RTU Firmware

for G-4510/4514 series

Warranty

All products manufactured by ICP DAS are warranted against defective materials for a period of one year from the date of delivery to the original purchaser.

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1. Introduction

1.1 Overview

The G-451x series RTU is an intelligent Active 2G/3G/4G Remote Terminal Unit which is built-in the specified firmware in G-451x series. Within the high-performance CPU, the G-451x series RTU can handle a large of data and are suit for the hard industrial environment. They feature 2G/3G/4G module, Ethernet interface, optional GPS module, 3 digital inputs, 3 digital outputs, 8 analog inputs, 1 relay output, 1 RS-232 and 1 RS-485 ports. That can be used in various application fields to transfer data by 2G/3G/4G or Ethernet. G-451x series RTU is suited for Remote data acquisition in various harsh environments.

It is designed for communicating with Modbus RTU devices and provides active data transmission via 2G/3G/4G connections. Except for the Modbus RTU's data, the built-in I/O and GPS data also can be transferred to RTU Center software by the defined period or DI/AI trigger. With the built-in redundancy communication paths of 2G/3G/4G and Ethernet in G-451x series RTU, the data would be guaranteed to transfer to host. When 2G/3G/4G or Ethernet connects failed, it will immediately switch to a different connection method in order to achieve data monitoring sustainability. Furthermore, G-451x series RTU provides simple I/O linkage control and the built-in I/O recorders in SD card.

We also offer M2M RTU center software with a user-friendly graphical interface for easy management of 2G/3G/4G RTU products. Users can monitor I/O data and status of 2G/3G/4G RTU devices through the PC interface. By using the M2M RTU API tool and M2M RTU center software, any remote monitoring system can be easily and efficiently implemented.
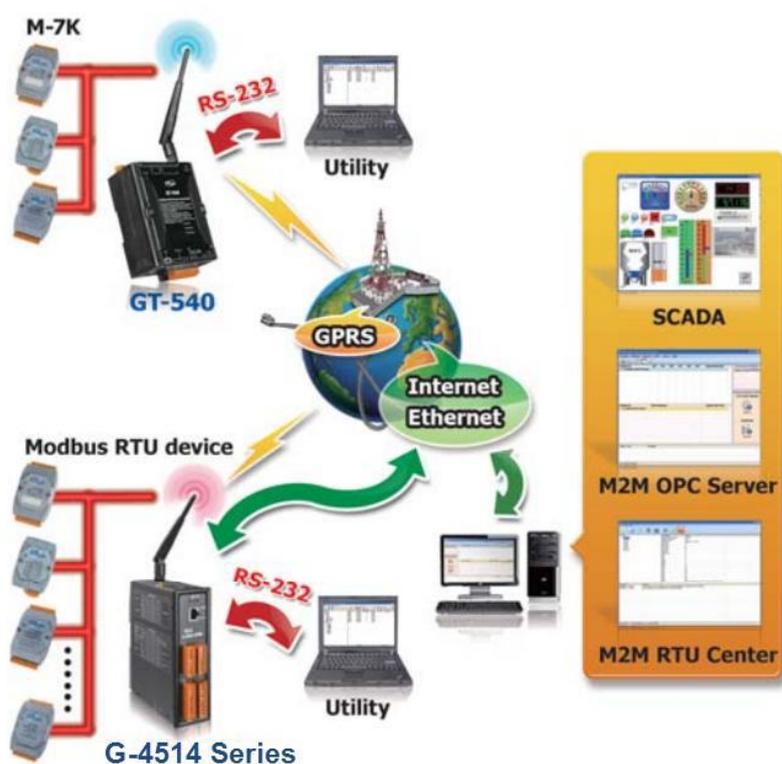
▶ **Easy to establish 2G/3G/4G network applications**

It is a big headache for engineers to establish the 2G/3G/4G applications because the dynamic IP management is required. Applying G-451x series RTU and M2M RTU center software, the dynamic IP addresses can be managed between them. The remote 2G/3G/4G RTU product would connect to M2M RTU Center automatically. Therefore, all remote 2G/3G/4G RTU devices can be managed by s single centralized M2M RTU Center software with a fixed IP address. Moreover, there are M2M API tool and OPC server for engineers to develop the 2G/3G/4G applications by VB, VC or SCADA development tools conveniently without any IP address management effort.

▶ **Active data transmission**

G-451x series RTU devices with active I/O transmission mechanism can raise the communication. Unlike the traditional poll communication, G-451x series RTU would transfer the data by the defined time, DI trigger or AI hi/lo alarm. In addition to improve the way of communication, that can also reduce the AP effort.

▶ **Redundant communication paths in GPRS and Ethernet**

There are 2G/3G/4G and Ethernet communication interfaces in G-451x series RTU. Through the setting in G-4500 RTU Utility, you can set the primary and backup paths to communicate with M2M RTU Center. When the primary path is failed, G-451x series RTU can use the backup path to communicate to M2M RTU Center to ensure the data can transfer to PC. That can raise the reliability of communication effectively.

▶ **Modbus RTU device connectivity**

The G-451x series RTU is built-in Modbus RTU protocol. That can make any Modbus RTU device connect to G-451x series RTU. By the way of G-451x series RTU, Modbus RTU devices can be used in 2G/3G/4G remote system.

▶ **Simple Local I/O link Control**

There are I/O built-in 2G/3G/4G RTU devices of ICP DAS. Therefore, these products can be the 2G/3G/4G I/O devices. Expect for these local I/O data can be sent to the host PC, the I/O link function of them help users to do the simple control in local field. For example: the DI trigger or high/low AI alarm can driver the DO channel.

▶ **Simple Local I/O link Control**

2G/3G/4G RTU products provide an external SD interface. Users can set which built-in I/O need to record in SD memory card for one day in a single file.

1.2 Features

- Automatic/continuous 2G/3G/4G Link Management
- Support Modbus RTU protocol to connect to Max 10 Modbus RTU devices via RS-485 port
- Support M2M OPC server for SCADA system
- Easy-to-use API tool for users to develop their applications by various program development tools
- Built-in I/O make 2G/3G/4G RTU be the 2G/3G/4G I/O devices
- Support LCD display in G-4514/4510 (P)D-4G series
- I/O data recorded in SD card
- Ethernet and 2G/3G/4G redundant communication paths
- Local I/O linkage function to make the simple local control
- Power supply 10 ~ 30 VDC

1.3 Communication and Software Architecture

The cellular service provider often assigned dynamic IP with private IP address on 2G/3G/4G network. That often causes the problem of communication with the host PC in most traditional solutions. To resolve this issue, they often use the high-cost public, static IP addresses for each device, DDNS solution, or buy VPN service. Instead of the above solutions, ICP DAS provides the active transmission method in G-451x series RTU devices. Each G-451x series RTU device would register and send data to M2M RTU Center automatically. That just needs a fixed IP in the Host PC for M2M RTU Center and M2M OPC server or other program can exchange data with M2M RTU Center. It is a good way to eliminate the IP management issue for users than the traditional solution.
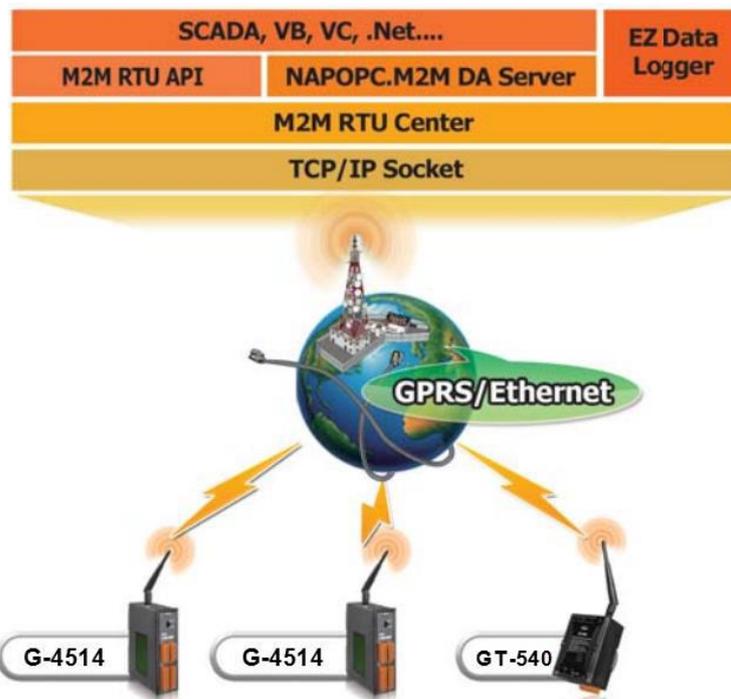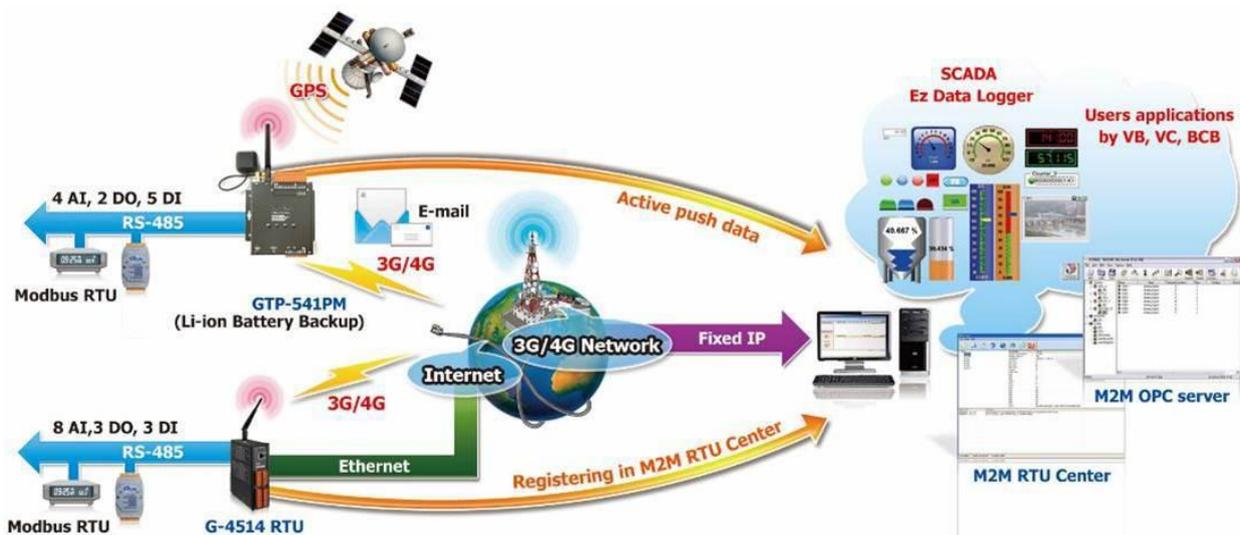
1.4 Applications

- Energy Management
- HVAC & Refrigeration
- Security & Access Control
- Vehicle tracking system

- Remote Control/Monitor System
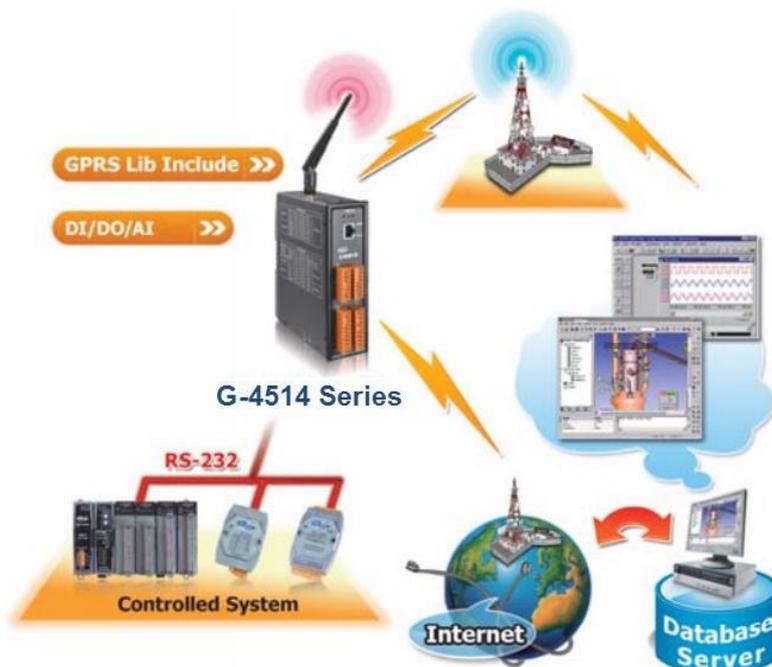
● Redundant Communication System
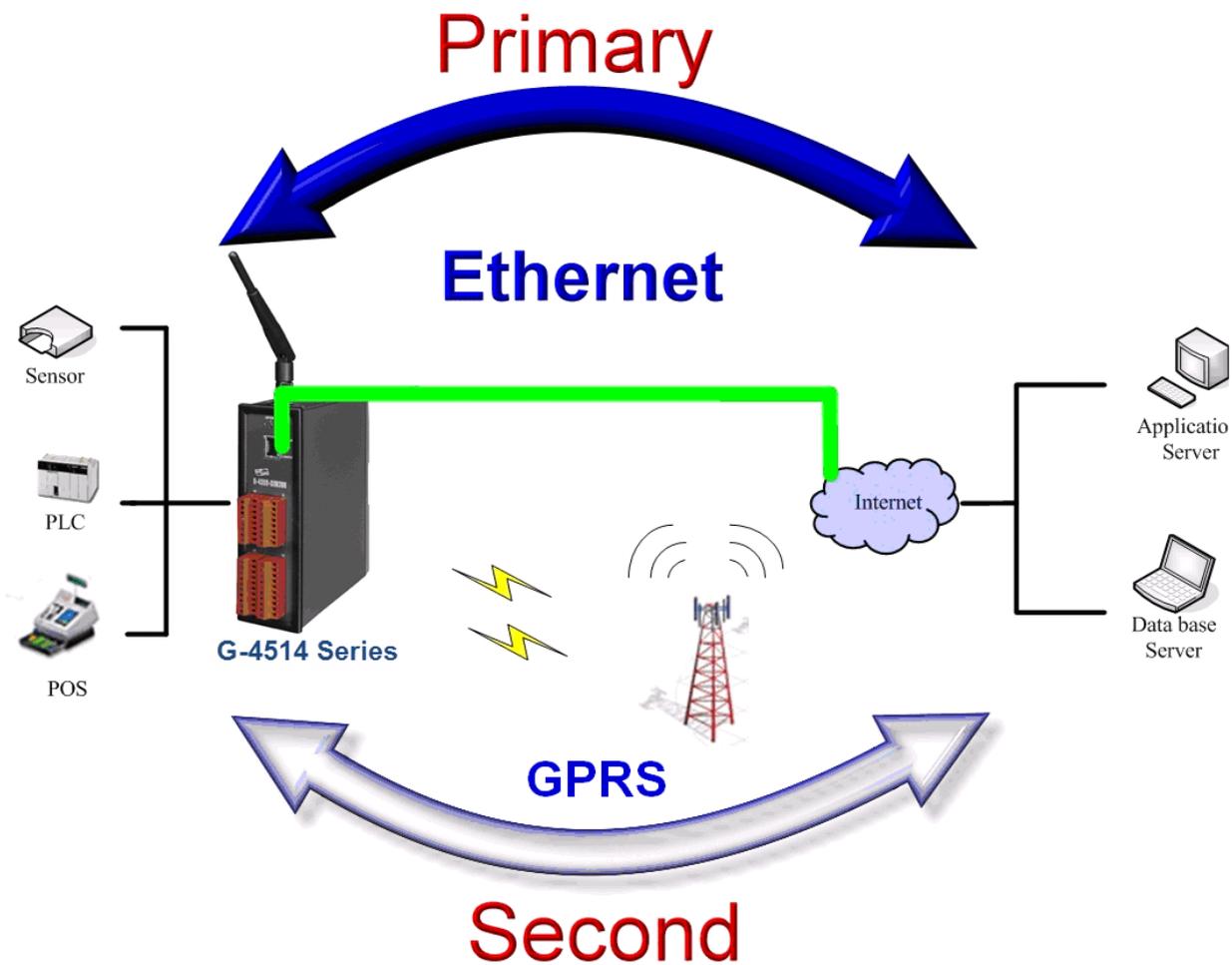
1.5 How to use G-451x Series RTU
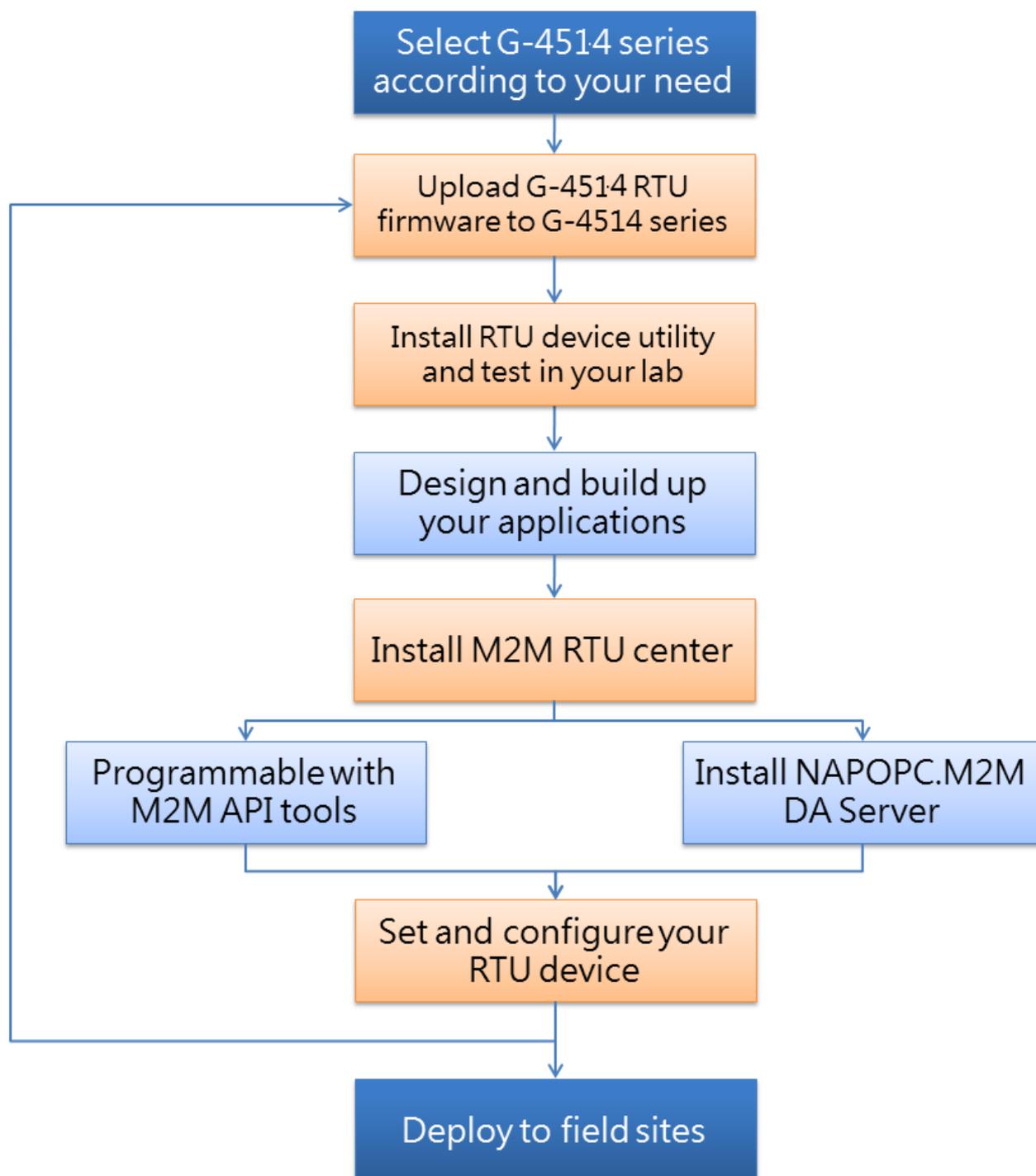
2. Hardware

2.1 Supported Product

The G-451x series RTU is an intelligent Active 2G/3G/4G Remote Terminal Unit which is built-in the specified firmware in G-451x series.

Product Type	Description
G-4514-4GAU CR	4G WCDMA Power Saving PAC with Solar charger (RoHS)
G-4514D-4GAU CR	4G WCDMA Power Saving PAC with Solar charger and LCD display (RoHS)
G-4514P-4GAU CR	4G WCDMA Power Saving PAC with Solar charger and GPS Function (RoHS)
G-4514PD-4GAU CR	4G WCDMA Power Saving PAC with Solar charger, LCD display and GPS Function (RoHS)
G-4510 CR	Power Saving PAC with Solar charger and optional communication module (RoHS)
G-4510D CR	Power Saving PAC with Solar charger, LCD display and optional communication module (RoHS)

| Product Type	Description
M2M RTU Center	The RTU Center supports the G-4500 RTU, GT-540 and other RTU products in ICP DAS that allow users to manage these RTU devices remotely
M2M Device Manager	It is convenient to manage M2M devices remotely, and provides users with the convenience of managing multiple M2M devices at the same time.
NAPOPC.M2MDA Server	ICP DAS NAPOPC.M2M DA Server is an OPC software package operated as an OPC driver of a HMI or SCADA system.

2.2 Pin Assignments

G-4514(D) / **G-4514P(D)**

LED Indicators: N/A, 4G, Sys, Fault, Charge
LED Indicators: GPS, 4G, Sys, Fault, Charge

CN2 Pin Assignment

	AI7	Pin 16	Pin 8	AGND	Analog Ground
	AI6	Pin 15	Pin 7	AGND	
	AI5	Pin 14	Pin 6	AGND	
Analog Input	AI4	Pin 13	Pin 5	AGND	
0 ~ +20 mA	AI3	Pin 12	Pin 4	DI2	Digital Input
	AI2	Pin 11	Pin 3	DI1	
	AI1	Pin 10	Pin 2	DI0	
	AI0	Pin 9	Pin 1	U2 DI	MCU2 Input

CN1 Pin Assignment

|					
	RL.NC	Pin 20	Pin 10	DO.PWR	Digital Output
MCU2 Output	RL.COM	Pin 19	Pin 9	DO2	
	RL.NO	Pin 18	Pin 8	DO1	
	CTS1	Pin 17	Pin 7	DO0	
COM1 RS-232	RTS1	Pin 16	Pin 6	D+	COM2 RS-485
	RxD1	Pin 15	Pin 5	D-	
	TxD1	Pin 14	Pin 4	GND	Ground For COM1
Power Input:	DC.+VS	Pin 13	Pin 3	BAT.+VS	12V Lead Acid
+10 ~ +30 VDC	DC.GND	Pin 12	Pin 2	BAT.+GND	Battery
	N/A	Pin 11	Pin 1	F.G.	Frame Ground

Front View

Front View

2.3 Operation Mode Switch

Operation Mode Switch		
RUN	OS can execute autoexec.bat	
	Flash can be read/write.	
Lock	OS can execute autoexec.bat	
	Flash is read only (lock).	
INIT	OS can not execute autoexec.bat	
	Flash can be read/write.	

2.4 Wire Connection

➢ Digital Input Wire Connection

Input Type	ON State DI value as **0**	OFF State DI value as **1**
Relay Contact		
TTL/CMOS Logic		
Open Collector		
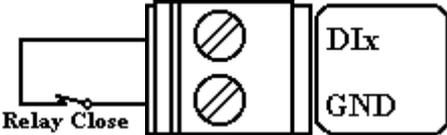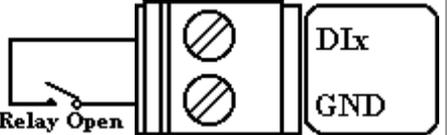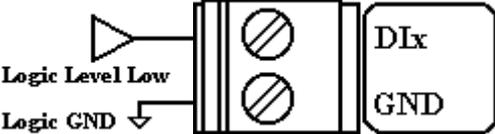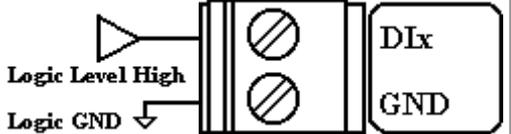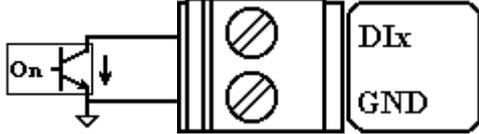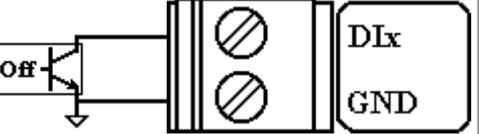
➢ Digital Output Wire Connection

Input Type	ON State DO value as 1	OFF State DO value as 0
Drive Relay		
Resistance Load		
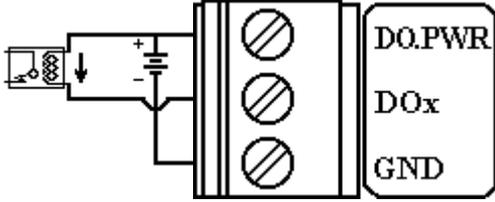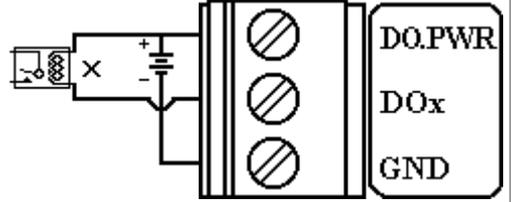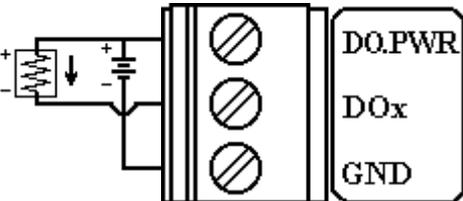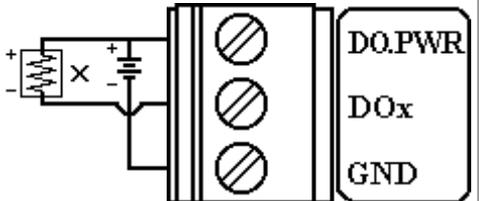
➢ Current Input Wire Connection

➢ Relay Wire connection

Relay Output ON	Relay Output OFF
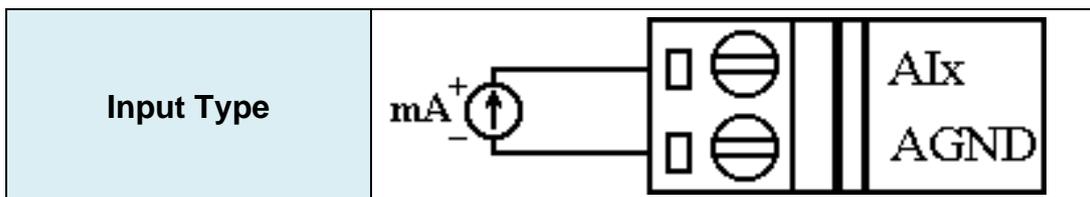
2.5 LED Indicators
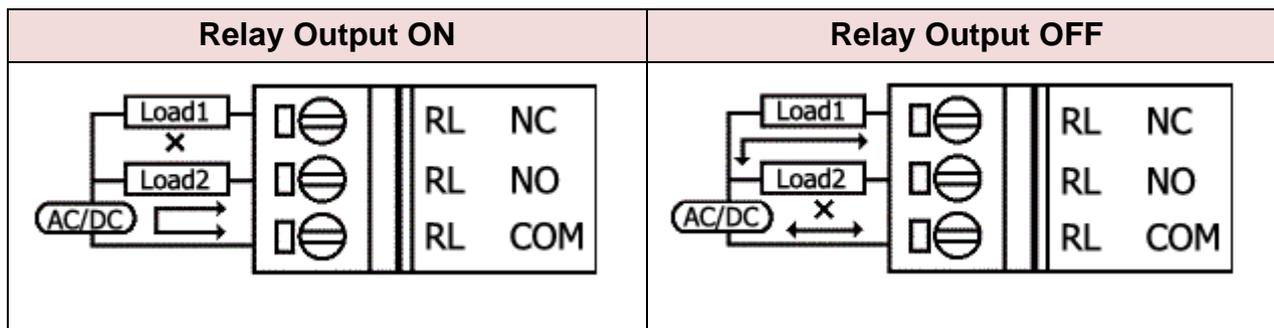
Without GPS　　　　　　　　　　　　　　　　**With GPS**
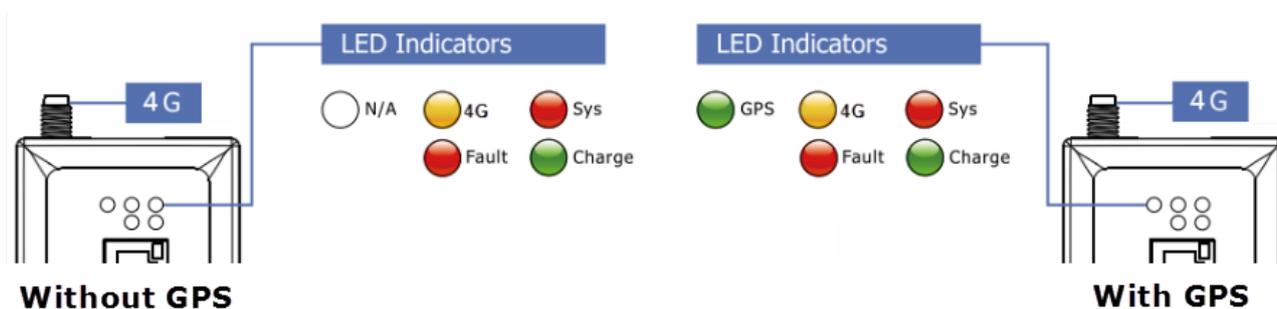
There are five LED indicators to help users to judge the various conditions of G-451X SERIES Series. The description is as follows：

A. **Sys** (Red)：System LED is to indicate if the G-451x Series RTU is normal or fail.

Connected	Linking	4G module fail or hardware initialization	PIN code error
Blinking (1 sec)	Blinking (2 sec)	Always ON	Blinking (50 ms)

B. **4G** (Yellow)：The modem LED can indicate the status of 4G module.

Normal	Abnormal	Data transmission
ON 2 sec OFF 1 sec	OFF	Blinking (0.2 sec)
	ON 1 sec OFF 2 sec	

C. **GPS** (Green)(Option)：The GPS LED can indicate the status of GPS module.

GPS Fail	Search GPS	Receive GPS data
Always OFF	Always ON	Blinking (1 sec)

D. **Charging** (Green)：Charging status indicator.

Charging	Not Charging
Always ON	Always OFF

E. **Fault** (Red)：Charging Fault indicator.

Normal	Fault
Always OFF	Always ON

2.6 Hardware Connection

When users want to use G-451X series RTU, they need to upload RTU firmware to G-451x series hardware. There are 2 kinds of interfaces which are RS-232 and Ethernet ports to download the firmware. Use the COM Port of Host PC connects to G-451x series with cable CA-0910. Please refer to the below picture.
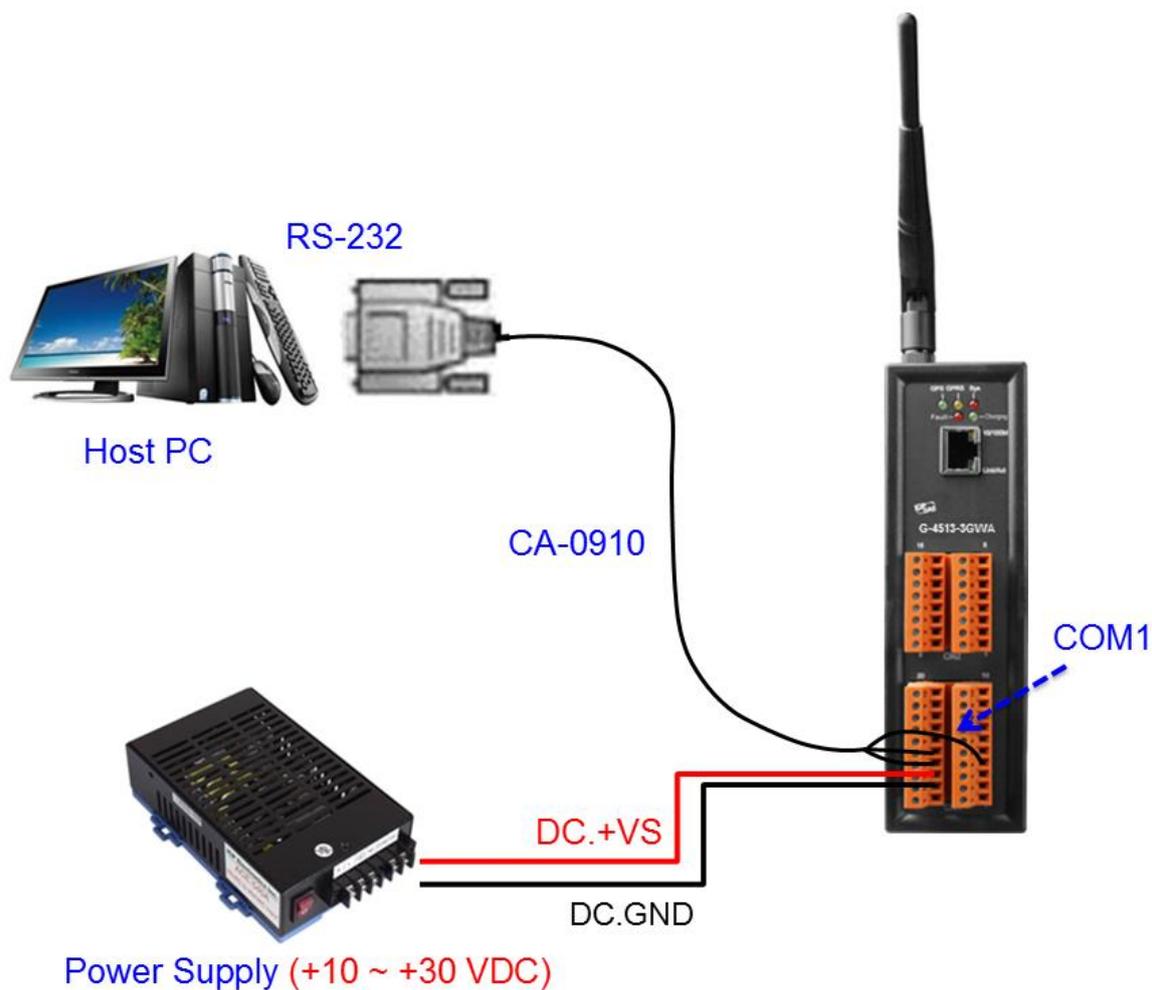

● Turn the dip switch to INIT mode and restart the G-451x series power.

2.7 Modbus Device Wire Connection

Devices provides Modbus RTU Master Protocol to connect to Modbus RTU Devices by RS-485 port (COM2) of G-451x series.
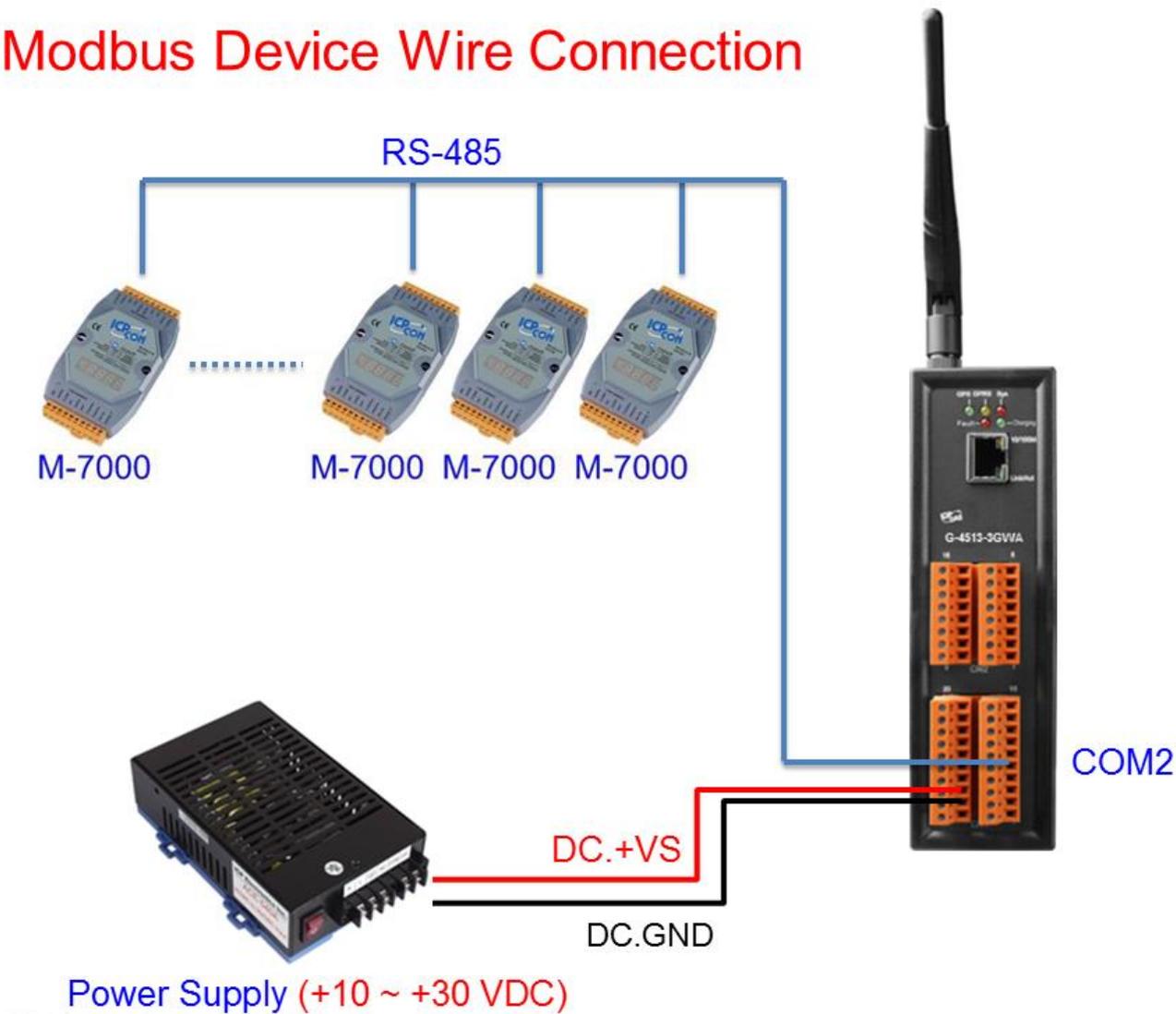
3. Upload Firmware

● Download the MiniOS7 Utility software
http://ftp.icpdas.com/pub/cd/8000cd/napdos/minios7/utility/minios7_utility/

● MiniOS7 Utility user's manual
http://ftp.icpdas.com/pub/cd/8000cd/napdos/minios7/utility/minios7_utility/minios7_utility.pdf

● Download G-451x Series RTU Firmware
https://www.icpdas.com/en/download/show.php?num=7999&model=G-4510D

FILE NAME	VERSION	FILE DATE	SIZE	NOTE	
G-451x_RTU_firmware_EC2x	v1.21	2022-12-12			💾
G-451x_SMSIO_firmware_EC2x		2022-05-04			💾
G-451x_NBIOT_firmware_BG9x		2022-05-04			💾

(1) RTU Firmware files are located at ..\software\firmware

| 名稱	修改日期	類型
G-451x_RTU_v1.40.4	2024/2/21 上午 09:32	檔案資料夾
readme.txt	2022/12/8 下午 12:05	文字文件

(2) RTU Utility are located at ..\software\utility

| 名稱	修改日期	類型
G-451x_RTU_Utility_v1.05.exe	2024/2/20 下午 04:22	應用程式
icpdas_mdev.ini	2010/7/21 下午 01:01	組態設定

3.1 Upload Firmware to G-451x Series via COM Port

(1) Choose Menu Bar > Connection, and click new connection
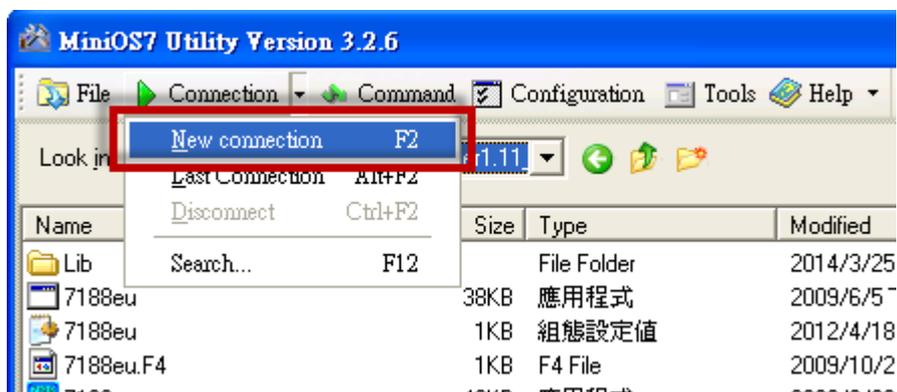

(2) Select your number of COM port
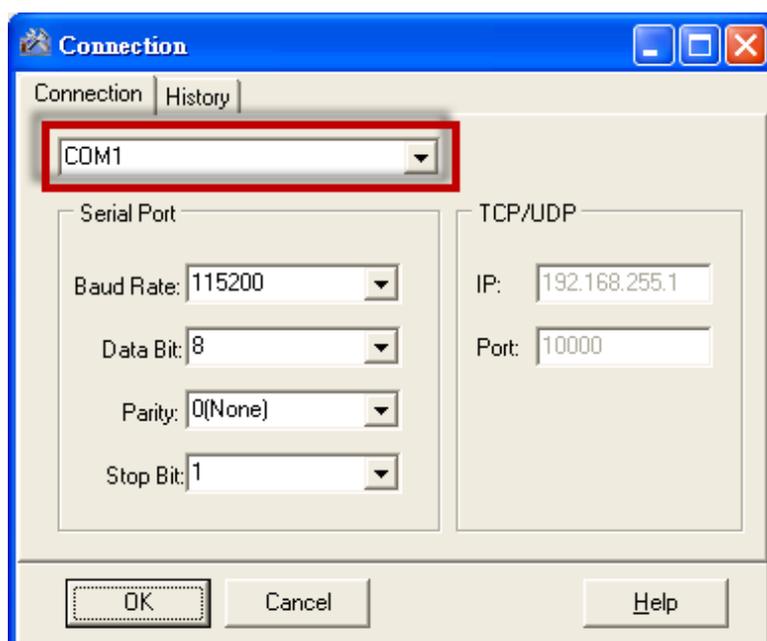
Com port parameters (Fixed)

Baud Rate	115200
Data Bit	8
Parity	0 (None)
Stop Bit	1

(3) Choose Menu Bar > Command, and click "Erase Disk"
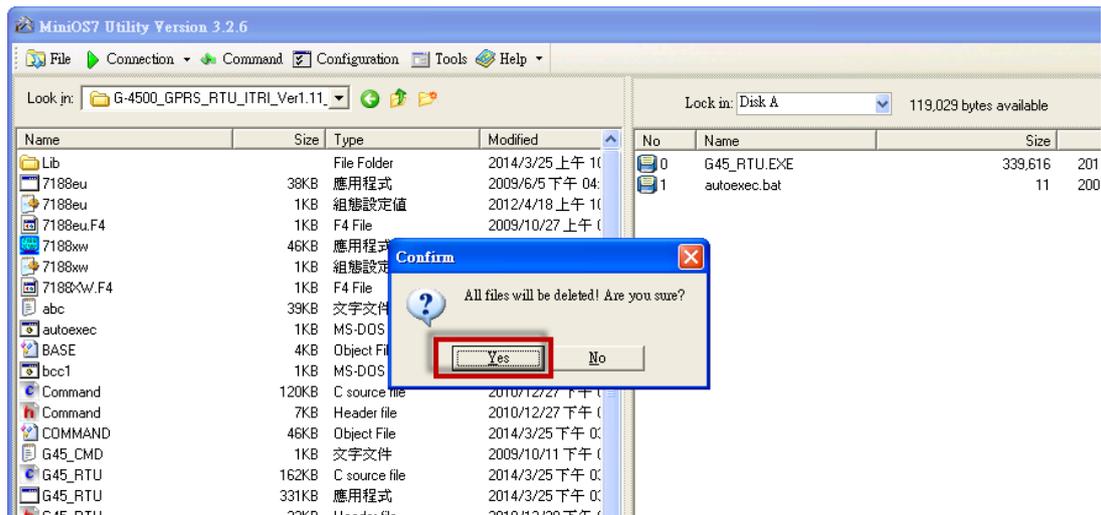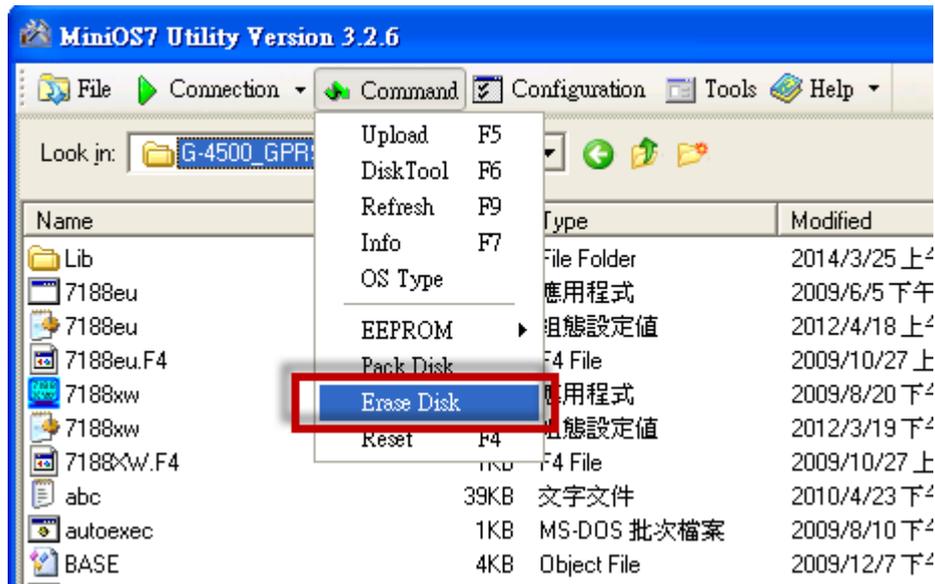
(4) Select the G45_RTU.exe and autoexec.bat, click the "Upload" button to upload the firmware
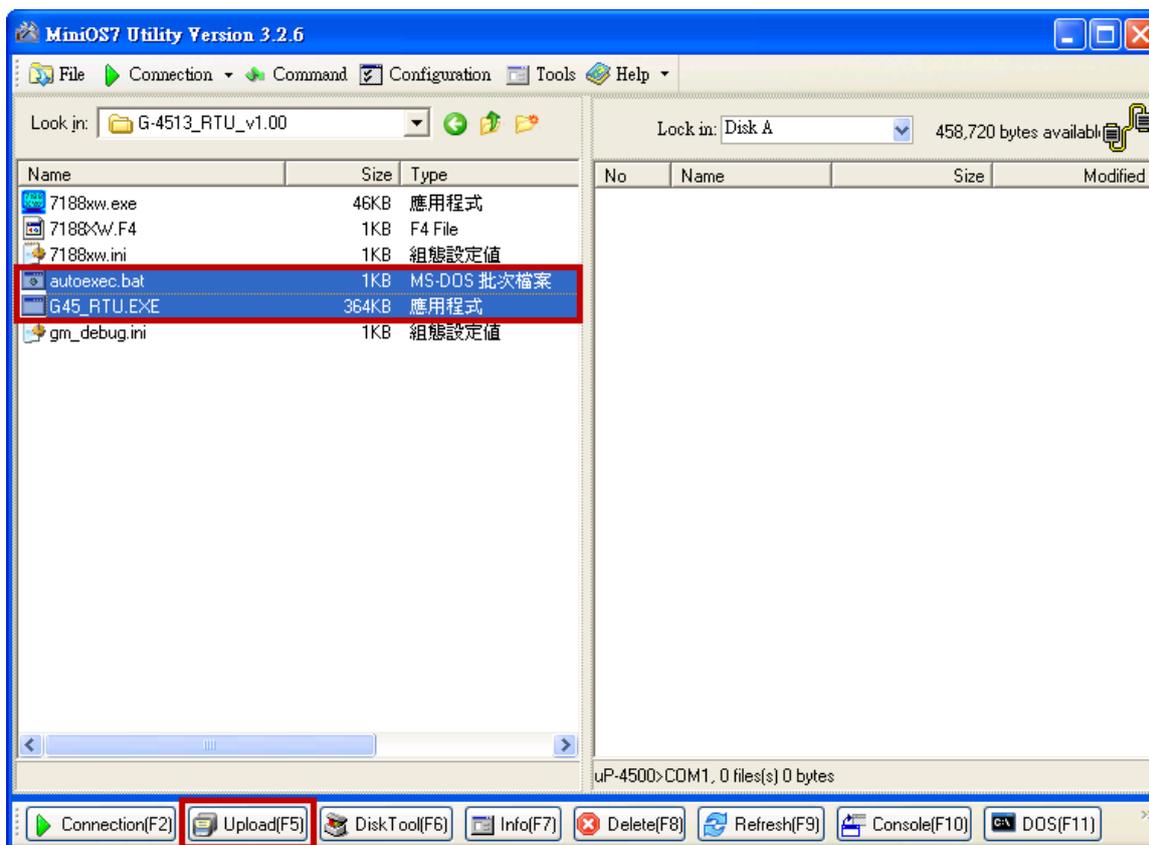
(5) Turn the dip switch to RUN mode and restart the G-451x series power after upload the firmware successfully

3.2 Upload Firmware to G-451x Series via Ethernet

(1) Choose Menu Bar > Connection, and click search

(2) Double-click your G-451x series.
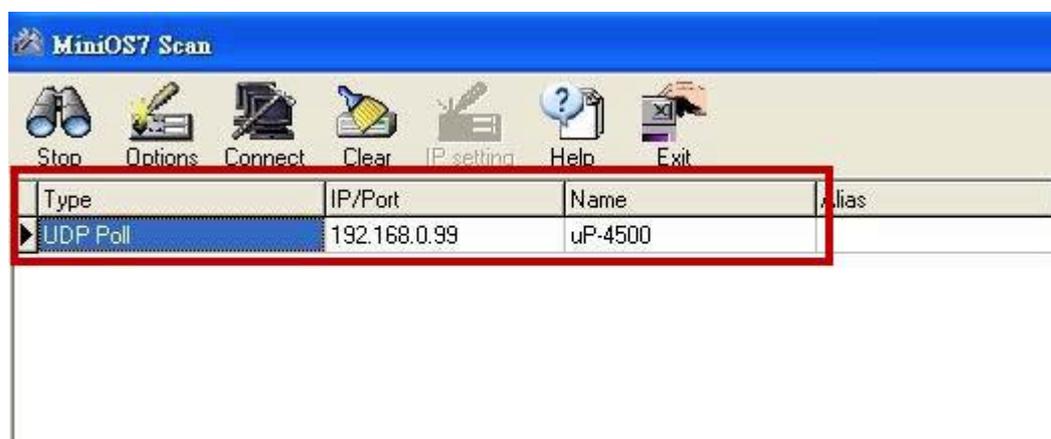
(3) Choose Menu Bar > Command, and click "Erase Disk"
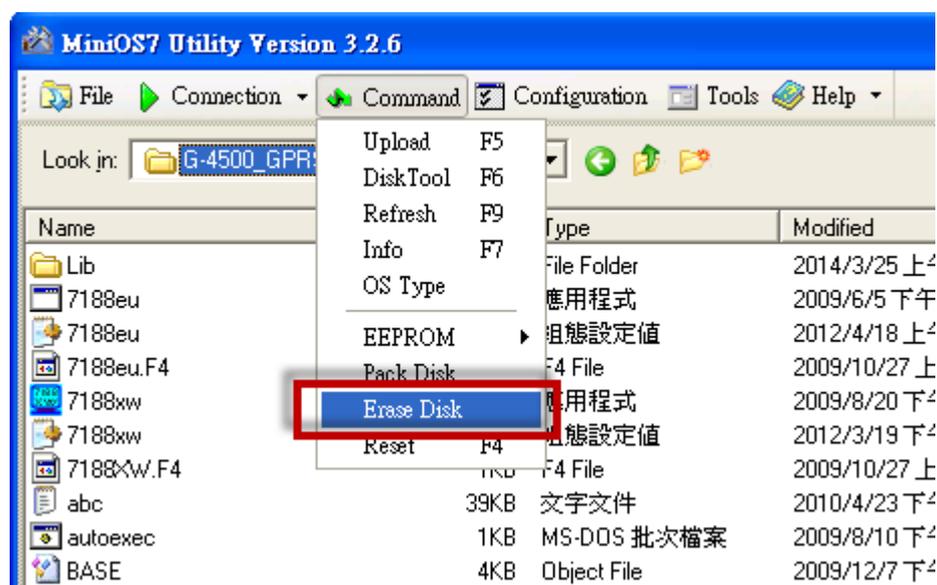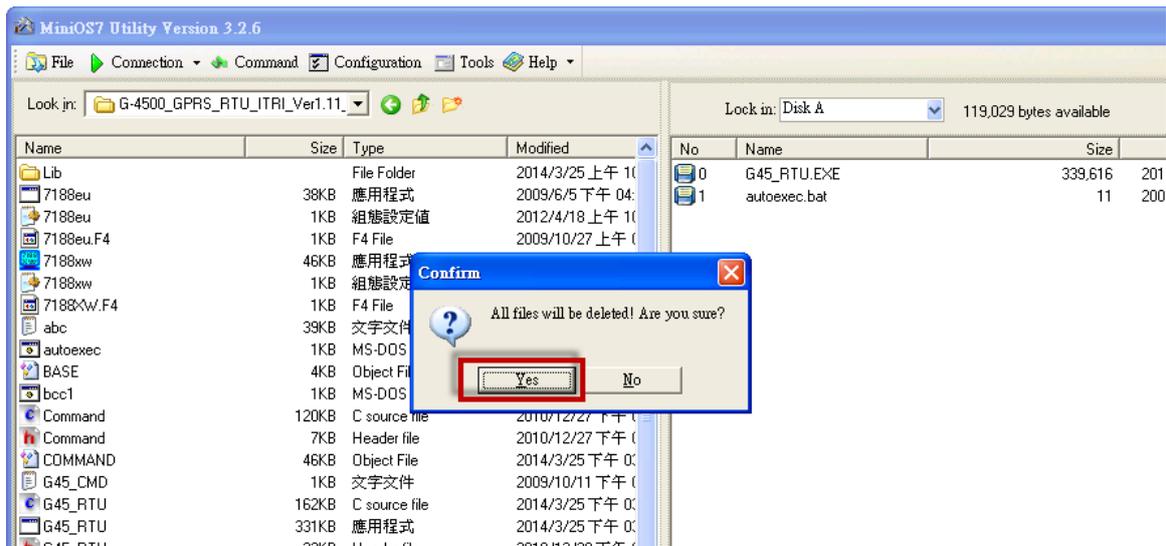
(4) Select the G45_RTU.exe and autoexec.bat, click the "Upload" button to upload the firmware
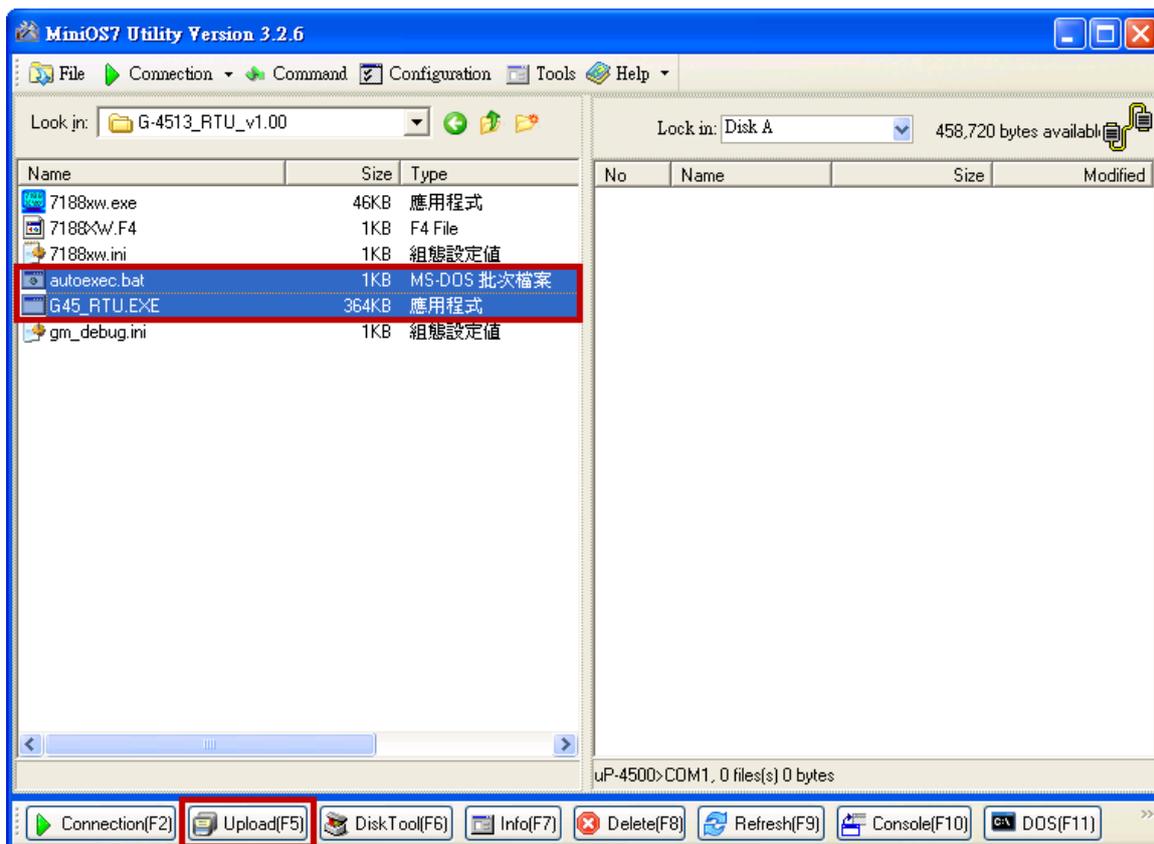
(5) Turn the dip switch to RUN mode and restart the G-451x series power after upload the firmware successfully

4. G-451x RTU Utility Operation

4.1 Installing .NET Compact Framework

You can use Utility to set parameters or view debug messages. It requires a .NET Framework 2.0 or higher runtime environment to execute.NET Framework 2.0 or later can be installed by downloading from the following URL or by directly searching for.

■ Download Microsoft .NET Framework Version 3.5
http://www.microsoft.com/en-us/download/details.aspx?id=21

4.2 Main Menu

The main menu of G-451x series RTU Utility includes the following sections
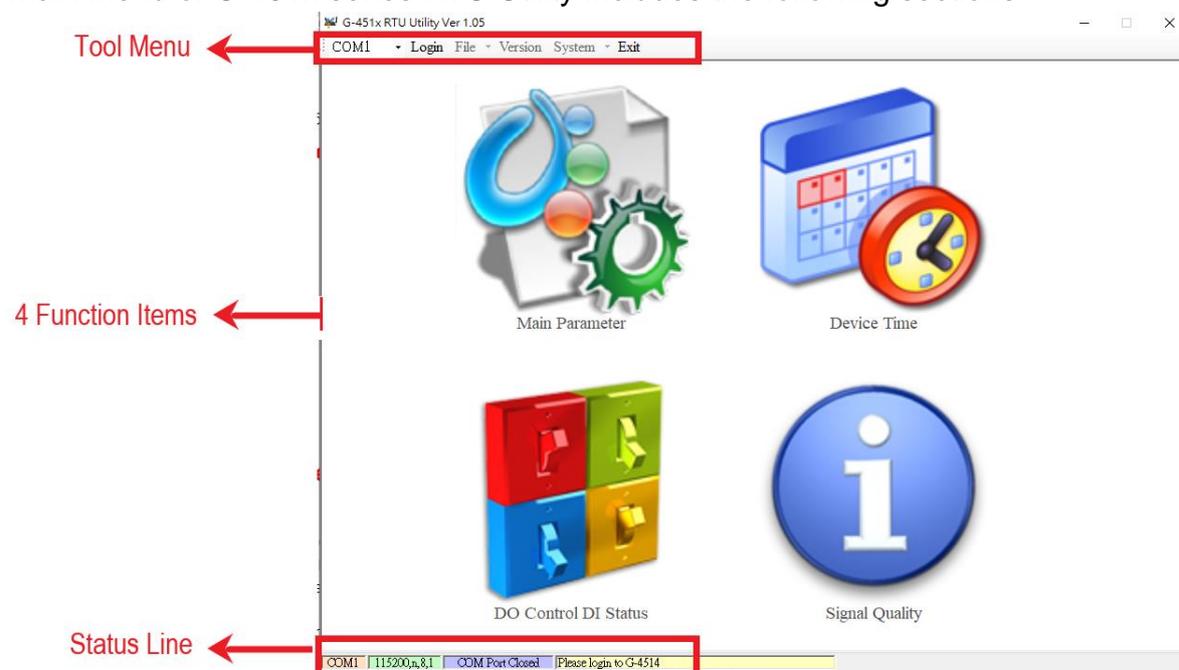
1.Tool Menu

■ **COM:** Set the COM port number in PC connecting to G-451x series

■ **Login/Logout:** Login G-451x series

■ **File:** There are import and export functions in "File" item. The functions would be enabled when "Main parameters" window is open

◆ **Import:** The parameters would be shown in "Main parameters" window from the specific .par file

◆ **Export:** The function can export the parameters as a .par file from the "Main parameters" window.

■ **Version:** Including the firmware and Utility version information

■ **System:** Provide users for recovering G-451x series RTU to factory and resetting

2. Function items

■ **Main Parameter:** The main parameter setting of G-451x series RTU includes Station ID, GPRS Username, GPRS Password, GPRS APN, Remoter server IP, Remote server Port, Local Ethernet IP, Local Ethernet Mask, Local Gateway, 10 Modbus device…etc.

■ **Device Time:** Display and set the RTC time of G-451x series device.

■ **DO Control/DI Status:** Display the status of I/O and control the DO output

■ **Signal Quality:** Show the 2G/3G/4G signal strength

3. Status Line

Show the related information during the operation procedure including

■ The com port number of PC

■ The communication setting of COM Port

■ The status of COM Port

■ The result of Utility operation

4.3 Login

It needs to login into G-451x series RTU to set its parameters. The description is below:

    (1)   Select the COM port number of PC.

    (2)   Press the "login" button
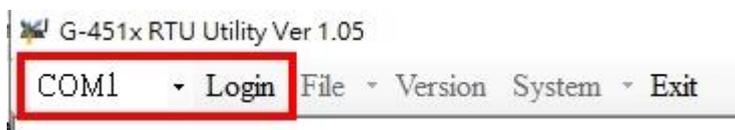
If the pin code in G-451x series RTU is not correct, the SYS led would be blanking per 50 ms and G-4500 utility would ask for users to input PIN or PUK code.

(1) Asking for inputting PIN code

Please enter the correct PIN code. You have a total of 3 attempts. If you enter incorrectly more than 3 times, the SIM card will be locked. Users need to contact the SIM card operator to inquire about the PUK code for unlocking.
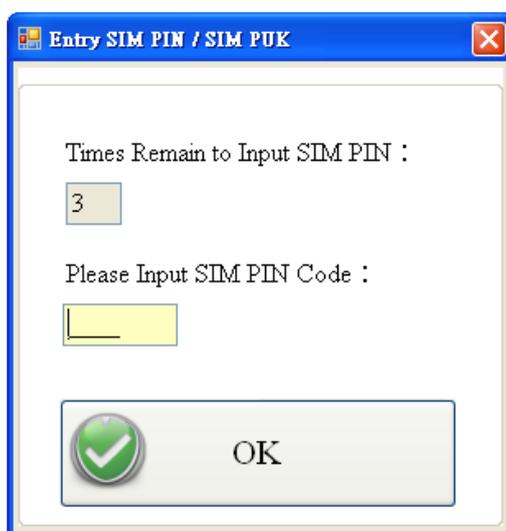

Tips & Warnings

1. The input count will only reset when entered correctly; it will not reset upon device restart or replacement.

2. It is recommended to place the SIM card in a mobile phone for decoding operations first.

(2) Asking for inputting PUK code

Please be sure to confirm the correct PUK code with your SIM card operator before inputting. You have a total of **10** attempts to input the code. If the number of incorrect attempts exceeds the allowed limit, it will result in permanent SIM card deactivation and cannot be used.
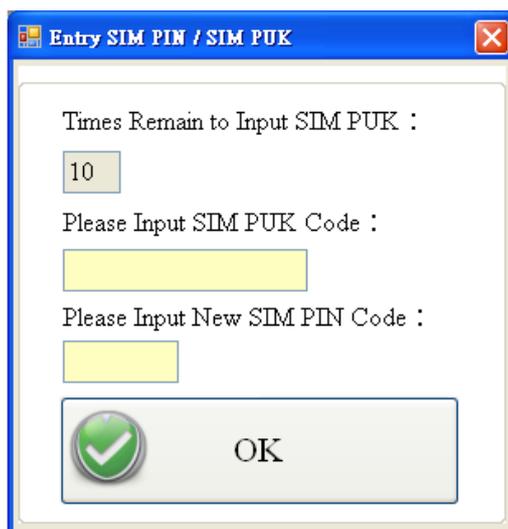
Tips & Warnings

1. The input count will only reset when entered correctly; it will not reset upon device restart or replacement.

2. It is recommended to place the SIM card in a mobile phone for decoding operations first.

4.4 Main Parameter

After configuring those pages, press "Write to Device" button to save these settings to G-451x series RTU. Then, reset G-451x series to enable these settings.

The "Read Form Device" button can help users to read back these settings from G-451x series RTU. In addition, these setting would be read from G-451x series RTU when the "Main Parameter" window pops up from the main menu.

4.4.1 Main Parameters

Parameter	Description
Station ID	The device Station ID would be shown in the RTU Center software. It can identify the different G-451x series device in the Remote OPC Server. (Range: 1 ~ 65535)
Update Time	Set report time interval. The G-451x series RTU will send the data to M2M RTU Center by the update time. (Range: 1 ~ 999999, unit: sec)
Heartbeat Time	Set heartbeat time interval. When the G-451x series update time is too long to terminate the GPRS connection by ISP, the heartbeat time will report smaller package to keep GPRS connection. (Range: 1 ~ 3600, unit: sec) Note: Some ISP companies would terminate the GPRS connection when the GPRS connection has any data flow for some time.

Connect Method	Four methods are supported for G-451x series RTU to connect to Remote server. 1. **Only GPRS** 2. **Only Ethernet** 3. **GPRS Master, Ethernet Slave (Redundancy system)** 4. **Ethernet Master, GPRS Slave (Redundancy system)**
Packet Method	Choose whether to encrypt the packaging. This function only supports RTU_Center v1.33b or above.
Enable GPS	Enable/ Disable GPS function. That would report **$GPRMC** format.
GPRS Username **GPRS Password**	The setting is important factor when connecting to a GPRS network. Check with your GPRS service provider for details.
GPRS APN	**Access point name (APN)** is the name used to identify a general packet radio service (GPRS) bearer service in the GSM mobile network. The APN defines the type of service that is provided in the packet data connection. You can get this APN by ISP. The setting is important factor when connecting to a GPRS network. Check with your GPRS service provider for details.
DNS Server	The **Domain Name System (DNS)** is a hierarchical naming system for computers, services, or any resource connected to the Internet or a private network. You must give this value which is DNS server IP if you want to connect remote server by domain name.
Remote Server	Connect to assignable remote server. It can be remote server's IP or remote server's Domain name.
Remote Server Port	Connect to assignable remote server port.
Modbus Baud Rate	Setting RS-485 Baud Rate (Range: 2400 ~ 115200 bps)
Modbus Parity	Setting RS-485 parity. (0: None,1: Even, 2: Odd)

Modbus Data Bit	Setting RS-485 data bit. (Data Bit: 7/8)
Modbus Stop Bit	Setting RS-485 stop bit. (Stop Bit: 1/2) Note: When Stop Bit is 2, the data bit must be 7 bit
Modbus Time Out	Set the timeout of connecting to Modbus Device. (Range: 1 ~ 65535, unit: sec)
Local Ethernet IP	Local Ethernet IP of the G-451x series
Local Ethernet Mask	Local Ethernet Mask of the G-451x series
Local Ethernet Gateway	Local Ethernet Gateway of the G-451x series
Enable LCD	This setting enables or disables the LCD function of the device. If enabled, the LCD will display device information.
Enable SD	The setting can enable or disable SD function of G-451x series RTU. If enable, the G-451x series record the data into SD card. (Data format is *.csv)
Interval Time of Modbus command	Users can control interval time of Modbus command by themselves. (0 ~ 1000, unit: ms) **0:** Use system default value **Other:** User define

Parameter	Description
Power-Saving Cycle Time	This function calculates the next reboot time after the device is powered on. The cycle time will include Connect Timeout, GPS Timeout, and Control time. (0 ~ 1000, unit: **min**) **0: Disable Power-Saving.** Note: 1. Connect Timeout, GPS Timeout, and Control time are the trigger conditions for entering sleep mode. 2. This time parameter must not be less than the sum of the three parameters: Connect Timeout, GPS Timeout, and Control time.

Connect Timeout	Represents the time when GPRS is not registered or Ethernet is not connected. (30 ~ 65535, Unit: **sec**) Note: The device will determine based on the Connect Method you have selected.
GPS Timeout	Represents the time when GPS is not positioned. (30 ~ 65535, Unit: **sec**) Note: If the GPS function is not enabled, the device will not make a judgment on this.
Control Time	Represents the packet transmission time. (0 ~ 65535, Unit: **sec**) **0: Disable** Note: counting from the start of the first packet.

Tips & Warnings

1. The trigger priority for entering sleep mode is as follows: **Connect Timeout > Control Time > GPS Timeout.**

4.4.2 Local I/O Parameters (I/O Linkage)

● DI linkage
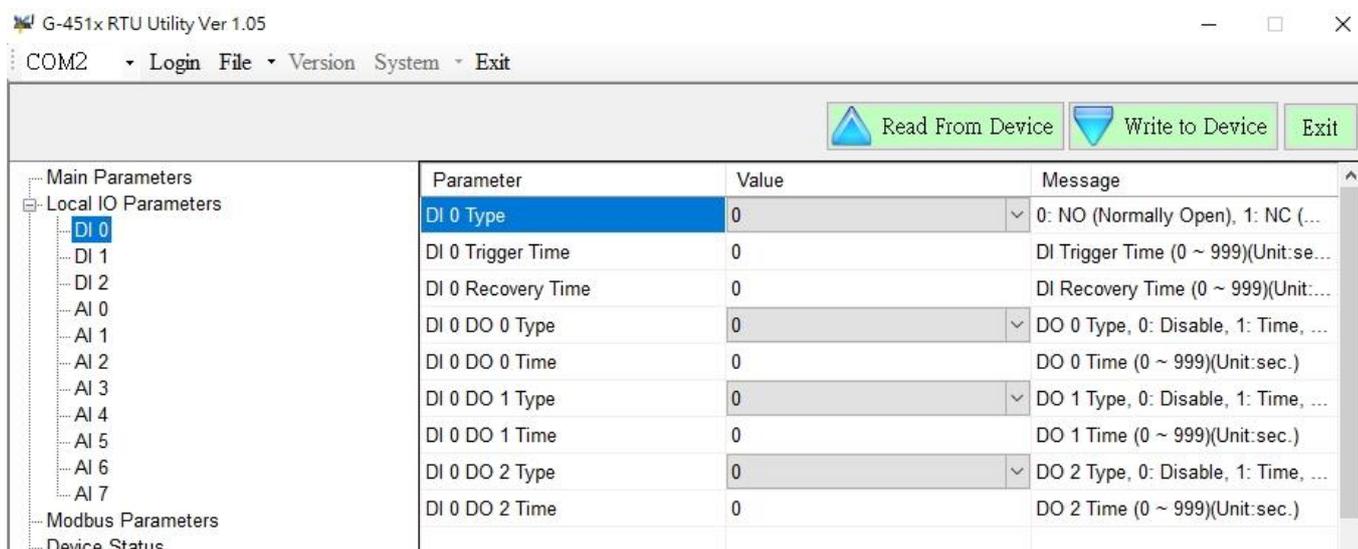
| Parameter	Description
DI Type	**0:** NO (Normally Open) **1:** NC (Normally Close)
DI Trigger Time	Range: 0 ~ 999, unit: sec
DI Recovery Time	Range: 0 ~ 999, unit: sec
DO 0 Type	There are 3 types to set: **0:** Disable, Disable the DO 0 function. **1:** Time, when the DI has different status, the DO 0 would output during DO 0 Time. **2:** State, changes with the DI state
DO 0 Time	DO 0 outputting time (Range: 0 ~ 999, unit: sec)
DO 1 Type	There are 3 types to set: **0:** Disable, Disable the DO 1 function. **1:** Time, when the DI has different status, the DO 1 would output during DO 1 Time. **2:** State, changes with the DI state
DO 1 Time	DO 1 outputting time (Range: 0 ~ 999, unit: sec)
DO 2 Type	There are 3 types to set: **0:** Disable, Disable the DO 2 function. **1:** Time, when the DI has different status, the DO 2

	would output during DO 2 Time. **2:** State, changes with the DI state
DO 2 Time	DO 2 outputting time (Range: 0 ~ 999, unit: sec)

● AI linkage

Parameter	Description
AI n Hi Alarm Value	0 ~ 20 mA
AI n Hi Trigger Time	Range: 0 ~ 999, unit: sec

AI n Hi Recovery Time	Range: 0 ~ 999, unit: sec
AI n Hi Alarm DO 0 Type	There are 3 types to set: **0:** Disable, Disable the DO 0 function. **1:** Time, when the DIn has different status, the DO 0 would output during DO 0 Time. **2:** State, changes with the DI state
AI n Hi Alarm DO 0 Time	DO 0 outputting time (Range: 0 ~ 999, unit: sec)
AI n Hi Alarm DO 1 Type	There are 3 types to set: **0:** Disable, Disable the DO 1 function. **1:** Time, when the DIn has different status, the DO 1 would output during DO 1 Time. **2:** State, changes with the DI state
AI n Hi Alarm DO 1 Time	DO 1 outputting time (Range: 0 ~ 999, unit: sec)
AI n Hi Alarm DO 2 Type	There are 3 types to set: **0:** Disable, Disable the DO 2 function. **1:** Time, when the DIn has different status, the DO 2 would output during DO 2 Time. **2:** State, changes with the DI state
AI n Hi Alarm DO 2 Time	DO 2 outputting time (Range: 0 ~ 999, unit: sec)
AI n Lo Alarm Value	0 ~ 20 mA
AI n Lo Trigger Time	Range: 0 ~ 999, unit: sec
AI n Lo Recovery Time	Range: 0 ~ 999, unit: sec
AI n Lo Alarm DO 0 Type	There are 3 types to set: **0:** Disable, Disable the DO 0 function. **1:** Time, when the DIn has different status, the DO 0 would output during DO 0 Time. **2:** State, changes with the DI state
AI n Lo Alarm DO 0 Time	DO 0 outputting time (Range: 0 ~ 999, unit: sec)
AI n Lo Alarm DO 1 Type	There are 3 types to set: **0:** Disable, Disable the DO 1 function. **1:** Time, when the DIn has different status, the DO 1 would output during DO 1 Time. **2:** State, changes with the DI state
AI n Lo Alarm DO 1 Time	DO 1 outputting time (Range: 0 ~ 999, unit: sec)
AI n Lo Alarm DO 2 Type	There are 3 types to set: **0:** Disable, Disable the DO 2 function. **1:** Time, when the DIn has different status, the DO 2 would output during DO 2 Time.

	2: State, changes with the DI state
AI n Lo Alarm DO 2 Time	DO 2 outputting time (Range: 0 ~ 999, unit: sec)
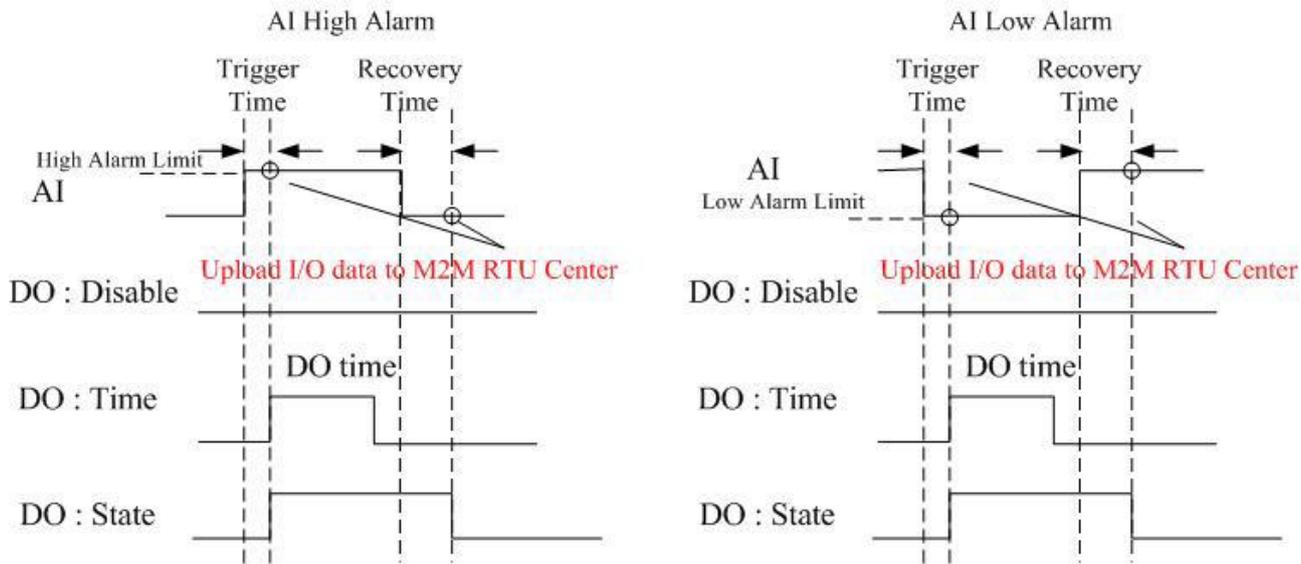
Tips & Warnings

1. The RTU Firmware has added the function to read the device voltage value and stores the parameter in AI 8.

4.4.3 Modbus Parameters

This page can help users configure the parameters of Modbus devices connected to the G-451x series. The maximum number of Modbus devices connected to the G-451x series is 10.

● **Add a new Modbus device**

Parameter	Description
Add button	Add a new Modbus device
Device Name	Select Modbus device Note: If not ICP DAS Modbus product, please select "Custom".
Device Addr.	Modbus device address (Range: 1 ~ 247)
DI Counts	Range: 0 ~ 32
DI Start Addr.	Range: 0 ~ 65535
DO Counts	Range: 0 ~ 32
DO Start Addr.	Range: 0 ~ 65535
AI Counts	Range: 0 ~ 16
AI Start Addr.	Range: 0 ~ 65535
AI Data Format	AI Data Format Note: If not ICP DAS Modbus product, the value is 255
AI Type code	AI Type code
AO Counts	Range: 0 ~ 16
AO Start Addr.	Range: 0 ~ 65535

AO Data Format	AO Data Format
	Note: If not ICP DAS Modbus product, the value is 255
AO Type code	AO Type code

Step 1: Select "**Custom**" or " **Modbus Device for ICPDAS**" in Device Name item

Step 2: Input your device name in User-defined Device Name item (Max. 20 character)

Step 3: After finishing setting a Modbus Device, press "**Add**" button to add the Modbus

device to Utility.
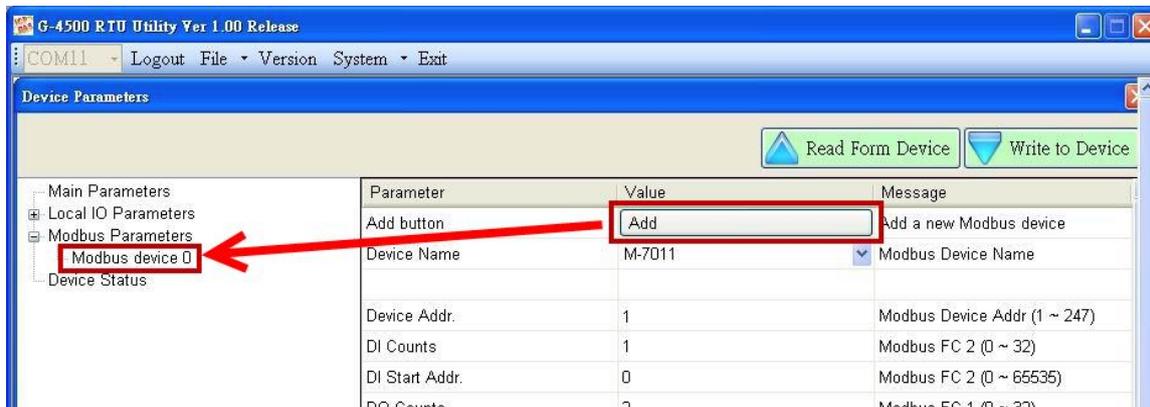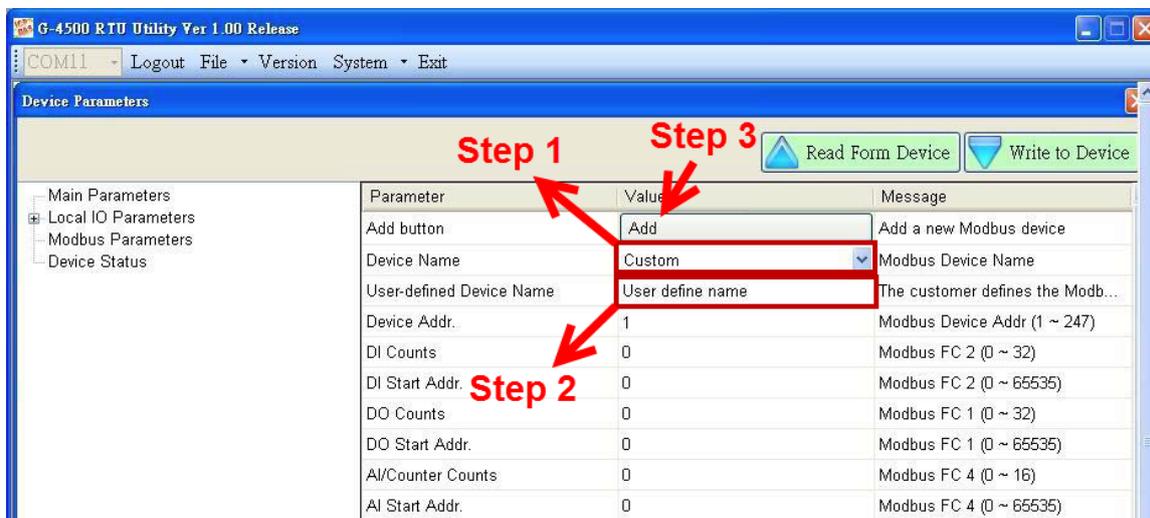
- **Modify a Modbus device**

Step 1: Select the Modbus device you want to modify in the left tree windows.

Step 2: Select the "**Update**" button after modifying your parameters

- **Delete a Modbus device**

Step 1: Select the Modbus device you want to delete

Step 2: Select the "**Del**" button.
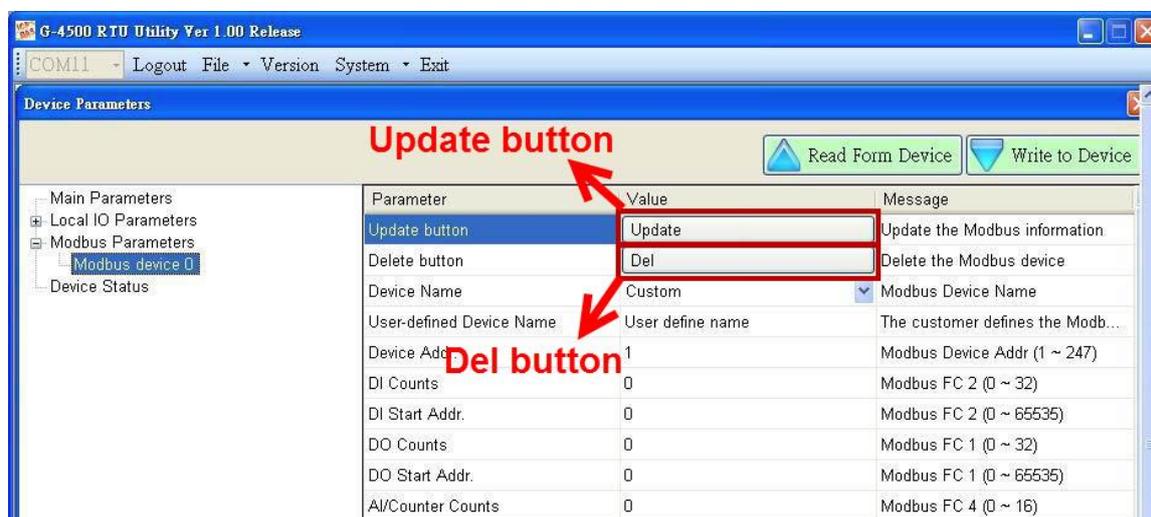
4.4.4 Device Status
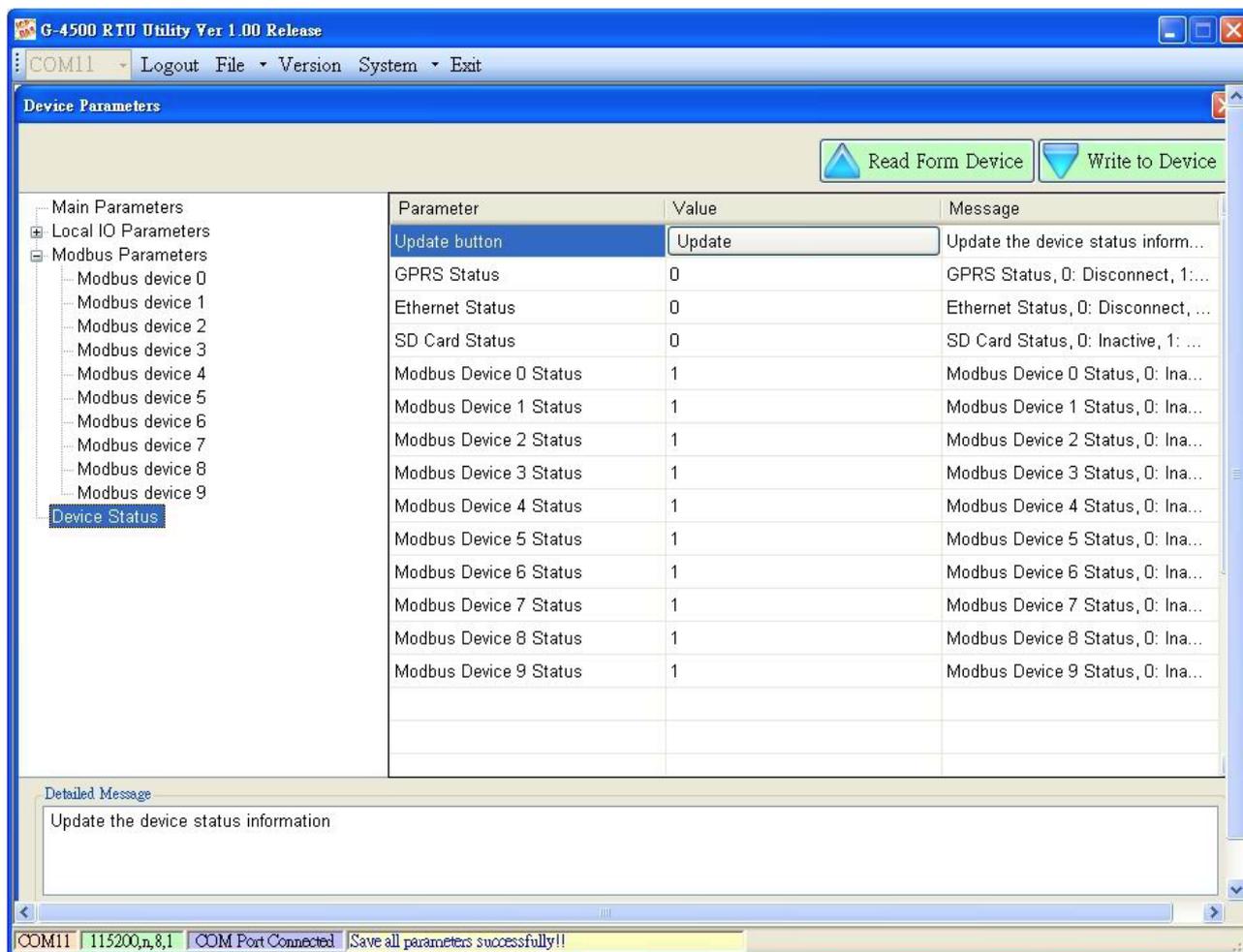
Parameter	Description
Update button	Update the device status information
GPRS Status	0: Disconnect 1: Connect
Ethernet Status	0: Disconnect 1: Connect
SD Card Status	0: Inactive 1: Active
Modbus Device n Status	n: 0 ~ 9 0: Inactive 1: Active

4.5 Import/Export Parameters

Users can use the import and export functions from the menu bar. This function would be enabled when the "Main Parameter" window is open. The explanation is below:
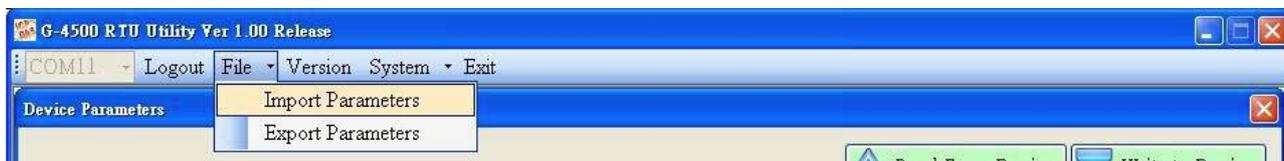
● **Import Parameters**

This function is used for reading back the setting of device parameters from .par file and displaying in "Main parameter" window. When pressing "import" button, a file selection window would pop up for users to choice the .par file.
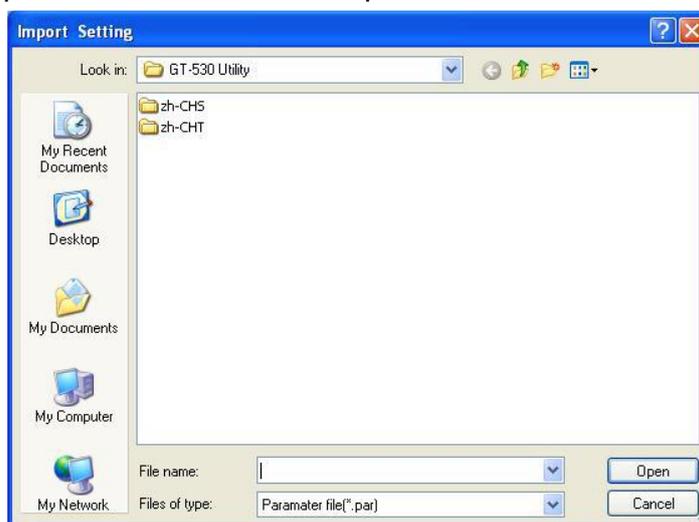
● **Export Parameters**

The function is used for saving the setting of "Main parameter" window as .par file. When pressing "Export" button, a file selection window would pop-up for users to save the setting as .par file in specific path.
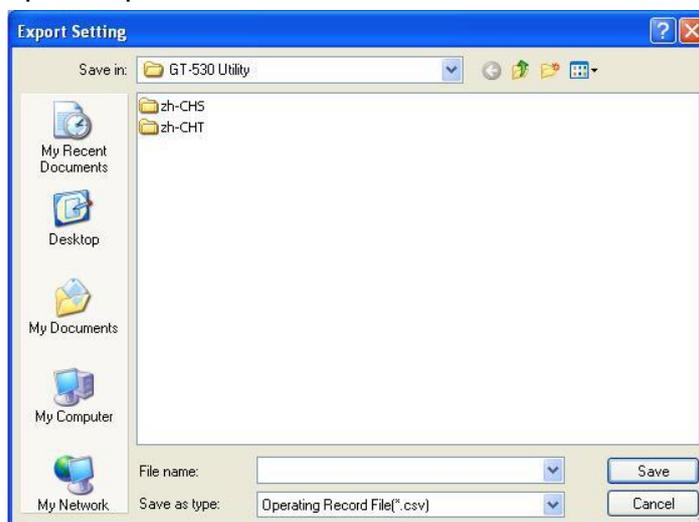
4.6 Device Time

You can change and query the time of the device through this window. The following are the operation options and field descriptions：
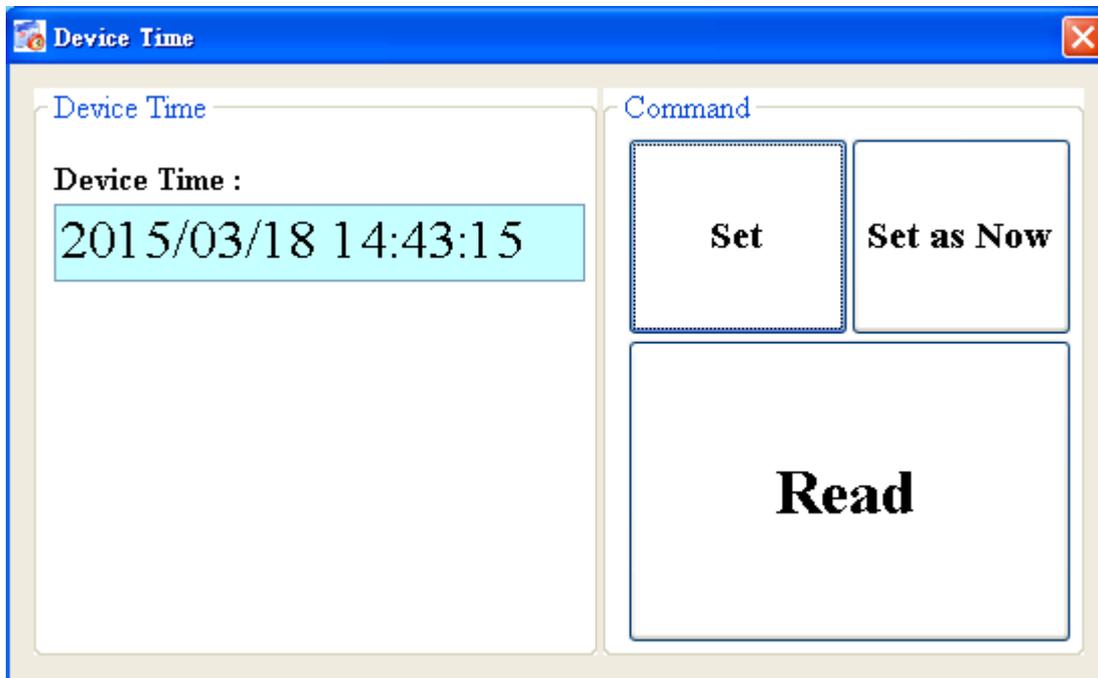
- **Device Time:** Display device time.

- **Set:** The user can enter the date and time into the Device Time field, and Set will set the time in the Device Time field to the device.

- **Set as Now:** Read the current date and time of the PC and set it to the device.

- **Read:** Display device current time.

4.7 DO Control/DI Status

This page provides the function for controlling DO and reading the status of DIs in the Labs.
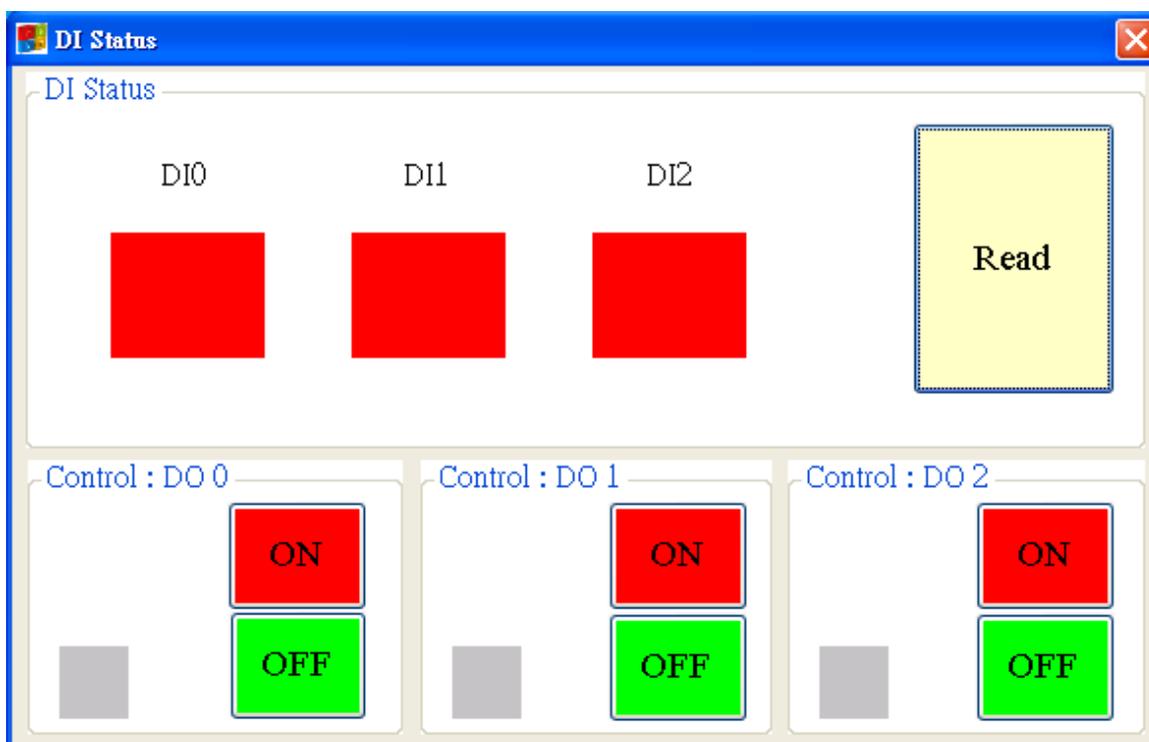
- DI Status:
  - **Red:** When the DI voltage logic is high
  - **Gray:** When the DI voltage logic is low
  - **Read:** Read the status of DI/DO.

- Control:DO0、DO1、DO2
  - **Red:** When DO is ON.
  - **Gray:** When OI is OFF.
  - **ON:** Open DO0、DO1
  - **OFF:** Close DO0、DO1

4.8 Signal Quality

Read the current signal strength from the device, express the signal strength in 5 segments, and display the current signal strength percentage.
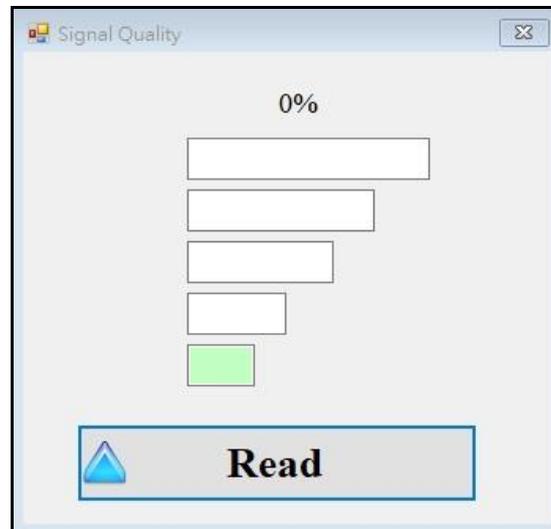
Tips & Warnings

⚠️ If the signal value is 0%, the user needs to re-insert, or remove the SIM card or set to a field with a good signal.

4.9 Version

Press "Version" in tool menu, and the window would show the version of Utility and firmware.
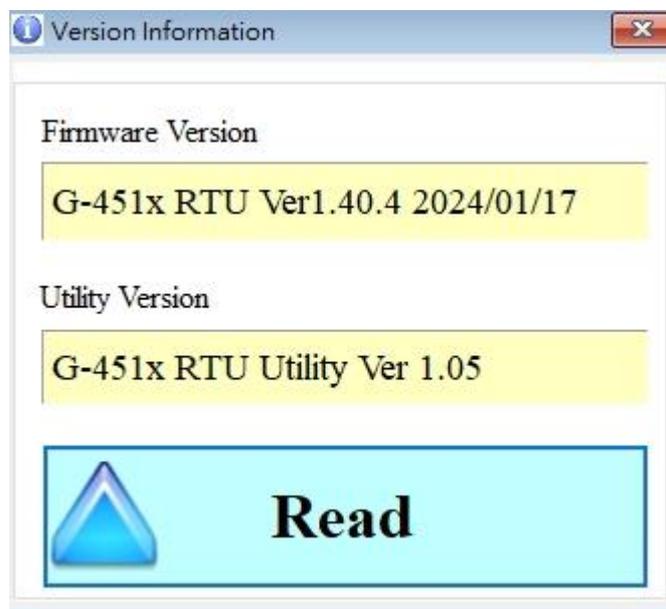
4.10 System

"System" menu item provide recovering factory setting and resetting G-451x series device functions.

- ● Recover to Factory Settings
  The function is used to recover device as factory settings including password.
  About the factory settings, please refer Appendix A.

- ● Reset Device
  The function is used to reset G-451x series device by software. Select "Rest G-451x" button to reset device.

4.11 LCD Information

If users choice the G-451x series device with LCD display, they can select the LCD enable in the RTU utility. There is system information of device will be shown in the LCD panel.
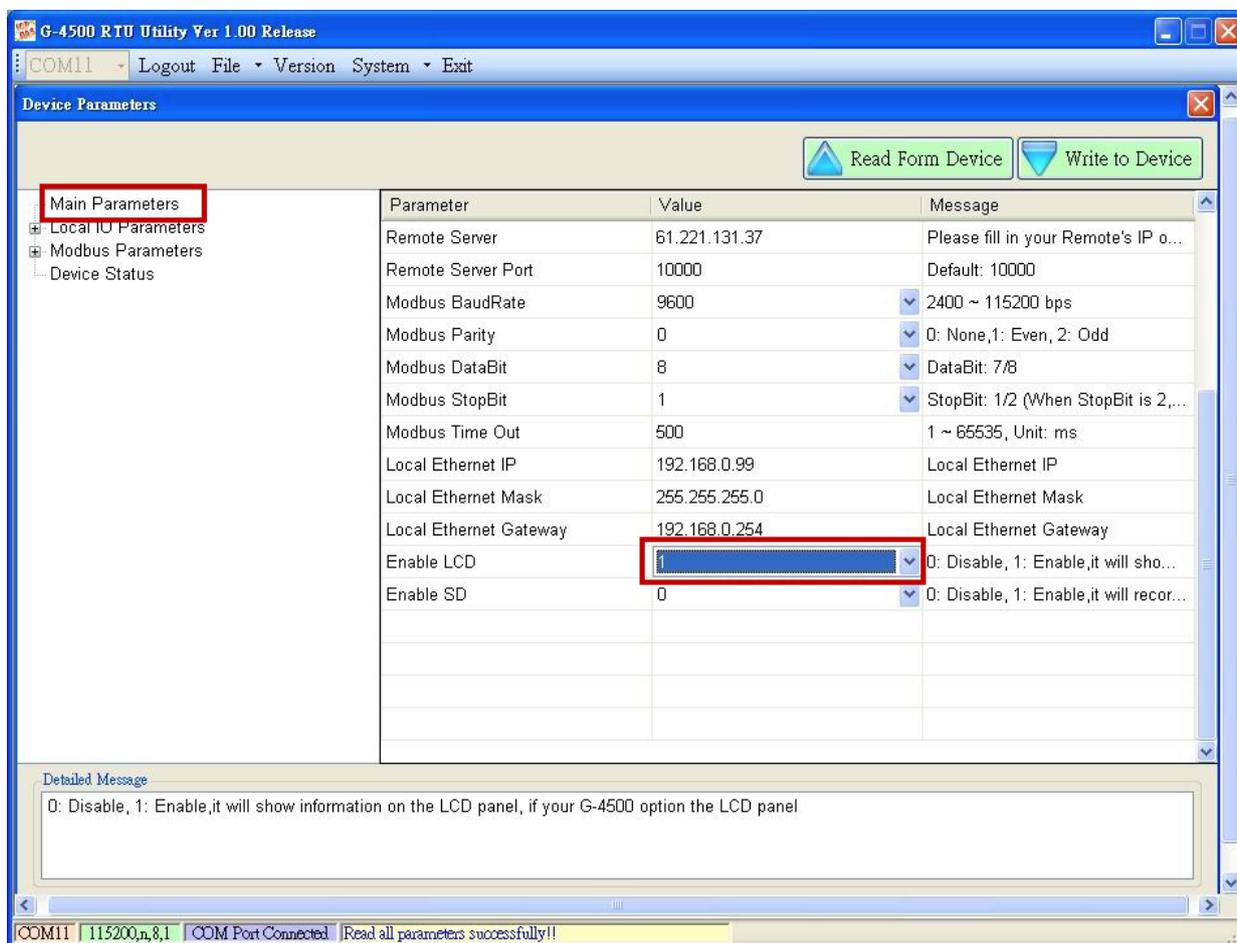

- The LCD panel of G-451x series

● **Display information**

Parameter	Description	
Station ID:	The device Station ID would be shown in the RTU Center software. It can identify the different G-451x device in the Remote OPC Server. (Range: 1 ~ 65535)	
Utime:	Report time interval. The device will send the data to M2M RTU Center by the update time. (Range: 1 ~ 999999, unit: sec)	
Only GPRS / **Only Ethernet /** **GPRS(M), Eth(S) /** **Eth(M), GPRS(S)**	Four methods are supported for device to connect to remote server. 1) Only GPRS 2) Only Ethernet 3) GPRS Master, Ethernet Slave (Redundancy system) 4) Ethernet Master, GPRS Slave (Redundancy system)	
GIP / EIP	The device GPRS or Ethernet IP	
GSM ¥▁▃▅▆	**Status**	**Description**
	¥▁	2G/3G/4G signal quality: 20%
	¥▁▃	2G/3G/4G signal quality: 40%
	¥▁▃▅	2G/3G/4G signal quality: 60%
	¥▁▃▅▆	2G/3G/4G signal quality: 80%
	¥▁▃▅▆█	2G/3G/4G signal quality: 100%
SIM Card:	**Status**	**Description**
	OK	SIM card is OK
	SIM Card: Err 1	SIM PIN. Module is waiting for SIM PIN
	SIM Card: Err 2	SIM PUK. Module is waiting for SIM PUK
	SIM Card: Err 3	PH_SIM PIN.
	SIM Card: Err 4	PH_SIM PUK.
	SIM Card: Err 5	SIM PIN2.
	SIM Card: Err 6	SIM PUK2.
	SIM Card: Err 7	SIM Card Error.
	SIM Card: Err 8	SIM Card not inserted.
	SIM Card: Err -5	Timeout
Date:	YYYY/MM/DD	
Time:	HH:MM:SS	

5. Data Logger

G-451x series device provides an external SD interface. These local I/O and Modbus data are recorded in SD card for one day in a single file.

● **The naming rule of logger file name**

The format of file name: **YYMMDDXX.csv**

1. **YY:** Year (2000 ~ 2099)
2. **MM:** Month (01 ~ 12)
3. **DD:** Day (01 ~ 31)
4. **XX:** Serial number (00 ~ 99)

● **The data format of the data logger file**

The content of the file apply comma char to separate the different field. The first row data is the name of the fields. After the first row data, it is I/O data. The format of I/O data is date, time, local I/O, station ID, update time, Modbus data and GPS data. Users can refer the following complete example to understand that.

Date	StationID	UpdateTime	GPS	DI0	DI1	DI2
20150101 120000	1	5	$GPRMC,160004,…	1	1	1
20150101 120005	1	5	$GPRMC,160009,…	1	1	1

DO0	DO1	DO2	AI0	AI1	AI2	AI3	AI4	AI5	AI6	AI7	AI Type	AI DataFormat
0	0	0	6	6	6	6	6	6	6	6	26	1
0	0	0	6	6	6	6	6	6	6	6	26	1

Module [M-7060] Addr.	DI0	DI1	DI2	DI3	DO0	DO1	DO2	DO3
1	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0

Tips & Warnings

⚠ If the SD free space is less than 100 MB, the early files would be deleted by system until the free space is more than 100MB.

6. Revision History

Revision	Date	Author	Description
1.0.0	2015/03/19	William	Release version
1.0.1	2024/02/21	Patty	1. Add packet encryption mode
			2. Added device sleep power-saving function.
			3. Added reading device voltage value.

Appendix A. G-451x series RTU Factory Settings

The following table lists is the default value of system parameters.

Parameter	Default value
Station ID	1
Update Time	5
Heartbeat Time	0
Connect Method	1
Packet Method	0
Enable GPS	0
GPRS Username	GUEST
GPRS Password	GUEST
GPRS APN	INTERNET
DNS Server	168.95.1.1
Remote Server	1.2.3.4
Remote Server Port	10000
Modbus BaudRate	9600
Modbus Parity	0
Modbus DataBit	8
Modbus StopBit	1
Modbus Time Out	500
Local Ethernet IP	192.168.255.1
Local Ethernet Mask	255.255.0.0
Local Ethernet Gateway	192.168.0.254
Enable LCD	0
Enable SD	0
Interval Time of Modbus command	0