

G-4500 RTU

User Manual

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.

Warning

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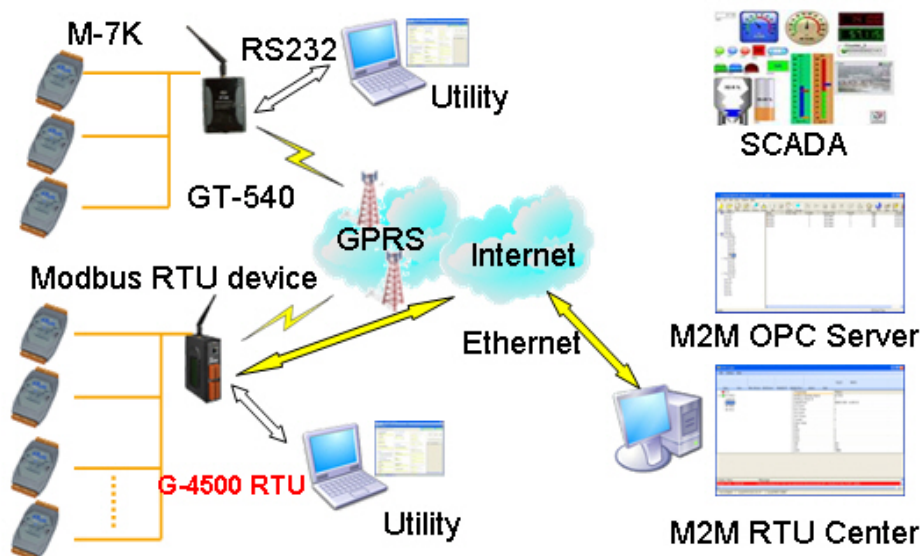
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Chapter 1 Introduction

1.1 Overview

The G-4500 RTU is an intelligent Active GPRS Remote Terminal Unit which is built-in the specified firmware in G-4500 series. Within the high performance CPU, the G-4500 RTU series can handle a large of data and are suit for the hard industrial environment. They feature GPRS/GSM module, Ethernet interface, optional GPS module, 3 digital inputs, 3 digital outputs, 8 analog inputs, 2 RS-232 and 1 RS-485 ports. That can be used in various application fields to transfer data by GPRS or Ethernet. G-4500 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 GPRS connection. 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 GPRS and Ethernet in G-4500 RTU, the data would be guaranteed to transfer to host. When GPRS or Ethernet connects failed, it will immediately switch to a different connection method in order to achieve data monitoring sustainability. Furthermore, G-4500 RTU provides simple I/O linkage control and the built-in I/O recorders in SD card.

We also provide M2M RTU center software with friendly Graphic interface to manage the GPRS RTU products easily. Users can monitor the I/O data and status of GPRS RTU device by the interface on PC. By using the M2M RTU API tool and M2M RTU center software, any remote monitoring system can be achieved easily and efficiently. For SCADA system, the M2M.OPC server is provided to connect to SCADA by OPC interface.



● **Easy to Establish GPRS Network Applications**

It is a big headache for engineers to establish the GPRS applications because the dynamic IP management is required. Applying G-4500 RTU and M2M RTU center software, the dynamic IP addresses can be managed between them. The remote GPRS RTU product would connect to M2M RTU Center automatically. Therefore, all remote GPRS RTU devices can be managed by a single centralized M2M GPRS RTU Center software with a fixed IP address.

Moreover, there are M2M API tool and OPC server for engineers to develop the GPRS applications by VB, VC or SCADA development tools conveniently without any IP address management effort.

● **Active data transmission**

G-4500 RTU devices with active I/O transmission mechanism can raise the communication. Unlike the traditional poll communication, G-4500 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 GPRS and Ethernet communication interfaces in G-4500 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-4500 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-4500 RTU is built-in Modbus RTU protocol. That can make any Modbus RTU device connect to G-4500 RTU. By the way of G-4500 RTU, Modbus RTU devices can be used in GPRS remote system.

● **Simple Local I/O link Control**

There are I/O built-in GPRS RTU devices of ICP DAS. Therefore, these products can be the GPRS 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.

● **Built-in I/O Data Logging**

GPRS 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.

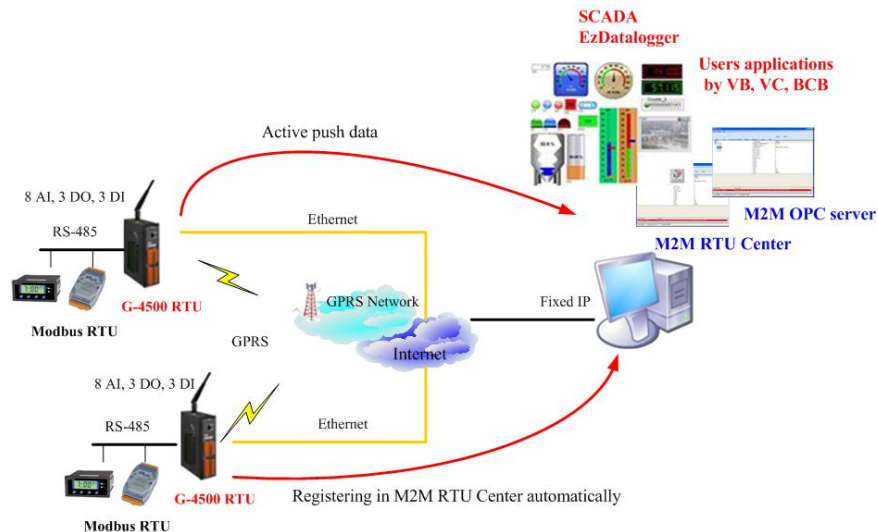
1.2 Features:

- Automatic/continuous GPRS 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 GPRS RTU be the GPRS I/O devices.
- Support LCD display in G-4500D-SIM340, G-4500PD-SIM340
- I/O data recorded in SD card
- Ethernet and GPRS redundant communication paths
- Local I/O linkage function to make the simple local control
- Power supply 10 ~ 30 V_{DC}

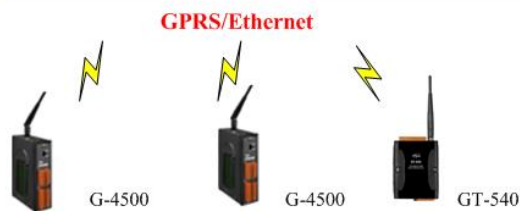
1.3 Communication and Software Architecture:

The cellular service provider often assigned dynamic IP with private IP address on GPRS 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-4500 RTU devices. Each G-4500 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.

Moreover, this way is also able to connect through a firewall.

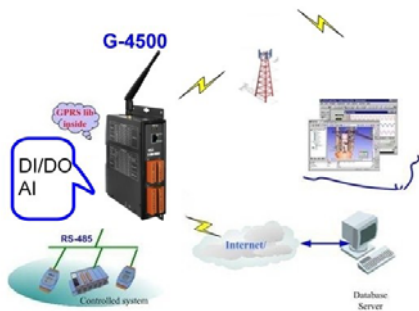


SCADA, VB, VC, .Net ...		Ez Data logger
API tool	NAPOPC, M2M OPC Server	
M2M RTU Center		
TCP/IP Socket		

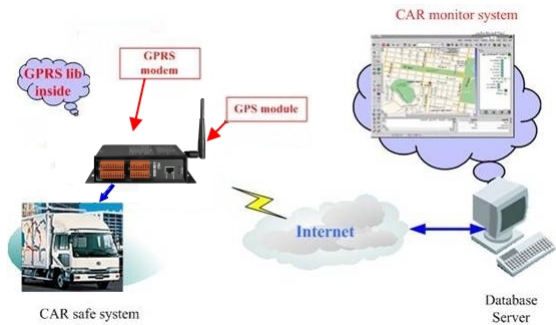


1.4 Applications:

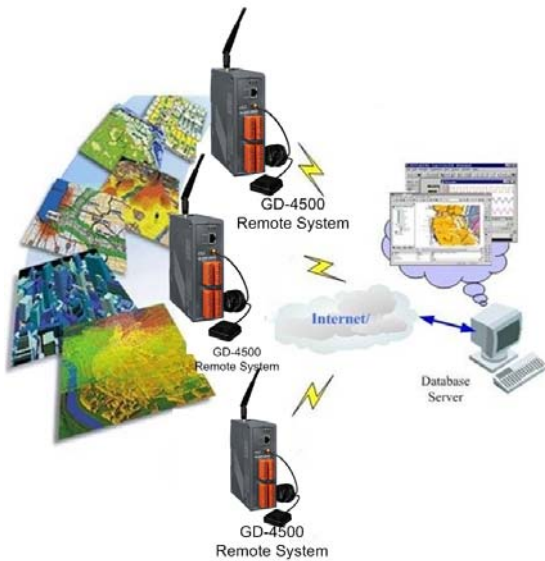
- Digital Signage
- Energy Management
- HVAC & Refrigeration
- Security & Access Control
- Vehicle tracking system



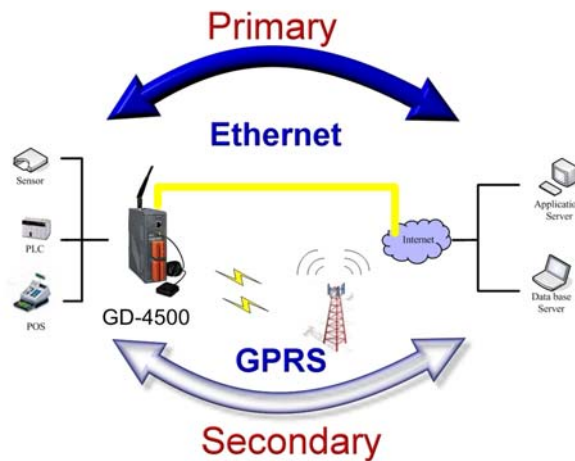
Remote Control/Monitor System



Car Monitor System

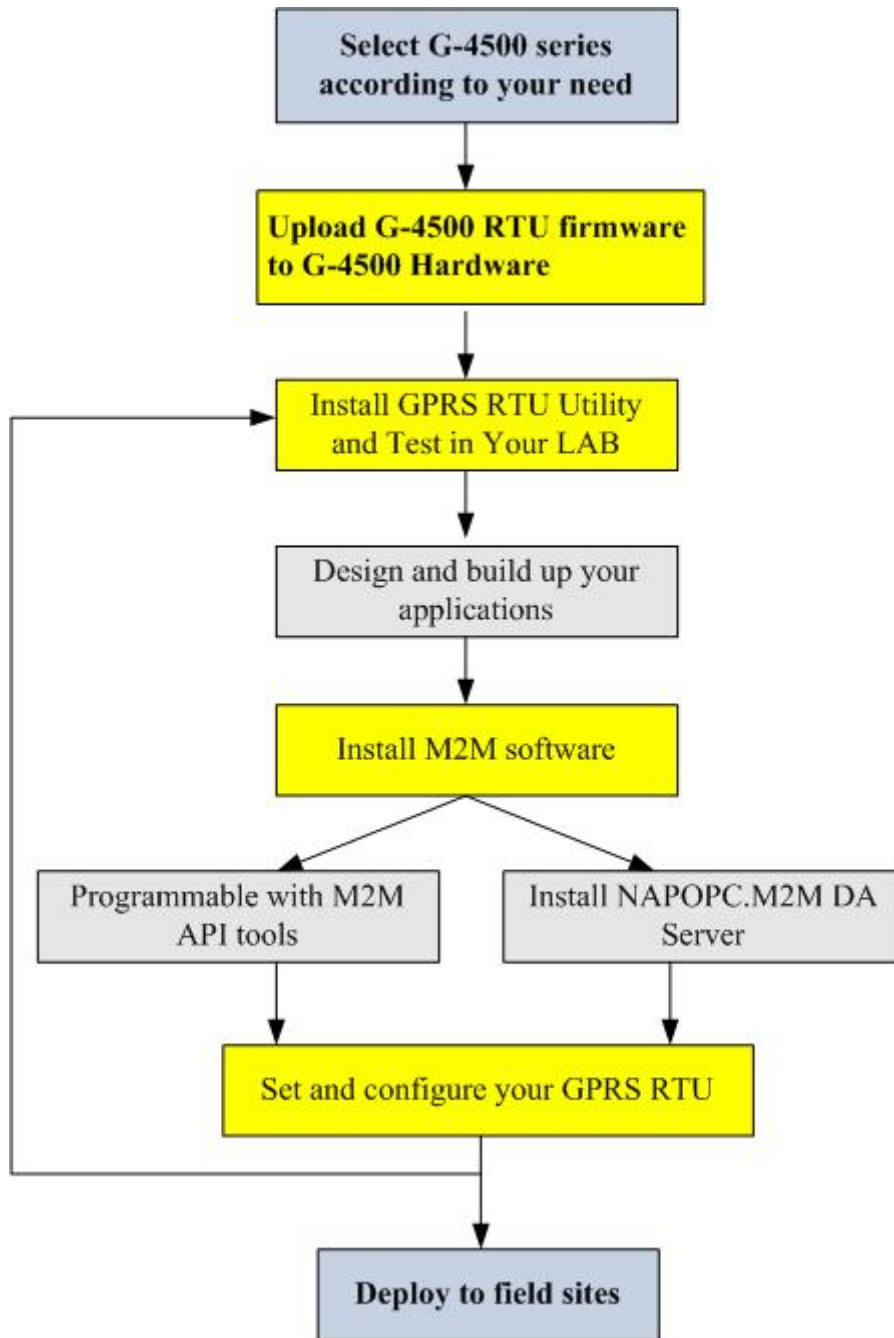


GIS system



Redundant Communication System

How to use G-4500 RTU in your applications



Chapter 2 Hardware

2.1 Supported Product

The G-4500 RTU is an intelligent Active GPRS Remote Terminal Unit which is built-in the specified firmware in G-4500 series including G-4500-SIM300 series, G-4500-SIM340 series and G-4500-3GWA series.



Products supports for G-4500 RTU firmware

Product Type	Description
G-4500-SIM300 CR	Tri-band M2M Mini-Programmable Automation Controller (RoHS)
G-4500D-SIM300 CR	Tri-band M2M Mini-Programmable Automation Controller with LCD display (RoHS)
G-4500P-SIM300 CR	Tri-band M2M Mini-Programmable Automation Controller with GPS function (RoHS)
G-4500PD-SIM300 CR	Tri-band M2M Mini-Programmable Automation Controller with LCD display and GPS function (RoHS)
G-4500-SIM340 CR	Quad-band M2M Mini-Programmable Automation Controller (RoHS)
G-4500D-SIM340 CR	Quad-band M2M Mini-Programmable Automation Controller with LCD display (RoHS)
G-4500P-SIM340 CR	Quad-band M2M Mini-Programmable Automation Controller with GPS function (RoHS)
G-4500PD-SIM340 CR	Quad-band M2M Mini-Programmable Automation Controller with LCD display and GPS function (RoHS)
GD-4500-SIM340 CR	Quad-band M2M Mini-Programmable Automation Controller (RoHS)
GD-4500D-SIM340 CR	Quad-band M2M Mini-Programmable Automation Controller with LCD display (RoHS)
GD-4500P-SIM340 CR	Quad-band M2M Mini-Programmable Automation Controller with GPS function (RoHS)
GD-4500PD-SIM340 CR	Quad-band M2M Mini-Programmable Automation Controller with LCD display and GPS function (RoHS)
G-4500-3GWA CR	Tri-band 3G WCDMA M2M Mini-PAC (RoHS)
G-4500D-3GWA CR	Tri-band 3G WCDMA M2M Mini-PAC with LCD display (RoHS)
G-4500P-3GWA CR	Tri-band 3G WCDMA M2M Mini-PAC with GPS function (RoHS)
G-4500PD-3GWA CR	Tri-band 3G WCDMA M2M Mini-PAC with LCD display and GPS function (RoHS)

2.2 Hardware Specifications

● G-4500-SIM300 Specifications

Item	G-4500-SIM300	G-4500D-SIM300	G-4500P-SIM300	G-4500PD-SIM300	
CPU	80 MHz internal microprocessor				
SRAM/Flash	512K/512K , real time clock, watchdog timer				
NVRAM	31 bytes, battery backup, data valid up to 10 years				
EEPROM	16 KB, retention > 40 years. 1,000,000 erase/write cycles				
Comm. Interface					
COM ports	COM1:5-wire RS-232; COM2: RS-485; COM3:3-wire RS-232				
Ethernet	10/100 Base-TX Ethernet controller				
GPRS Interface					
Frequency Band	Tri-band 900/1800/1900 MHz				
GPRS connectivity	GPRS class 10/8; GPRS station class B				
DATA GPRS	Downlink transfer: Max. 85.6 kbps; Uplink transfer: Max 42.8kbps				
GPS Interface					
Support Channels	-	-	32	-	
Sensitivity	-	-	Tracking = up to -159 dBm (with external LNA)	-	
			Cold start = up to -146 dBm (with external LNA)		
Acquisition Time	-	-	Hot start (Open Sky) = 2 s(typical)	-	
			Cold start (Open Sky) = 36 s(typical)		
Protocol Support	-	-	NMEA 0183 version 3.01	-	
LCD Interface					
General	Effective display area	-	80.61 mm x 14.37 mm (W x H)	-	80.61 mm x 14.37 mm (W x H)
	Module Dimension	-	93 mm x 70 mm x 1.6 mm (W x H x T)	-	93 mm x 70 mm x 1.6 mm (W x H x T)
Life Time	-	-	Expected life is more than 100,000 hours under normal operation	-	Expected life is more than 100,000 hours under normal operation

Power				
Protection	Power reverse polarity protection			
Frame Ground Protection	ESD, Surge, EFT, Hi-Pot			
Power Requirement	15W; Unregulated +10 VDC ~ +30 VDC			
Power Consumption	Idle: 75 mA @ 24 VDC; Data Link: 150 ~ 400 mA (peak) @ 24 VDC			
LED Indicators				
System	Red			
GPRS	Yellow			
GPS	Green		Yes	
Mechanical				
Casing	Metal			
Dimensions	47 mm x 142 mm x 168 mm (W x L x H)			
Installation	DIN-Rail and wall mount			
Environment				
Operating Temperature	-20 ~ +70 °C	-15 ~ +55 °C	-20 ~ +70 °C	-15 ~ +55 °C
Storage Temperature	-40 ~ +80 °C	-20 ~ +70 °C	-40 ~ +80 °C	-20 ~ +70 °C
Humidity	5~90% RH, non-condensing			

● G-4500-SIM340 Specifications

Item	G-4500-SIM340	G-4500D-SIM340	G-4500P-SIM340	G-4500PD-SIM340	
CPU	80 MHz internal microprocessor				
SRAM/Flash	512K/512K , real time clock, watchdog timer				
NVRAM	31 bytes, battery backup, data valid up to 10 years				
EEPROM	16 KB, retention > 40 years. 1,000,000 erase/write cycles				
Comm. Interface					
COM ports	COM1:5-wire RS-232; COM2: RS-485; COM3:3-wire RS-232				
Ethernet	10/100 Base-TX Ethernet controller				
GPRS Interface					
Frequency Band	Quad-band 850/900/1800/1900 MHz				
GPRS connectivity	GPRS class 10/8; GPRS station class B				
DATA GPRS	Downlink transfer: Max. 85.6 kbps; Uplink transfer: Max 42.8kbps				
GPS Interface					
Support Channels	-		32		
Sensitivity	-		Tracking = up to -159 dBm (with external LNA)		
			Cold start = up to -146 dBm (with external LNA)		
Acquisition Time	-		Hot start (Open Sky) = 2 s(typical)		
			Cold start (Open Sky) = 36 s(typical)		
Protocol Support	-		NMEA 0183 version 3.01		
LCD Interface					
General	Effective display area	-	80.61 mm x 14.37 mm (W x H)	-	80.61 mm x 14.37 mm (W x H)
	Module Dimension	-	93 mm x 70 mm x 1.6 mm (W x H x T)	-	93 mm x 70 mm x 1.6 mm (W x H x T)
Life Time	-		Expected life is more than 100,000 hours under normal operation	-	Expected life is more than 100,000 hours under normal operation
Power					
Protection	Power reverse polarity protection				

Frame Ground Protection	ESD, Surge, EFT, Hi-Pot			
Power Requirement	15W; Unregulated +10 VDC ~ +30 VDC			
Power Consumption	Idle: 75 mA @ 24 VDC; Data Link: 150 ~ 400 mA (peak) @ 24 VDC			
LED Indicators				
System	Red			
GPRS	Yellow			
GPS	Green		Yes	
Mechanical				
Casing	Metal			
Dimensions	47 mm x 142 mm x 168 mm (W x L x H)			
Installation	DIN-Rail and wall mount			
Environment				
Operating Temperature	-20 ~ +70 °C	-15 ~ +55 °C	-20 ~ +70 °C	-15 ~ +55 °C
Storage Temperature	-40 ~ +80 °C	-20 ~ +70 °C	-40 ~ +80 °C	-20 ~ +70 °C
Humidity	5~90% RH, non-condensing			

● GD-4500-SIM340 Specifications

Item	GD-4500-SIM340	GD-4500D-SIM340	GD-4500P-SIM340	GD-4500PD-SIM340	
CPU	80 MHz internal microprocessor				
SRAM/Flash	512K/512K , real time clock, watchdog timer				
NVRAM	31 bytes, battery backup, data valid up to 10 years				
EEPROM	16 KB, retention > 40 years. 1,000,000 erase/write cycles				
Comm. Interface					
COM ports	COM1:5-wire RS-232; COM2: RS-485; COM3:3-wire RS-232				
Ethernet	10/100 Base-TX Ethernet controller				
GPRS Interface					
Frequency Band	Quad-band 850/900/1800/1900 MHz				
GPRS connectivity	GPRS class 10/8; GPRS station class B				
DATA GPRS	Downlink transfer: Max. 85.6 kbps; Uplink transfer: Max 42.8kbps				
GPS Interface					
Support Channels	-		32		
Sensitivity	-		Tracking = up to -159 dBm (with external LNA)		
			Cold start = up to -146 dBm (with external LNA)		
Acquisition Time	-		Hot start (Open Sky) = 2 s(typical)		
			Cold start (Open Sky) = 36 s(typical)		
Protocol Support	-		NMEA 0183 version 3.01		
LCD Interface					
General	Effective display area	-	80.61 mm x 14.37 mm (W x H)	-	80.61 mm x 14.37 mm (W x H)
	Module Dimension	-	93 mm x 70 mm x 1.6 mm (W x H x T)	-	93 mm x 70 mm x 1.6 mm (W x H x T)
Life Time	-		Expected life is more than 100,000 hours under normal operation	-	Expected life is more than 100,000 hours under normal operation
Power					
Protection	Power reverse polarity protection				

Frame Ground Protection	ESD, Surge, EFT, Hi-Pot			
Power Requirement	15W; Unregulated +10 VDC ~ +30 VDC			
Power Consumption	Idle: 75 mA @ 24 VDC; Data Link: 150 ~ 400 mA (peak) @ 24 VDC			
LED Indicators				
System	Red			
GPRS	Yellow			
GPS	Green	Yes		
Mechanical				
Casing	Plastic			
Dimensions	60 mm x 140 mm x 172 mm (W x L x H)			
Installation	DIN-Rail and wall mount			
Environment				
Operating Temperature	-20 ~ +70 °C	-15 ~ +55 °C	-20 ~ +70 °C	-15 ~ +55 °C
Storage Temperature	-40 ~ +80 °C	-20 ~ +70 °C	-40 ~ +80 °C	-20 ~ +70 °C
Humidity	5~90% RH, non-condensing			

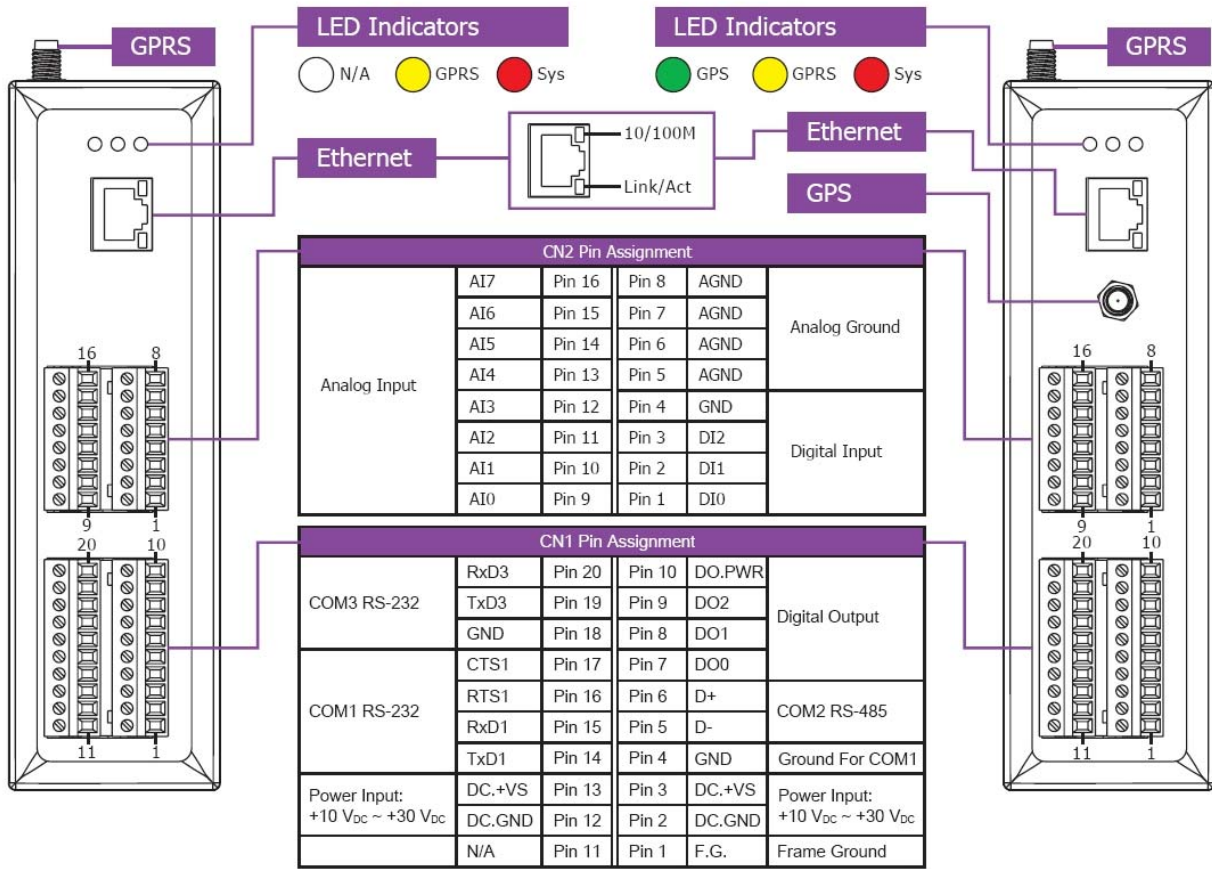
● G-4500-3GWA Specifications

Item	G-4500-3GWA	G-4500D-3GWA	G-4500P-3GWA	G-4500PD-3GWA	
CPU	80 MHz internal microprocessor				
SRAM/Flash	512K/512K , real time clock, watchdog timer				
NVRAM	31 bytes, battery backup, data valid up to 10 years				
EEPROM	16 KB, retention > 40 years. 1,000,000 erase/write cycles				
Comm. Interface					
COM ports	COM1:5-wire RS-232; COM2: RS-485; COM3:3-wire RS-232				
Ethernet	10/100 Base-TX Ethernet controller				
3G Interface					
Frequency Band	Tri-band 2100/1900/850 MHz				
Data Transmission	UMTS / HSDPA / HSUPA Downlink transfer: Max. 7.2Mbps; Uplink transfer: Max 5.76Mbps				
GSM Interface					
Frequency Band	Quad-band 850/900/1800/1900 MHz				
GPRS connectivity	GPRS class 12/10; GPRS station class B				
DATA GPRS	Downlink transfer: Max. 85.6 kbps; Uplink transfer: Max 42.8kbps				
GPS Interface					
Support Channels	-		32		
Sensitivity	-		Tracking = up to -159 dBm (with external LNA) Cold start = up to -146 dBm (with external LNA)		
Acquisition Time	-		Hot start (Open Sky) = 2 s(typical) Cold start (Open Sky) = 36 s(typical)		
Protocol Support	-		NMEA 0183 version 3.01		
LCD Interface					
General	Effective display area	-	80.61 mm x 14.37 mm (W x H)	-	80.61 mm x 14.37 mm (W x H)
	Module Dimension	-	93 mm x 70 mm x 1.6 mm (W x H x T)	-	93 mm x 70 mm x 1.6 mm (W x H x T)

Life Time	-	Expected life is more than 100,000 hours under normal operation	-	Expected life is more than 100,000 hours under normal operation
Digital Output				
Output Channel	3			
Output Type	Open Collector (Sink/NPN)			
Load Voltage	+30 VDC max.			
Load Current	100 mA max.			
Isolated Voltage	Non-isolated			
Digital Input				
Input Channel	3			
Input Type	Source(Dry Type), Common Ground			
Off Voltage Level	+1 V max.			
On Voltage Level	+3.5 ~ +30 V			
Isolated Voltage	Non-isolated			
Analog Input				
Input Channel	8			
Resolution	12 - bit			
Input Range/Type	0 ~ 20 mA			
Sample Rate	1 KHz max. (Read one channel)			
Power				
Protection	Power reverse polarity protection			
Frame Ground Protection	ESD, Surge, EFT, Hi-Pot			
Power Requirement	15W; Unregulated +10 VDC ~ +30 VDC			
Power Consumption	Idle: 75 mA @ 24 VDC; Data Link: 150 ~ 400 mA (peak) @ 24 VDC			
LED Indicators				
System	Red			
3G/GSM	Yellow			
GPS	Green		Yes	
Mechanical				

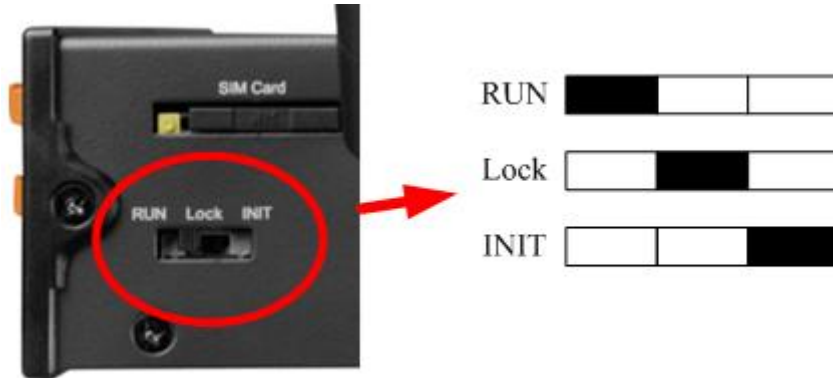
Casing	Metal			
Dimensions	47 mm x 142 mm x 168 mm (W x L x H)			
Installation	DIN-Rail and wall mount			
Environment				
Operating Temperature	-20 ~ +70 °C	-15 ~ +55 °C	-20 ~ +70 °C	-15 ~ +55 °C
Storage Temperature	-40 ~ +80 °C	-20 ~ +70 °C	-40 ~ +80 °C	-20 ~ +70 °C
Humidity	5~90% RH, non-condensing			

2.3 Pin Assignments of G-4500 series



2.4 Operation Mode Switch

When users want to use G-4500 RTU firmware, they must upload the firmware in init mode. The figure shows how to set G-4500 into Run, Lock or init modes.

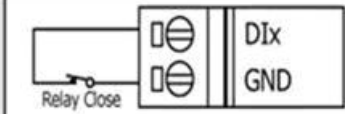
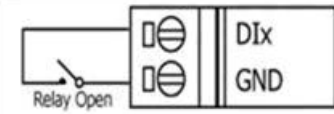
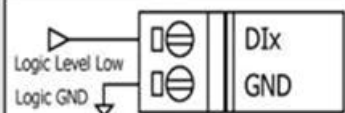
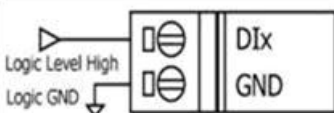
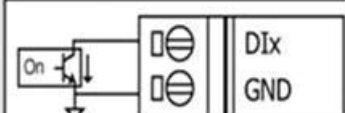
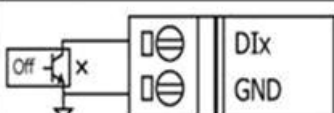


Operation Mode Switch	
RUN	OS can execute autoexec.bat
	Flash can be read/wirte.
LRun	OS can execute autoexec.bat
	Flash is read only (lock).
INIT	OS can not execute autoexec.bat
	Flash can be read/wirte.

2.6 DI/DO/AI Internal Structure and Wire Connection

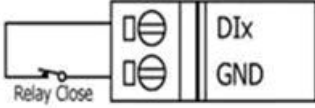
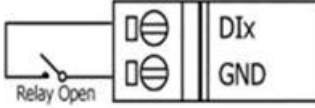
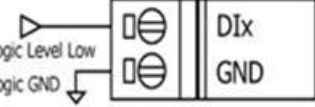
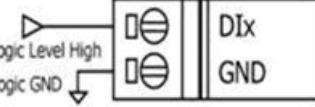


- DI mode- NC (normal close)

The NC mode is used as normal close in relay application as follows. The logical value of DI is 1 when the relay is ON in normal use. When the relay is triggered as relay open, the logical value of DI is 0.

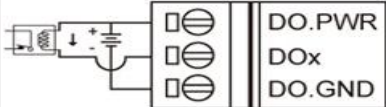
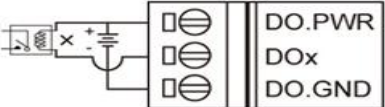
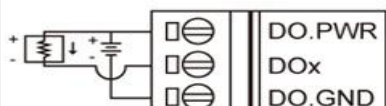
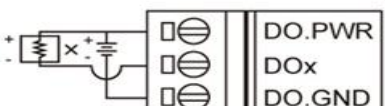
Input Type	Not Trigger	Trigger
	ReadBack as 1	ReadBack as 0
Relay Contact	Relay ON	Relay Off
		
TTL/CMOS Logic	Voltage < 1V	Voltage > 3.5V
		
Open Collector	Open Collector On	Open Collector Off
		

● DI mode- NO (normal open) and Counter

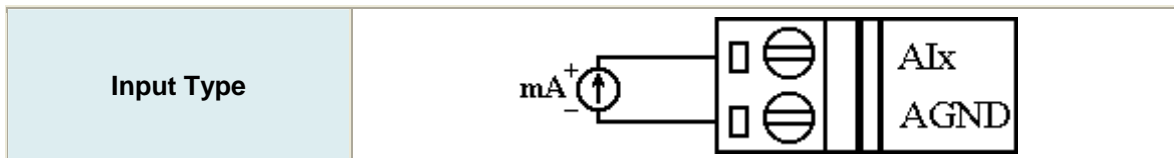
The wire connection in counter and NO modes are the same. The NO mode is used as normal open in relay application as follows. The logical value of DI is 0 when the relay is close in normal use.

Input Type	Trigger	Not Trigger
	ReadBack as 1	ReadBack as 0
Relay Contact	Relay ON 	Relay Off 
	Voltage < 1V	Voltage > 3.5V
TTL/CMOS Logic	Logic Level Low Logic GND 	Logic Level High Logic GND 
Open Collector	Open Collector On 	Open Collector Off 

● DO wire connection

	Relay ON	Relay Off
Drive Relay		
Resistance Load		

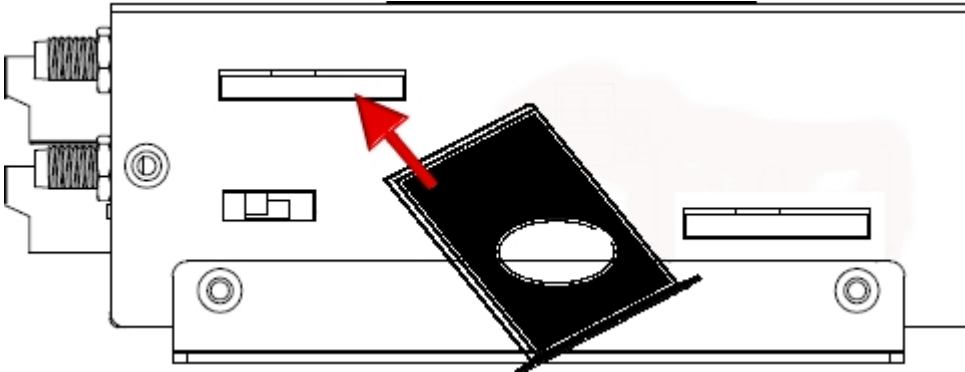
● AI wire connection



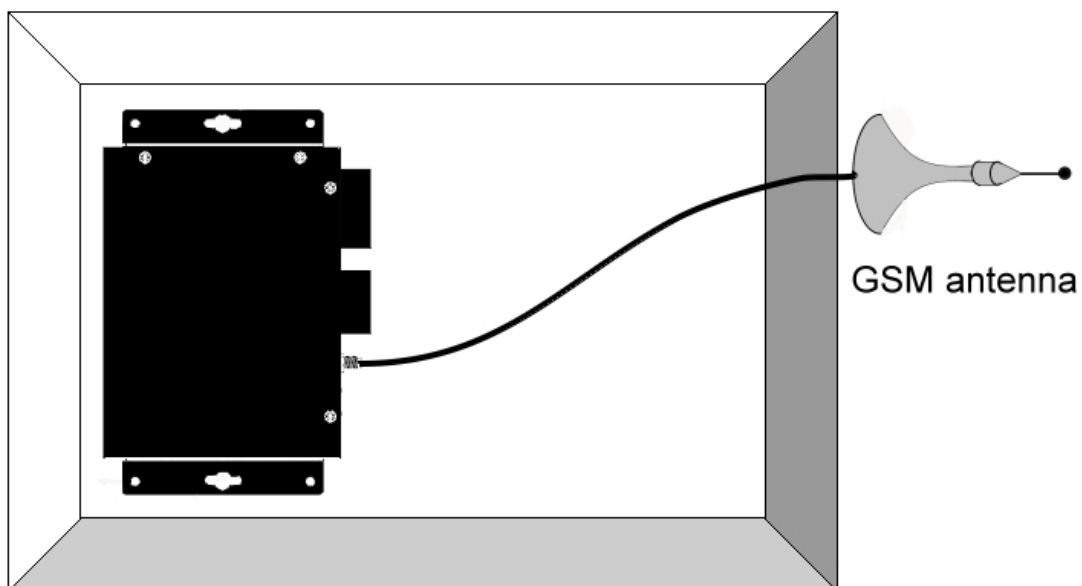
Note: Users have not used AIx channel, please connect AIx with AGND.

2.7 GPRS/GSM Installation

- SIM Card Installation

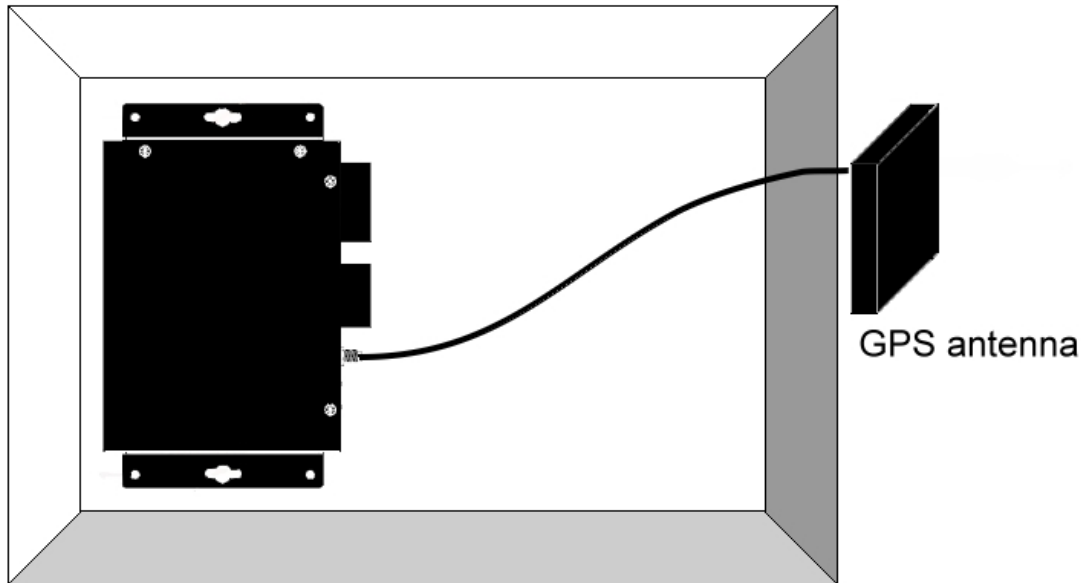


- GPRS/GSM Antenna Installation

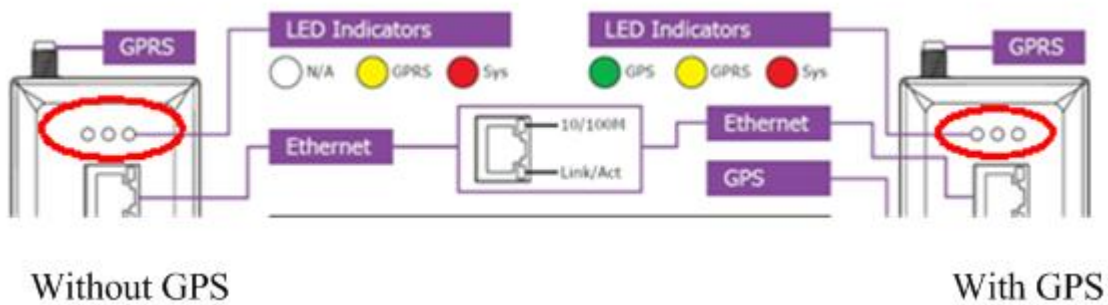


2.8 GPS Installation (Option)

- GPS Antenna Installation



2.9 LED indicators



There are three LED indicators to help users to judge the various conditions of G-4500 RTU. The description is as follows :

SYS(Red) : System LED is to indicate if the G-4500 RTU is normal or fail.

Act	Link	GSM Fail or Hardware initialization	PIN code is wrong or don't install SIM card
Blanking (1 sec)	Blanking (2 sec)	Always on	Blinking per 50 ms

GSM (Yellow) : The modem LED can indicate the status of GSM module.

Modem normal	Modem fail
Blanking (3 sec)	Off or Blanking (not 3 sec)

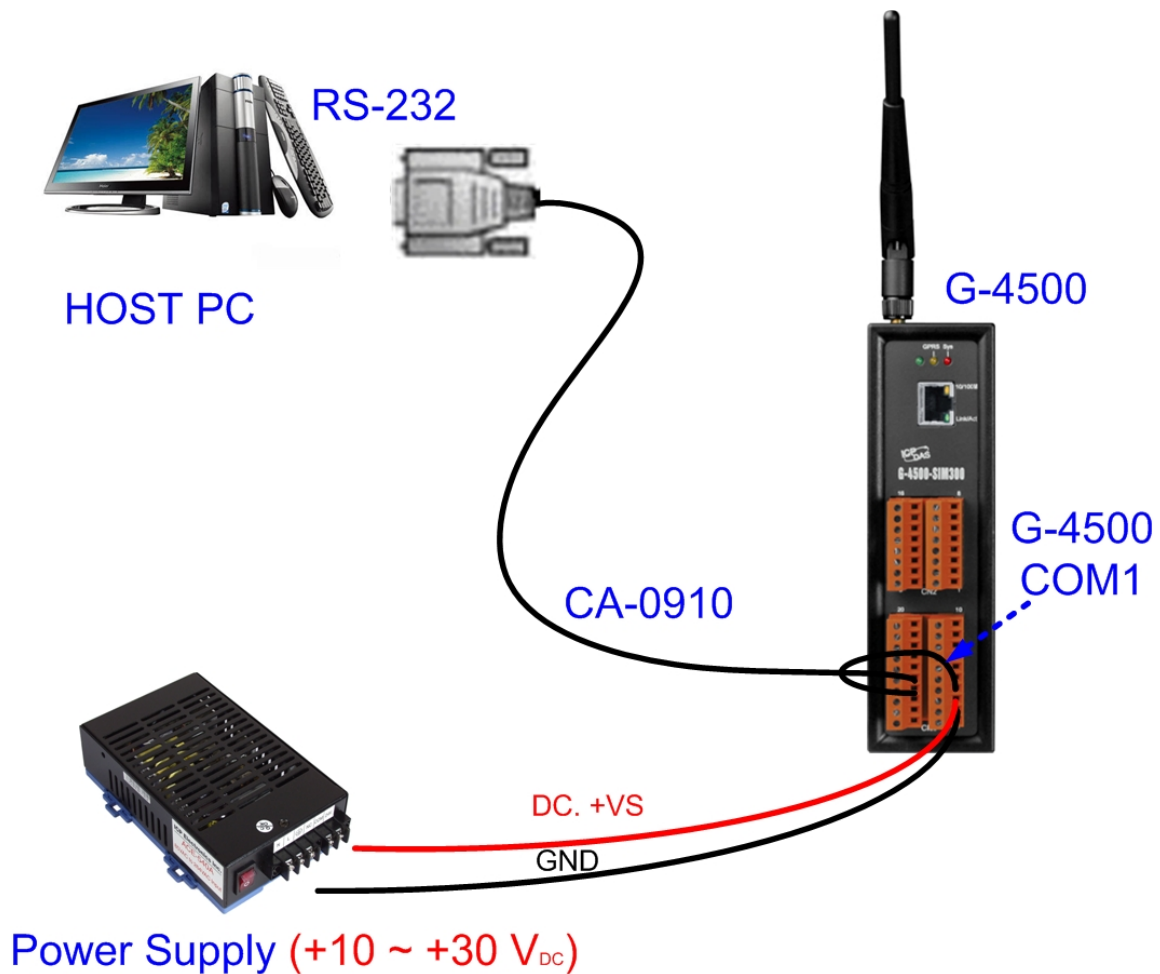
GPS (Green)(Option) : The GPS LED can indicate the status of GPS module.

GPS Fail	Search GPS	Receive GPS data
Always off	Always on	Blanking (1 sec)

Chapter 3 Upload firmware to G-4500

3.1 Hardware connection

When users want to use G-4500 RTU, they need to upload G-4500 RTU firmware to G-4500 series hardware. (The G-4500 series supported for G-4500 RTU firmware are listed in Chapter 2). 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-4500 with cable CA-0910. Please refer to the picture below.



- Turn the dip switch to **INIT** mode and **restart** the G-4500 power



3.1 Upload Software

- Download the MiniOS7 Utility software

http://ftp.icpdas.com/pub/cd/8000cd/napdos/minios7/utility/minios7_utility/

- MiniOS7 Utility document

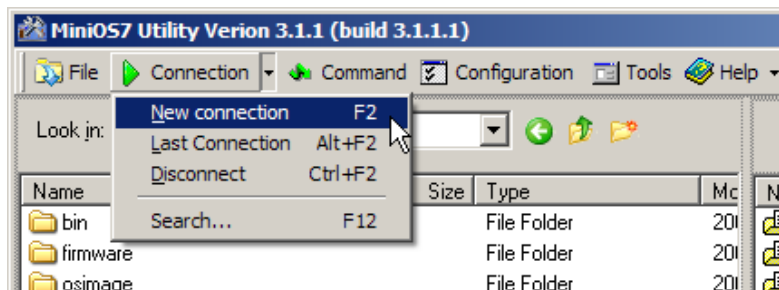
http://ftp.icpdas.com/pub/cd/8000cd/napdos/minios7/utility/minios7_utility/minios7_utility.pdf

- G-4500 RTU firmware:

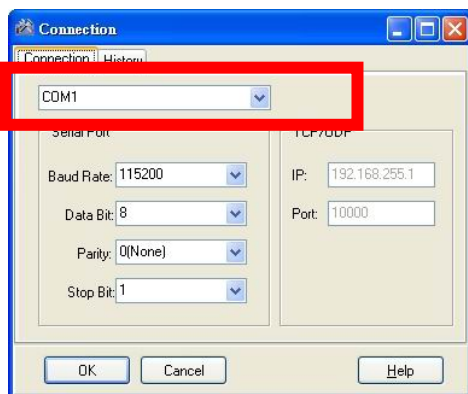
http://ftp.icpdas.com/pub/cd/usbcd/napdos/m2m/rtu/g-4500_rtu/software/firmware/

3.1.1 Upload the firmware to G-4500 via COM Port

- (1) Choose MenuBar > Connection, and then click new connection.



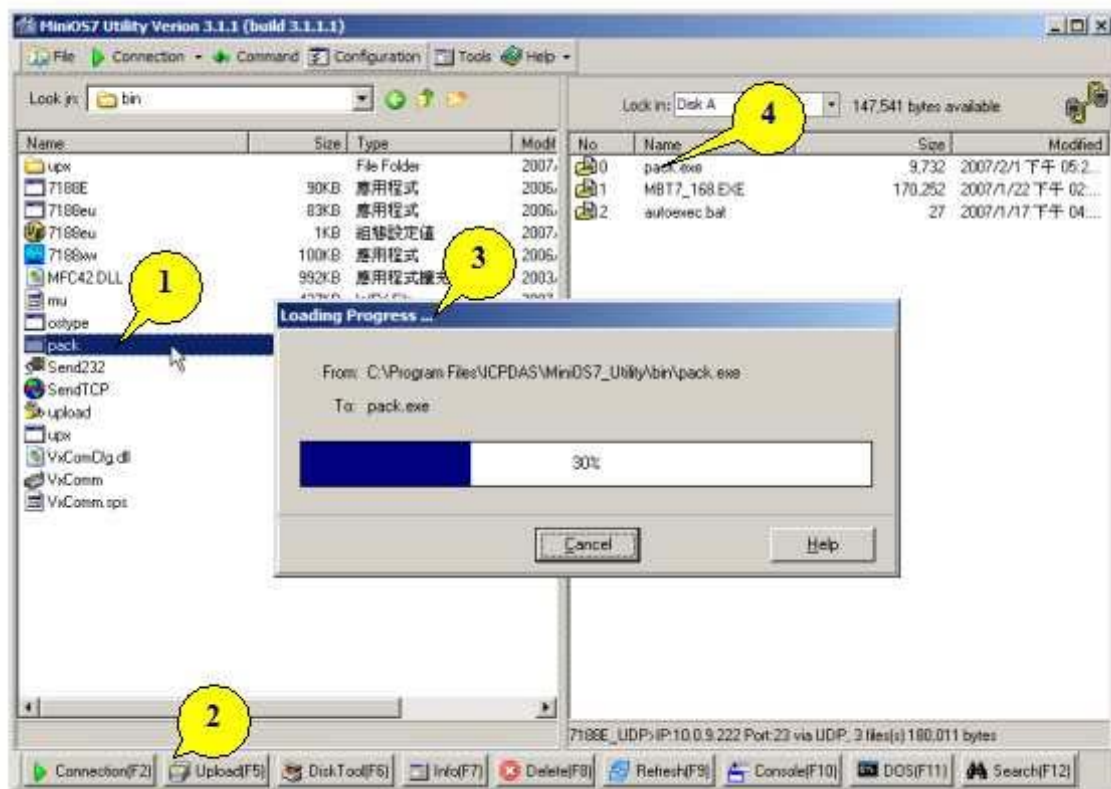
- (2) Select your number of COM Port.



Serial Port Parameters (Fixed)

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

(3) Select the **G45_RTU.exe** and **autoexec.bat**, and then click the “Upload” Button to upload the firmware.



(4) Turn the dip switch to **RUN** mode and **restart** the G-4500 power after upload the firmware successfully.

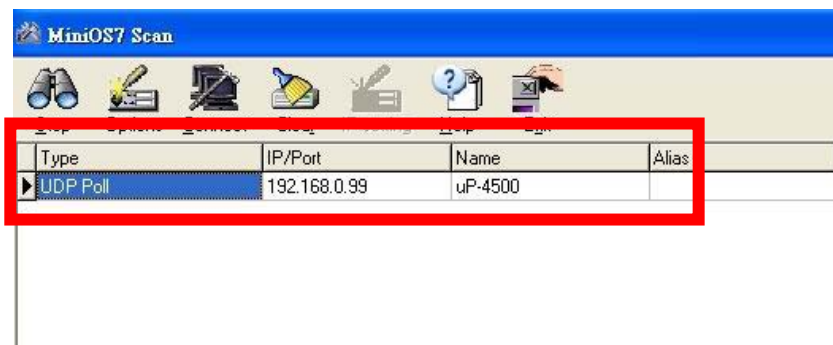


3.1.2 Upload the firmware to G-4500 via Ethernet

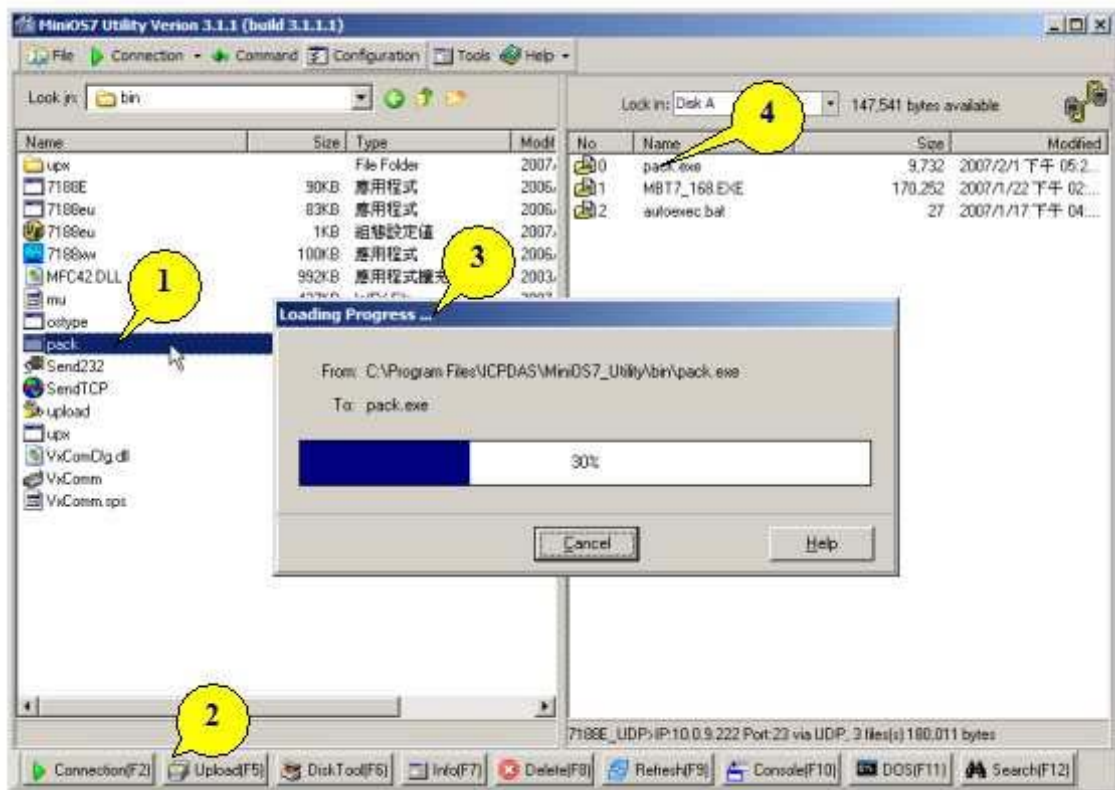
(1) Choose MenuBar > Connection, and then click Search.



(2) Double-Click your G-4500.



(3) Select the **G45_RTU.exe** and **autoexec.bat**, and then click the “Upload” Button to upload the firmware.



(4) Turn the dip switch to **RUN** mode and **restart** the G-4500 power after upload the firmware successfully.



Chapter 4 Installing G-4500 RTU Utility

In this chapter, we explain how to use G-4500 RTU Utility to configure your G-4500 RTU.

Note: It needs the runtime environment with .NET Framework 2.0 or above to execute the G-4500 RTU Utility in the PC. If there has .NET Framework 2.0 or above in the PC, the section 3.1 can be omitted.

4.1 Installing .NET Compact Framework

Plug shipment CD into the PC

- ◆ Microsoft .Net Framework Version 2.0:

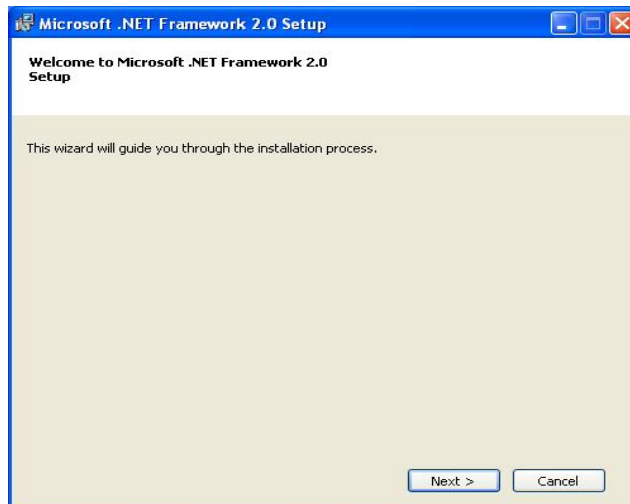
<http://www.microsoft.com/downloads/details.aspx?FamilyID=0856eacb-4362-4b0d-8edd-aab15c5e04f5&DisplayLang=en>

- ◆ Microsoft .Net Framework Version 3.5:

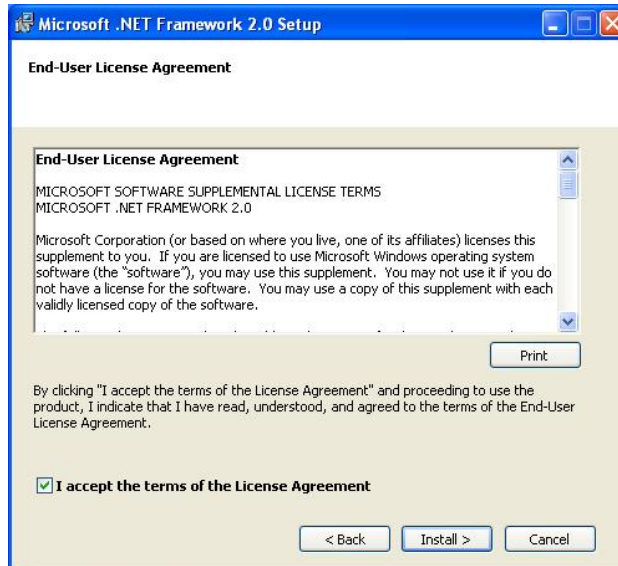
<http://www.microsoft.com/downloads/details.aspx?familyid=333325FD-AE52-4E35-B531-508D977D32A6&displaylang=en>

The install figure is as follows:

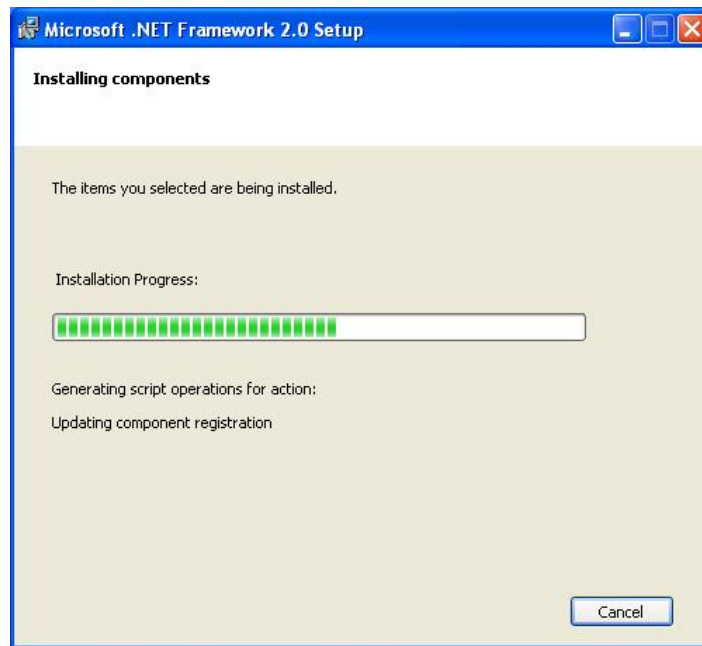
- ◆ Press “Next” to the next step.



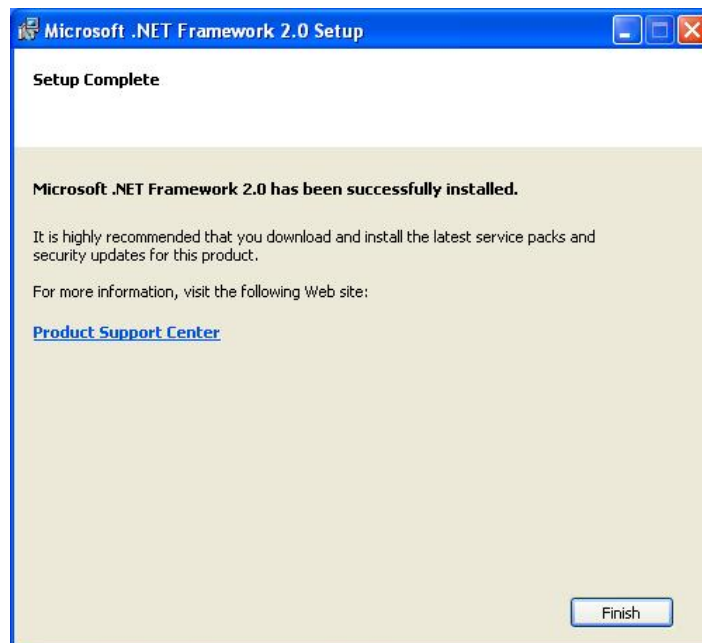
- ◆ Select the “I accept the terms of the License Agreement” and “Install ” to the next step.



- ◆ The installation process would be going



- ◆ After finishing the installation, press "Finish" to exit the program.



4.2 Installing G-4500 RTU Utility

Plug in the shipment CD into the PC

FTP:

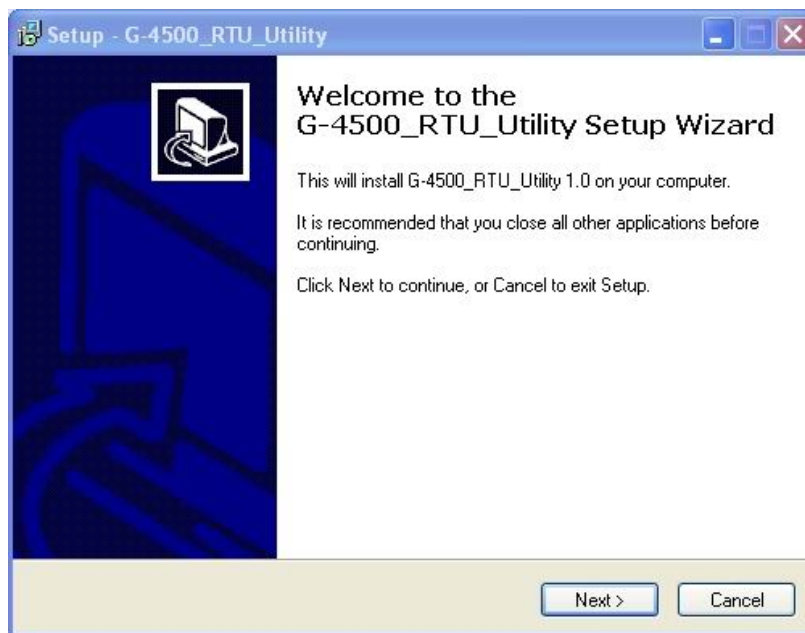
http://ftp.icpdas.com/pub/cd/usbcd/napdos/m2m/rtu/g-4500_rtu/software/utility/

CD: /m2m/rtu/g-4500_rtu/software/utility/

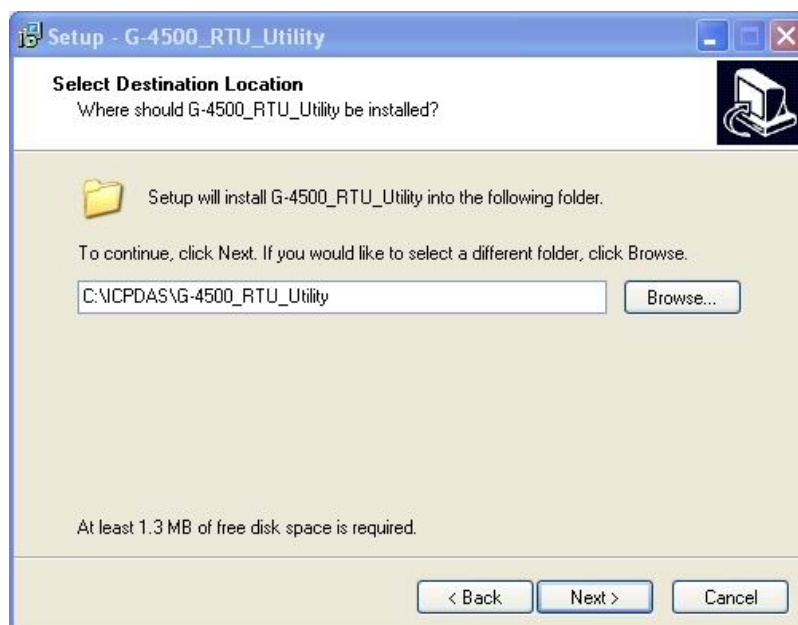
Execute Setup.exe

The installation figure is as follows:

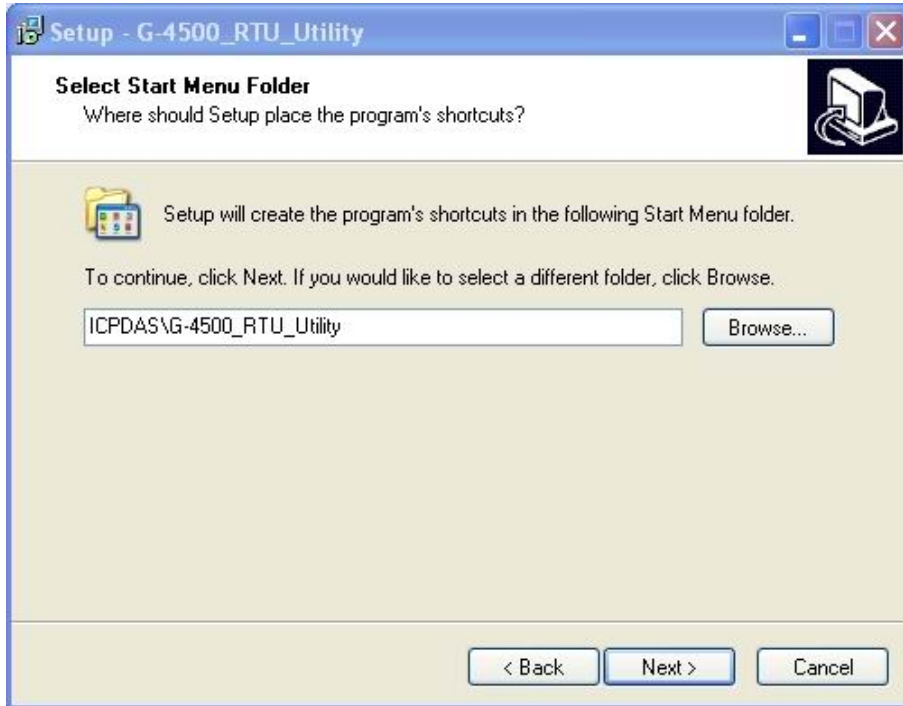
- ◆ Press “Next” to start the installation procedure.



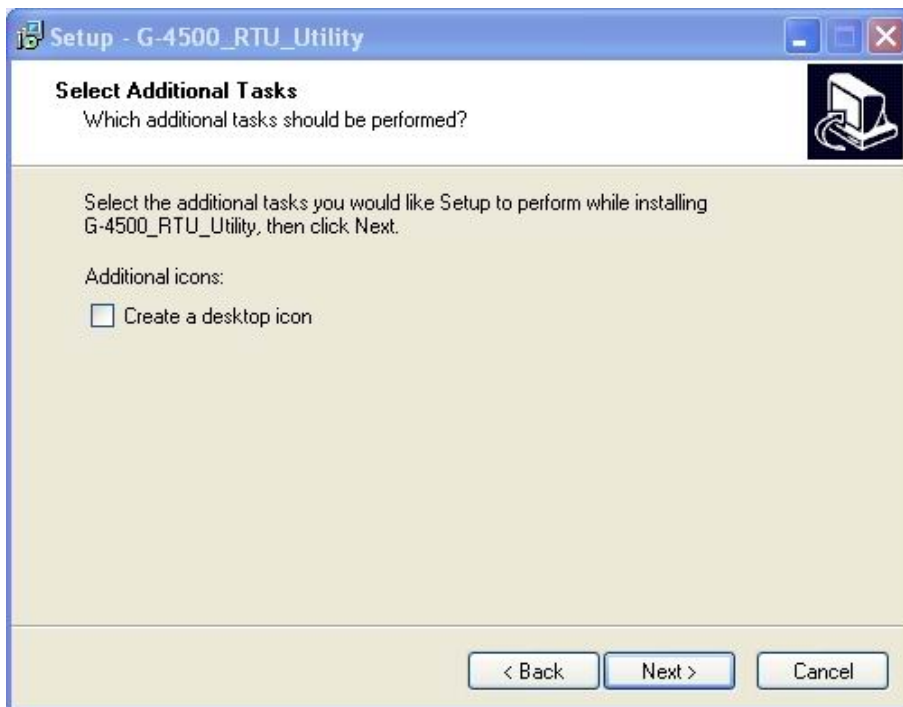
- ◆ Select the installation path. The default path is "C:\ICPDAS\G-4500_RTU_UTILITY". Press “Next” to the next step.



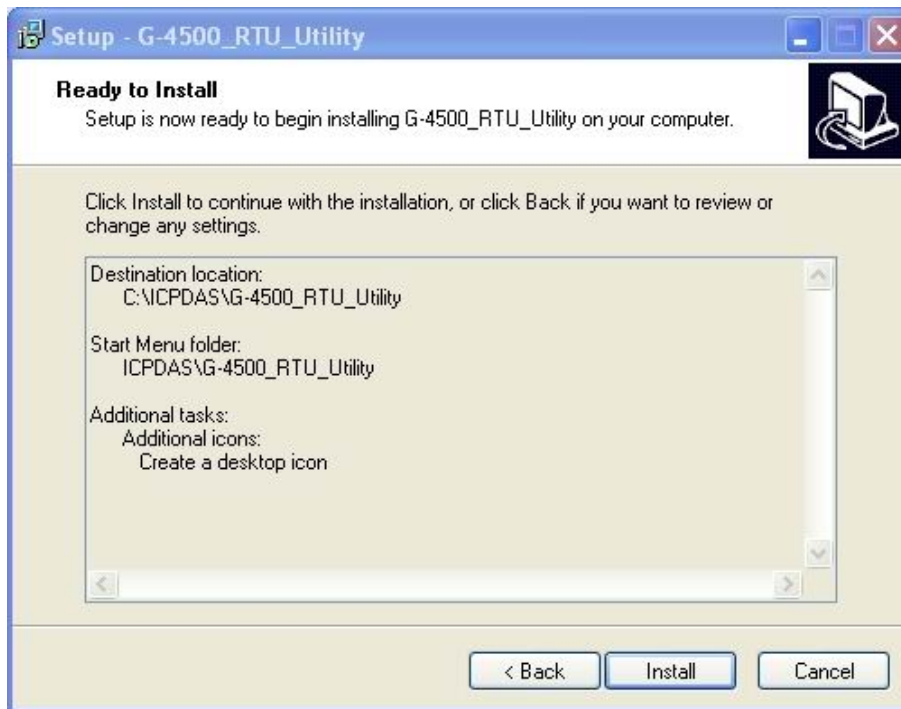
- ◆ Select the start menu folder path. The default path is "ICPDAS\G-4500_RTU_UTILITY". Press "Next" to the next step.



- ◆ Press "Next" to the next step.



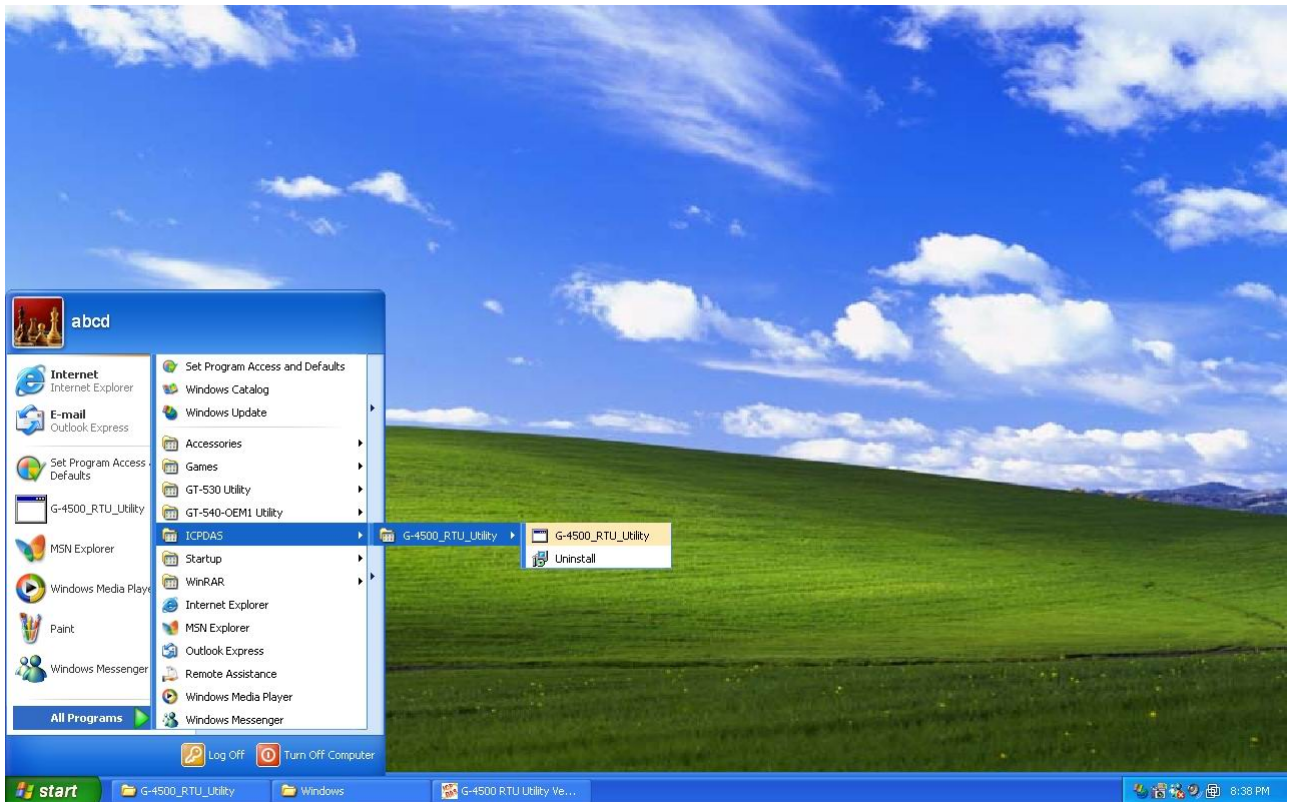
- ◆ Press "Next" to the next step.



Press "Finish" to finish the installation procedure.



- ◆ Launch G-4500 RTU Utility from the start menu "Start→All Programs→ICPDAS→G-4500_RTU_UTILITY→ G-4500_RTU_UTILITY".

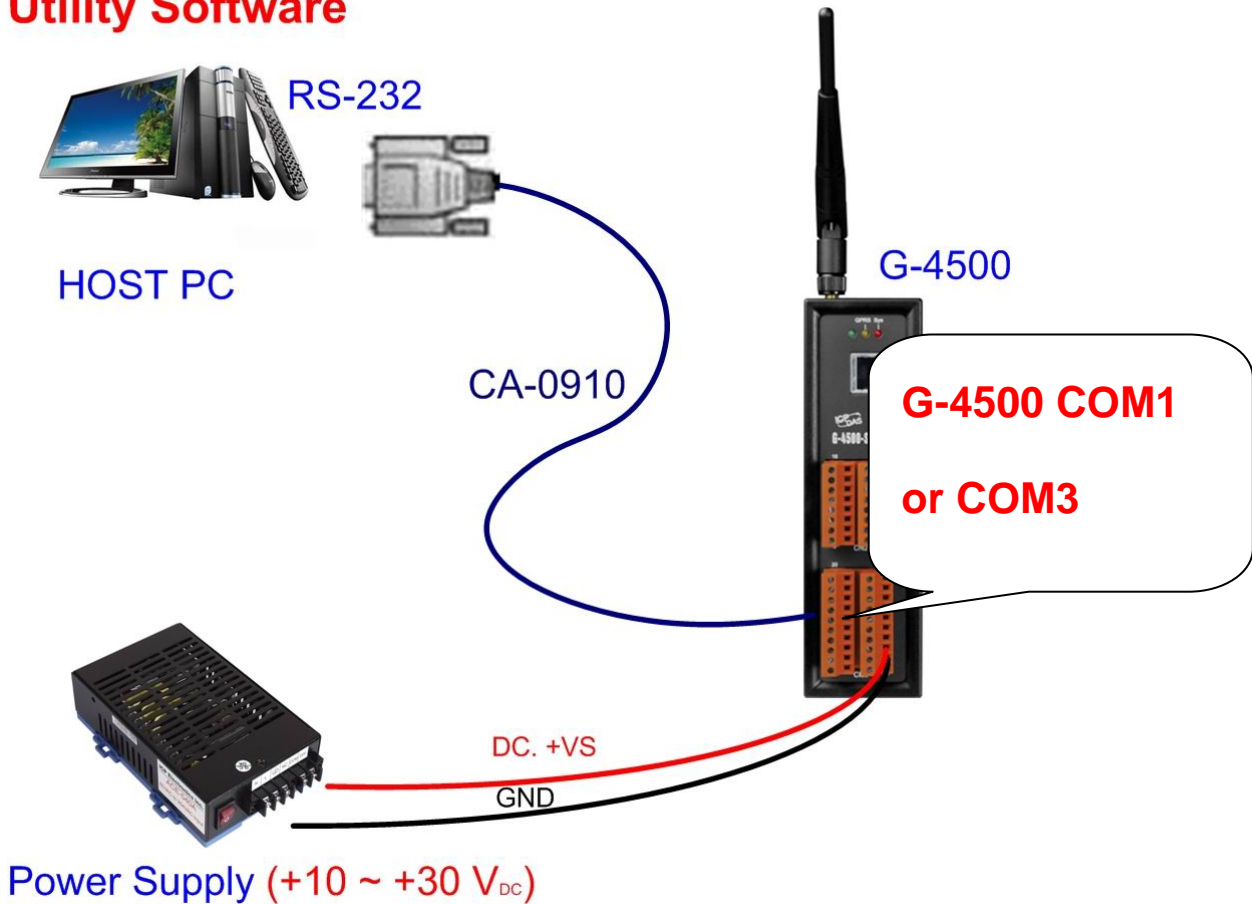


Chapter 5 G-4500 RTU Utility operation

5.1 Hardware connection

When you want to configure G-4500 RTU with G-4500 Utility, using the COM Port of Host PC connects to G-4500 with cable CA-0910. You can select COM1 or COM3 on your G-4500. Please refer to the picture below.

Utility Software



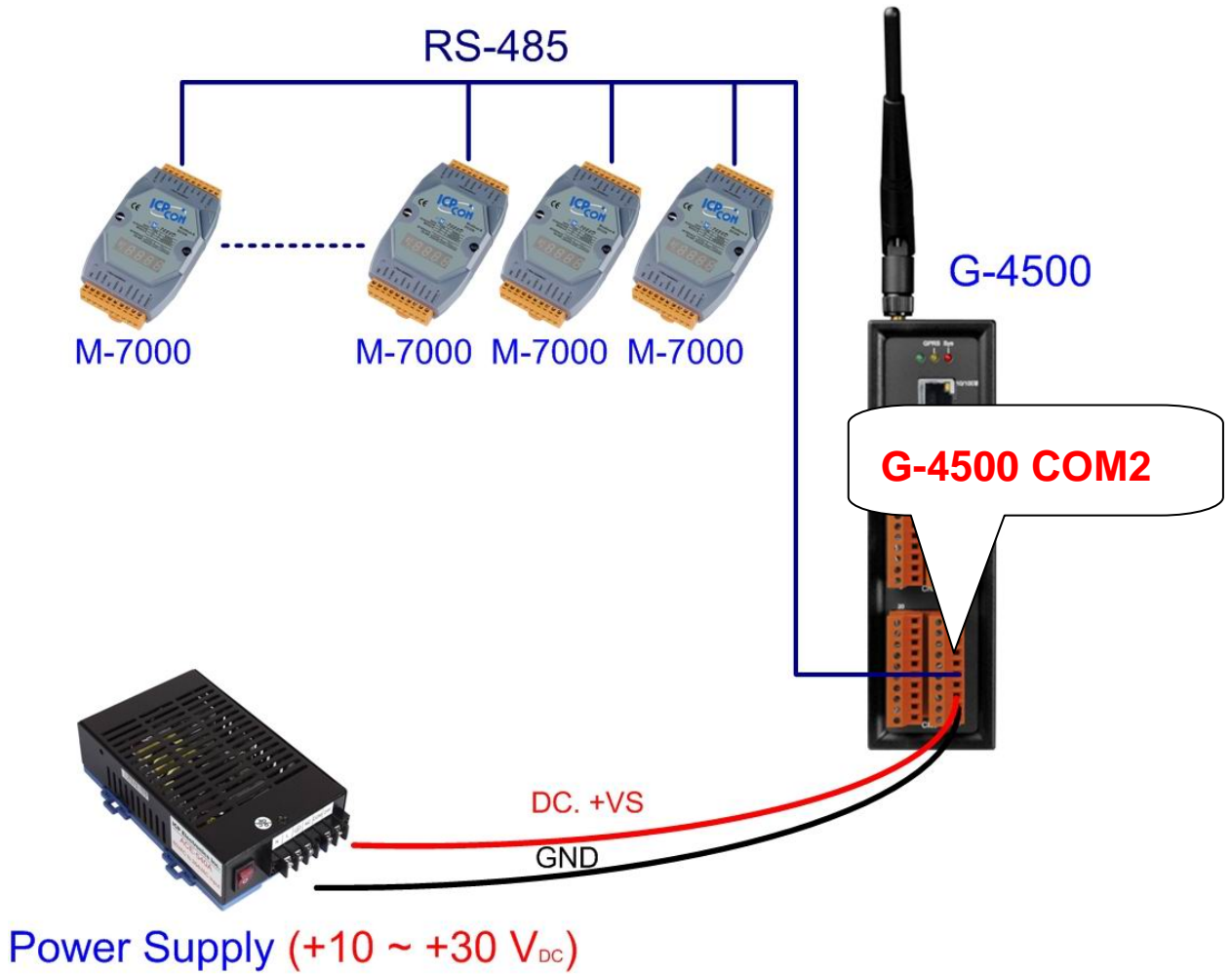
- Turn the dip switch to **RUN** mode and **restart** the G-4500 power



5.2 Modbus Device wire connection

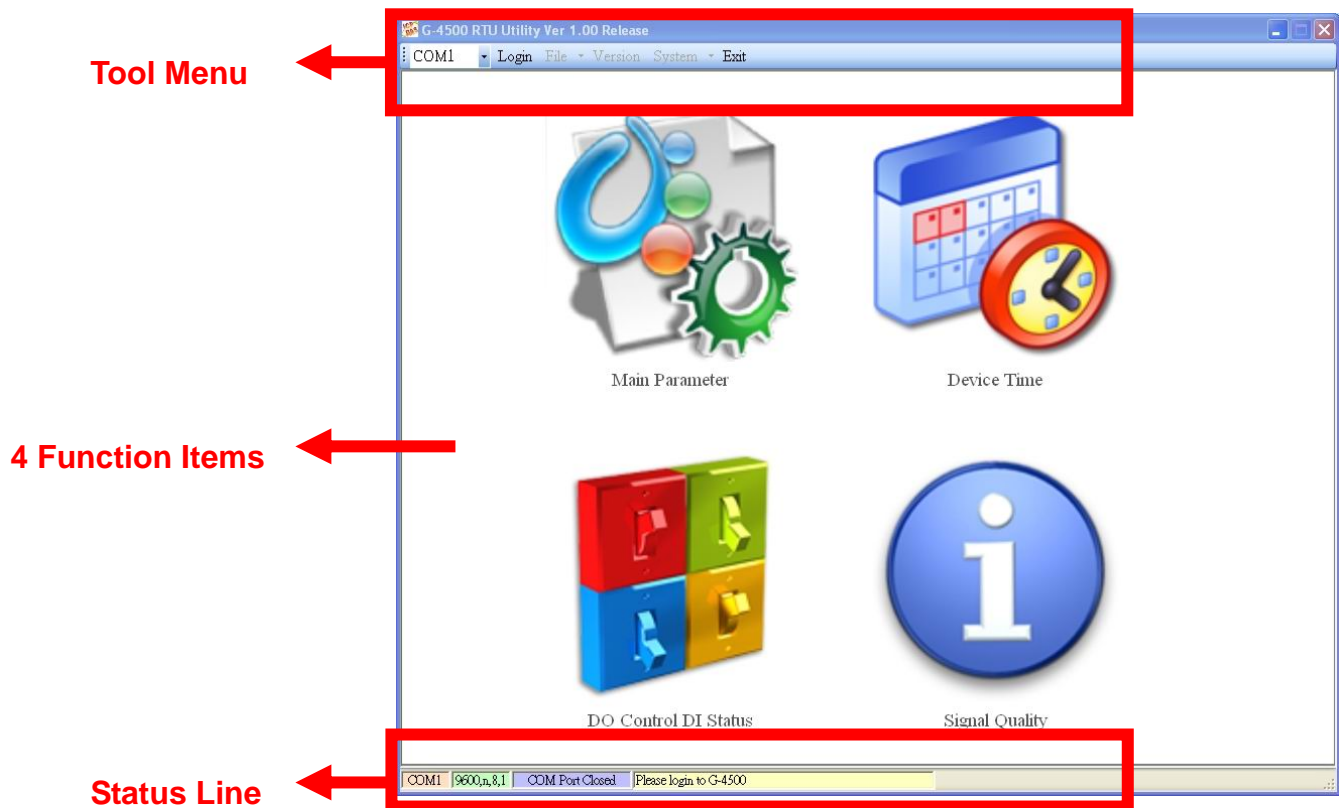
G-4500 RTU provides Modbus RTU Master Protocol to connect to Modbus RTU Devices by RS-485 port (COM2) of G-4500.

Modbus Device Wire Connection



5.3 Main menu

The main menu of G-4500 RTU Utility includes the following sections:



Tool menu

- ◆ “COM”: Set the COM port number in PC connecting to G-4500.
- ◆ Login/Logout

There are import and export functions in “File” item. The functions would be enabled when “Main parameters” window is open.

Export: The function can export the parameters as .par file from the “Main parameters” windows.

Import : The parameters would be shown in “Main parameters” window from the specific .par file.
- ◆ Version: Including the firmware and Utility version information.
- ◆ System: Provide users for recovering G-4500 RTU to factory and resetting G-4500.
- ◆ Exit: To exit G-4500 RTU utility

4 function items:

- ◆ “Main parameter”: The main parameter setting of G-4500 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,

- ◆ “Device time”: Display and set the RTC time of G-4500 RTU. It is also can get the information of the last and next time of the return report.
- ◆ “DO Control/DI status”: Display the status of I/O and control the DO output.
- ◆ “Signal Quality”: Show the GSM signal strength.

Status Line

Show the related information during the operation procedure including:

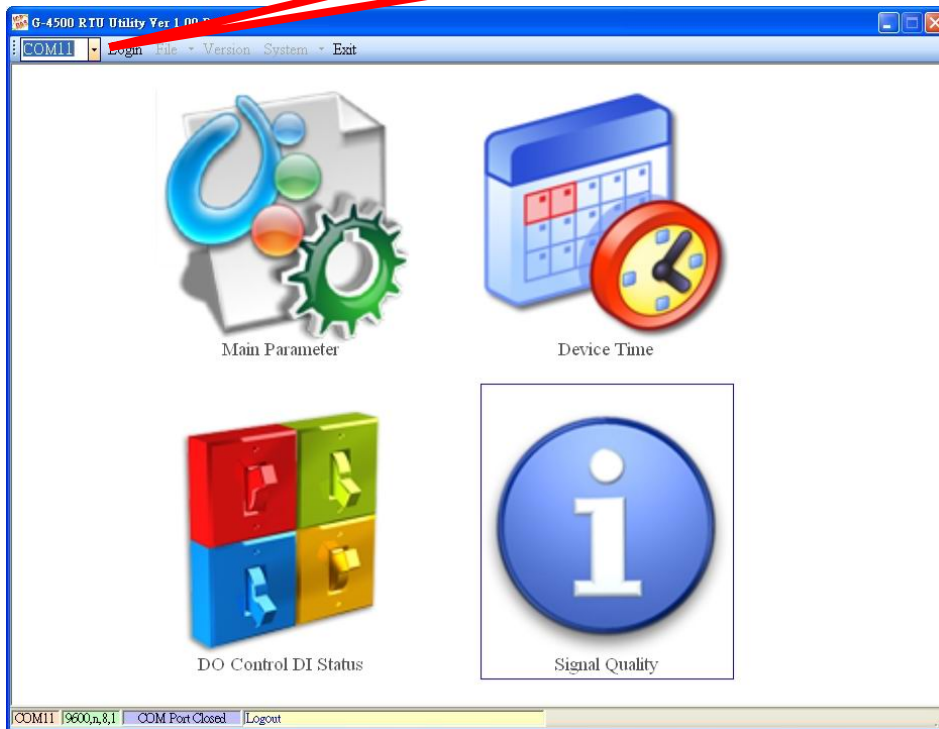
- ◆ The com port number of PC
- ◆ The communication setting of COM Port
- ◆ The status of COM Port
- ◆ The result of Utility operation

5.4 Login

It needs to login into G-4500 RTU to set its parameters. The description is below:

- (1) Select the COM port number of PC.
- (2) Press the “login” button

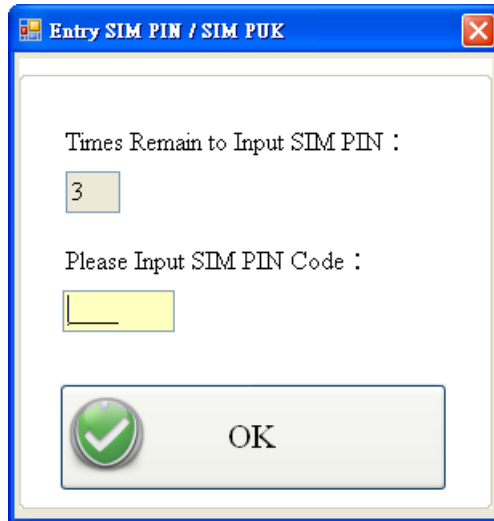
1. The COM Port number of PC



If the pin code in G-4500 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.

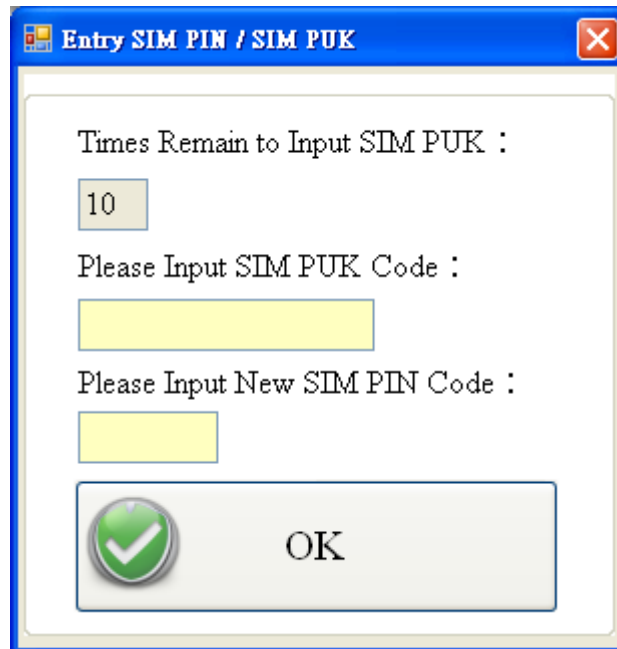
(1) Asking for inputting PIN code:

If the PIN code is effective, the “Enter SIM PIN/SIM PUK” window would pop-up as follows. If the number of times for inputting the wrong PIN code is more than the allowed number, the PIN code would be ineffective. And the “PUK code” window would pop up.



(2) Asking for inputting PUK code

If the PIN code is ineffective, the “PUK code” window would pop-up as follows. As the number of times for inputting the wrong PUK code is more than allowed number, the SIM card would be ineffective forever. Therefore, it is important to input the correct PUK code.



If the PIN or PUK code is correct, the STA led would blank per second. Users can operate other function of G-4500 in this utility.

5.5 Main parameter

There are 4 tree pages in “Main parameter” window. They are “Main Parameters, Local IO Parameters, Modbus Parameters and Device Status” pages.

After configuring those pages, press “Write to Device” button to save these settings to G-4500 RTU. Then, reset G-4500 to enable these settings.

The “Read Form Device” button can help users to read back these settings from G-4500 RTU. In addition, these setting would be read from G-4500 RTU when the “Main Parameter” window pops up from the main menu.

• Main Parameters

The following page is “Main Parameters”. Users can refer the explanation below :

The screenshot shows the 'G-4500 RTU Utility Ver 1.00 Release' window. The 'Device Parameters' sub-window is active, displaying a tree view on the left with 'Main Parameters' selected. The main area contains a table of parameters and their values, with a 'Message' column. At the top right of the sub-window are buttons for 'Read Form Device' and 'Write to Device'. At the bottom left is a 'Detailed Message' box showing '1 ~ 65535'. The status bar at the bottom of the utility window shows 'COM11 | 115200,n,8,1 | COM Port Connected | Read all parameters successfully!'.

Parameter	Value	Message
Station ID	4	1 ~ 65535
Update Time	1	1 ~ 999999, Unit: sec
Heartbeat Time	0	1 ~ 3600, 0: Disable, Unit: sec
Connect Method	0	0: Only GPRS, 1: Only Ethernet...
Enable GPS	0	1: Enable, 0: Disable, it will retur...
GPRS Username	GUEST	GPRS Username
GPRS Password	GUEST	GPRS Password
GPRS APN	INTERNET	GPRS APN (Access Point Name)
DNS Server	168.95.1.1	DNS Server
Remote Server	61.221.131.37	Please fill in your Remote's IP o...
Remote Server Port	10000	Default: 10000
Modbus BaudRate	9600	2400 ~ 115200 bps
Modbus Parity	0	0: None, 1: Even, 2: Odd
Modbus DataBit	8	DataBit: 7/8
Modbus StopBit	1	StopBit: 1/2 (When StopBit is 2,...
Modbus Time Out	500	1 ~ 65535, Unit: ms
Local Ethernet IP	192.168.0.99	Local Ethernet IP

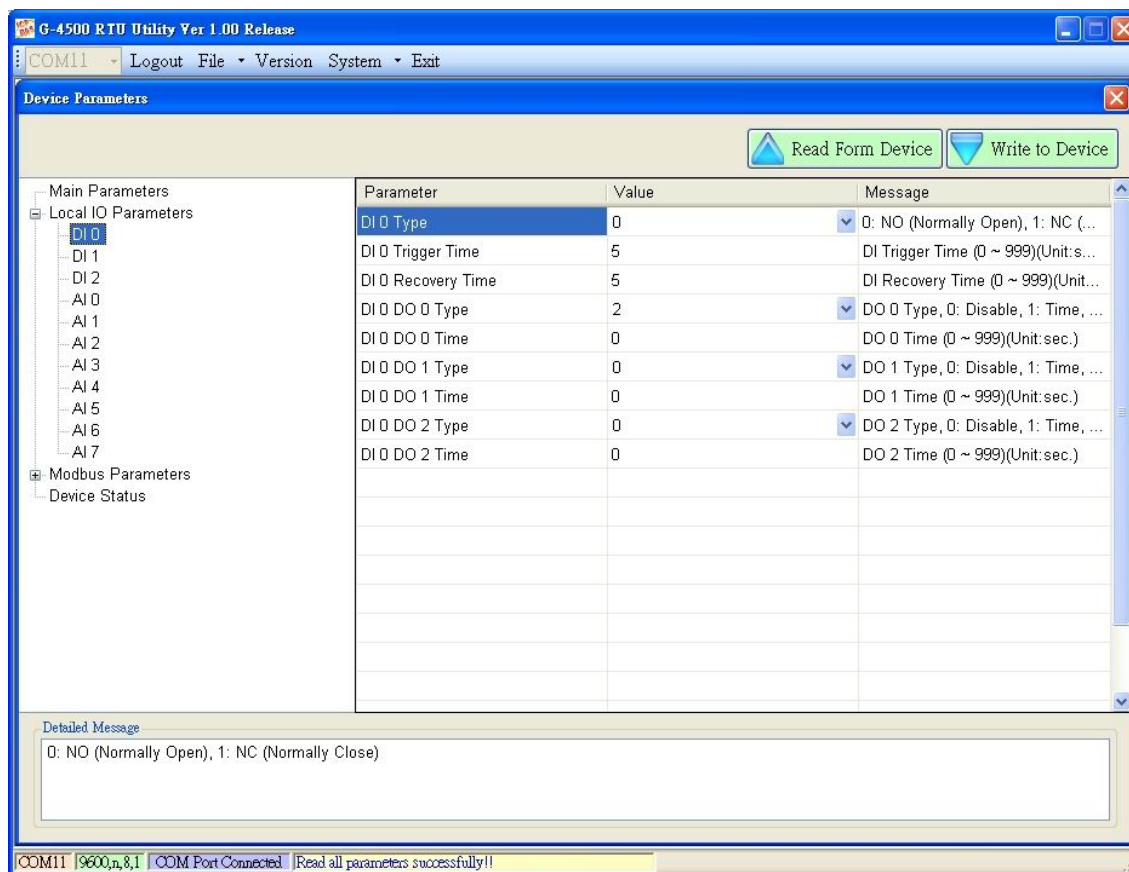
Parameter	describe
Station ID	The device Station ID would be shown in the Remote OPC Server. It can identify the different G-4500 device in the Remote OPC Server. (Range: 1 ~ 65535)
Update time	Set report time interval. The G-4500 RTU will send the data to M2M RTU Center by the update time. The based unit is: sec. (Range: 1 ~ 999999 secs)
Heartbeat Time	Set heartbeat time interval. When the G-4500 update time is too long to terminate the GPRS connection by ISP, the heartbeat time will report smaller package to keep GPRS connection. (unit: sec) (Range: 1 ~ 3600) Note: Some ISP companies would terminate the GPRS connection when the GPRS connection has any data flow for some time.
Connect Method	4 methods are supported for G-4500 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)
Enable GPS	The setting can enable or disable GPS function of G-4500 RTU. If enable, the GPS data also transfer to M2M.OPC.Server. That would report \$GPRMC format.
GPRS Username	The setting is important factor when connecting to a GPRS network. Check with your GPRS service provider for details.
GPRS Password	The setting is important factor when connecting to a GPRS network. Check with your GPRS service provider for details.
GPRS APN	The setting is important factor when connecting to a GPRS network. Check with your GPRS service provider for details. 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.
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 Baudrate	COM 2 of G-4500 baud rate. (Range: 2400 ~ 115200 bps)
Modbus Parity	COM 2 of G-4500 parity. (0: None, 1: Even, 2: Odd)
Modbus DataBit	COM 2 of G-4500 data bit. (DataBit: 7/8)
Modbus StopBit	COM 2 of G-4500 stop bit. (StopBit: 1/2 (When StopBit is 2, the data bit must be 7 bit))
Modbus Time out	Set the timeout of connecting to Modbus Device. (unit: sec) (Range: 1 ~ 65535)
Local Ethernet IP	Local Ethernet IP of the G-4500
Local Ethernet Mask	Local Ethernet Mask of the G-4500
Local Ethernet Gateway	Local Ethernet Gateway of the G-4500
Enable LCD	The setting can enable or disable LCD function of G-4500 RTU. If enable, the LCD show information about G-4500 status.
Enable SD	The setting can enable or disable SD function of G-4500 RTU. If enable, the G-4500 record the data into SD card. (* .csv data format)
Interval Time of Modbus command	Users can control interval time of Modbus command by themselves. 0 ~ 1000, Unit: ms. 0: Use system default, other: User define

• Local I/O Parameters (I/O linkage)

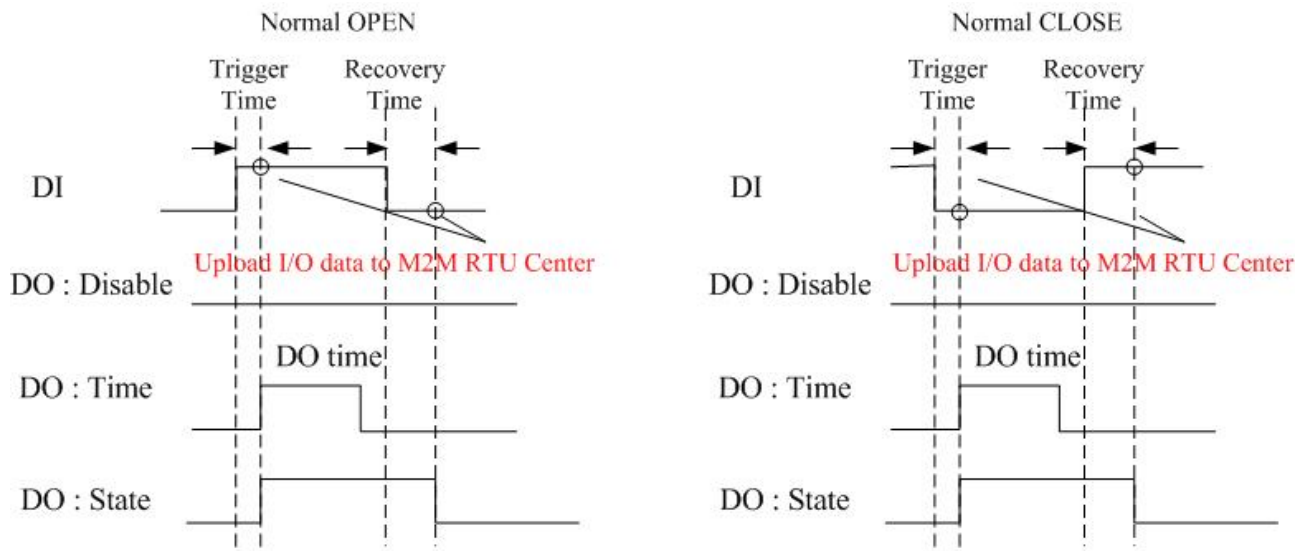
The following page is “Local IO Parameters”. Users can refer to the explanation below :

■ DI linkage

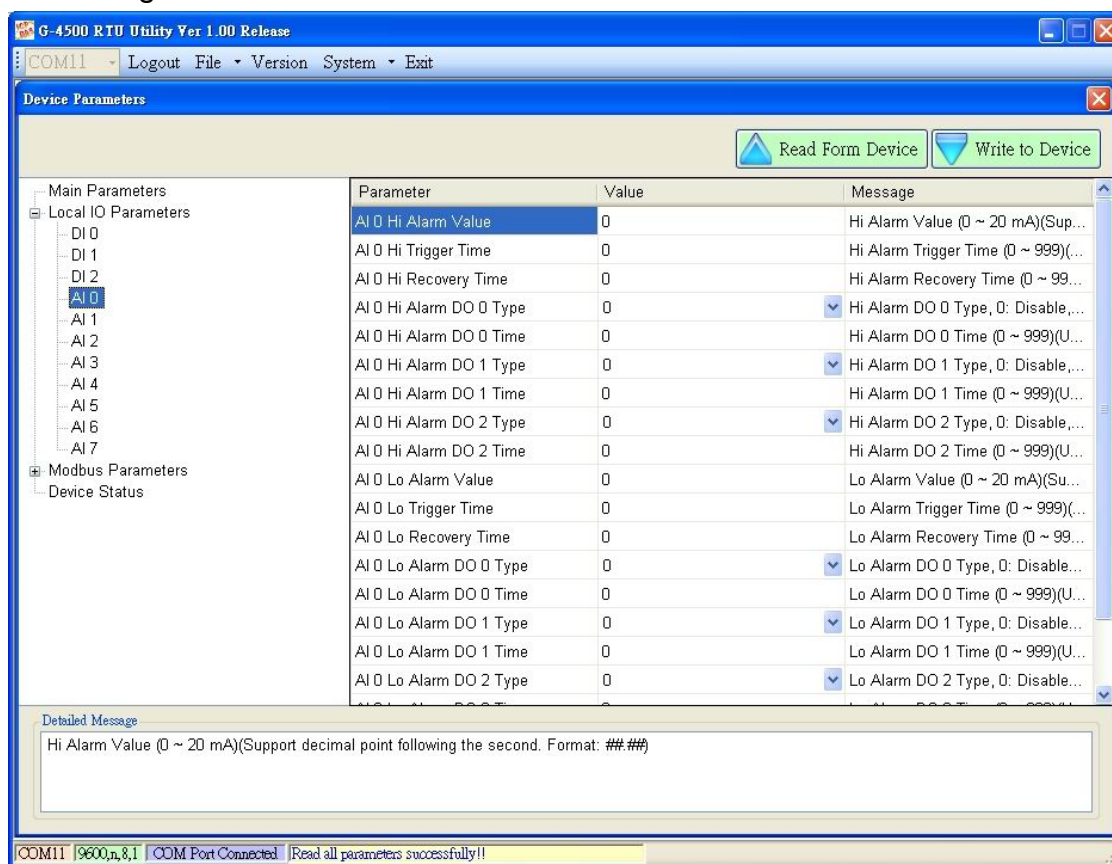


Parameter	describe
DI Type	0: NO (Normally Open), 1: NC (Normally Close)
DI Trigger Time	Range: 0 ~ 999, unit: sec
DI Recovery Time	Range: 0 ~ 999, unit: sec
DO 0 Type	There are 3 types to set: 1) 0: Disable, Disable the DO 0 function. 2) 1: Time, when the DI has different status, the DO 0 would output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

	would output during DO 1 Time. 3) 2: State, changes with the DI state
DO 1 Time	DO 1 outputting time (unit: sec) (Range: 0 ~ 999)
DO 2 Type	There are 3 types to set: 1) 0: Disable, Disable the DO 2 function. 2) 1: Time, when the DI has different status, the DO 2 would output during DO 2 Time. 3) 2: State, changes with the DI state
DO 2 Time	DO 2 outputting time (unit: sec) (Range: 0 ~ 999)

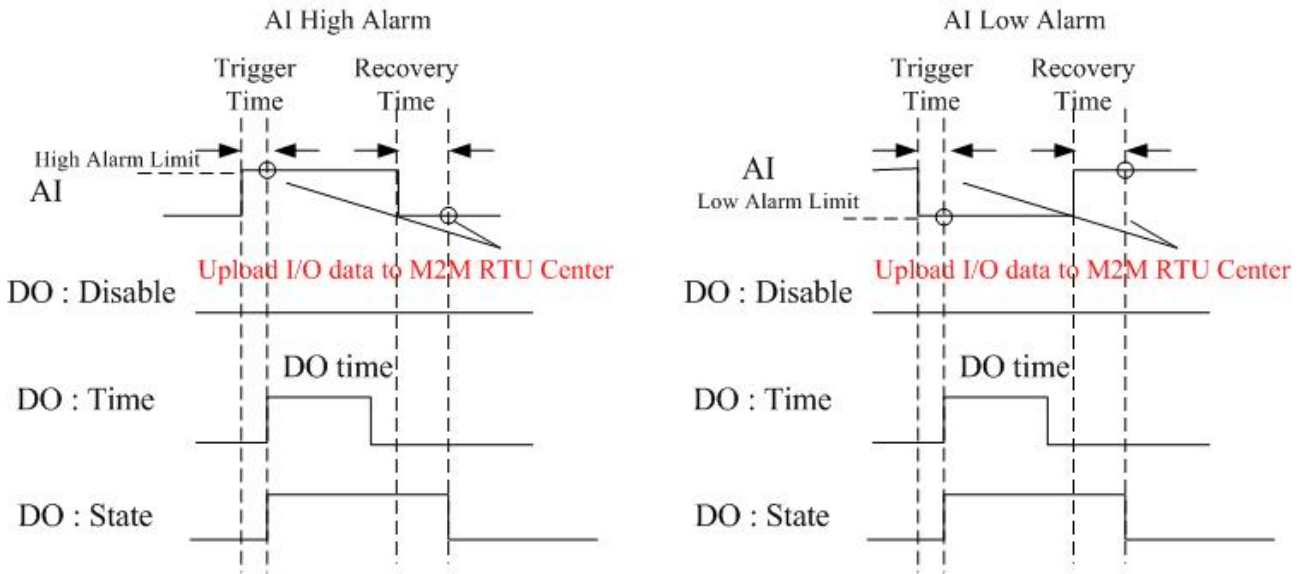


■ AI linkage



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

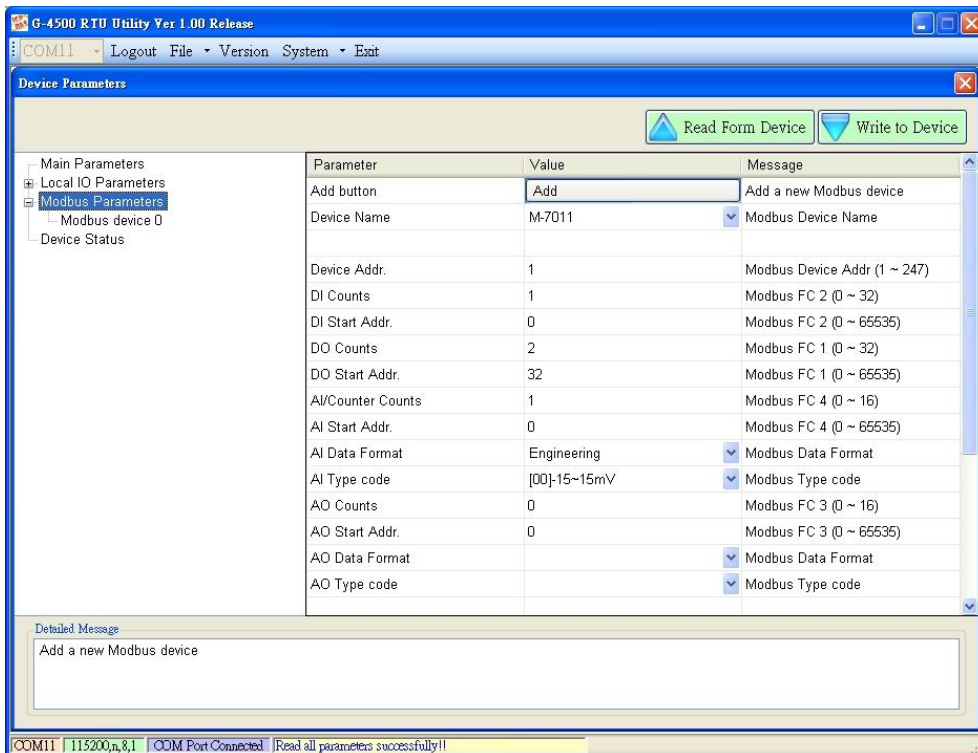
Hi Alarm DO 2 Type	There are 3 types to set: 1) 0: Disable, Disable the DO 2 function. 2) 1: Time, when the DI n has different status, the DO 2 would output during DO 2 Time. 3) 2: State, changes with the DI state
Hi Alarm DO 2 Time	DO 2 outputting time (unit: sec) (Range: 0 ~ 999)
AI Lo Alarm Value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



• Modbus Parameters

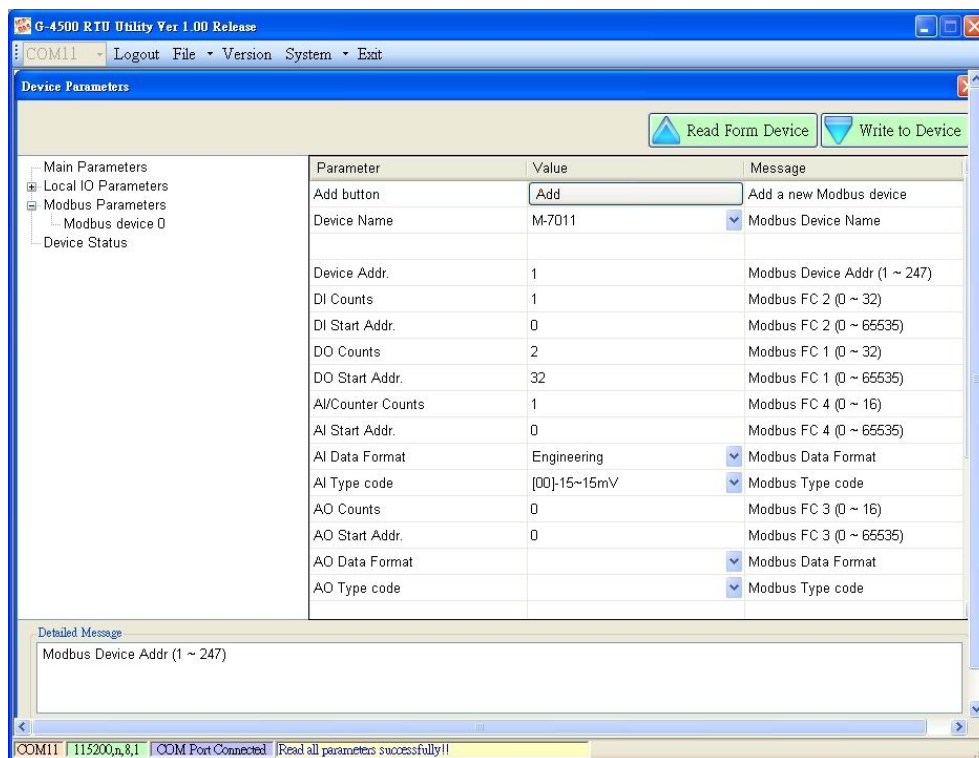
This page can help users to configure the parameters of Modbus Devices connected to G-4500 RTU. The maximum number of Modbus devices connected to G-4500 RTU is 10.

- Add a new ICP DAS's Modbus Device



Parameter	describe
Add button	Add a new Modbus Device
Device Name	Select Modbus Device.
Device Addr.	Modbus device Addr. (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 ~ 32
AI Start Addr.	Range: 0 ~ 65535
AI Data Format	AI Data Format (If not ICP DAS Modbus product, the value is 255)
AI Type code	AI Type code
AO Counts	Range: 0 ~ 32
AO Start Addr.	Range: 0 ~ 65535
AO Data Format	AO Data Format (If not ICP DAS Modbus product, the value is 255)
AO Type code	AO Type code

After finishing setting a Modbus Device, press “Add” button to add the Modbus device to G-4500 RTU.

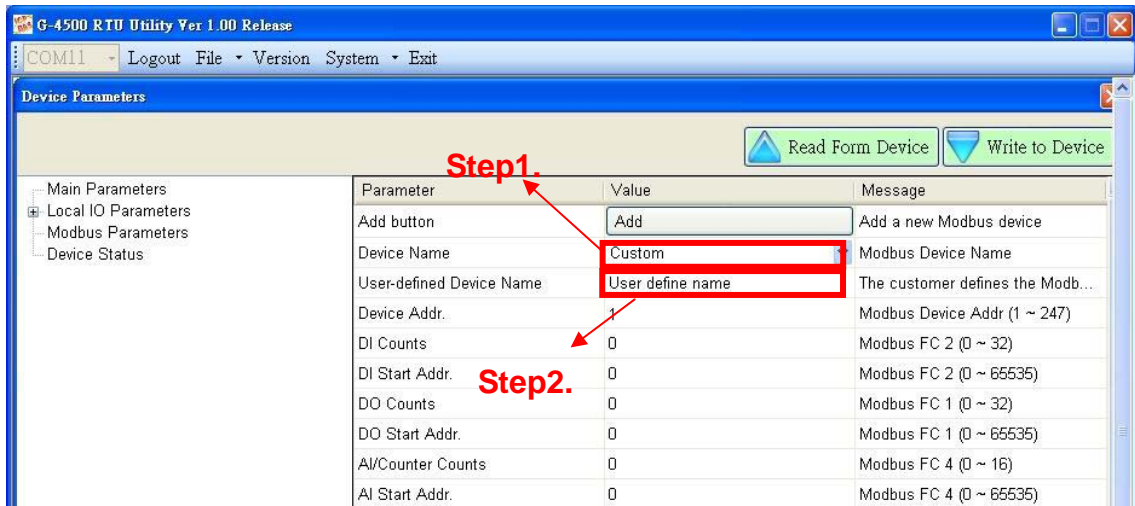


■ Add other company's Modbus Device

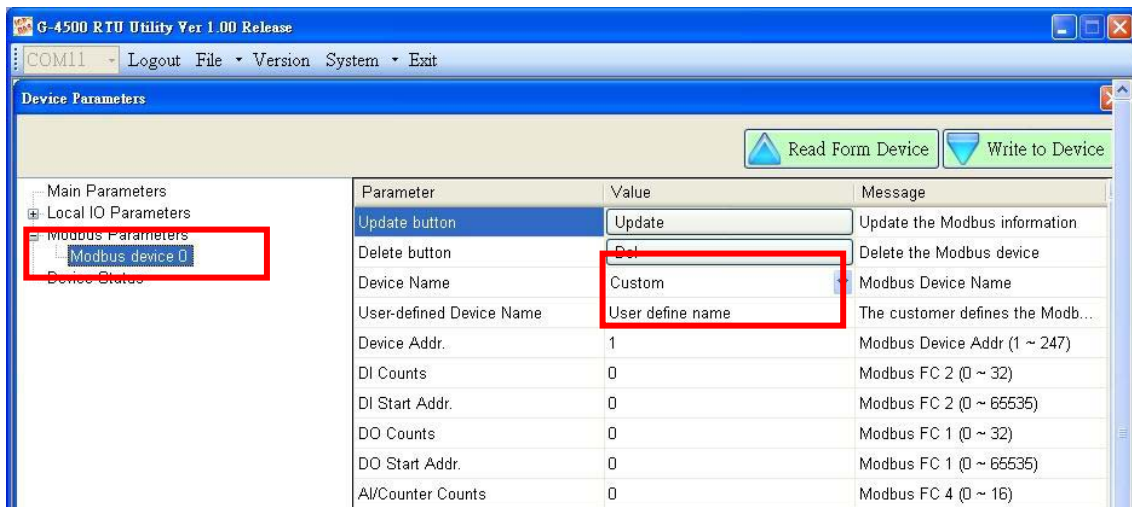
Except for Modbus products of ICP DAS, G-4500 RTU can connect to any Modbus RTU devices. Users can follow the steps to do that.

Step1. Select "Custom" in Device Name item

Step2. Input your device name in User-defined Device Name item (Max. 20 character)



After add a new device.



■ Modify a Modbus Device

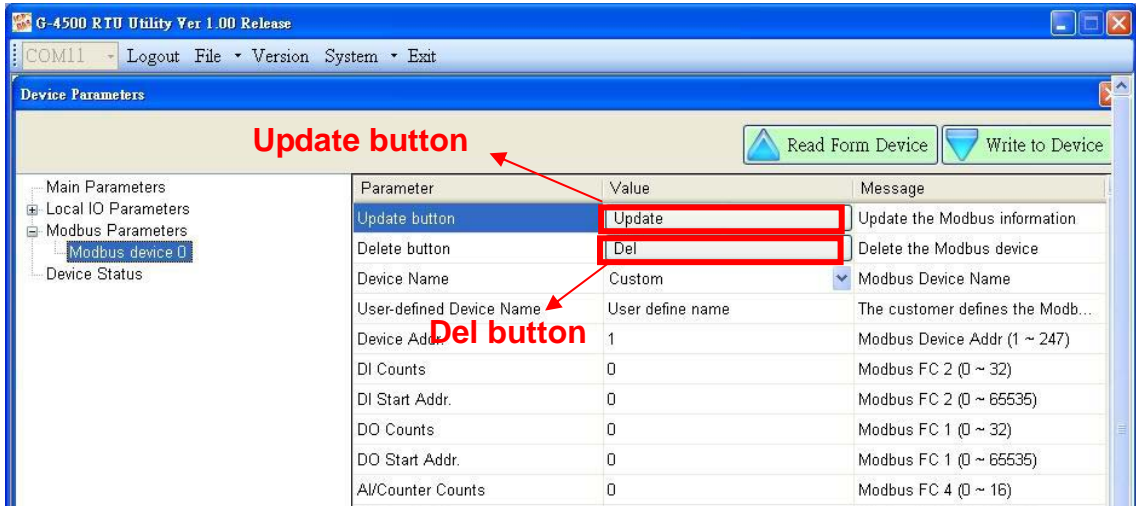
Step1. Select the Modbus device you want to modify in the left tree windows.

Step2. Select the Update button after modifying your parameters

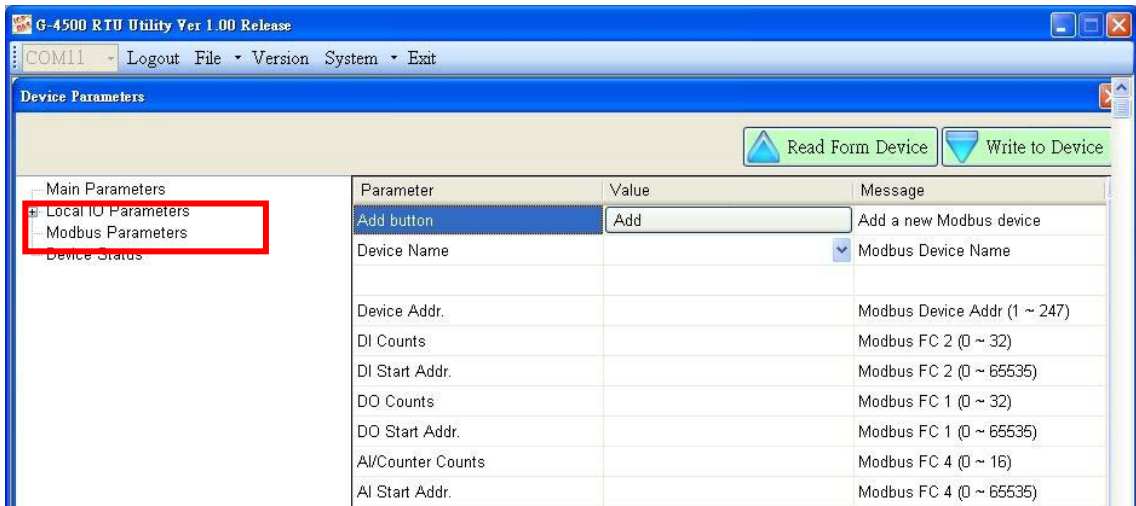
■ Delete a Modbus Device

Step1. Select the Modbus device you want to delete

Step2. Select the Del button.

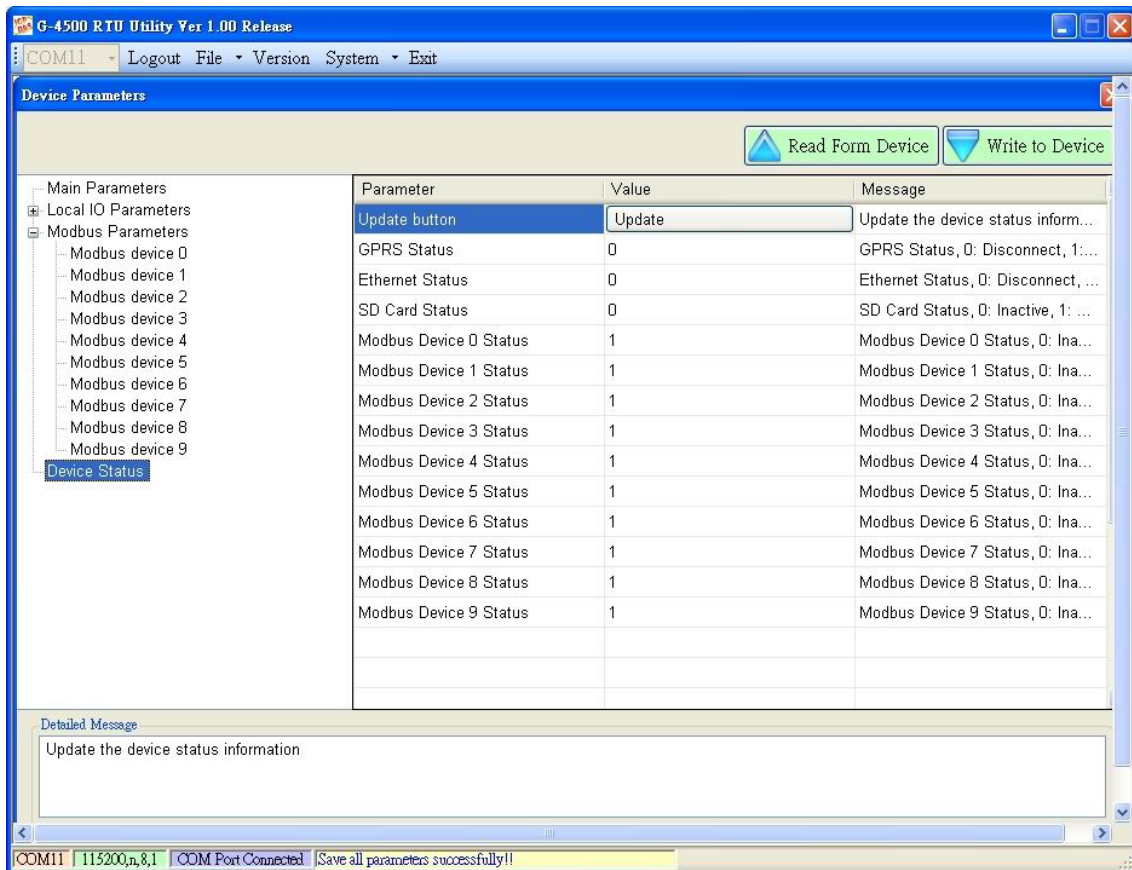


After delete a device



• Device Status

The following page is “Device Status”. Users can refer to the explanation below :



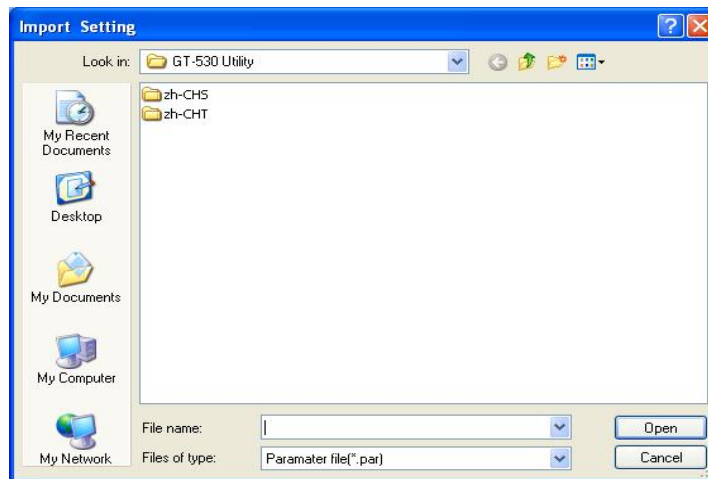
Parameter	Description
Update button	Update the device status information
GPRS Status	0: Disconnect 1: Connect
Ethernet Status	0: Disconnect 1: Connect
SD Card Status	0: Inactive 1: active
Modbus Device -n	n: 0 ~ 9, 0: Inactive 1: active

5.6 Import/Export Parameters

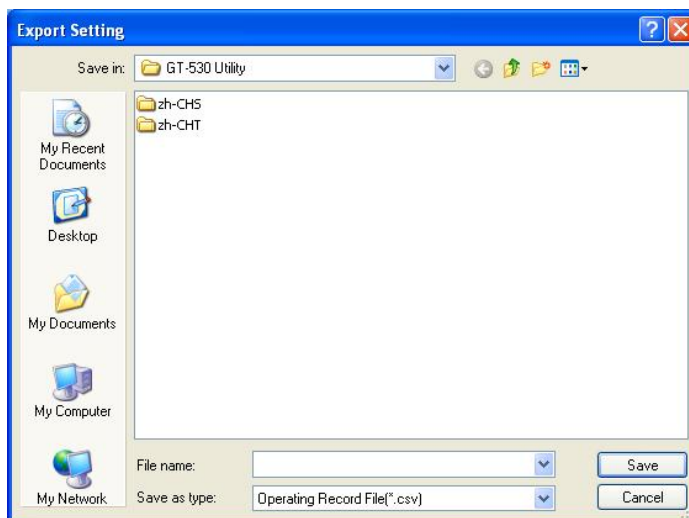
Users can use the import and export functions from the menu bar. This function would be enabled when the “Main Parameter” window is open. The explanation is below:



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.

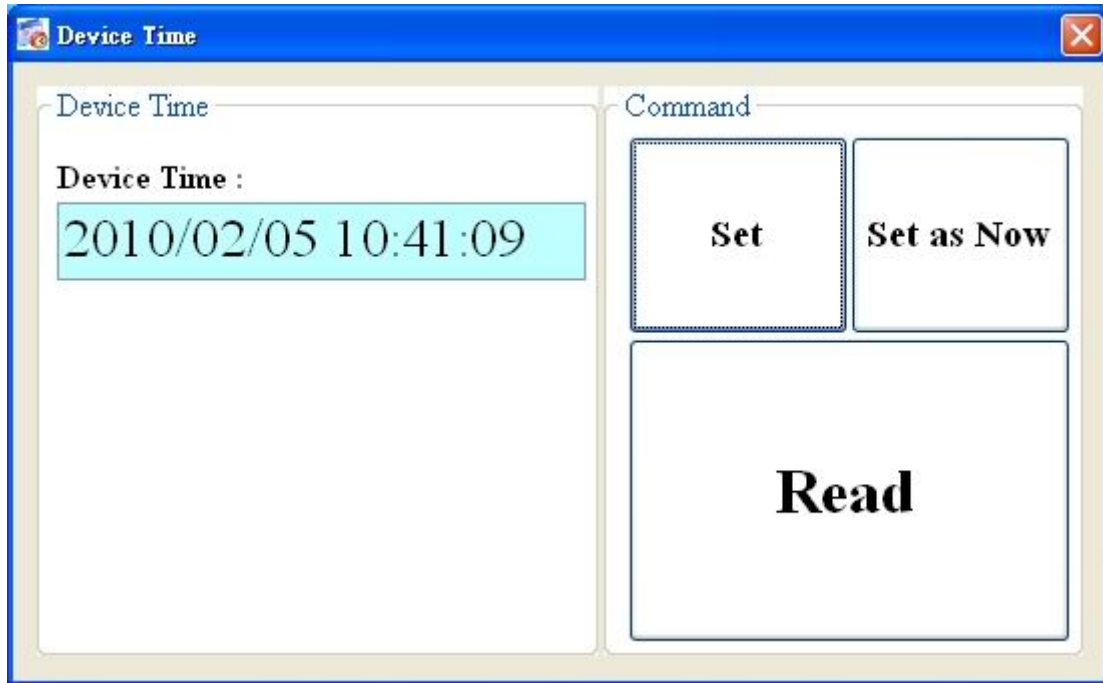


Export Parameters: The function is used for saving the setting of “Main parameter” window as .par file. When pressing “Export” button, a file selection window would pop-up for users to save the setting as .par file in specific path.



5.7 Device Time

This window provides the function to inquire and modify the time of G-4500 RTU. Besides, the next and last report times are also shown. The text field operation is below.



Text field :

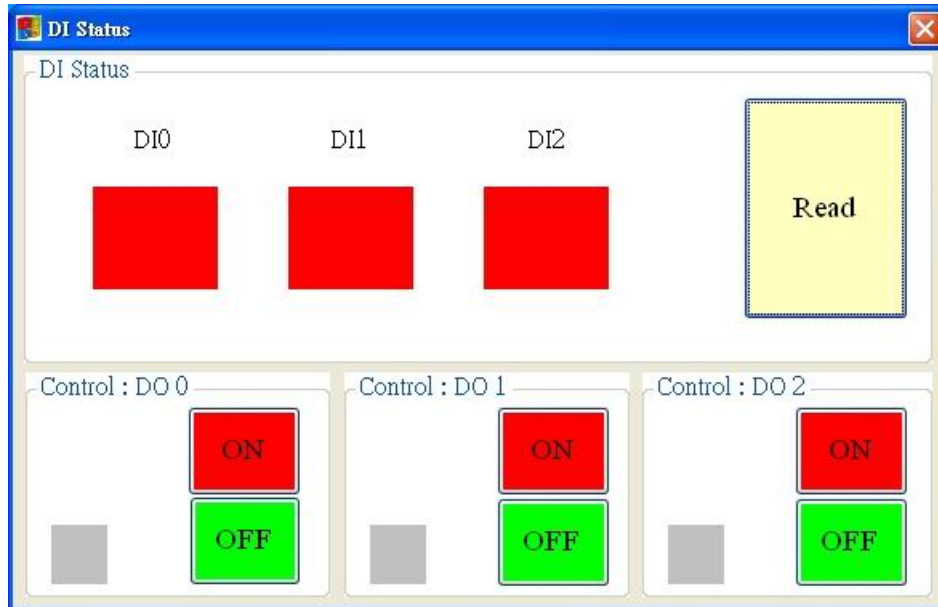
Device time: show the time of G-4500 RTU. Users also can change the time in this field to key in the specific time.

Operation:

- (1) "Set as Now": Set the PC time to G-4500 RTU. After setting the time successfully, the information of G-4500 RTU time.
- (2) Set: Set the G-4500 RTU time according the "Device Time" field. After setting the time successfully, the information of G-4500 RTU time would be updated.
- (3) Read: Read back the time of G-4500 RTU, the next report time.

5.8 DO control/DI status

This page provides the function for controlling DO and reading the status of DIs in the Labs.



Text field

(1) DI0 ~ DI2 、 DO0 ~ DO2 :

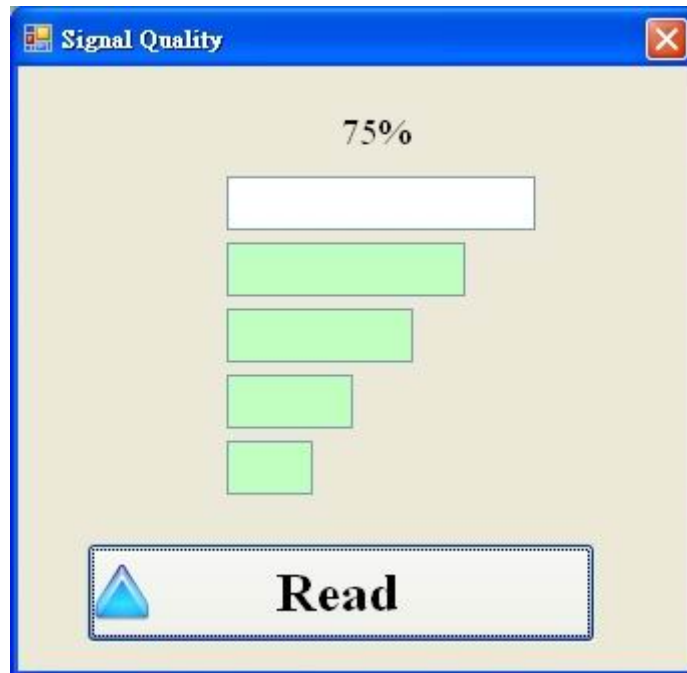
- ✧ Grey : the voltage logic is high.
- ✧ Red : the voltage logic is low

Operation

- (1) Read : Read back the status of DI0 ~ DI2 and DO0 ~ DO2 from G-4500.
- (2) DO0 ~ DO2 ON : Set the DO output on
- (3) DO0 ~ DO2 OFF : Set the DO output off

5.9 Signal Quality

This window can show GSM signal strength. It is used for users to know the GSM signal in Local site.



Text field :

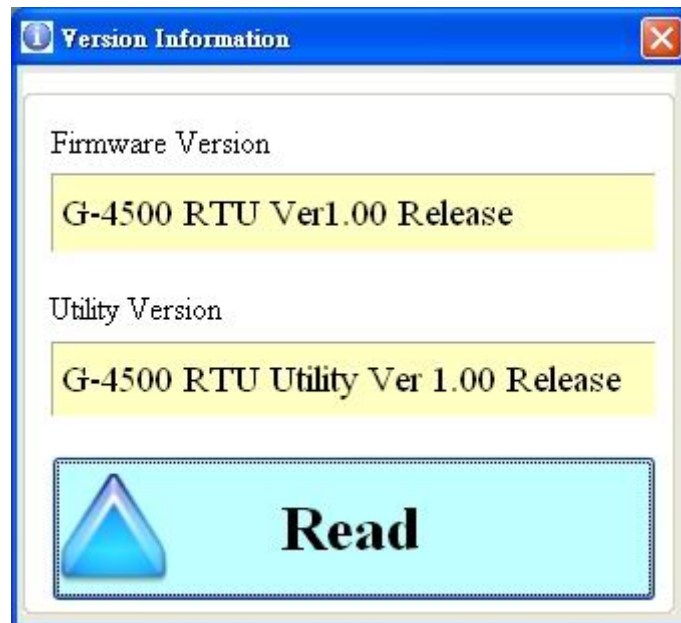
The strength is divided into 5 sections shown in percentage.

Operation :

- (1) Read : Read the GSM signal strength.

5.10 Version

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



Text field:

- (1) Firmware version: show the version information of G-4500 RTU's firmware
- (2) Utility version: show the version information of G-4500 RTU's utility

Operation:

Read: Read these information from G-4500 RTU.

5.11 System

“System” menu item provide recovering factory setting and resetting G-4500 RTU functions.



• Recover to Factory Settings

The function is used to recover G-400 RTU as factory settings including password. Select the Recover to Factory Settings.

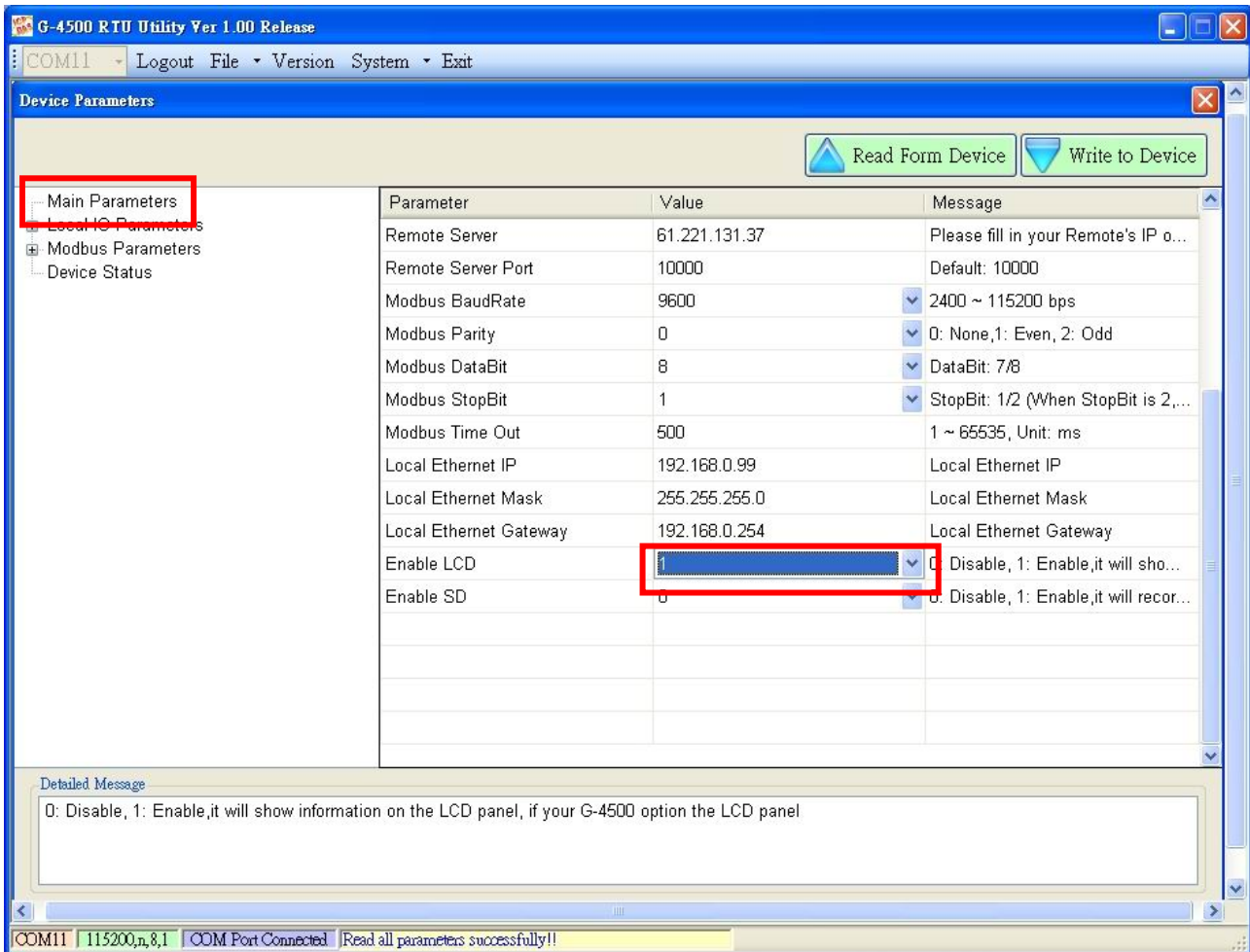
Main Parameters	
Parameter	Default
Station ID	1
Update time	5
Heartbeat Time	0
Connect Method	0
Enable GPS	0
GPRS Username	GUEST
GPRS Password	GUEST
GPRS APN	INTERNET
DNS Server	168.95.1.1
Remote Server	
Remote Server Port	10000
Modbus Baudrate	9600
Modbus Parity	0
Modbus DataBit	8
Modbus StopBit	1
Modbus Time out	500
Local Ethernet IP	192.168.255.1
Local Ethernet Mask	255.255.0.0
Local Ethernet Gateway	192.168.255.254
Enable LCD	0
Enable SD	0
Interval time of Modbus Command	0

• **Reset G-4500**

The function is used to reset G-4500 by software. Select “Rest G-4500” button to reset G-4500.

5.12 LCD Information

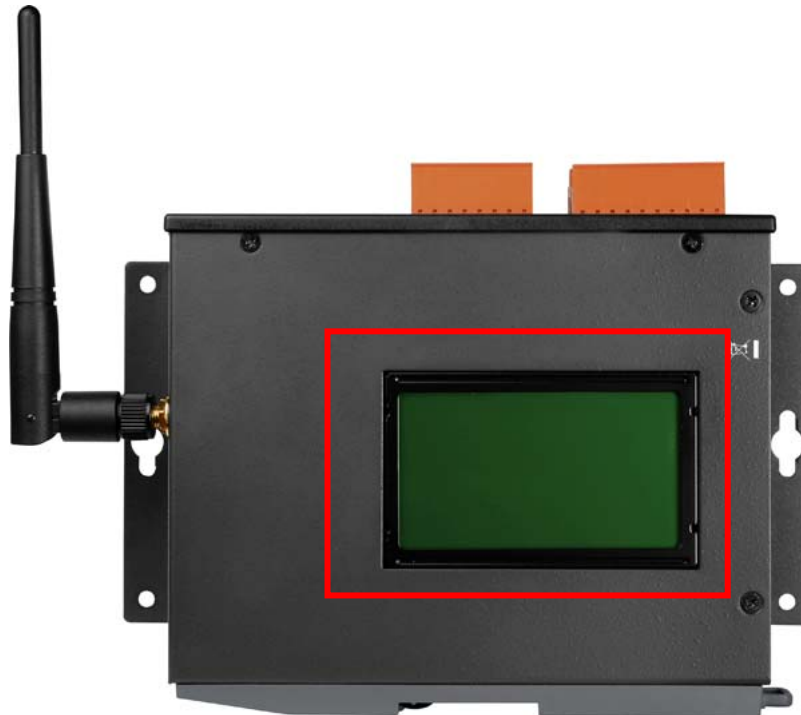
If users choose the G-4500 series with LCD display, they can select the LCD enable in the G-4500 RTU utility. There is system information of G-4500 RTU will be shown in the LCD panel.



Support Hardwares






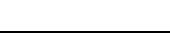
**G-4500D-SIM300, G-4500PD-SIM300, G-4500D-SIM340,
G-4500PD-SIM340**

The LCD panel of G-4500



Display information

Parameter	Descriptions
Station ID:	The device Station ID would be shown in the Remote OPC Server. It can identify the different G-4500 device in the Remote OPC Server. (Range: 1 ~ 65535)
Utime:	Set report time interval. The G-4500 RTU will send the data to M2M RTU Center by the update time. The based unit is: sec. (Range: 1 ~ 999999 secs)
Only GPRS/Only Ethernet/ GPRS(M),Eth(S)/ Eth(M),GPRS(S)	4 methods are supported for G-4500 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)	
GIP/EIP	The G-4500 GPRS or Ethernet IP	
GSM 	Status	Descriptions
		GSM signal quality: 20%
		GSM signal quality: 40%
		GSM signal quality: 60%
		GSM signal quality: 80%
		GSM signal quality: 100%
SIM Card:	Status	Descriptions
	OK	The status of 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. ME is waiting for phone to SIM card (antitheft)
	SIM Card:Err 4	PH_SIM PUK. ME is waiting for SIM PUK (antitheft)
	SIM Card:Err 5	SIM PIN2. PIN2, e.g. for editing the FDN book possible only if preceding Command was acknowledged with +CME ERROR:17
	SIM Card:Err 6	SIM PUK2. PUK2 possible only if preceding Command was acknowledged with error +CME ERROR: 18
	SIM Card:Err 7	SIM Card Error
	SIM Card:Err 8	SIM Card not inserted
Date:	year/month/date	
Time:	hour/minute/second	

5.13 Data log

G-4500 RTU provides an external SD interface. These local I/O and Modbus data are recorded in SD memory card for one day in a single file.

Note: The SD card must have more than 256 MB free spaces.

The file format is “*.csv” that divided each record with “,”. The file name is according to the date, The G-4500 IO data, and Modbus device data would be saved in the file. For example: If the date is 2010/03/18, the file name would be 10031800.csv. The last “00” characteristics represent the first file in this day. If the setting of G-4500 RTU is changed, another file would be created as 10031801.csv.

File name format:

YYMMDDXX.csv

YY- Year (2000 ~ 2099)

MM- Month (1 ~ 12)

DD – Day (1~31)

XX – 00 ~ 99

Recorder format in the data log file:

Example:

2010/03/18 10:14:57

Modbus device M-7016

Address: 5

DI*1, DO*4, AI*2, AO*1

Record data:

Date	StationID	UpdateTime	GPS	DI0	DI1	DI2	DO0	DO1	DO2	AI0	AI1	AI2	AI3	AI4	AI5	AI6
20100318 101457	4	10	NULL	1	1	1	0	0	0	6	6	6	6	6	6	6
20100318 101502	4	10	NULL	1	1	1	0	0	0	6	6	6	6	6	6	6

AI7	AIType	AIDataFormat	Module [M-7016] Addr.	DI0	DO0	DO1	DO2	DO3	AI0	AI1	AIType
6	26	1	5	0	1	1	1	1	8	8	0
6	26	1	5	0	1	1	1	1	8	8	0

AIDataFormat	AOI0	AOType	AODDataFormat
0	0	50	0
0	0	50	0

Note:

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. At the same time, the warning information would be sent to M2M RTU Center.

Version Record

Version	By	Date	Description
1.00	Yide	2010/02/12	
1.01	Yide	2010/03/28	
1.02	Yide	2010/08/10	
1.03	Yide	2011/06/30	