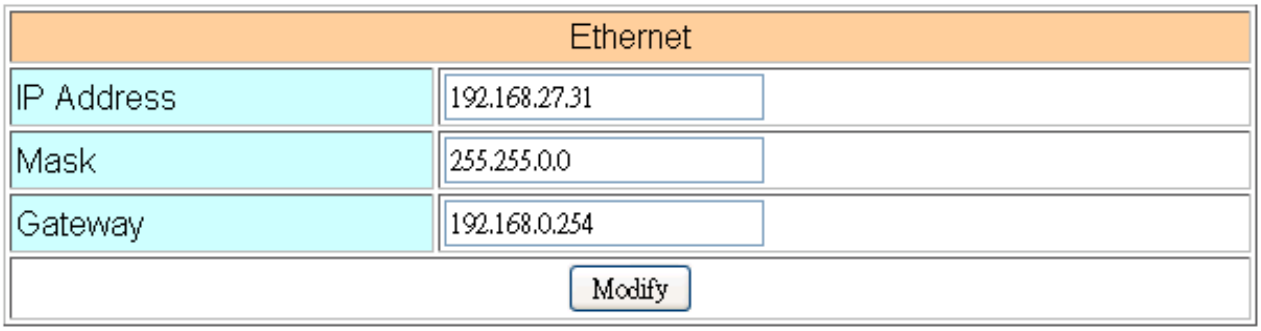
・USB Disk / Micro SD card

- ■ Size: Total storage size
- ■ used: Used size
- ■ Available: Free space in the storage
- ■ Path: The mount point in the file system.

5.3 Network

5.3.1 Ethernet

The “Ethernet” page provides basic settings for Ethernet:



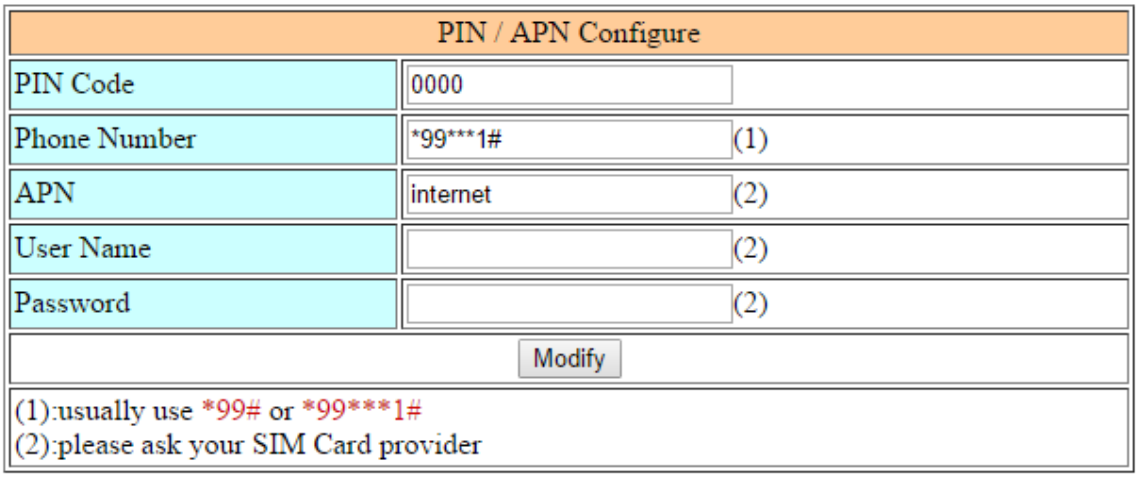
(1) IP Address: Ethernet IP.

(2) Mask: Gateway mask.

(3) Gateway: Gateway IP.

5.3.2 PIN / APN Configure

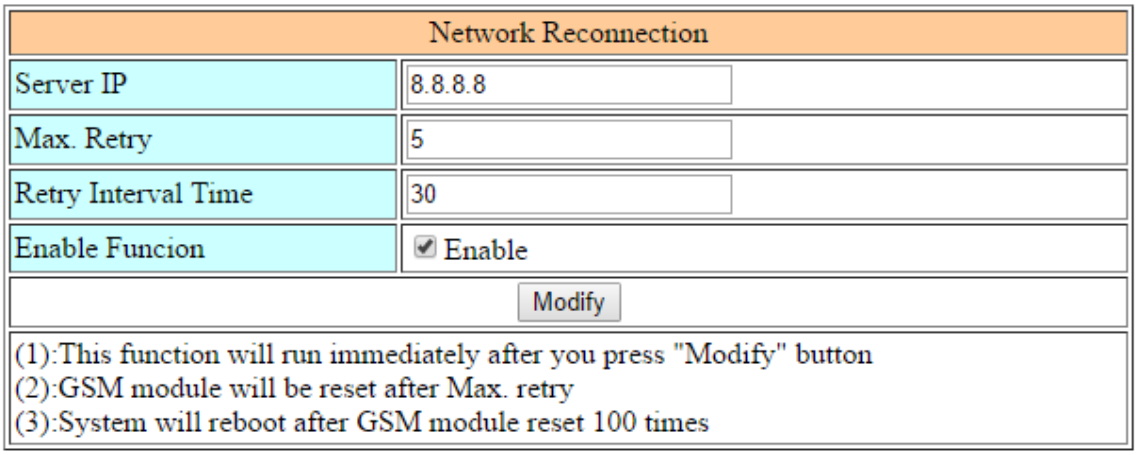
The “PIN / APN Configure” page provides the basic settings of 3G / 4G network:



- PIN Code: The PIN code is a 4-character number provided by the SIM card provider.
- Phone Number: It is generally filled in as "*99***1#" or "*99#", depending on the SIM card provider.
- APN: Access point name. Please consult the SIM card provider.
- User Name: Dial-up user name. Please consult the SIM card provider.
- Password: Dial-up password. Please consult the SIM card provider.

5.3.3 Network Reconnection

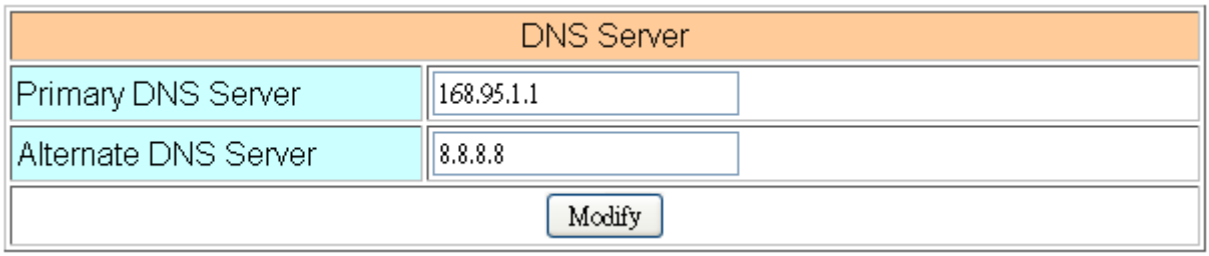
The "Network Reconnect" page provides a function to keep the device on the mobile network at all times, but it will send an ICMP signal to check the mobile network. The default setting is "Enable" to ensure that the device is always online.



- Server IP: The destination IP or URL of the ICMP signal.
- Max. Retry: If the number of system retries exceeds this number, the 3G / 4G module will be reset and dialed again.
- Interval Time: System retry interval.
- Enable Function: Whether to Enable this function. This setting will run immediately.

5.3.4 DNS

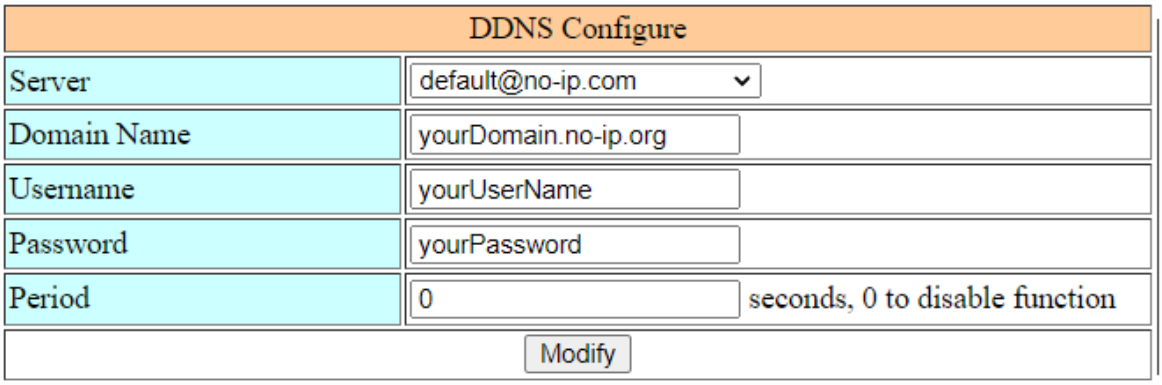
The "DNS" page provides the settings of the DNS server IP.



- Primary DNS Server: The device will first use it to obtain DNS service.
- Alternate DNS Server: If the "primary DNS server" is invalid, the device will use it to obtain DNS service

5.3.5 DDNS Client

The "DDNS Client" page provides a real-time update of the dynamic domain name server to point to the changing IP address on the Internet



・Server: The domain name of the DDNS service provider.

・Domain: The domain name registered by the user.

・Username: The username of DDNS service.

・Password: The password of DDNS service.

・Period: The time period (in seconds) to update the address[1].

※ [1] Filling in 0 will disable this function.

5.3.6 VPN

The "VPN" page provides the function of creating a VPN connection (in PPTP protocol).

VPN Configure	
VPN Server	vpnServerIP
VPN Username	yourUserName
VPN Password	yourPassword
DDNS	Enable
DDNS Server	dynupdate.no-ip.com
DDNS Domain Name	yourDomain.no-ip.org
DDNS Username	yourUserName
DDNS Password	yourPassword
DDNS Period	60
FTP	Enable
FTP Server	ftpServerIP
FTP Port	ftpServerPort
FTP Username	yourUserName
FTP Password	yourPassword
FTP File Name	vpn_ip.txt
FTP Period	60
FTP Passive Mode	Enable
VPN Enable	Enable
Modify	
(1):The VPN of GRP uses PPTP protocol. (2):The DDNS and FTP in this page is used to let user get the VPN IP.	

・VPN:

- VPN Server: The IP of the VPN service provider
- VPN Username: The username of the VPN service.
- VPN Password: The username of the VPN service.

・DDNS:

- DDNS Server: The IP of the DDNS service provider.
- DDNS Domain Name: The domain name registered by the user.

- DDNS Username: The username of the DDNS service.
- DDNS Password: The password of the DDNS service.
- DDNS Period: The time period (in seconds) to update the address.

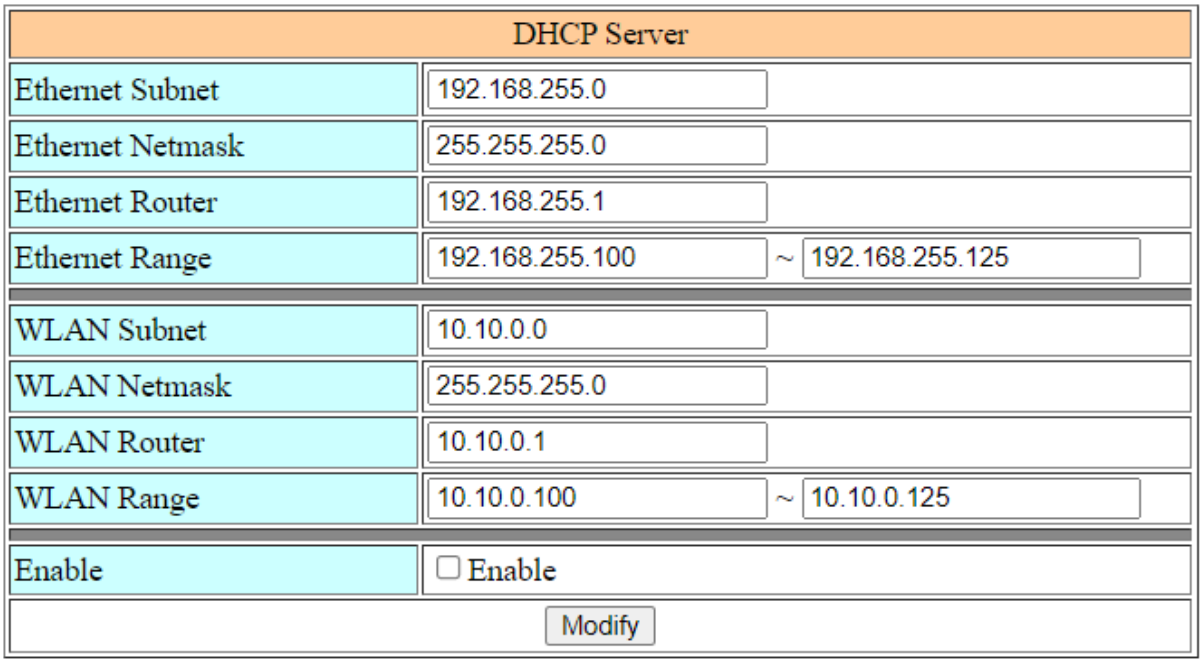
・FTP:

- FTP Server: The IP of the FTP service provider.
- FTP Port: The port of the FTP service provider.
- FTP Username: The username of the FTP service.
- FTP Password: The password of the FTP service.
- FTP File Name: The file used to save the user's address on the server.
- FTP Period: The time period (in seconds) to update the address.
- FTP Passive Mode: Whether to enable passive mode.

・VPN Enable: Whether to Enable this function. This setting will run after reboot.

5.3.7 DHCP Server

The "DHCP Server" page provides the function of dynamically assigning IP.



・Ethernet Subnet: The DHCP server subnet of the Ethernet interface.

・Ethernet Netmask: The DHCP server mask of the Ethernet interface.

・Ethernet Router: The router IP of the Ethernet interface.

・Ethernet Range: Dynamic IP range of the Ethernet interface.

・WLAN Subnet: The DHCP server subnet of the Wi-Fi interface.

・WLAN Netmask: The DHCP server mask of the Wi-Fi interface.

・WLAN Router: The router IP of the Wi-Fi interface.

・WLAN Range: Dynamic IP range of the Wi-Fi interface.

5.3.8 Routing & Port Mapping (Port Forwarding)

The “Routing Rule” page provides setting of routing rules.

ROUTING Rule			
Rule NO.	IP	Mask	Target
0	192.168.27.1	24	ppp0
1			
2			
3			
4			
5			
6			
7			
8			
9			

・Routing Rule

■ IP: IP address.

■ Mask: The mask will affect the number of IPs managed by this rule.

◆”24” means “255” IP.

◆“28” means “16“ IP.

◆“32” means “1” IP.

■ Target: The target interface of the rule.

◆“eth0” is “Ethernet”

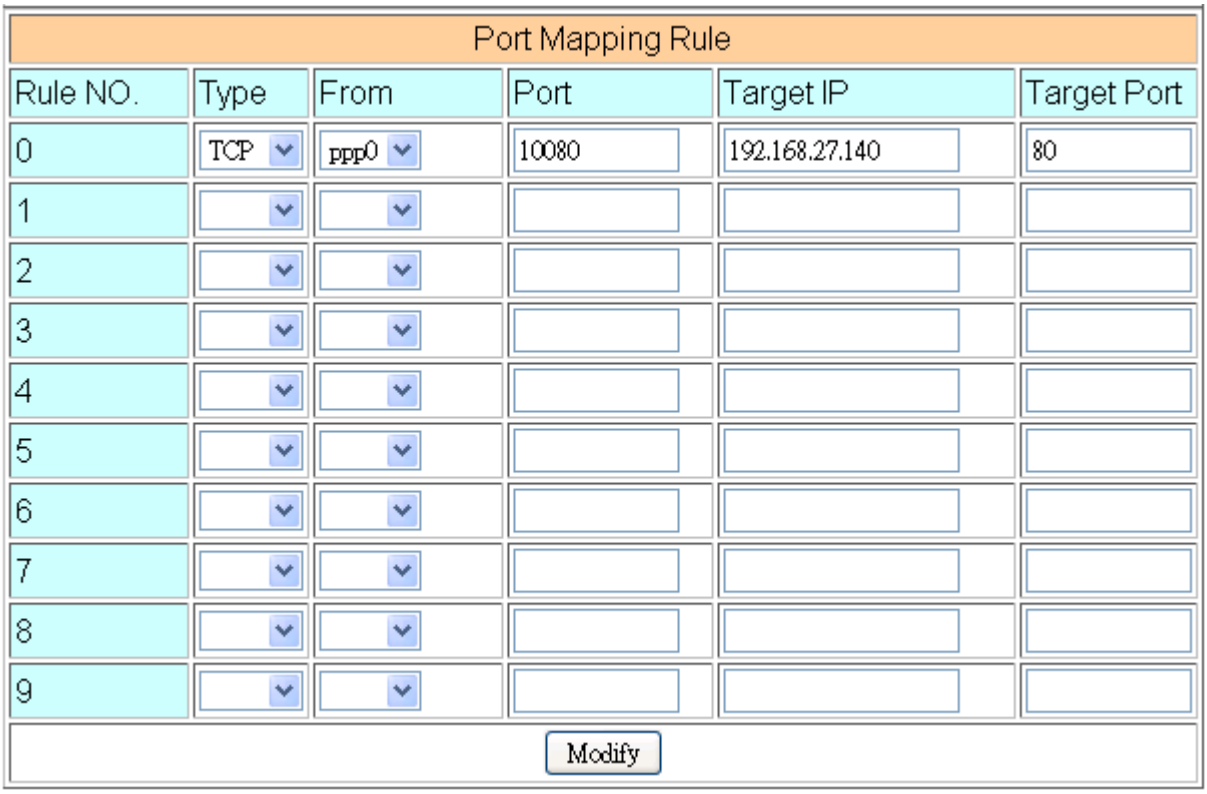
◆“ppp0” is “3G / 4G network”

◆“ppp1” is “VPN”

※ For example:

Rule 0 will push socket data packets with addresses from 192.168.27.1 to 192.168.27.255 to "ppp0" (3G / 4G network).

The “Routing Mapping Rule” page provides setting of port forwarding.



Port Mapping Rule

Rule NO.	Type	From	Port	Target IP	Target Port
0	TCP	ppp0	10080	192.168.27.140	80
1					
2					
3					
4					
5					
6					
7					
8					
9					

Modify

・Routing Rule

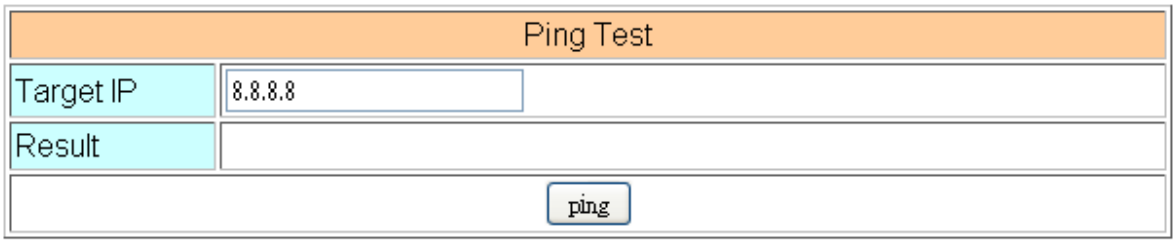
- ■ Type: Protocol type supports "TCP" and "UDP"
- ■ From: The interface from which the socket comes.
- ■ Port: The port from which the socket comes.
- ■ Target IP: The forward IP of the socket.
- ■ Target Port: The forward port of the socket.

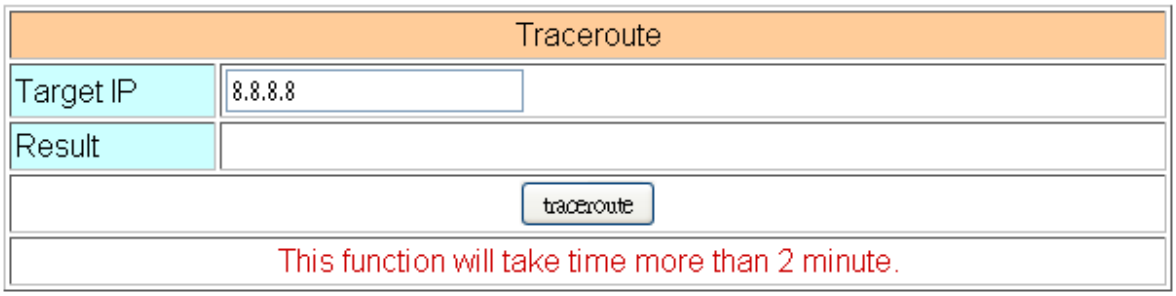
※ For Example:

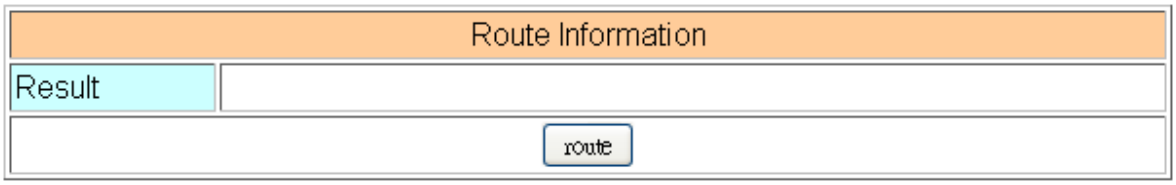
Rule 0 will bind sockets from "ppp0" and port "10080" to “192.168.27.140:80”.

5.3.9 Diagnostic

The “Diagnostic” page provides tools for checking network issues.



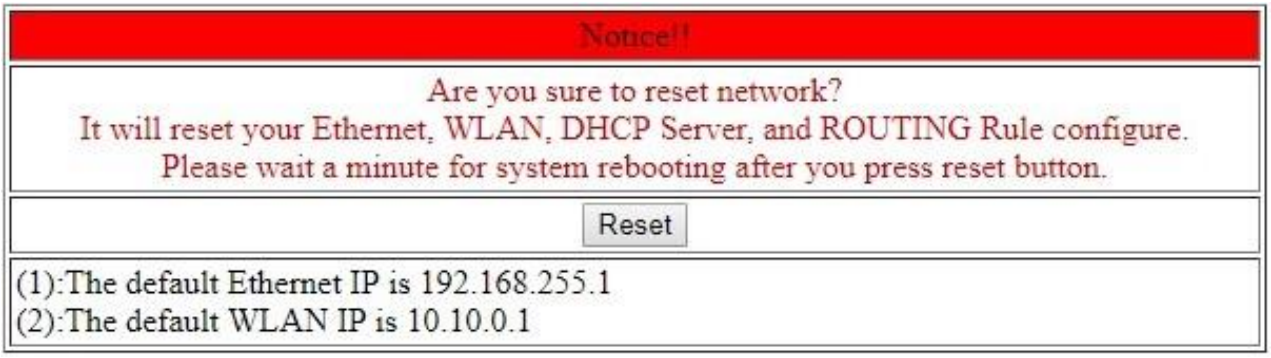




- Ping Test: This tool will ping the "Target IP" and display the result below.
- Traceroute: This tool will trace the routing path to the "Target IP" and display the results below.
- Route Information: This tool will show route settings below.

5.3.10 Reset Network

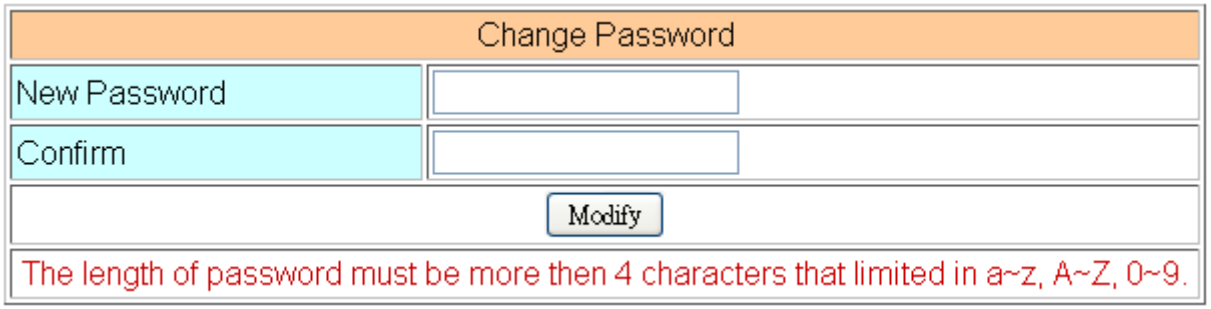
The "Reset Network" page provides the function of resetting all Ethernet, DHCP, routing rules and port forwarding settings.



5.4 System

5.4.1 Password

The "Change Password" page provides password settings.



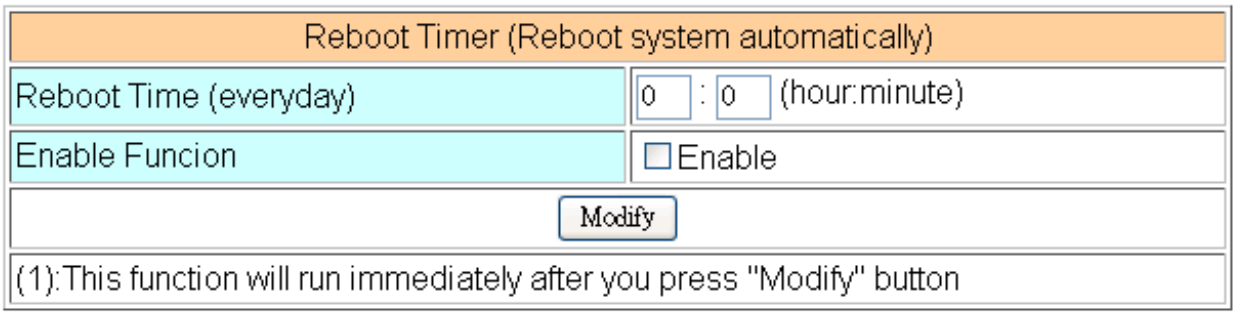
- Password: Enter the new password.
- Confirm: Confirm the new password.

5.4.2 Reboot

The "Reboot" page provides the function of restarting the device.

5.4.3 Reboot Timer

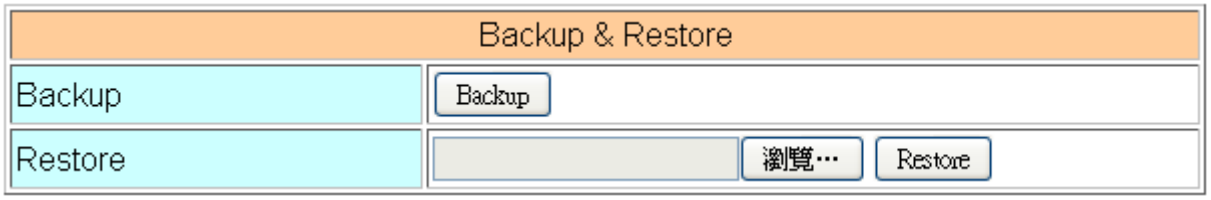
The "Restart Timer" page provides the function of automatically restarting the system.



- Reboot Time (everyday): Time to reboot the system.
- Enable: Whether to Enable this function. This setting will run immediately.

5.4.4 Backup & Restore

The "Backup and Restore" page provides backup and restore of settings.



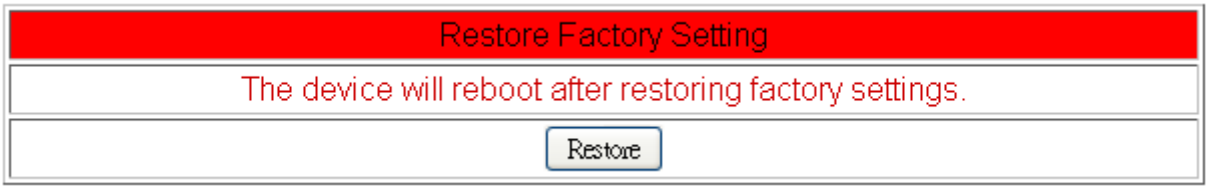
- Backup: Press the "Backup" button to back up the settings to the user's PC.
- Restore: Press the "Browse" button to select the file, and then press the "Restore" button to store your settings.

5.4.5 Update

The "Update" page provides a firmware update function. Users can download the update file (".tarc") from the IPCDAS website, and then put it into the SD card. Please back up the configuration before updating and restore it after the update.

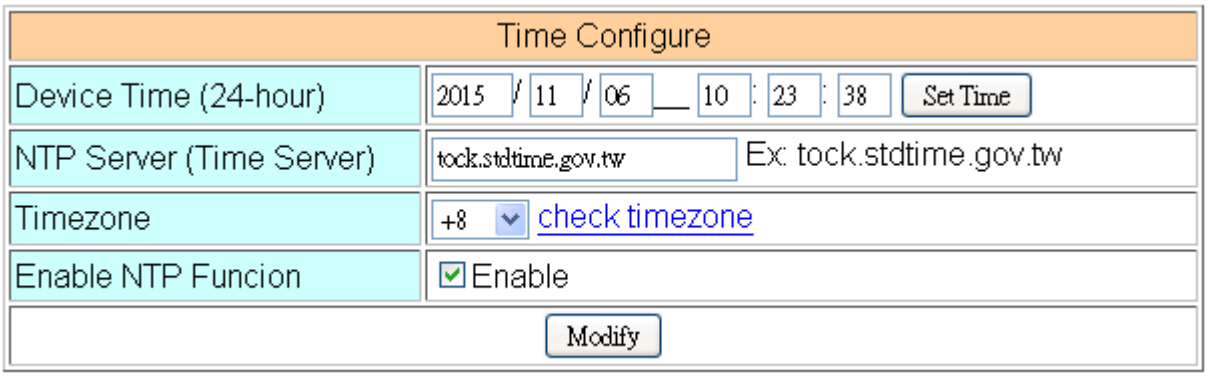
5.4.6 Restore Factory

The "Restore Factory" page provides the function to restore the settings to the factory settings.



5.4.7 Time

The "Time" page provides the time information of the device.



- Set Time: Set the device's time to be the same as your computer.
- NTP Server: The device will connect to the NTP server to synchronize the time.
- Timezone: If the user does not know your time zone, please click the "Check Time Zone" link to find it.
- Enable NTP Function: If this function is enabled, the device will automatically update the time.

5.5 VxServer

Through "VxServer" and "VxComm Utility", users can create a virtual COM port on a remote PC to communicate with the COM port of the device.

5.5.1 VxServer

The "VxServer" page provides the function of establishing a connection with the VxServer.

Virtual COM Function (VxServer)	
Server IP	192.168.12.2
Server Port	11000 default=11000
Heartbeat Time	10 10~65535 seconds
Device ID	1 1~255, unique ID for device
Alias	GRP-530 Max. Length = 8
Time Interval	50 1~5000 ms, default=50
Data Length	1000 10~1000 bytes, default=1000
Modbus TCP to RTU (Port1)	☐ Enable, COM2 --> TCP Port 10001
Modbus TCP to RTU (Port2)	☐ Enable, COM3 --> TCP Port 10002
Default Baudrate (Port1)	115200 bps
Default Baudrate (Port2)	115200 bps
Default Format (Port1)	8N1 (Data bit, Parity, Stop bit)
Default Format (Port2)	8N1 (Data bit, Parity, Stop bit)
Enable Funcion	☐ Enable
Firmware Version	v1.0.0
Modify	
(1)Heartbeat Time: if this value is small, it is sensitive to detect network disconnected (2)Virtual IP: please set it different from other virtual COM device	

- Server IP: VxServer IP or domain name.
- Server Port: VxServer port number.
- Heartbeat Time: The time interval for sending heartbeat packets to VxServer.[1]
- Device ID: The unique ID used to identify the device.
- Alias: The alias of the device. The maximum length is 8 characters.
- Time Interval: The time interval for sending serial port data to VxServer.[2]

・Data Length: The data length of the serial port data sent to the VxServer.[3]

・Modbus TCP to RTU: Modbus TCP to Modbus RTU gateway function.

- ■ “Port1” = “COM2 (RS-232)”
- ■ “Port2” = “COM3 (RS-485)”

・Default Baudrate: This value depends on your Modbus RTU device.

・Default Format: The configuration of "data bit", "parity" and "stop bit".

- ■ Data bit support
  - ◆“8” means “8-bits”
  - ◆“7” means “7-bits”
- ■ Parity bit support
  - ◆“N” means “None”
  - ◆“O” means “Odd”
  - ◆“E” means “Even”
- ■ Stop bit support
  - ◆“2” means “2-bits”
  - ◆“1” means “1-bit”

・Enable Function: Whether to Enable this function. This setting will run after reboot.

※ [1] VxServer will detect the disconnection in advance and terminate the connection.

※ [2] If the time interval between two serial data is greater than this value, the data will be divided into two network packets. If there is not enough time interval, but the data length exceeds the “Data Length”, the data is still divided into two network packets.

※ [3] If the serial port data length exceeds this value, the data will be divided into two data packets. If this function is not needed, users usually only need to set this value to 1000 bytes (default). This value is restricted by the network protocol.

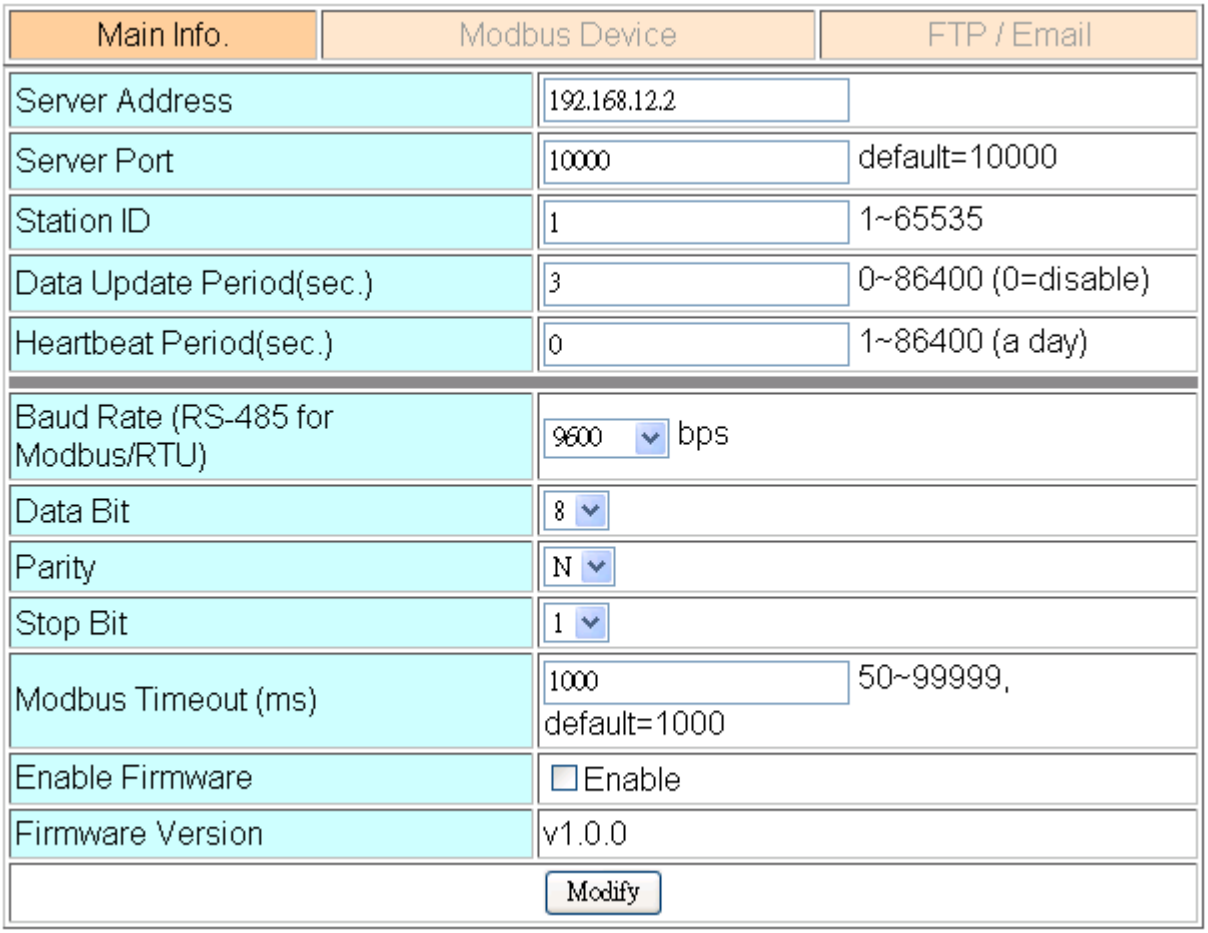
5.6 RTU Client

The RTU device uploads its I/O information, Modbus RTU/TCP device I/O information and GPS information to the RTU Center.

5.6.1 RTU Client

The "RTU Client" page provides the function of establishing a connection with RTU Center and the setting of Modbus communication

Main Info. tab



- Server Address: RTU Center IP or domain name.
- Server Port: RTU Center port number.
- Station ID: The unique ID used to identify the device.
- Data Update Period (sec.): The time interval for sending data packet.
- Heartbeat Period (sec.): The time interval for sending heartbeat packet.[1]
- Baud Rate (RS-485 for Modbus/RTU): The baud rate of RS-485 (COM3).
- Data bit: The data bit of RS-485 (COM3).
- Parity: The parity bit of RS-485 (COM3).

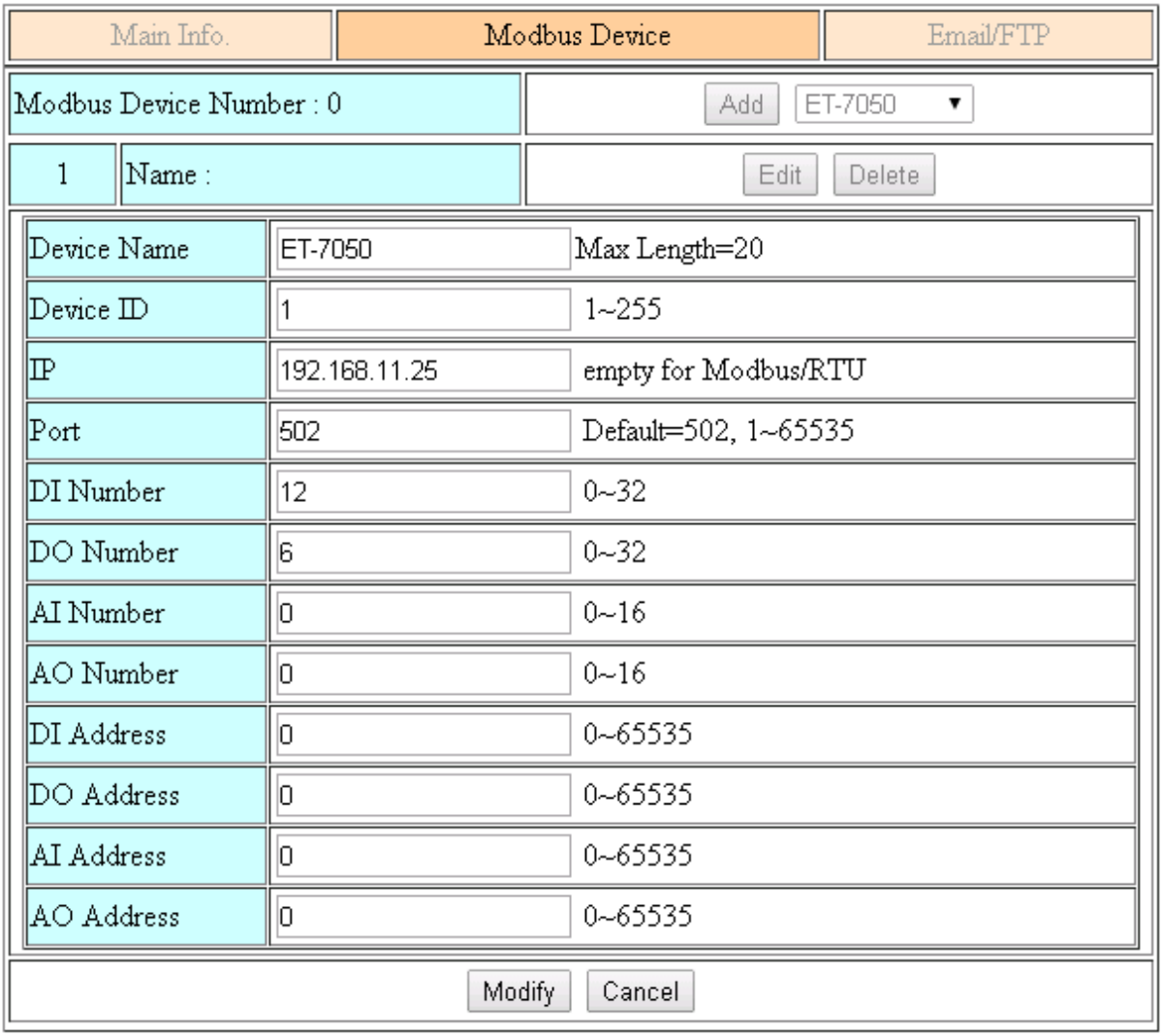
・Stop bit: The stop bit of RS-485 (COM3).

・Modbus Timeout (ms): Modbus communication timeout value.

・Enable Function: Enable this feature.

※ [1] The RTU center will detect the disconnection in advance and terminate the connection. The "Heartbeat Period" must be less than "Data Update Period".

Modbus Number tab



・Modbus Device Number: The modbus device number is displayed here. Users can select a model in the list, and then click "Add" to add a new modbus device.

・Device Name: The name of the Modbus device is displayed in the RTU Center.

・Device ID: Modbus ID.

・IP: The IP of Modbus TCP device.[1]

- Port: The Port of Modbus TCP device.
- DI Number: The number of DI channel.
- DO Number: The number of DO channel.
- AI Number: The number of AI channel.
- AO Number: The number of AO channel.
- DI Address: The start address for reading DI value.
- DO Address: The start address for reading DO value.
- AI Address: The start address for reading AI value.
- AO Address: The start address for reading AO value.

※ [1] For Modbus RTU device, leave it blank.

FTP / Email tab

Main Info.	Modbus Device	FTP / Email
Data Log Interval (sec.)	5	0~86400 (0=disable)
Max. Time per Log File (min.)	3	3~1440 minutes
FTP Server Address	61.219.167.34	empty --> disable FTP
FTP Port	221	default=21
FTP Username	test	
FTP Password	test	
Enable FTP Funcion	☑ Enable	
Email From	abc@gmail.com Ex: abc@gmail.com	empty --> disable Email
Email To	xyz@gmail.com	Ex: xyz@gmail.com
Example for 2 or more contact	xx@gmail.com,yy@gmail.com	
Email Server	smtp.gmail.com	Ex: smtp.gmail.com
Email Server Port	25	Ex: 25
Email Username	abc	Ex: abc
Email Password	123abc	Ex: 123abc
Enable Email Funcion	☐ Enable	
Modify		

- Data Log Interval (sec.): The time interval for recording I / O data.[1]
- Max. Time per Log File (min.): The time interval for spliting new log files.[2]
- FTP Server Address: FTP Server IP or Domain name.
- FTP Port: FTP server port number.
- FTP Username: The username of FTP account.
- FTP password: The password of FTP account.
- Enable FTP Function: Enable FTP report function.
- Email From: The email will be sent from this address.
- Email To: The email will be sent to this address.[3]
- Email Server: The server address of the email server.
- Email Server Port: The server port of the email server.[4]

- Email Username: The username of email account.
- Email Password: The password of email account.
- Enable Email Function: Enable email report function.

※ [1] Setting to "0" will disable all functions in this tab.

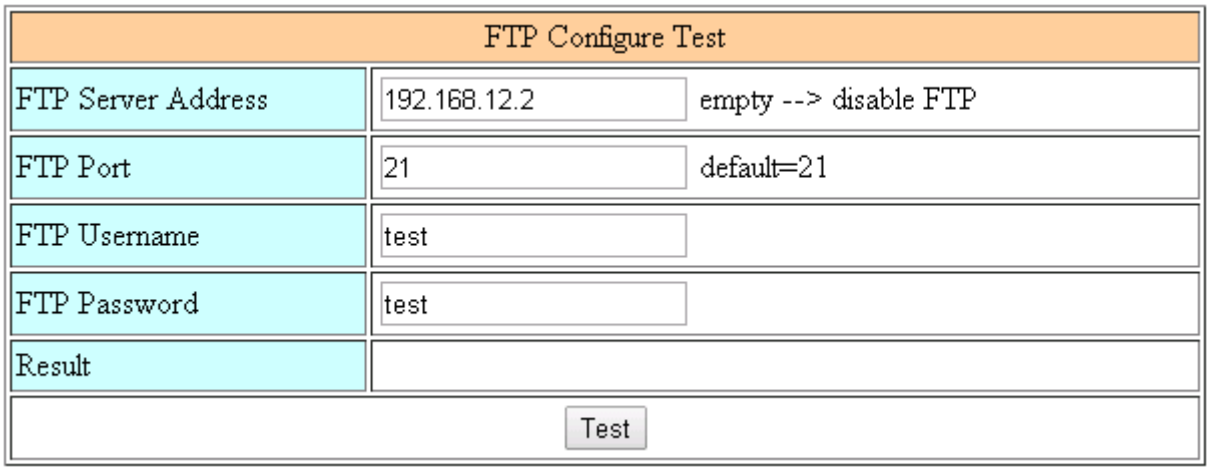
※ [2] The interval at which log files are sent via email or FTP. When the log file exceeds 3 MB or the new file split interval exceeds this value, the log file will be treated as an old log file and moved to the "LOGFILE" folder.
If users enable the “Enable FTP Function” / “Enable Email Function”, these old log files will be copied to "FTP_UPLOAD" / "MAIL_UPLOAD" and sent.

※ [3] Use "," to separate each email address

※ [4] Usually 25, 465, or 587.

5.6.2 FTP Test

The "FTP Configuration Test" page provides a tool to send test files to the FTP server.



- FTP Server Address: FTP Server IP or Domain Name.
- FTP Port: FTP server port number.
- FTP Username: The username of FTP account.
- FTP password: The password of FTP account.

5.6.3 Email Test

The "FTP Configuration Test" page provides tools for sending test emails.

Email Configure Test		
Email From	abc@gmail.com	Ex: abc@gmail.com
Email To	xyz@gmail.com	Ex: xyz@gmail.com
Email Server	smtp.gmail.com	Ex: smtp.gmail.com
Email Server Port	25	Ex: 25 or 587
Email Username	abc	Ex: abc
Email Password	123abc	Ex: 123abc
Result		
Test		

- Email From: The email will be sent from this address.
- Email To: The email will be sent to this address.[1]
- Email Server: The email server IP.
- Email Server Port: The email server port number.[2]
- Email Username: The username of email account.
- Email Password: The password of email account.
- “Test” button: Press this button to send test emails.

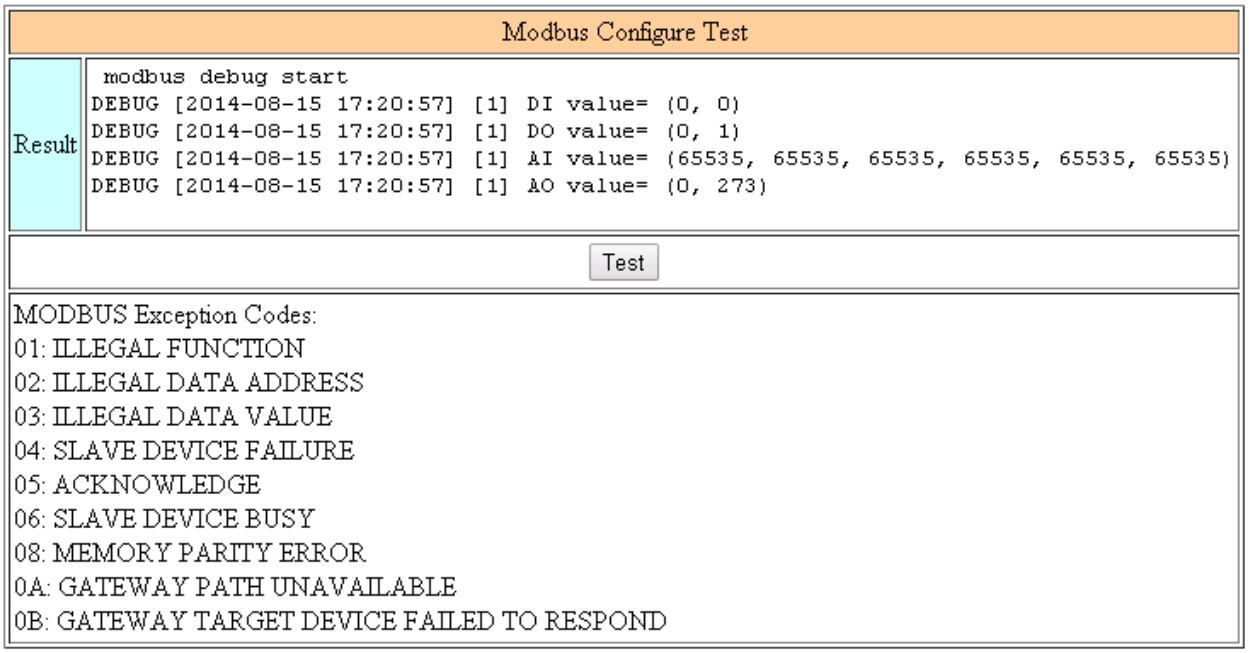
※ [1] Using “,” to separate each mail address.

※ [2] Usually 25, 465, or 587.

5.6.4 Modbus Test

The “Modbus Configure Test” page provides tools for polling Modbus devices.

The following is an example of ET-7026.



5.7 RTU CAN Client

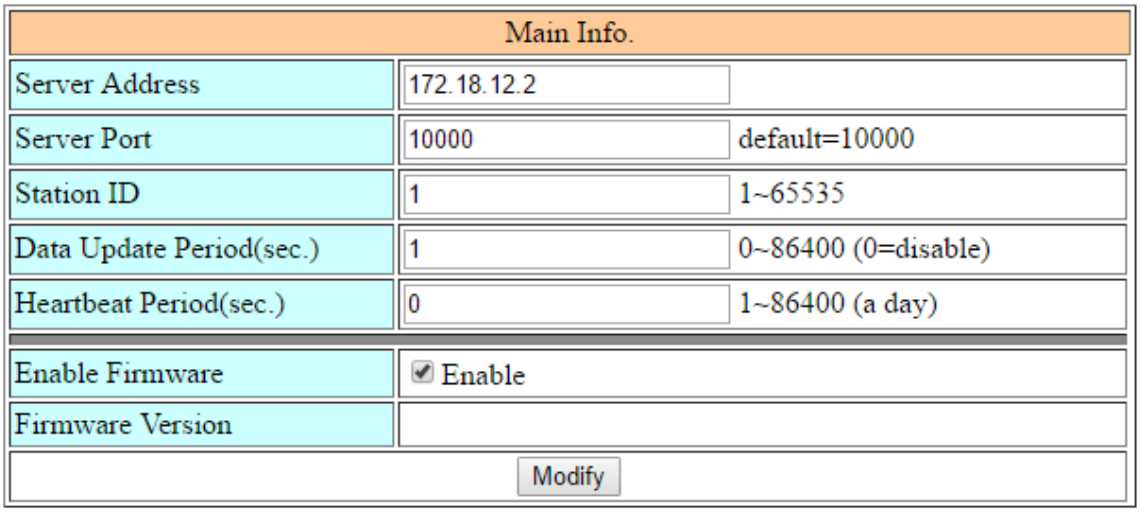
The RTU device uploads its I/O information, Modbus RTU/TCP device I/O information and GPS information to the RTU Center.

In this function, the GRP device will treat the CAN data as the Modbus device AI value and upload it to the RTU center.

5.7.1 RTU CAN Client

The "RTU CAN Client" page provides the function of establishing a connection with RTU Center and the setting of CAN communication

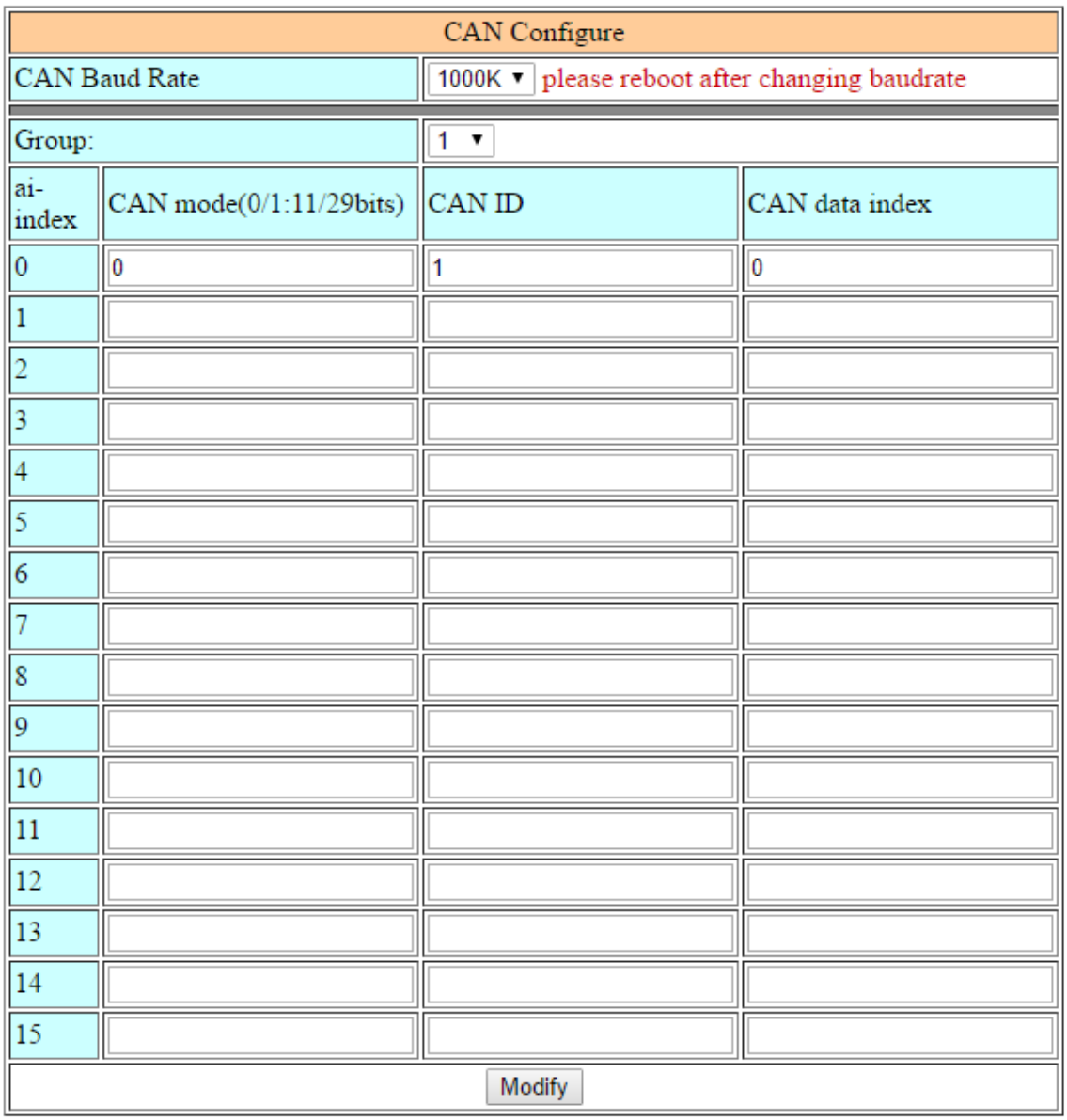
Main Info. tab



- Server Address: RTU Center IP or domain name.
- Server Port: RTU Center port number.
- Station ID: The unique ID used to identify the device.
- Data Update Period (sec.): The time interval for sending data packet.
- Heartbeat Period (sec.): The time interval for sending heartbeat packet.[1]
- Enable Function: Enable the RTU Client function.

※ [1] The RTU center will detect the disconnection in advance and terminate the connection. The "Heartbeat Period" must be less than "Data Update Period".

CAN Configure tab



- CAN Baud Rate: Configure the baud rate here.
- Group: There are 10 groups in RTU function, from 1 to 10.
- ai-index: There are 16 AI points in a group, from 0 to 15.
- CAN mode: Arbitration field type
  - "0" means "Standard identifier (11-bits)"
  - "1" means "Extended identifier (29-bits)"
- CAN ID: The identifier of the CAN data.
- CAN data index: The data index of the CAN data, from 0 to 7.

FTP/ Email tab

Main Info.	Modbus Device	FTP / Email
Data Log Interval (sec.)	5	0~86400 (0=disable)
Max. Time per Log File (min.)	3	3~1440 minutes
FTP Server Address	61.219.167.34	empty --> disable FTP
FTP Port	221	default=21
FTP Username	test	
FTP Password	test	
Enable FTP Funcion	☑ Enable	
Email From	abc@gmail.com Ex: abc@gmail.com	empty --> disable Email
Email To	xyz@gmail.com	Ex: xyz@gmail.com
Example for 2 or more contact	xx@gmail.com,yy@gmail.com	
Email Server	smtp.gmail.com	Ex: smtp.gmail.com
Email Server Port	25	Ex: 25
Email Username	abc	Ex: abc
Email Password	123abc	Ex: 123abc
Enable Email Funcion	☐ Enable	
Modify		

- Data Log Interval (sec.): The time interval for recording I / O data.[1]
- Max. Time per Log File (min.): The time interval for spliting new log files.[2]
- FTP Server Address: FTP Server IP or Domain name.
- FTP Port: FTP server port number.
- FTP Username: The username of FTP account.
- FTP password: The password of FTP account.
- Enable FTP Function: Enable FTP report function.
- Email From: The email will be sent from this address.
- Email To: The email will be sent to this address.[3]
- Email Server: The server address of the email server.
- Email Server Port: The server port of the email server.[4]

- Email Username: The username of email account.
- Email Password: The password of email account.
- Enable Email Function: Enable email report function.

※ [1] Setting to "0" will disable all functions in this tab.

※ [2] The interval at which log files are sent via email or FTP. When the log file exceeds 3 MB or the new file split interval exceeds this value, the log file will be treated as an old log file and moved to the "LOGFILE" folder.
If users enable the “Enable FTP Function” / “Enable Email Function”, these old log files will be copied to "FTP_UPLOAD" / "MAIL_UPLOAD" and sent.

※ [3] Use "," to separate each email address

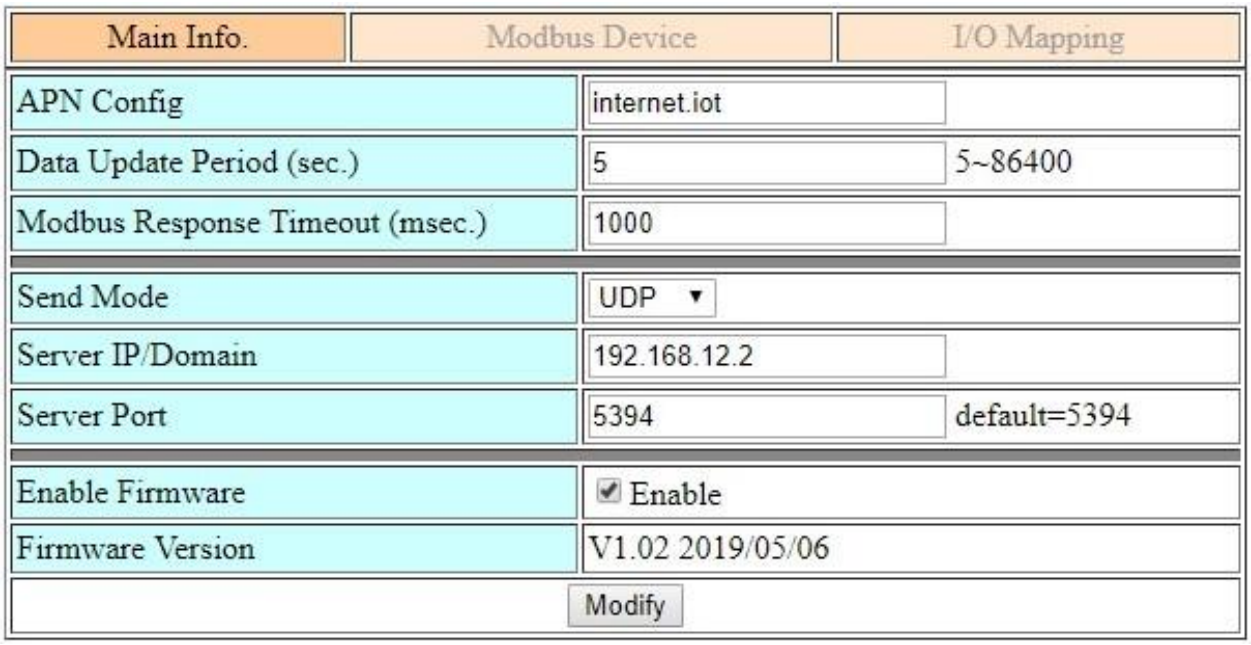
※ [4] Usually 25, 465, or 587.

5.8 NB-IoT Client

5.8.1 NB-IoT Client

The "NB-IoT Client" page provides the function of establishing a connection with the user's MQTT Broker or NB-DA Server provided by ICPDAS.

Main Info. Tab (in UDP mode)



- APN Config: Access point name. Please consult the SIM card provider.
- Data Update Period (sec.): The time interval for sending data to the NB-DA Server or the MQTT Broker.
- Modbus Response Timeout (msec.): Modbus communication timeout value.
- Send Mode: Support UDP or MQTT.[1]
- Server IP/Domain: MQTT Broker IP or domain name.
- Server Port: MQTT Broker port number.[2]
- Enable Function: Whether to Enable this function. This setting will run after reboot.

※ [1] UDP mode With SMS4 security.

※ [2] Default 1883.

※ Note. If there is an SD card, this function will also save the log data to it.

Main Info tab (in MQTT mode)

Main Info.	Modbus Device	I/O Mapping
APN Config	internet.iot	
Data Update Period (sec.)	5	5~86400
Modbus Response Timeout (msec.)	1000	
Send Mode	MQTT ▼	
Server IP/Domain	iot.eclipse.org	
Server Port	1883	default=1883
Buffer Size	512	default=512
Keep Alive	1000	default=1000, 0~65535
MQTT Version	3	default=3, can set 3 or 4
User Name		if have user name
Password		if have password
1st Session		
Subscribe DO	.cloud.ICPDAS.USER/0/0/D(	
Subscribe AO	.cloud.ICPDAS.USER/0/0/A(	
Publish DEVINFO	.cloud.ICPDAS.UE/0/0/DEVI	
Publish DI	.cloud.ICPDAS.UE/0/0/DI	
Publish AI	.cloud.ICPDAS.UE/0/0/AI	
Publish GPS	.cloud.ICPDAS.UE/0/0/GPS	
Publish ACK	.cloud.ICPDAS.UE/0/0/ACK	ACK for DO/AO
Use CHT platform	☐ Enable	
CHT Device ID		if use CHT platform
CHT Sensor ID		if use CHT platform
2nd Session		
Subscribe DO	.cloud.ICPDAS.USER/0/1/D(	
Subscribe AO	.cloud.ICPDAS.USER/0/1/A(	
Publish DEVINFO	.cloud.ICPDAS.UE/0/1/DEVI	
Publish DI	.cloud.ICPDAS.UE/0/1/DI	

Publish AI	.cloud.ICPDAS.UE/0/1/AI
Publish GPS	.cloud.ICPDAS.UE/0/1/GPS
Publish ACK	.cloud.ICPDAS.UE/0/1/ACK ACK for DO/AO
Use CHT platform	Enable
CHT Device ID	if use CHT platform
CHT Sensor ID	if use CHT platform
Enable Firmware	Enable
Firmware Version	V1.02 2019/05/06
Modify	

- APN Config: Access point name. Please consult the SIM card provider.
- Data Update Period (sec.): The time interval for sending data to the NB-DA Server or the MQTT Broker.
- Modbus Response Timeout (msec.): Modbus communication timeout value.
- Send Mode: Support UDP or MQTT.[1]
- Server IP/Domain: MQTT Broker IP or domain name.
- Server Port: MQTT Broker port number.[2]
- Buffer Size: The size of the buffer used to store MQTT messages.[3]
- Keep Alive: The period of the MQTT PINGREQ message.
- MQTT Version: Set the MQTT version to be used.
- User Name: The username for MQTT connection (if any).
- Password: The password for MQTT connection (if any).
- SubscribeDO: The MQTT topic used to receive DO messages.
- SubscribeAO: The MQTT topic used to receive AO messages.
- Publish DEVINFO: The MQTT topic used to send DEVINFO messages.
- Publish DI: The MQTT topic used to send DI messages.
- Publish AI: The MQTT topic used to send AI messages.
- Publish GPS: The MQTT topic used to send GPRMC messages.
- Publish ACK: The MQTT topic used to respond when a DO or AO message is received.
- Use CHT platform: Whether to use the CHT IoT platform.
- CHT Device ID: Set the Device ID obtained from CHT IoT Platform.
- CHT Sensor ID: Set the Sensor ID obtained from CHT IoT Platform.

・Enable Function:　Whether to Enable this function. This setting will run after reboot.

※ [1] UDP mode With SMS4 security.

※ [2] Default 1883.

※ [3] The message including topics and data.

MQTT Message Format:

・Message format for normal MQTT Broker:

Topic	For subscription or publication, DEVINFO / GPS / DO / DI / AO / AI / ACK can use different topics. **※ Note. Must include "Session ID/Type" in the end of topic.** **For example: ".cloud.ICPDAS.USER/0/0/DO".**
Data	All message types have different data formats.

・Message format for CHT Platform:

Topic	For subscription or publication, DEVINFO / GPS / DO / DI / AO / AI / ACK can use different topics.
Data	All message types have different data formats. **※ Note. DO / DI / AO / AI data will be "Session ID/Type/Data".** **・"Session ID" is from 0 to 1999.** **・"Type" is "DO", "DI", "AO" or "AI".** **※ Note. JSON format defines by the CHT Platform include time, Device ID, Sensor ID and data.**

・Data Type:

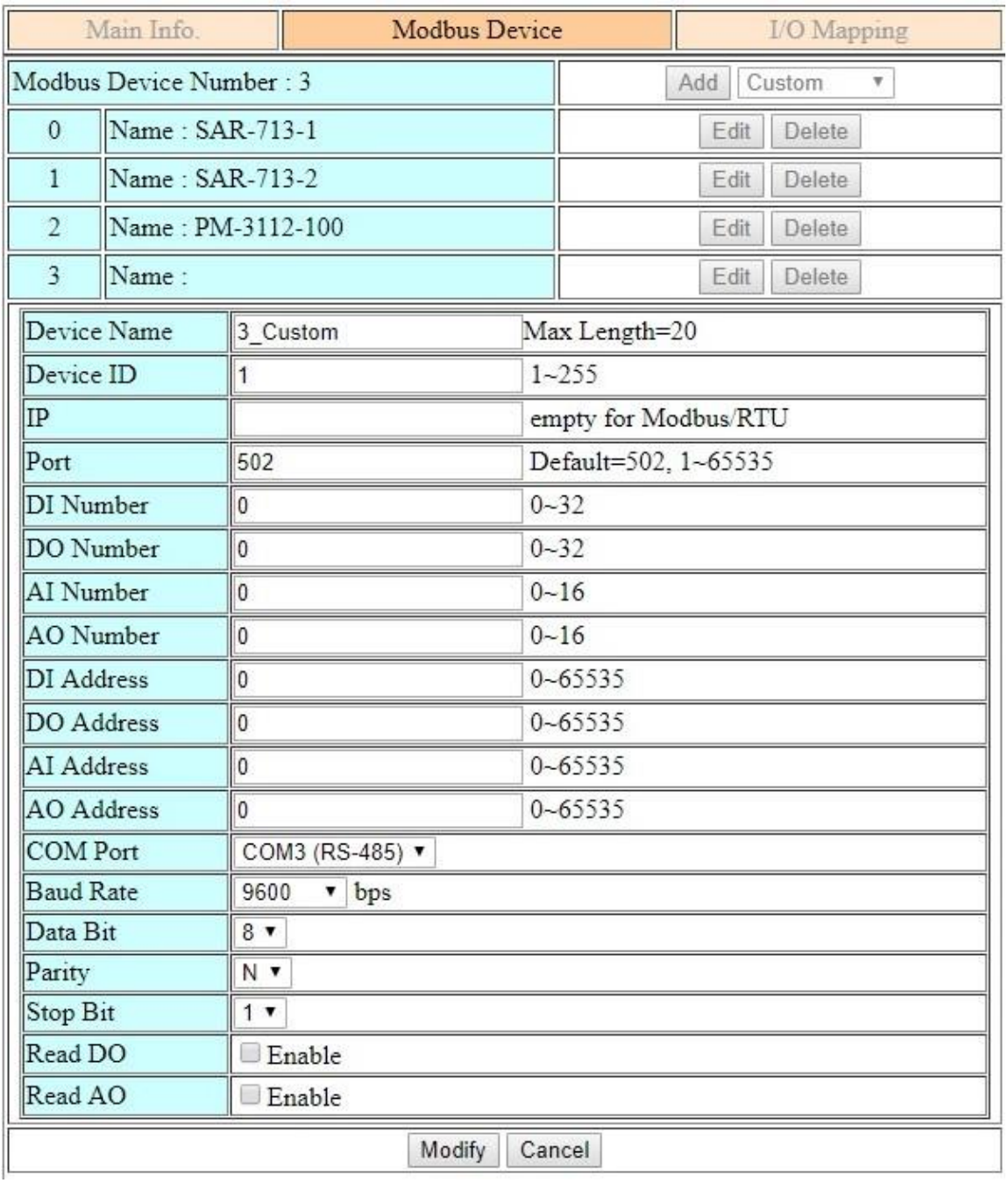
Type	Application	Data	Data Example
DEVINFO	Publish	RSRP, ECL, SNR, Bat level	-80,0,16,0
GPS	Publish	・$GPRMC data. ・NMEA 0183 protocol.	GPRMC,121252.000,A,3958.3032 ,N,11629.6046,E,15.15,359.95,070306,, ,A*54

DO	Subscribe	· 1 byte per DO. · The maximum length is 32. · The data format is HEX.	MQTT Broker: 00010001000100010001000100 01000100010001 CHT Platform: 0/DO/00010001000100010001000100 01000100010001
DI	Publish	· 1 byte per DI. · The maximum length is 32. · The data format is HEX.	MQTT Broker: 00010001000100010001000100010001 00010001000100010001000100010001 CHT Platform: 0/DI/00010001000100010001000100010001 00010001000100010001000100010001
AO	Subscribe	· 2 bytes per AO. · The maximum length is 32. · The data format is HEX.	MQTT Broker: 00000001000200030004000 5 00060007000800090020002100 22 00230024002500260027002800 29 With CHT Platform: 0/AO/00000001000200030004000 5 00060007000800090020002100 22 00230024002500260027002800 29
AI	Publish	· 2 bytes per AI. · The maximum length is 32 · The data format is HEX.	With normal MQTT Broker: 00000001000200030004000500 06 00070008000900100011001200130014 00150016001700180019 With CHT Platform: 0/AI/00000001000200030004000500 06 00070008000900100011001200130014 00150016001700180019
ACK	Publish	If DO / AO is received, DO_ACK / AO_ACK will be publish.	DO_ACK

・DEVINFO data:

Data Type	Data Range
RSRP	-140 ~ -44dBm
ECL	0 ~ 2
SNR	-20 ~ 30 dB
Battery level	0 ~ 100 %

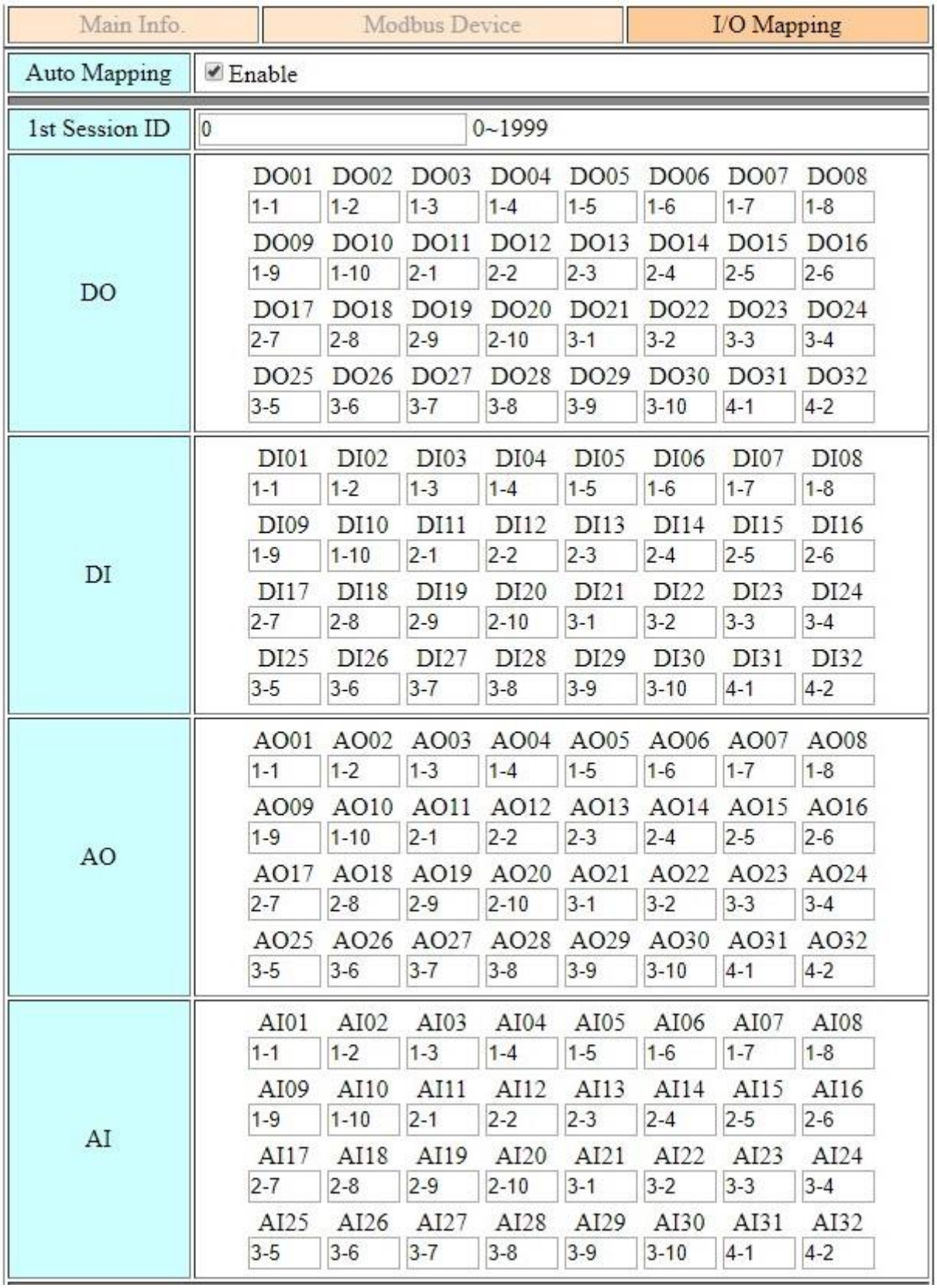
Modbus Device tab



- Modbus Device Number: The modbus device number is displayed here. Users can select a model in the list, and then click "Add" to add a new modbus device.
- Device Name: The name of the Modbus device is displayed in the RTU Center.
- Device ID: Modbus ID.
- IP: The IP of Modbus TCP device. [1]
- Port: The Port of Modbus TCP device.
- DI Number: The number of DI channel.
- DO Number: The number of DO channel.
- AI Number: The number of AI channel.
- AO Number: The number of AO channel.
- DI Address: The start address for reading DI value.
- DO Address: The start address for reading DO value.
- AI Address: The start address for reading AI value.
- AO Address: The start address for reading AO value.
- COM Port: Select COM port.
- Baud Rate: The baud rate of COM port.
  - ■ Data Bit: The data bit of COM port.
  - ■ Parity: The parity bit of COM port.
  - ■ Stop Bit: The stop bit of COM port.
- Read DO: Whether to append DO value after DIvalue.
- Read AO: Whether to append AO value after AI value.

※ [1] For Modbus TCP devices, leave it blank.

I/O Mapping tab



2nd Session ID	1 0~1999
DO	DO01 DO02 DO03 DO04 DO05 DO06 DO07 DO08 4-3 4-4 4-5 4-6 4-7 4-8 4-9 4-10 DO09 DO10 DO11 DO12 DO13 DO14 DO15 DO16 0-0 0-0 0-0 0-0 0-0 0-0 0-0 0-0 DO17 DO18 DO19 DO20 DO21 DO22 DO23 DO24 0-0 0-0 0-0 0-0 0-0 0-0 0-0 0-0 DO25 DO26 DO27 DO28 DO29 DO30 DO31 DO32 0-0 0-0 0-0 0-0 0-0 0-0 0-0 0-0
DI	DI01 DI02 DI03 DI04 DI05 DI06 DI07 DI08 4-3 4-4 4-5 4-6 4-7 4-8 4-9 4-10 DI09 DI10 DI11 DI12 DI13 DI14 DI15 DI16 0-0 0-0 0-0 0-0 0-0 0-0 0-0 0-0 DI17 DI18 DI19 DI20 DI21 DI22 DI23 DI24 0-0 0-0 0-0 0-0 0-0 0-0 0-0 0-0 DI25 DI26 DI27 DI28 DI29 DI30 DI31 DI32 0-0 0-0 0-0 0-0 0-0 0-0 0-0 0-0
AO	AO01 AO02 AO03 AO04 AO05 AO06 AO07 AO08 4-3 4-4 4-5 4-6 4-7 4-8 4-9 4-10 AO09 AO10 AO11 AO12 AO13 AO14 AO15 AO16 0-0 0-0 0-0 0-0 0-0 0-0 0-0 0-0 AO17 AO18 AO19 AO20 AO21 AO22 AO23 AO24 0-0 0-0 0-0 0-0 0-0 0-0 0-0 0-0 AO25 AO26 AO27 AO28 AO29 AO30 AO31 AO32 0-0 0-0 0-0 0-0 0-0 0-0 0-0 0-0
AI	AI01 AI02 AI03 AI04 AI05 AI06 AI07 AI08 4-3 4-4 4-5 4-6 4-7 4-8 4-9 4-10 AI09 AI10 AI11 AI12 AI13 AI14 AI15 AI16 0-0 0-0 0-0 0-0 0-0 0-0 0-0 0-0 AI17 AI18 AI19 AI20 AI21 AI22 AI23 AI24 0-0 0-0 0-0 0-0 0-0 0-0 0-0 0-0 AI25 AI26 AI27 AI28 AI29 AI30 AI31 AI32 0-0 0-0 0-0 0-0 0-0 0-0 0-0 0-0
Modify	

1. Please enter all device's I/O to the mapping table.
2. The valuable I/O positions must be continuous.
3. format example:
   The 1st Device's 2nd DO is "1-2".
   You can enter "1-2" into the DO position.

・Auto Mapping: Whether to automatically check all Modbus devices and map all I/O.

・Session ID: The unique ID used to identify the device.

・DO / DI / AO / AI: The mapping format is **“[DEV_NO]-[IO_NO]”**.[1]

※ [1] “DEV_NO” is the number of modbus device, starting from 1.
“IO_NO” is the number of modbus device I/O, starting from 1.

※ Note. If "Read DO" / "Read AO" is enabled, in addition to filling in the DO / AO mapping table, the DO / AO mapping data also needs to fill in the DI / AI mapping table.

Example:

If the 1st Modbus Device (DEV_NO is 1) has 2 AI and 5 AO, in addition to fill in the “1-1” and “1-2” to the AO mapping table, also need to fill in the “1-3”, “1-4”, “1-5”, “1-6”, and “1-7” to the AI mapping table. In this case, GRP-500M will send DEVINFO, AI (include 2 AI and 5 AO), and GPS messages.

6. Example

6.1 3G / 4G Router Application

This example shows the steps to share 3G/4G network to 3 XPAC8000.

(1) The Ethernet configuration of XPAC8000 is as follows:

- IP is from “192.168.0.10” to “192.168.0.12”.
- Mask is “255.255.0.0”.
- Gateway is “192.168.27.31”.

(2) Fill in the Ethernet IP and mask. After finishing all the settings, click "Modify".

Ethernet	
IP Address	192.168.27.31
Mask	255.255.0.0
Gateway	
Modify	

(3) If necessary, fill in "PIN Code", "APN", "User Name" and "Password". After finishing all the settings, click "Modify".

PIN / APN Configure		
PIN Code	0000	
Phone Number	*99***1#	(1)
APN	internet	(2)
User Name		(2)
Password		(2)
Modify		
(1):usually use *99# or *99***1# (2):please ask your SIM Card provider		

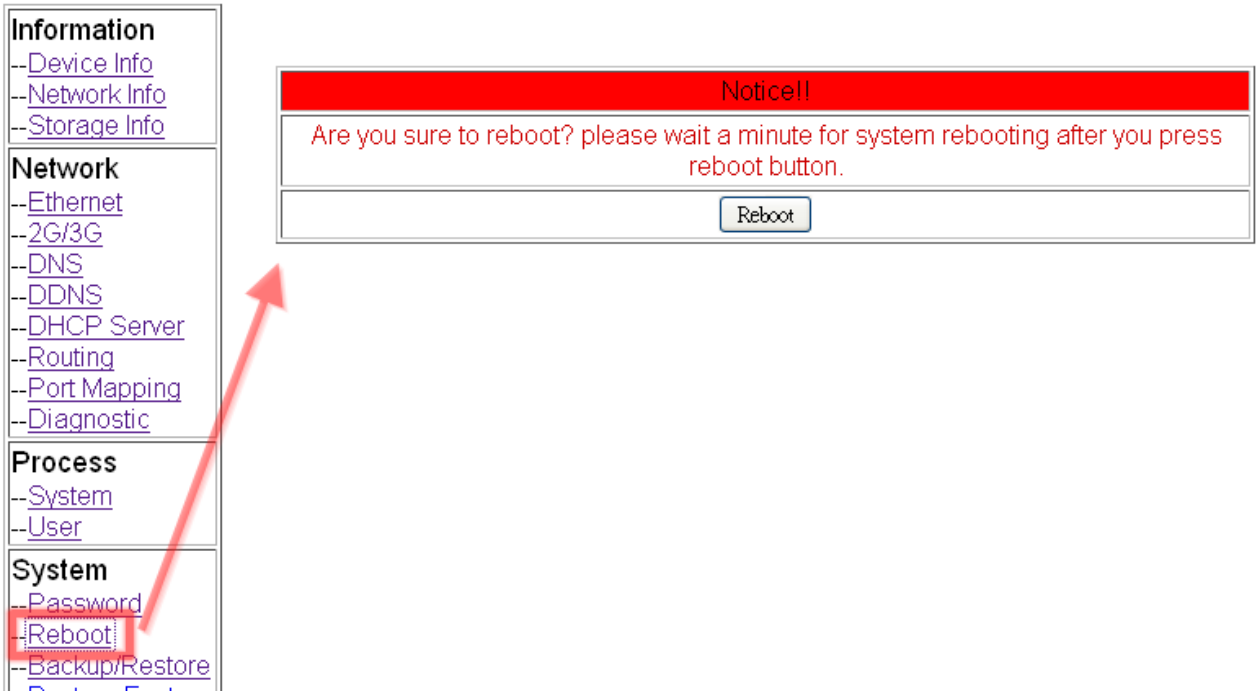
(4) Enable the "Network Reconnect" function to ensure that the mobile network is always online (usually, the ISP will disconnect once every 1 to 3 days).
Server IP can fill in user server IP or Google DNS server IP (8.8.8.8).
If the user uses MDVPN, please make sure that the server IP does not deny the ICMP service (Ping). After finishing all the settings, click "Modify".

Network Reconnection	
Server IP	8.8.8.8
Max. Retry	5
Retry Interval Time	30
Enable Funcion	☑ Enable
Modify	
(1):This function will run immediately after you press "Modify" button (2):GSM module will be reset after Max. retry (3):System will reboot after GSM module reset 100 times	

(5) Fill in the routing rules to share the 3G/4G network. Rule 0 will share the 3G/4G network to IP addresses from 192.168.0.1 to 192.168.0.255. After finishing all the settings, click "Modify".

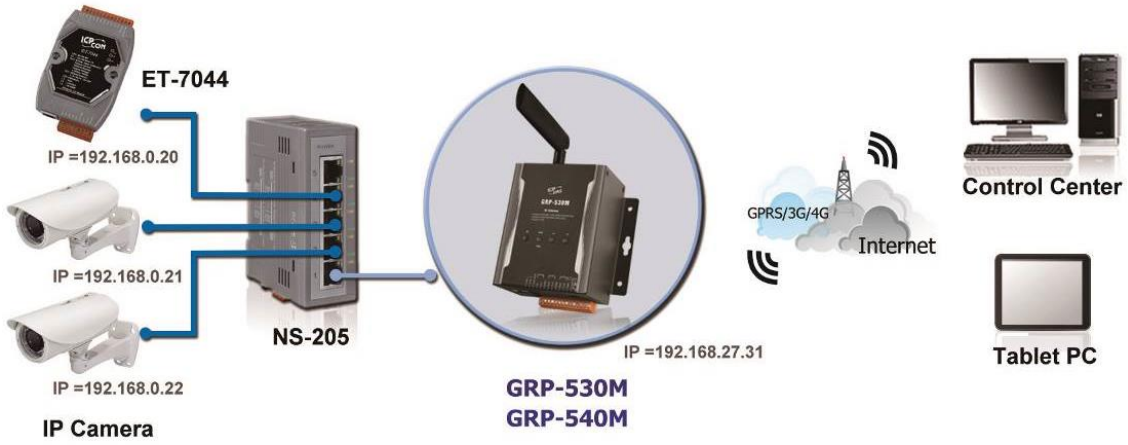
ROUTING Rule			
Rule NO.	IP	Mask	Target
0	192.168.0.1	24	ppp0
1			
2			
3			
4			
5			
6			
7			
8			
9			

(6) Please reboot the device to enable the setting.



6.2 Web Server and IP Camera Application

This example shows the steps to share 3G/4G network to ET-7044 and IP camera.



(1) The Ethernet configuration of ET-7044 is as follows:

- IP is from “192.168.0.20” to “192.168.0.22”.
- Mask is “255.255.0.0”.
- Gateway is “192.168.27.31”.

(2) Fill in the Ethernet IP and mask. After finishing all the settings, click "Modify".

Ethernet	
IP Address	192.168.27.31
Mask	255.255.0.0
Gateway	
Modify	

(3) If necessary, fill in "PIN Code", "APN", "User Name" and "Password". After finishing all the settings, click "Modify".

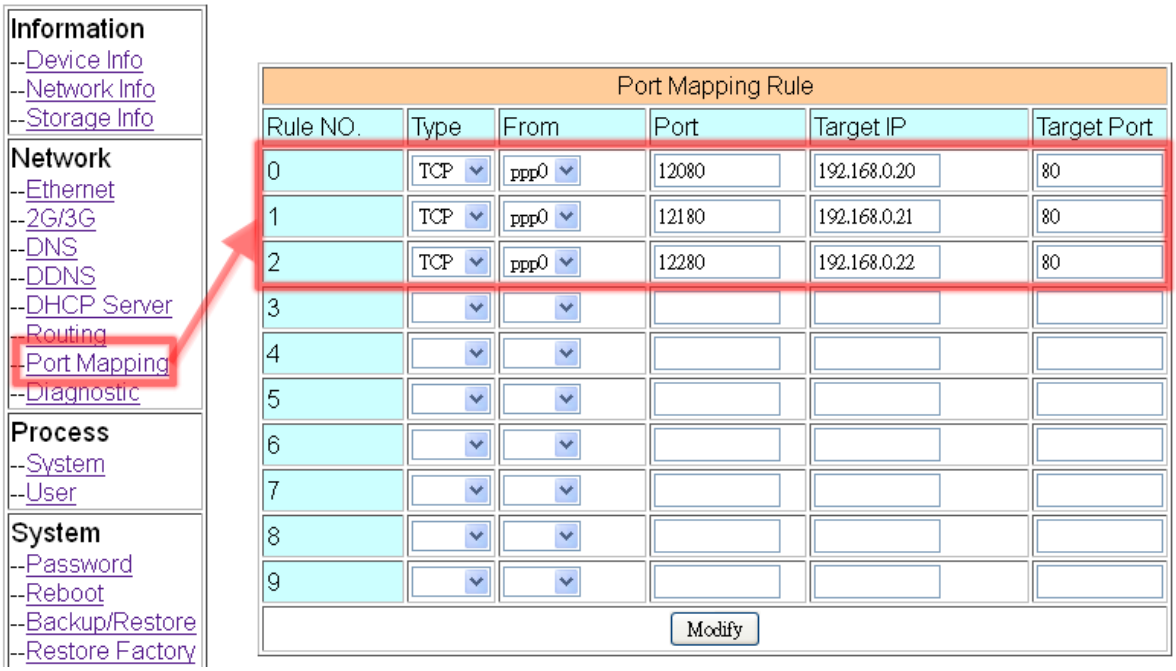
PIN / APN Configure		
PIN Code	0000	
Phone Number	*99***1#	(1)
APN	internet	(2)
User Name		(2)
Password		(2)
Modify		
(1):usually use *99# or *99***1# (2):please ask your SIM Card provider		

(4) Enable the "Network Reconnect" function to ensure that the mobile network is always online (usually, the ISP will disconnect once every 1 to 3 days).
Server IP can fill in user server IP or Google DNS server IP (8.8.8.8).
If the user uses MDVPN, please make sure that the server IP does not deny the ICMP service (Ping). After finishing all the settings, click "Modify".

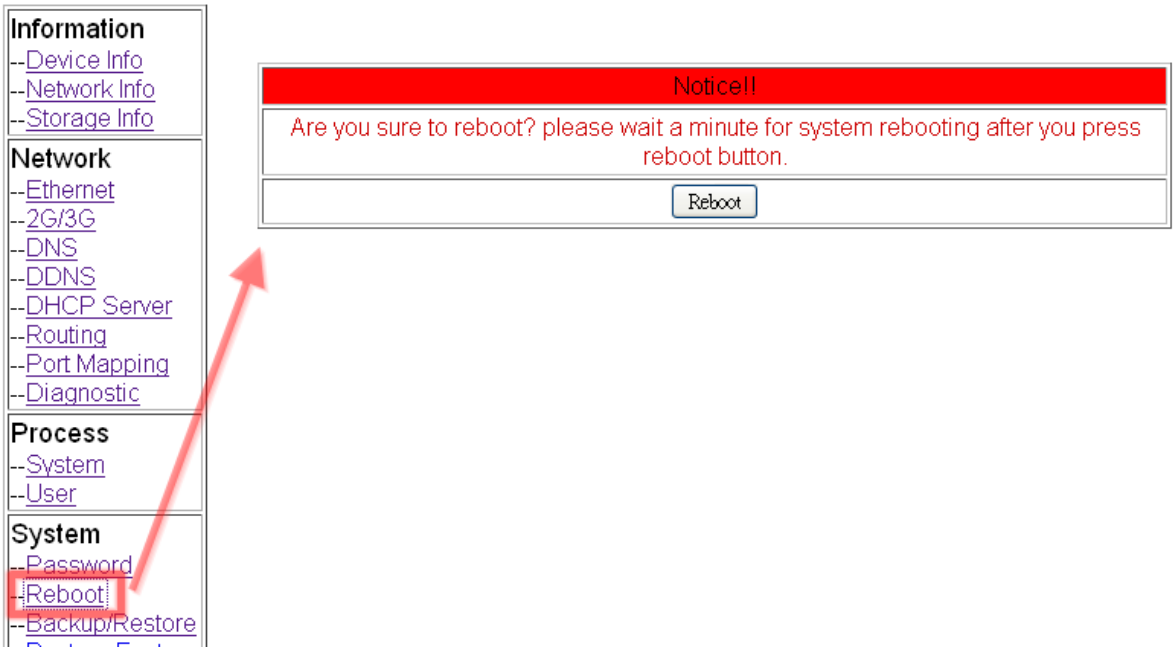
Network Reconnection	
Server IP	8.8.8.8
Max. Retry	5
Retry Interval Time	30
Enable Funcion	☑ Enable
Modify	
(1):This function will run immediately after you press "Modify" button (2):GSM module will be reset after Max. retry (3):System will reboot after GSM module reset 100 times	

(5) Fill in the routing rules to enable users to access the devices behind the GRP device through the Internet. Rules 0 to 3 bind the ports of the 3G/4G network interface to the “Target IP”and “Target port”. After finishing all the settings, click "Modify".

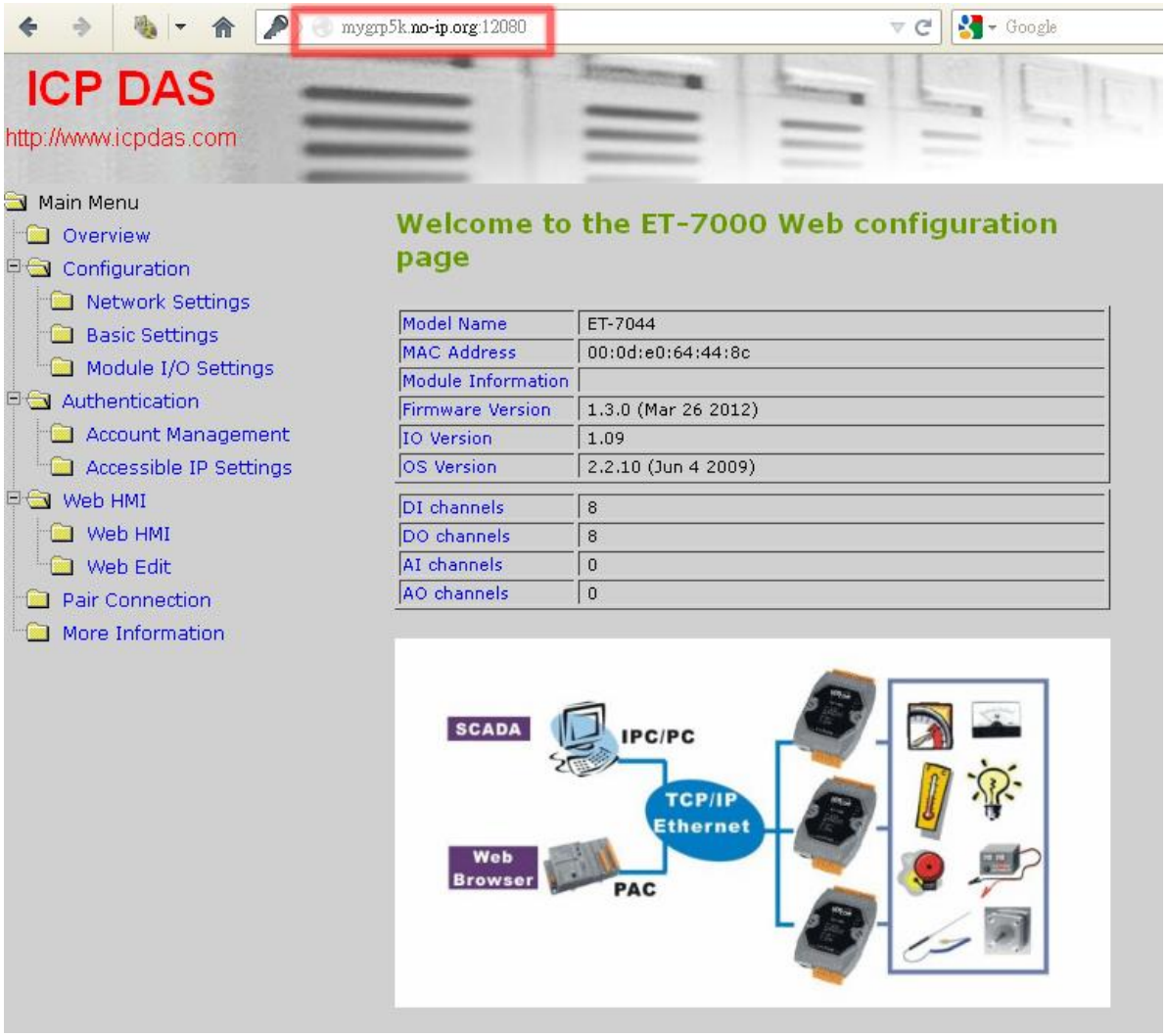
- Bind port 12080 of 3G / 4G network interface to ”192.168.0.20:80”.
- Bind port 12180 of 3G / 4G network interface to “192.168.0.21:80”.
- Bind port 12280 of 3G / 4G network interface to “192.168.0.22:80”.



(6) Please reboot the device to enable the setting.



(7) To view the IP camera image from a web browser, please enter the IP address or domain name of the GRP device in the 3G / 4G network.



6.3 Remote I/O Control / Temperature Monitor

This example shows the remote control application through "Serial port to 3G / 4G gateway function".

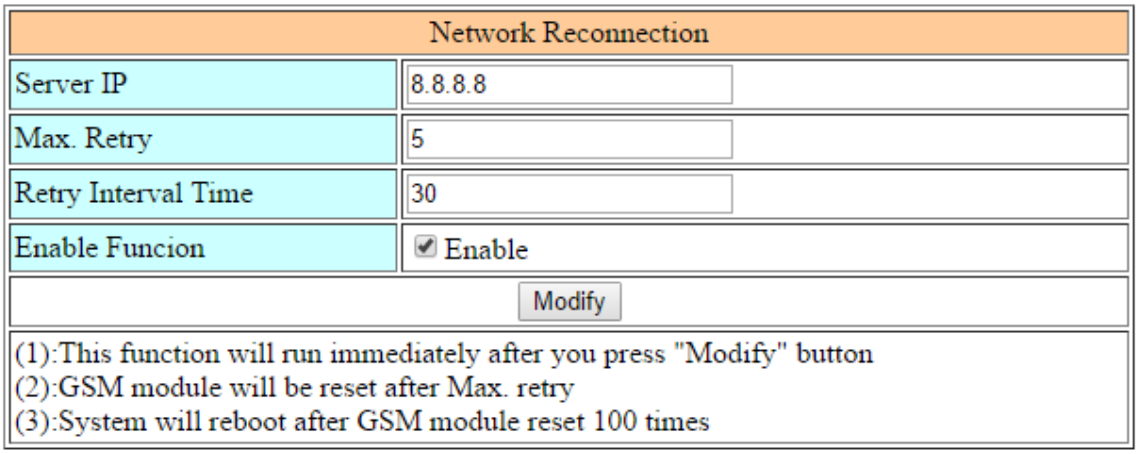
(1) Connect the device (DL-100 or PLC) to the serial port of the GRP device.

(2) Open VxServer and VxComm Utility software.

(3) If necessary, fill in "PIN Code", "APN", "User Name" and "Password". After finishing all the settings, click "Modify".

PIN / APN Configure		
PIN Code	0000	
Phone Number	*99***1#	(1)
APN	internet	(2)
User Name		(2)
Password		(2)
Modify		
(1):usually use *99# or *99***1# (2):please ask your SIM Card provider		

(4) Enable the "Network Reconnect" function to ensure that the mobile network is always online (usually, the ISP will disconnect once every 1 to 3 days).
Server IP can fill in user server IP or Google DNS server IP (8.8.8.8).
If the user uses MDVPN, please make sure that the server IP does not deny the ICMP service (Ping). After finishing all the settings, press the "Modify" button.

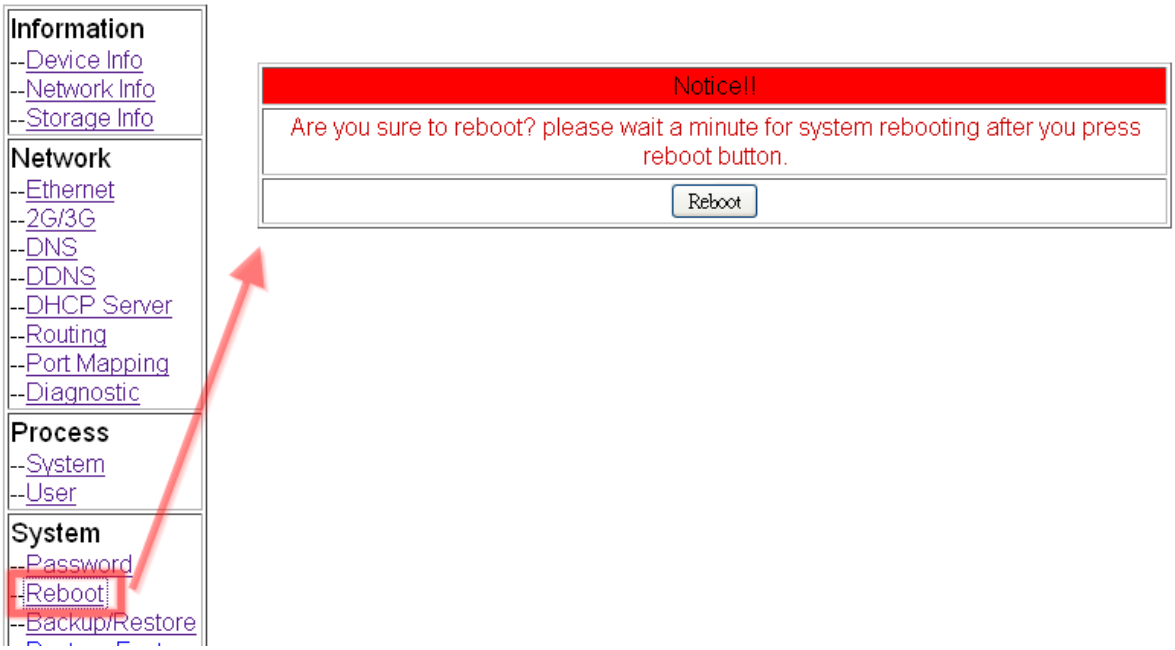


(5) Fill in the “Server IP” and “Server Port” (default 11000).

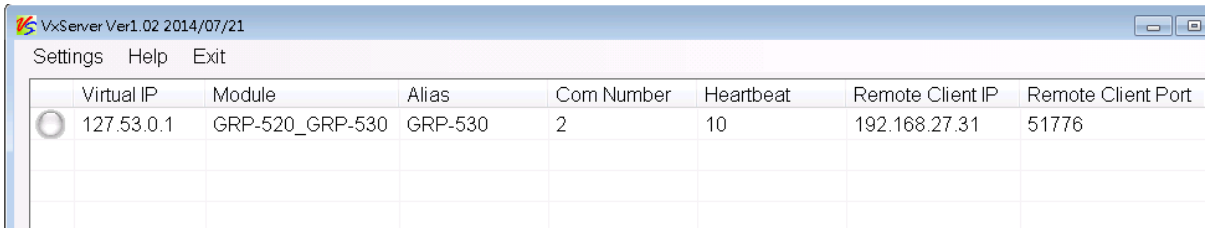
After finishing all the settings, check the "Enable" field, and then press the "Modify" button.

Virtual COM Function (VxServer)	
Server IP	192.168.12.2
Server Port	11000 default=11000
Heartbeat Time	10 10~65535 seconds
Device ID	1 1~255, unique ID for device
Alias	GRP-530 Max. Length = 8
Time Interval	50 1~5000 ms, default=50
Data Length	1000 10~1000 bytes, default=1000
Modbus TCP to RTU (Port1)	☐ Enable, COM2 --> TCP Port 10001
Modbus TCP to RTU (Port2)	☐ Enable, COM3 --> TCP Port 10002
Default Baudrate (Port1)	115200 bps
Default Baudrate (Port2)	115200 bps
Default Format (Port1)	8N1 (Data bit, Parity, Stop bit)
Default Format (Port2)	8N1 (Data bit, Parity, Stop bit)
Enable Funcion	☑ Enable
Firmware Version	v1.0.0
Modify	
(1)Heartbeat Time: if this value is small, it is sensitive to detect network disconnected (2)Virtual IP: please set it different from other virtual COM device	

(6) Please reboot the device to enable the setting.



(7) After rebooting, the GRP device will automatically connect to VxServer.



(8) After the GRP device is connected to VxServer, follow the steps below.

A. Press the "Search Server" button to get the device list.

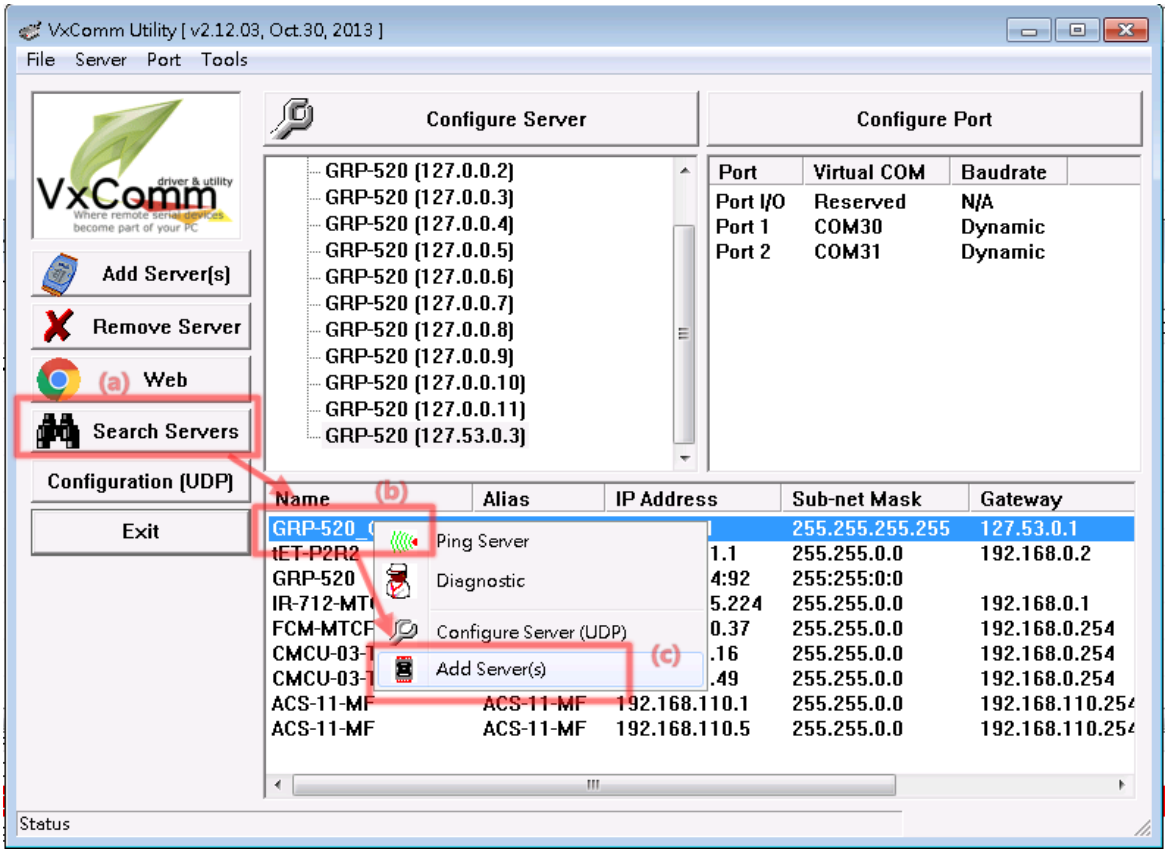
B. Right-click on "GRP-520_GRP-530"

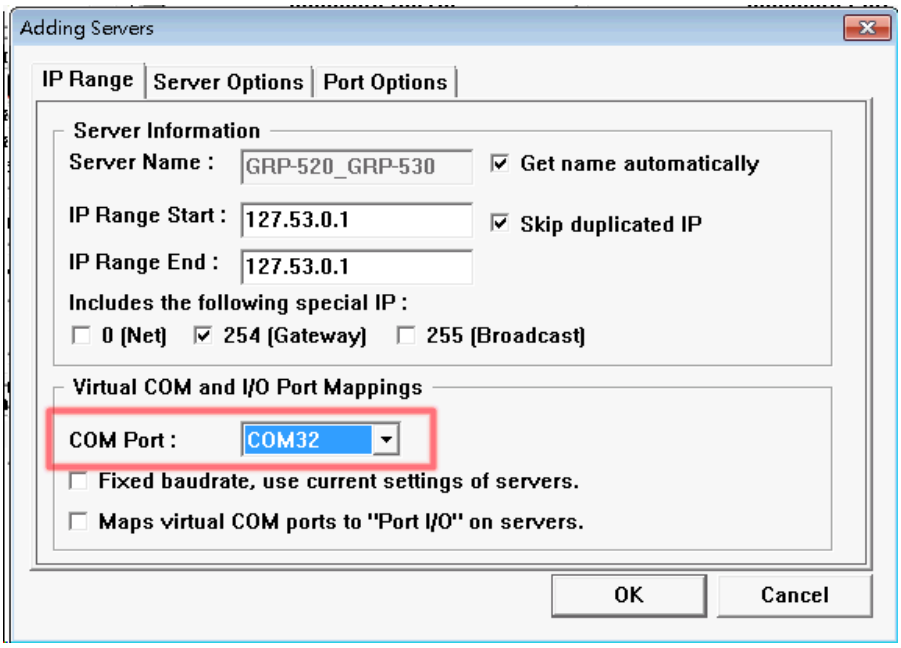
C. Click "Add Server".

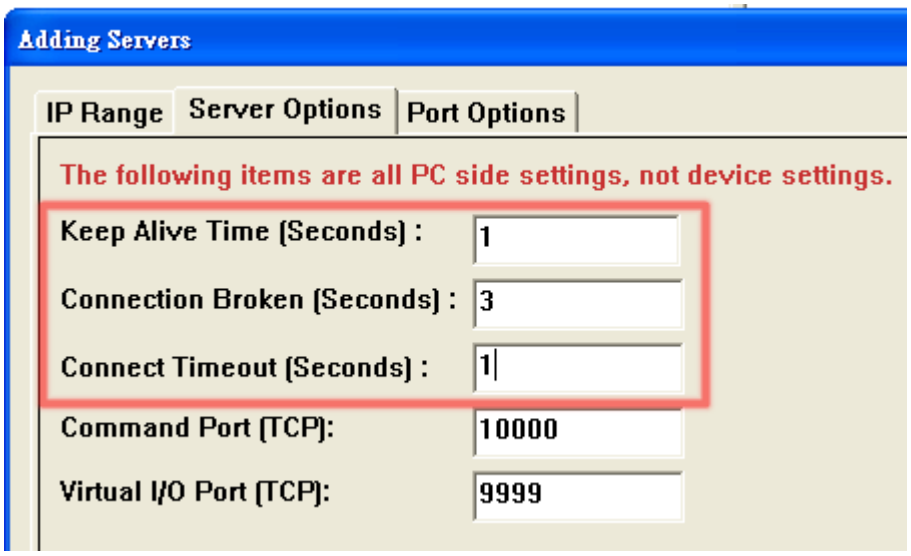
D. Select the starting number of the virtual serial port.

E. Change the settings tab to "Server Options" and set it as a screenshot. The polling timeout must exceed 3 seconds.

F. Click “OK”.



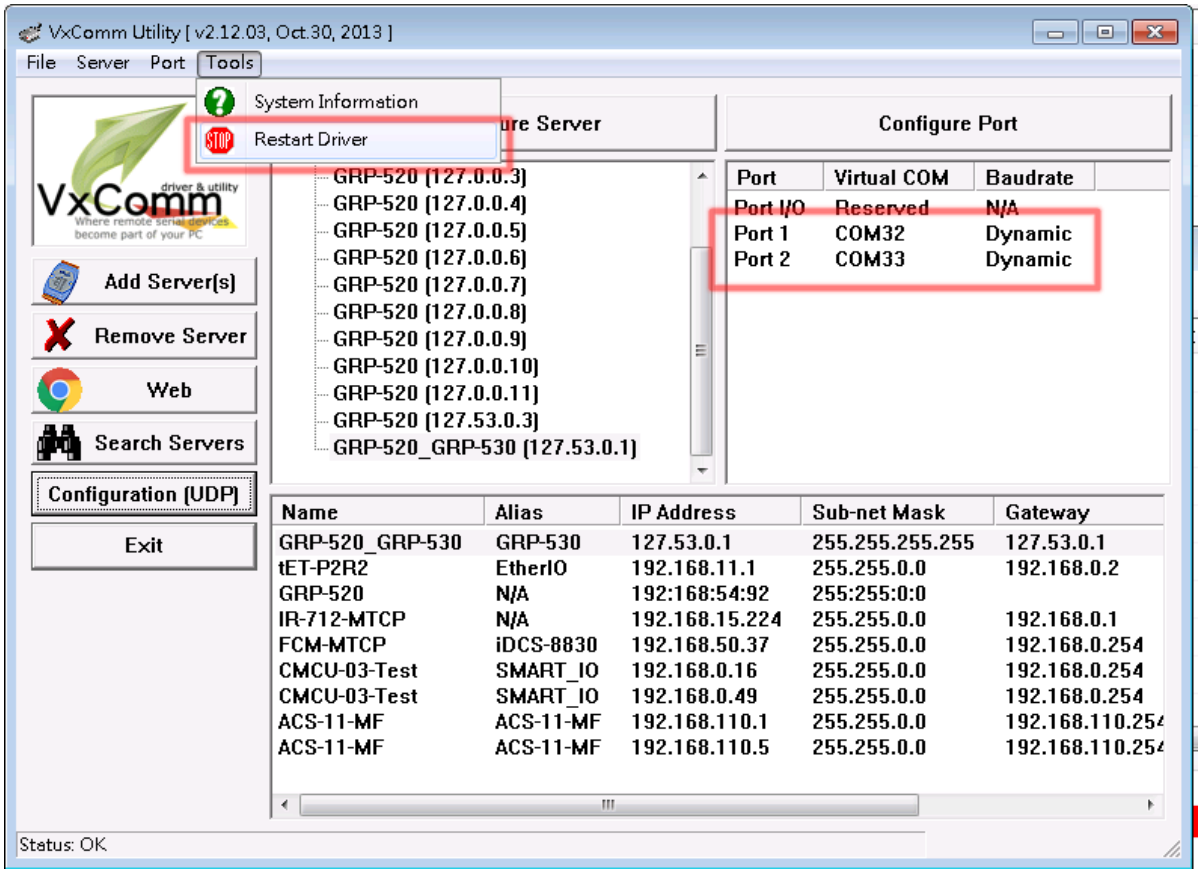




(9) The user will see the virtual COM ports (COM32 and COM33 in this example) but can not open them. Please follow the steps below to open the virtual COM port.

A. Click “Tools / Restart Driver” to restart the driver.

B. Open the com port to connect your device.



6.4 Modbus TCP to Modbus RTU over 3G / 4G, and card reader monitor

After completing the following steps, please set the "IP:Port" of the Modbus TCP program to "127.0.20.1:10001" in your control center (port 10001 is RS-232; port 10002 is RS-485)

(1) Please connect your device (M-7017 or PLC) to RS-485 of GRP device.

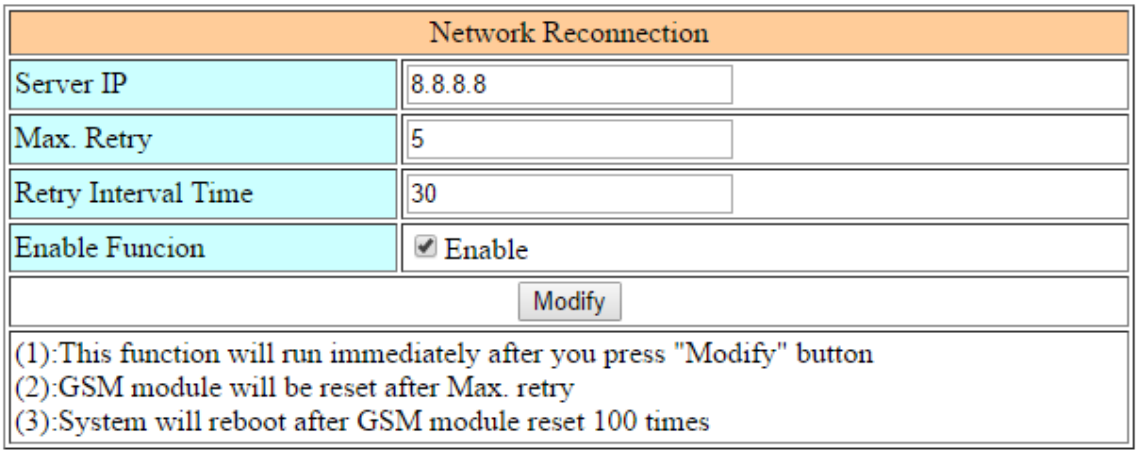
- The baudrate of Modbus device is 9600 bps and the data format is 8N1.
- The baudrate of Card Reader is 115200 bps and the data format is 8N1.

(2) Open VxServer and VxComm Utility software.

(3) If necessary, fill in "PIN Code", "APN", "User Name" and "Password". After finishing all the settings, click "Modify".

PIN / APN Configure		
PIN Code	0000	
Phone Number	*99***1#	(1)
APN	internet	(2)
User Name		(2)
Password		(2)
Modify		
(1):usually use *99# or *99***1# (2):please ask your SIM Card provider		

(4) Enable the "Network Reconnect" function to ensure that the mobile network is always online (usually, the ISP will disconnect once every 1 to 3 days).
Server IP can fill in user server IP or Google DNS server IP (8.8.8.8).
If the user uses MDVPN, please make sure that the server IP does not deny the ICMP service (Ping). After finishing all the settings, click "Modify".



(5) Fill in the “Server IP” and “Server Port” (default 11000).

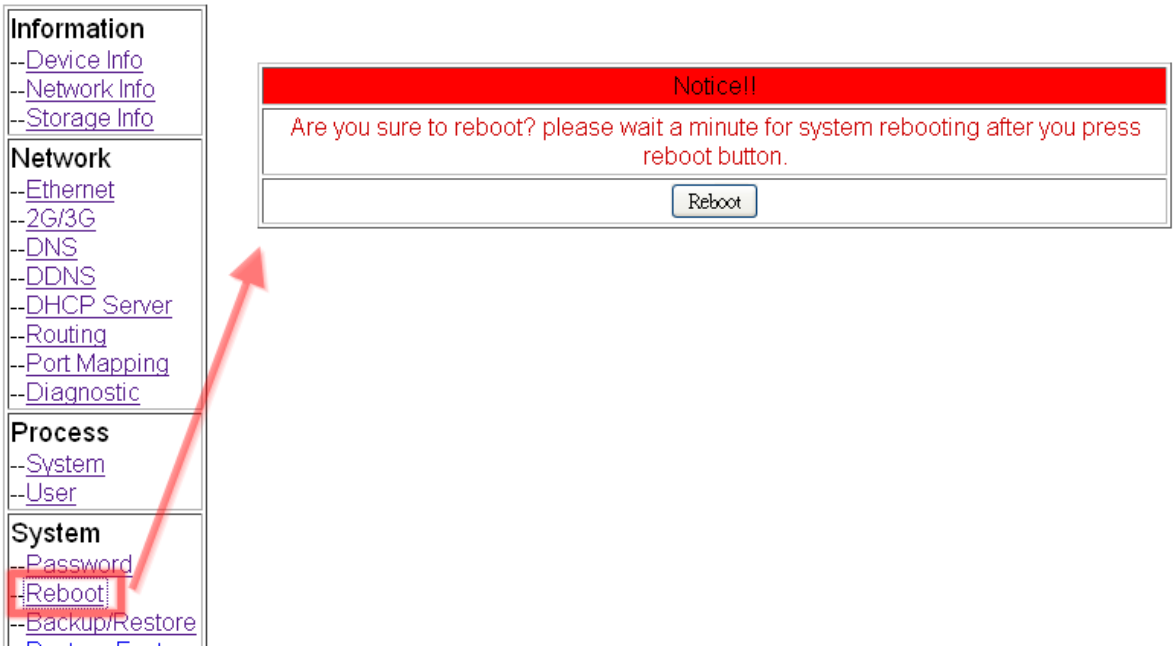
For the card reader, set Port1 (RS-232) as the default value.

For Modbus RTU devices, set Port2 (RS-485) as follows.

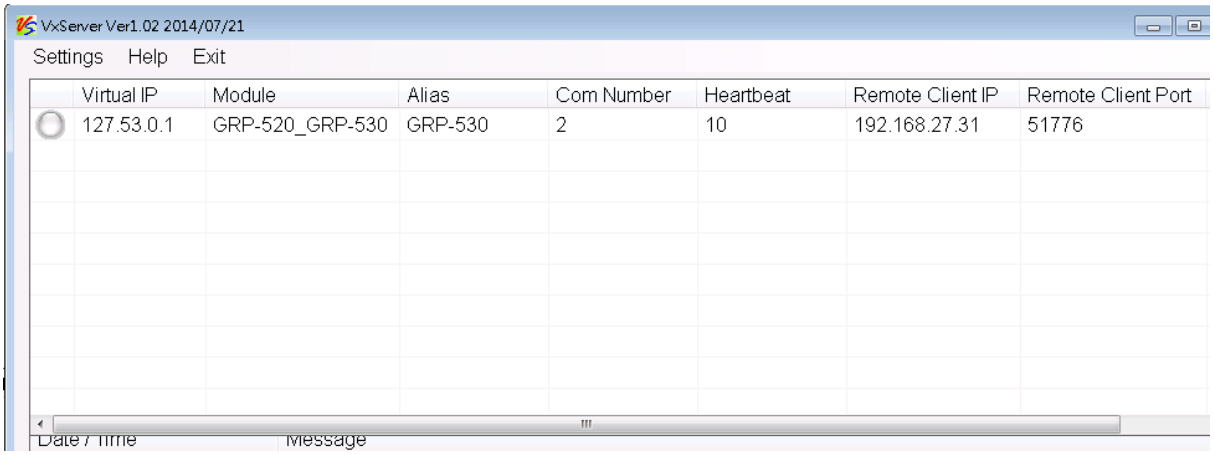
After finishing all the settings, check "Enable Function", and then click"Modify".

Virtual COM Function (VxServer)		
Server IP	192.168.12.2	
Server Port	11000	default=11000
Heartbeat Time	10	10~65535 seconds
Device ID	1	1~255, unique ID for device
Alias	GRP-530	Max. Length = 8
Time Interval	50	1~5000 ms, default=50
Data Length	1000	10~1000 bytes, default=1000
Modbus TCP to RTU (Port1)	☐ Enable, COM2 --> TCP Port 10001	
Modbus TCP to RTU (Port2)	☑ Enable, COM3 --> TCP Port 10002	
Default Baudrate (Port1)	115200 bps	
Default Baudrate (Port2)	9600 bps	
Default Format (Port1)	8N1 (Data bit, Parity, Stop bit)	
Default Format (Port2)	8N1 (Data bit, Parity, Stop bit)	
Enable Funcion	☑ Enable	
Firmware Version	v1.0.0	
Modify		
(1)Heartbeat Time: if this value is small, it is sensitive to detect network disconnected (2)Virtual IP: please set it different from other virtual COM device		

(6) Please reboot the device to enable the setting.

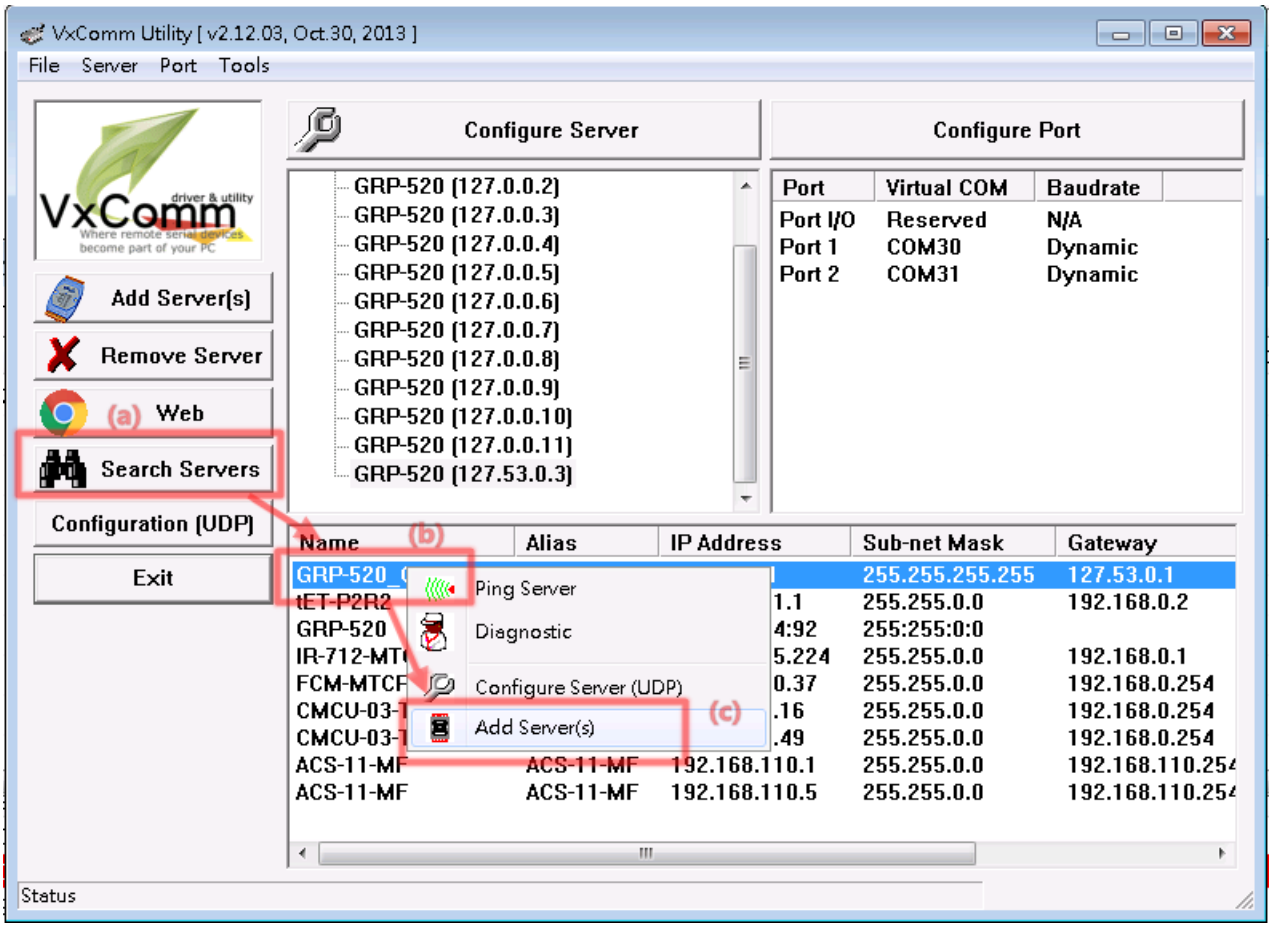


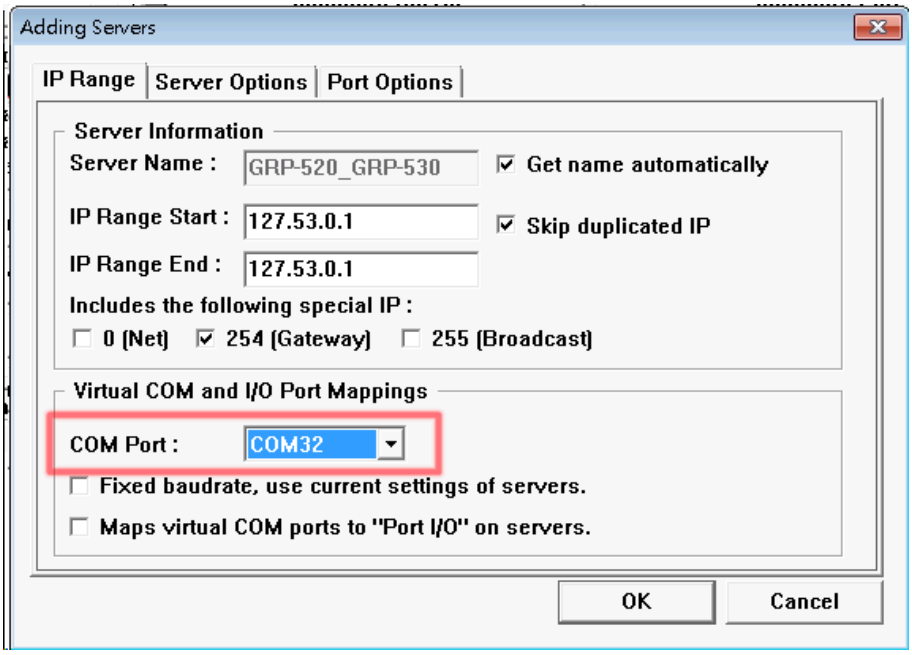
(7) After rebooting, the GRP device will automatically connect to VxServer.

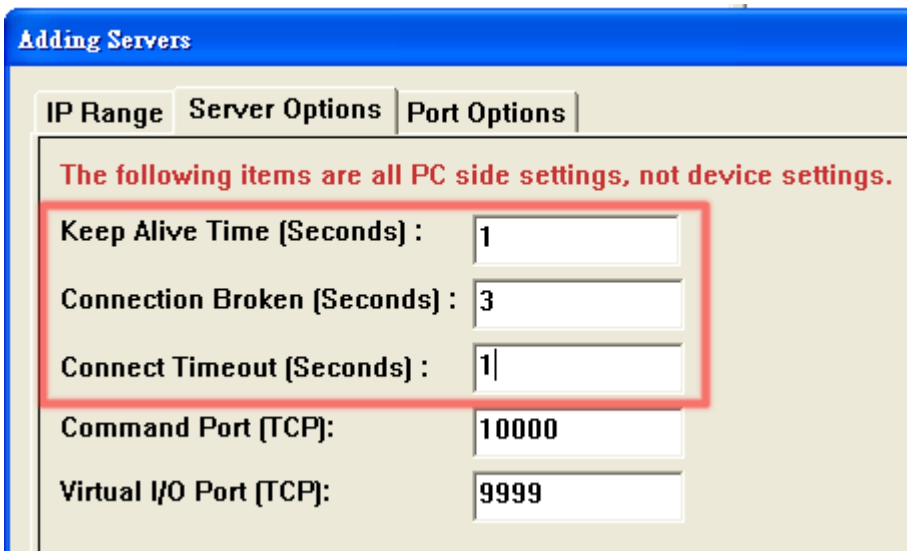


(8) After the GRP device is connected to VxServer, follow the steps below.

A. Press the "Search Server" button to get the device list.
B. Right-click on "GRP-520_GRP-530".
C. Click "Add Server".
D. Select the starting number of the virtual serial port.
E. Change the settings tab to "Server Options" and set it as a screenshot. The polling timeout must exceed 3 seconds.
F. Click “OK”



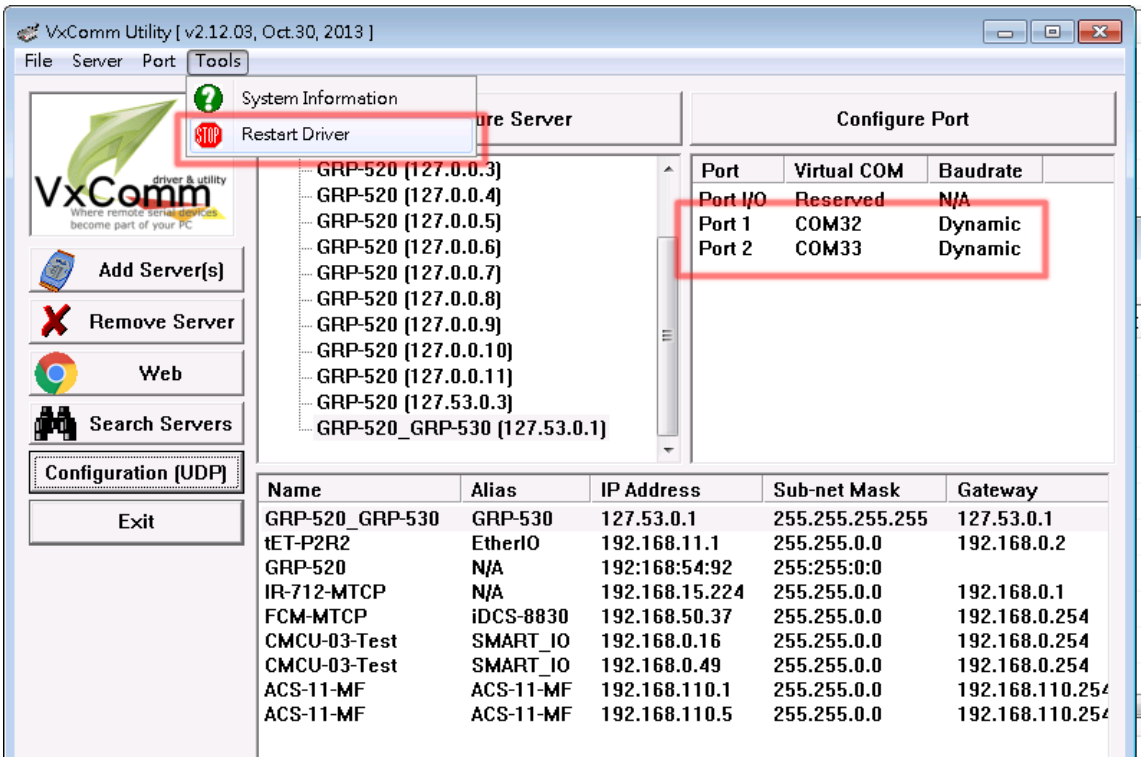




(9) The user will see the virtual COM ports (COM32 and COM33 in this example) but can not open them. Please follow the steps below to open the virtual COM port.

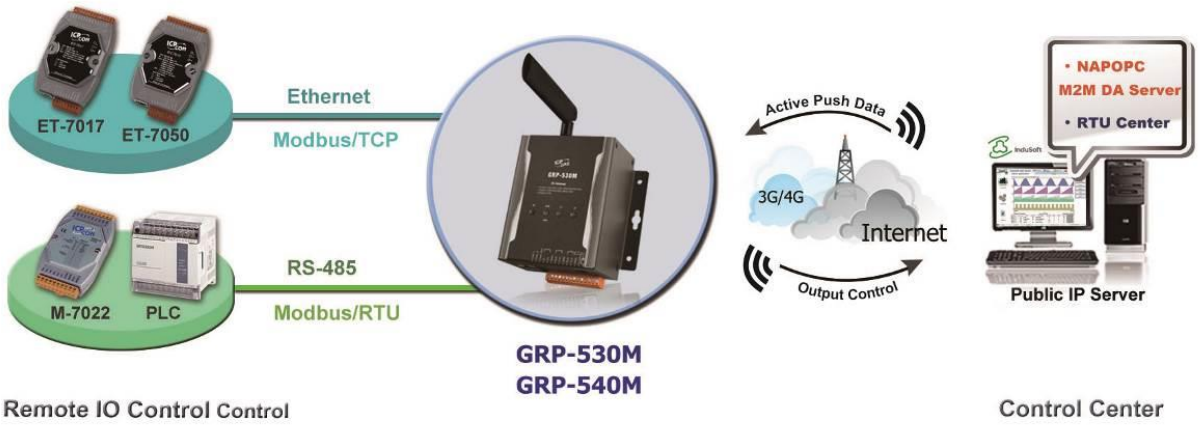
A. Click “Tools / Restart Driver” to restart the driver.

B. Open the com port to connect your device.



6.5 RTU Client for Remote Control Application with RTU API.

This example shows how to use RTU API to collect and control remote Modbus RTU and Modbus TCP I / O with RTU client/server. This system has ET-7017, M-7045 and PLC.

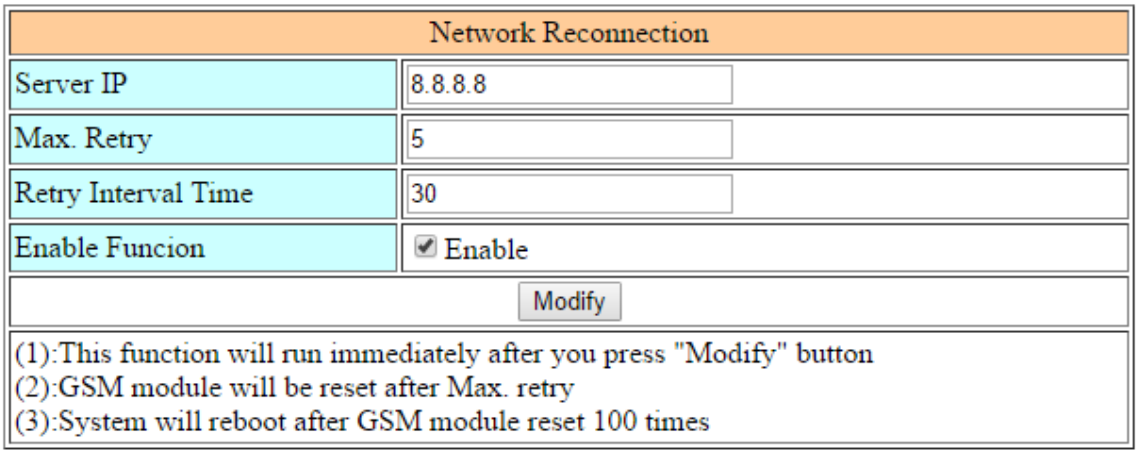


(1) Please connect the RS-485 or Ethernet of the device (ET-7k or M-7k module) to GRP-500M

(1) If necessary, fill in "PIN Code", "APN", "User Name" and "Password". After finishing all the settings, click "Modify".

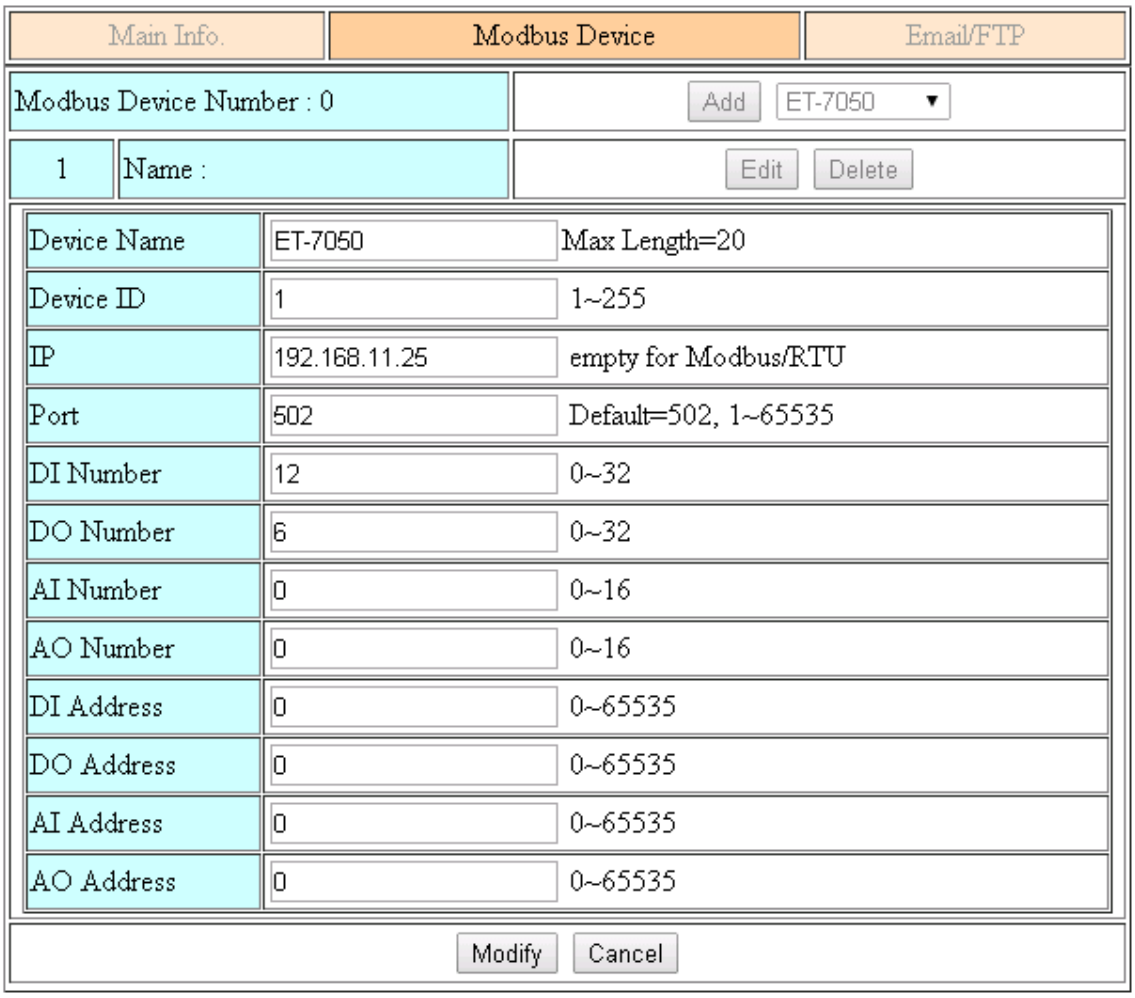
PIN / APN Configure		
PIN Code	0000	
Phone Number	*99***1#	(1)
APN	internet	(2)
User Name		(2)
Password		(2)
Modify		
(1):usually use *99# or *99***1# (2):please ask your SIM Card provider		

(2) Enable the "Network Reconnect" function to ensure that the mobile network is always online (usually, the ISP will disconnect once every 1 to 3 days).
Server IP can fill in user server IP or Google DNS server IP (8.8.8.8).
If the user uses MDVPN, please make sure that the server IP does not deny the ICMP service (Ping). After finishing all the settings, click "Modify".



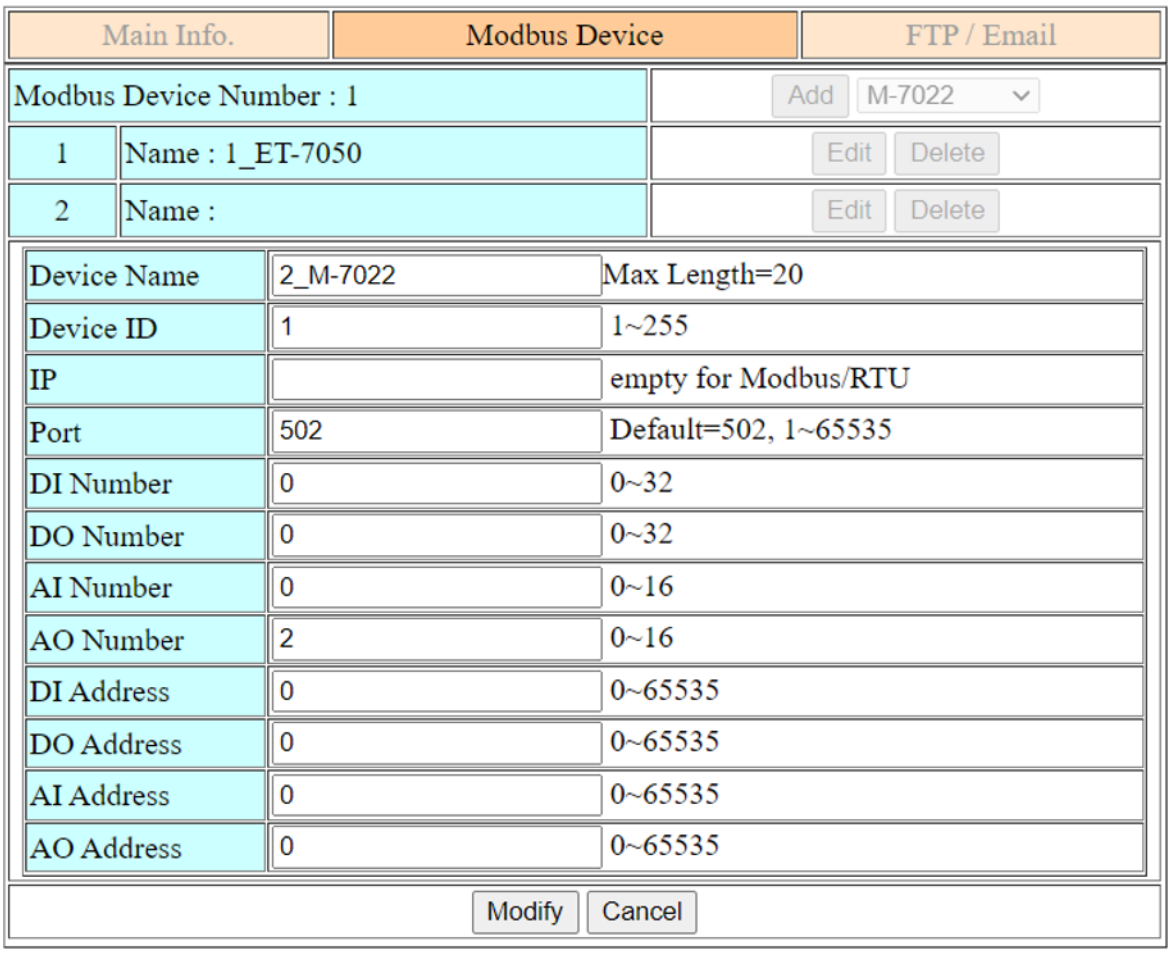
(3) Select “ET-7050” in the list, and then click "Add", the web will display all I/O number information, as shown below.

Modify the "Device Name", "Device ID", "IP" and "Port" of ET-7050, and then click "Modify".

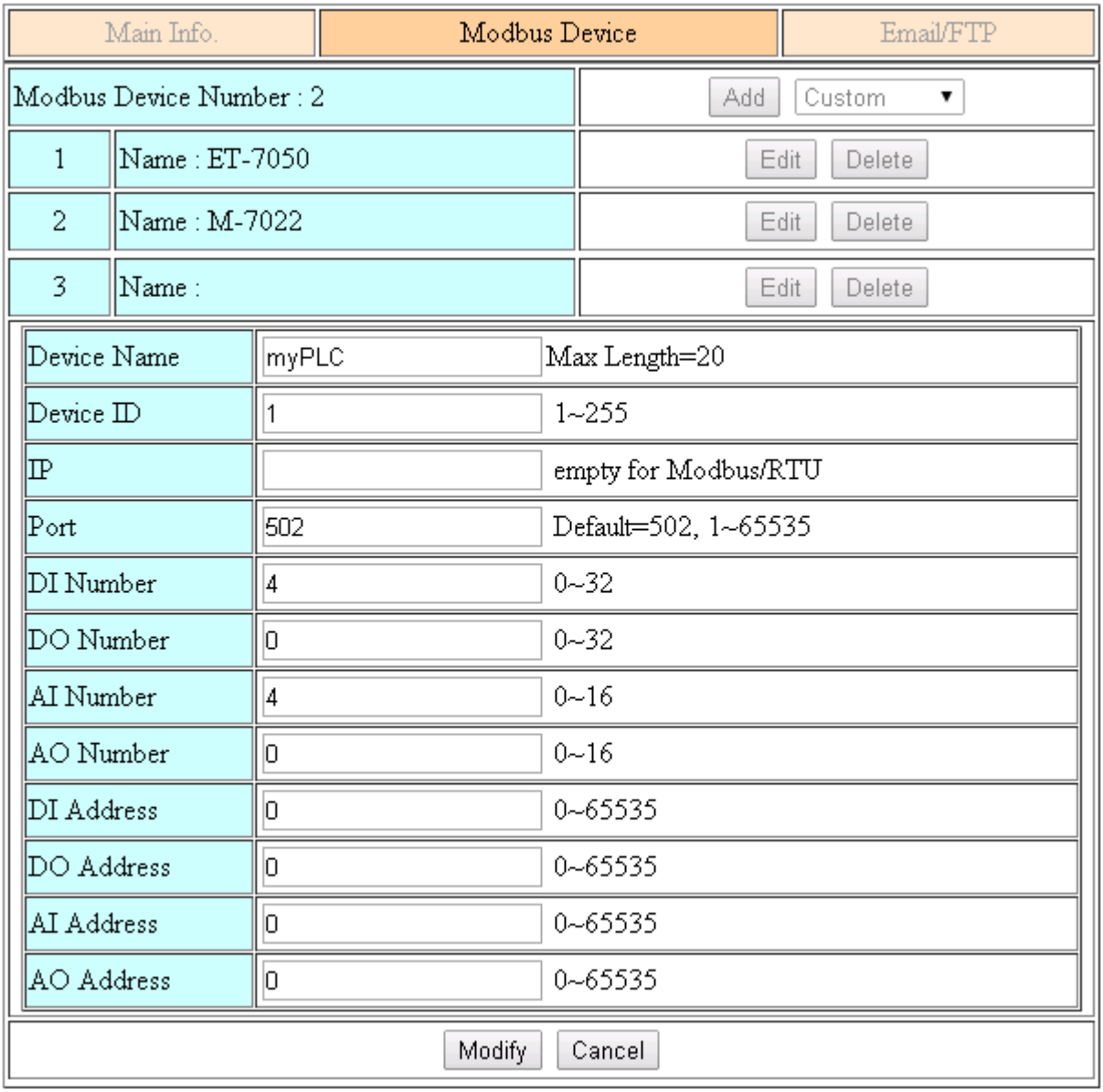


(4) Select “M-7022” in the list, and then press the "Add" button, the web will display all I/O number information, as shown below.

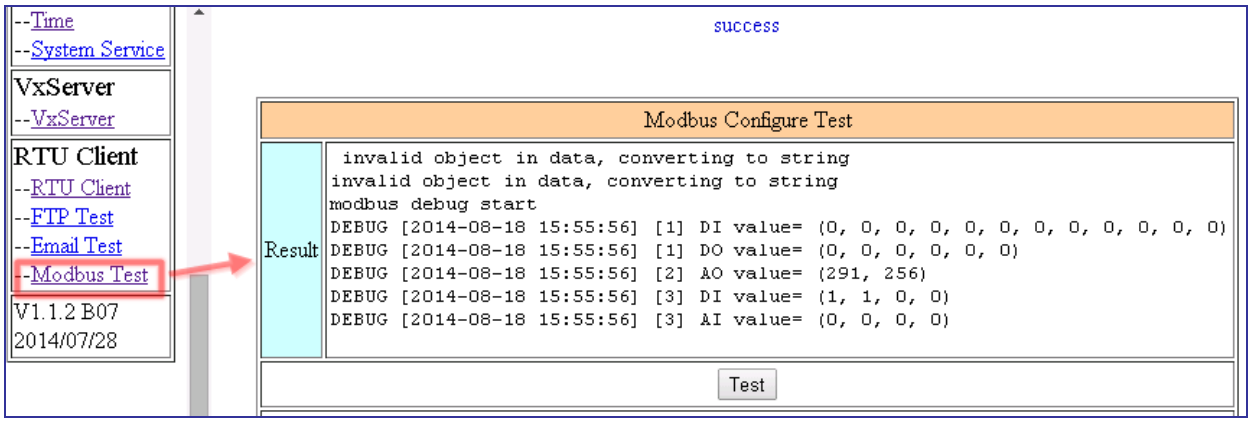
Modify the "Device Name" and "Device ID" of M-7022 (keep the default values of “IP" and "Port"), and then click "Modify".



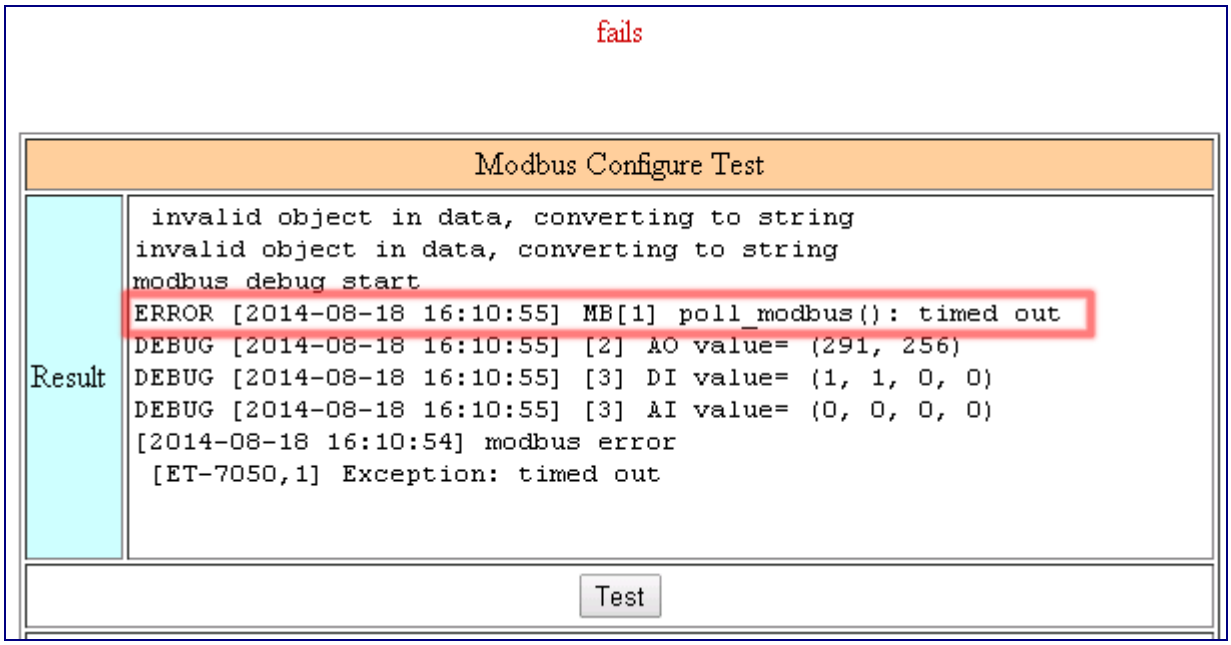
(5) Select ”Custom” in the list, and then press the "Add" button, the web will display all I/O number information, as shown below.
Modify the “Device Name”, “Device ID”, “DI Number”, “AI Number” of PLC, and then click "Modify".



(6) Select the "Modbus Test" function, and then press the "Test" button to test the settings. If the result is successful, follow the next step.

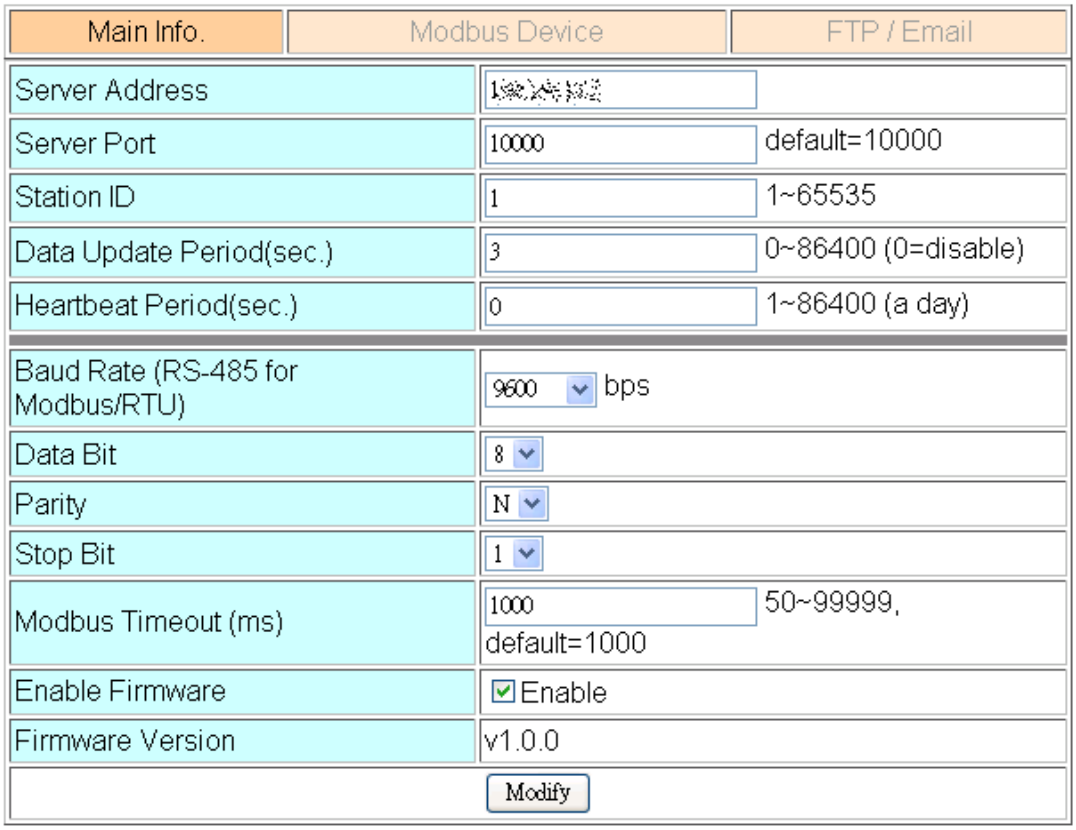


If the result failed, please check your settings or wiring.



(7) Configure “Main Info.” Tab.

- Fill in the "Server Address" and "Server Port" of RTU Center.
- Fill in the “Station ID”(different from other RTU equipment).
- Fill in the “Data Update Period” and “Heartbeat Period” (0 disable).
- Fill in the RS-485 configuration of the Modbus RTU device.



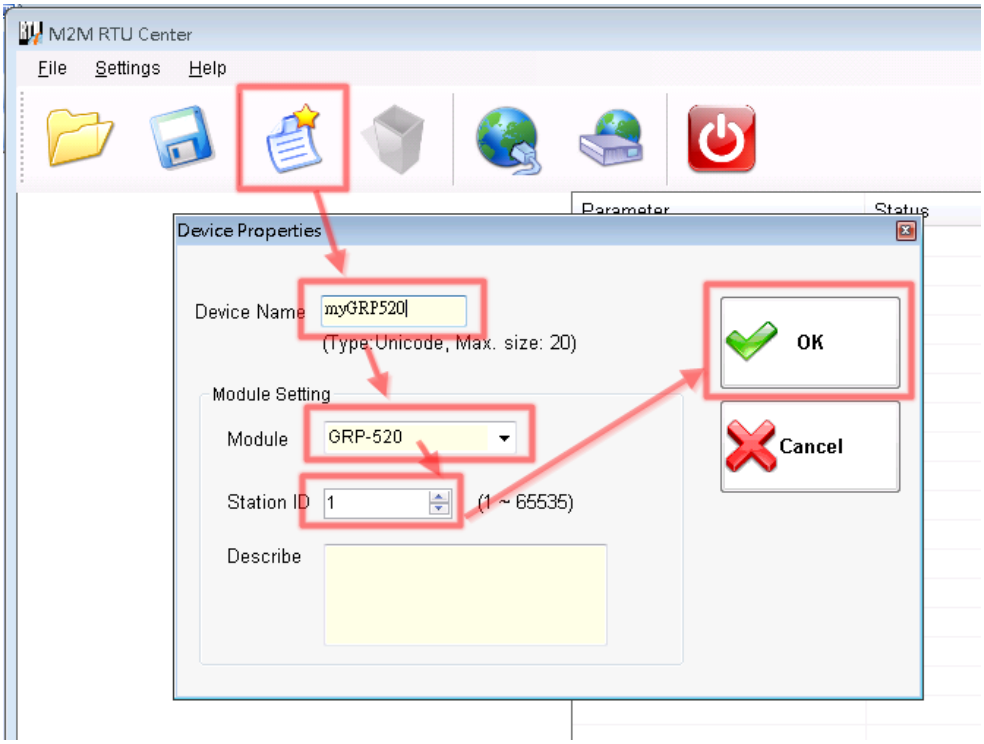
(8) Open the RTU Center, and then follow the steps below to add RTU devices.

A. Click the "New Device" icon.

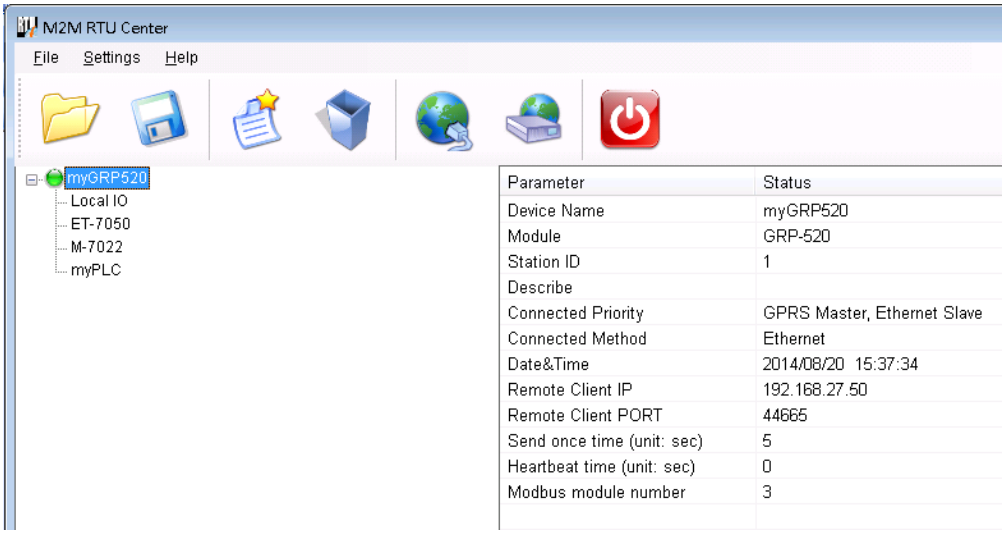
B. Enter the alias of the GRP device

C. Select the module type as “GRP-520”.

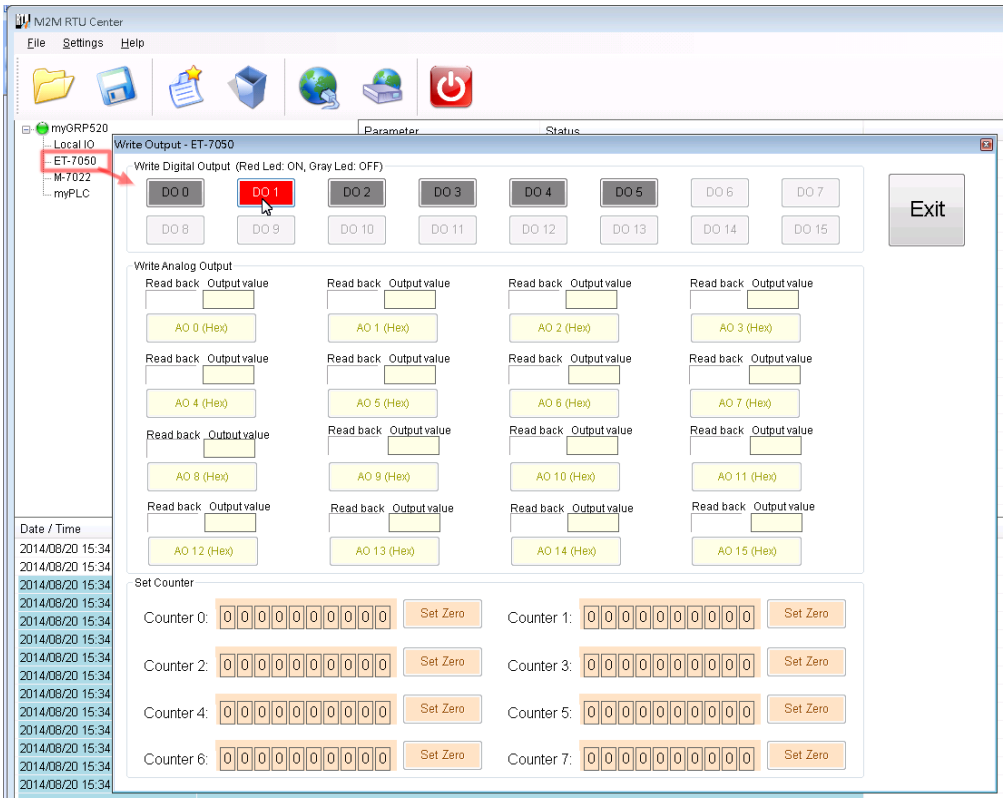
D. Fill in the “Station ID” as the “Station ID” of GRP device.



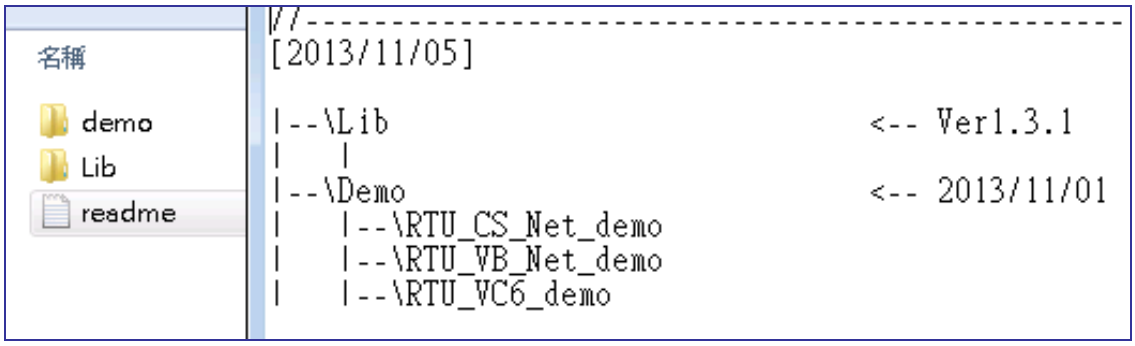
(9) After reboo, the GRP device will automatically connect to RTU Center.



(10) Double-click "ET-7050" to call up the "Output Control Panel", and press "DO1" to control the remote DO.



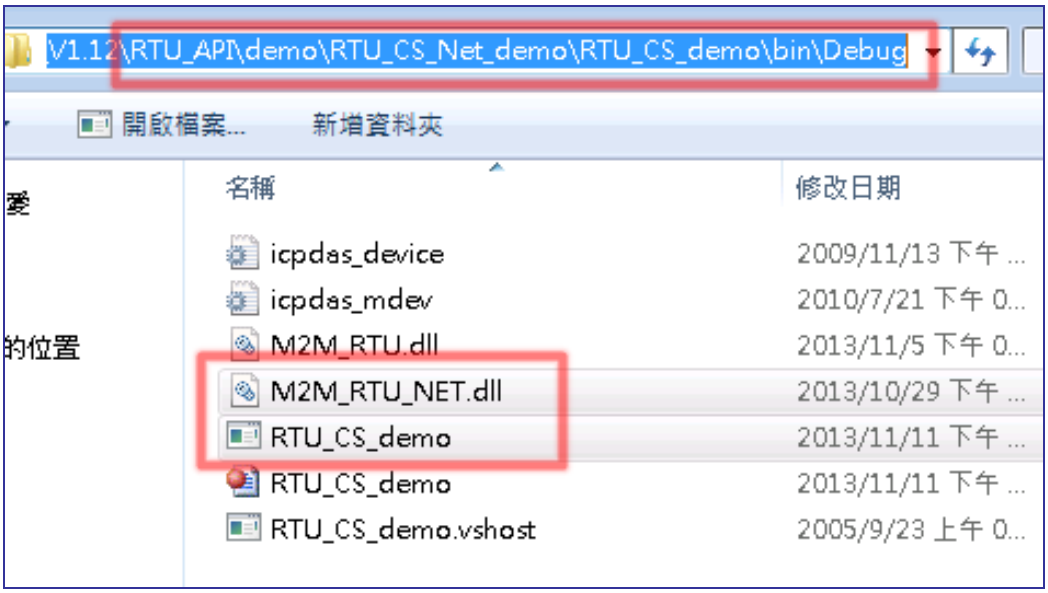
(11) Download the RTU API from the RTU center webpage and unzip it. There are RTU API library and some C#, VB.Net, VC6 demos, as shown below.

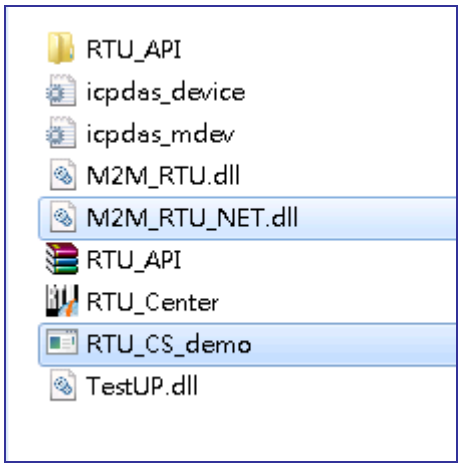


(12) Copy the pre-built demo to the folder in the RTU Center.

The demo must be in the same folder as RTU Center, because the same memory is shared in “M2M_RTU.dll”.

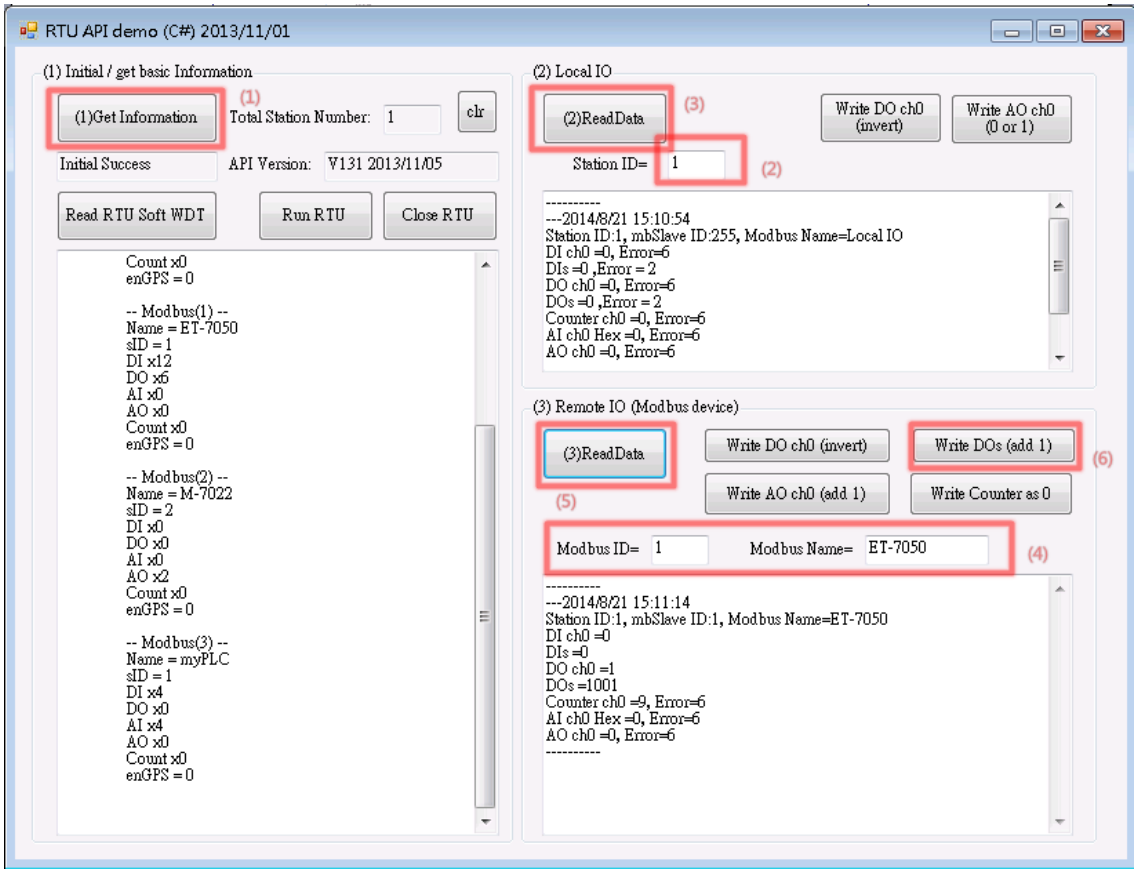
Here we copied "RTU_CS_demo.exe" and "M2M_RTU_NET.dll" from the C# demo.





(13) Execute “RTU_CS_Demo.exe”.

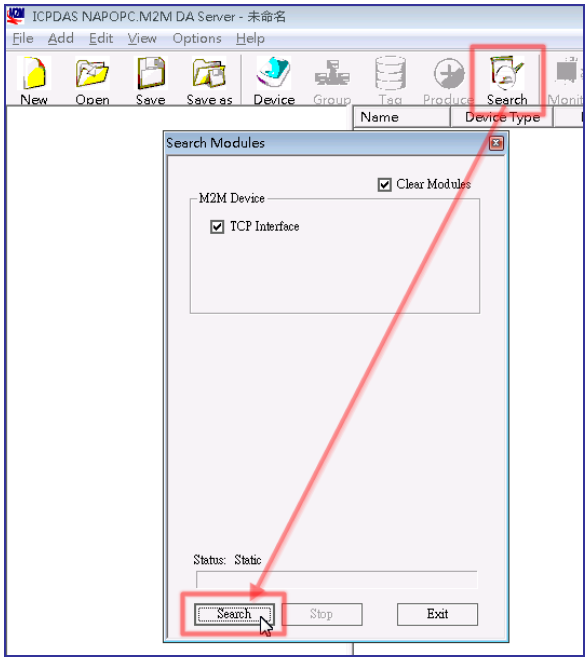
A. Press "Get Information" to get all station information.
B. Fill in the “Station ID” as the “Station ID” of GRP device.
C. Press the "Read Data" button to read the local IO data. Because the GRP device has no local IO, we get the error code here.
D. Fill in "Modbus ID" as "Modbus ID" of ET-7050, and "Modbus Name" as "ET-7050", and then press "ReadData" to get all IO data.
E. Press the "Write Dos (add 1)" button to control DO.

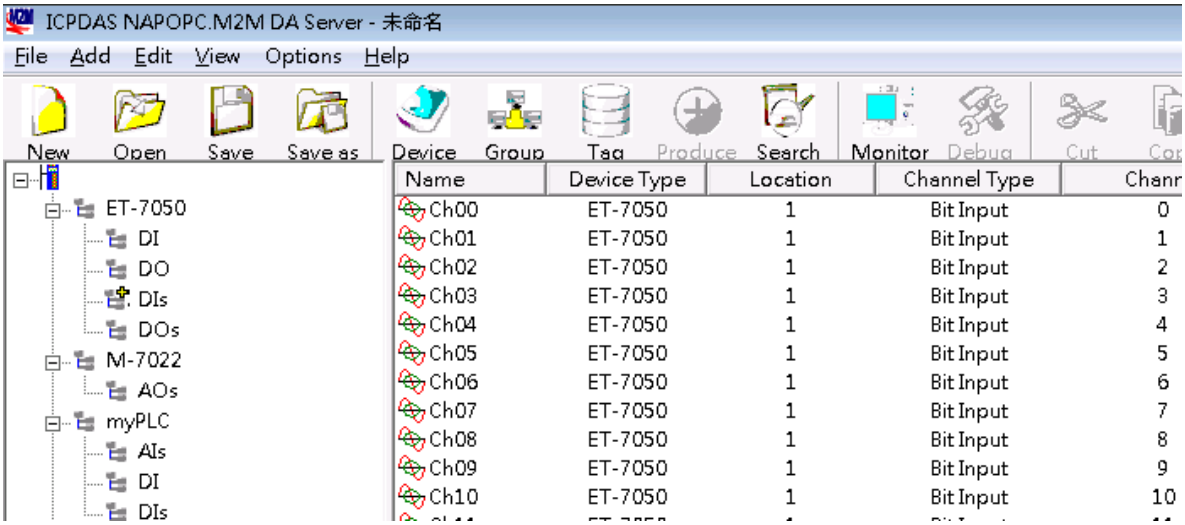


6.6 RTU Client for Remote Control Application with OPC DA Server.

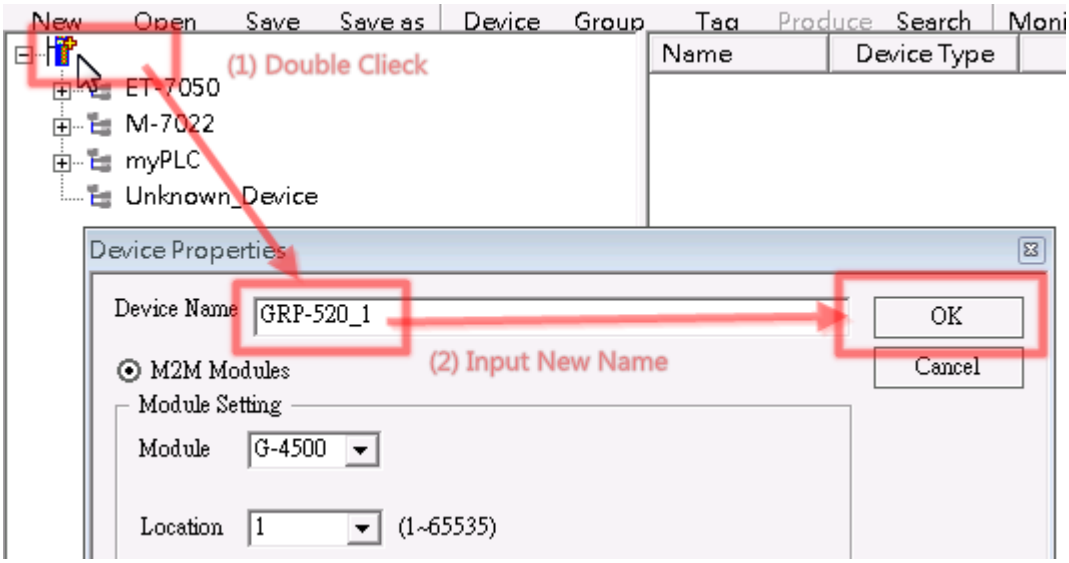
(1) For RTU Client and RTU Center, please refer to the previous section.

(2) Open NAPOPC.M2M DA Server, and then click "Search" to automatically add all the tags of the device.

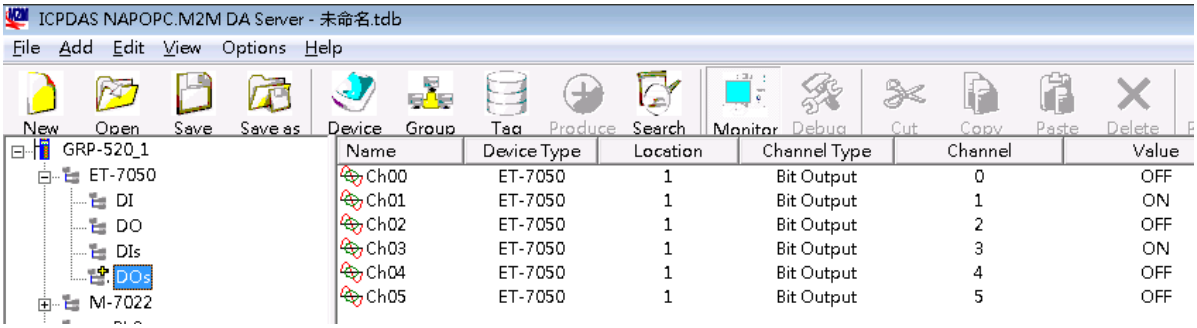




(3) Double-click the device node to modify the device name.



(4) Now users can use OPC Client to read I/O data from NAPOPC.M2M DA Server, or use the client "Monitor" to monitor all I/O data.

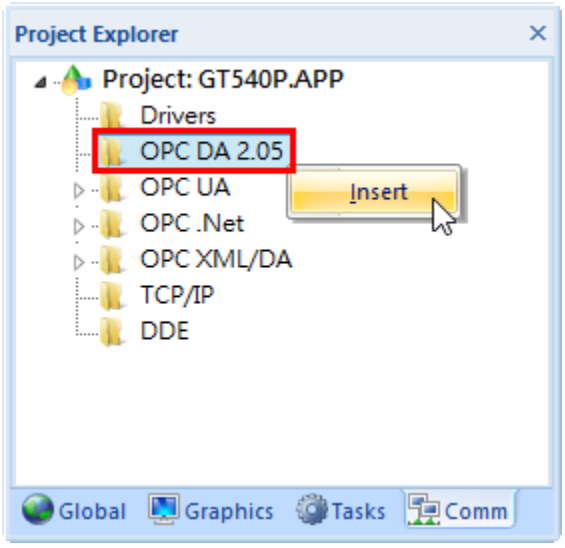


6.7 RTU Client for Remote Control Application with InduSoft.

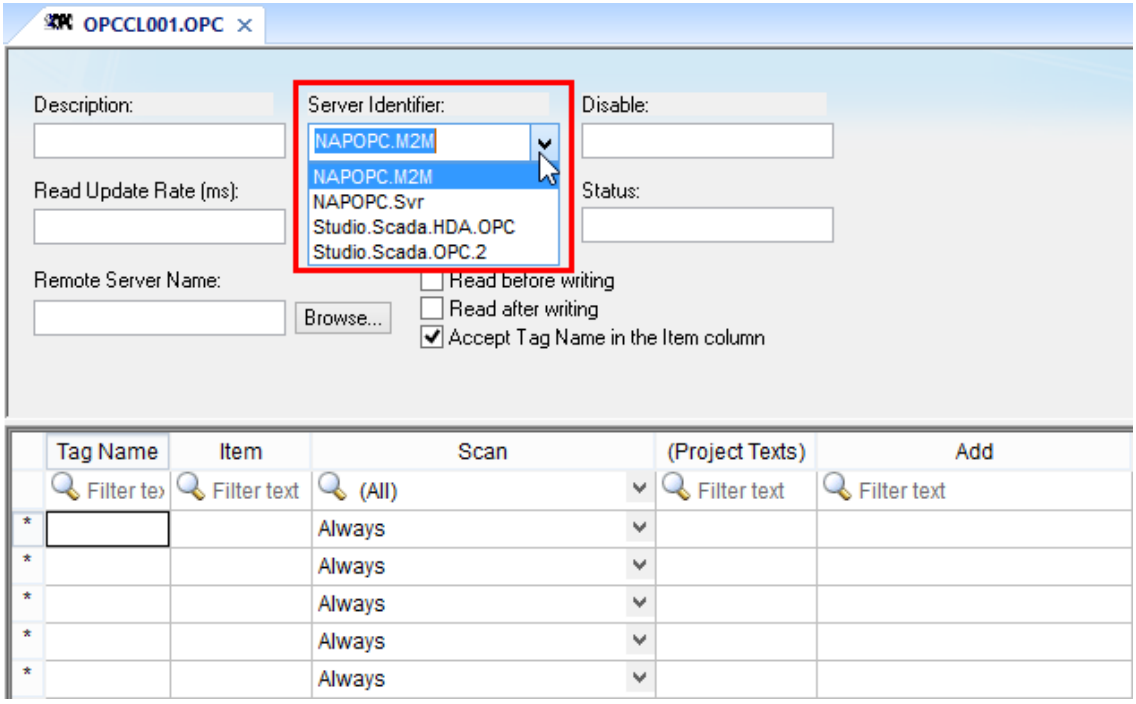
This example shows how to use SCADA "InduSoft" to control/monitor the remote I/O.

(1) For RTU Client, RTU Center and OPC Server, please refer to the previous section.

(2) Right-click the OPC DA 2.05 folder and insert a new worksheet.



(3) Select OPC Server from the “Server Identifier”, and then select the “NAPOPC.M2M” item from the combo box.

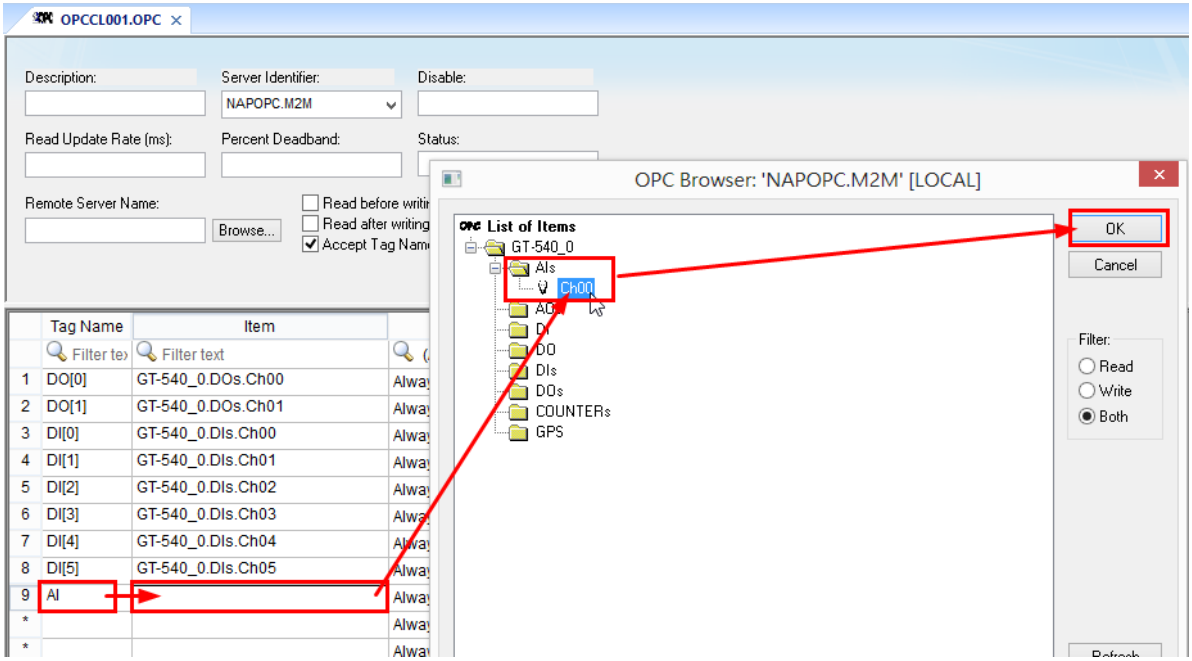


(4) Configure label names and item columns

A. Fill in the “Tag Name”.

B. Double-click the “Item” column and select the point from the pop-up window.

C. Click “OK”.



6.8 Email or FTP report I/O logger file.

This example shows how to use GRP devices to periodically report I/O recorder files.

(1) For Modbus configuration, please refer to section 4.5.

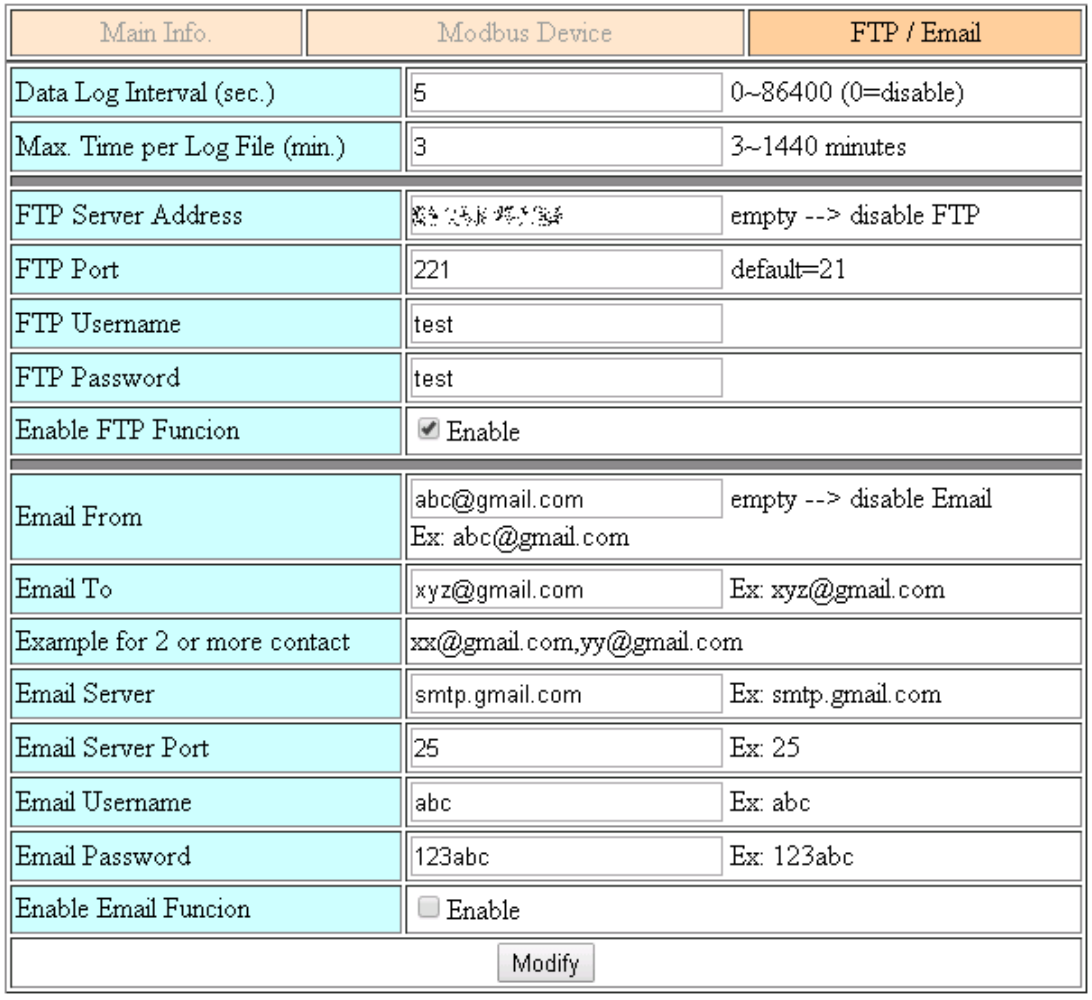
(2) Configure Email / FTP function in “Email / FTP” tab.

A. Fill in "Data Log Interval" to record I/O data to the log file.

B. Fill in "Max. Time per log file" to report log files.

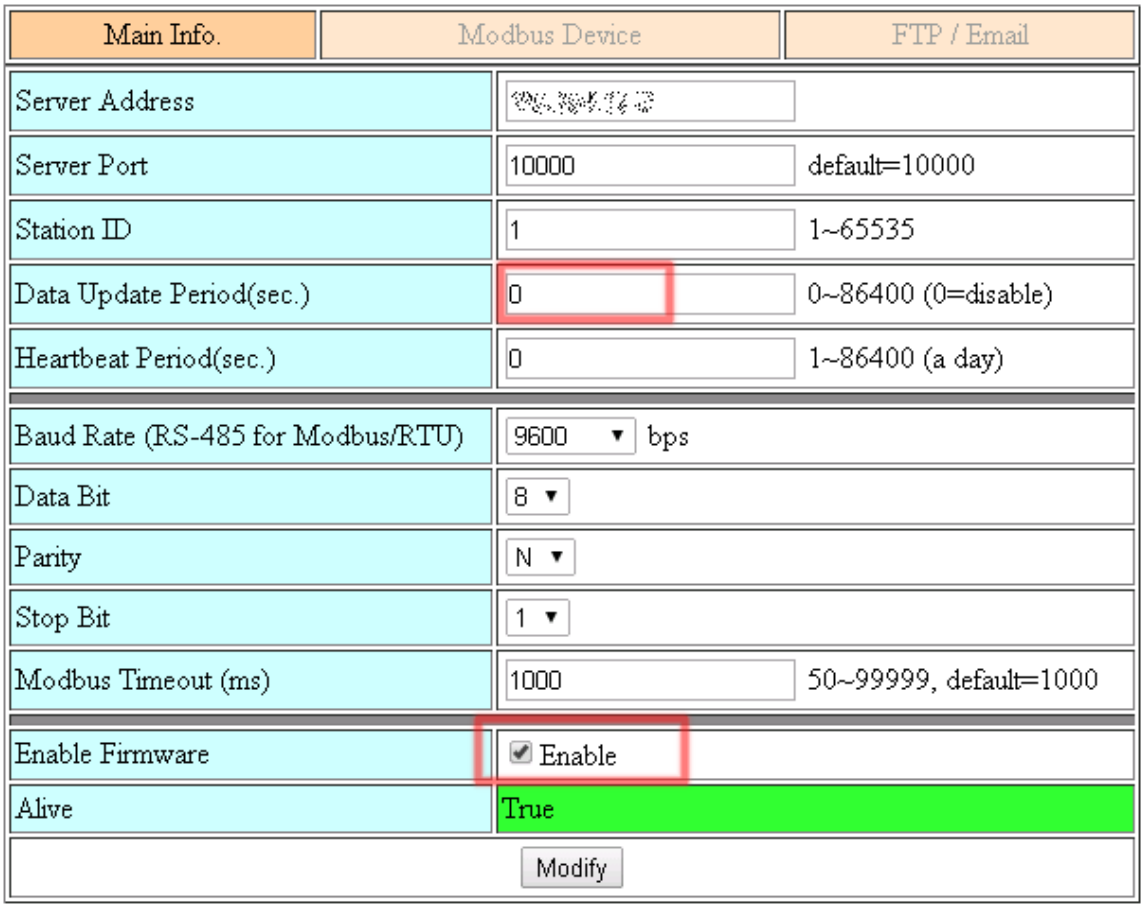
C. To use FTP function, fill in all setting and check "Enable FTP Function".
To use Email function, fill in all setting and check "Enable Email Function".

D. Click “Modify”



(3) Finally, enable this function in the "Main Info" tab.

If the user does not need to send data to the RTU Center, set the "Data Update Period" to 0.



6.9 Data Collection and Remote Control (NB-DA Server)

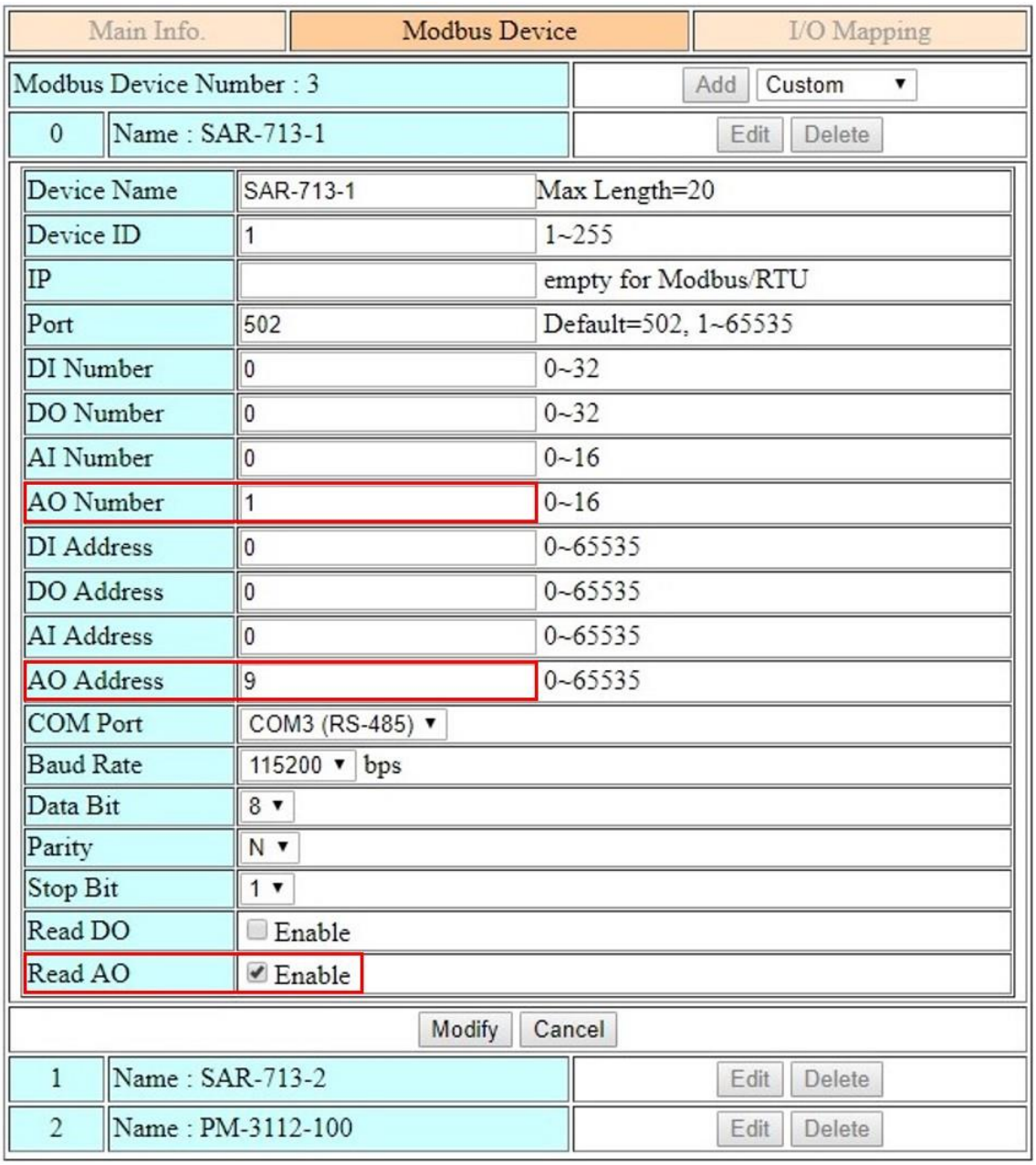
This example shows a data collection and remote control application through the NB-DA server. There are PM-3112 and SAR-713 in this system.

(1) Please connect the device (PM-3112 and SAR-713) to serial port of the GRP device. The baudrate of the device is 115200 bps and the data format is 8N1.

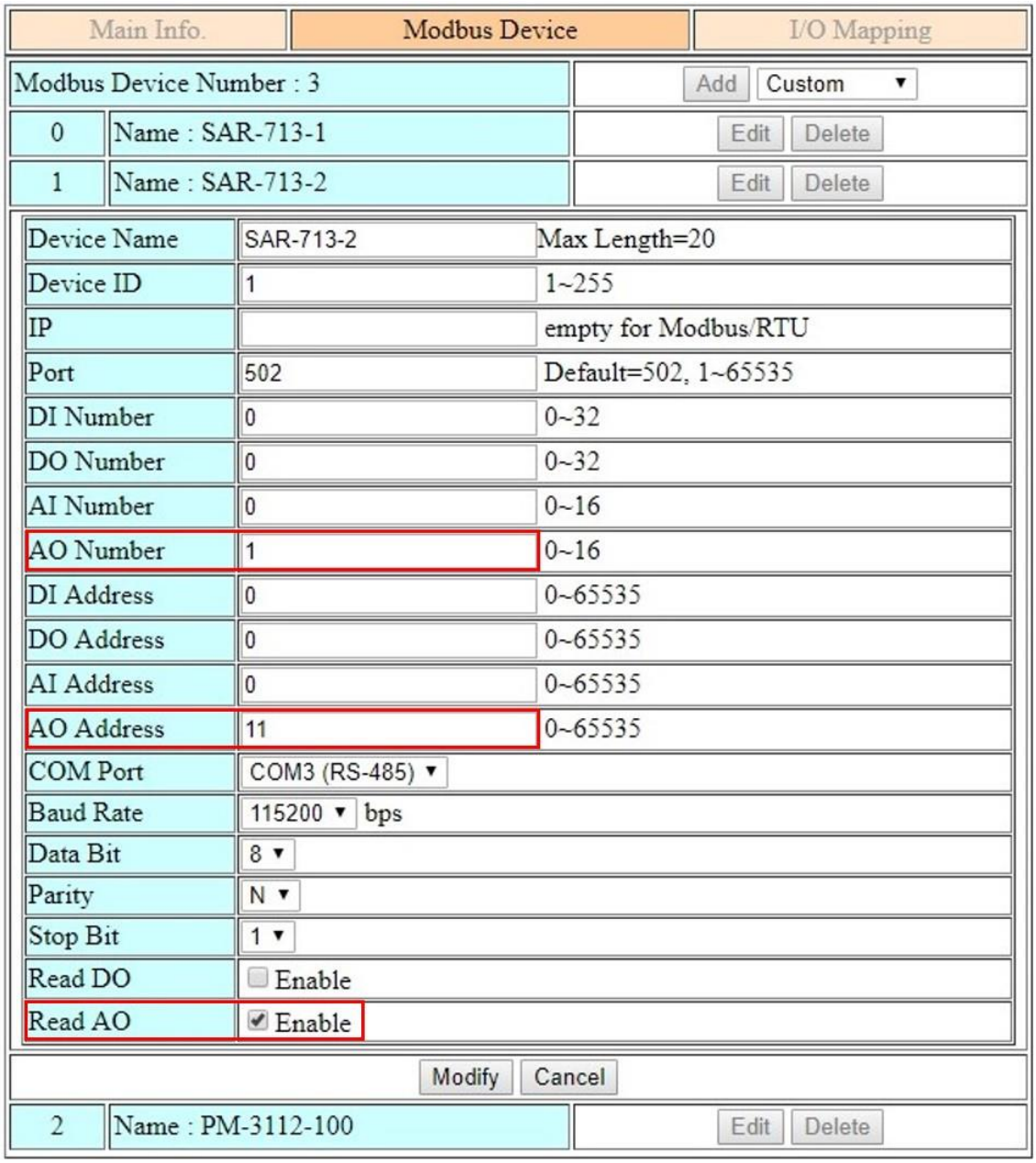
(2) Add a device in the "Modbus Devices" tab.

Main Info.	Modbus Device	I/O Mapping
Modbus Device Number : 3		Add Custom ▼
0	Name : SAR-713-1	Edit Delete
1	Name : SAR-713-2	Edit Delete
2	Name : PM-3112-100	Edit Delete

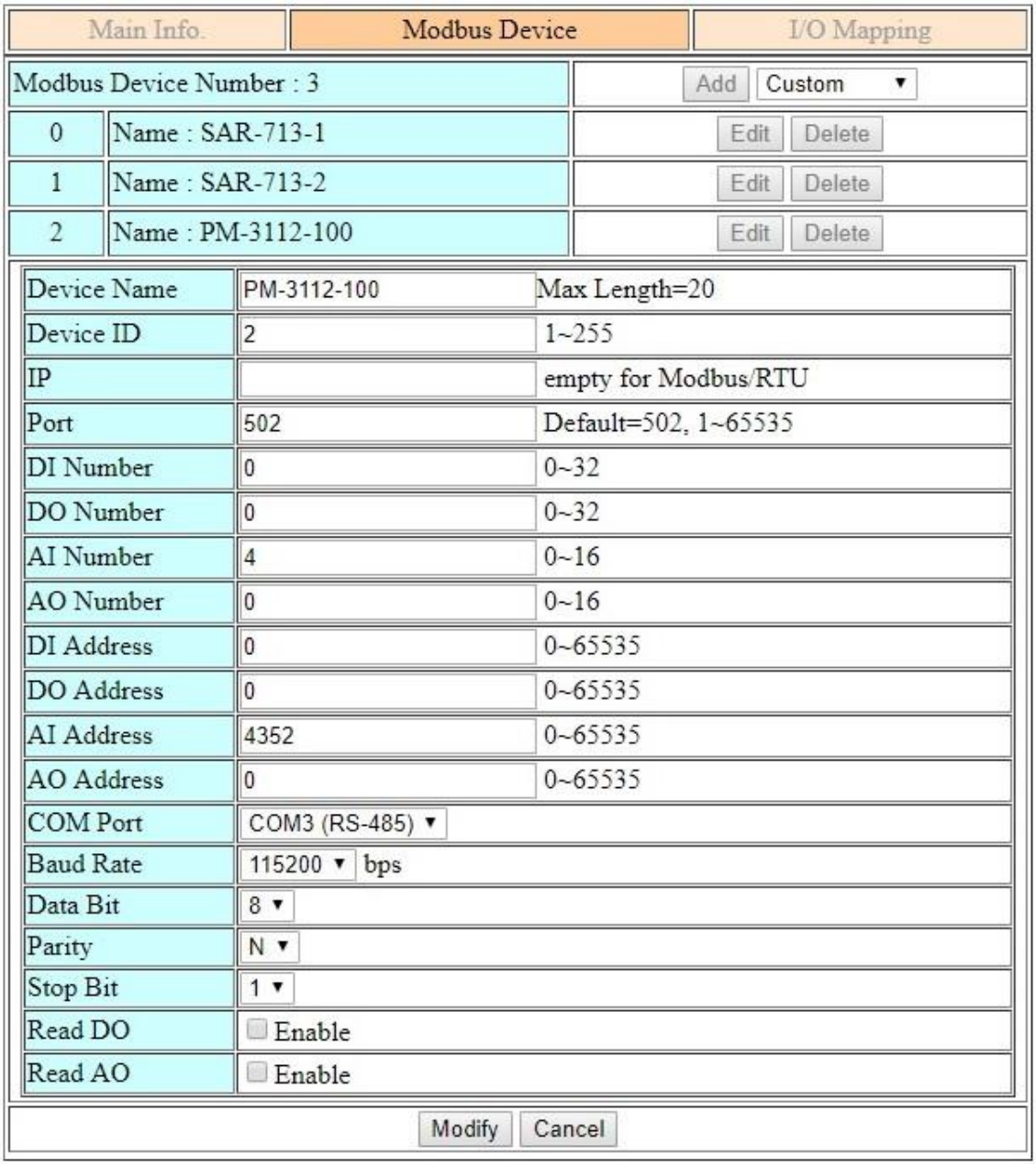
In this example, the user want to use the two AO values of SAR-713, but their Modbus addresses are not consecutive. We split the SAR-713 settings into two Modbus settings, as shown below:



For the first setting to read 1 AO at AO address 9 and the second setting to read 1 AO at address 11. In addition, The AO of SAR-713 is required, so "Read AO" should also be enabled.



The settings of PM-3112 are as follows, there are 4 AIs that need to be read:



Main Info.	Modbus Device	I/O Mapping

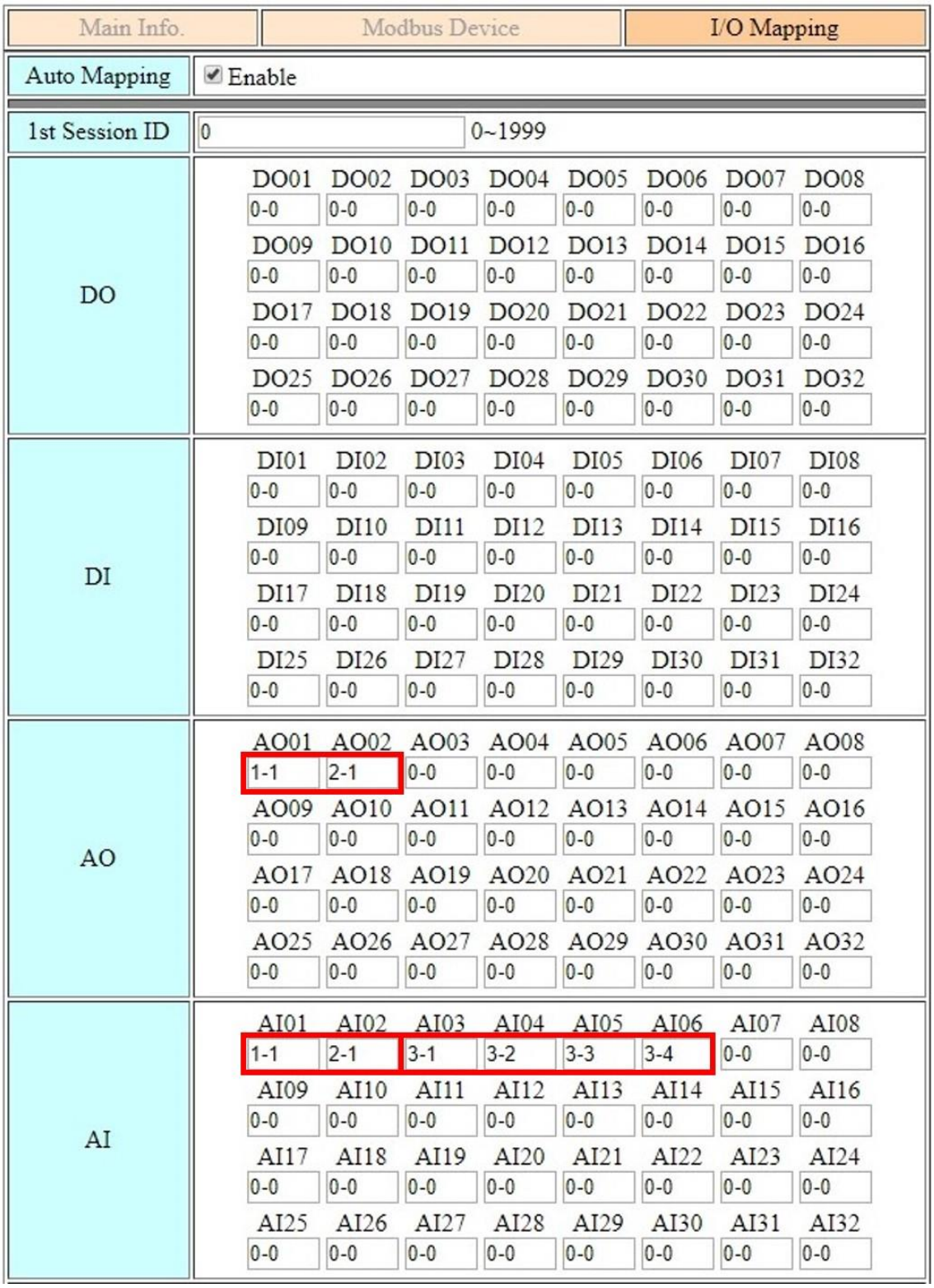
Modbus Device Number : 3		Add Custom ▼
0	Name : SAR-713-1	Edit Delete
1	Name : SAR-713-2	Edit Delete
2	Name : PM-3112-100	Edit Delete

Device Name	PM-3112-100	Max Length=20
Device ID	2	1~255
IP		empty for Modbus/RTU
Port	502	Default=502, 1~65535
DI Number	0	0~32
DO Number	0	0~32
AI Number	4	0~16
AO Number	0	0~16
DI Address	0	0~65535
DO Address	0	0~65535
AI Address	4352	0~65535
AO Address	0	0~65535
COM Port	COM3 (RS-485) ▼	
Baud Rate	115200 ▼ bps	
Data Bit	8 ▼	
Parity	N ▼	
Stop Bit	1 ▼	
Read DO	☐ Enable	
Read AO	☐ Enable	

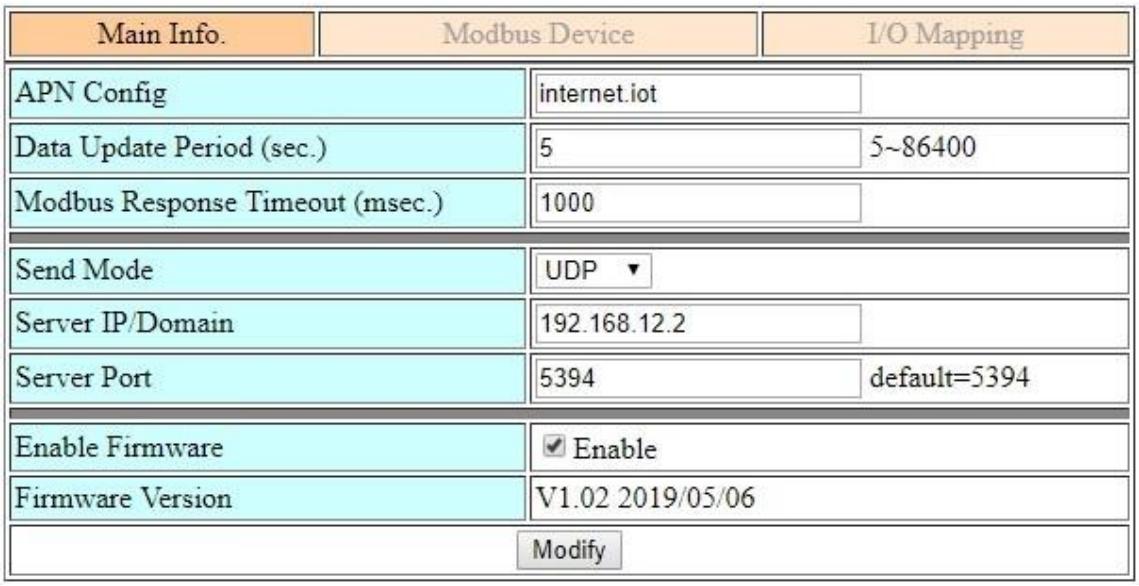
Modify Cancel

(3) Set I / O mapping table:

A. Fill in the "Session ID" to let NB-DA Server identify this device.
B. Because SAR-713 enables "Read AO", the AO mapping data (“1-1” and “2-1”) also needs to fill in the AI mapping table.
C. The AO mapping data of PM-3112 are "3-1", "3-2", "3-3" and "3-4".



(4) If necessary, fill in the "PIN Code", "APN", "User Name" and "Password".
Fill in the the “Server IP” and “Server Port as the IP and port of NB-DA Server.
After finishing all the settings, press the "Modify" button.



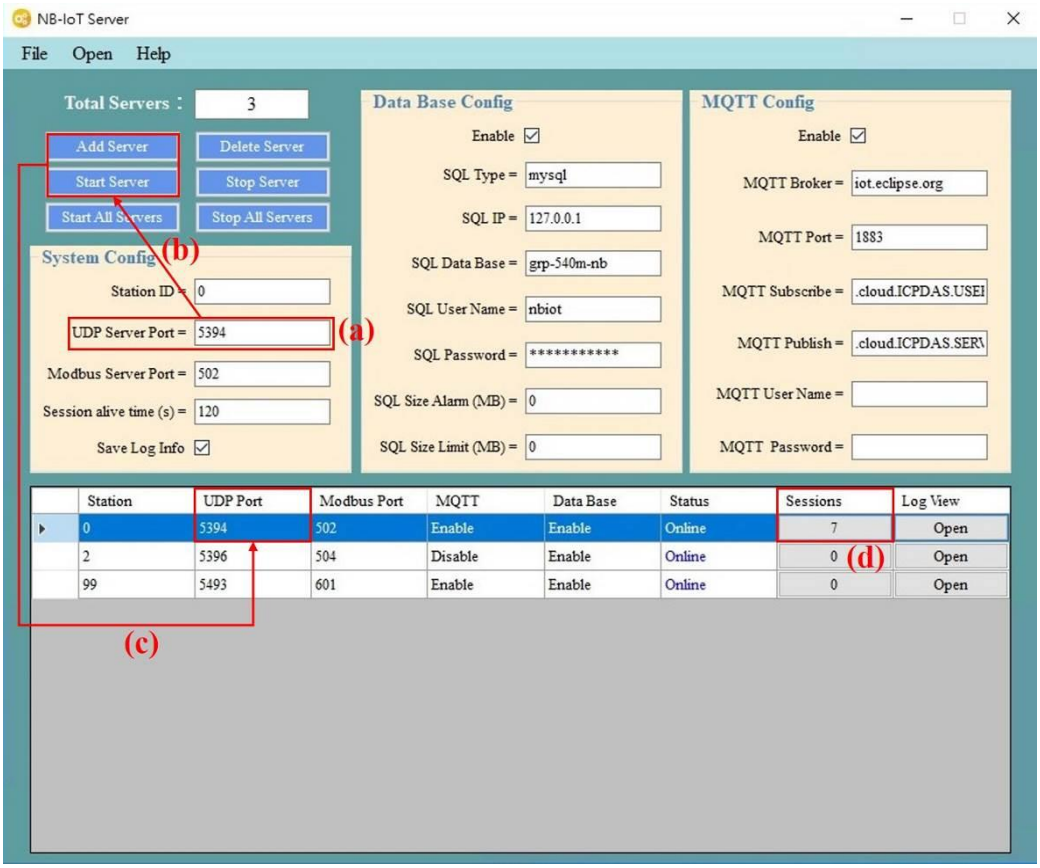
(5) Setting NB-DA Server:

A. Fill in the the “UDP Server Port” as the “Server Port” of the GRP device.

B. After all the settings are ready, click "Add Server".

C. Select th “UDP Port” column, and then click “Start Server”.

D. After the server is started, if data is received from the GRP device, the “Sessions” column will display the session living status.



(6) If data is received and the server opens MQTT or the database, the user can receive the data by accessing the database or subscribing to MQTT topics. The server also creates a Modbus Server by default. The user can use the local IP and the port set on the server to connect to the Modbus Server, and then use Modbus TCP commands to get data.

(7) If the user wants to control the remote DO / AO, the user can modify the value on the Modbus Server or publish DO / AO MQTT messages to the topic subscribed by the NB-DA Server.

・[Server Side] Examples of DO / AO MQTT control messages are as follows:

Publish Topic	Publish Data (example)
[Topic of server subscribe]/ [Station ID]/ [Session ID]/ DO	0001000100010001000100010001000100010001 0001000100010001000000000000
[Topic of server subscribe]/ [Station ID]/ [Session ID]/ AO	0000000100020003000400050006000700080 0009001000110012001300140015001600170 0018001900200021002200230024002500260 0027000000000000000000

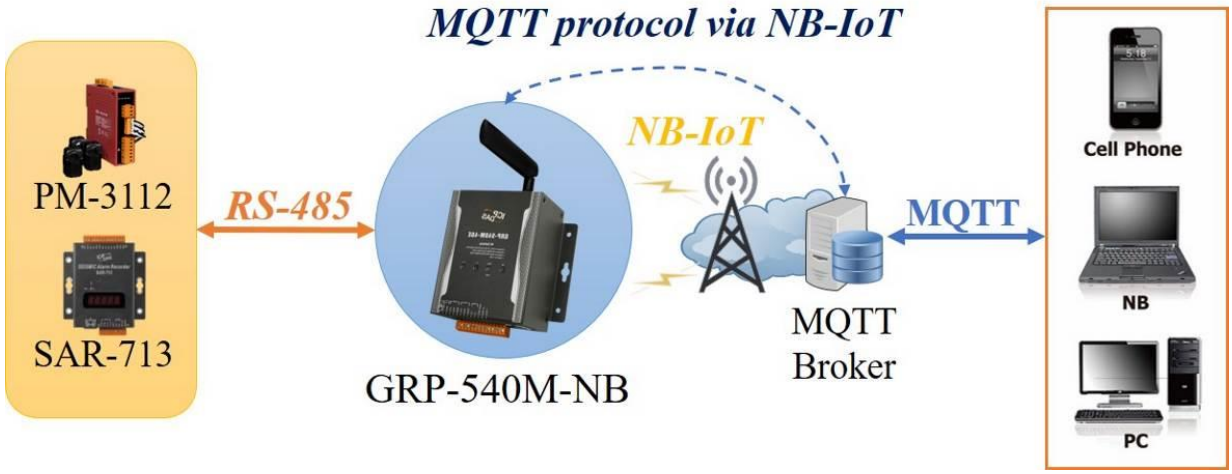
- Each DO has 1 byte, in hexadecimal format, the data length must be 32 and “00” is set for empty DO.
- Each AO has 2 bytes, in hexadecimal format, the data length must be 32 and “0000” is set for empty AO.

・[Server Side] The DEVINFO / DI / AI / GPS / ACK data like below:

- DEVINFO data include RSRP, ECL, SNR, and Battery level.
- Each DO has 1 byte, in hexadecimal format, the data length must be 32 and “00” is set for empty DO.
- Each AO has 2 bytes, in hexadecimal format, the data length must be 32 and “0000” is set for empty AO.
- GPS data is the "$GPRMC" message of NMEA 0183 protocol.

6.10 Data Collection and Remote Control (MQTT Broker)

This example shows an application for data collection and remote control through an MQTT broker. There are PM-3112 and SAR-713 in this system.



(1) Please connect the device (PM-3112 and SAR-713) to serial port of the GRP device. The baudrate of the device is 115200 bps and the data format is 8N1.

(2) Add Modbus devices in the "Modbus Devices" tab (same as example 6.9).

(3) Fill in the I / O mapping table (same as example 6.9).

Main Info.	Modbus Device	I/O Mapping

APN Config	internet.iot	
Data Update Period (sec.)	5	5~86400
Modbus Response Timeout (msec.)	1000	
Send Mode	MQTT ▾	
Server IP/Domain	iot.eclipse.org	
Server Port	1883	default=1883
Buffer Size	512	default=512
Keep Alive	1000	default=1000, 0~65535
MQTT Version	3	default=3, can set 3 or 4
User Name		if have user name
Password		if have password
1st Session		
Subscribe DO	.cloud.ICPDAS.USER/0/0/D(	
Subscribe AO	.cloud.ICPDAS.USER/0/0/A(	
Publish DEVINFO	.cloud.ICPDAS.UE/0/0/DEVI	
Publish DI	.cloud.ICPDAS.UE/0/0/DI	
Publish AI	.cloud.ICPDAS.UE/0/0/AI	
Publish GPS	.cloud.ICPDAS.UE/0/0/GPS	
Publish ACK	.cloud.ICPDAS.UE/0/0/ACK	ACK for DO/AO
Use CHT platform	☐ Enable	
CHT Device ID		if use CHT platform
CHT Sensor ID		if use CHT platform
2nd Session		
Subscribe DO	.cloud.ICPDAS.USER/0/1/D(	
Subscribe AO	.cloud.ICPDAS.USER/0/1/A(	
Publish DEVINFO	.cloud.ICPDAS.UE/0/1/DEVI	
Publish DI	.cloud.ICPDAS.UE/0/1/DI	
Publish AI	.cloud.ICPDAS.UE/0/1/AI	
Publish GPS	.cloud.ICPDAS.UE/0/1/GPS	
Publish ACK	.cloud.ICPDAS.UE/0/1/ACK	ACK for DO/AO
Use CHT platform	☐ Enable	
CHT Device ID		if use CHT platform
CHT Sensor ID		if use CHT platform
Enable Firmware	☑ Enable	
Firmware Version	V1.02 2019/05/06	

Modify

(4) If necessary, fill in the "PIN Code", "APN", "User Name" and "Password".
Fill in the the “Server IP” and “Server Port as the IP and port of MQTT Broker.
After finishing all the settings, press the "Modify" button.

(5) If the user uses the CHT IoT platform, the user also needs to fill in the "Username", "Password", "Device ID" and "Sensor ID", and then enable "Use CHT Platform".

・[GRP Device Side] Examples of DO/AO MQTT control messages for are as follows:

Publish Topic	Publish Data (example)
Set by user for DO	0001000100010001000100010001000100010001
Set by user for AO	0000000100020003000400050006000700080009 0020002100220023002400250026002700280029

- Each DO has 1 byte, in hexadecimal format, the data length must be 32 and “00” is set for empty DO.
- Each AO has 2 bytes, in hexadecimal format, the data length must be 32 and “0000” is set for empty AO.
- Must include "Session ID/Type" at the end of the topic, such as ".cloud.ICPDAS.USER/0/0/DO”.

・[GRP Device Side] Examples of DEVINFO/DI/AI/GPS/ACK datas are as follows:

Publish Topic	Publish Data (example)
DEVINFO	-80,0,16,0
DI	0001000100010001000100010001000100010001000100010001 0000000000000
AI	0000000100020003000400050006000700080009001000110012 0013001400150016001700180019002000210022002300240025 0026002700000000000000000
GPS	$GPRMC:083559.00:A:4717:11437:N:00833:91522:E:0.004: 77.52:091202:::A*57
ACK	DO_ACK

- Each DO has 1 byte, in hexadecimal format, the data length must be 32.
- Each AO has 2 bytes, in hexadecimal format, the data length must be 32.
- GPS data is “$GPRMC” message of NMEA 0183 protocol.
- ACK data is published by GRP when it received DO/AO control message.

・[GRP Device Side with CHT IoT Platform] Examples of DO/AO MQTT control messages for are as follows:

- ■ Each DO has 1 byte, in hexadecimal format, the data length must be 32.
- ■ Each AO has 2 bytes, in hexadecimal format, the data length must be 32.
- ■ Must include "Session ID/Type" at the end of the topic, such as ".cloud.ICPDAS.USER/0/0/DO".

Publish Topic	Publish Data (example)
DO	[SessionID]/DO/00010001000100010001000100010001000100010001
AO	[SessionID]/AO/0000000100020003000400050006000700080009 0020002100220023002400250026002700280029

・ [GRP Device Side with CHT IoT Platform] Examples of DEVINFO/DI/AI/GPS/ACK datas are as follows:

Publish Topic	Publish Data (example)
DEVINFO	-80,0,16,0
DI	[SessionID]/DI/0001000100010001000100010001000100010001000100010001 0001000000000000
AI	[SessionID]/AI/0000000100020003000400050006000700080009001000110012001300140015001600170018001900200021002200230024002500260027000000000000000000
GPS	$GPRMC:083559.00:A:4717:11437:N:00833:91522:E:0.004 :77.52:091202:::A*57
ACK	DO_ACK

- ■ Each DO has 1 byte, in hexadecimal format, the data length must be 32.
- ■ Each AO has 2 bytes, in hexadecimal format, the data length must be 32.
- ■ GPS data is “$GPRMC” message of NMEA 0183 protocol.
- ■ ACK data is published by GRP when it received DO/AO control message.

Appendix A. Revision History

This chapter provides revision history information to this document.

The table below shows the revision history.

Version	Date	Description of changes
1.0.0	2021-10-05	The First Release Revision.
1.0.1	2021-11-01	Update DDNS table picture. Add DHCP Server and GPS Information.