PDS-8x1 Series User Manual

Ver. 1.2

Programmable Device Server with I/O Expansion Slot(s)

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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CONTACT US

If you have any questions, please feel free to contact us via email at:

service@icpdas.com, service.icpdas@gmail.com

SUPPORT

This manual relates to the following modules:

PDS-811 and PDS-821

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Packing List

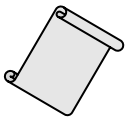
The shipping package includes the following items:

PDS-811 PDS-821

or

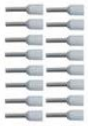
PDS-8x1 Series x1

CA-0910 Cable x1



Quick Start x1

Screw Driver x1



Pin Terminal x16

Note: If any of these items are missing or damaged, please contact the local distributor for more information. Save the shipping materials and cartons in case you need to ship the module in the future.

More Information

Documentation :
http://ftp.icpdas.com/pub/cd/8000cd/napdos/pds/pds-8x1/document/

Firmware :
http://ftp.icpdas.com/pub/cd/8000cd/napdos/pds/pds-8x1/firmware/

OS Image (MiniOS7):
http://ftp.icpdas.com/pub/cd/8000cd/napdos/pds/pds-8x1/OS_image/

Demo :
http://ftp.icpdas.com/pub/cd/8000cd/napdos/pds/pds-8x1/demo/

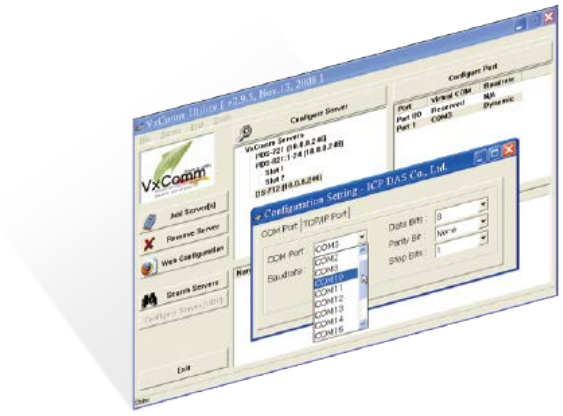
1. Introduction

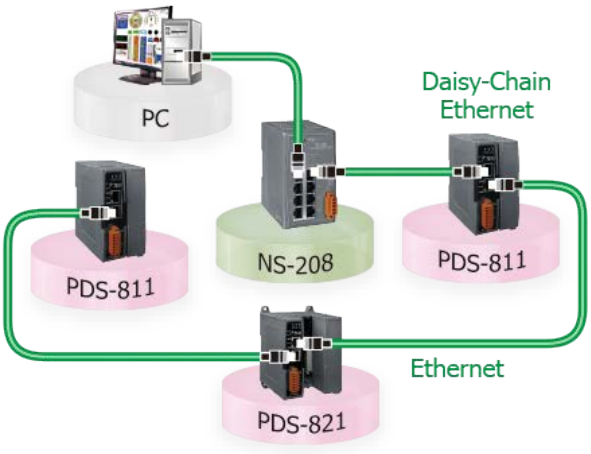
The PDS-811 and PDS-821 programmable device servers (PDS) are compact, modular, intelligent, rugged, and are designed for networking RS-232 and RS-422/485 serial devices to an Ethernet network. The PDS-811 has one I/O expansion slot, while PDS-821 has two I/O expansion slots that can be used to attach various 2- or 4-port serial communication modules. Therefore, a maximum of 4 serial ports can be installed on the PDS-811 or a maximum of 8 serial ports can be installed on the PDS-821.

Note: There is no serial module built-in to the PDS-811 or PDS-821 by default.

The PDS-811 and PDS-821 controllers are equipped with a 2-port 10/100 Base-TX Ethernet Switch that can be used to connect two network segments. The Ethernet Switch processes and routes data on the data-link layer (layer 2) of the OSI model to create a different collision domain per switch port. Using a switch allows you to attain dedicated bandwidth on point-to-point connections with every computer, and therefore run in full duplex mode with no collisions. Furthermore, the built-in 2-port Ethernet Switch on the PDS-811/821 enables network wiring to be simplified by cascading your Ethernet devices.

The PDS-8x1 series contains a built-in operating system, the MiniOS7, which offers a stable and high performance environment that is similar to DOS. The MiniOS7 can boot up the PDS-8x1 series within just one second, with the added benefit of no virus problems and a small footprint. Furthermore, the PDS-8x1 series is designed for low power consumption, maintenance elimination (no hard disk and no fan), and is constructed from fire retardant materials (UL94-V0 level) with a robust case.





1.1 Selection Guide

➢ PDS-8x1 Series controllers Selection Guide

Model	PDS-811	PDS-821
Slots	1	2
CPU	80186 (80 MHz)	80186 (80 MHz)
RAM/Flash Disk	512 KB/512 KB	512 KB/512 KB
Ethernet	2-Port Ethernet Switch	2-Port Ethernet Switch
Operating System	MiniOS7	MiniOS7
Console Port	3-wire RS-232	3-wire RS-232
Serial Ports (Optional) Max.	4	8

➢ Optional Serial Modules Selection Guide

Model	I-8112iW	I-8114W	I-8114iW	I-8142iW	I-8144iW
Interface	9-wire RS-232	9-wire RS-232	5-wire RS-232	4-wire RS-422 2-wire RS-485	4-wire RS-422 2-wire RS-485
Ports	2	4	4	2	4
FIFO	128 Bytes	128 Bytes	128 Bytes	128 Bytes	128 Bytes
Isolation	3000 V	-	3000 V	3000 V	3000 V
Self-tuner	-	-	-	Yes	Yes
Connector	DB-9	DB-37	DB-37	Terminal Block	Terminal Block

Note:

2-wire RS-485: Data+, Data- with Self-Tuner inside

4-wire RS-422: TxD+, TxD-, RxD+, RxD-

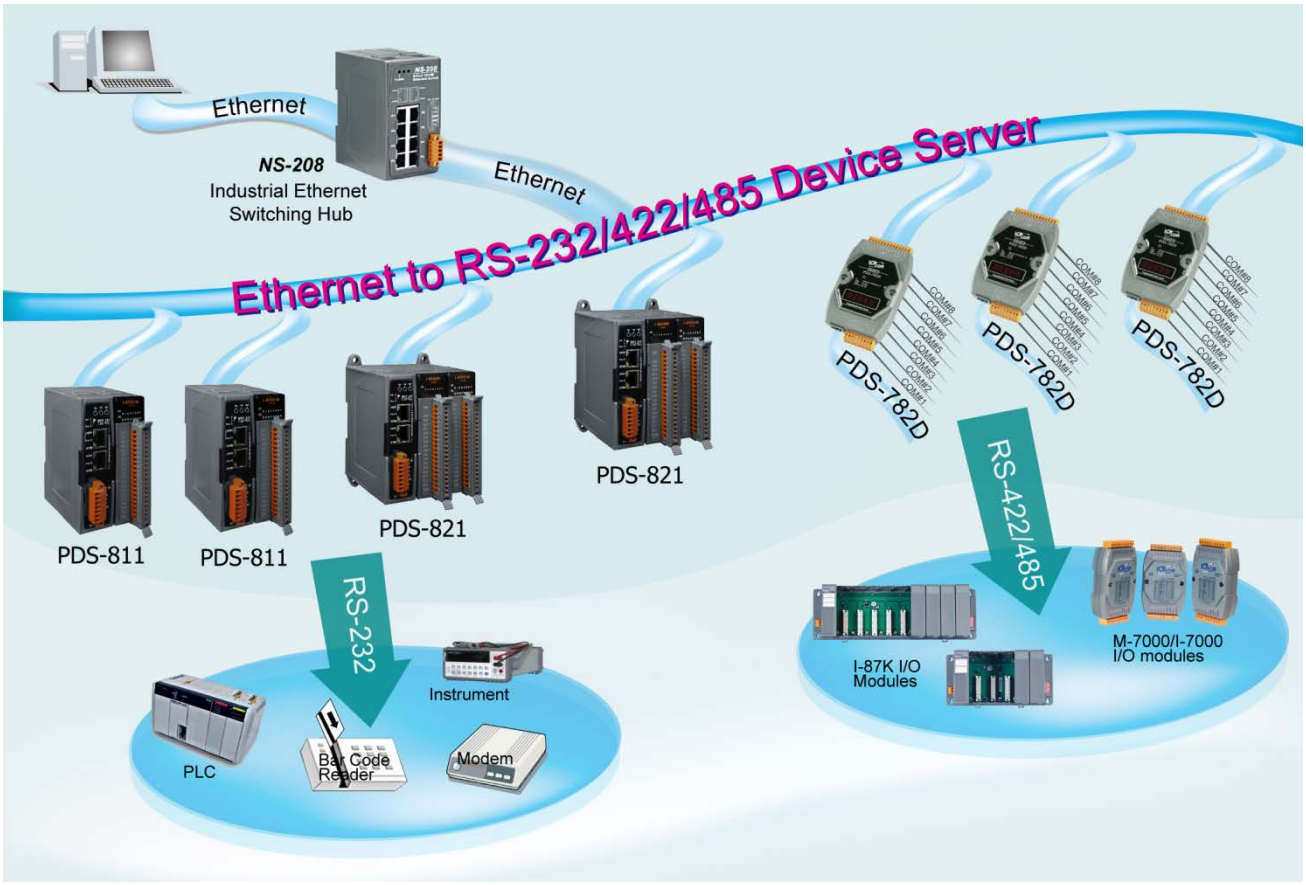
3-wire RS-232: RxD, TxD, GND

5-wire RS-232: RxD, TxD, CTS, RTS, GND

9-wire RS-232: RxD, TxD, CTS, RTS, DSR, DTR, DCD, RI, GND

1.2 Ethernet Solutions

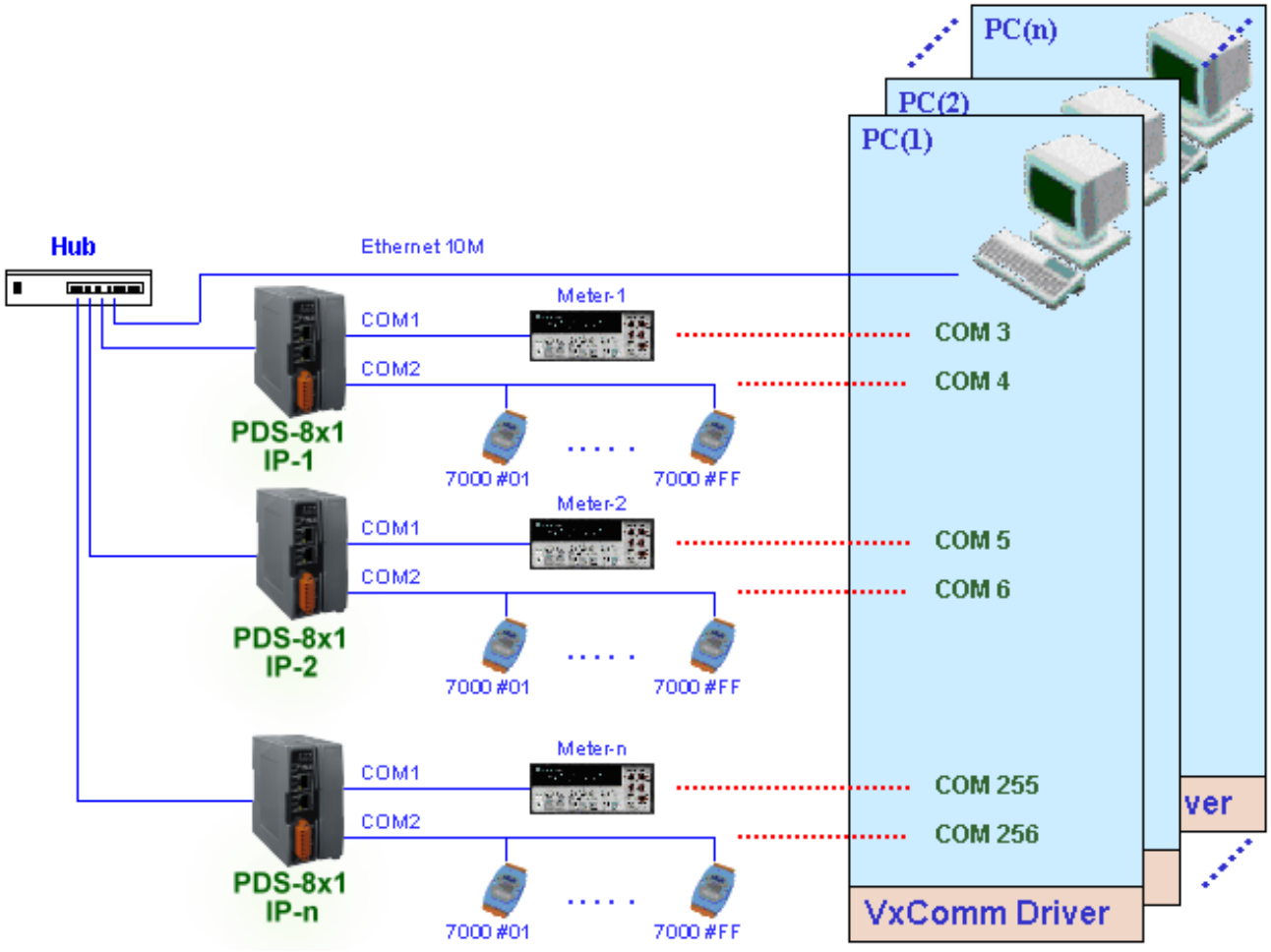
Nowadays, the Ethernet protocol has become the foremost standard for local area networks. Connectivity via the Internet is now common in many of the latest applications from home appliances, to vending machines, to testing equipment, to UPS, etc. An Ethernet network can link office automation and industrial control networks, access remote systems and share data and information between machines from multiple vendors, and also provides a cost-effective solution for industrial control networks.



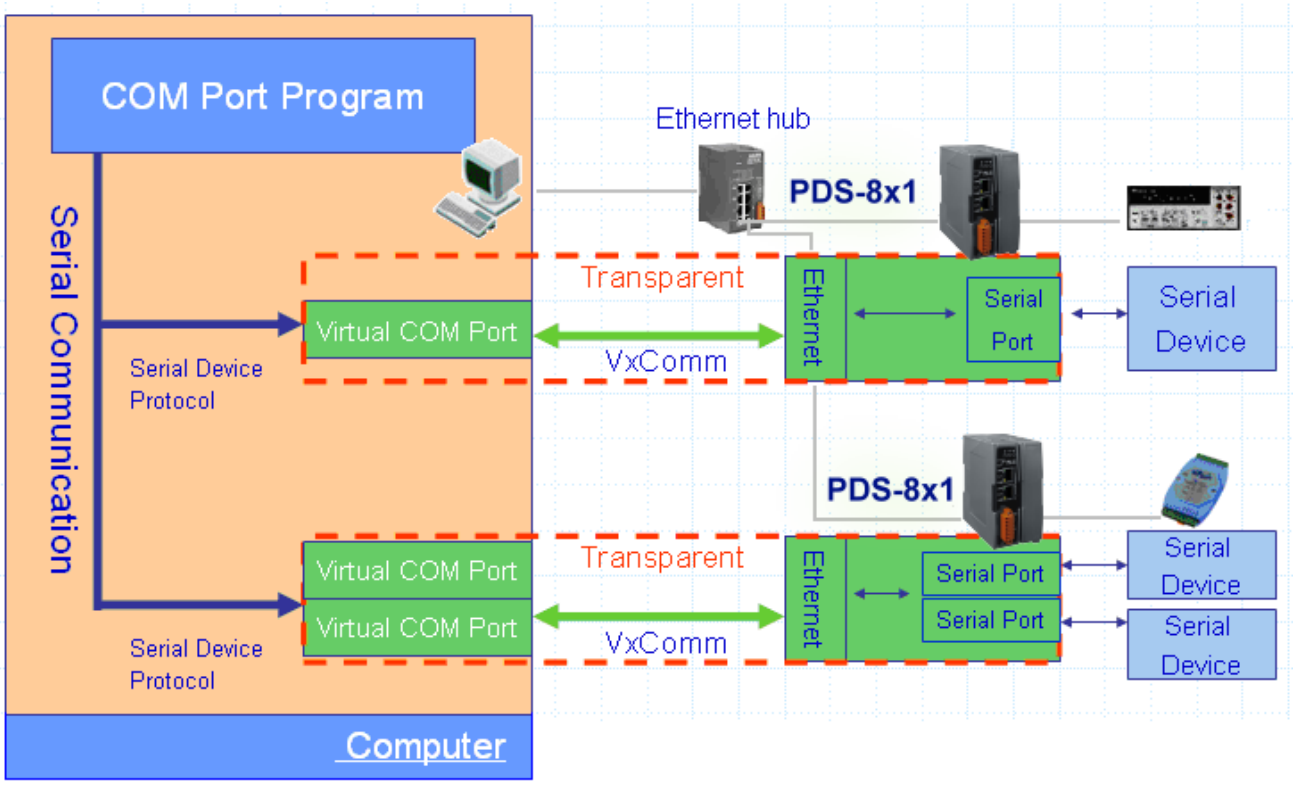
1.3 VxComm Technology

In general, writing a TCP/IP program is more difficult than writing a COM Port program. Another issue is that perhaps the existing the COM Port communication system was built many years ago and is now outdated.

As a result, a new technology, VxComm was developed to virtualize the COM Ports of the PDS-8x1 controller to allow up to 256 COM Ports to be used on a central computer. The VxComm driver saves time when accessing serial devices through the Ethernet without the need for reprogramming the COM Port software on the PC.

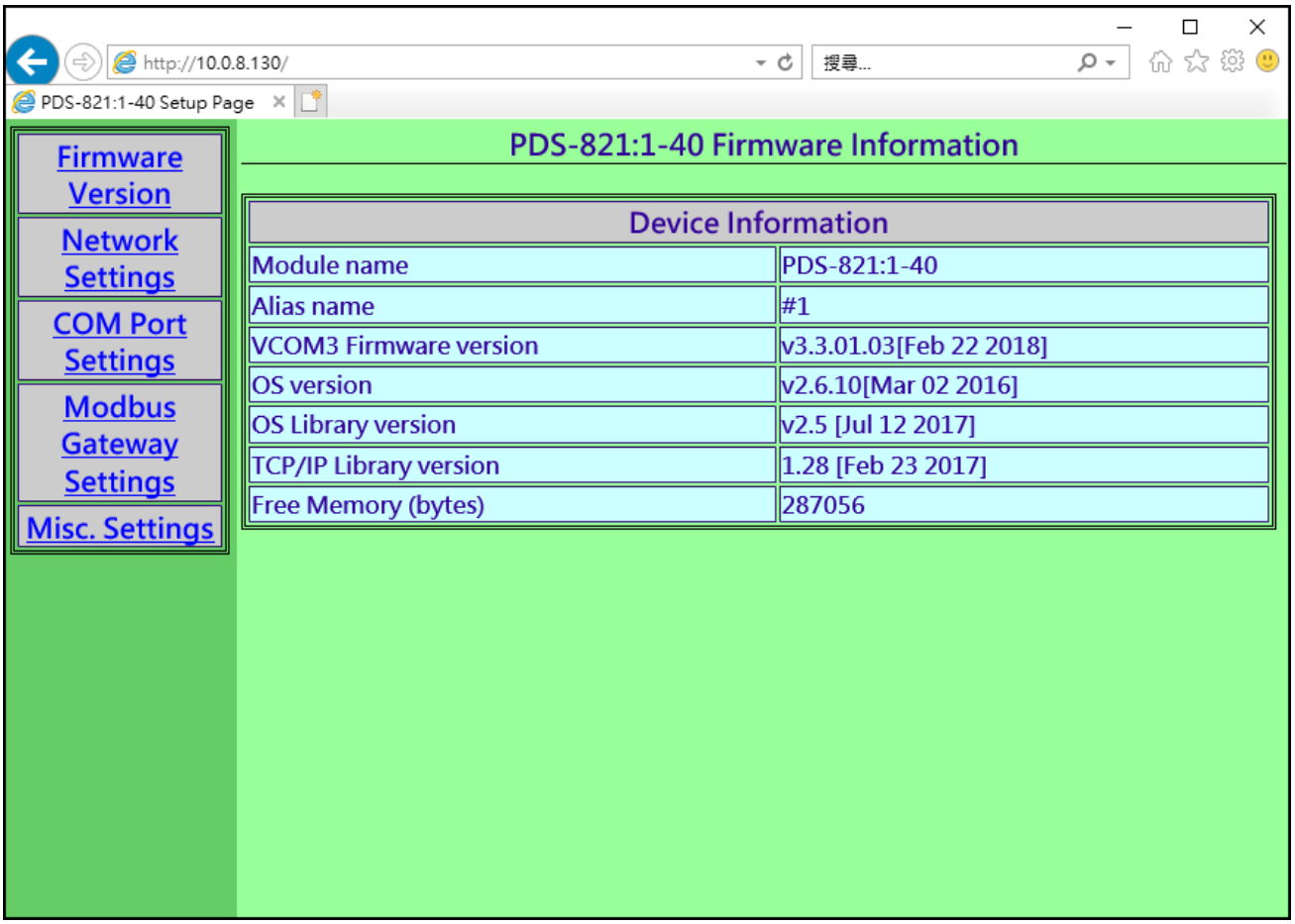


The VxComm driver controls all the details of the Ethernet TCP/IP programming technique, meaning that, with the assistance of PDS-8x1 controller and VxComm technology, your COM Port program will be able to access your serial devices through the Ethernet in the same way as through a COM Port.



1.4 Web Server Technology

Web server technology enables the PDS-8x1 controller to be configured via a standard web browser interface, e.g. Google Chrome, Internet Explorer, or Firefox, etc. This means that it is easy to check the configuration of the PDS-8x1 controller via an Ethernet network without needing to install any other software tools, thereby reducing the learning curve required for maintaining the device.



2. Hardware Information

This chapter provides a detailed description of the front panel, the hardware specifications, the pin assignments, the wiring notes and the dimensions for the PDS-8x1 controller.

2.1 Specifications

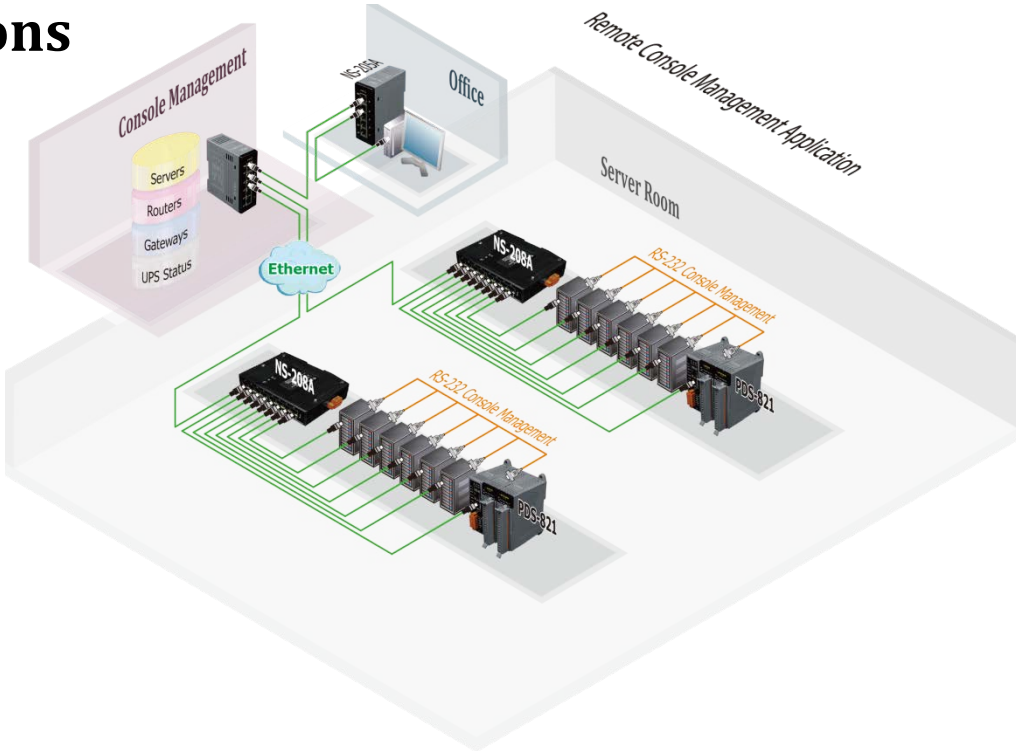
Models	PDS-811	PDS-821
CPU		
CPU	80186-80 MHz or compatible	
SRAM	512 KB	
Flash Memory	512 KB	
EEPROM	16 KB	
Built-in Watchdog Timer	Yes	
I/O Expansion Slots	1 Slot	2 Slots
Communication Interface		
COM1 (Console)	RS-232 (TxD, RxD, GND)	
Ethernet	2-port 10/100 Base-TX Ethernet Switch (Auto-negotiating, auto MDI/MDI-X, LED indicator)	
COM Port Formats		
Speed	115200 bps Max.	
Data Bit	7, 8	
Parity	None, Even, Odd	
Stop Bit	1	
LED Indicators		
TxD/RxD	Yes (for COM1 console port)	
System	Yes	
Power		
ESD Protection	Yes (with Frame Ground)	
Protection	Power Reverse Polarity Protection	
Required Supply Voltage	+10 V_{DC} ~ +30 V_{DC} (non-regulated)	
Power Consumption	0.6 A @ 5 V for CPU and Backplane, 1.0 A @ 5 V for Plug-in Modules, Total: 8 W	
Mechanism		
Flammability	Fire Retardant Materials (UL94-V0 Level)	
Dimension (W x H x D)	64 mm x 110 mm x 120 mm	95 mm x 110 mm x 132 mm
Installation	DIN-Rail	DIN-Rail or Wall mounting
Environment		
Operating Temperature	-25 ~ +75 °C	
Storage Temperature	-40 ~ +80 °C	
Humidity	5 ~ 95% RH, non-condensing	

2.2 Features

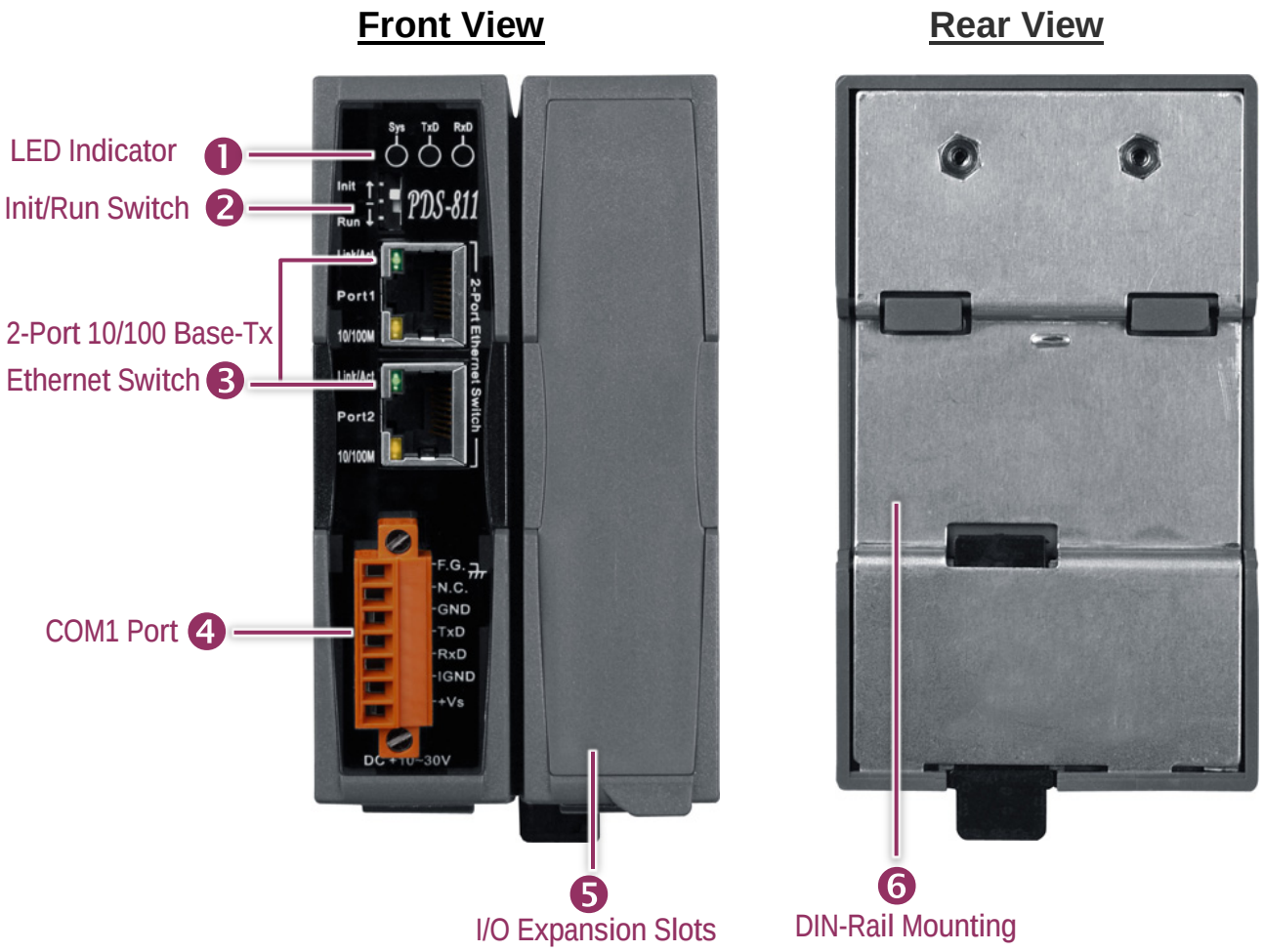
- Incorporate Serial Devices in an Ethernet network
- Provides Virtual COM for 32-bit and 64-bit Windows XP/7/8/2012/10
- Watchdog Timer suitable for use in harsh environments
- 2-port 10/100 Base-TX Ethernet Switch
  (Auto-negotiating, auto MDI/MDI-X, LED indicator)
- ESD Protection and Frame Ground Design
- Built-in High Performance MiniOS7 from ICP DAS
- "Virtual COM" extends PC COM ports
- Programmable Internet/Ethernet Controller
- Power Reverse Polarity Protection
- 3-wire RS-232 Console Port
- RS-232 TxD/RxD LED Indicators
- System Status LED Indicator
- RoHS Compliant & no Halogen
- Low power consumption

2.3 Applications

- Factory Automation
- Building Automation
- Home Automation



2.4 Appearance



1. LED Indicator

Once power is supplied to the PDS-8x1 controller, the system LED indicator will illuminate. An overview of the LED functions is given below:

LED Name	Function	LED Behavior
Sys	Running Firmware	ON (Red)
TxD	Serial Port Busy	Flashing (Yellow)
RxD		Flashing (Green)

2. Init/Run Switch

- **Init Mode:** Uses factory settings and allows the firmware to be updated
- **Run Mode:** Firmware operation mode

For PDS-8x1 controller, the operating mode switch is set to the **"Run"** position by default. In order to update the firmware for the PDS-8x1 controller, the switch must be moved from the **"Run"** position to the **"Init"** position. The switch must be returned to the Run position after the update is complete. Note that the PDS-8x1 must be rebooted after changing the operating mode.

Run Mode

Init Mode

3. 2-Port 10/100 Base-Tx Ethernet Switch

The PDS-8x1 controller are equipped with two RJ-45 jack that is used as the 10/100 Base-TX Ethernet port and features networking capability. When an Ethernet link is detected and an Ethernet packet is received, the **Link/Act LED (Green)** indicator and the **10/100 M LED (Yellow)** indicator will be illuminated.

4. COM1 Port

For more detailed information regarding the pin assignments for the COM1 ports, refer to Section 2.6 “Pin Assignments”.

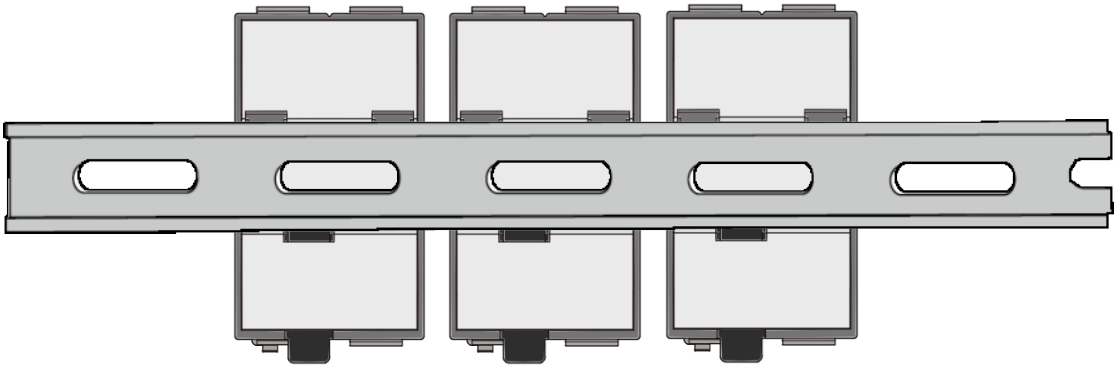
The definition for **“+Vs”** and **“IGND”** for use as the power supply applies to PDS-8x1 controller.
The valid power voltage range is from +10 to +30 VDC.

The definition for **“F.G.” (Frame Ground)**:
Electronic circuits are constantly vulnerable to Electrostatic Discharge (ESD), which becomes worse in a continental climate area. PDS-8x1 controller feature a new design for the frame ground, which provides a path that bypasses ESD, resulting in an enhanced ESD protection capability and ensuring that the module is more reliable.

5. I/O Expansion Slots

The PDS-811 has one I/O expansion slot, while PDS-821 has two I/O expansion slots that can be used to attach various 2- or 4-port serial communication modules (refer to Section 2.6.2 “Optional Serial Module” for more details). Therefore, a maximum of 4 serial ports can be installed on the PDS-811 or a maximum of 8 serial ports can be installed on the PDS-821.

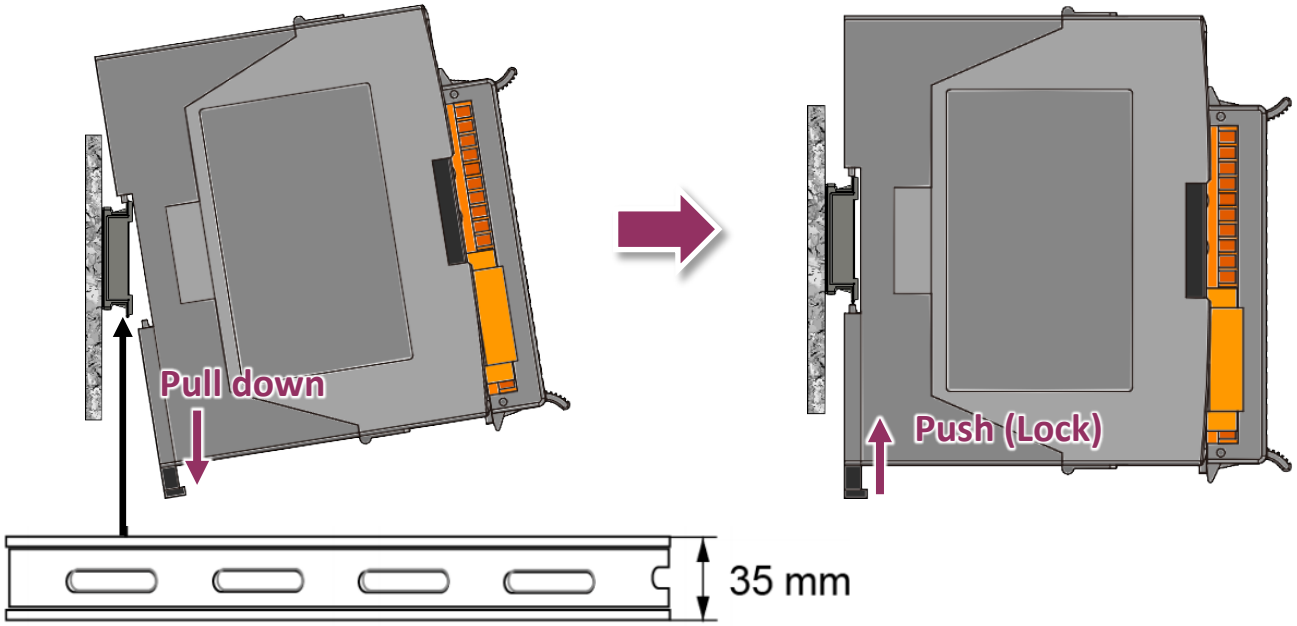
6. DIN-Rail Mounting



The PDS-8x1 controller contains simple rail clips to enable it to be reliably mounted on a standard 35 mm DIN rail. There are three DIN-Rail versions available that enable a variety of ICP DAS devices to be mounted. Each is made of stainless steel and has a ground wire attached at one end.

Part number	Dimensions
DRS-125	125 mm x 35 mm
DRS-240	240 mm x 35 mm
DRS-360	360 mm x 35 mm

➢ **Clip the PDS-8x1 controller onto a stainless DIN rail.**

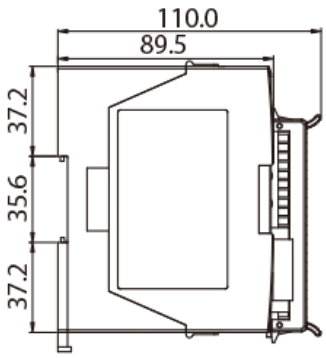


A stainless steel DIN rail is recommended.

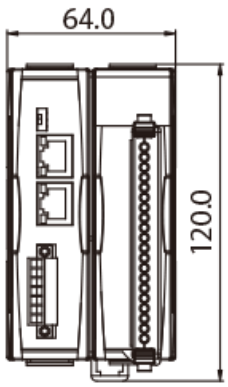
2.5 Dimensions

The following diagrams provide the dimensions of the PDS-8x1 controller that can be used as a reference when defining the specifications for any custom enclosures. All dimensions are in millimeters.

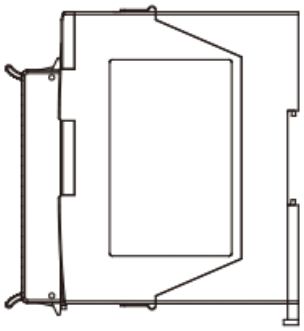
2.5.1 PDS-811



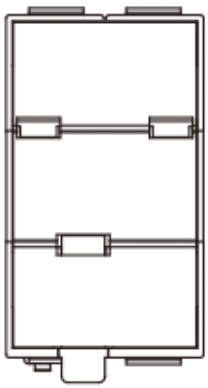
Left Side View



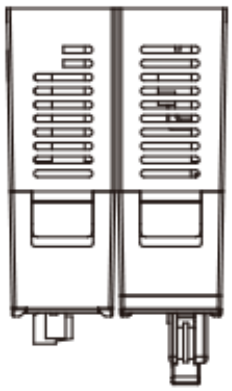
Front View



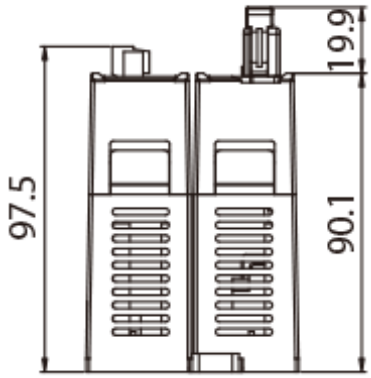
Right Side View



Rear View

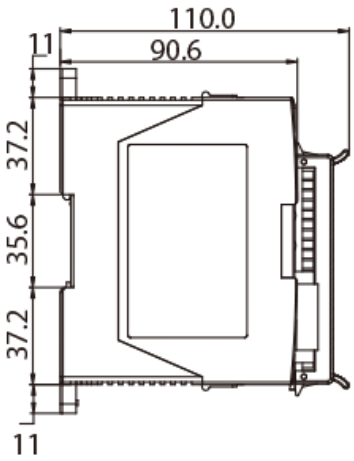


Top View

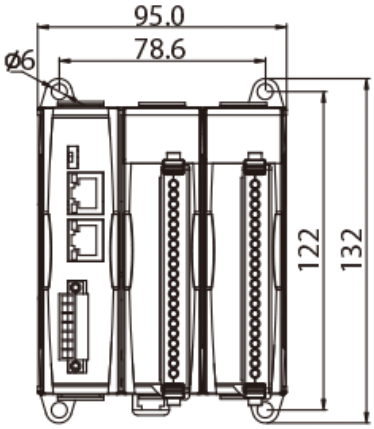


Bottom View

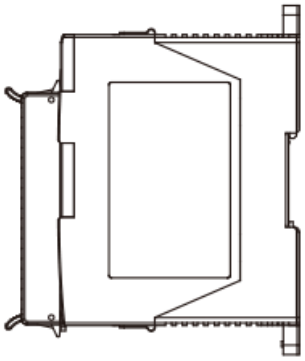
2.5.2 PDS-821



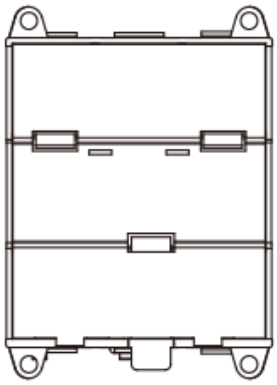
Left Side View



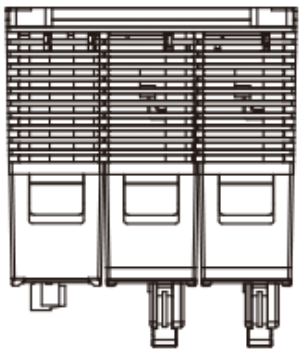
Front View



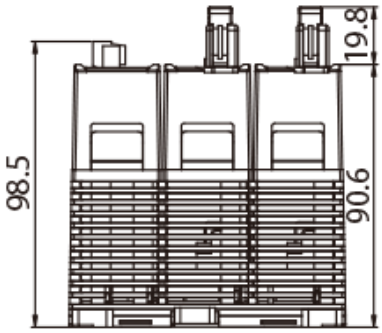
Right Side View



Rear View



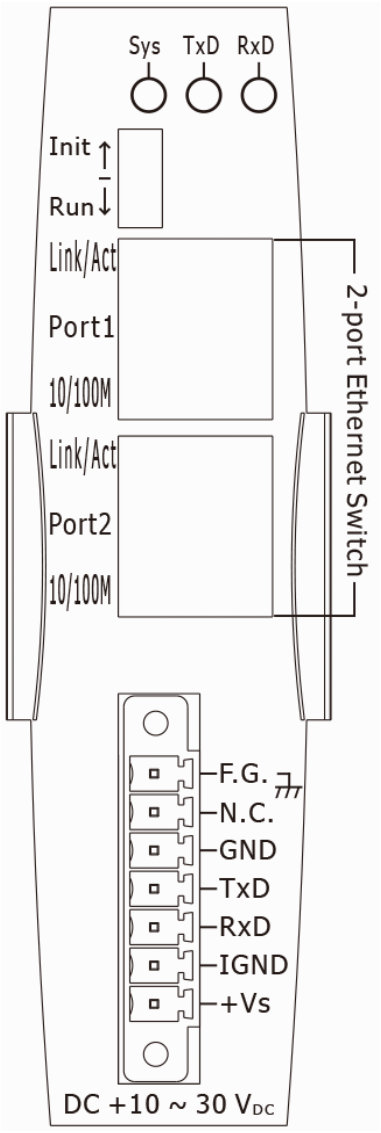
Top View



Bottom View

2.6 Pin Assignments

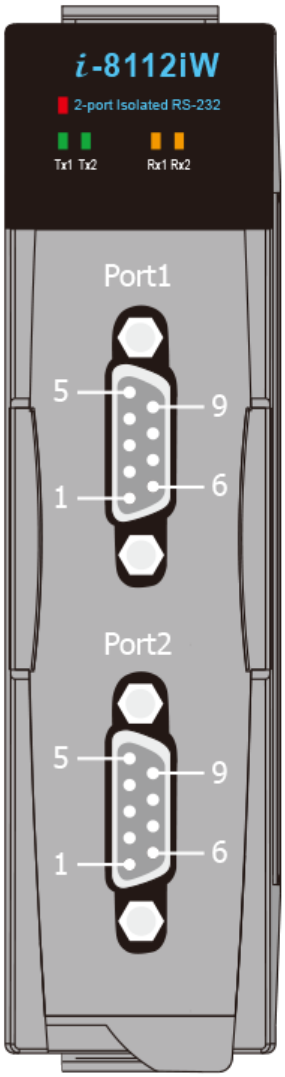
2.6.1 PDS-811 and PDS-821



2.6.2 Optional Serial Module

I-8112iW

The I-8112iW is an optional serial module that provides 2 isolated RS-232 serial ports.



Pin Assignment	Terminal No.	Pin Assignment
GND1	05	
DTR1	04	
TxD1	03	
RxD1	02	
DCD1	01	
	09	RI1
	08	CTS1
	07	RTS1
	06	DSR1

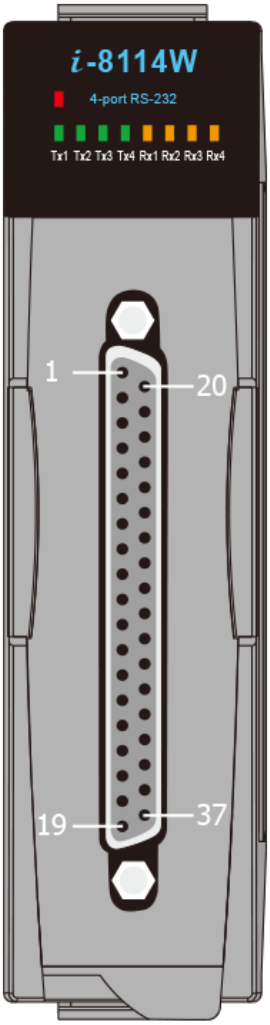
Port1 — 9-Pin Male D-Sub Connector

Pin Assignment	Terminal No.	Pin Assignment
GND2	05	
DTR2	04	
TxD2	03	
RxD2	02	
DCD2	01	
	09	RI1
	08	CTS2
	07	RTS2
	06	DSR2

Port2 — 9-Pin Male D-Sub Connector

I-8114W

The I-8114W is an optional serial module that provides 4 non-isolated RS-232 serial ports.

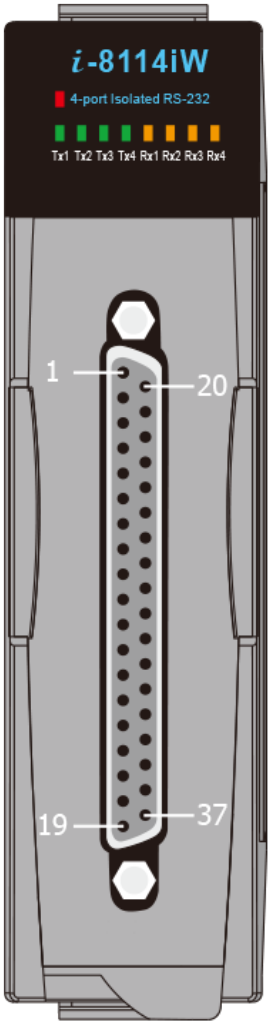


Pin Assignment	Terminal No.	Pin Assignment
N.C.	01	
DCD3	02	
GND	03	
CTS3	04	
RxD3	05	
RI4	06	
DTR4	07	
DSR4	08	
RTS4	09	
TxD4	10	
DCD2	11	
GND	12	
CTS2	13	
RxD2	14	
RI1	15	
DTR1	16	
DSR1	17	
RTS1	18	
TxD1	19	
	20	RI3
	21	DTR3
	22	DSR3
	23	RTS3
	24	TxD3
	25	DCD4
	26	GND
	27	CTS4
	28	RxD4
	29	RI2
	30	DTR2
	31	DSR2
	32	RTS2
	33	TxD2
	34	DCD1
	35	GND
	36	CTS1
	37	RxD1

37-Pin Female D-Sub Connector

I-8114iW

The I-8114iW is an optional serial module that provides 4 isolated RS-232 serial ports.

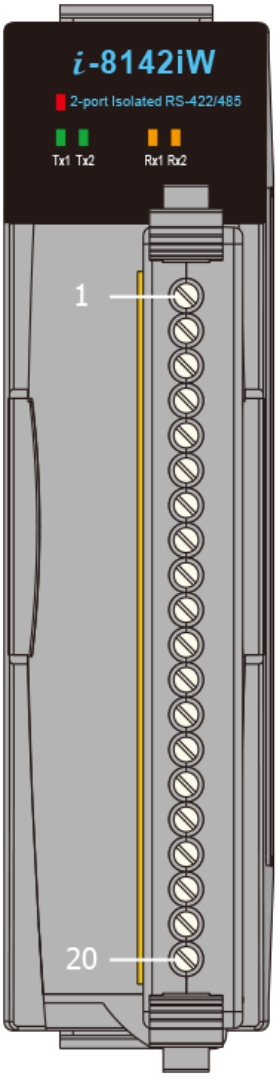


Pin Assignment	Terminal No.	Pin Assignment
N.C.	01	
N.C.	02	20 N.C.
GND3	03	21 N.C.
CTS3	04	22 N.C.
RxD3	05	23 RTS3
N.C.	06	24 TxD3
N.C.	07	25 N.C.
N.C.	08	26 GND4
RTS4	09	27 CTS4
TxD4	10	28 RxD4
N.C.	11	29 N.C.
GND2	12	30 N.C.
CTS2	13	31 N.C.
RxD2	14	32 RTS2
N.C.	15	33 TxD2
N.C.	16	34 N.C.
N.C.	17	35 GND1
RTS1	18	36 CTS1
TxD1	19	37 RxD1

37-Pin Female D-Sub Connector

I-8142iW

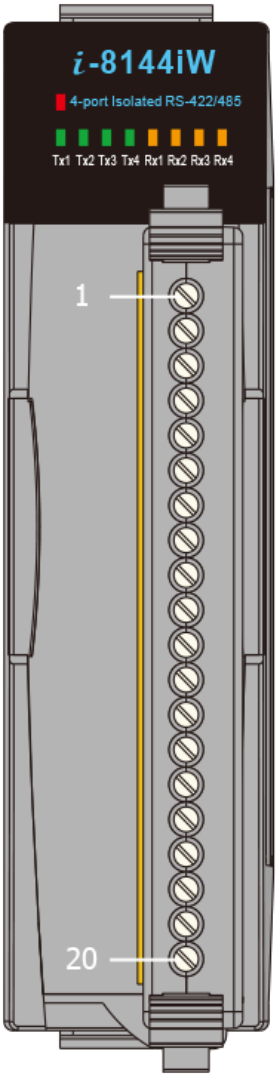
The I-8142iW is an optional serial module that provides 2 isolated RS-422/485 serial ports.



Terminal No.	Pin Assignment
01	D1+/TxD1+
02	D1-/TxD1-
03	RxD1+
04	RxD1-
05	GND1
06	D2+/TxD2+
07	D2-/TxD2-
08	RxD2+
09	RxD2-
10	GND2
11	N.C.
12	N.C.
13	N.C.
14	N.C.
15	N.C.
16	N.C.
17	N.C.
18	N.C.
19	N.C.
20	N.C.

I-8144iW

The I-8144iW is an optional serial module that provides 4 isolated RS-422/485 serial ports.

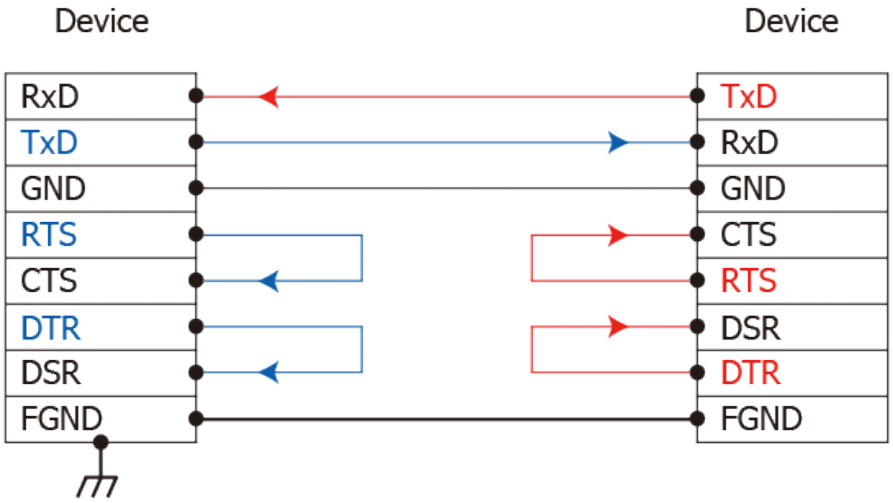


Terminal No.	Pin Assignment
01	D1+/TxD1+
02	D1-/TxD1-
03	RxD1+
04	RxD1-
05	GND1
06	D2+/TxD2+
07	D2-/TxD2-
08	RxD2+
09	RxD2-
10	GND2
11	D3+/TxD3+
12	D3-/TxD3-
13	RxD3+
14	RxD3-
15	GND3
16	D4+/TxD4+
17	D4-/TxD4-
18	RxD4+
19	RxD4-
20	GND4

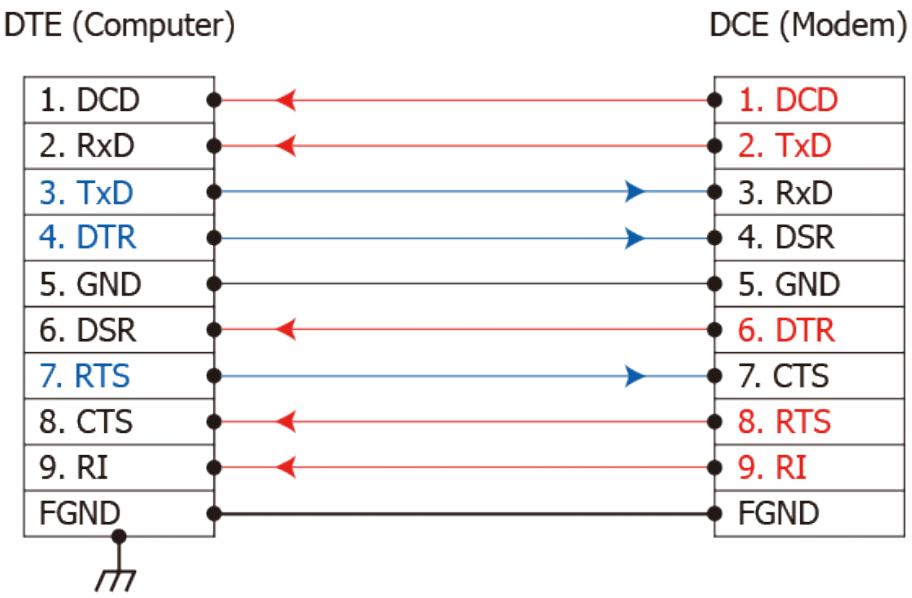
2.7 Wiring Notes for RS-232/485/422 Interfaces

2.7.1 RS-232 Wiring

3-wire RS-232 Wiring



9-wire RS-232 Wiring

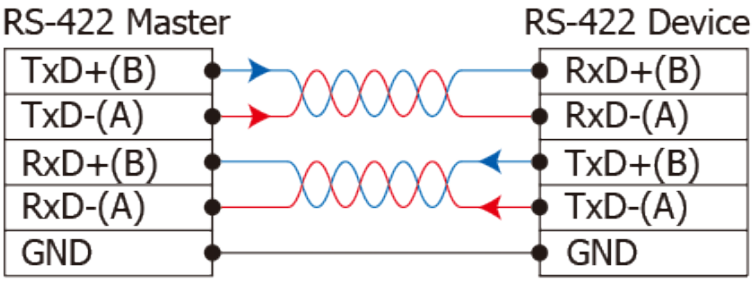


Notes:

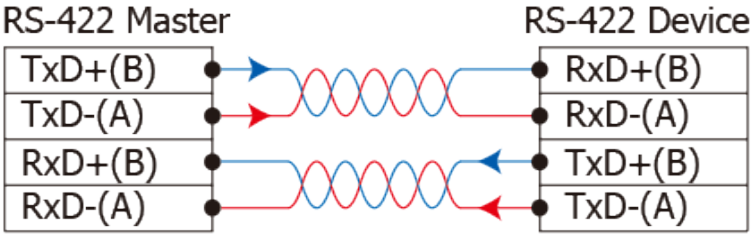
1. **For 3-Wire RS-232 connections, it is recommended to short unused signals such as RTS/CTS and DTR/DSR, since some system may still check the CTS and DSR status.**
2. **FGND is the frame ground that soldered to DB9 metal-shield.**

2.7.2 RS-422 Wiring

4-wire RS-422 Wiring

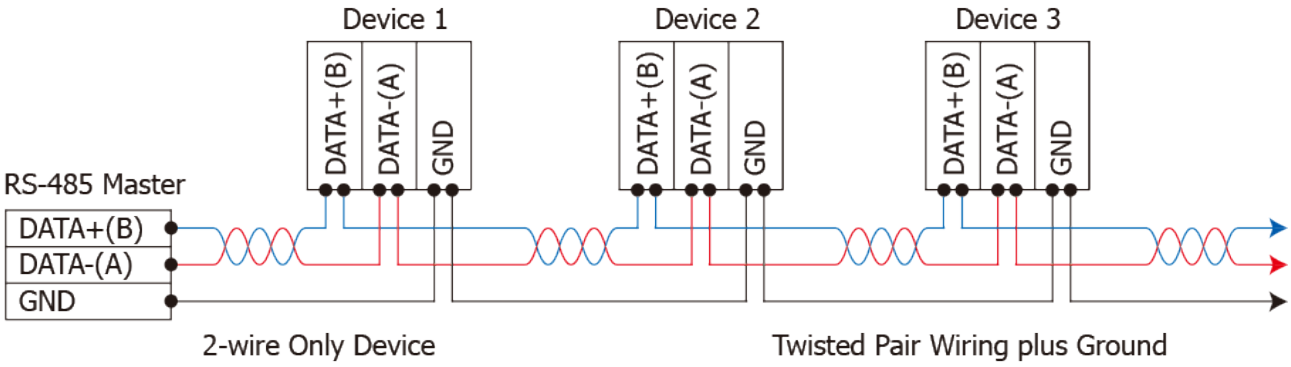


4-wire RS-422 Isolated Wiring

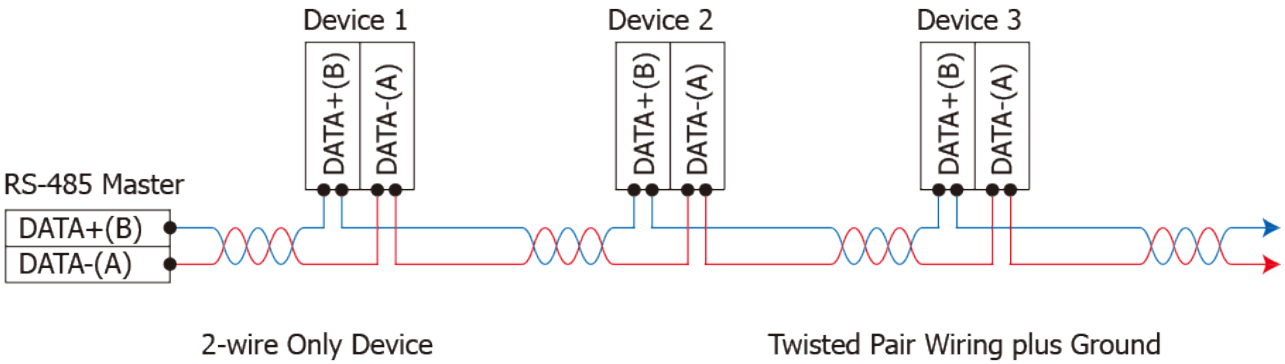


2.7.3 RS-485 Wiring

2-wire RS-485 Wiring



2-wire RS-485 Isolated Wiring



Notes:

1. **Usually, you have to connect all signal grounds of RS-422/485 devices together to reduce common-mode voltage between devices.**
2. **Twisted-pair cable must be used for the DATA+/- wires.**
3. **Both two ends of the cable may require a termination resistor connected across the two wires (DATA+ and DATA-). Typically 120 Ω resisters are used.**
4. **The Data+ and B pins are positive-voltage pins, and Data- and A pins are negative-voltage pins in the above figure. The B/A pins may be defined in another way depending on devices, please check it first.**

3. Setting up the PDS-8x1 Controller

This chapter provides detailed information about the "Self-Test" process, which is used to confirm that the PDS-8x1 controller is operating correctly. Before beginning the "Self-Test" process, the wiring test, Ethernet configuration and VxComm utility driver installation procedures must first be fully completed. Follow the procedure described below:

3.1 Connect the Power Supply and the Host PC

1. Ensure that the network settings on your PC are configured correctly.

2. Ensure that the Windows firewall or any Anti-Virus firewall software is correctly configured or temporarily disable these functions; otherwise the **"Search Servers"** function in the VxComm Utility may not work as required. You may need to contact your System Administrator for more details of how to do this.

3. Check that the Init/Run switch is in the **"Run"** position.

Figure 3-1

4. Connect both the PDS-8x1 and the Host computer to the same sub-network or the same Ethernet Switch.
5. **Short the RxD and TxD pins** of the PDS-8x1 controller for self-test.
6. **Supply +24 V_{DC} (+10 ~ +30 V_{DC}) power** to the PDS-8x1 controller.

Refer to Figure 3-2 for an illustration of how to perform the above steps.

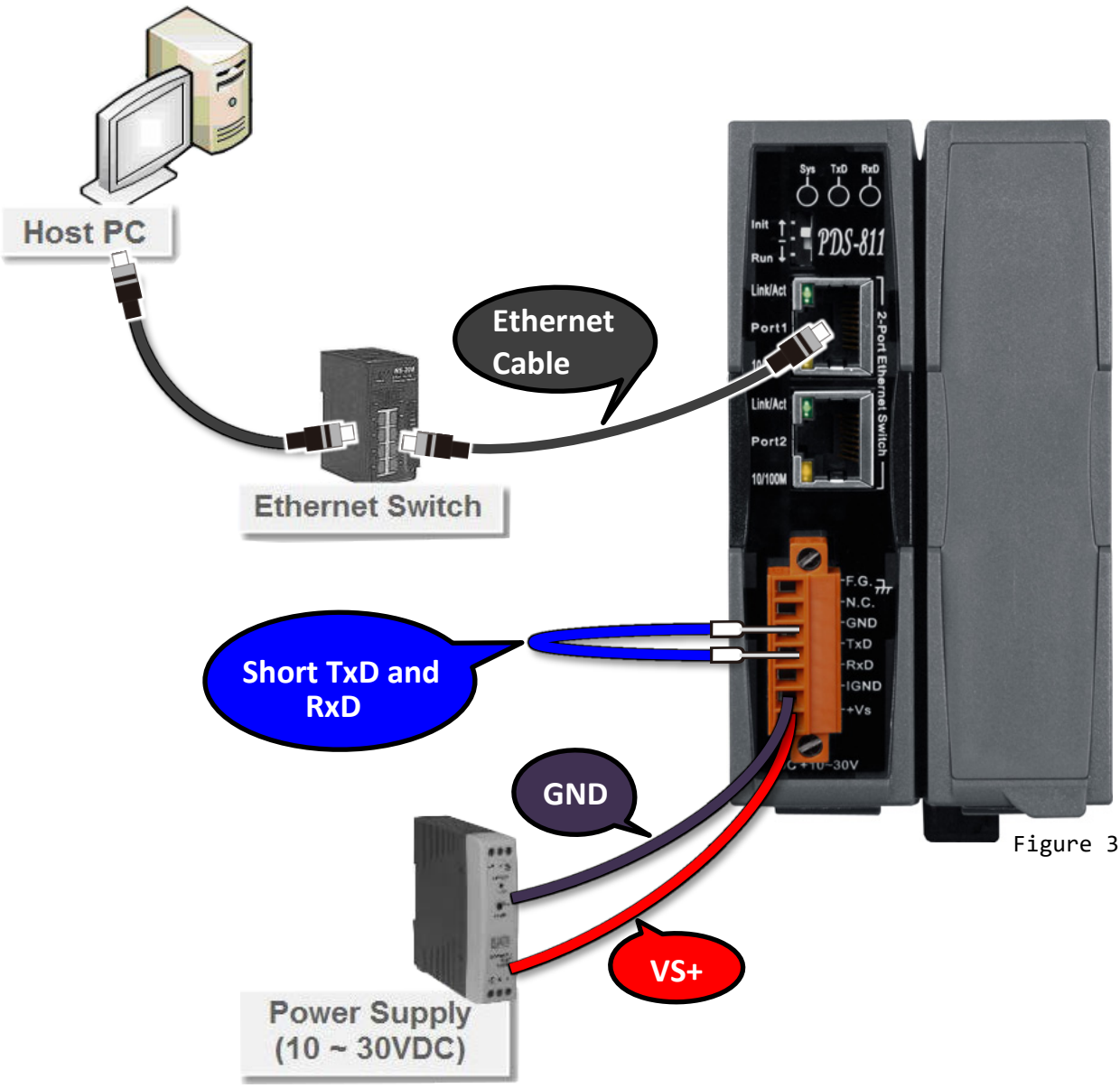


Figure 3-2

7. Verify that the System LED indicator is flashing on the PDS-8x1 controller.

Figure 3-3

3.2 Installing the I-8K Serial Modules

PDS-8x1 controller has 1/2 I/O expansion slots and only supports I-8K series modules. This Section provides detailed information about how to inserts a serial module to PDS-8x1 controller. Follow the procedure described below:

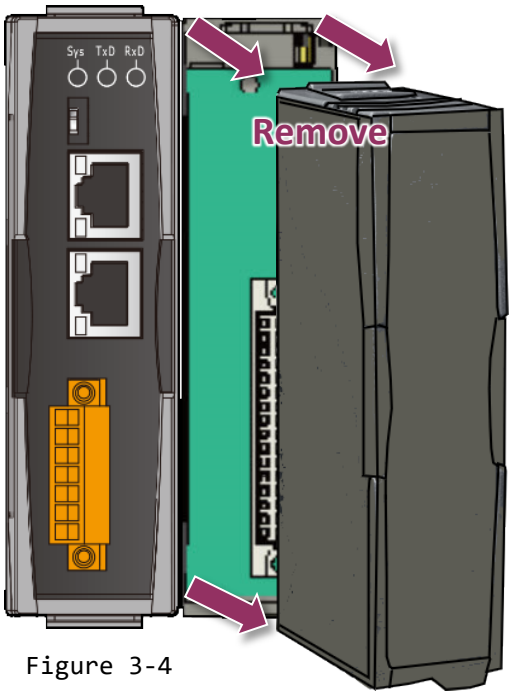


Figure 3-4

1. Remove the I/O expansion slot cover from the PDS-8x1 controller.

2. Align serial module (optional) with slot and press firmly to seat module into connector.

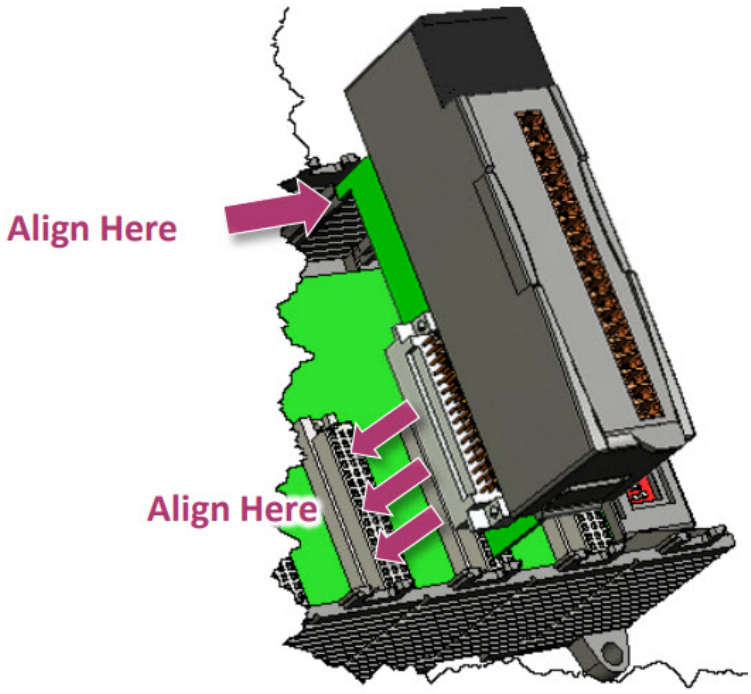


Figure 3-5

⚠ Note: It is recommended that the power to the PDS-8x1 is switched off when wring the series module which are plugging in the PDS-8x1 slots.

3. Pull top and bottom locking tabs toward module face.

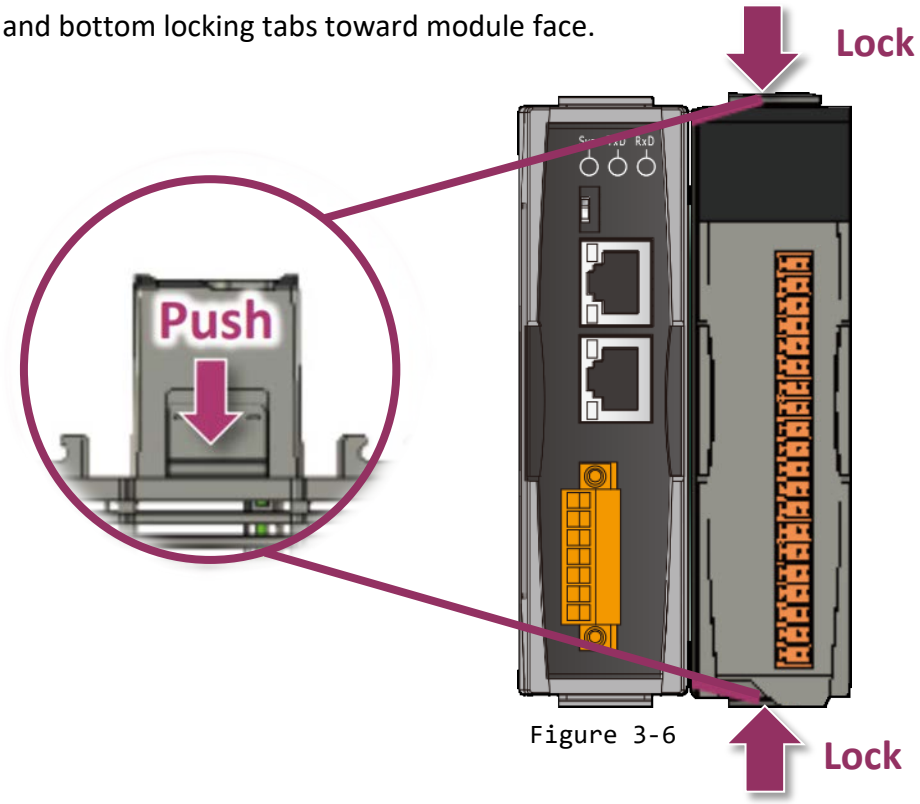


Figure 3-6

4. Attach field wiring using the terminal block, and then insert the terminal block. The I-8K Serial module Web page includes the specifications and pin assignments, etc. (http://www.icpdas.com/products/Industrial/pds/PDS-800_Series.htm)

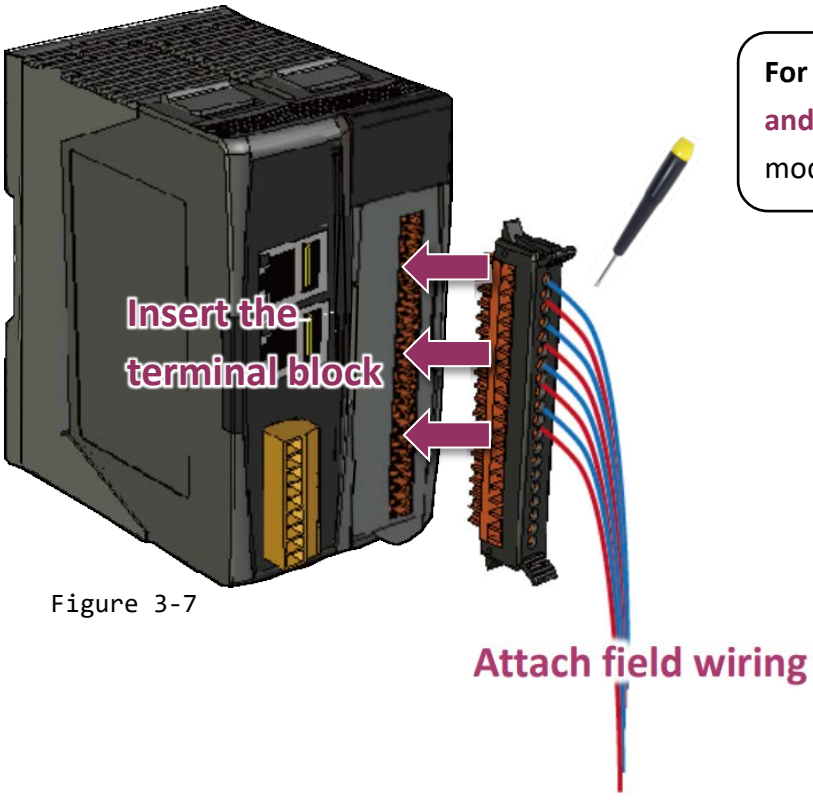


Figure 3-7

For example, short the **"TxD1+" to "RxD1+" and "TxD1-" to "RxD-" pins** of the I-8142iw module (RS-422 bus) for self-test.

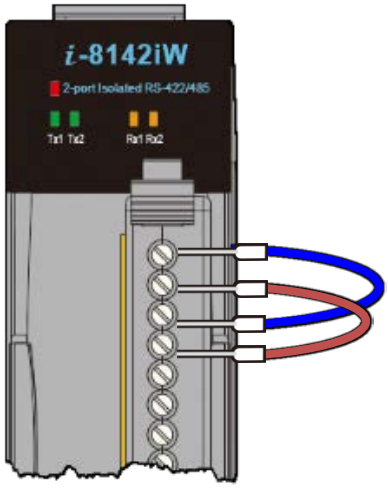


Figure 3-8

3.3 Install the VxComm Utility

The VxComm Utility can be obtained from either the ICP DAS FTP site or the ICP DAS web site. The location of the download addresses are shown below:

http://ftp.icpdas.com/pub/cd/8000cd/napdos/driver/vxcomm_driver/windows/

ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/driver/vxcomm_driver/windows/

3.4 Configuring Network Settings

1. Open the VxComm Utility and then click the **"Search Servers"** button to search for the PDS-8x1 controller.

2. Once the search process is complete, double-click the name of the PDS-8x1 controller to open the **"Configure Server"** dialog box.

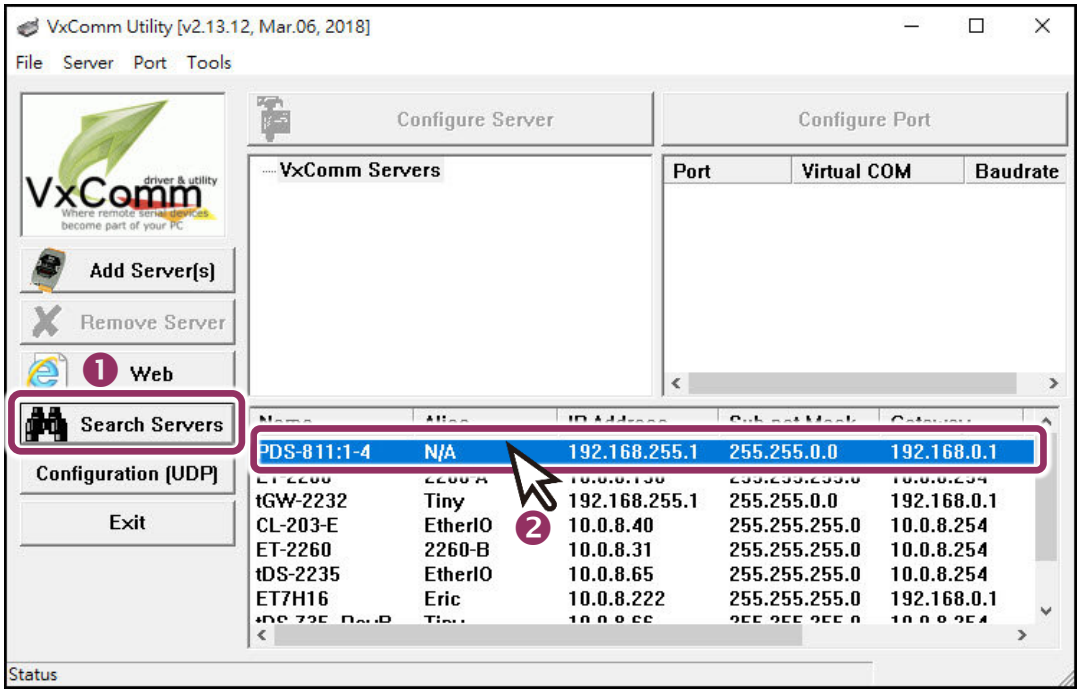


Figure 3-9

Factory Default Settings of PDS-8x1:

IP Address	Subnet Mask	Gateway
192.168.255.1	255.255.0.0	192.168.0.1

3. Enter the network settings information, including the **IP, Mask and Gateway addresses**, and then click **"OK"** button. The new settings for the PDS-8x1 controller will take effect within 2 seconds. If you don't know the correct network configuration information, contact your Network Administrator to obtain the details.

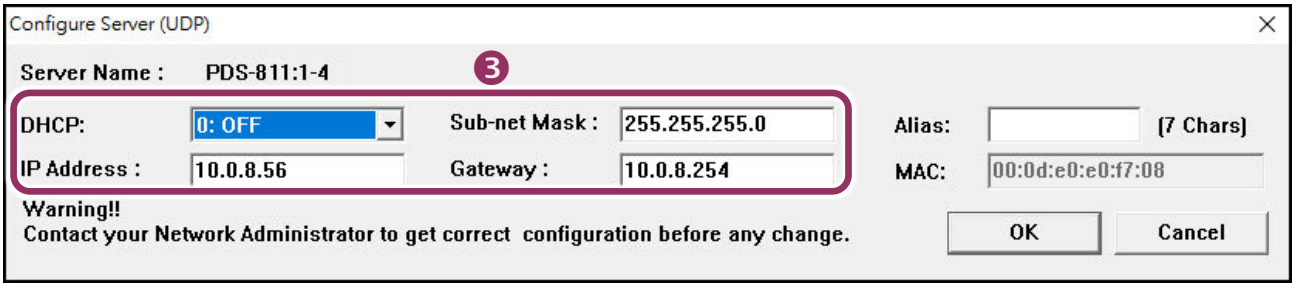


Figure 3-10

3.5 Configuring the Virtual COM Ports

1. Wait 2 seconds and then click the **"Search Servers"** button again to ensure that the PDS-8x1 controller is working correctly with the new configuration.
2. Click the name of PDS-8x1 controller to select it.

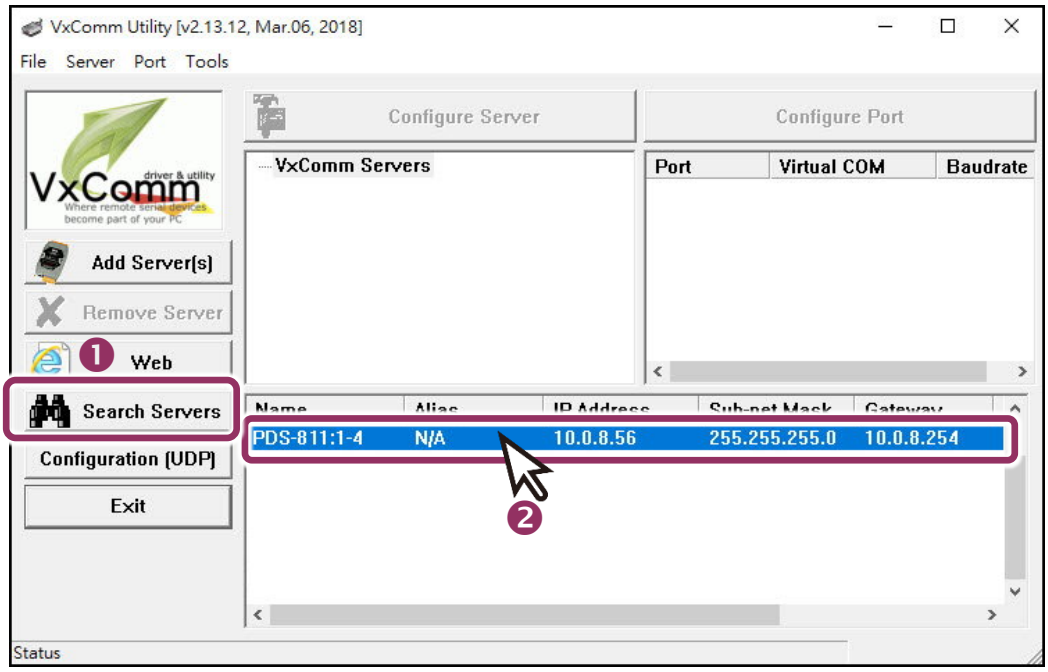


Figure 3-11

3. Click the **"Add Server[s]"** button.
4. Assign a COM Port number and click **"OK"** to save your settings.

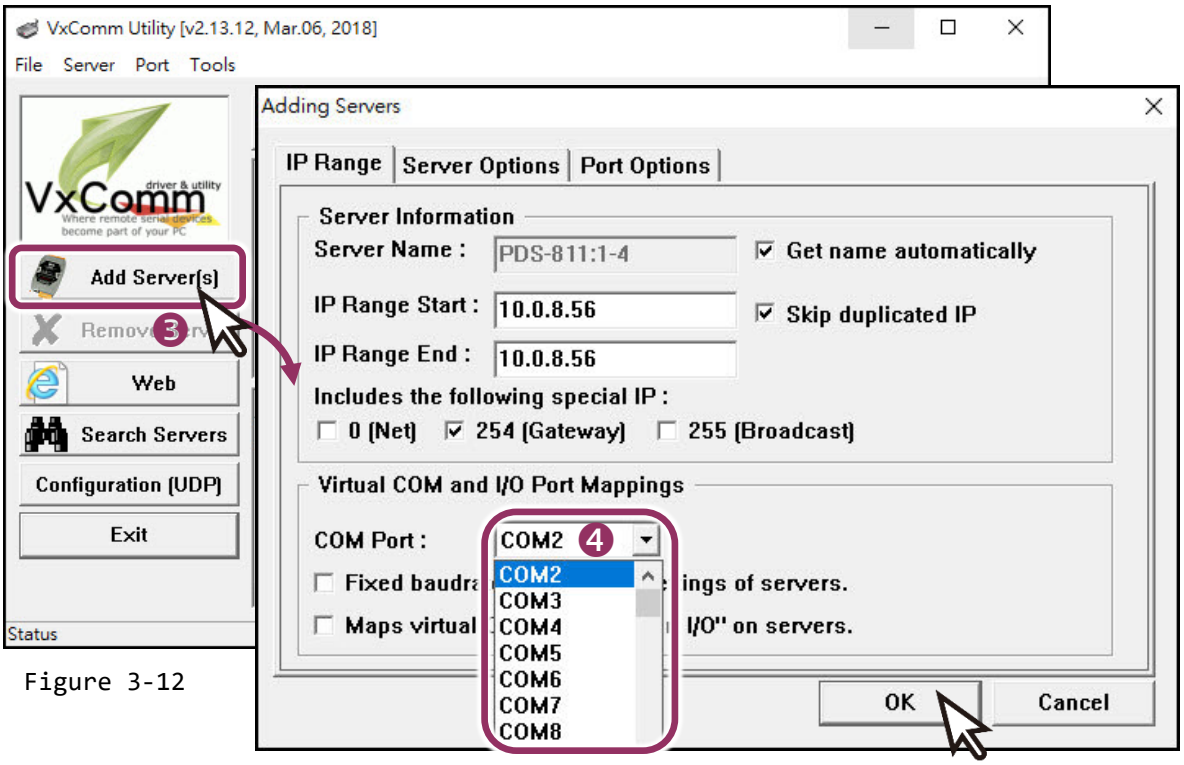


Figure 3-12

5. Click on PDS-8x1 controller name or slot module (e.g., Slot1) that your module plugged in, and then check the virtual COM port mappings on the PC.

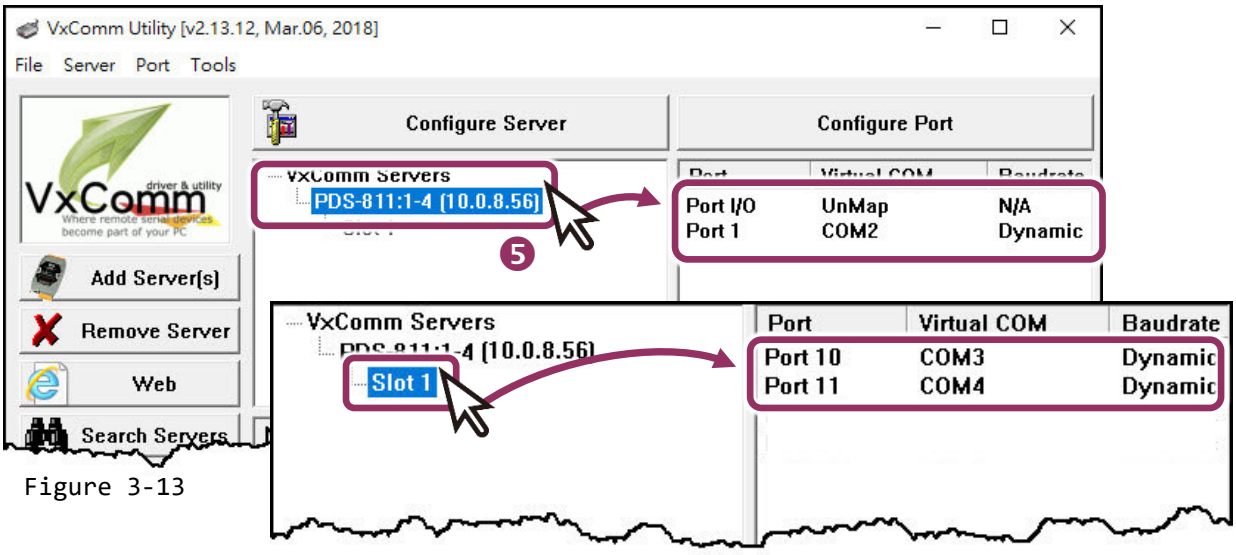


Figure 3-13

6. Click **"Restart Driver"** item in the **"Tools"** menu to display the "VxComm Utility: Restarting Driver" dialog box.
7. Click the **"Restart Driver"** button.

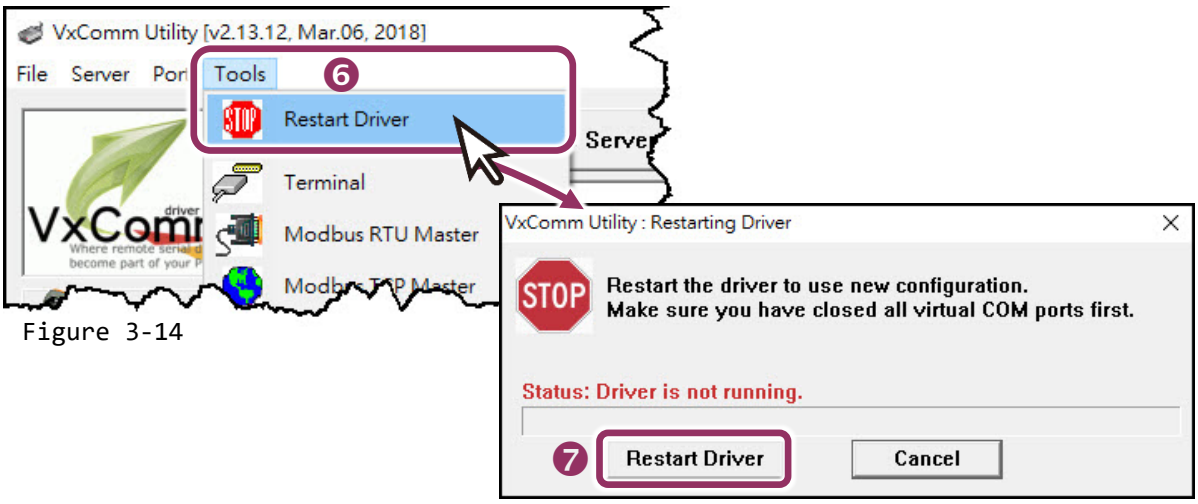


Figure 3-14

3.6 Testing your PDS-8x1 Controller

1. **Right click Port 1** and choose the "**Open COM Port**" item.
2. Check that the Configuration of the COM Port is correct and then click the **"Open COM"** button.

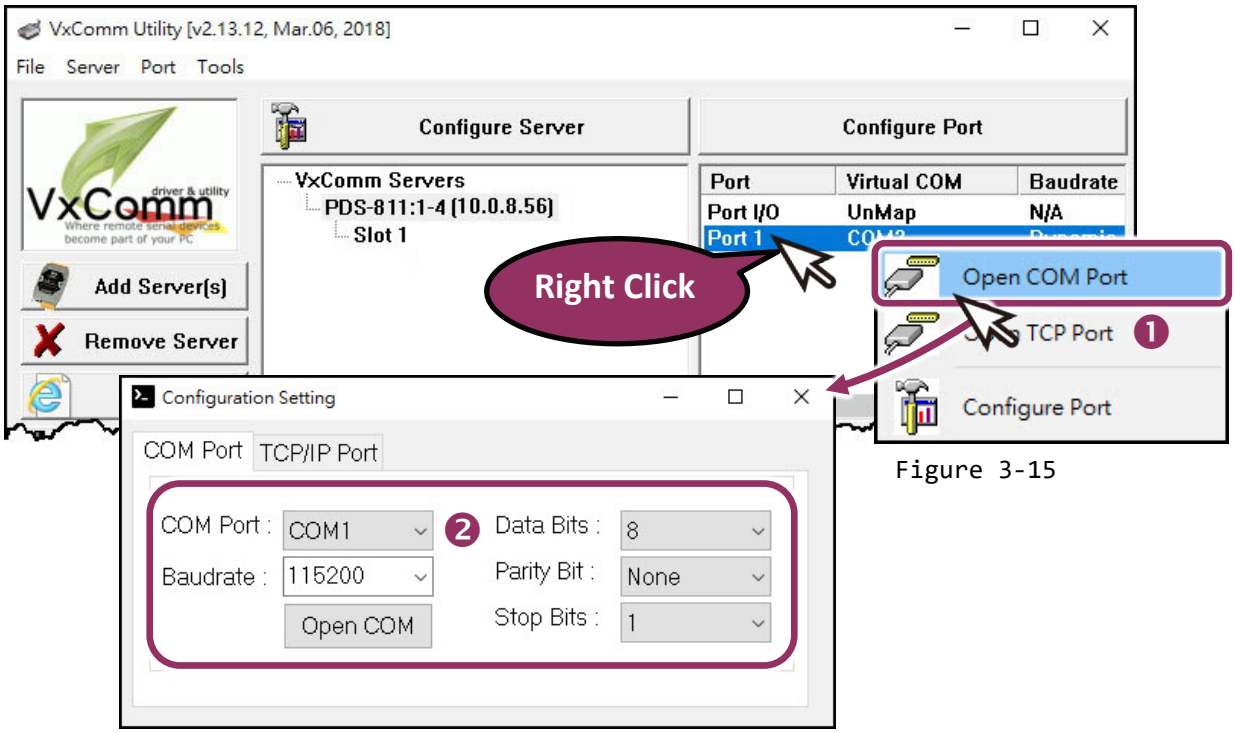


Figure 3-15

3. Type a string (e.g., $01M) in the **"send"** field.
4. Click the **"Hex/Text"** option in the **"Display"** section.
5. Click the **"Send"** button to send the message.
6. If a response is received, it will be displayed in the **"Received"** field.
   If the test is successful, then your COM port program should now be able to work with this Virtual COM Port.

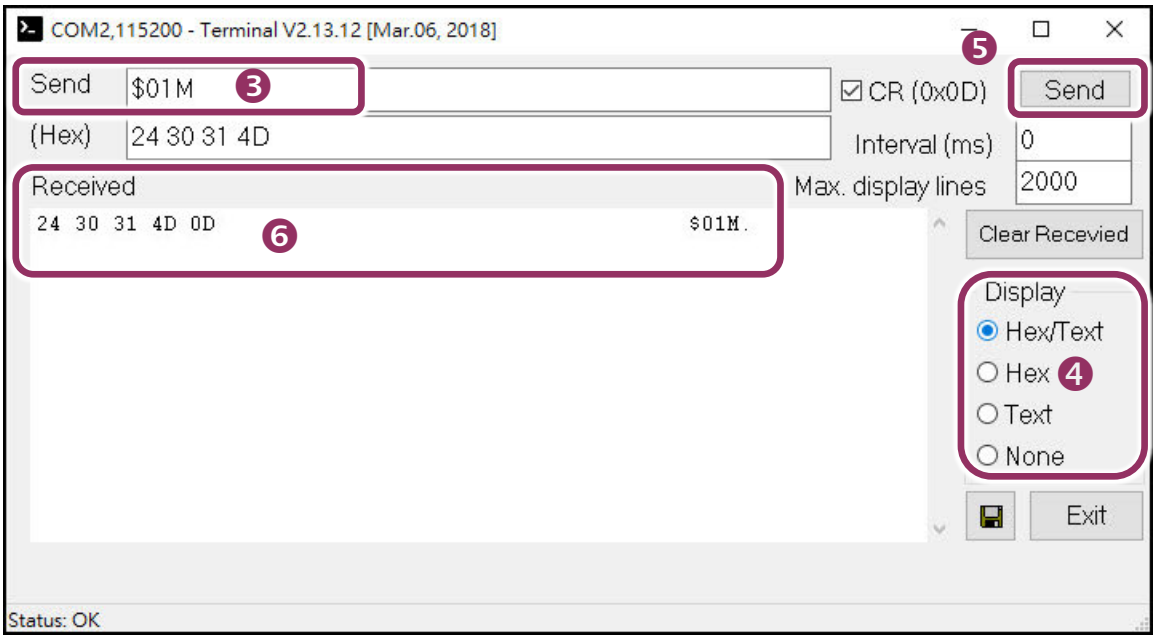


Figure 3-16

3.7 Testing your Serial Module (Optional)

1. Click on serial modules (Slot) and right click Port 10 then choose the "**Open COM Port**" item.

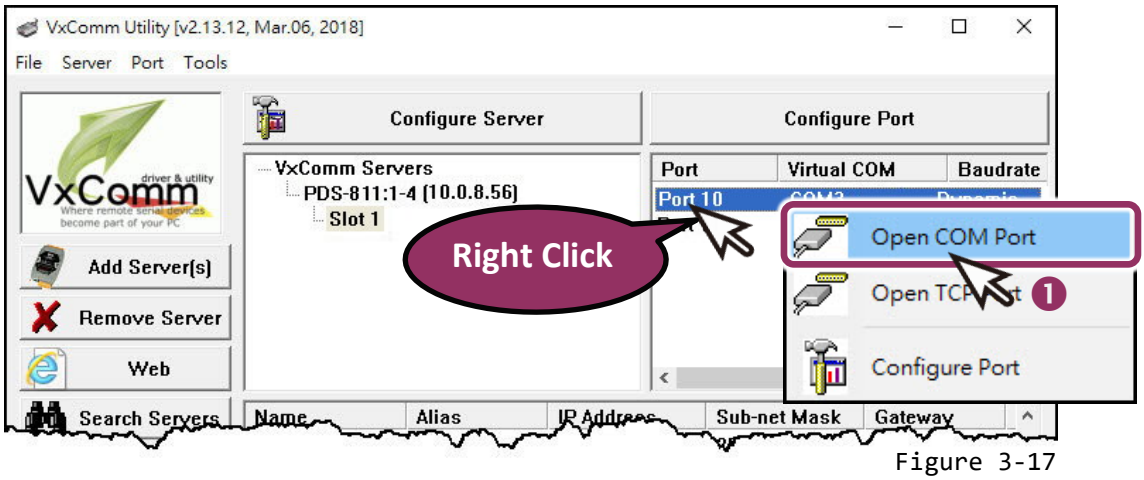


Figure 3-17

2. Check that the configuration of the COM Port is correct and then click the **"Open COM"** button.

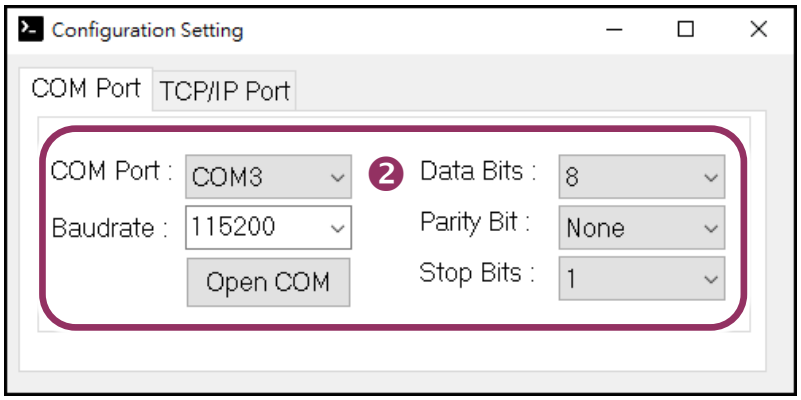


Figure 3-18

3. Type a string (e.g., $01M) in the **"send"** field.

4. Click the **"Hex/Text"** option in the **"Display"** section.

5. Click the **"Send"** button to send the message.

6. If a response is received, it will be displayed in the **"Received"** field.

If the test is successful, then your COM port program should now be able to work with this Virtual COM Port.

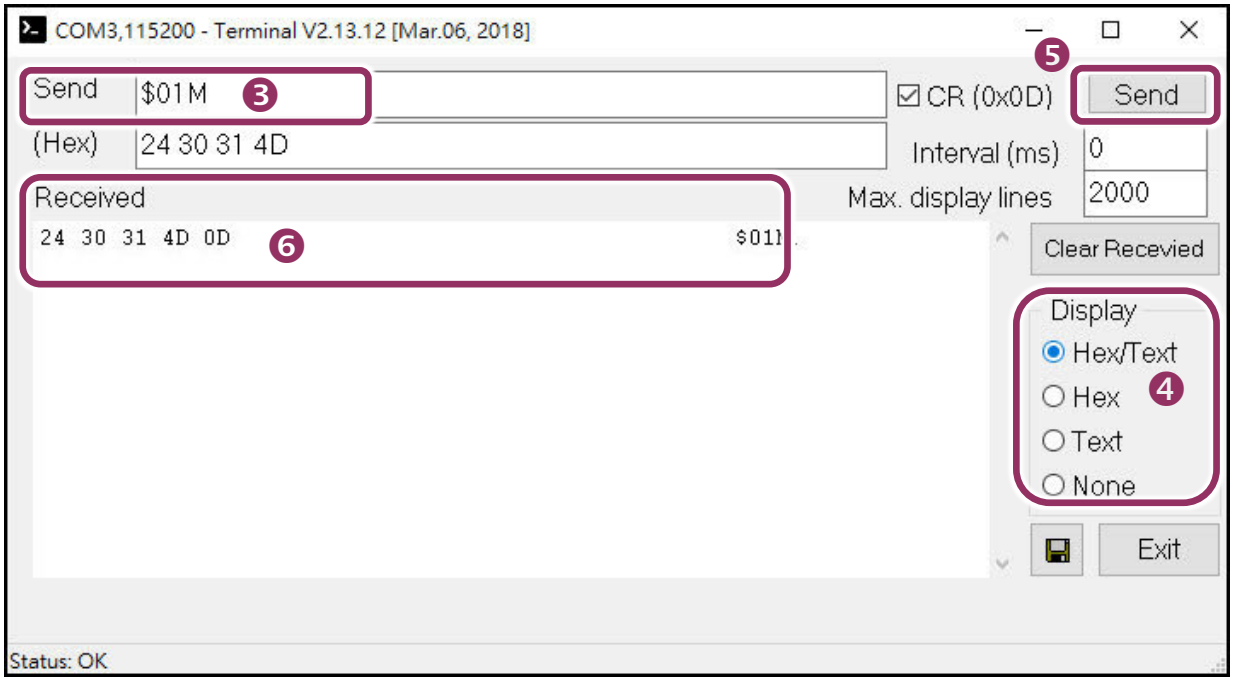


Figure 3-19

⚠ Note: While using RS-485 modules (e.g. I-8144iW), you should wire the Data1+ with Data2+ signals, and wire the Data1- with Data2- signals for self-test. Then open the first two COM ports, send data to one and receive data from the other.

4. Web Configuration

Once the PDS-8x1 controller has been correctly configured and is functioning on the network normally, the configuration details can be retrieved or modified using either the VxComm Utility or a standard web browser.

4.1 Logging in to the PDS-8x1 Web Server

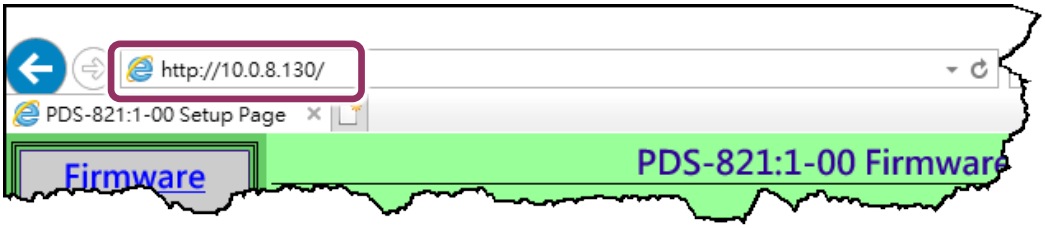
The embedded PDS-8x1 controller web server can be accessed from any computer that has an Internet connection.

➢ Step 1: Open a new browser window.

Open a web browser, for example, Google Chrome, Firefox or Internet Explorer, which are reliable and popular Internet browsers that can be used to configure PDS-8x1 controller.

➢ Step 2: Enter the URL for the PDS-8x1 web server

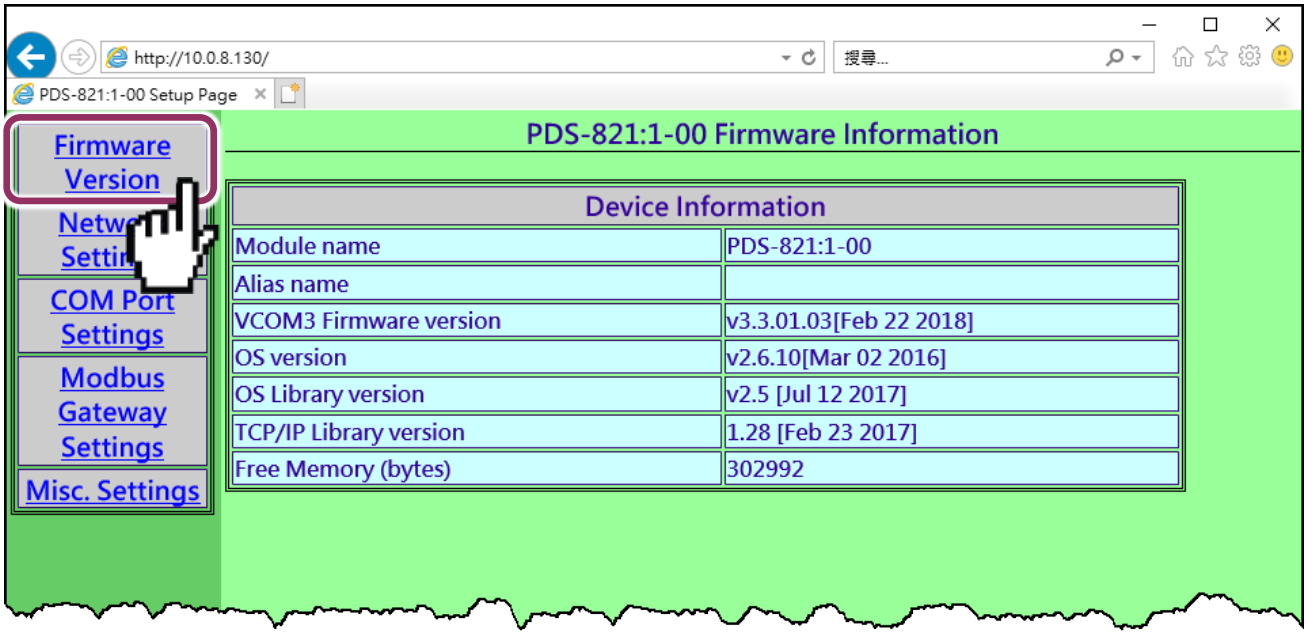
Ensure that you have correctly configured the network settings for the PDS-8x1 controller (refer to Chapter 3 "Setting up the PDS-8x1 Controller" for detailed instructions), and then enter the URL address of the PDS-8x1 in the address bar of the browser or click the **"Web"** button in the VxComm Utility to log in to the web configuration pages.



➢ Step 3: Log in to the PDS-8x1 Web Server

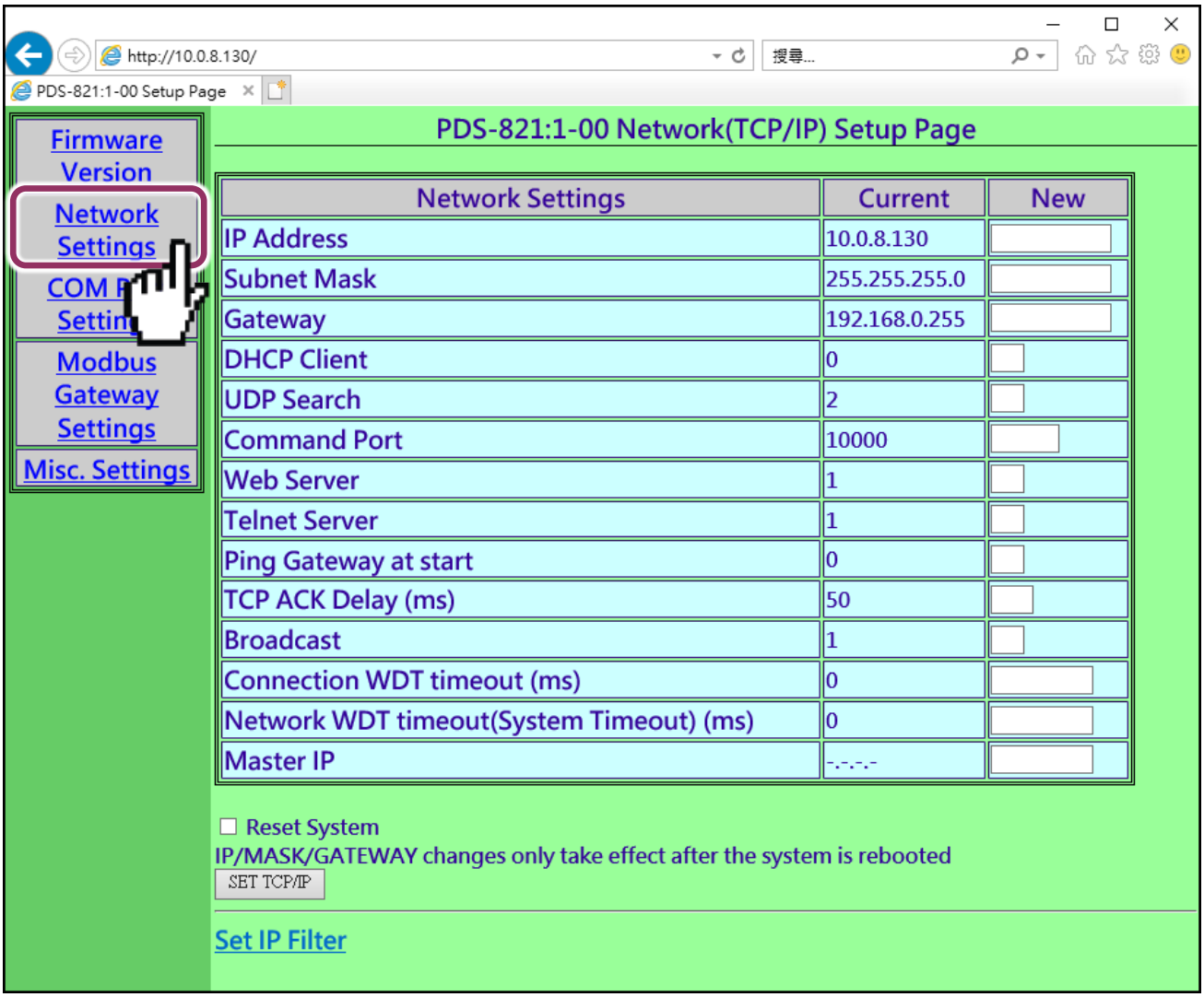
After logging into the PDS-8x1 web server, the main page will be shows **firmware information** of the PDS-8x1 controller.

If you update the firmware for the PDS-8x1 controller, this page can be used to check the software version information of the PDS-8x1.



4.2 Network Setting

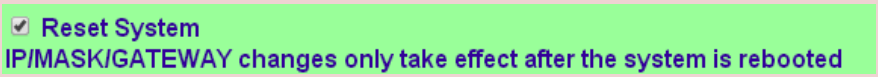
The **Network Settings** section provides information related to most important network settings for the PDS-8x1 controller, including the **IP Address, Subnet Mask** and **Default Gateway** values, etc. If they do not match, the PDS-8x1 controller will not operate correctly. If the settings are changed while the module is operating, any connection currently in use will be lost and an error will occur.



➢ The following is an overview of the parameters contained in the **Network Settings** section:

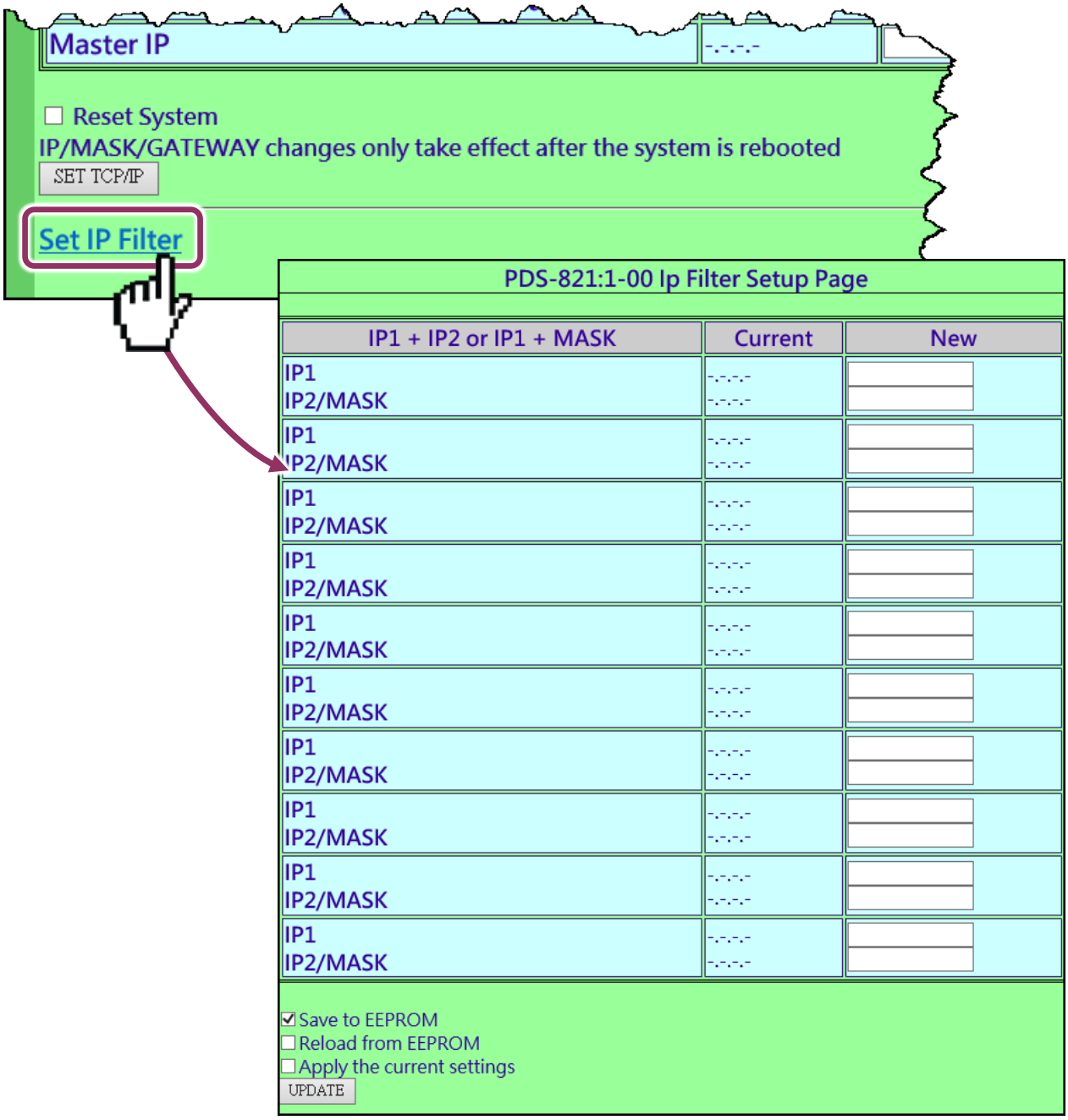
Item	Description	Default
IP Address	If no DHCP server is installed on the network, the network settings can be configured manually.	
Subnet Mask	This parameter is used to assign the subnet mask for the PDS-8x1 controller. The subnet mask indicates which portion of the IP address is used to identify the local network or subnet.	
Gateway	This parameter is used to assign the IP Address of the Gateway to be used by the PDS-8x1 controller. A Gateway (or router) is a device that is used to connect an individual network to one or more additional networks.	
DHCP Client	This parameter is used to enable or disable DHCP Client configuration function. It is recommended that the DHCP Client setting is kept as disabled, and using static network settings. This ensures your PDS-8x1 controller always using a fixed IP address, and you don't need to configure the virtual COM mappings again and again. 0 = Disabled, 1 = Enabled	
UDP Search	This parameter is used to enable or disable UDP Search function. 0 = Disabled 1 = Enabled 2 = Enable the UDP Search function until another client is connected. By keeping the UDP search setting as 2, the PDS-8x1 controller loading will be reduced. The VxComm Utility will not be able to search for this module until this module's clients are all disconnected.	2
Command Port	This parameter is used to configure the TCP Command Port to a custom value depending on your requirement. Note that if the TCP Command Port configuration setting is completed, the TCP port of serial port will be change, as follows: COM1= TCP Command Port + 1 COM2= TCP Command Port + 2 …., and so on. The default TCP Command Port is 10000. Thus, the serial COM port1/port2 is 10001/10002, and so on.	10000

Item	Description	Default
Web Server	This parameter is used to enable or disable Web Server function. If the web server has been disabled (Web Server=0), refer to FAQ: "How to enable web server for the PDS/7188EN Series module" to enable PDS-8x1 web server. 0 = Disabled, 1 = Enabled	1
Telnet Server	This parameter is used to enable or disable Telnet Server function. 0 = Disabled, 1 = Enabled	1
Ping Gateway at start	If the setting is 1 (enabled), the PDS-8x1 controller will send a ping packet to the gateway during the power-on stage. It is used to inform the gateway that a PDS-8x1 controller (itself) has joined the network. 0 = Disabled, 1 = Enabled	0 (Disabled)
TCP ACK Delay (ms)	PDS-8x1 controller does not want to send an empty ACK followed by a TCP data packet 1ms later, every time. So it delays a little (TCP ACK Delay), and then can combine the ACK and data packet into one. This efficiency reduces the number of packets and reduces network loadings.	50 ms
Broadcast	This parameter is used to receive or reject UDP broadcast packets. 1 = receive UDP broadcast packets 0 = reject UDP broadcast packets	1
Connection WDT timeout (ms)	If the PDS-8x1 controller does not receive any data from a client PC within the period of the "Connection WDT timeout", the module will close the connection to the client. 0 = Disabled, Min. setting value = 10000	0 (Disabled)

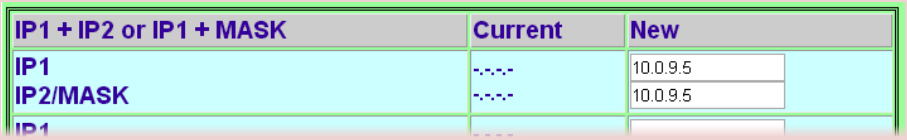
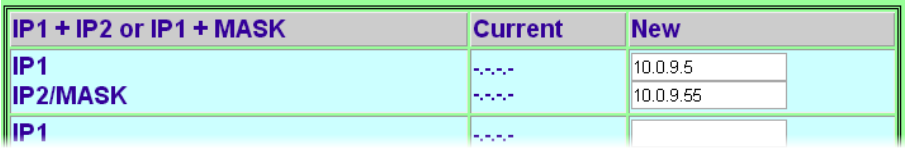
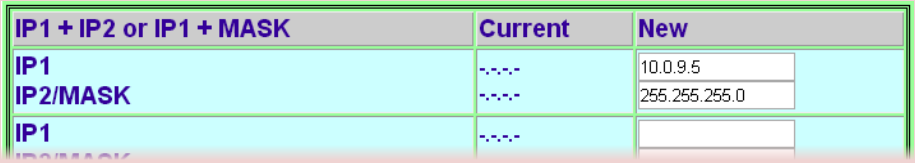
Item	Description	Default
Network WDT timeout (System Timeout) (ms)	If the PDS-8x1 controller does not receive any data from any of the clients within the period of the "Network WDT timeout", the module will reboot itself. This setting is the same as "SystemTimeout" setting (unit: ms) on Console/Telnet command, and is the same as "/STxxx" in command line parameter (unit: seconds). When user uses "config=RESET" Console/Telnet command to clear the EEPROM, the "Network WDT timeout" (SystemTimeout, /ST) setting will also be cleared to 0. Users have to configure this setting again by "SystemTimeout" Console/Telnet command. 0 = Disabled, Min. setting value = 30000	0 (Disabled)
Master IP	If the Master IP is set, only the client using Master IP can change the COM Port configuration. It is to prevent the COM Port configuration changed by other clients.	empty
Reset System	If the "Reset System" option is checked, the PDS-8x1 controller will reboot itself after the saving operation is complete, otherwise the original settings will still be valid until the next power-on. 	
SET TCP/IP	Click this button to save the revised settings to the PDS-8x1 controller.	

4.2.1 IP Filter Setting

The **Set IP Filter** limits which client PCs are able to link to the PDS-8x1 controller via specific IP addresses. When one or more IP addresses are set in the filter table, only client PCs where the IP address is included in the range listed of the filter table will be able to connect to the PDS-8x1 controller. Any requests from other PCs will be rejected.



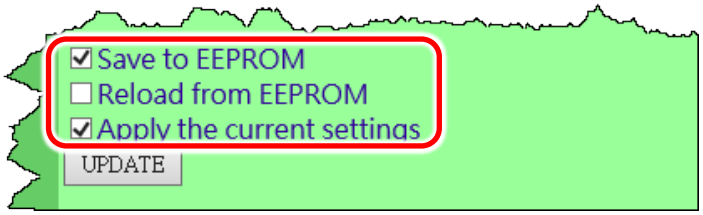
➢ The following is an overview of the parameters contained in the **IP Filter Setup Page** section:

Item	Description
Set IP1 only	Set a single IP address, the IP address entered in the "IP1" and "IP2/MASK" text fields will be the same, as the image below shows. Only clients who's IP address is included in the filter table are able to connect to the PDS-8x1 controller. 
Set IP1 + IP2	Set a range of IP address as a starting and ending point. The initial IP address must be entered in the "IP1" text field and final IP address must be entered in the "IP2/MASK" text field, as the image below shows.  This allows clients who's IP address is included in the range of 10.0.9.5 to 10.0.9.55 are able to connect to the PDS-8x1 controller.
Set IP1 + Mask	Set the IP Filter (Available IP) range, the IP address must be entered in the "IP1" text field and Mask address must be entered in the "IP2/MASK" text field, as the image below shows.  This allows clients who's IP address is included in the range of 10.0.9.0 to 10.0.9.255 are able to connect to the PDS-8x1 controller. Note that how to get the IP address range 10.0.9.0 to 10.0.9.255? It's calculated as follows: Formula: (IP1 & MASK) to (IP1 & Mask) + (~MASK) ↓ (10.0.9.5 & 255.255.255.0) to (10.0.9.5 & 255.255.255.0) + (0.0.0.255) ↓ (10.0.9.0) to (10.0.9.0) + (0.0.0.255) ↓ 10.0.9.0 to 10.0.9.255

Item	Description
Save to EEPROM	If the "UPDATE" button is clicked with checking "Save to EEPROM" option, the new settings will be saved to the PDS-8x1 controller only and the new settings will be valid after the next power-on.
Reload from EEPROM	If the "UPDATE" button is clicked with checking "Reload from EEPROM" option, PDS-8x1 controller can apply the settings from EEPROM immediately.
Apply the current settings	If the "Apply the current settings" checked when the "UPDATE" button is clicked, the new settings will be valid immediately.
UPDATE	Click this button to save the revised settings to the PDS-8x1 controller.

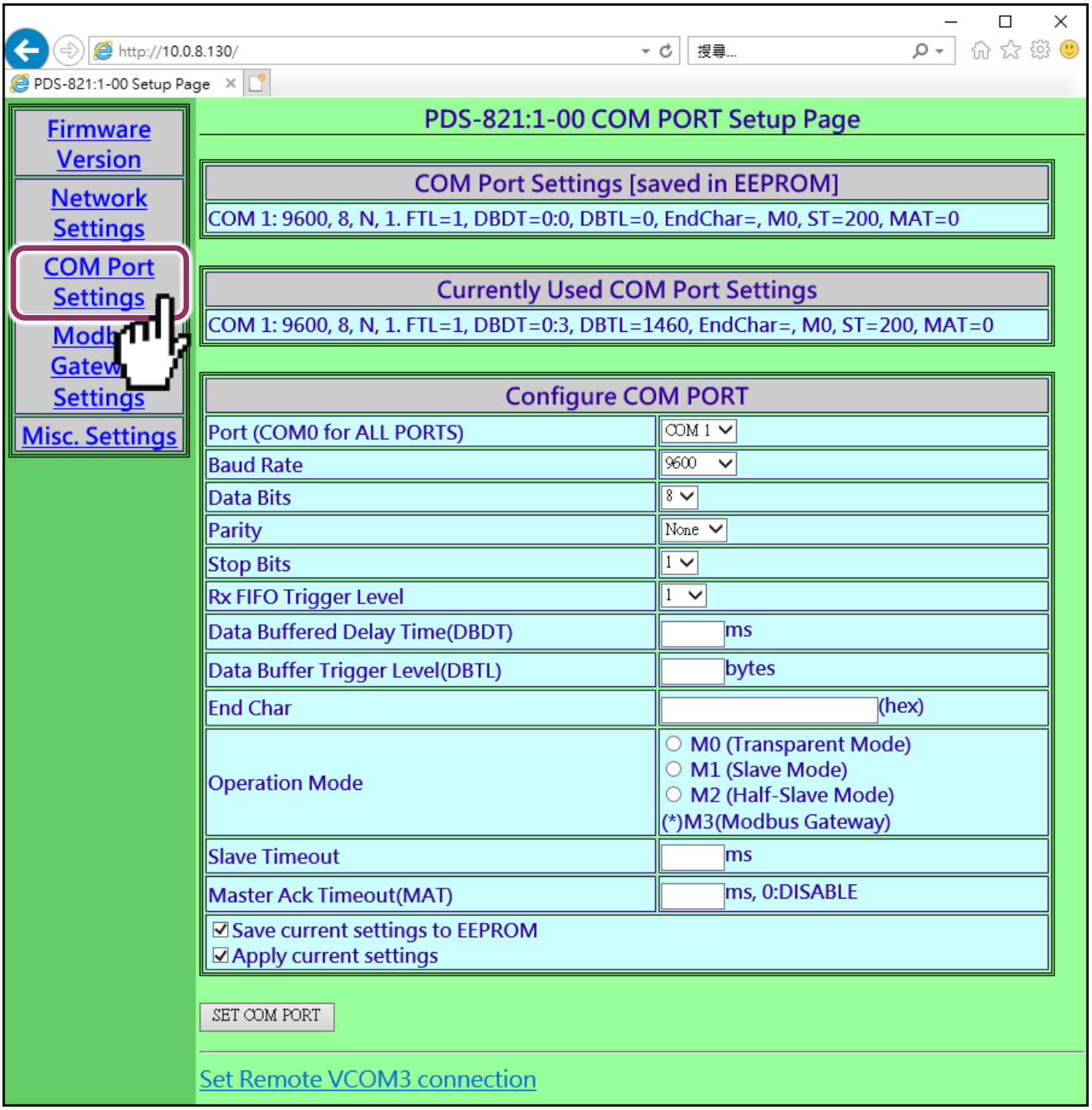
Note:

After configuring IP filter settings, please confirm that the "Save to EEPROM" and "Apply the current settings" option are checked, and then click the "UPDATE" button.



4.3 COM Port Settings

The **COM Port Settings** section provides functions allowing items such as baud rate, data format, data transmission mode and pair-connection settings, etc. to be configured, each of which will be described in more detail below.



➢ The COM Port Settings list is saved in the EEPROM on the PDS-8x1 controller.

COM Port Settings [saved in EEPROM]
COM 1: 9600, 8, N, 1. FTL=1, DBDT=0:0, DBTL=0, EndChar=, M0, ST=200, MAT=0

➢ The Currently Used COM Port Settings list.

Currently Used COM Port Settings
COM 1: 9600, 8, N, 1. FTL=1, DBDT=0:3, DBTL=1460, EndChar=, M0, ST=200, MAT=0

➢ The COM Port Settings area.

Configure COM PORT	
Port (COM0 for ALL PORTS)	COM 1
Baud Rate	9600
Data Bits	8
Parity	None
Stop Bits	1
Rx FIFO Trigger Level	1
Data Buffered Delay Time(DBDT)	ms
Data Buffer Trigger Level(DBTL)	bytes
End Char	(hex)
Operation Mode	○ M0 (Transparent Mode) ○ M1 (Slave Mode) ○ M2 (Half-Slave Mode) (*)M3(Modbus Gateway)
Slave Timeout	ms
Master Ack Timeout(MAT)	ms, 0:DISABLE
☑ Save current settings to EEPROM ☑ Apply current settings	

SET COM PORT

Set Remote VCOM3 connection

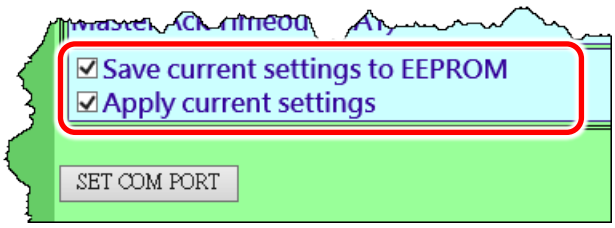
➢ The following is an overview of the parameters contained in the **COM Port Settings** section:

Item	Description	Default
Port (COM0 for ALL PORTS)	The COM Port number on the PDS-8x1 controller.	COM1
Baud Rate	This parameter is used to set the Baud Rate for the COM ports.	9600
Data Bits	This parameter is used to set the Data Size for the COM ports.	8
Parity	This parameter is used to set the Parity for the COM ports.	None
Stop Bits	This parameter is used to set the Stop Bits for the COM ports.	1
Rx FIFO Trigger Level	This option is used to set the number of characters that the COM Port can receive at once time, the PDS-8x1 controller will move the data from the COM Port FIFO to the PDS-8x1 controller. If the amount of data transferred is large and uses a transfer speed (115200 bps), setting a smaller value is helpful in preventing data loss.	1
Data Buffered Delay Time (DBDT)	When the COM port does not receive data from devices connected over the period of DBDT setting, the PDS-8x1 controller will determine that the data transfer is over and return to process next tasks.	0
Data Buffered Trigger Level (DBTL)	Set the receive buffer size. When the buffer receives the data reaches to value, it will be sent out. Settings range: 1 ~ 1460 Bytes	1460
End Char	The PDS-8x1 controller outputs an Ethernet packet immediately after the ending-chars pattern is identified from the incoming serial data.	0 (Disabled)
Operation Mode	M0: Transparent Mode (Multi-echo mode) M1: Slave Mode (Single-echo mode) M2: Half-Slave Mode (Is situated between M0 and the M1 mode) M3: Modbus Gateway The more detailed information regarding M0, M1, M2 and M3 modes, please refer to the Section 4.3.1 "Operation Mode: M0, M1, M2 and M3".	M0

Item	Description	Default
Slave Timeout	In M1 (Slave Mode), the slave mode timeout setting is use to set the waiting time after last character of the request sent to the device. If the device does not respond within the timeout value, the PDS-8x1 controller will return a timeout error and process next request.	200 ms
Master ACK timeout (MAT)	If the PDS-8x1 controller does not receive any data from Slave for a certain period, the PDS-8x1 controller will return an ACK character to Master and process next request based on the configured timeout value.	0 (Disabled)
Save current settings to EEPROM	If the "SET COM PORT" button is clicked with checking "Save current settings to EEPROM" option, the new settings will be saved to the PDS-8x1 controller only and the new settings will be valid after the next power-on.	
Apply current settings	If the "Apply current settings" checked when the "SET COM PORT" button is clicked, the new settings will be valid immediately.	
SET COM PORT	Click this button to save the revised settings to the PDS-8x1 controller.	

Note:

After configuring COM Port Settings, please confirm that the "Save current settings to EEPROM" and "Apply current settings" option are checked, and then click the "SET COM PORT" button.

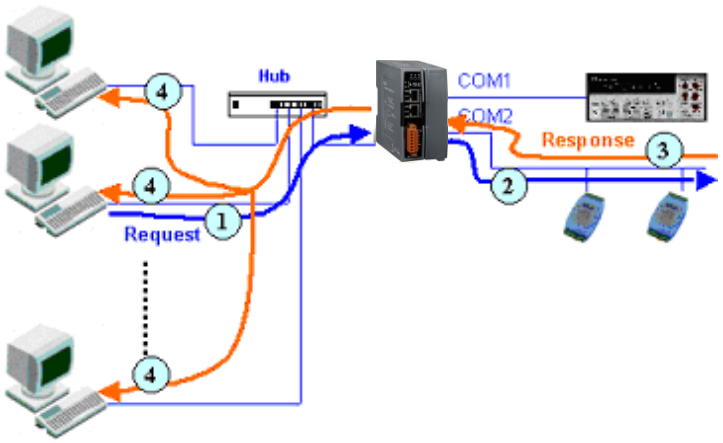


4.3.1 Operation Mode: M0, M1, M2 and M3

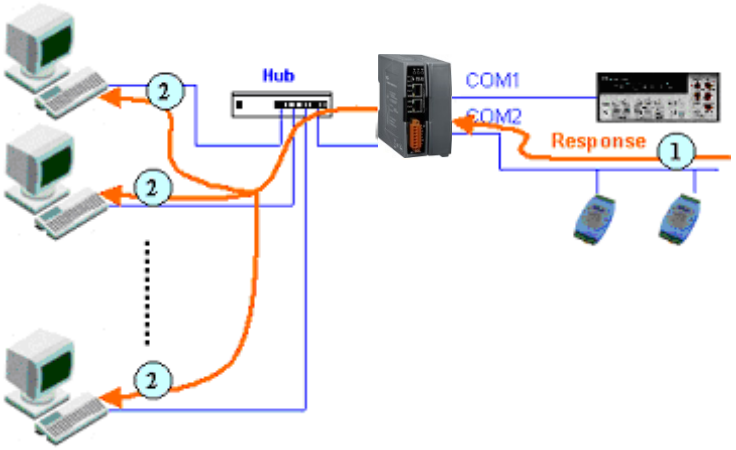
M0: Transparent Mode (Multi-echo, shared)

M0 is used for Virtual COM and TCP/IP connections. In this mode, data is transmitted to each client that is connected to the PDS-8x1 controller.

Condition 1: One client sends a request to the PDS-8x1 controller to access a device. The PDS-8x1 controller transmits the data from device to each connected client.



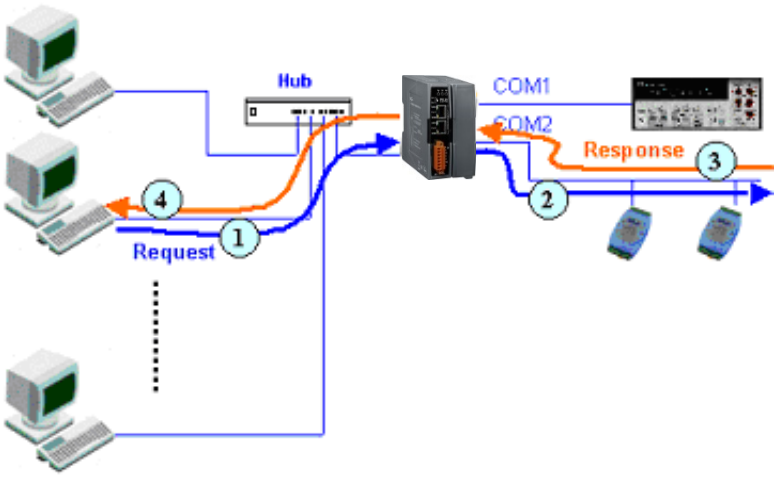
Condition 2: No clients send any requests to the PDS-8x1 controller. The PDS-8x1 controller transmits data from the device to each connected client.



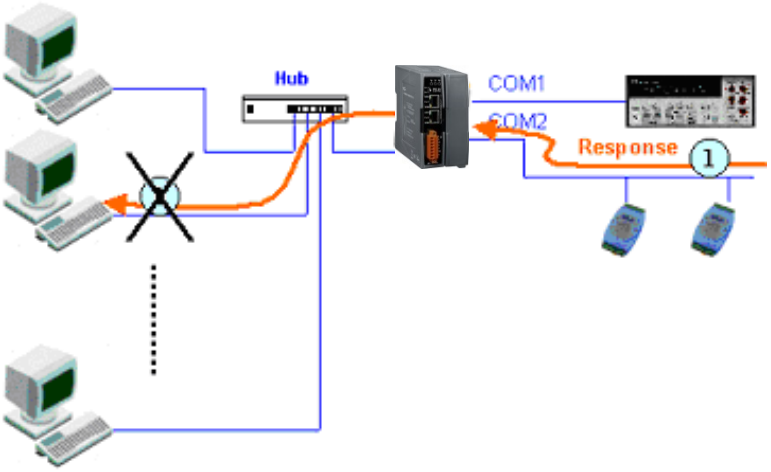
M1: Slave Mode (Single-echo, Non-shared)

M1 is used for Virtual COM and TCP/IP connections. In this mode, data is transmitted to the specific client that requested the service. If the client does not send a request to the COM port of the PDS-8x1 controller, then the module won't return any data to it.

Condition 1: One client sends a request to the PDS-8x1 controller to access a device. The PDS-8x1 controller transmits data from the device to the client that requested the service.



Condition 2: No clients send any requests to the PDS-8x1 controller. The PDS-8x1 controller doesn't transmit any data from the device to any client.



M2: Half-Slave Mode (Is situated between M0 and the M1 mode)

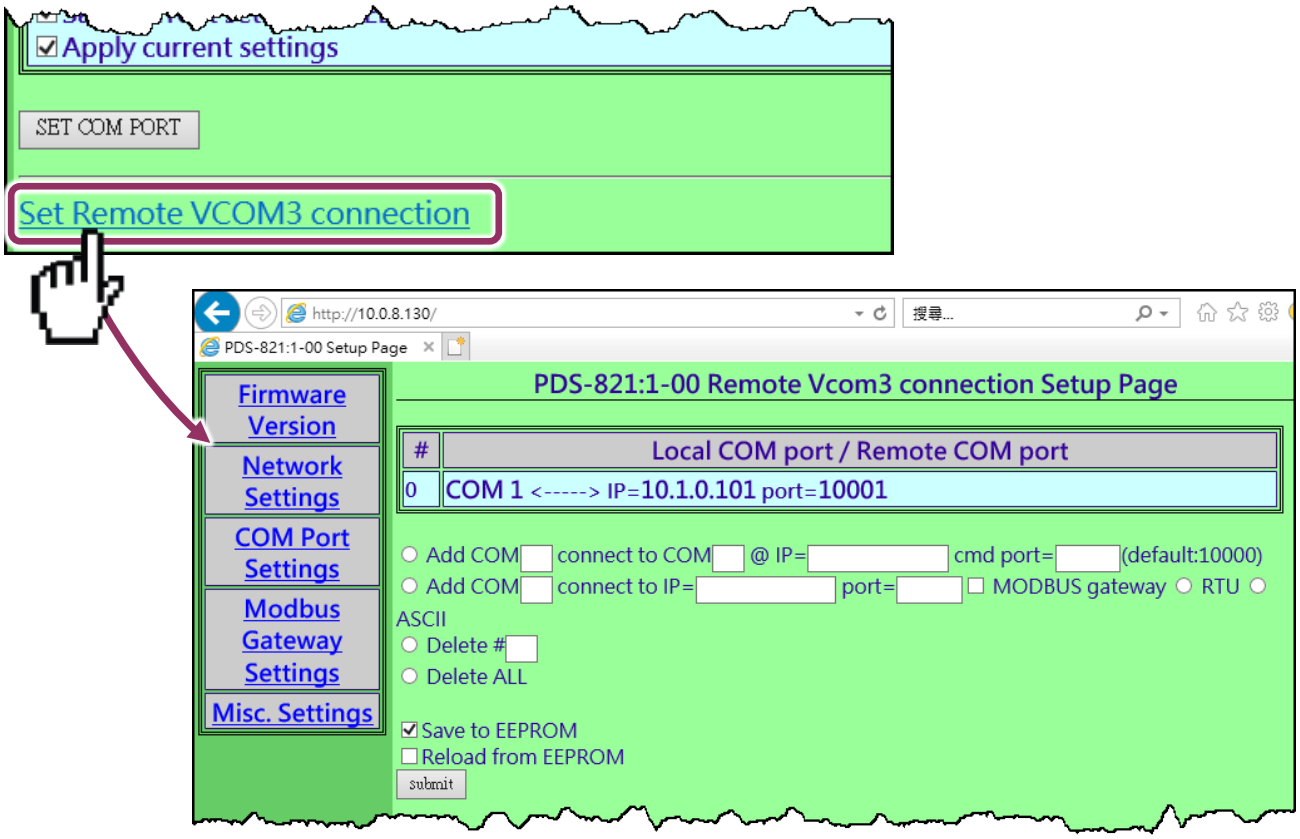
M2 is used for Virtual COM and TCP/IP connections. If only one client connects to the PDS-8x1 controller, the operation mode same as M0 mode (Multi-echo, shared), refer to Section "M0: Transparent Mode". If there are two or more clients connecting to the PDS-8x1 controller, the operation mode same as M1 mode (Single-echo, Non-shared), refer to Section "M1: Slave Mode". PDS-8x1 controller sends data to the last client when data is available but no request from any client.

M3: Modbus Gateway

When PDS-8x1 controller are configured to Modbus Gateway, the operation mode will be automatically set to M3 mode. The more detailed information regarding configuring Modbus Gateway, refer to Section 4.4 "Modbus Gateway Settings" and Chatper 5 "Modbus Testing and Protocol".

4.3.2 Set Remote VCOM3 Connection

Clicking the **"Set Remote VCOM3 Connection"** will display the **PDS Remote Vcom3 connection Setup Page** allowing your enable and configure the pair connections for the PDS-8x1 controller, which will be described in more detail below.



The following is an overview of the parameters contained in the **Remote Vcom3 connection Setup Page** section:

Item	Description
Add COM "Number"	Serial COM port number of the local device (Master)
connect to COM "Number"	Serial COM port number of the remote device (Slave)
@ IP= "IP Address"	IP address of the remote device (Slave)
cmd port= "command port" (default: 10000)	Command Port number of the remote device (Slave)
Add COM "Number"	Serial COM port number of the local device (Master)
connect to IP= "IP Address"	IP address of the remote device (Slave)
Port= "TCP port"	TCP Port number of the remote device (Slave)

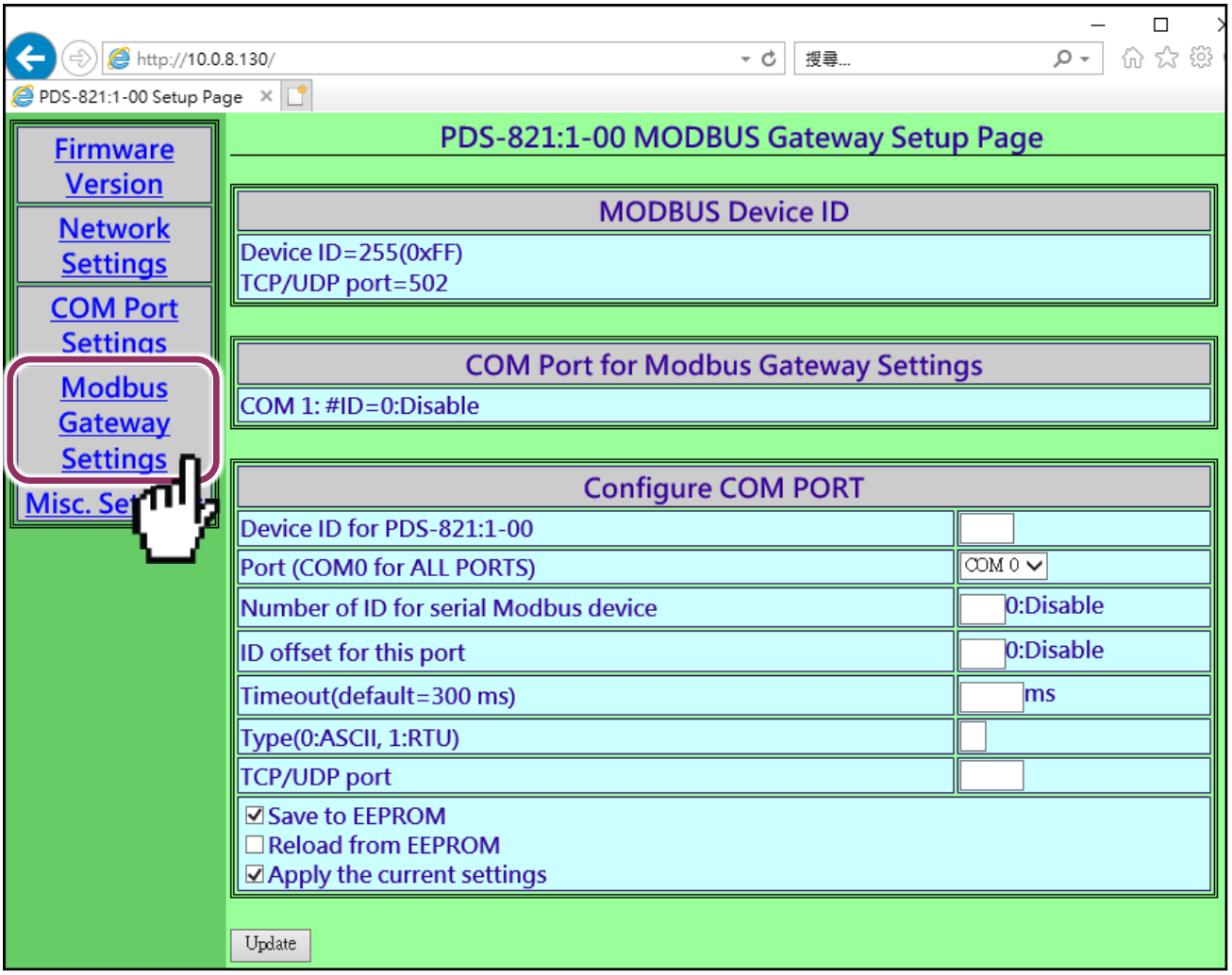
Item	Description
MODBUS gateway	If the “MODBUS gateway” checked, the serial port is specified as gateway from the Modbus RTU or Modbus ASCII (Master) to Modbus TCP for the remote device (Slave)
Delete # “Number”	Delete a specific # “Number” from the Pair-connection List.
Delete All	Delete all items from the pair-connection List.
Save to EEPROM	If the “submit” button is clicked with checking “Save to EEPROM” option, the new settings will be saved to the PDS-8x1 controller only and the new settings will be valid after the next power-on.
Reload from EEPROM	If the “submit” button is clicked with checking “Reload from EEPROM” option, PDS-8x1 controller can apply the settings from EEPROM immediately.
Submit	Click this button to save the revised settings to the PDS-8x1 controller.

Note:
After setting the pair-connection functions, please power-on reboot the PDS-8x1 controller, and then setting is complete.

4.4 Modbus Gateway Settings

The **"Modbus Gateway Settings"** section provides sets the Modbus Gateway functions for PDS-8x1 controller, including the Modbus device ID, Modbus Protocol, TCP/UDP port and timeout values, etc., which will be described in more detail below. The more detailed information regarding Modbus Gateway applications settings, refer to Chatper 6 "Modbus Testing and Protocol".

Note:
Starting from the firmware version v3.3.01.03 [Feb 22 2018], the PDS-8x1 controller support Modbus Gateway function.



➢ Check the Modbus Device ID of PDS-8x1 controller.

⚠ **Note: This ID setting is not used for your Modbus slave device.**

MODBUS Device ID
Device ID=255(0xFF) TCP/UDP port=502

➢ Check the COM Port for Modbus Gateway settings:

COM Port for Modbus Gateway Settings
COM 1: #ID=0:Disable

➢ The COM Port Settings section:

Configure COM PORT	
Device ID for PDS-821:1-00	
Port (COM0 for ALL PORTS)	COM 0
Number of ID for serial Modbus device	0:Disable
ID offset for this port	0:Disable
Timeout(default=300 ms)	ms
Type(0:ASCII, 1:RTU)	
TCP/UDP port	
☑ Save to EEPROM ☐ Reload from EEPROM ☑ Apply the current settings	

Update

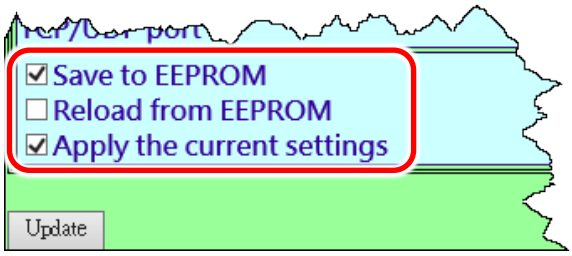
➢ The following is an overview of the parameters contained in the **Configure COM Port** section:

Item	Description
Device ID for PDS	This parameter is used to configure the device ID of PDS-8x1 controller. ⚠ Note: This ID setting is not used for your Modbus slave device. The default Device ID = 255 (0xFF)
Port (COM 0 for ALL PORTS)	This parameter is used to select the COM Port number on the PDS-8x1 controller.
Number of ID for serial Modbus device	This parameter is used to configure the slave device ID range of your Modbus device. 0 = Disable

Item	Description
ID offset for this Port	This parameter is used to set the slave device ID offset. For example: Virtual Device ID (Device ID of Modbus command) = 3, Offset = 2, Physical Device ID (Modbus Device) = 5
Timeout (default = 300 ms)	If the PDS series does not receive any data from RTU Slave for a certain period, the PDS-8x1 controller will return a timeout error to PC based on the configured timeout value.
Type (0: ASCII, 1: RTU)	This parameter is used to configure the serial port that is used by the Modbus RTU or Modbus ASCII protocol.
TCP/UDP port	This parameter is used to configure the Modbus TCP/UDP port. The default COM1 = TCP/UDP Ports 502
Save to EEPROM	If the "Update" button is clicked with checking "Save to EEPROM" option, the new settings will be saved to the PDS-8x1 controller only and the new settings will be valid after the next power-on.
Reload from EEPROM	If the "Update" button is clicked with checking "Reload from EEPROM" option, PDS-8x1 controller can apply the settings from EEPROM immediately.
Apply the current settings	If the "Apply the current settings" checked when the "Update" button is clicked, the new settings will be valid immediately.
UPDATE	Click this button to save the revised settings to the PDS-8x1 controller.

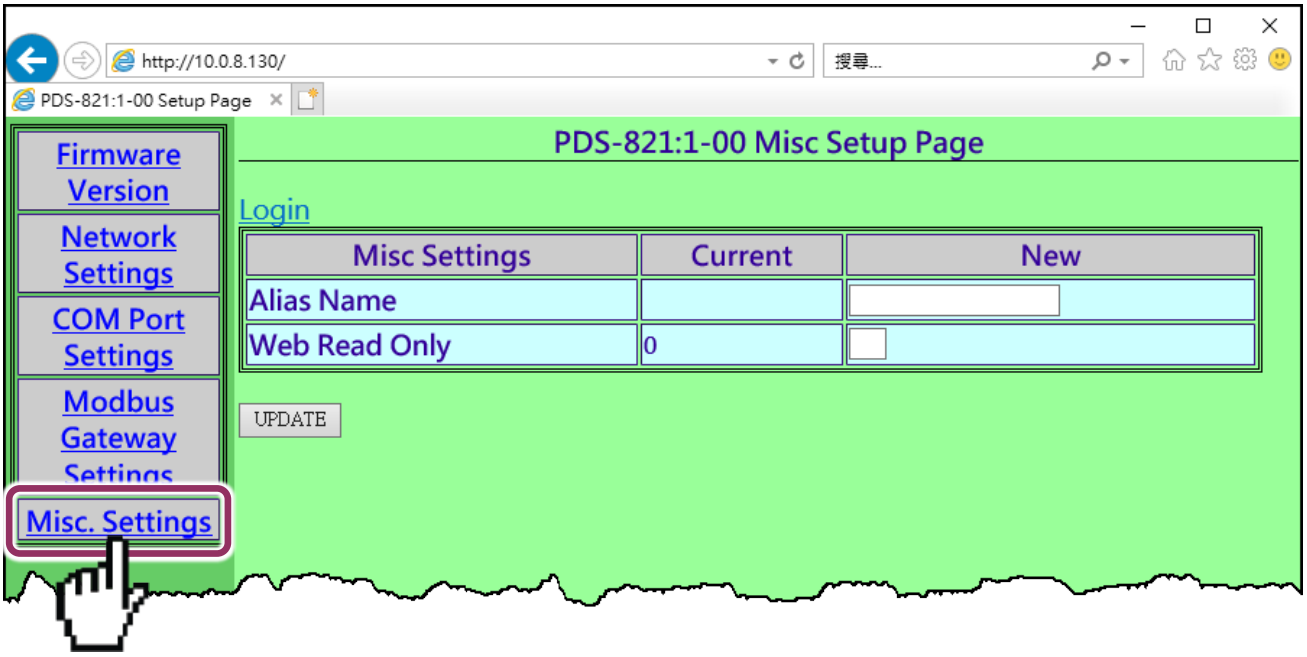
Note:

After configuring IP filter settings, please confirm that the "Save to EEPROM" and "Apply the current settings" option are checked, and then click the "UPDATE" button.



4.5 Misc. Settings

The **Miscellaneous Settings** provides functions allowing items such as the alias name, Web read only, restore factory default and change password to be configured, each of which will be described in more detail below.



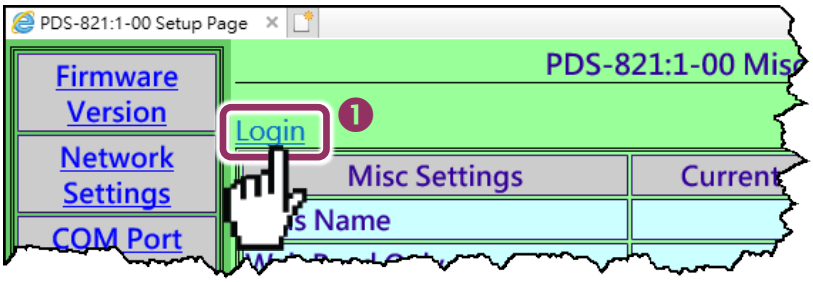
➢ The following is an overview of the parameters contained in the **Misc Setup Page** section:

Item	Description
Login	Click the this tab to proceed to the Login page that can disable "Web Read Only" property, change password and Restore to Factory Default Settings, refer to the Sections 4.5.1 "Disable the "Web Read Only" Function", Section 4.5.2 "Change Password" and Section 4.5.3 "Restore to Factory Default Settings" for more detail information.
Alias Name	This parameter is used to assign an alias for each PDS-8x1 controller to assist with easy identification.
Web Read Only	This parameter is used to enable "Web Read Only" function. If the "Web Read Only" properly is set to 1 (Enabled), the web server will **not** be able to save any new configurations to the PDS-8x1 controller. The default setting should be 0 (Disabled). 0 = Disabled, 1 = Enabled
UPDATE	Click this button to save the revised settings to the PDS-8x1 controller.

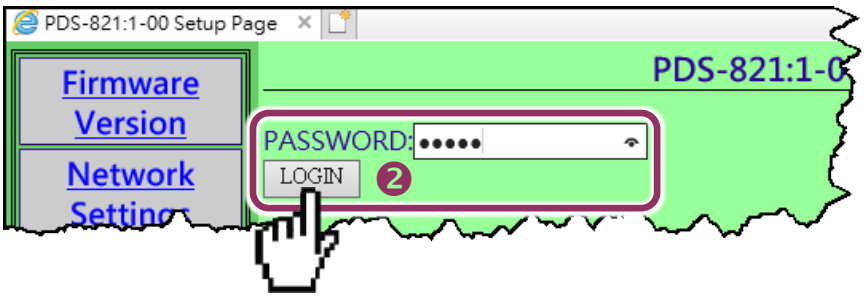
4.5.1 Disable the "Web Read Only" Function

The following instructions guide you to disable the **"Web Read Only"** function.

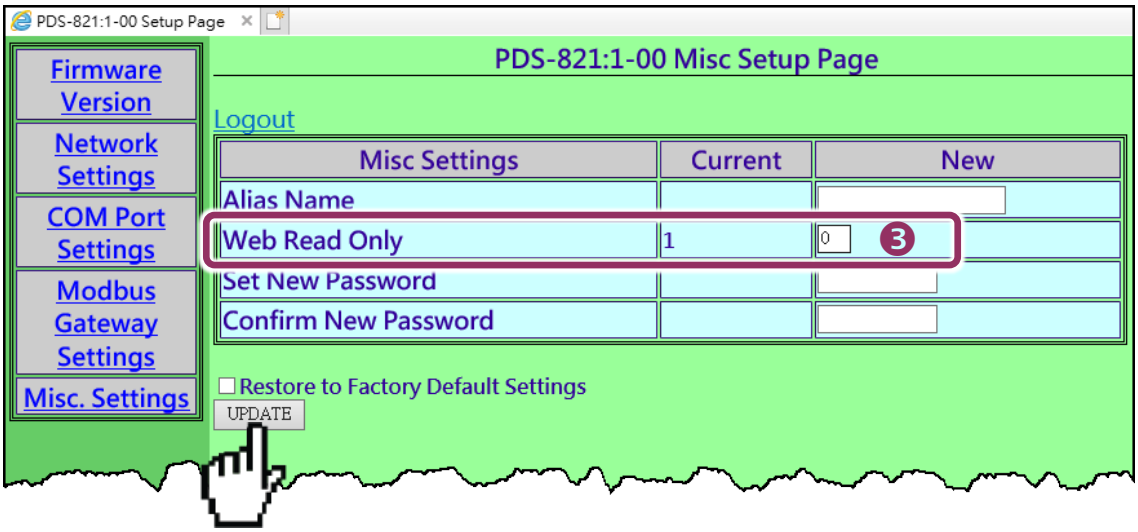
Step 1: Click the "**Login**" tab at the PDS-8x1 Misc Setup Page to proceed to the Login Page.



Step 2: Enter the password in the **"PASSWORD:"** field (use the default password **"admin"**) and click the "**LOGIN**" button to proceed to the settings page. If you want to change default password, please refer to Section 4.5.2 "Change Password".

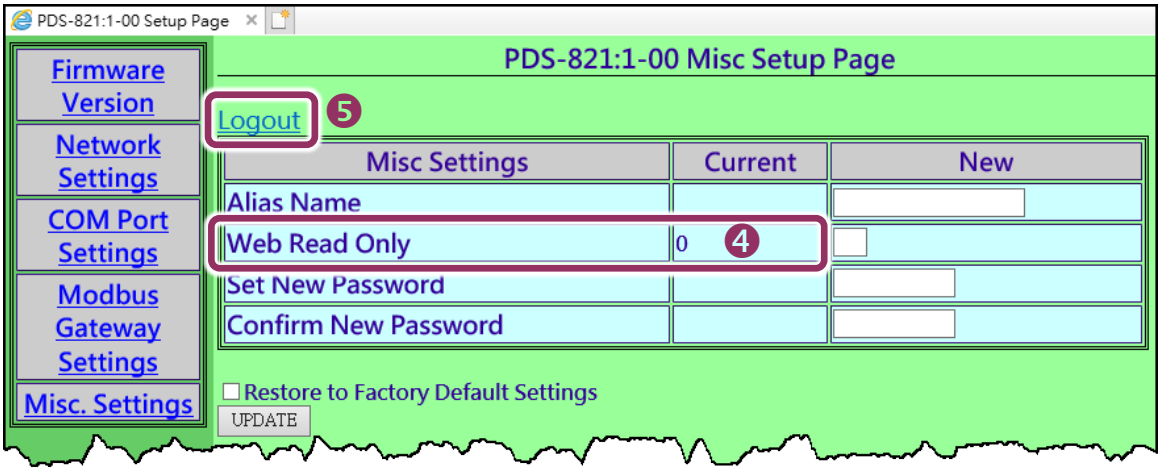


Step 3: Set the new "**Web Read Only**" **properly = 0** and click the "**UPDATE**" button to update the settings.



Step 4: Check that the current the "**Web Read Only**" **= 0**.

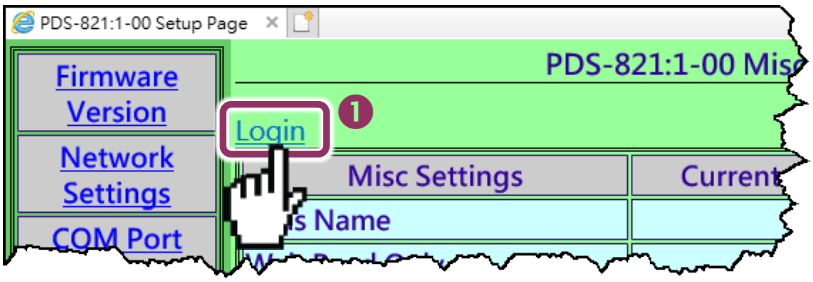
Step 5: Click "**Logout**" to complete the operation.



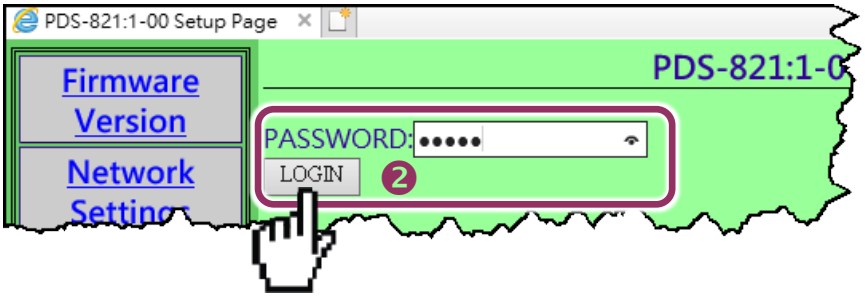
4.5.2 Change Password

To change a password of the Login Page, follow the procedure described below:

Step 1: Click the "**Login**" tab at the PDS-8x1 Misc Setup Page to proceed to the Login Page.



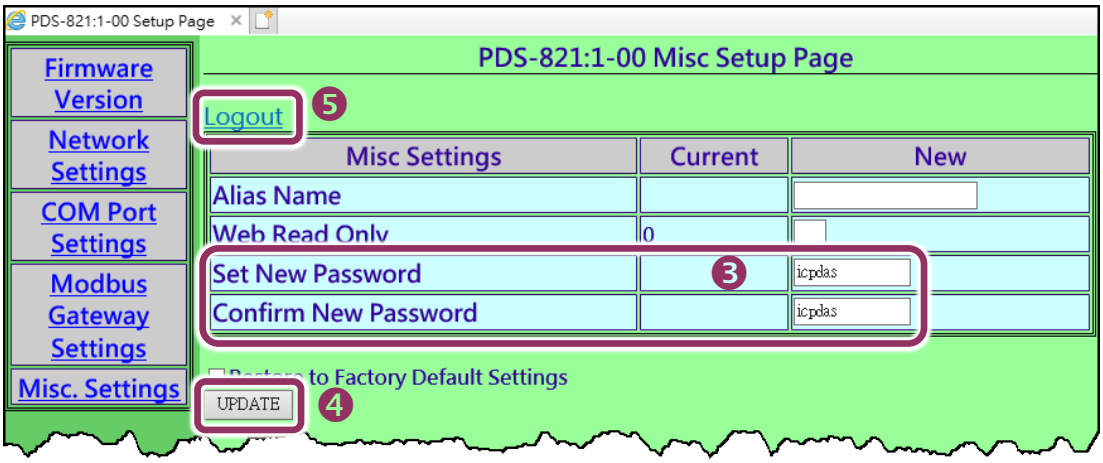
Step 2: Enter the password in the **"PASSWORD:"** field (use the default password **"admin"**) and click the "**LOGIN**" button to proceed to the settings page.



Step 3: Enter the new password in the **"Set New Password"** field. Re-enter the new password in the **"Confirm new password"** field.

Step 4: Click the **"UPDATE"** button to update the password.

Step 5: Click the "**Logout**" to complete the operation.

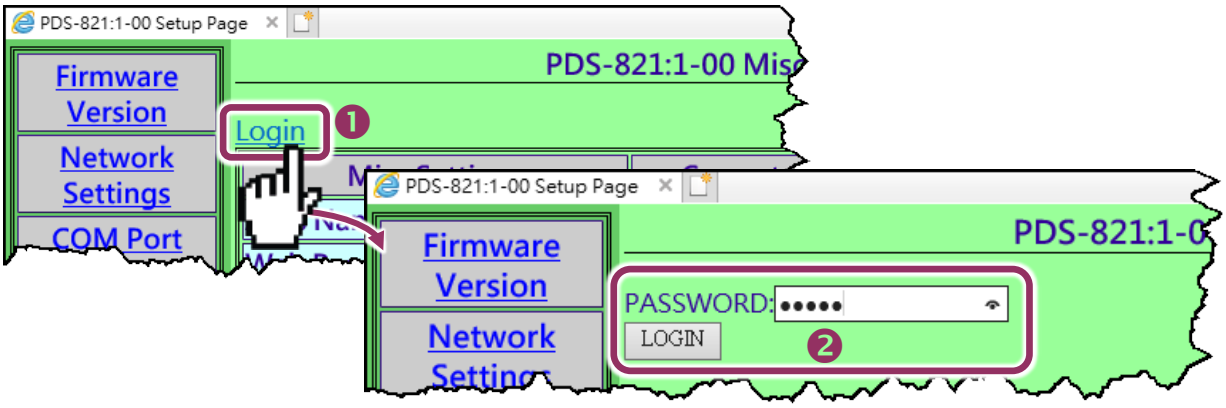


4.5.3 Restore to Factory Default Settings

Use the following procedure to reset all parameters to their original factory default settings:

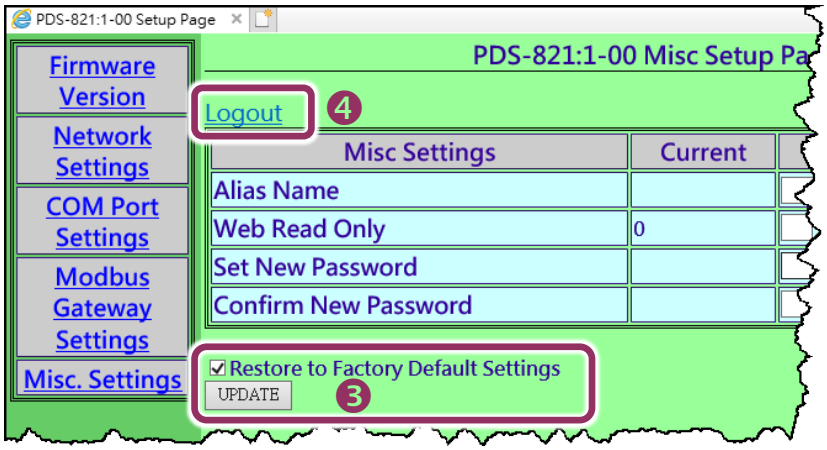
Step 1: Click the "**Login**" tab at the PDS-8x1 Misc Setup Page to proceed to the Login Page.

Step 2: Enter the password in the **"PASSWORD:"** field (use the default password **"admin"**) and click the "**LOGIN**" button to proceed to the settings page. If you want to change default password, please refer to Section 4.5.2 "Change Password".



Step 3: Check the **"Restore to Factory Default Settings"** option and click the **"UPDATE"** button to update the setting.

Step 4: Click the "**Logout**" to complete the operation, and then **power-on reboot** the PDS-8x1 controller.



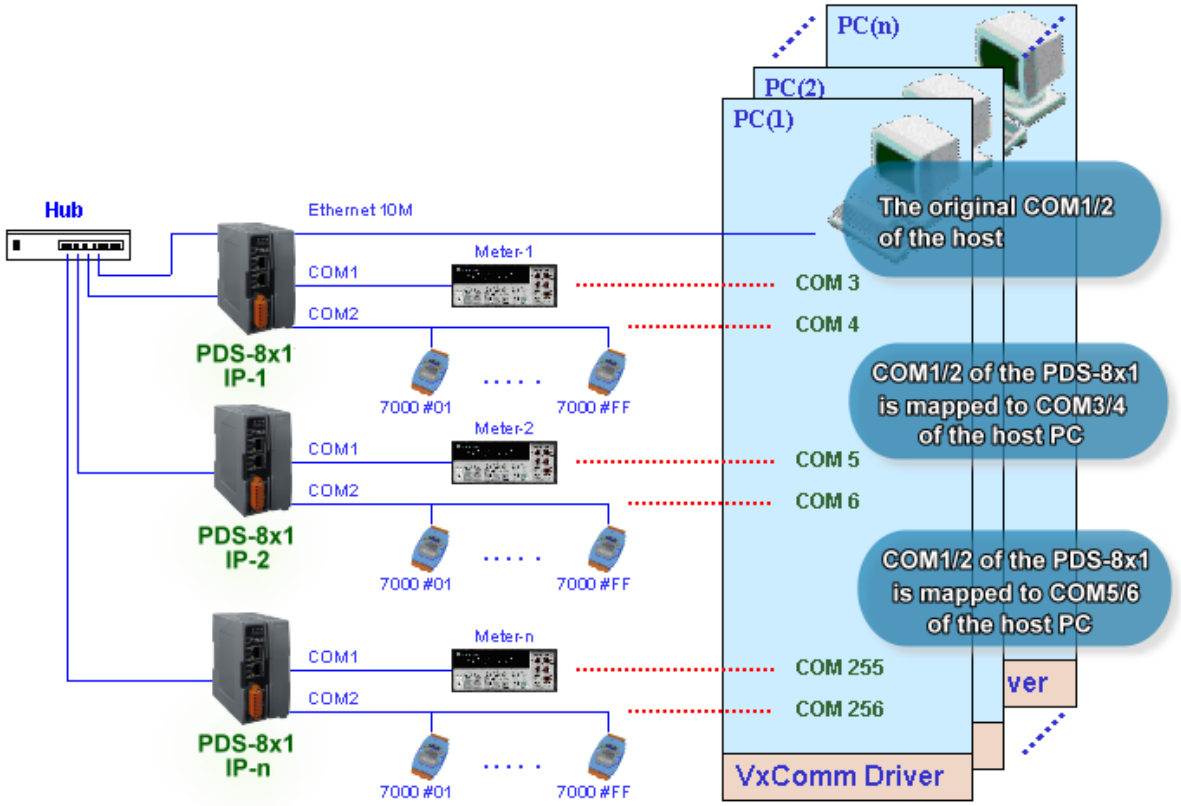
PDS-8x1 Factory Default Settings	
Network Settings	
IP Address	192.168.255.1
Gateway Address	192.168.0.1
Subnet Mask	255.255.0.0
DHCP	Disabled
Basic Settings	
Alias	N/A

Note:
User can restore PDS-8x1 password to default value "admin" by using "config=RESET" console command (refer to Chapter 7 "Console/Telnet Commands List"). This command sets most configurations of PDS-8x1 to factory setting. It requires rebooting the PDS-8x1 for loading new configuration (includes default password).

5. Typical Applications

5.1 Virtual COM Application

The PDS-8x1 controller is designed to link RS-232/422/485 devices to an Ethernet network. The VxComm utility allows the built-in PDS-8x1 COM Port to be virtualized to a standard COM Port of a host PC, as shown below:



In the configuration above, Meter-1 is virtualized to link to COM3 of the host PC. Therefore, a program originally designed for the MS-COMM standard can access the meter without the need for any modification.

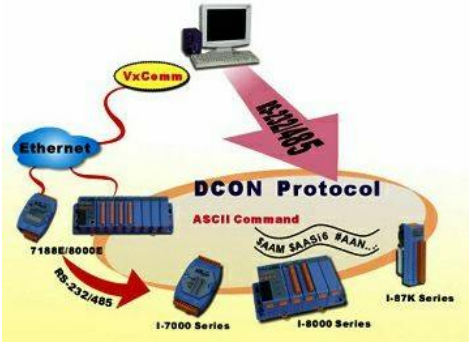
5.2 Ethernet I/O Applications

➢ Linking to I-7000 series modules

The I-7000 series provides a variety of I/O operations, such as D/I, D/O, A/D, D/A, Counter and Frequency Measurement, etc. The I-7000 series was originally designed to be used with RS-485 networks, so the RS-485 of COM on the PDS-8x1 can be used to link to I-7000 series modules.

By using VxComm technology, programs that support serial devices on the host PC can be upgraded from an RS-485 network to an Ethernet network without requiring any modifications to the program.

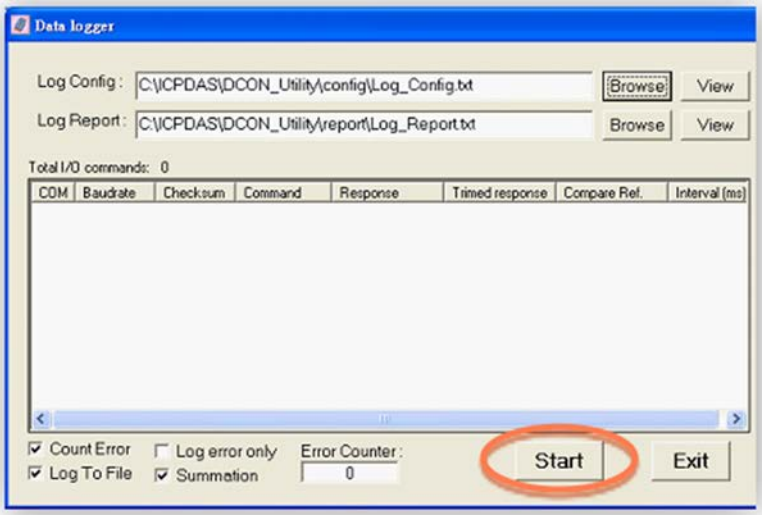
➢ Configurable Ethernet Data Logger



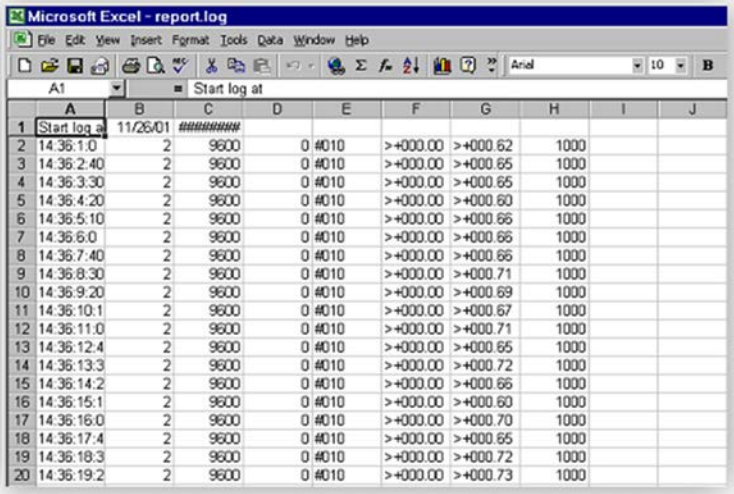
Using the VxComm driver, the PDS-8x1 + 7000 modules can be virtualized to become COM Port + 7000 modules located on the host PC, and then the Data Logger in the DCON Utility can be used to access data related to the I-7000 from the Ethernet. Signal data originating from the I-7000 modules can be analyzed using MS Excel without the need to write any custom programs.

1: The DCON utility includes a log function, as show below:

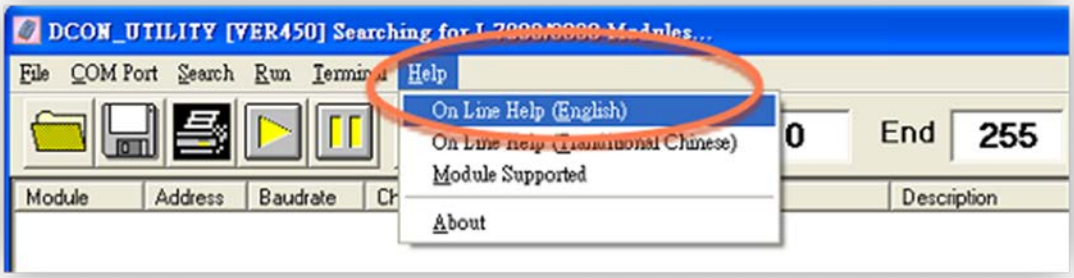
2: Configure the system connection as shown below and click the **"Start"** button to begin logging data.



3: Open the log file in MS Excel to view the log data as shown in the example below:



By using the I-7000 DCON utility and MS Excel in conjunction with **VxComm technology**, the signal data originating from I-7000 modules via the Ethernet network can be analyzed without the need to write custom programs. For more information about the **log function**, refer to the online help feature (English and Traditional Chinese) of the DCON utility.



5.3 Pair-connection Applications

PDS-8x1 controller can be used to create a pair-connection application (as well as serial-bridge or serial-tunnel), and then route data between two serial devices via TCP/IP, which is useful when connecting mainframe computers, servers or other serial devices that do not themselves have Ethernet capability.

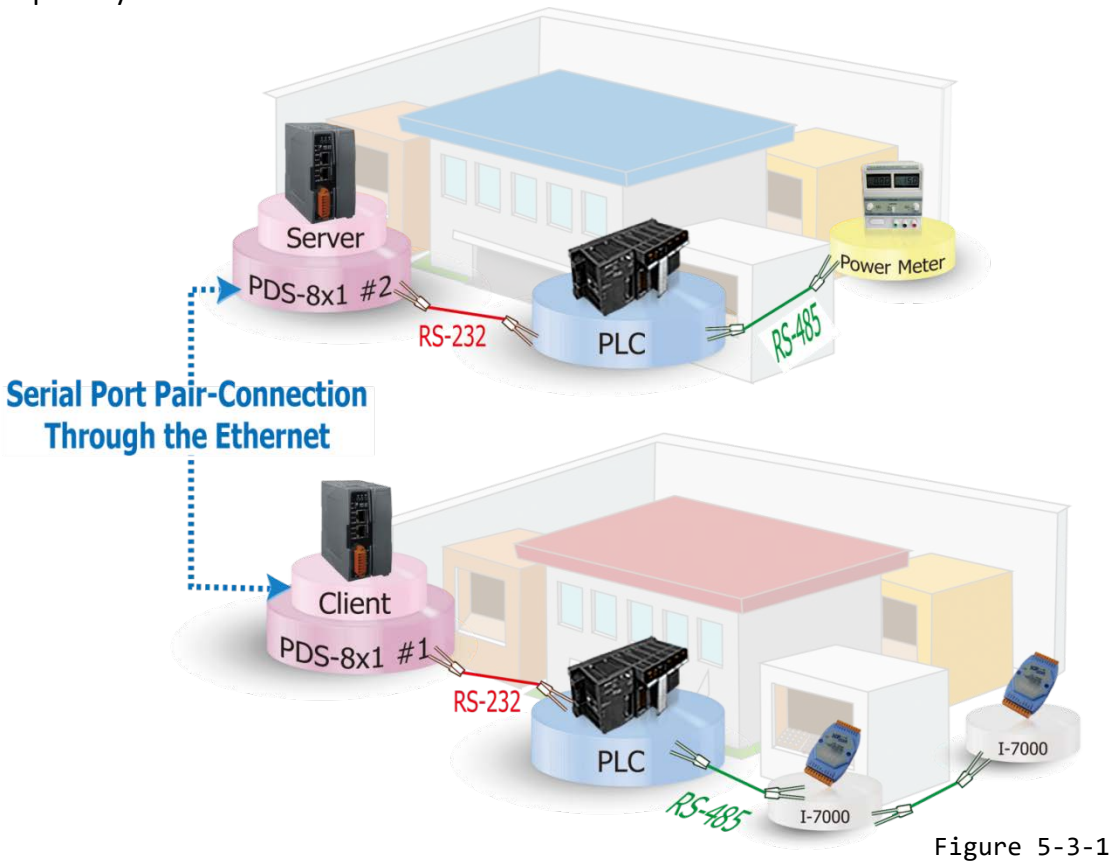


Figure 5-3-1

The following are examples of pair-connection tests:

Pair-connection Settings:

Model		Port Settings (default)			Pair-connection Settings	
		COM Port	Baud Rate	Data Format	Remote Server IP	Remote TCP Port (default)
Client Mode	PDS-8x1 #1	COM1	9600	8N1	IP Address of PDS-8x1 #2	10001
Server Mode	PDS-8x1 #2	COM1	9600	8N1	-	-

Note: The Baud Rate and Data Format settings of the client and server (PDS-8x1 #1 and #2) depend on the COM ports of the PC (or the connected device).

Follow the procedure described below:

➢ Step 1: Connecting to a network, PC and Power

1. Confirm that the PDS-8x1 controllers are functioning correctly. Refer to Chapter 3 "Setting up the PDS-8x1 controller" for more details.
2. Connect COM1 of the PC to COM1 of the PDS-8x1 #1, and then connect COM2 of the PC to COM1 of the PDS-8x1 #2. For detailed RS-232 wiring information, refer to Section 2.7 "Wiring Notes for RS-232/485/422 Interfaces".
3. Supply +24 V_{DC} (+10 ~ +30 V_{DC}) power to the PDS-8x1 controller.

The image below shows an example of the setup for a pair-connection test:

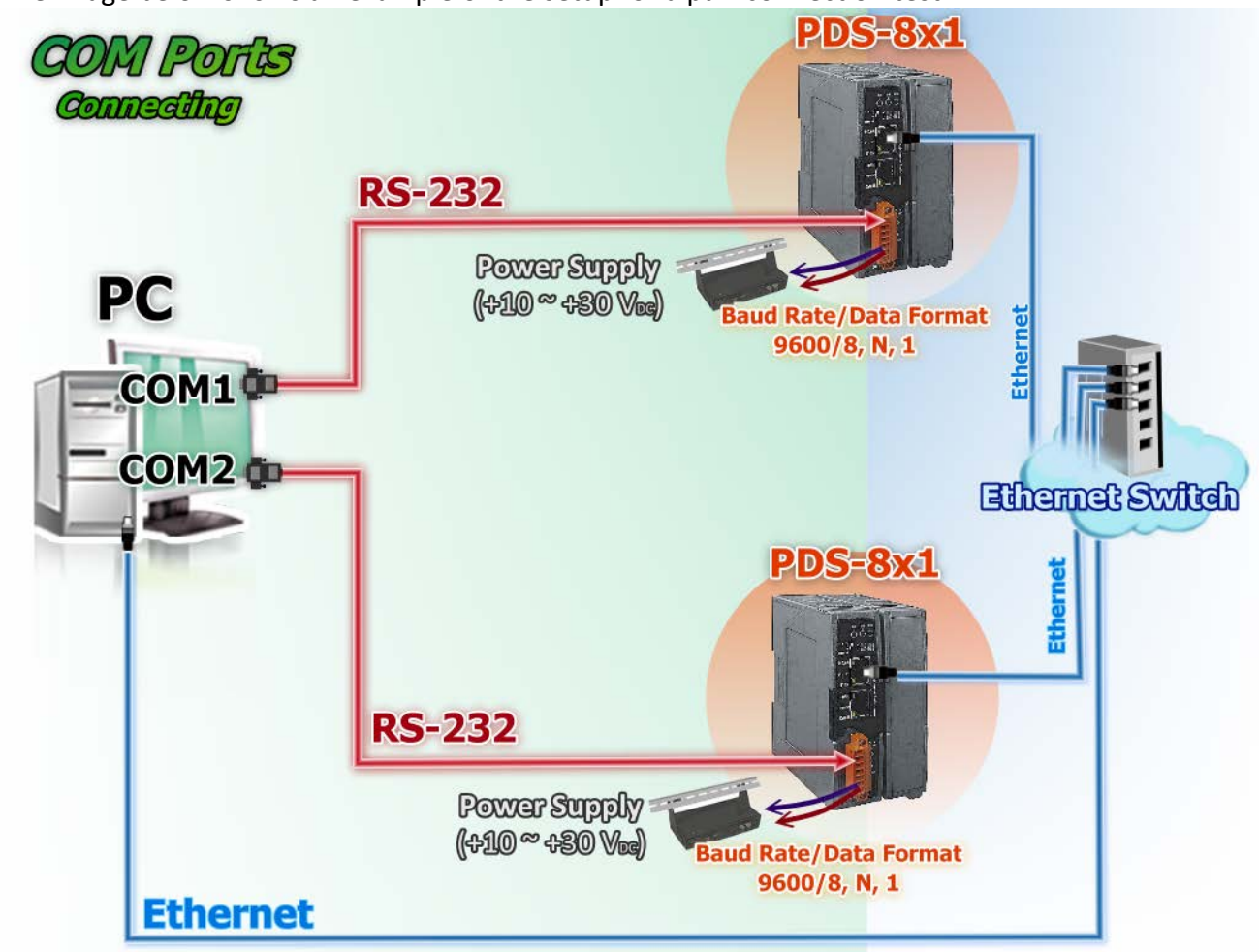


Figure 5-3-2

➢ Step 2: Configuring the Ethernet Settings

Contact your Network Administrator to obtain the correct and functioning network configuration for the PDS-8x1 controllers (including the **IP Address, Mask and Gateway details)**. Also refer to Chapter 3 "Setting up the PDS-8x1 controller" for more details.

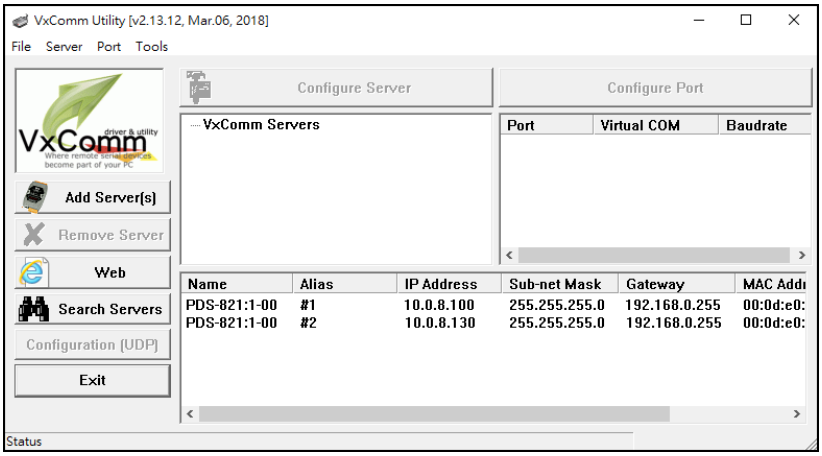


Figure 5-3-3

➢ Step 3: Configuring PDS-8x1 #1 in Client Mode

1. Enter the URL address of the PDS-8x1 #1 in the address bar of the browser or click the **"Web"** button in the VxComm Utility to log in to the web configuration page.

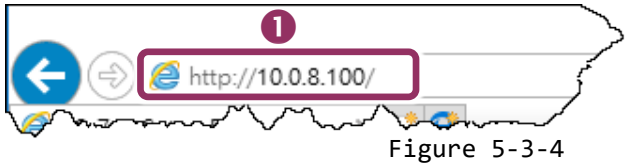


Figure 5-3-4

2. Check **firmware version is v3.2.32[Feb 07 2014] or later** of the PDS-8x1 #1.

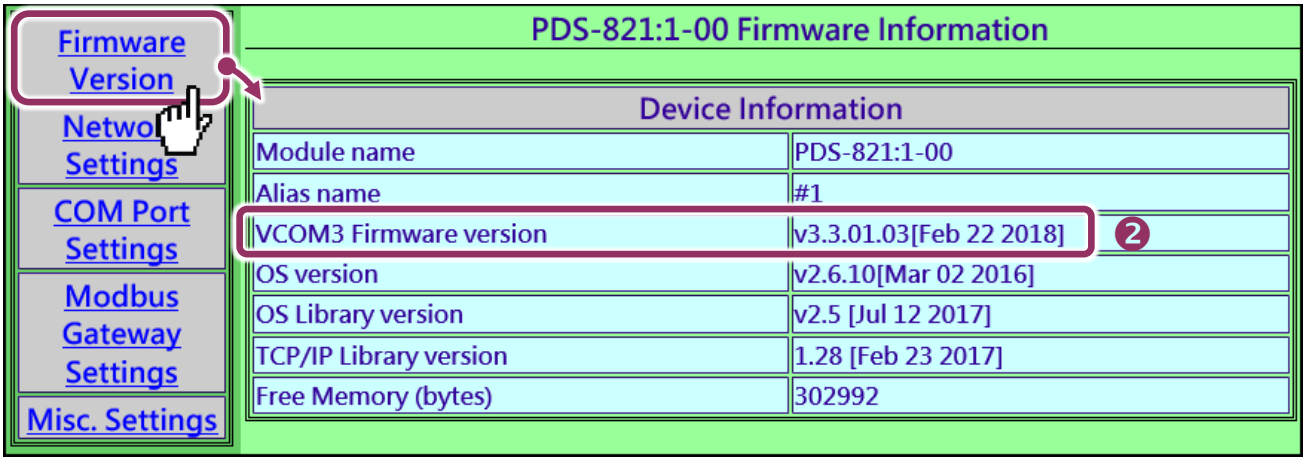


Figure 5-3-5

3. Click the "**COM Port Settings**" tag to enter the settings page, and select the appropriate **COM Port number, Baud Rate and Data Format** settings from the relevant drop down options, for example **"9600"**, "**8", "None"** and **1**" .

4. Check the "**Save current settings to EEPROM**" and "**Apply Current settings**" options, and then click the "**SET COM PORT**" button to finish configuration.

5. Click "**Set Remote VCOM3 connection**" to proceed to the PDS-8x1 Remote Vcom3 connection Setup Page (Pair-connection settings).

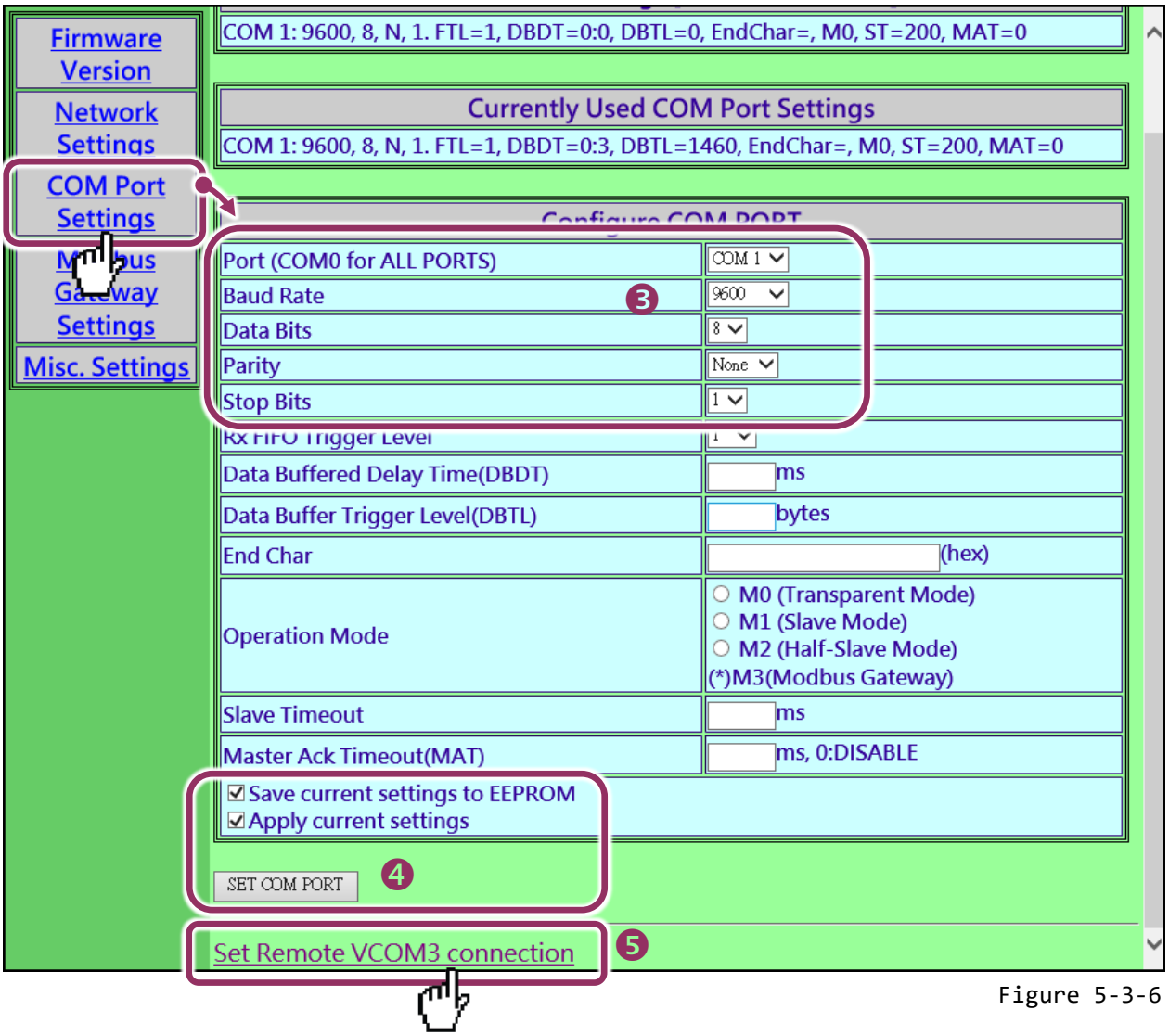


Figure 5-3-6

6. Select "**Add COM**" and type in the COM port of the PDS-8x1 #1 (Client) which you want to use. Type the appropriate **COM Port number, IP address and command port of the PDS-8x1 #2 (Server)** settings in the relevant fields, for example **"COM: 1"**, **"IP: 10.0.8.130" and "cmd port: 10000"**.

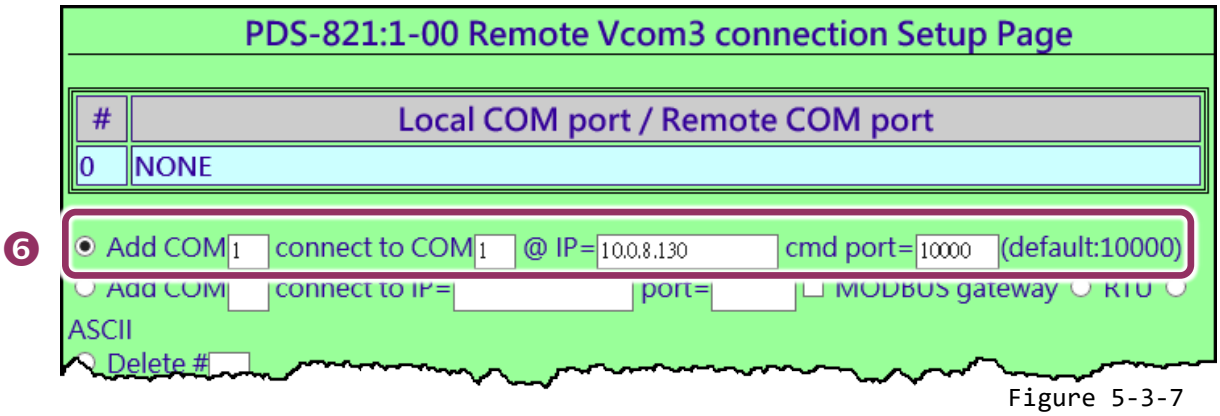


Figure 5-3-7

※ If the remote device isn't our product and doesn't support command port 10000, refer to the following to configure pair-connection function.

6. Select "**Add COM**" and type in the COM port of the PDS-8x1 #1 (Client) which you want to use. Type the appropriate **IP address and TCP Port of the PDS-8x1 #2 (Server)** settings in the relevant fields, for example **"IP: 10.0.8.130" and "port: 10001"**.

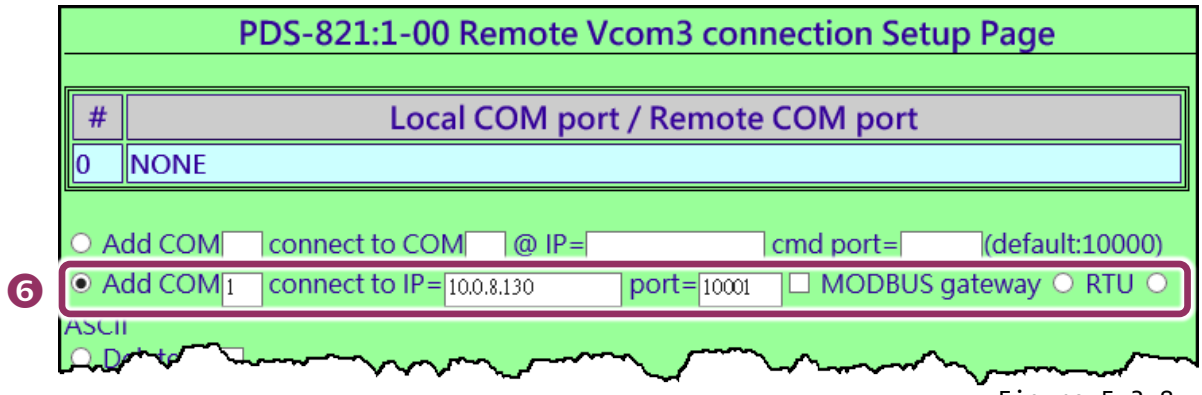


Figure 5-3-8

7. Check the "**Save to EEPROM**" option and click "**submit**" button to update configuration.

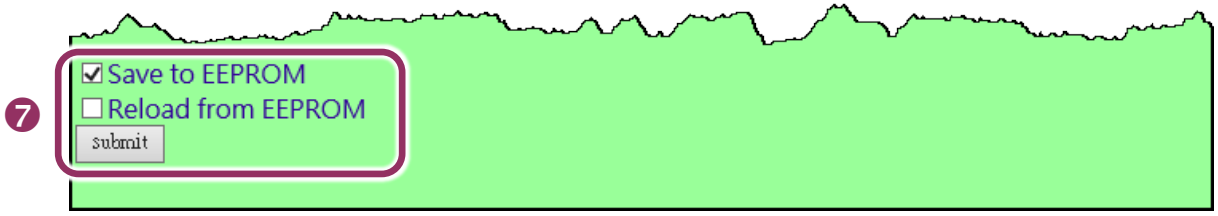


Figure 5-3-9

8. Check the **Local COM Port/Remote COM port** area for pair-connection setting.

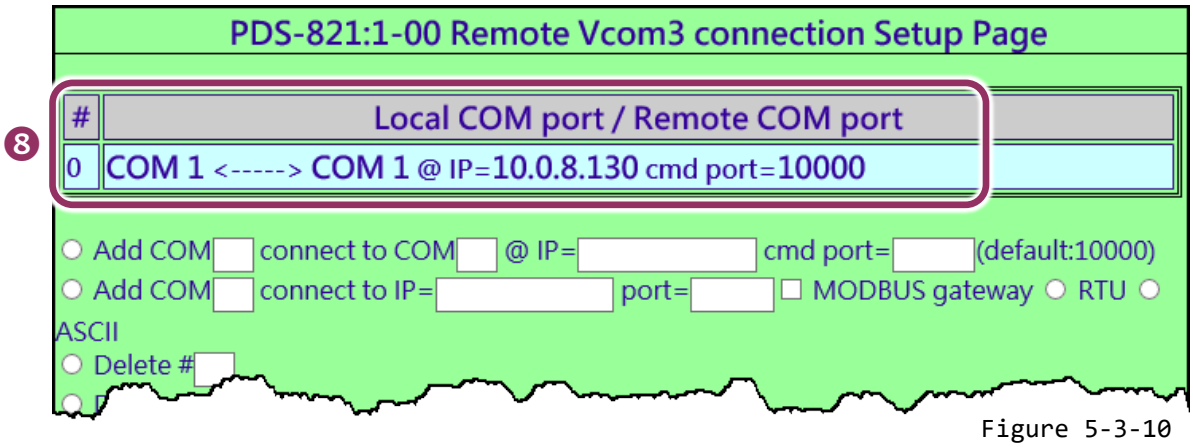


Figure 5-3-10

9. **Reboot PDS-8x1 #1(Client)** and then setting is complete.

➢ Step 4: Configuring the PDS-8x1 #2 in Server Mode

1. Enter the URL address of the PDS-8x1 #2 in the address bar of the browser or click the **"Web"** button in the VxComm Utility to log in to the web configuration page.

2. Click the "**COM Port Settings**" tag to enter the settings page, and select the appropriate **COM Port number, Baud Rate and Data Format** settings from the relevant drop down options, for example **"9600"**, "**8", "None"** and **1**" .

3. Check the "**Save current settings to EEPROM**" and "**Apply Current settings**" items, and then click the "**SET COM PORT**" button to finish configuration.

4. Click **"Set Remote VCOM3 connection"** at the PDS-8x1 #2 (Server) COM PORT setup page.

Refer to Figures 5-3-4 and 5-3-6 for illustrations of how to perform the Steps 1 to 4.

5. Confirm that the Local COM port/Remote COM port area of the **PDS-8x1#2 (Server) is "None"**.

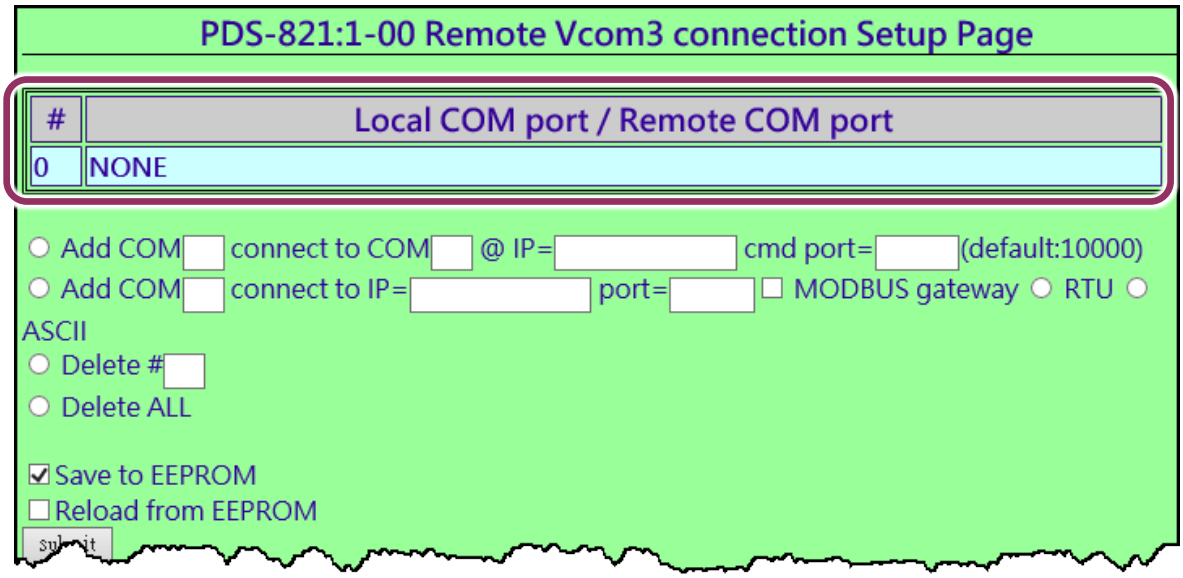


Figure 5-3-11

➢ Step 5: Testing the Pair-connection Functions

1. Download the Test2COM.exe, you can get it from the following ICP DAS web:
   http://ftp.icpdas.com/pub/cd/iocard/pci/napdos/multiport/utility/

2. Execute the Test2COM.exe program.

Note: The Baud Rate and data format depend on the serial port settings for the web configuration of the PDS-8x1 #1 and PDS-8x1 #2.

Refer to Figure 5-3-12 for details settings.

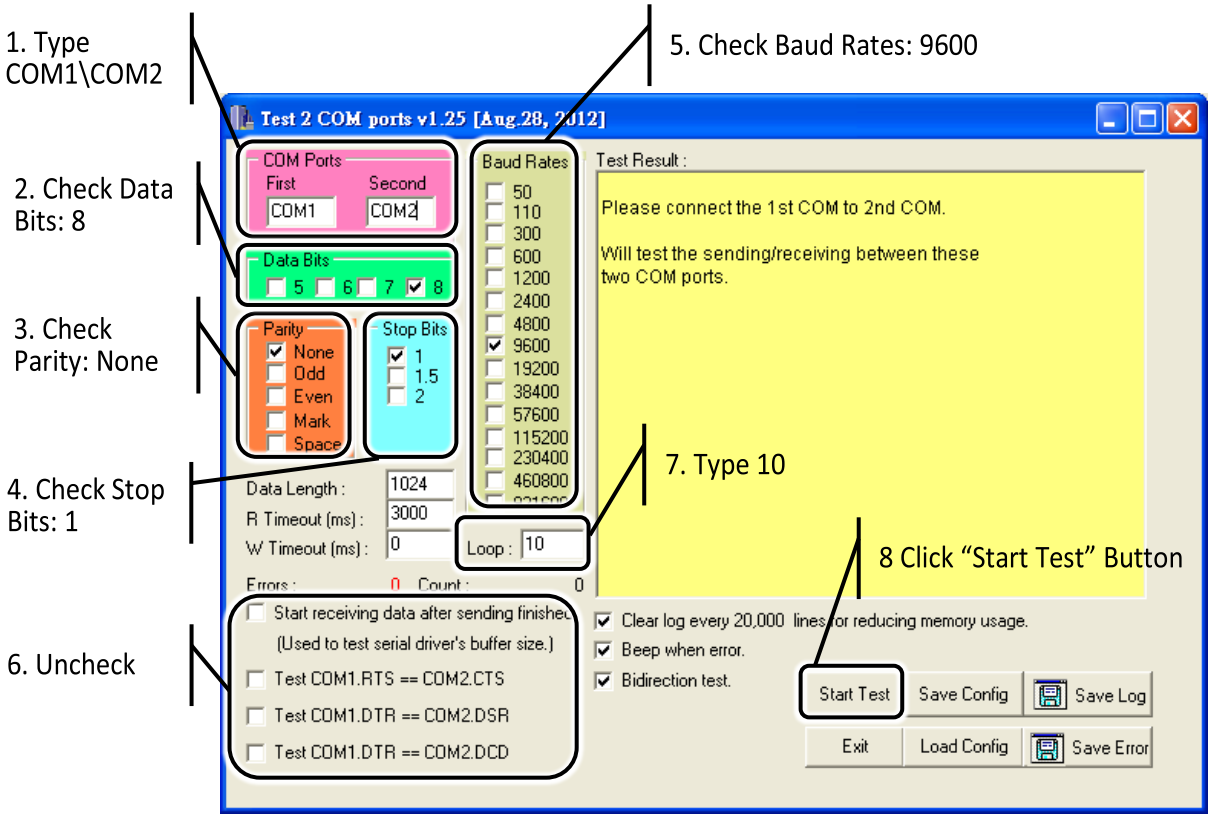


Figure 5-3-12

3. Get the test result.

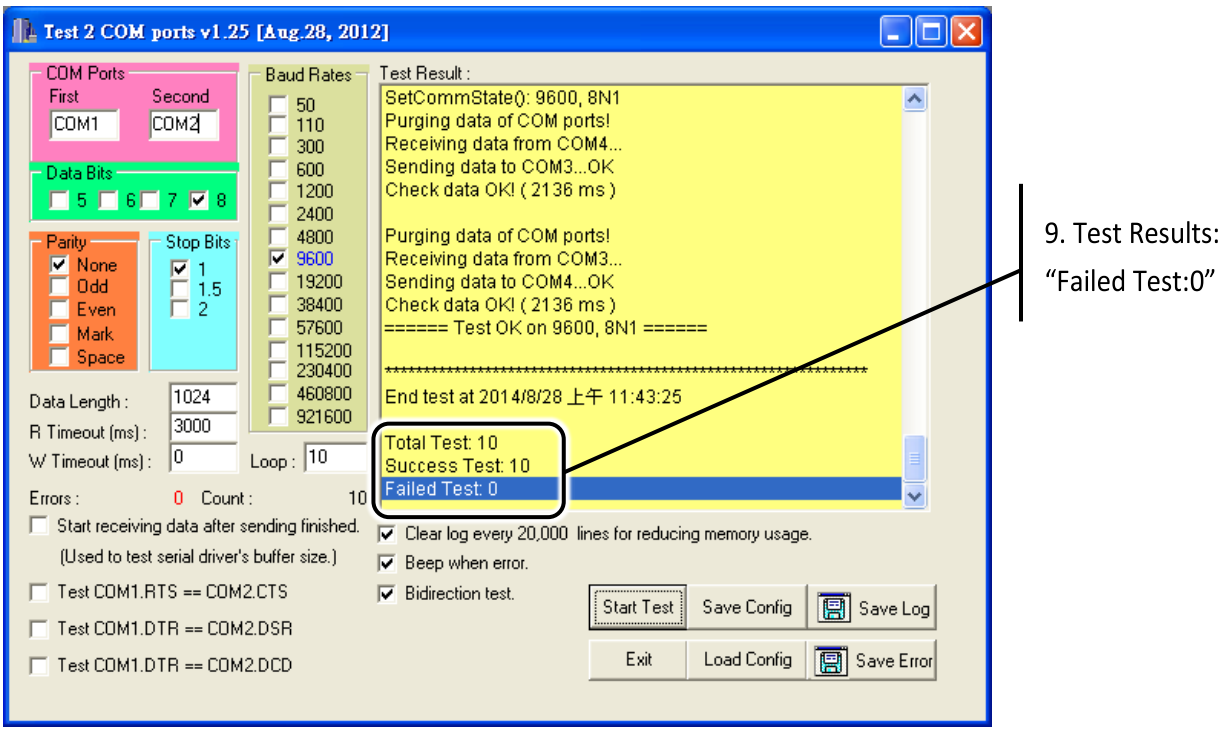


Figure 5-3-13

6. Modbus Testing and Protocol

The PDS-8x1 controller can works as a Modbus TCP to RTU/ASCII gateway that supports most SCADA/HMI communications based on the Modbus/TCP protocol. This chapter provides detailed information about the Self-Test process, which is used to confirm that the PDS-8x1 controller is operating correctly. Note: Starting from the firmware version v3.3.01.03 [Feb 22 2018], the PDS-8x1 controller support Modbus Gateway function.

Here, the M-7022 module is used as an example. For other Modbus RTU device or third party Modbus RTU device, refer to the specific Quick Start Guide or User Manual for that Modbus RTU device. Follow the procedure described below:

➢ Step 1: Connect the Modbus device to the PDS-8x1 Controller.

1. Keep up network connection and power on status for your PDS-8x1 controller. Refer to Chapter 3 "Setting up the PDS-8x1 controller" for more details.
2. Connect the Modbus device (e.g. M-7022, optional) to the COM10(A) (RS-485 bus) of serial module (e.g., I-8142iw module) on PDS-8x1 controller for self-test.
3. Supply power to the Modbus device (M-7022, Device ID: 5, +10 to +30 V_{DC} Power used).

6.1 Modbus/TCP to Modbus/RTU Gateway

➢ Step 1: Configuring Baud Rate and Data Format

1. Enter the URL address of the PDS-8x1 controller in the address bar of the browser to log in to the web configuration pages.

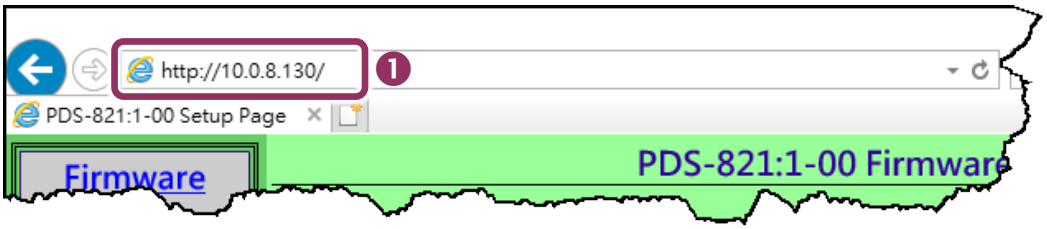


Figure 6-1-1

2. Click the **"COM Port Settings"** in the web page to configure the COM ports.
3. Select the appropriate **COM Port, Baud Rate and Data Format** settings from the relevant drop down options depending on your Modbus device, for example **Port: COM10(A), Baud Rate: 19200, Data Bits: 8, Parity: None, Stop Bits: 2**.
4. Click the **"SET COM PORT"** button to update it to PDS-8x1 controller.

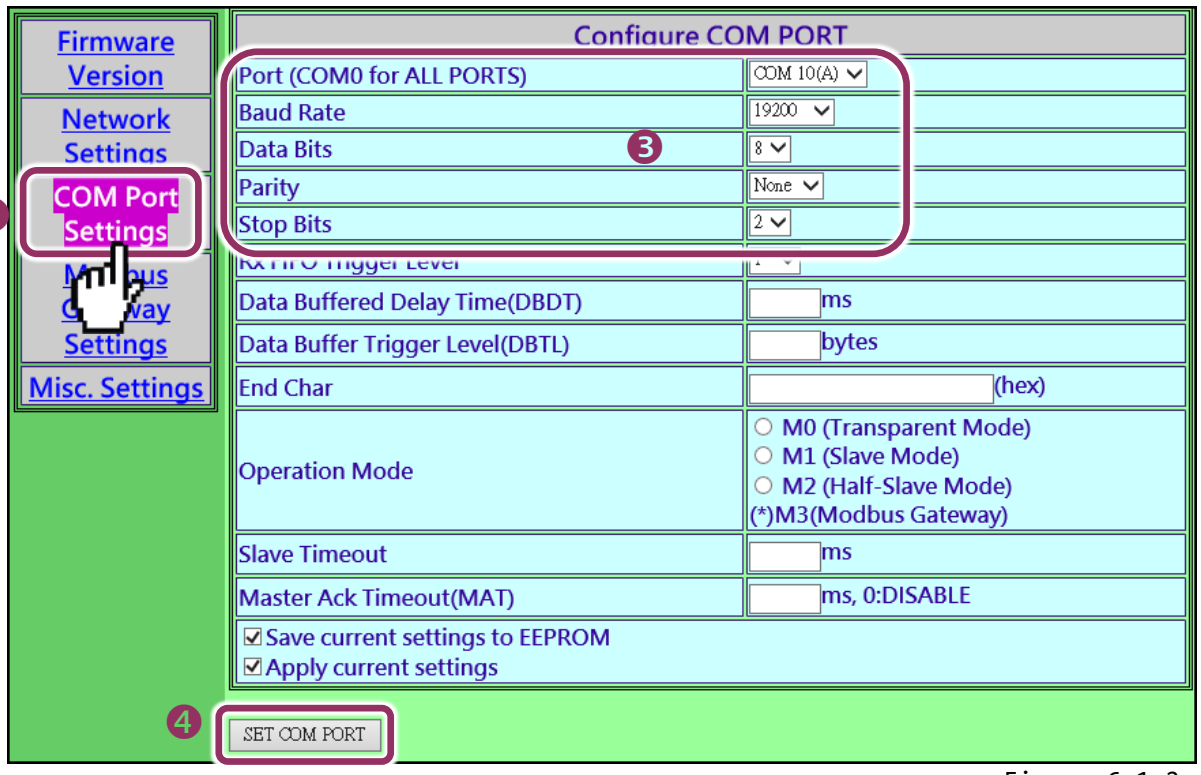


Figure 6-1-2

➢ Step 2: Configuring COM Ports for Modbus Gateway

1. Click the **"Modbus Gateway Settings"** in the web page to configure the COM ports.
2. Select appropriate **COM Port** from the **"Port (COM0 for ALL PORTS)"** drop down options, for example **"COM10(A)"**.
3. Assign a **Numbers of Modbus device** in the **"Number of ID for serial Modbus device"** field, for example **"6"**.
4. Select **Modbus type** from the **"Type (0: ASCII, 1: RTU)"** field, for example **"1 (Modbus RTU)"**.
5. Checked the **"Save to EEPROM"** and **"Apply the current setting"** and then click the **"Update"** button to update it to PDS-8x1 controller.

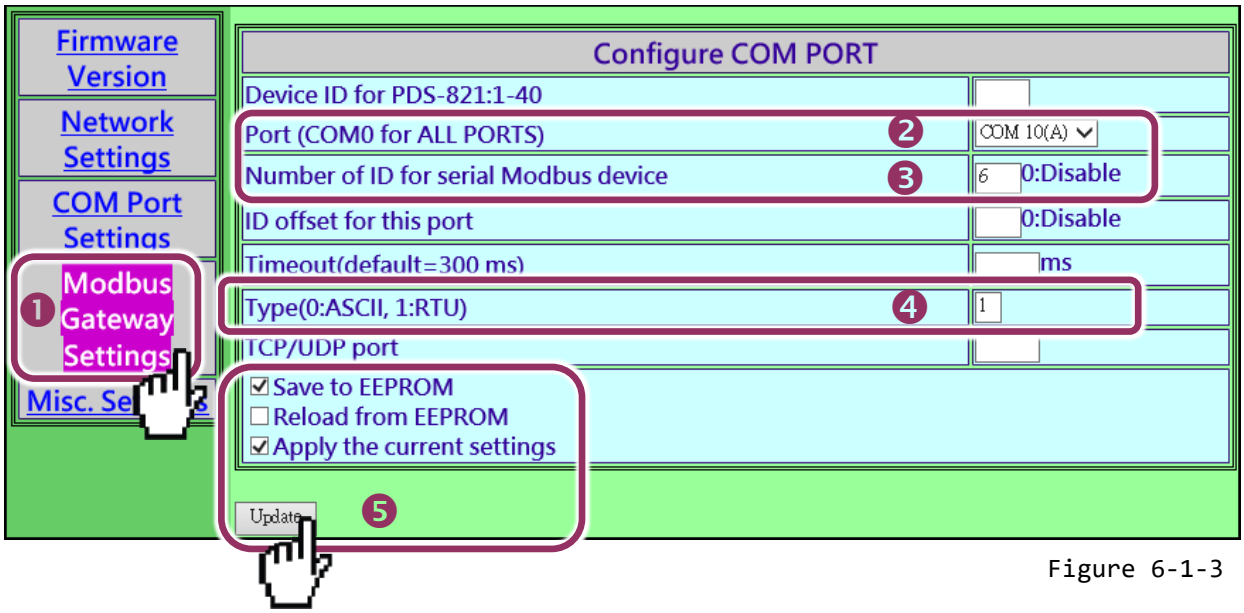


Figure 6-1-3

6. Check the COM Port for Modus gateway settings.

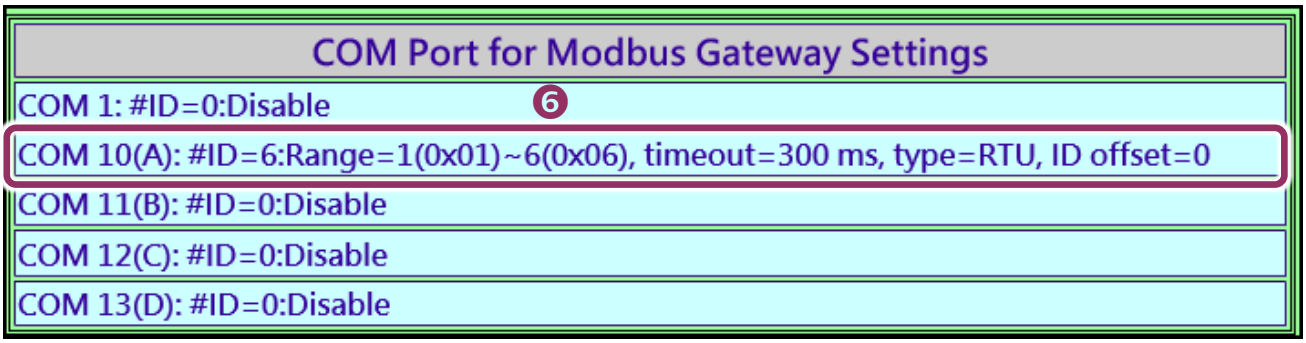


Figure 6-1-4

➢ Step 3: Test Modbus/TCP to Modbus/RTU Gateway

1. In the VxComm Utility, select the **"Modbus TCP Master"** item from the **"Tools"** menu to open the Modbus TCP Master Utility. **Note: This function is only supported by the VxComm driver version v2.12.15 [Dec. 13, 2014] or later.**

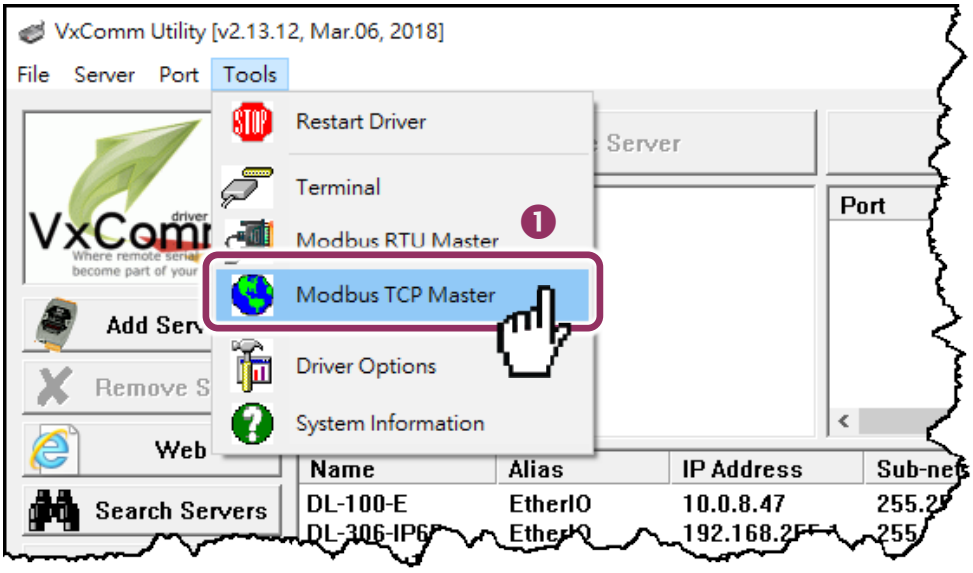


Figure 6-1-5

2. In the Modbus TCP Master Utility, **type the IP address and TCP port of PDS-8x1** and then click **"Connect"** button to connect the PDS-8x1.

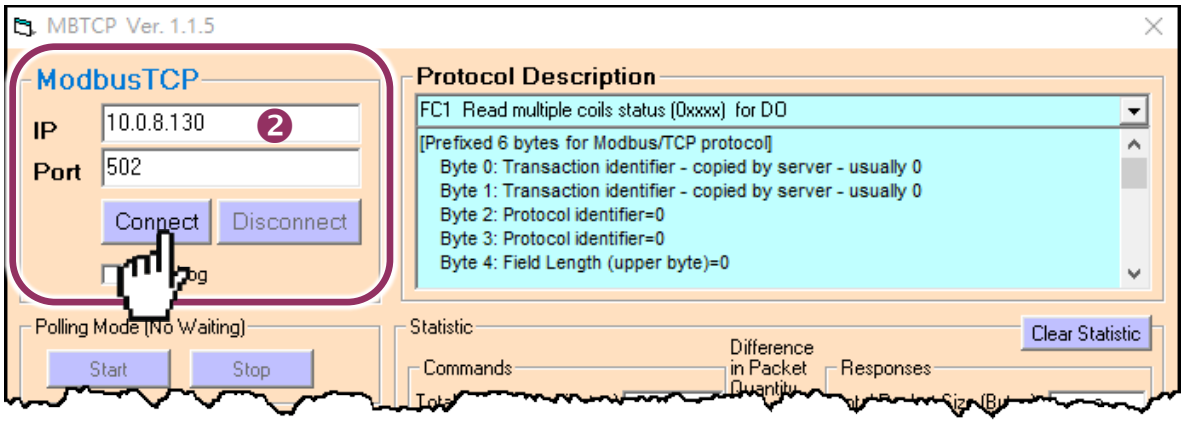


Figure 6-1-6

3. Refer to **"Protocol Description"** and **type Modbus command** in the "command" field.
   Note: The Modbus command settings depends on your Modbus device.
4. Click the **"Send Command"** button.
5. If the response data is correct, it means the test is success.

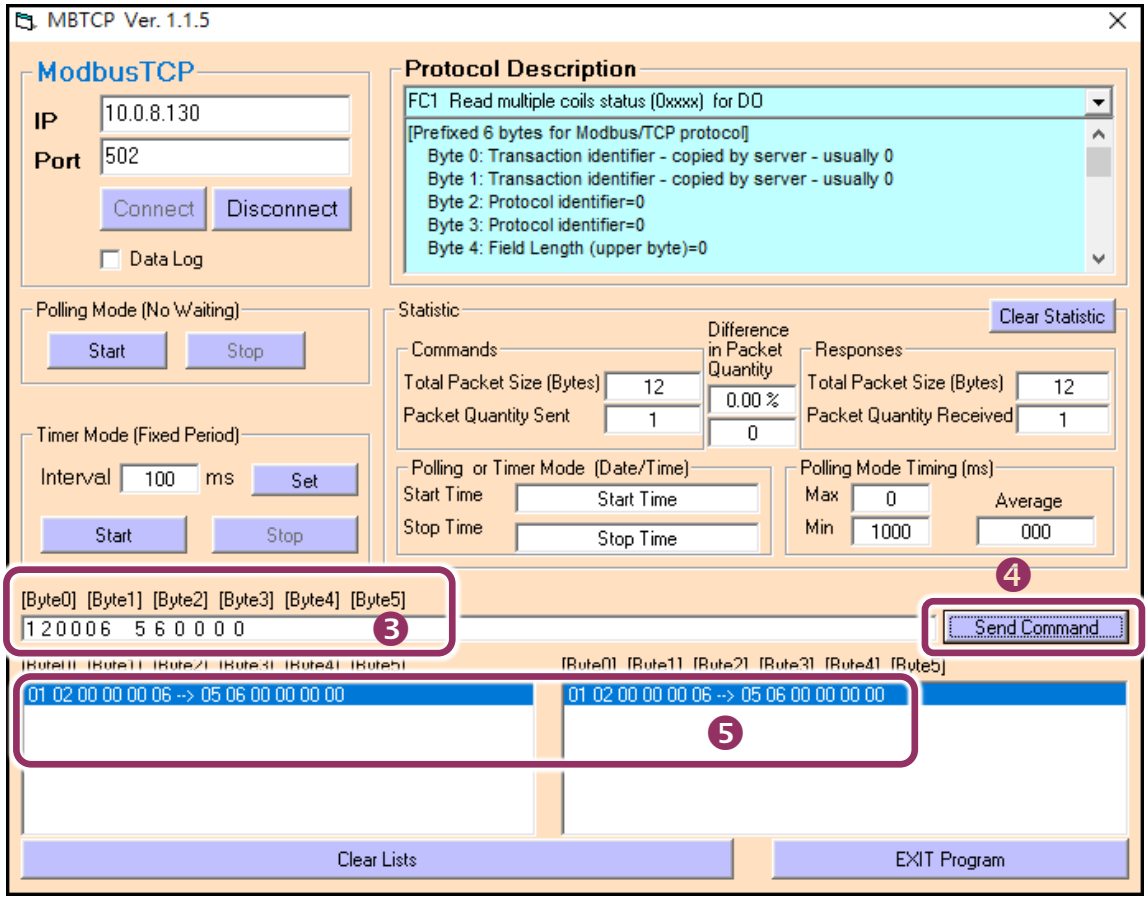


Figure 6-1-7

6.2 Access Modbus Device via Virtual COM Ports

If you want to use Modbus/RTU command to access the Modbus device through Virtual COM Ports, you can refer to below steps.

➢ Step 1: Configuring COM Ports for Virtual COM

1. Enter the URL address of the PDS-8x1 controller in the address bar of the browser to log in to the web configuration pages. (refer to Figure 6-1-1)
2. Click the **"COM Port Settings"** item to configure the COM ports, and then confirm that serial COM ports of PDS-8x1 controller are **not in the M3 mode (Modbus Gateway)**.

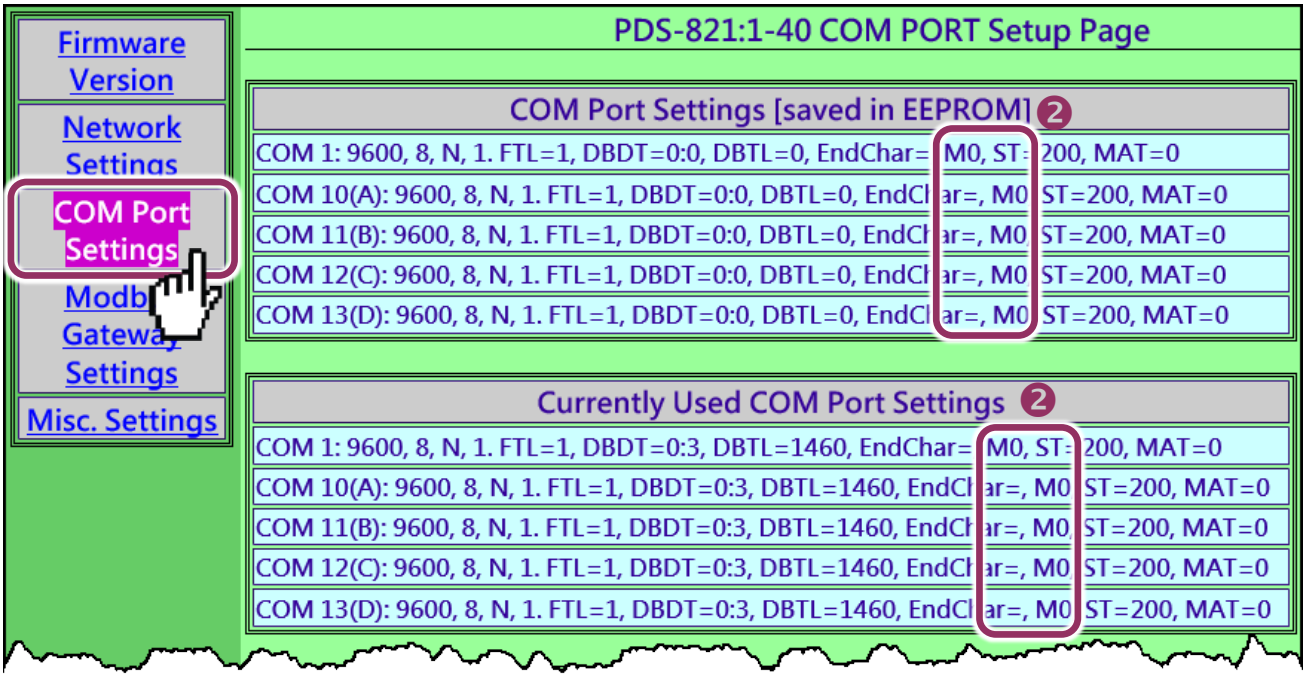


Figure 6-2-1

Note:
If the serial COM Port is M3 Mode (Modbus Gateway), refer to the Section 6.2.1 "How do I disable the M3 Mode (Modbus Gateway)" to disable it.

3. Select appropriate **COM Port** from the **"Port (COM0 for ALL PORTS)"** drop down options, for example **"COM10(A)"**.
4. Select the appropriate **Baud Rate and Data Format** settings from the relevant drop down options depending on your Modbus device, for example **Baud Rate: 19200, Data Bits: 8, Parity: None, Stop Bits: 2**.
5. Select the **"M0, M1 or M2"** from the **"Operation Mode"** field, for example **"M0 (Transparent Mode)"**.
6. Check the **"Save current settings to EEPROM"**, **"Apply current settings"** and then click the **"SET COM PORT"** button to complete the setting.

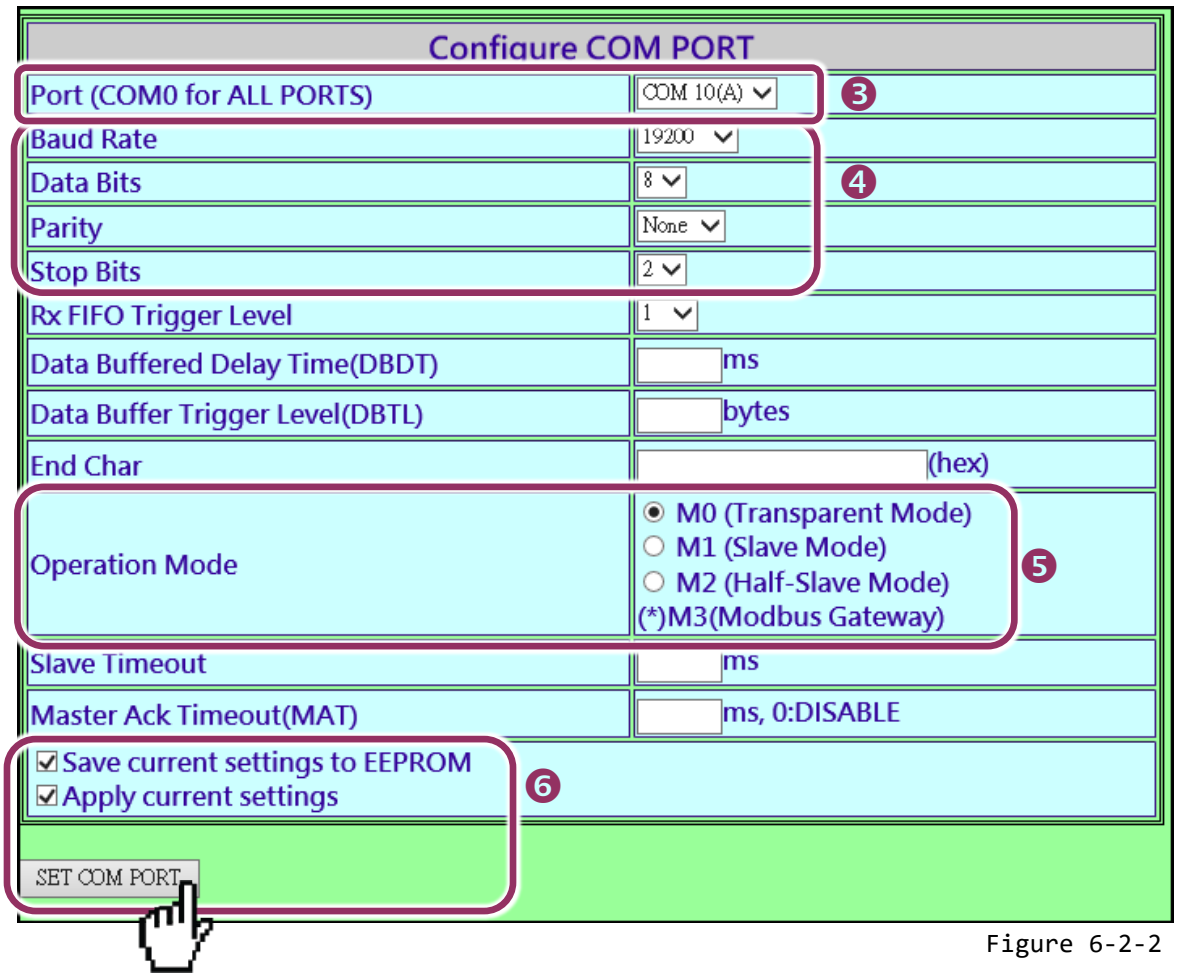


Figure 6-2-2

7. Run VxComm Utility program to the configuring the Virtual COM Ports of the PDS-8x1 controller, refer to Chapter 3 "Setting up the PDS-8x1 Controller" for detail information.

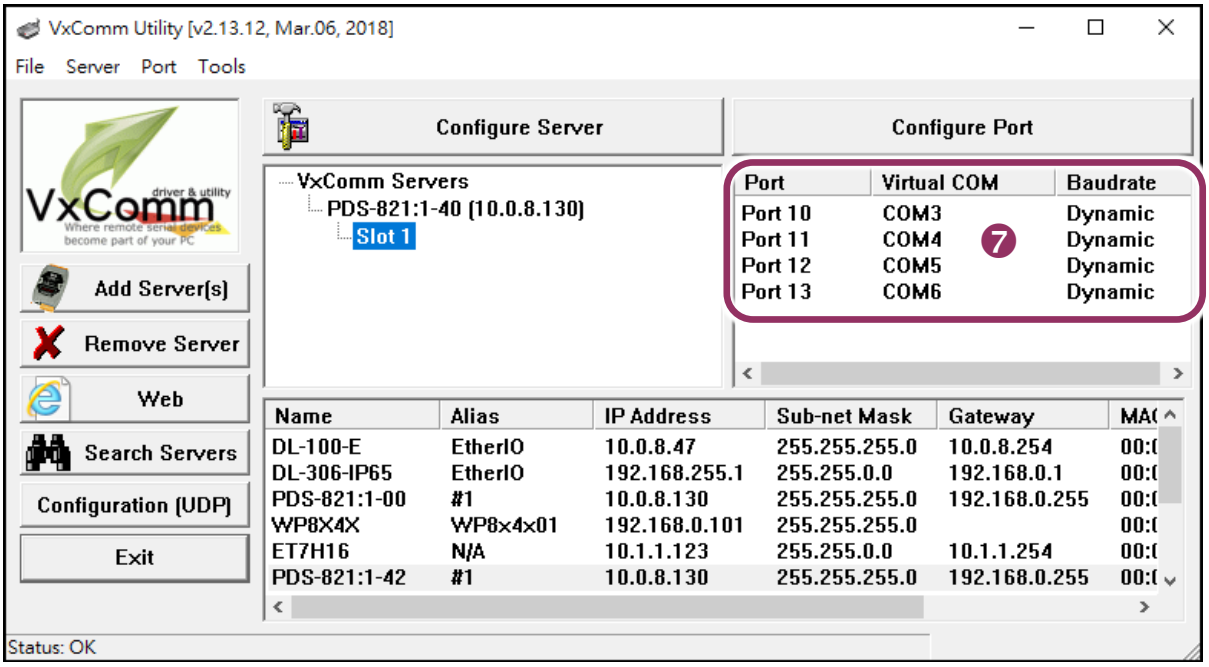


Figure 6-2-3

➢ Step 2: Testing Modbus Device through Virtual COM Ports

1. In the VxComm Utility, select the **"Modbus RTU Master"** item from the **"Tools"** menu to open the Modbus RTU Master Utility. Note: This function is only supported by the VxComm driver version v2.12.15 [Dec. 13, 2014] or later.

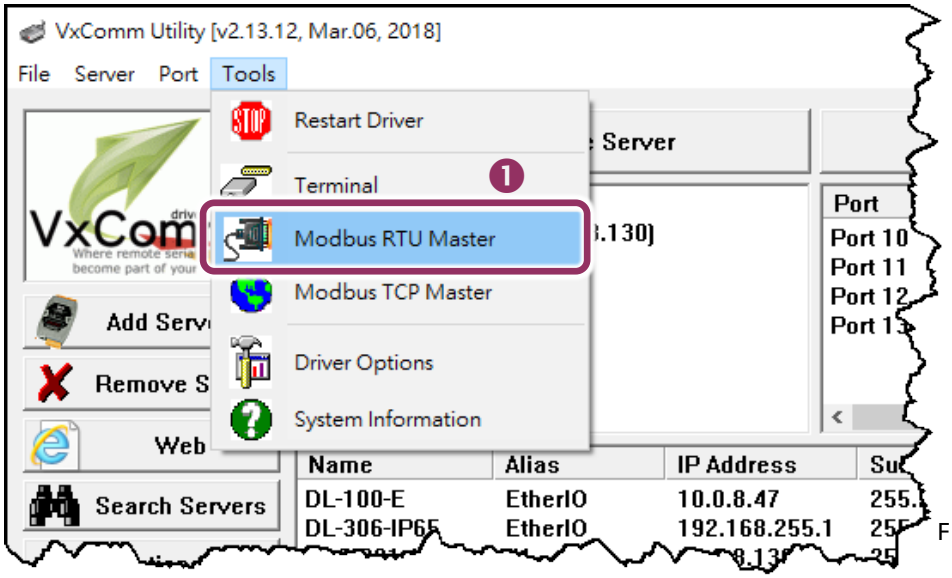


Figure 6-2-4

2. **Select your virtual COM port, Baud Rate and Data Format on PDS-8x1 controller** and then click **"Open"** button to connect the PDS-8x1 controller, for example **virtual Port: COM3, Baud Rate: 19200, Line control: N, 8, 2**.

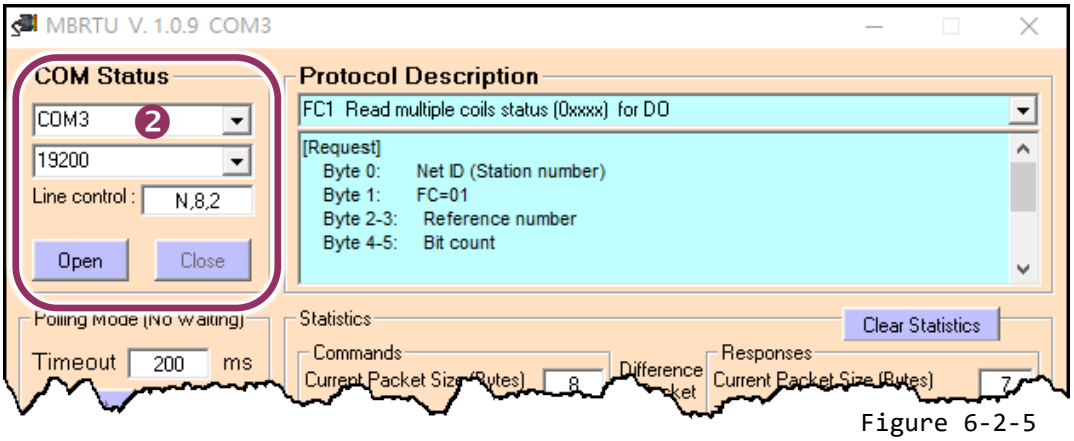


Figure 6-2-5

3. Refer to **"Protocol Description"** and **type Modbus command** in the command field.
   Note: The Modbus command settings depends on your Modbus device.
4. Click the **"Send Command"** button.
5. If the response data is correct, it means the test is success.

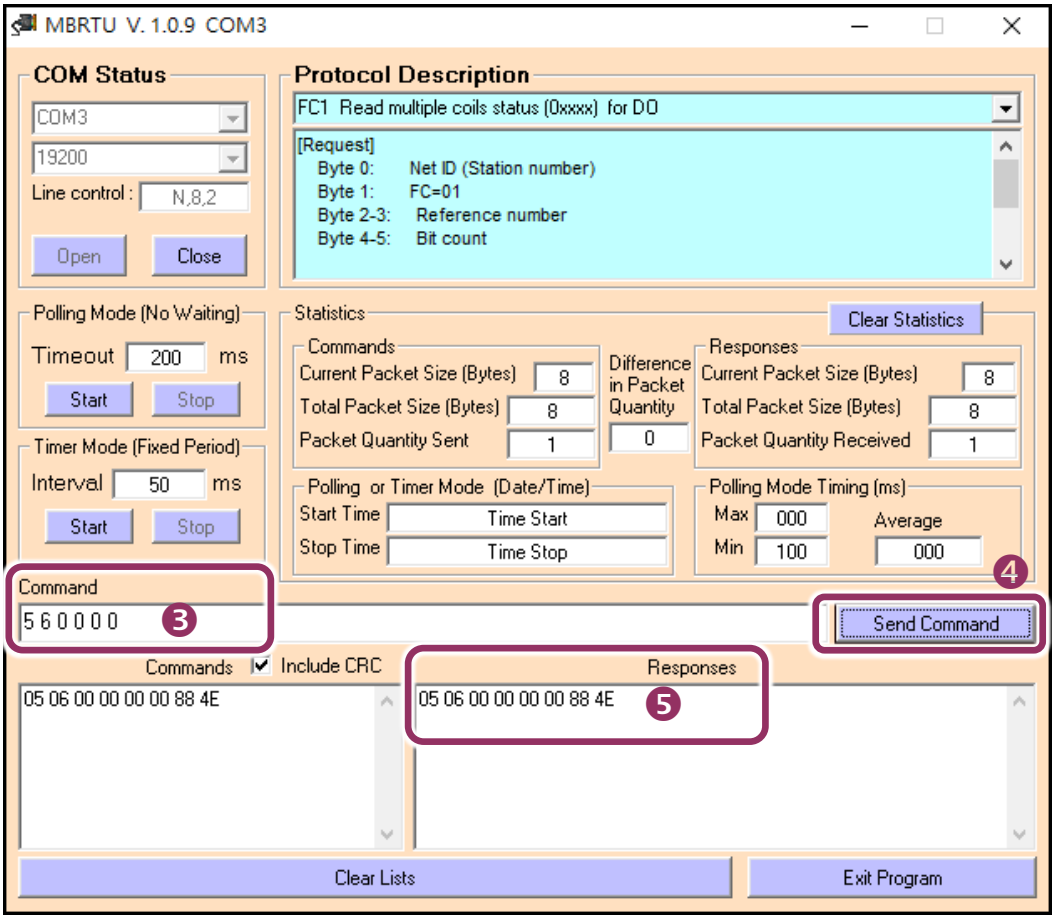


Figure 6-2-6

6.2.1 How do I disable the M3 Mode (Modbus Gateway)

Follow the procedure described below:

1. Click the **"Modbus Gateway Settings"** in the web page.
2. Select the **appropriate COM Port** from the **"Port (COM0 for ALL PORTS)"** drop down options, for example **"COM0"** for all ports, and then enter the **"0"** in the **"Number of ID for serial Modbus device"** field.
3. Checked the **"Save to EEPROM"** and **"Apply the current settings"** options, then click the **"Update"** button to complete the setting.
4. Confirm that the serial COM ports are **"Disable"** in the **"COM Port for Modbus Gateway Settings"** area.

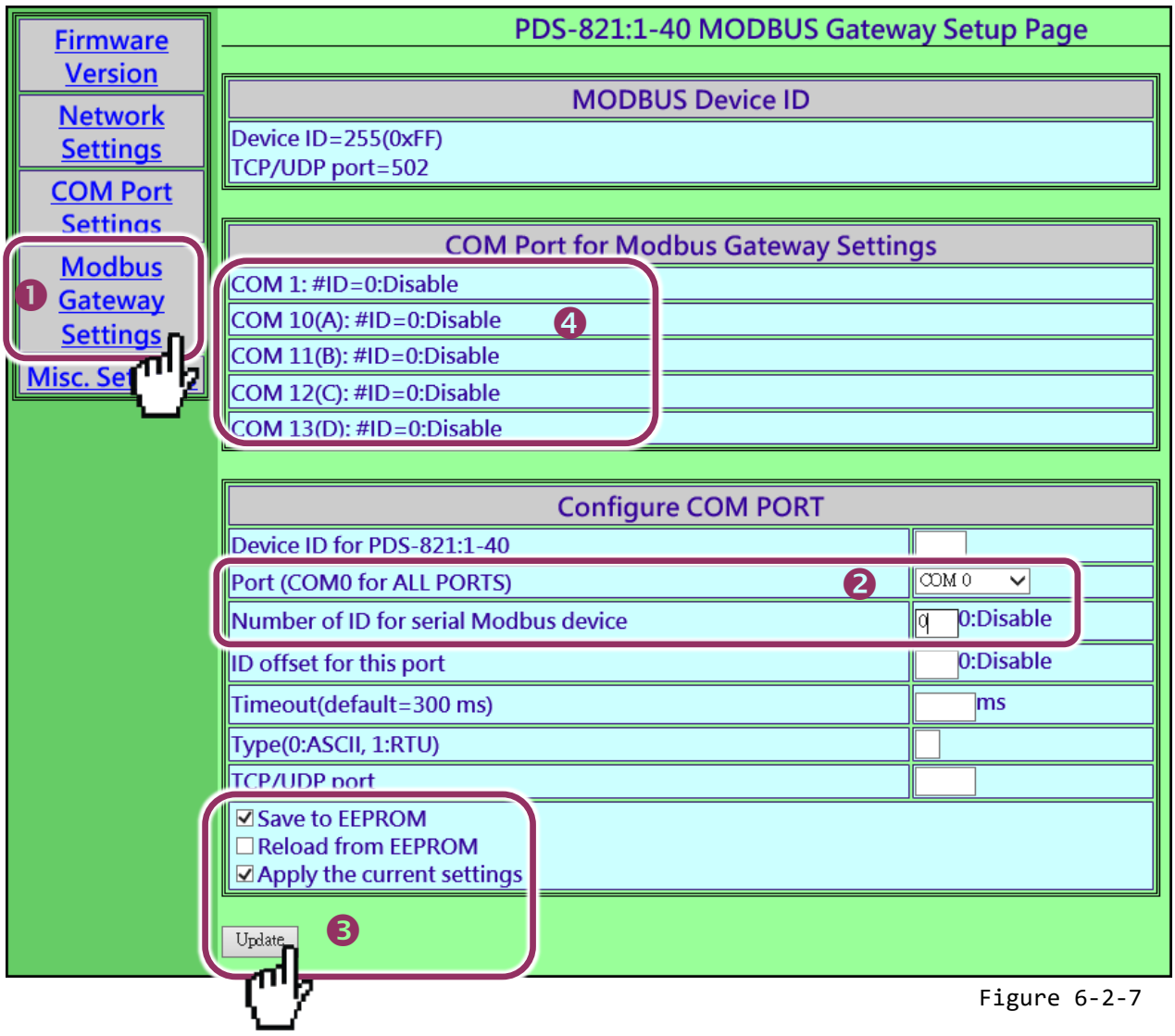
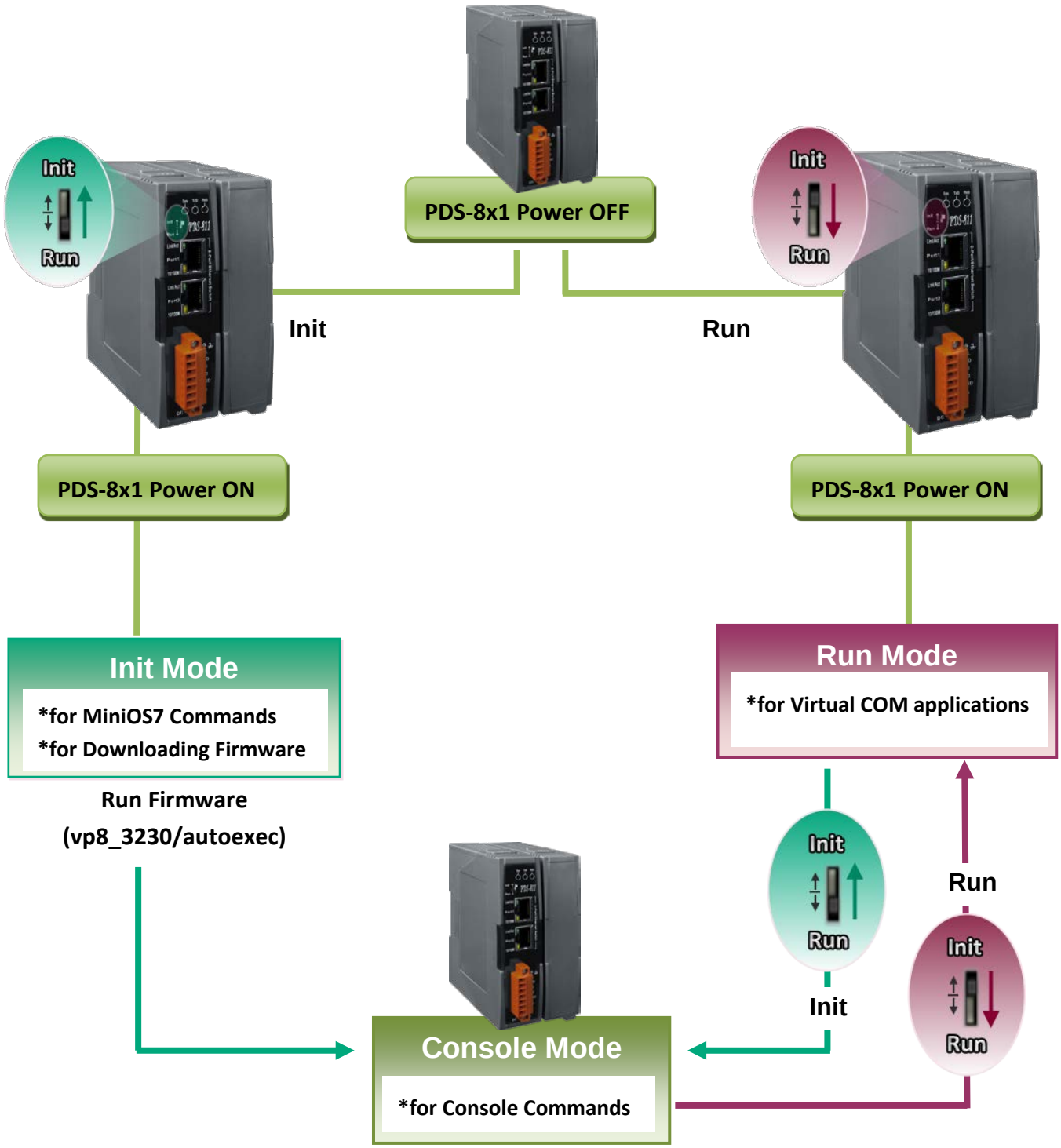


Figure 6-2-7

7. Console/Telnet Commands List

7.1 Operation Flowchart



7.2 Comparison Sheet (Init, Run and Console Modes)

Mode	Firmware	VCOM Commands	Telnet Commands	Console Commands
Init	Stop	No	No	No
	Init Mode is used to upgrade firmware and accepts MiniOS7 commands (from PDS.COM1) only.			
Run	Running	Yes	Yes	No
	Run Mode is used for Virtual COM applications, and accepts Virtual COM commands (TCP port 10000) and Telnet commands (TCP port 23).			
Console	Running	Yes	Yes	Yes
	Console Mode is used to configure the Virtual COM. PDS.COM1 is the console port that accepts console commands while other ports are still working with Virtual COM applications.			

7.3 Command List

Section	Command	Description
7.3.1	IPFILTER	Retrieves/Sets the IP addresses that are allowed to access the PDS-8x1.
7.3.2	IPCONF	Queries the network configuration. (IP/Mask/Gateway/MAC addresses).
7.3.3	SOCKET	Lists all the status of sockets (Listen/Not Used Yet) together with the type of each socket (TCP Server: Port No./UDP/Unused).
7.3.4	COM	Queries or sets the configuration of the COM Ports (Baud Rate/Parity /Stop Bits)
7.3.5	Broadcast	Queries or sets the Broadcast parameter, which determines whether or not the module can receive Broadcast packets.
7.3.6	SystemTimeout	If PDS-8x1 has no network communications during the SystemTimeout period, the PDS-8x1 will reboot it-self automatically.
7.3.7	SocketTimeout	If there is no data send/receive on the connection during the SocketTimeout period, the PDS-8x1 will close the connection automatically.
7.3.8	M	Gets/Sets the echo mode. /M0: Transparent Mode, Multi-Echo, Data-Shared. /M1: Slave Mode, Single-Echo, None-Shared.
7.3.9	EchoCmdNo	Queries or sets the EchoCmdNo parameter that enables or disables adding Command Number before response.
7.3.10	EndChar	Sets a character that determines the end of a response string.
7.3.11	IP	Queries or sets the IP address.
7.3.12	MASK	Queries or sets the subnet Mask value.
7.3.13	GATEWAY	Queries or sets the Gateway address.
7.3.14	MAC	Queries the MAC address.
7.3.15	NAME	Queries the module name.
7.3.16	ALIAS	Sets the alias for a PDS-8x1.
7.3.17	DHCP	Enables/Disables the DHCP client.
7.3.18	UDP	Sets whether to reply to a UDP search command.
7.3.19	VER	Queries the version information
7.3.20	SAVE	Determines whether or not backup copies of the "autoexec.bat" and "vcom.ini" files are saved when using the “load” command.
7.3.21	LOAD	Loads file to the built-in flash disk on PDS-8x1. It should be used to update firmware only.
7.3.22	CONFIG	Restores the factory default settings.
7.3.23	RESET	Reboots the PDS-8x1 module.
7.3.24	QUIT	Exits the running firmware.

7.3.1 IPFILTER

This command is used to query or edit IP filter table. The IP filter table restricts the access of packets based on the IP header. If one or more IP addresses are saved into the IP filter table, only clients whose IP is specified in the IP filter table can access the PDS-8x1.

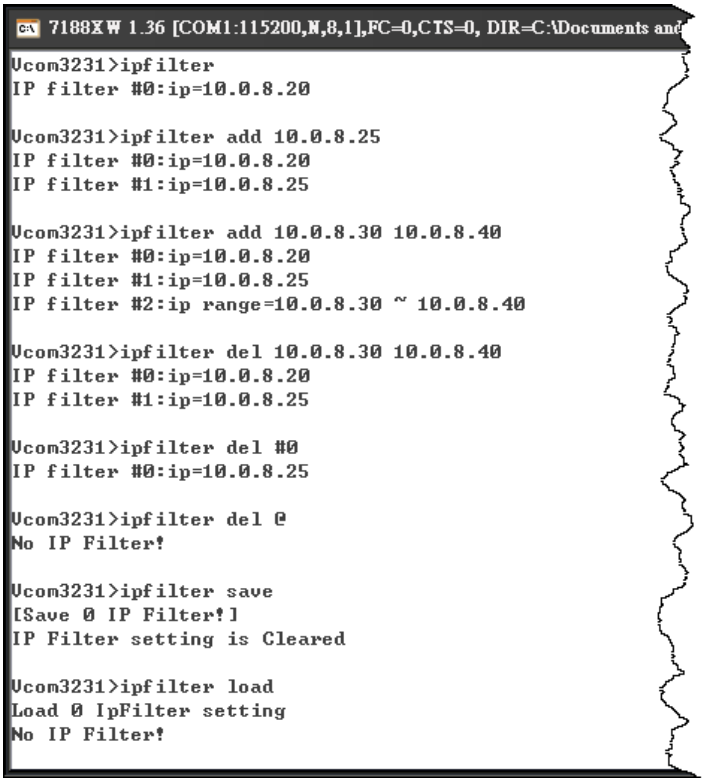
Effect: Immediate

Command	Arguments	Description
ipfilter		Queries the IP filter table.
ipfilter	ADD ip1 ADD ip1 ip2	Adds an IP address to the IP filter table. Adds a range of IP addresses (ip1 ~ ip2) to the IP filter table.
ipfilter	DEL ip1 DEL ip1 ip2	Deletes an IP address (ip1) from the IP filter table. Deletes a range of IP addresses (ip1 ~ ip2) from the IP filter table. The IP address that follows the DEL command should already be listed in the IP filter table.
ipfilter	DEL #n	Deletes item "n" from the IP filter table.
ipfilter	DEL @	Deletes all items from the IP filter table.
ipfilter	SAVE	Saves the IP filter table to the EEPROM. If the IP filter table is empty, the data in EEPROM will be cleared.
ipfilter	LOAD	Loads the IP filter table from the EEPROM.

※The IP filter table is loaded automatically when the PDS-8x1 is booted.

※Use the "ipfilter save" command to save a new IP filter table to the EEPROM.

Figure 7-3-1: The figure illustrates is an example of a **IPFILTER** configuration.



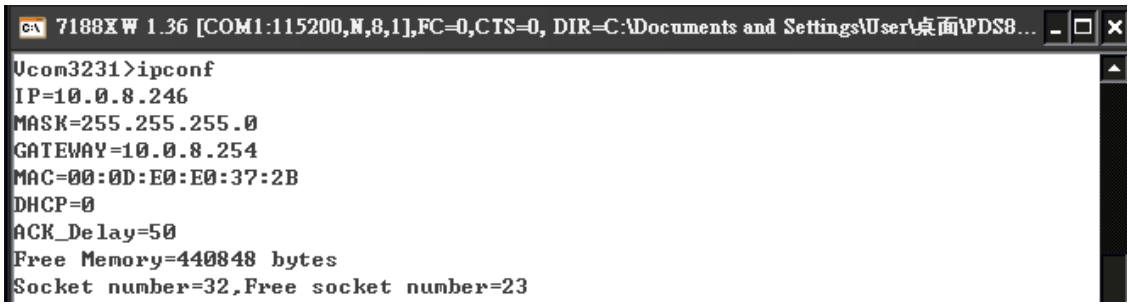
7.3.2 IPCONF

This command is used to display the network configuration information, such as IP address, Mask Address, Gateway address and MAC address and the status of DHCP, ACK_Delay, Free Memory and Socket status.

Effect: Immediate

Command	Arguments	Description
ipconf		Queries the network configuration.

Figure 7-3-2: The figure illustrates is an example of a **IPCONF** configuration.



7.3.3 SOCKET

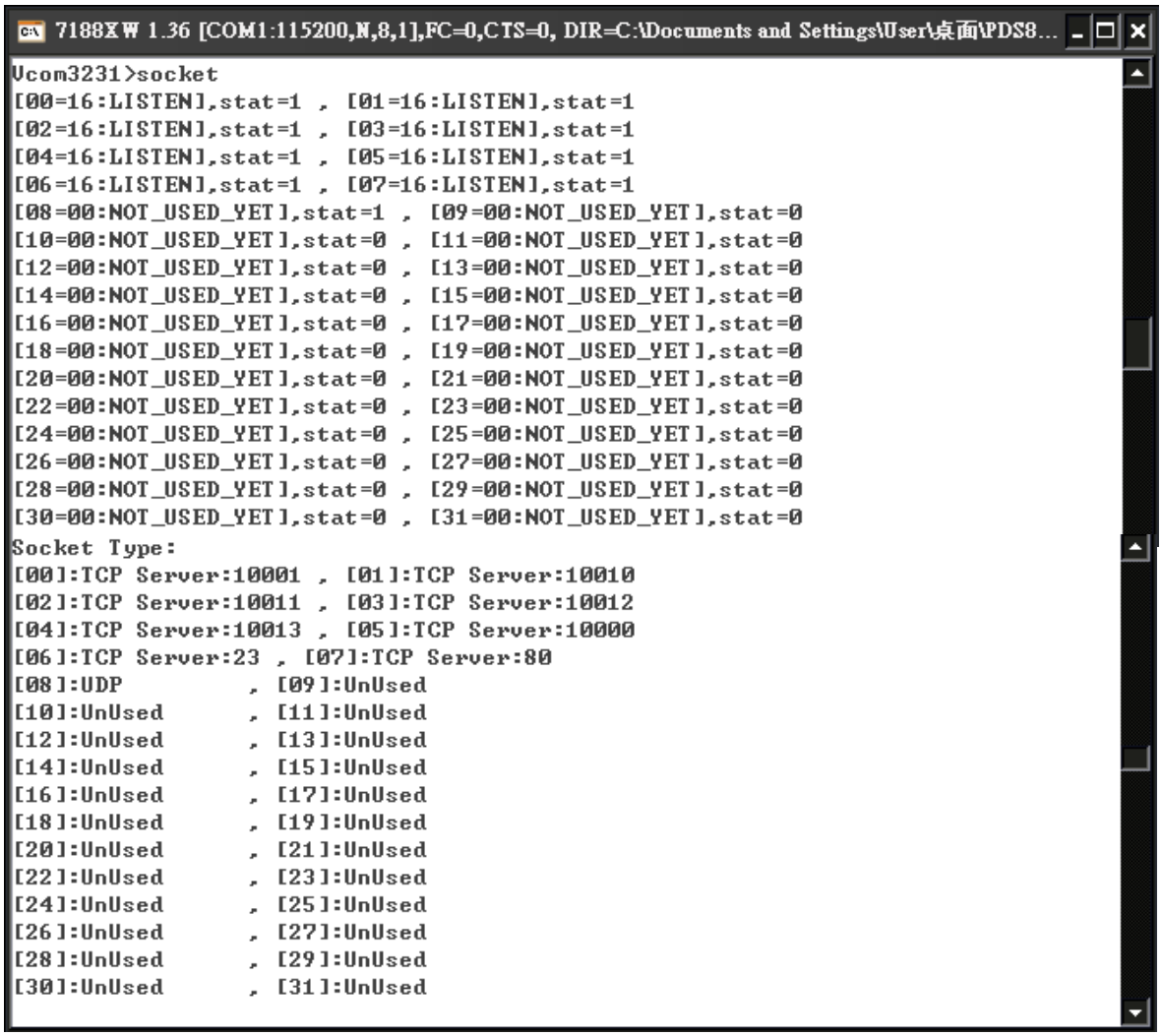
This command lists the status of all sockets (Listen/Not Used Yet) together with the type of each socket (TCP Server: Port No./UDP/Unused)

If stat = 1, the socket is used.
If stat = 0, the socket is not yet used.

Effect: Immediate

Command	Arguments	Description
socket		Lists the status of all sockets.

Figure 7-3-3: The figure illustrates is an example of a **SOCKET** configuration.



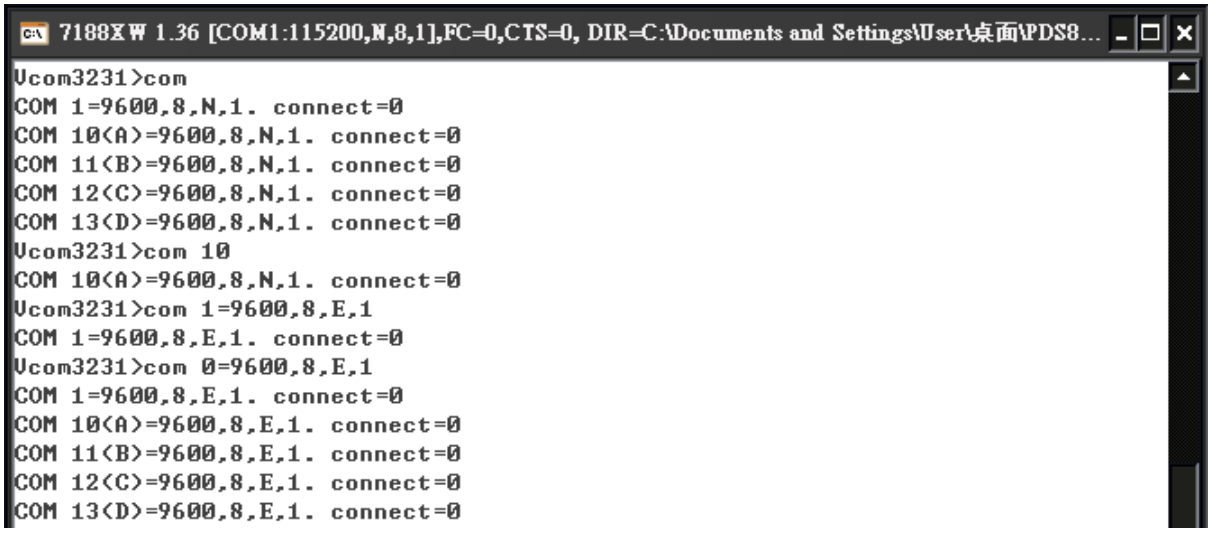
7.3.4 COM

This command queries or sets the configuration of the COM Ports (Baud Rate/Parity/Stop bits).

Effect: Immediate

Command	Arguments	Description
com		Queries the configuration of all COM Ports.
com	n	Queries configuration of COM Port “n”. If n = 0, the configuration of all COM Ports will be listed in the same way as using the command “com” above.
com	N= BaudRate, DataBits, Parity,StopBit(s)	Sets the configuration of COM Port “n”. If n = 0, the settings will be valid for all Com Ports on the PDS-8x1.

Figure 7-3-4: The figure illustrates is an example of a **COM** configuration.



7.3.5 Broadcast

This command is used to Enable/Disable listening broadcast packets on PDS-8x1.

Effect: Immediate

Command	Arguments	Description
Broadcast		Queries the Broadcast settings.
Broadcast	= 1	Sets Broadcast = 1. The system is able to receive broadcast packets.
Broadcast	= 0	Sets Broadcast = 0. The system will ignore broadcast packets.

Figure 7-3-5: The figure illustrates is an example of a **Broadcast** configuration.

7.3.6 SystemTimeout

This command queries or sets the system timeout value.

If the SystemTimeout is greater than zero, and the PDS-8x1 does not receive any packets from any client for longer than the SystemTimeout period, the PDS-8x1 will reboot itself.

Effect: Immediate

Command	Arguments	Description
SystemTimeout		Queries the SystemTimeout settings.
SystemTimeout	= nnnnn	Sets the SystemTimeout. (Unit : ms) Default factory setting is 300000 ms (= 300 seconds = 5 minutes) Min. value is 30000 ms (= 30 seconds)

Figure 7-3-6: The figure illustrates is an example of a **SystemTimeout** configuration.

7.3.7 SocketTimeout

This command is used to query or set the SocketTimeout parameter.

If the SocketTimeout is greater than zero, and the PDS-8x1 does not receive any data from a client PC for longer than the SocketTimeout period, the PDS-8x1 will close the socket connection between itself and the client PC.

Effect: Immediate

Command	Arguments	Description
SocketTimeout		Queries the SocketTimeout settings.
SocketTimeout	= nnnnn	Sets the SocketTimeout. (Unit : ms) Default = 0 (disable) Min. = 10000

Figure 7-3-7: The figure illustrates is an example of a **SocketTimeout** configuration.

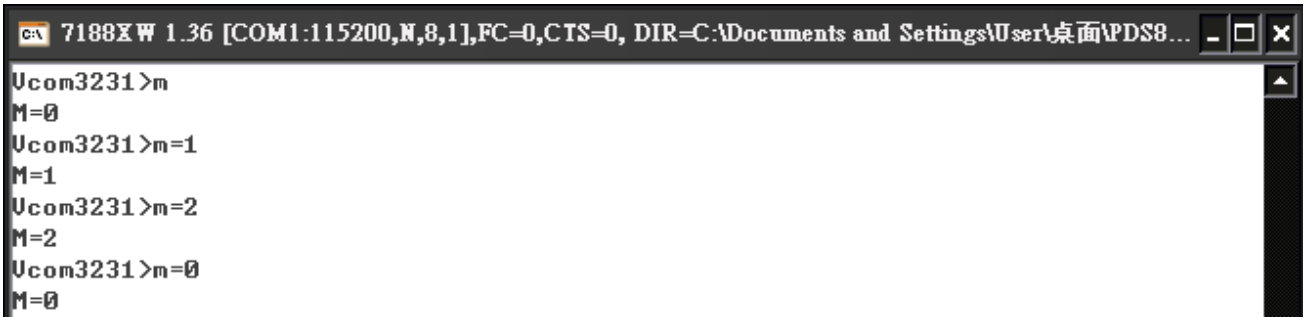
7.3.8 M

This command is used to query or set the echo mode.

Effect: Immediate

Command	Arguments	Description
M		Queries the echo mode settings.
M	= 0	Sets the Multi-echo mode to enable. When set to multi-echo mode, the PDS-8x1 echoes data from a device to all clients that are connected.
M	= 1	Sets the Single-echo mode to enable. When set to single-echo mode, the PDS-8x1 echoes data from a device to the client that requested the service.
M	=2	Sets the Half-Save Mode to enable. If only one client connects to the PDS-8x1 controller, the operation mode same as M0 mode; and if there are two or more clients connecting to the PDS-8x1 controller, the operation mode same as M1 mode.

Figure 7-3-8: The figure illustrates is an example of a **M** configuration.



7.3.9 EchoCmdNo

This command is used to query or set the EchoCmdNo parameter.

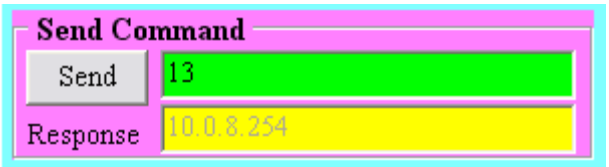
The EchoCmdNo parameter is used to set whether the PDS-8x1 prefixes the Virtual COM command to the corresponding response. (Virtual COM commands are used to configure a PDS-8x1 through TCP port 10000)

Effect: Immediate

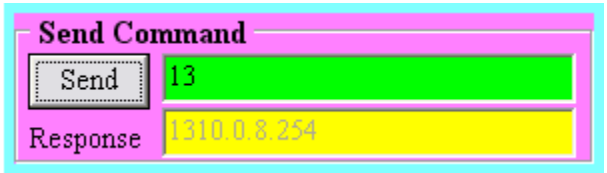
Command	Arguments	Description
EchoCmdNo		Queries the EchoCmdNo settings.
EchoCmdNo	= 0	If EchoCmdNo = 0, a Virtual COM command number will not be prefixed to the corresponding response.
EchoCmdNo	= 1	If EchoCmdNo = 1, a Virtual COM command number will be prefixed to the corresponding response.

`Figure 7-3-9:` The figure illustrates is an example of a **EchoCmdNo** configuration.

EchoCmdNo = 0



EchoCmdNo = 1



7.3.10 EndChar

This command is used to query or set the EndChar parameter.

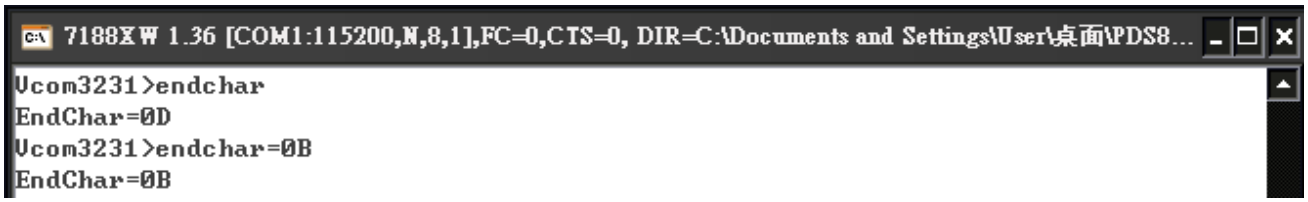
PDS-8x1 sends out the response string from serial port to TCP client immediately when it received a char on the response string that matching the EndChar.

Set EndChar = 00 to disable the EndChar feature.

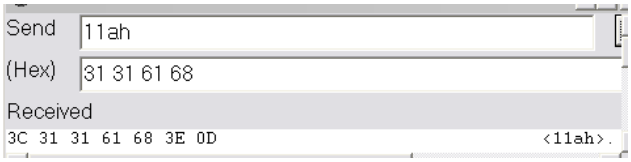
Effect: Immediate

Command	Arguments	Description
Endchar		Queries the endchar setting.
Endchar	= HH	Sets the endchar.

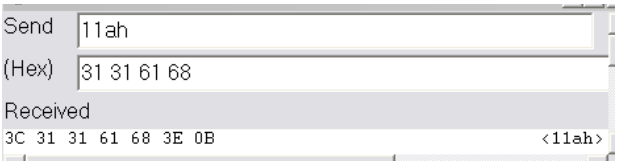
Figure 7-3-10: The figure illustrates is an example of a **EndChar** configuration.



EndChar = 0D



EndChar = 0B



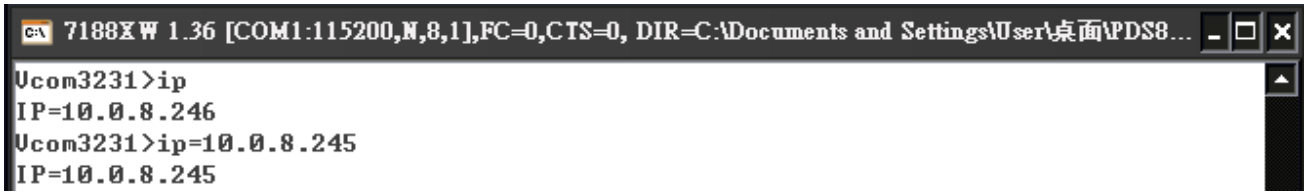
7.3.11 IP

This command is used to query or set the IP address.

Effect: After the next reboot.

Command	Arguments	Description
IP		Queries the IP address.
IP	= xxx.xxx.xxx.xxx	Sets the IP address.

Figure 7-3-11: The figure illustrates is an example of a **IP** configuration.



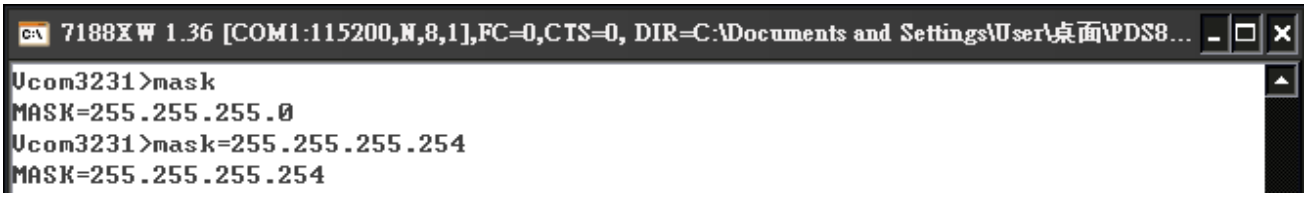
7.3.12 MASK

This command is used to query or set the subnet Mask value.

Effect: After the next reboot.

Command	Arguments	Description
MASK		Queries the subnet Mask value.
MASK	= xxx.xxx.xxx.xxx	Sets the subnet Mask value.

Figure 7-3-12: The figure illustrates is an example of a **MASK** configuration.



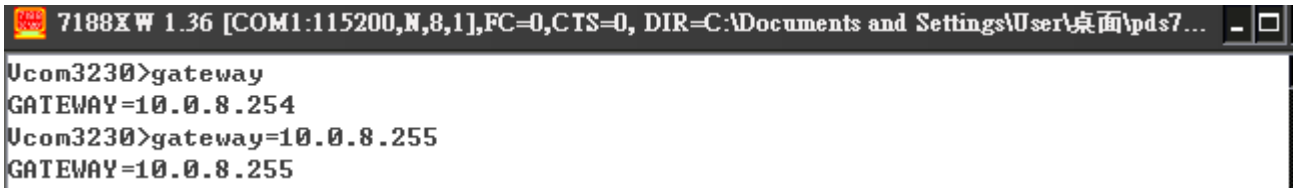
7.3.13 GATEWAY

This command is used to query or set the outgoing Gateway address of the subnet.

Effect: After the next reboot.

Command	Arguments	Description
Gateway		Queries the subnet Gateway value.
Gateway	= xxx.xxx.xxx.xxx	Sets the subnet Gateway value.

Figure 7-3-13: The figure illustrates is an example of a **Gateway** configuration.



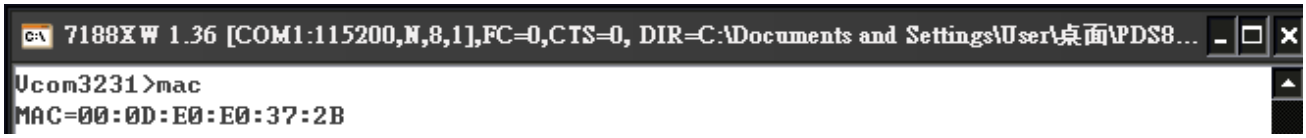
7.3.14 MAC

This command is used to query the MAC address.

Effect: Setting the address is not allowed.

Command	Arguments	Description
MAC		Queries the MAC address.(Setting the address is not allowed)

Figure 7-3-14: The figure illustrates is an example of a **MAC** configuration.



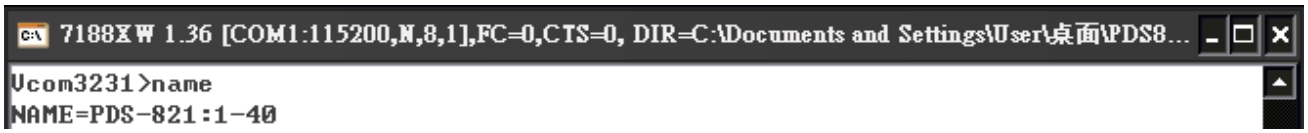
7.3.15 NAME

This command is used to query the name of a PDS-8x1 controller.

Effect: Setting the address is not allowed.

Command	Arguments	Description
NAME		Queries the name of a PDS-8x1 controller.

Figure 7-3-15: The figure illustrates is an example of a **NAME** configuration.



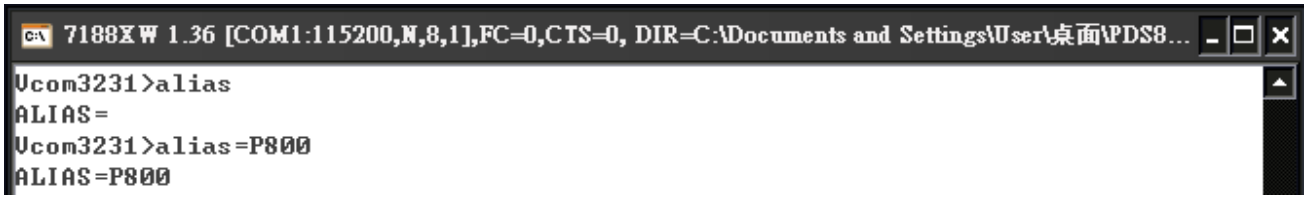
7.3.16 ALIAS

This command is used to query or set the alias of a PDS-8x1. The maximum character length of PDS-8x1 alias name is 16 bytes.

Effect: Immediate

Command	Arguments	Description
alias		Queries the alias.
alias	= xxxx	Sets the alias of a PDS-8x1 controller to “xxxx”.

Figure 7-3-16: The figure illustrates is an example of a **alias** configuration.



7.3.17 DHCP

This command is used to set the DHCP client to either enabled or disabled.

DHCP function will get a dynamic IP address setting for PDS-8x1 automatically. Thus it's recommended to disable DHCP function and use a static IP address setting. This prevents you to configure virtual COM mappings again and again.

Effect: Immediate

Command	Arguments	Description
DHCP	= 0	Disables the DHCP client.
DHCP	= 1	Enables the DHCP client.

Figure 7-3-17: The figure illustrates is an example of a **DHCP** configuration.

7.3.18 UDP

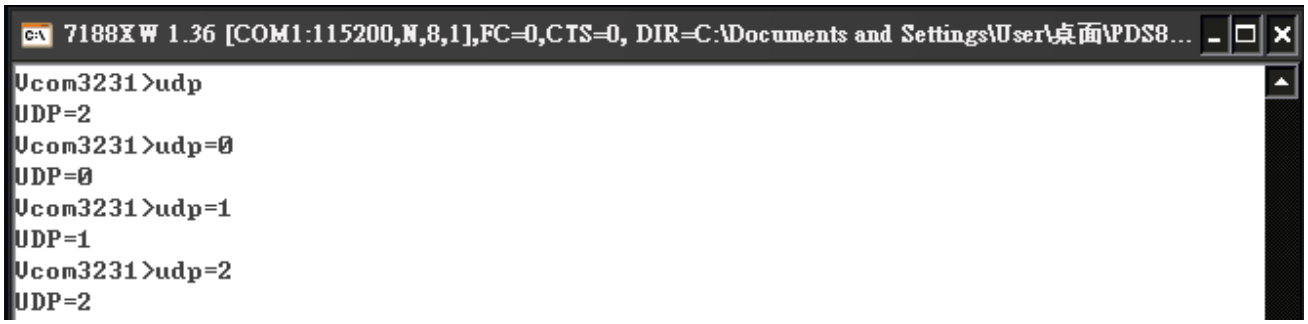
This command is used to configure the UDP Search function.

UDP is used to set the action mode for when a PDS-8x1 receives a UDP search command.

Effect: Immediate

Command	Arguments	Description
UDP	= 0	Rejects UDP search commands. The PDS-8x1 will not reply to the UDP search command, and can not be searched again.
UDP	= 1	Replies to UDP search commands. The PDS-8x1 controller will reply to the UDP search command, and can be searched.
UDP	= 2	Replies to UDP search commands till a client is connected.

Figure 7-3-18: The figure illustrates is an example of a **UDP** configuration.



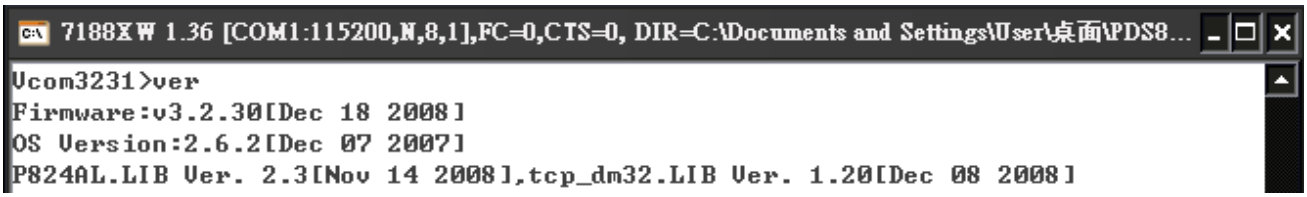
7.3.19 VER

This command is used to query the version information for a PDS-8x1.

Effect: Setting the version information is not allowed.

Command	Arguments	Description
VER		Queries the version information.

Figure 7-3-19: The figure illustrates is an example of a **VER** configuration.



7.3.20 SAVE

This command is used to set the PDS-8x1 to backup or no-backup **"autoexec.bat"** and **"vcom.ini"** files when using "load" command.

Effect: Immediate

Command	Arguments	Description
save	= 1	When the "load" command is used, backup copies of the "autoexec.bat" and "vcom.ini" files will be saved.
save	= 0 (Default)	When the "load" command is used, backup copies of the "autoexec.bat" and "vcom.ini" files will NOT be saved.

Refer to Figures 7-3-20 and 7-3-21 for detail illustrations.

7.3.21 LOAD

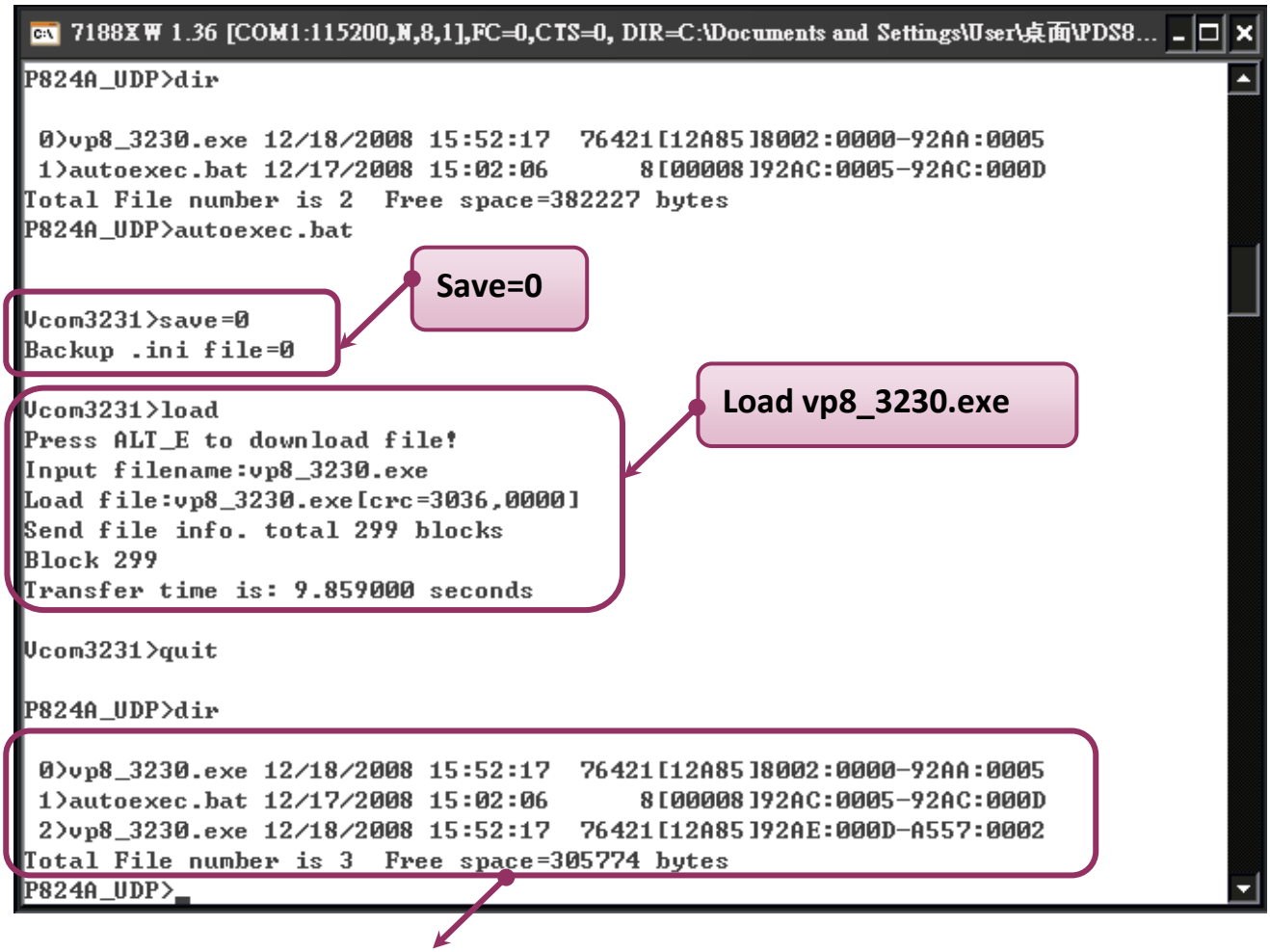
This command is used to loads file to the built-in flash disk on PDS-8x1. It should be used to update firmware only.

Effect: Immediate

Command	Arguments	Description
load		The command is coordinated with the MiniOS7 "load" command and can be used to renew the "vcom3230.exe", "vcom.ini" or "autoexec.bat" file(s).

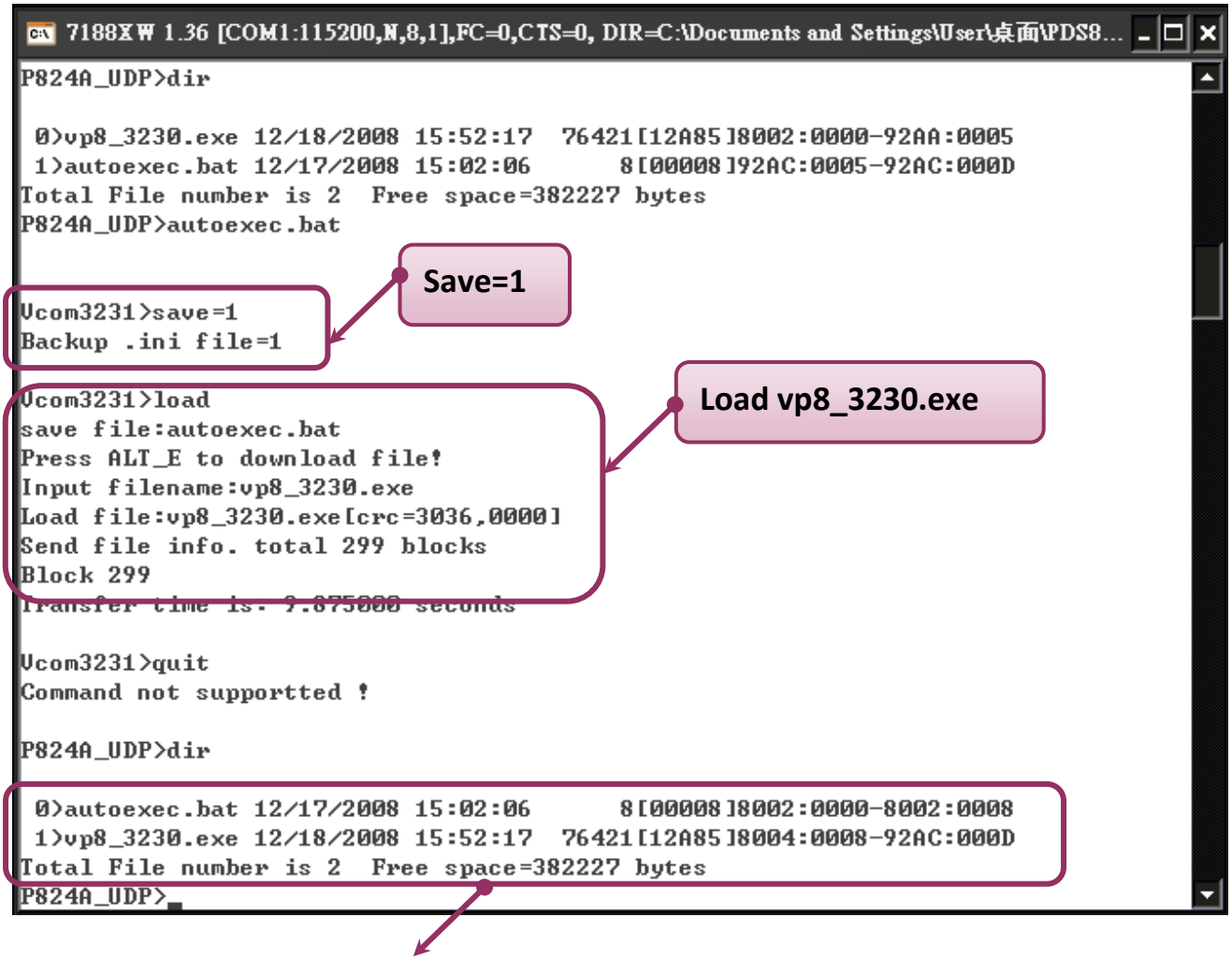
※ "Load" is not a Telnet command.

Figure 7-3-20: The figure illustrates is an example of a **Save = 0** configuration.



※When save = 0, the system doesn't back up the "autoexec.bat" and "vcom.ini" files to memory, and doesn't clear the flash disk. It only loads the file that is selected specified.

Figure 7-3-21: The figure illustrates is an example of a **Save = 1** configuration.



※ When save = 1, system will back up the "autoexec.bat" and "vcom.ini" files to memory first, clear all files in the flash disk, and then load the "autoexec.bat" and "vcom.ini" files from memory and run the "load" command to load the specified file(s).

7.3.22 CONFIG

This command is used to clear the settings in the EEPROM.

Effect: Immediate

Command	Arguments	Description
config	= RESET	Clears the settings in the EEPROM. After reboot, the firmware will use the new (default) settings on EEPROM. Note: "RESET" MUST be in capital letters.

※When "Config=RESET" is used, the Password, Alias and IPFILTER settings will also be cleared, but the IP/MASK/GATEWAY addresses will not.

※The SystemTimeout setting is also cleared to 0 by the "config=RESET" command, you have to configure the SystemTimeout value again. The default factory setting of SystemTimeout value should be 300000 ms (= 300 seconds).

Figure 7-3-22: The figure illustrates is an example of a **CONFIG** configuration.

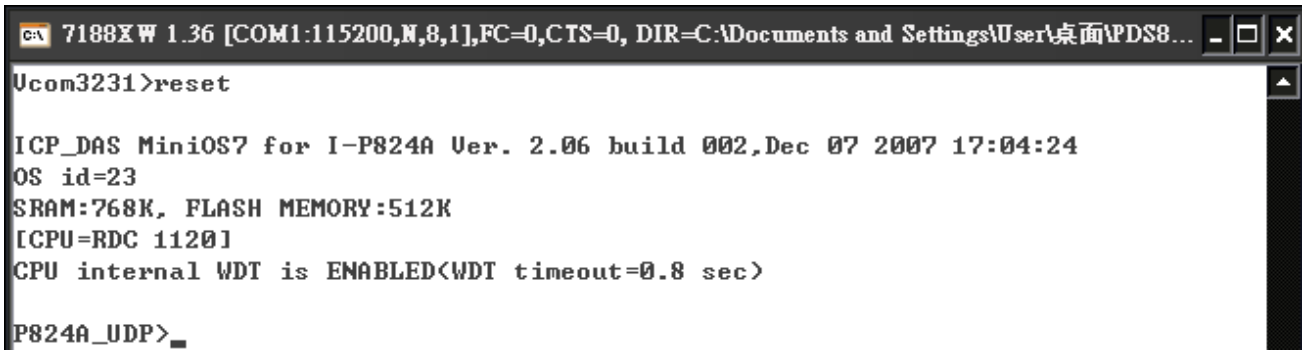
7.3.23 RESET

This command is used to reboot the PDS-8x1 controller.

Effect: Immediate

Command	Arguments	Description
reset		Reboot the PDS-8x1 controller.

Figure 7-3-23: The figure illustrates is an example of a **RESET** configuration.



7.3.24 QUIT

This command is used to stop and quit the firmware of PDS-8x1 controller.

Effect: Immediate

Command	Arguments	Description
quit		Quits the firmware.

Figure 7-3-24: The figure illustrates is an example of a **Quit** configuration.

Appendix A: Linking to a Development PC

Step 1: Connect the download-cable (CA0910), between the PDS-8x1 controller and COM 1 of the development PC.

1-1: Connect the connector of CA-0910 download cable to your host computer.

1-2: Wire the CA-0910 to PDS-8x1 controller, as follows:

Connect the CA-0910.TX with PDS-8x1.TxD

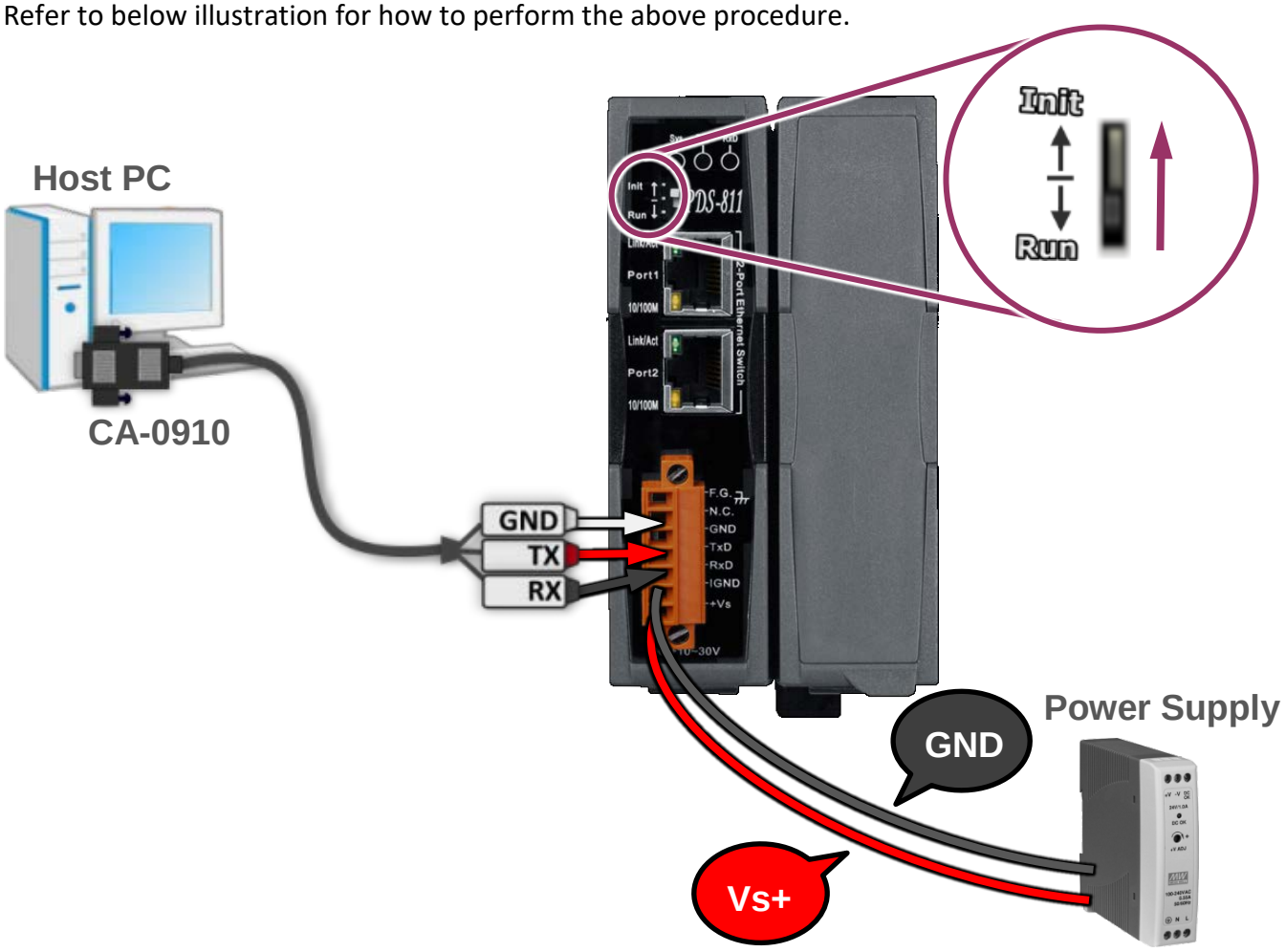
Connect the CA-0910.RX with PDS-8x1.RxD

Connect the CA-0910.GND with PDS-8x1.GND

Step 2: Set the Init/Run Switch in **"Init Mode"** position.

Step 3: **Supply +24 V_{DC} (+10 ~ +30 V_{DC}) power** to the PDS-8x1 controller.

Refer to below illustration for how to perform the above procedure.



Step 4: Verify that the System LED indicator is flashing on the PDS-8x1 controller.

Step 5: Unzip the **"7188XW_yyyymmdd.zip"** file on the PC.

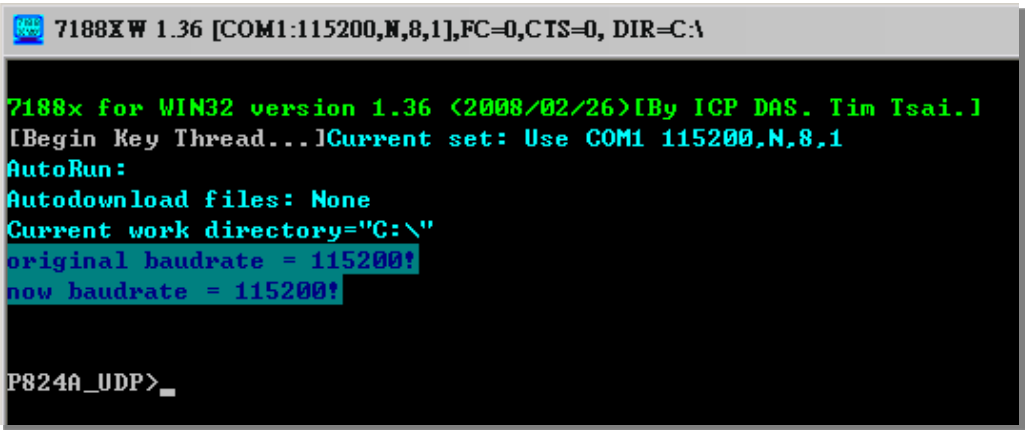
The **"7188XW_yyyymmdd.zip"**can be obtained from either the ICP DAS FTP site or the ICP DAS web site. The location of the download addresses are shown below:

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

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

Step 6: Execute 7188XW.EXE/C#, and change the Baud Rate to 115200 bps, N81. **"/C#"** is the COM Port of the development PC.

Step 7: Press [↵Enter] twice on the development PC.



Step 8: Read the configuration of the PDS-8x1 (The following is a default value).

```
P824A_UDP>ip
IP=192.168.255.1
P824A_UDP>mask
MASK=255.255.0.0
P824A_UDP>gateway
Gateway=192.168.0.1
P824A_UDP>mac
Ethernet Address = 00:0d:e0:e0:37:2b
P824A_UDP>setcom 1
Current set is: 9600,8,0,1
```

Read configuration command

- Ip
- Mask
- Gateway
- Mac
- setcom port

Step 9: The configuration of the PDS-8x1 as follows can be changed.

Please setting for with your PC same network region **IP/Mask/Gateway addresses**.
This example: **10.0.8.246/255.255.255.0/10.0.8.255**

```
P824A_UDP>ip 10.0.8.246
Set IP=10.0.8.246
[ReadBack]IP=10.0.8.246
P824A_UDP>mask 255.255.255.0
Set MASK=255.255.255.0
[ReadBack]MASK=255.255.255.0
P824A_UDP>gateway 10.0.8.255
Set GATEWAY=10.0.8.255
[ReadBack]Gateway=10.0.8.255
P824A_UDP>setcom 1 115200,n,8,1
Current set is: 9600,8,0,1
Set to: 115200,8,0,1 [checksum:CC]
```

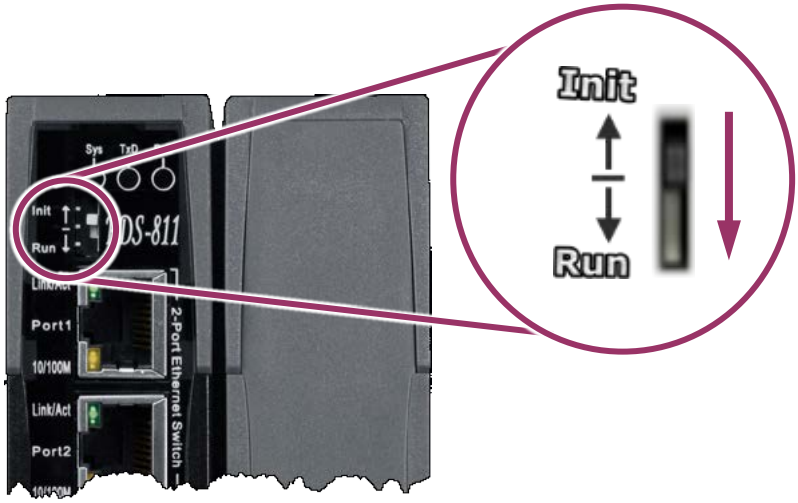
Settings configuration command

- ip [new ip]
- mask [new mask]
- gateway [new gateway]
- mac [new mac]
- setcom port (refer to Table A-1)
- [baud][data_bit][parity][stop_bit]

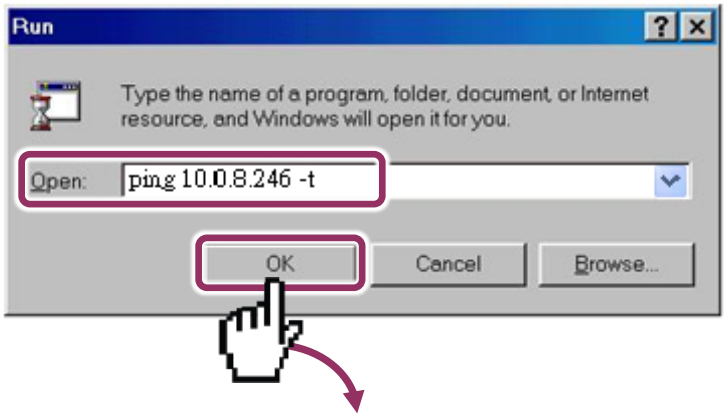
Table A-1: **"setcom"** parameters are as follows.

Port	1
Baud Rate	2 ~ 921600
Data Bit	7, 8: for COM 1
Parity	N, n : None parity E, e : Even parity O, o : Odd parity
Stop Bit	1: for COM 1

Step 10: Set the Init/Run Switch in **"Run Mode"** position, and then **power-on reboot** the PDS-8x1 controller.



Step 11: Execute ping you setting IP (Example: ping 10.0.8.246 –t) using a run command.




```
Pinging 10.0.8.246 with 32 bytes of data:

Reply from 10.0.8.246: bytes=32 time=1ms TTL=64
Reply from 10.0.8.246: bytes=32 time<1ms TTL=64
Reply from 10.0.8.246: bytes=32 time<1ms TTL=64
Reply from 10.0.8.246: bytes=32 time<1ms TTL=64
Reply from 10.0.8.246: bytes=32 time<1ms TTL=64
Reply from 10.0.8.246: bytes=32 time<1ms TTL=64
Reply from 10.0.8.246: bytes=32 time<1ms TTL=64
Reply from 10.0.8.246: bytes=32 time<1ms TTL=64
Reply from 10.0.8.246: bytes=32 time<1ms TTL=64
Reply from 10.0.8.246: bytes=32 time<1ms TTL=64
```

Follow the procedure described below:

1. Click the "**Start**" button and then click **"Run"** to open the "**Run Command"** dialog box.
2. In the **"Run Command"** dialog box, type **"pin 10.0.8.246 -t"** in the **"Open:"** field.
3. Click the **"OK"** button to open a Command Prompt window.
4. The ping results should be smooth and continuous

Notes:

1. 192.168.255.1 is the default IP of the PDS-8x1. The IP address can be changed using the instructions in step 8.

2. If the PDS-8x1 cannot be successfully pinged from the PC, refer to Step 8 to change the configuration of the PDS-8x1. (The mask and gateway addresses of PDS-8x1 controller and the PC should make the network definition.)

3. The MAC address of the PDS-8x1 should be unique on the same network. Refer to step 8 for details of how to change the MAC address of the PDS-8x1.

4. Each PDS-8x1 MAC address is unique in the default shipping.

In general, if the host PC can ping the PDS-8x1 controller smoothly and continuously, all other software and drivers for the PDS-8x1 controller will operate correctly. Therefore, users should ensure that the development PC is able to ping the PDS-8x1 controller smoothly before any further testing is carried out.

Appendix B: Glossary

1. ARP (Address Resolution Protocol)

The Address Resolution Protocol (ARP) is a telecommunication protocol that is used to convert an IP address to a physical address, such as an Ethernet address.

Consider two machines A and B that share the same physical network. Each has an assigned IP address IP_A and IP_B, and a MAC address, MAC_A and MAC_B. The goal is to devise a low-level software application that hides the MAC addresses and allows higher-level programs to work only with the IP addresses. Ultimately, however, communication must be carried out by the physical networks using whatever MAC address scheme the hardware supplies.

Suppose machine A wants to send a packet to machine B across a physical network to which they are both attached, but A only has the Internet address for B, IP_B. The question arises: how does A map that address to the MAC address for B, MAC_B?

ARP provides a method of dynamically mapping 32-bit IP address to the corresponding 48-bit MAC address. The term dynamic is used since the mapping is performed automatically and is normally not a concern for either the application user or the system administrator.

2. Clients and Servers

The client-server paradigm uses the direction of initiation to categorize whether a program is a client or server. In general, an application that initiates peer-to-peer communication is called a client. End users usually invoke client programs when they use network services.

By comparison, a server is any program that waits for incoming requests from a client program. The server receives a request from a client, performs the necessary actions and returns the result to the client.

3. Ethernet

The term Ethernet generally refers to a standard published in 1982 by Digital Equipment Corp., Intel Corp. and Xerox Corp. Ethernet is the most popular physical layer Local Area Network (LAN) technology in use today.

4. Firmware

Firmware is an embedded software program or set of instructions programmed on a device that provides the necessary instructions for how the device communicated with other computer hardware, and is located or stored in a semi-permanent storage area, e.g., ROM, EEPROM, or Flash memory. Firmware can often be updated by downloading a file from the manufacturer's web site or FTP.

5. Gateway

Computers that interconnect two networks and pass packets from one to the other are called Internet Gateways or Internet Routers. Gateways route packets that are based on the destination network, rather than the destination host.

6. ICMP (Internet Control Message Protocol)

ICMP provides a method of communicating between the Internet Protocol software on one machine and the corresponding software on another. It allows a gateway to send error or control messages to other gateways, or allows a host to diagnose problems with the network communication.

7. Internet

Physically, the Internet is a collection of packet switching networks interconnected by gateways that together with the TCP/IP protocol, allows them to perform logically as a single, large and virtual network. The Internet recognizes hosts using 32-bit IP address.

8. IP (Internet Protocol) Address

Each interface on the Internet must have a unique IP address (also called an Internet address). These addresses are 32-bit numbers, and are normally written as four decimal numbers, one for each byte of the address for example "192.168.41.1**"**. This is called dotted-decimal notation.

9. MAC (Media Access Control) Address

To allow a computer to determine which packets are meant for it, each device attached to an Ethernet network is assigned a 48-bit integer known as its MAC address (also called the Ethernet address, the hardware address or the physical address). A MAC address is normally written as eight hexadecimal numbers, for example "**00:71:88:af:12:3e:0f:01**". Ethernet hardware manufacturers purchase blocks of MAC addresses and assign them in sequence as they manufacture Ethernet interface hardware. Thus, no two hardware interfaces can have the same MAC address.

10. Packet

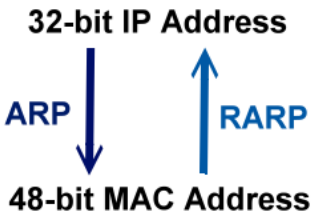
A packet is the unit of data sent across a physical network. It consists of a series of bits containing data and control information, including the source and the destination node (host) address, and is formatted for transmission from one node to another.

11. Ping

Ping is a network administration utility used to test the whether a host on an Internet network is active, and to measure the round-trip time for messages sent from the originating host to a destination computer. Ping operates by sending an ICMP echo request message to a host, expecting an ICMP echo reply to be returned. Normally, if a host cannot be pinged, Telnet or FTP cannot be used to connect to the host. Conversely, if Telnet or FTP cannot be used to connect to a host, Ping is often the starting point to determine the nature of the problem.

12. RARP (Reverse Address Resolution Protocol)

RARP provides a method of dynamically mapping 48-bit MAC address to the corresponding 32-bit IP address. RARP has now been replaced by the Bootstrap Protocol (BOOTP) and the modern Dynamic Host Configuration Protocol (DHCP).



13. Socket

Each TCP segment contains a source and destination port number that can be used to identify the sending and receiving application. These two values, along with the source and destination IP addresses in the IP header, uniquely identify each connection. The combination of an IP address and a port number is called a socket.

14. Subnet Mask

A Subnet mask, often simply called the “Mask”, is a 32-bit number that masks and IP address, and divides the IP address into the network address and the host address. Given its own IP address and its subnet mask, a host can determine whether a TCP/IP packet is destined for a host that is (1) on its own subnet, or (2) on a different network. If (1), the packet will be delivered directly; otherwise it, will be delivered via a gateway or a router.

15. TCP (Transmission Control Protocol)

TCP is a set of rules used in combination with the Internet Protocol to send data in the form of message units between computers over the Internet. TCP provides a reliable flow of data between two hosts and is associated with tasks such as dividing the data passed to it from an application into appropriately sized chunks for the network layer below, acknowledging received packets, setting timeouts to make certain that the other end acknowledges packets that are sent, and so on.

16. TCP/IP

The Transmission Control Protocol (TCP) and the Internet Protocol (IP) are standard network protocols that are almost always implemented and used together in a formation is known as TCP/IP. TCP/IP can be used to communicate across any set of interconnected networks.

17. UDP (User Datagram Protocol)

UDP is an internet protocol that provides a much simpler service to the application layer as it only sends packets of data from one host to an other, but there is no guarantee that the packets will reach the destination host. UDP is suitable for purposes where error checking and correction is either not necessary or is performed in the application.

Appendix C: Revision History

This chapter provides revision history information to this document.

The table below shows the revision history.

Revision	Date	Function
1.0	Aug. 2009	Initial issue
1.1	Nov. 2014	Delete Appendix: FAQ
1.2	Sep. 2018	1.Remove the package CD 2. Add Section DIN-Rail Mounting 3.Add Section 3.2 Installing the I-8K Serial Modules 4.Add Section 4.4 Modbus Gateway Settings 5. Add Chapter 6. Modbus Testing and Protocol