PDS-220Fx Series User Manual

Ver. 1.3

Programmable Serial-to-Fiber Device Server

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-220FT, PDS-220FC,

PDS-220FCS and PDS-220FCS-60

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Packing List

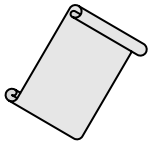
The shipping package includes the following items:

- ☑ One PDS-220Fx Series Module
- ☑ One printed Quick Start Guide

PDS-220FT

or

PDS-220FC


Quick Start

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-220fx/document/

Firmware :
http://ftp.icpdas.com/pub/cd/8000cd/napdos/pds/pds-220fx/firmware/

OS Image (MiniOS7):
http://ftp.icpdas.com/pub/cd/8000cd/napdos/pds/pds-220fx/OS_image/

Demo :
http://ftp.icpdas.com/pub/cd/8000cd/napdos/pds/pds-220fx/demo/

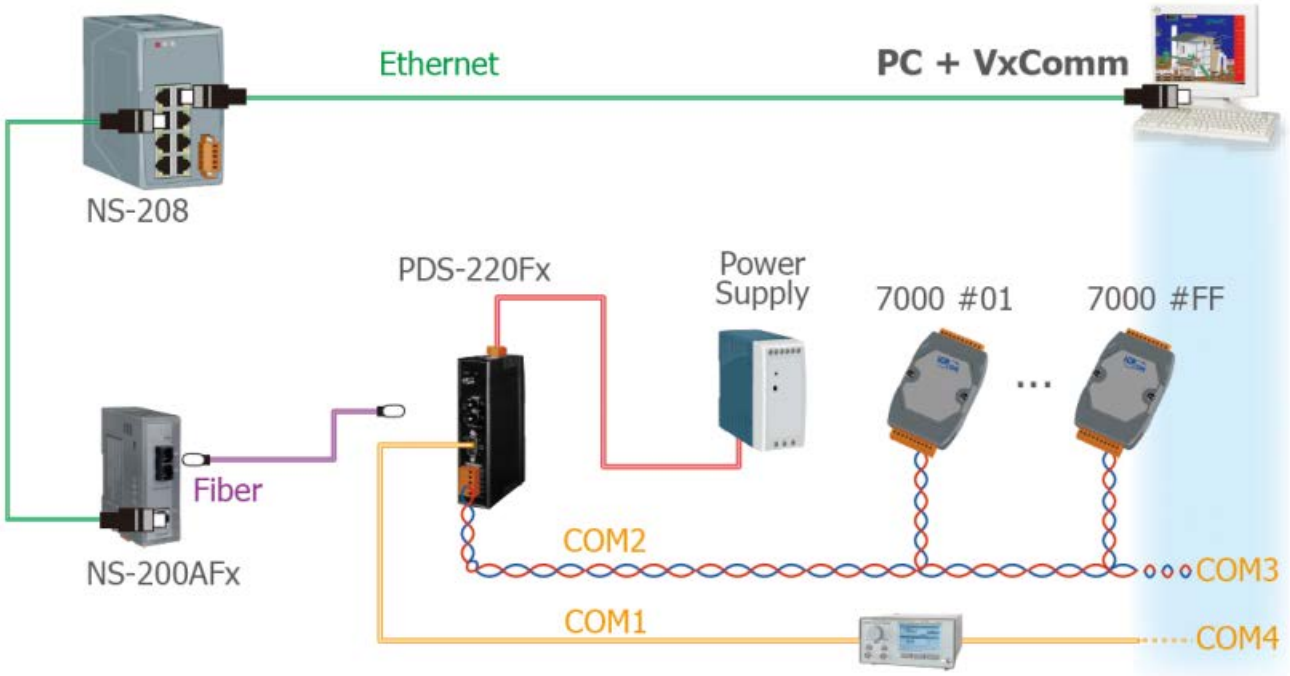
1. Introduction

The PDS-220Fx series is a family of Programmable Device Servers, also known as **"Serial-to-Ethernet gateway"**, that are designed for adding optical fiber connectivity to RS-232/422/485 devices.

The user-friendly VxComm Driver/Utility allows users to easily turn the built-in COM ports of the PDS-220Fx series into standard COM ports on a PC. By virtue of its protocol independence, a small-core OS and high flexibility, the PDS-220Fx series is able to meet the demands of every network-enabled application.

The PDS-220Fx series includes a powerful and reliable Xserver programming structure that allows you to design your robust Ethernet applications in one day. The built-in, high-performance MiniOS7 boots the PDS-220Fx up in just one second and gives you fastest responses.

The PDS-220Fx is equipped with 1 RS-232 port and 1 RS-485/422 port. The removable on-board terminal block connector is designed for easy and robust wiring in industrial situations.



1.1 Selection Guide

Model	CPU	SRAM	Flash	Fiber Port	Mode	Distance	COM1	COM2
PDS-220FT	80 MHz	512 KB	512 KB	100 Base-FX, ST Connector	Multi-mode	2 km	5-wire RS-232	RS-422 RS-485
PDS-220FC				100 Base-FX, SC Connector	Multi-mode	2 km		
PDS-220FCS				100 Base-FX, SC Connector	Single-mode	30 km		
PDS-220FCS-60				100 Base-FX, SC Connector	Single-mode	60 km		

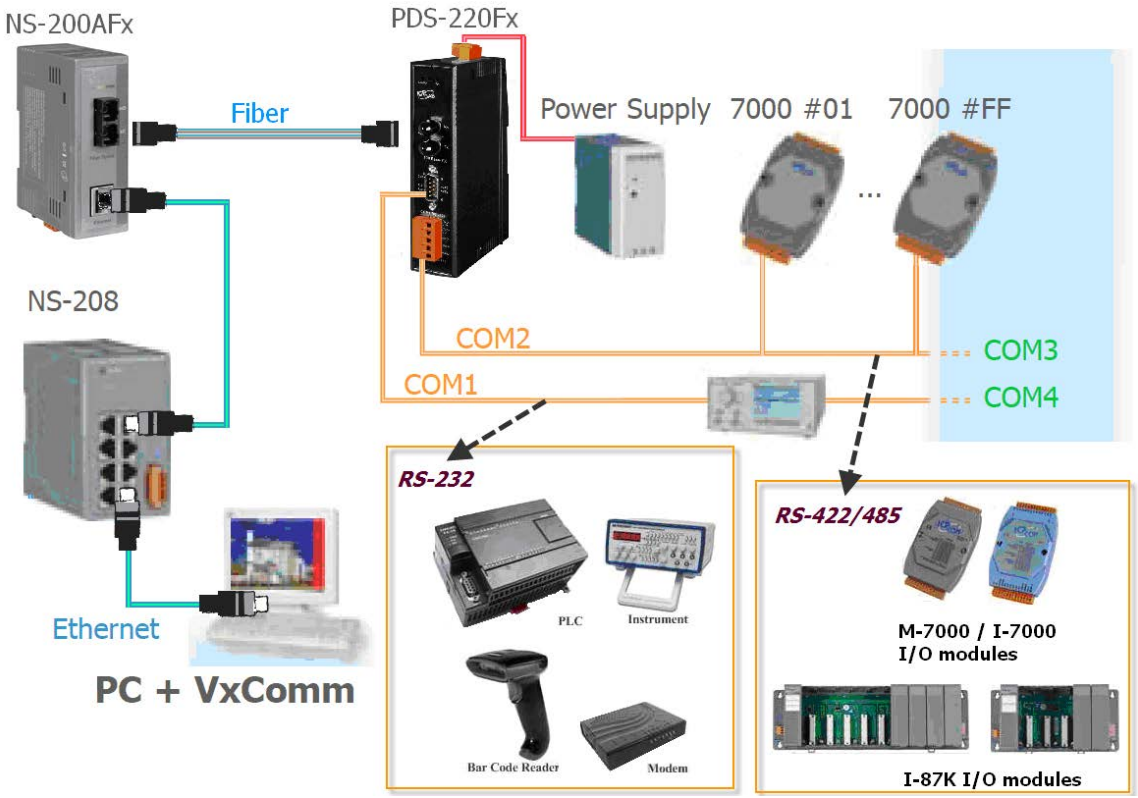
Note:
5-wire RS-232: RxD, TxD, CTS, RTS, GND
4-wire RS-422: TxD+, TxD-, RxD+, RxD-
2-wire RS-485: Data+, Data-

1.2 Fiber Optic Solutions

The fiber-optic communications permits transmission over longer distances than other forms of communications because of the signals travel along them with less loss and no crosstalk. It has following important features: Immunity to electromagnetic interference (EMI) — Motors, relays, welders and other industrial equipment generate a tremendous amount of electrical noise that can cause major problems with copper cabling.

- **High electrical resistance, making it safe to use near high-voltage equipment or between areas with different earth potentials.**
- **No sparks — important in flammable or explosive gas environments.**
- **Not electromagnetically radiating, and difficult to tap without disrupting the signal — important in high-security environments.**

Because of these reasons, optical fibers have largely replaced copper wire communications in core networks in the developed world.

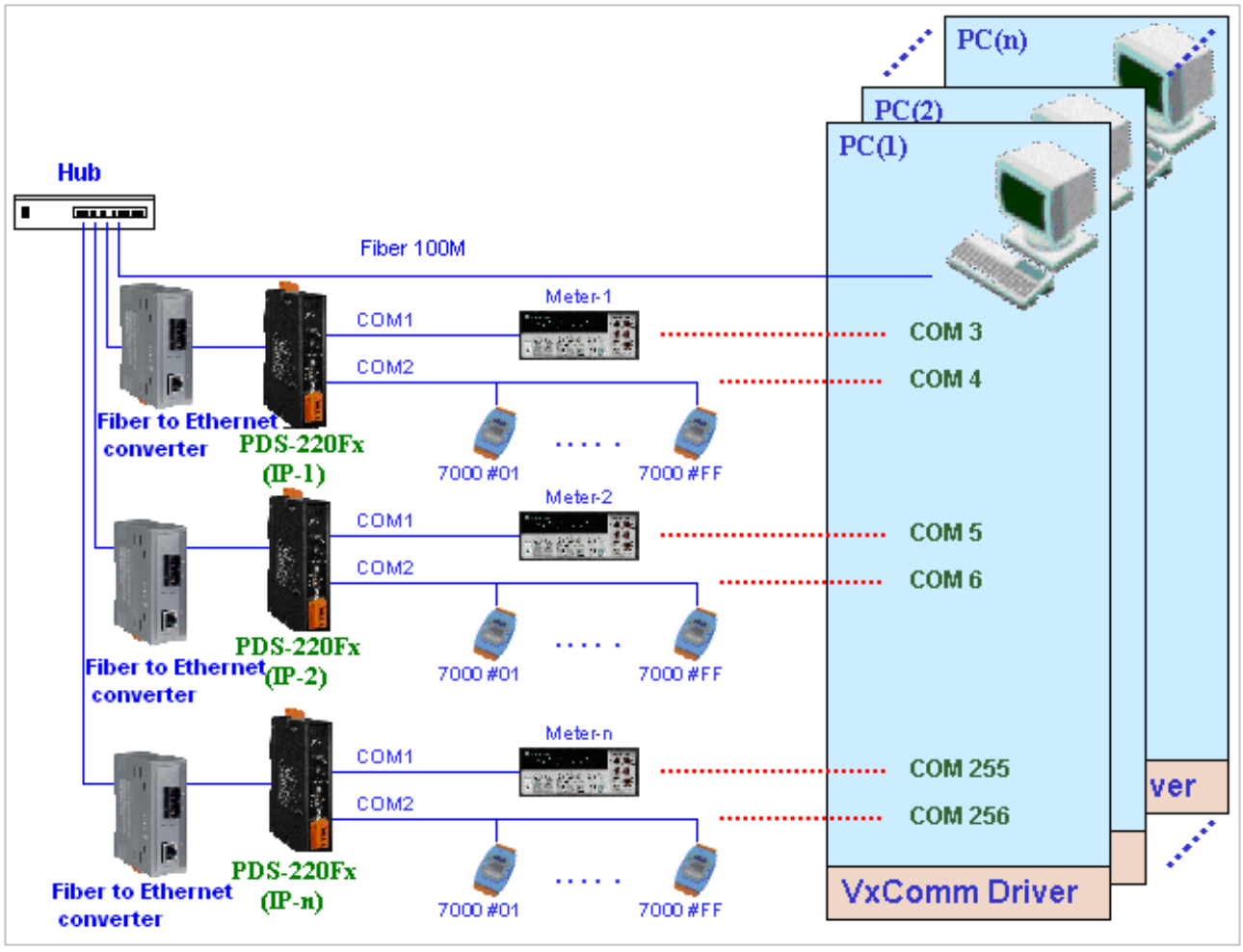


1.3 VxComm Technology

In general, writing a TCP/IP program is more difficult than a COM port program, or the COM port communication system was built many years ago.

As a result, a new technology, **VxComm** was developed to **virtualize the COM ports of the PDS-220Fx Series to allow up to 256 COM Ports to be used on the 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-220Fx 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.



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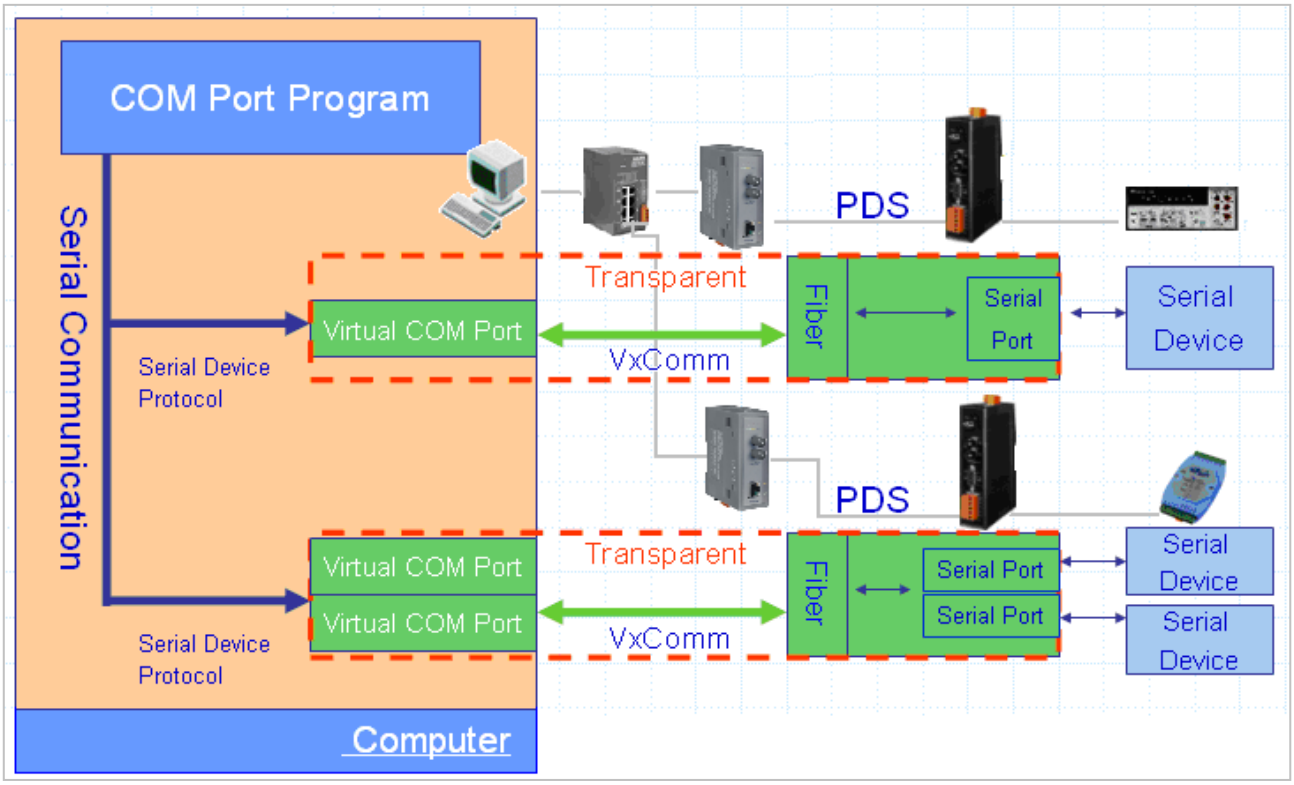
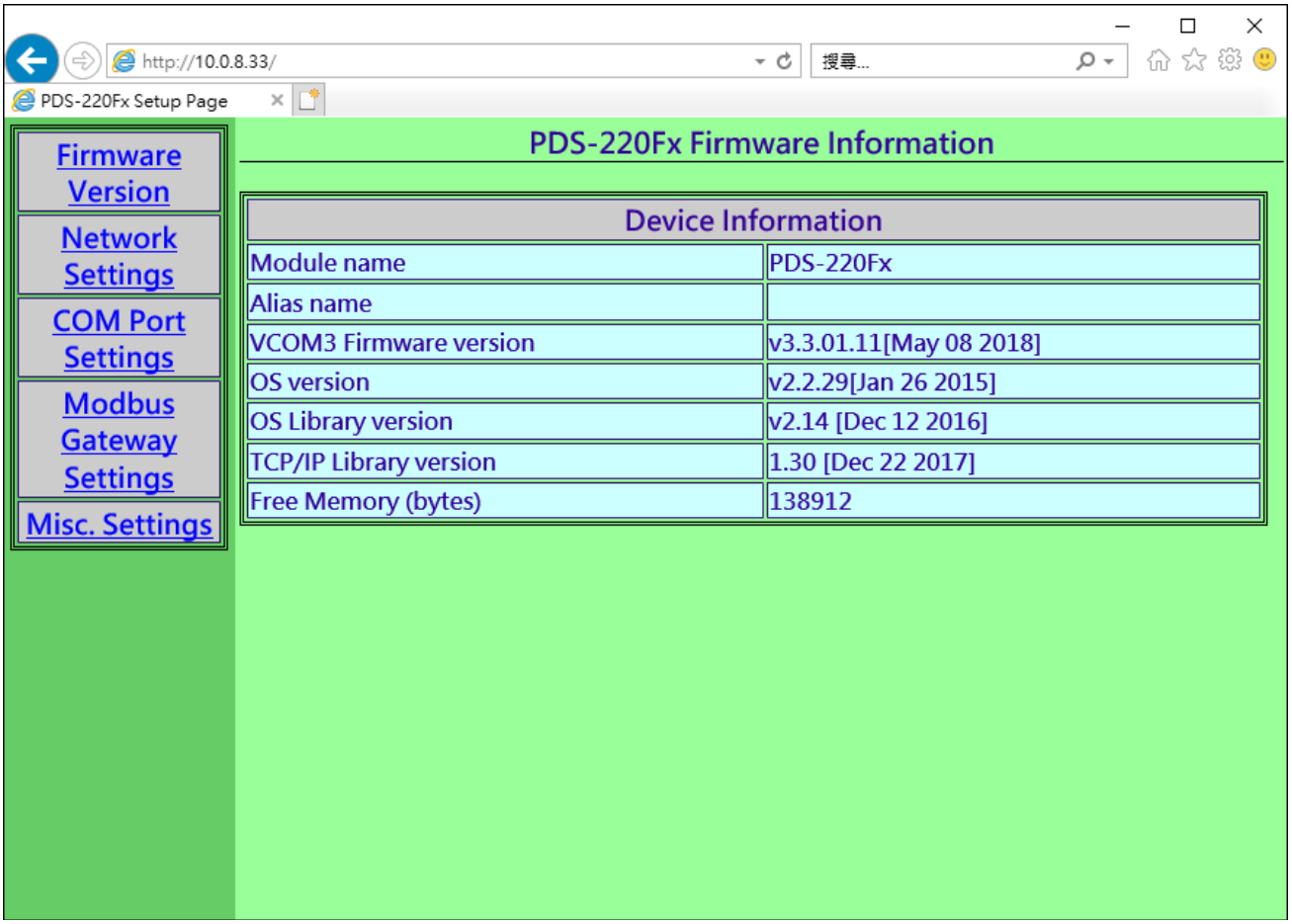


1.4 Web Server Technology

Web server technology enables the PDS-220Fx Series 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-220Fx Series 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-220Fx Series.

2.1 Specifications

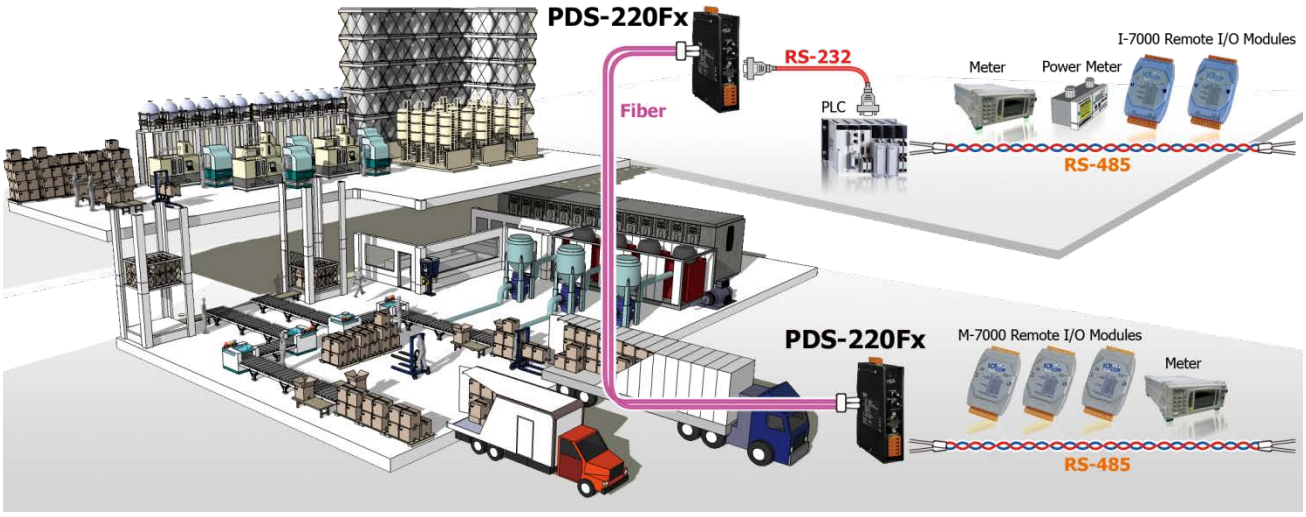
Models		PDS-220Fx	PDS-220FC	PDS-220FCS	PDS-220FCS-60
CPU					
CPU		80186, 80 MHz or compatible			
SRAM		512 KB			
Flash		512 KB; Erase unit is one sector (64 KB); 100,000 erase/write cycles			
EEPROM		16 KB; Data retention: 40 years; 1,000,000 erase/write cycles			
Peripheral		Watchdog Timer, Init Pin			
Communication Interface					
COM1		Male DB-9, 5-wire RS-232 (RxD, TxD, CTS, RTS, GND); Note: +/- 4 kV ESD Protection			
COM2		Removable Terminal Block 2-wire RS-485 (D+, D-, GND) with Self-Tuner ASIC or 4-wire RS-422 (TxD+, TxD-, RxD+, RxD-, GND) Note: +/- 4 kV ESD Protection			
Fiber Port		100 Base-FX, ST connector	100 Base-FX, SC connector		
Mode	Fiber Cables	Multi-mode: 50/125, 62.5/125 or 100/140 µm		Single-mode: 8.3/125, 8.7/125, 9/125 or 10/125 µm	
	Wavelength	1300 or 1310 nm			
	Min. TX Output	-20 dBm		-15 dBm	-5 dBm
	Max. TX Output	-14 dBm		-8 dBm	-0 dBm
	Max. RX Sensitivity	-32 dBm		-34 dBm	-35 dBm
	Min. RX Overload	-8 dBm		-5 dBm	
	Budget	12 dBm		19 dBm	30 dBm
Distance		2 km, (62.5/125 µm recommended) for full duplex		30 km, (9/125 µm recommended) for full duplex	60 km, (9/125 µm recommended) for full duplex
COM Port (16C550 or Compatible UART)					
Data Bit		7, 8			
Parity		None, Even, Odd, Mark, Space			
Stop Bit		1, 2			
Baud Rate		115200 bps max.			
LED Indicators					
Link/Act		Green			
System		Red			
Power					
Power Input		+12 VDC ~ +48 VDC (non-regulated)			
Power Consumption		0.14 A @ 24 VDC			
Protection		Power Reverse Polarity Protection, EMS Protection (Frame GND)			
Mechanical					
Dimensions (W x L x H)		31 mm x 121 mm x 157 mm	31 mm x 123 mm x 157 mm		
Installation		DIN-Rail mounting			
Environment					
Operating Temperature		-25 °C ~ +75 °C			
Storage Temperature		-30 °C ~ +85 °C			
Humidity		10 ~ 90% RH, non-condensing			

2.2 Features

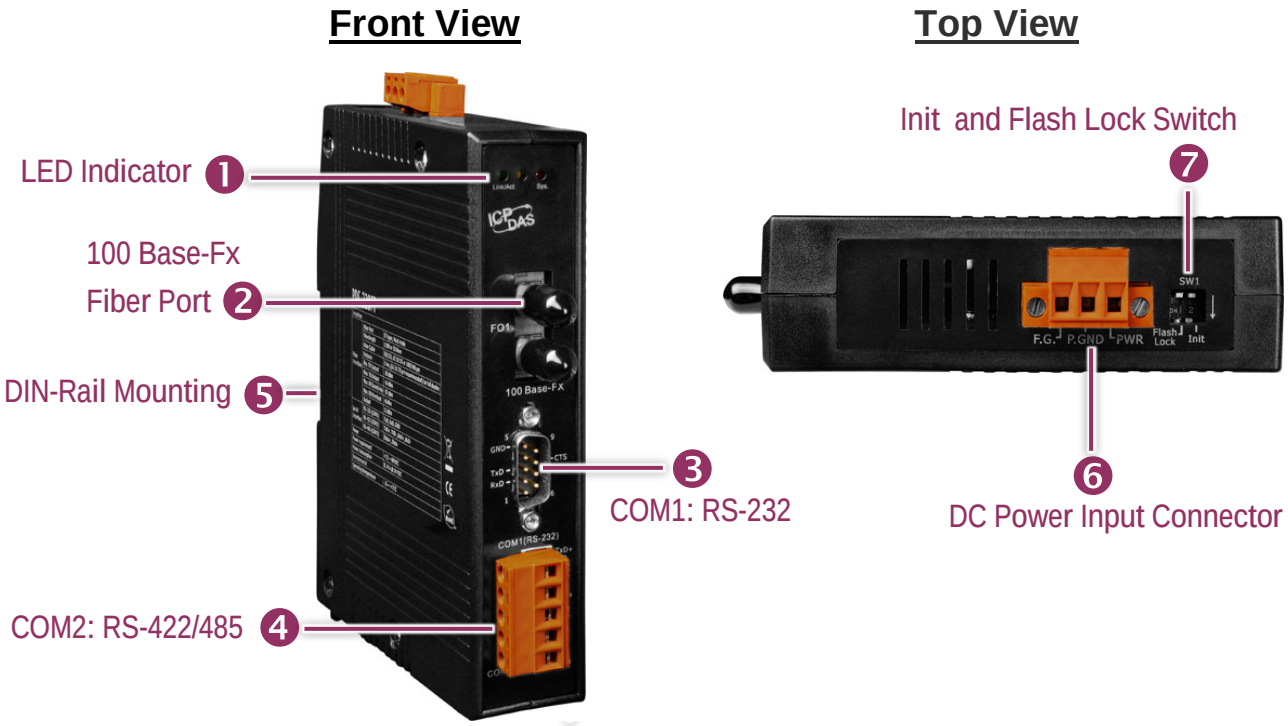
- Adds optical fiber connectivity to serial devices
- "Virtual COM" extends PC COM ports
- Virtual COM for 32/64-bit Windows XP/7/10/2012/2016
- Powerful Programmable Device Server
- Watchdog Timer suitable for use in harsh environments
- Power Reverse Polarity Protection
- Serial Port +/- 4 kV ESD Protection Circuit
- Self-tuner ASIC Controller on the RS-485 port
- 100 Base-Fx (SC/ST connector)
- 3-wire RS-232 Console Port
- Built-in high performance MiniOS7 from ICP DAS
- Low power consumption
- ODM Service is available

2.3 Applications

- Factory Automation
- Building Automation
- Home Automation



2.4 Appearance



1. LED Indicator

Once power is supplied to the PDS-220Fx Series, the **Sys. LED (Red)** indicator will illuminate. When an Ethernet link is detected, the **Link/Act LED (Green)** indicator will be illuminated.

2. 100 Base-Fx Fiber Port

The PDS-220Fx Series provide 2 types of Fiber Optic connectors to choose from including SC and ST. The fiber port is capable of transferring data at long cable distance. An overview of the SC and ST connectors is given below:

Fiber Port	100 Base-FX, ST Connector	100 Base-FX, SC Connector		
Models	PDS-220FT	PDS-220FC	PDS-220FCS	PDS-220FCS-60
Distance	2 km	2 km	30 km	60 km

3. COM1: RS-232

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

4. COM2: RS-422/485

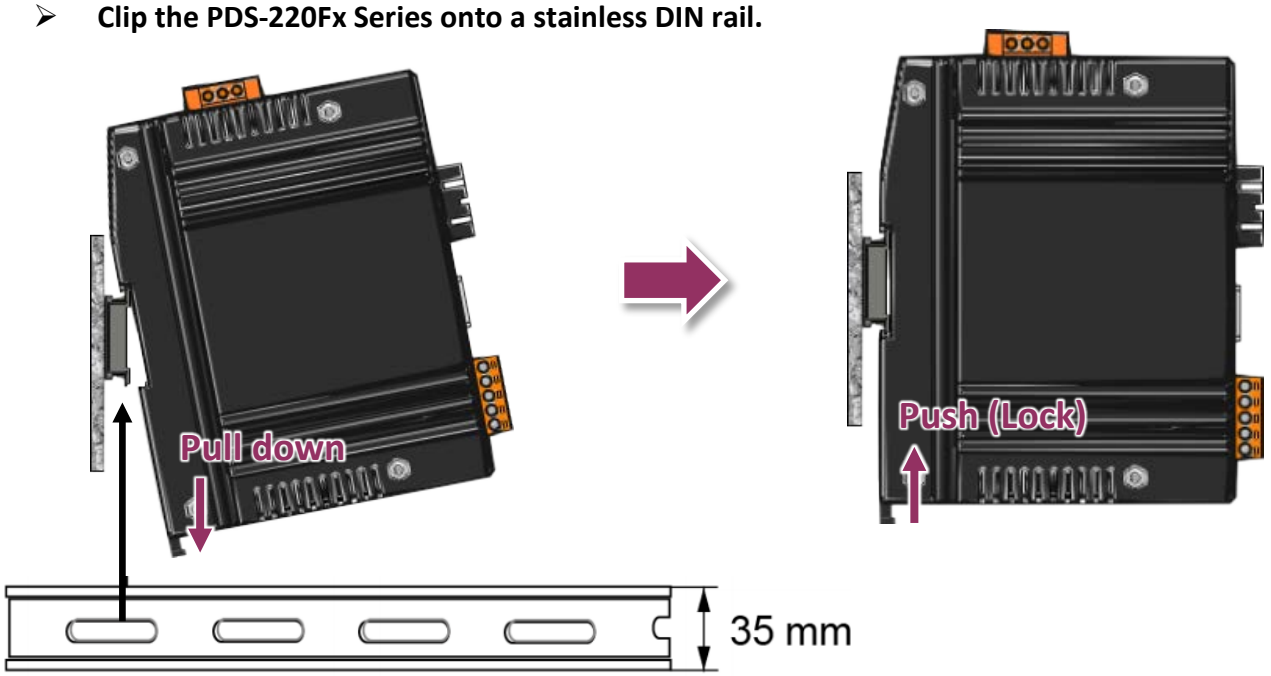
For more detailed information regarding the pin assignments for the COM2 ports, refer to Section 2.6 “Pin Assignments”.

5. DIN-Rail Mounting

The PDS-220Fx Series 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-220Fx Series onto a stainless DIN rail.**



A stainless steel DIN rail is recommended.

6. DC Power Input Connector

Terminal No.	Pin Assignment
03	PWR
02	P.GND
01	F.G.

Power Input: Removable Terminal Block

The definition for **"PWR"** and **"P.GND"** for use as the power supply applies to PDS-220Fx Series.
The valid power voltage range is from +12 to +48 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-220Fx Series 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. It is recommended that the Frame Ground of the PDS-220Fx series module is corrected to the earth ground, such as the ground of an AC power supply, to provide better ESD protection for the module.

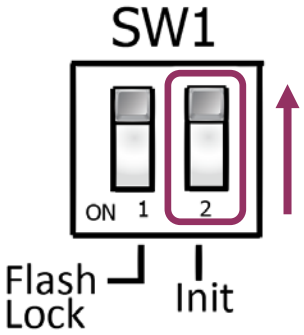
7. SW1 (Init and Flash Lock Switch)

➢ Init Switch

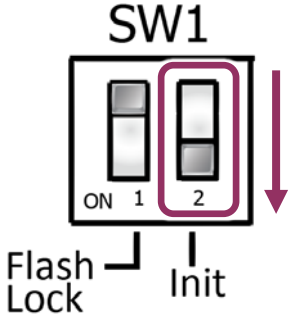
Init Mode: Uses factory settings and allows the firmware to be updated
Run Mode: Firmware operation mode

For PDS-220Fx Series, the operating mode switch is set to the **"Run"** position by default. In order to update the firmware for the PDS-220Fx Series, 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-220Fx must be rebooted after changing the operating mode.

Factory Default is Run Mode



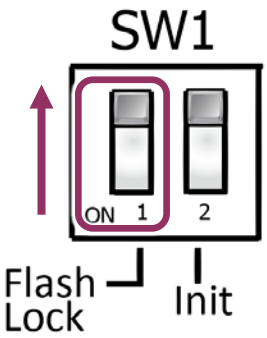
Init Mode



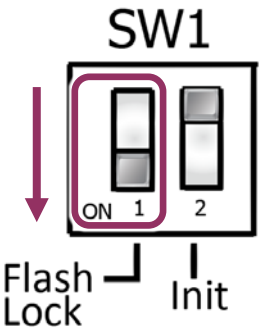
➢ Flash Lock Switch

In factory default settings, the **"Flash Lock"** function is disabled. User can modify the program by yourself or update the firmware. But if need to avoid writing or erasing any file in the flash, user have to enable the **"Flash Lock"** function in the PDS-220Fx Series. Please switch the position to **"Flash LOCK"** and then the PDS-220Fx Series can restrict any write to flash memory.

Factory Default is Non-Lock

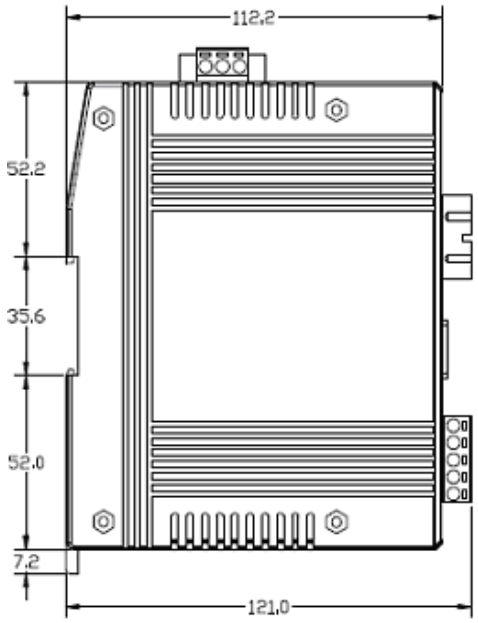


Flash Lock

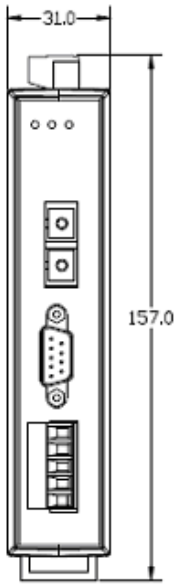


2.5 Dimensions

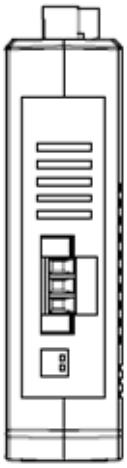
The following diagrams provide the dimensions of the PDS-220Fx Series that can be used as a reference when defining the specifications for any custom enclosures. All dimensions are in millimeters.



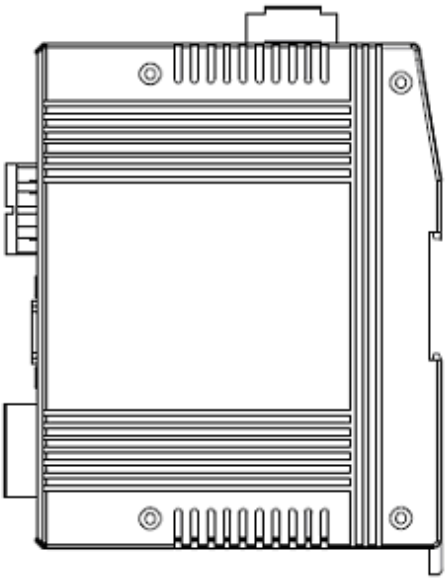
Left Side View



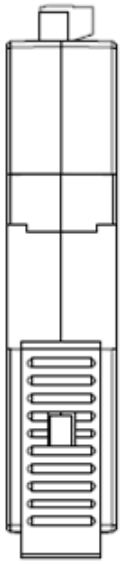
Front View



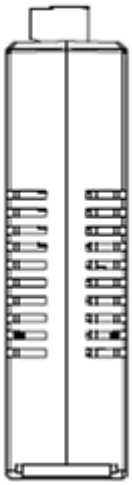
Top View



Right Side View



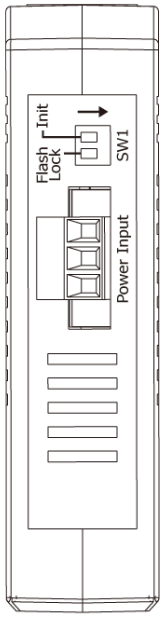
Rear View



Bottom View

2.6 Pin Assignments

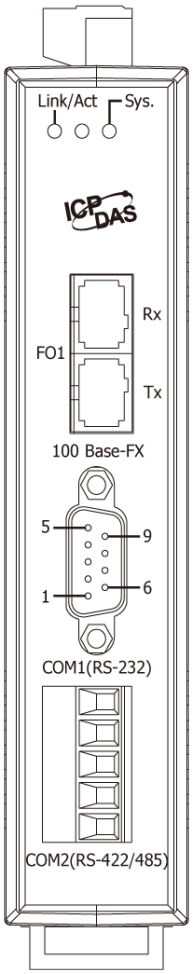
Top View



Terminal No.	Pin Assignment
03	PWR
02	P.GND
01	F.G.

Power Input: Removable Terminal Block

Front View



Pin Assign-ment	Terminal No.		Pin Assign-ment
GND	05	09	--
--	04	08	CTS
TxD	03	07	RTS
RxD	02	06	--
--	01		

COM1: Male DB-9 Connector

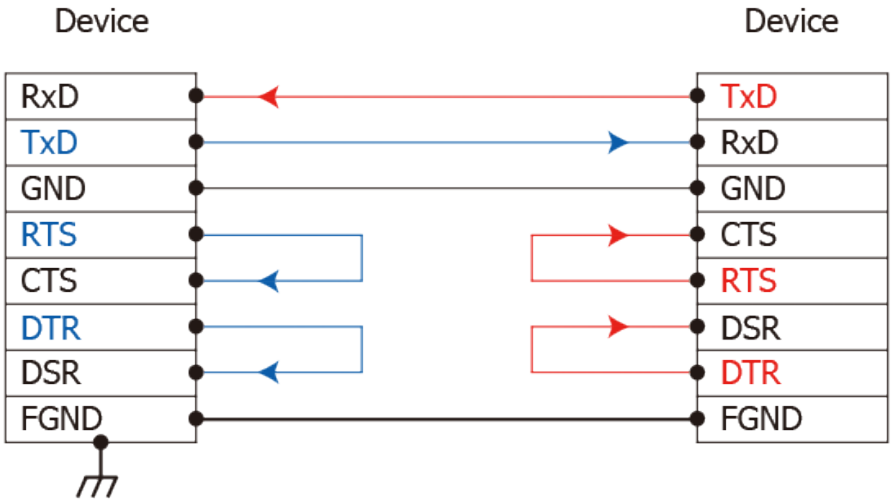
Terminal No.	Pin Assignment
01	TxD+/D+
02	TxD-/D-
03	RxD+
04	RxD-
05	GND

COM2: Removable Terminal Block

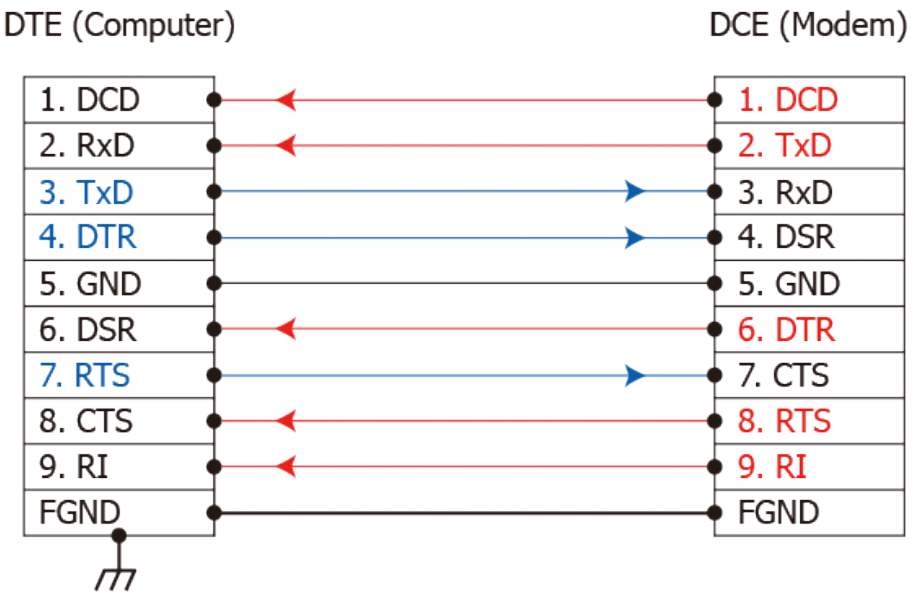
2.7 Wiring Notes for RS-232/485/422 Interfaces

2.7.1 RS-232 Wiring

3-wire RS-232 Wiring



9-wire RS-232 Wiring

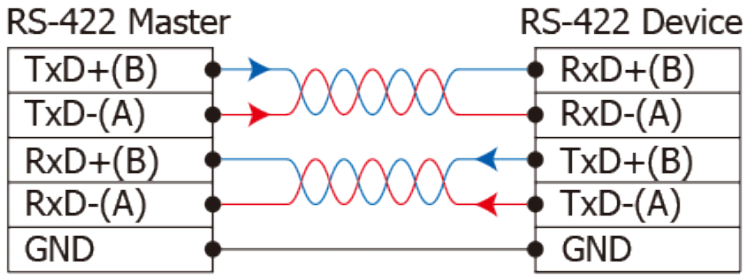


Notes:

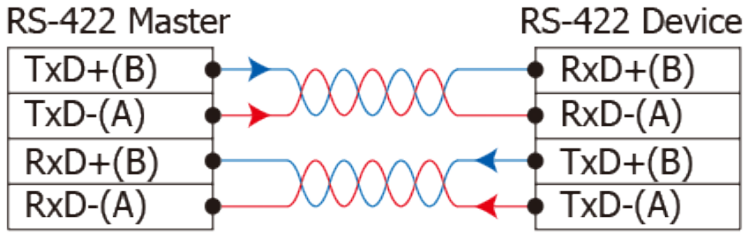
1. **For 3-Wire RS-232 connections, it is recommended to short unused signals such as RTS/CTS and DTR/DSR, since some system may still check the CTS and DSR status.**
2. **FGND is the frame ground that soldered to DB9 metal-shield.**

2.7.2 RS-422 Wiring

4-wire RS-422 Wiring

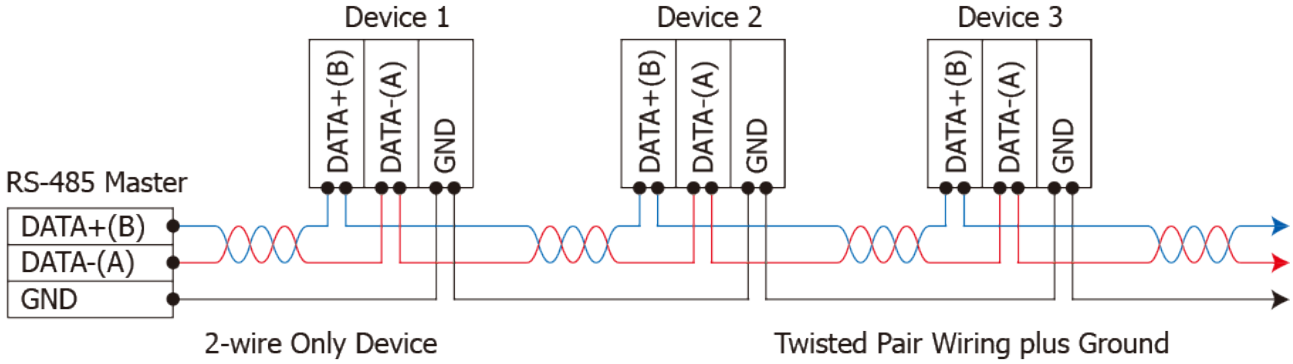


4-wire RS-422 Isolated Wiring

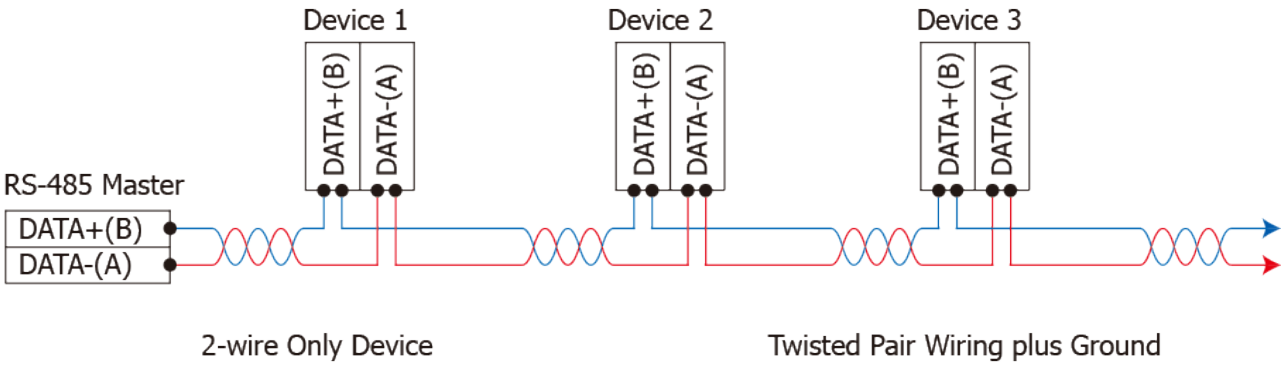


2.7.3 RS-485 Wiring

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-220Fx Module

This chapter provides detailed information about the "Self-Test" process, which is used to confirm that the PDS-220Fx Series 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. Connect both the PDS-220Fx via the Fiber Optic Converter (e.g., NS-200AF Series, Optional) and Host computer to the same sub-network or the same Ethernet Switch.
4. **Short the "TxD+" to "RxD+" and "TxD-" to "RxD-" pins on the COM2** terminal block on the PDS-220Fx for self-test.

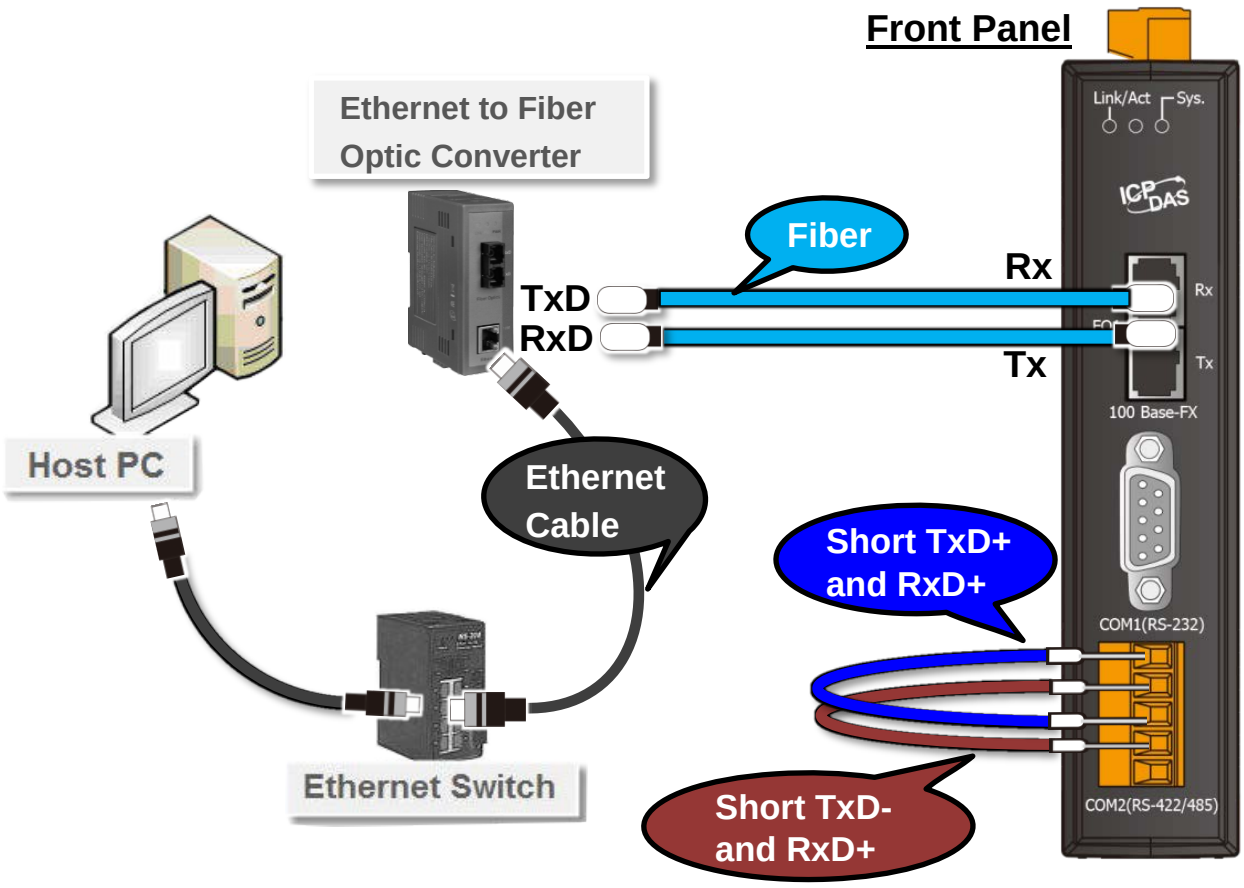


Figure 3-1

5. Check that the Init Switch (SW1) is in the **"Run"** position.
6. **Supply power (+12 VDC ~ +48 VDC)** to the PDS-220Fx.

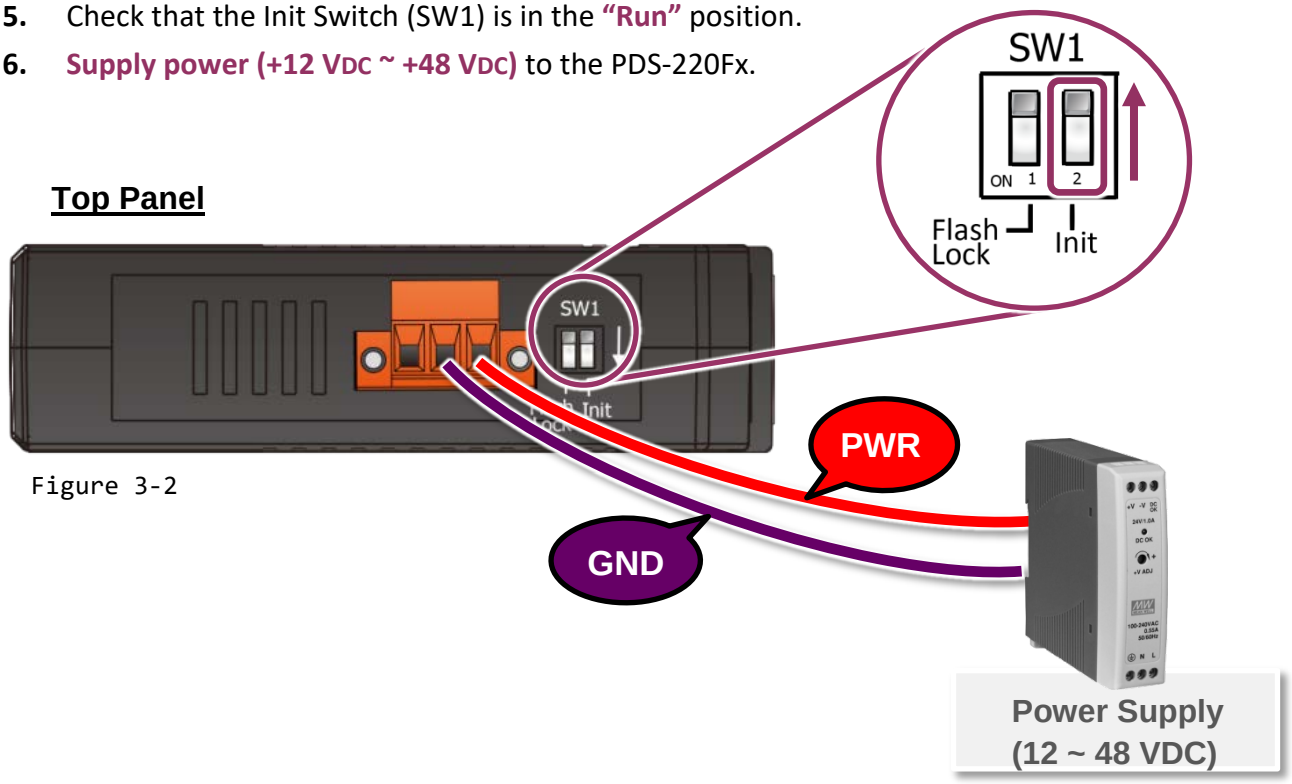


Figure 3-2

7. Verify that the System LED (Sys.) indicator is flashing on the PDS-220Fx.

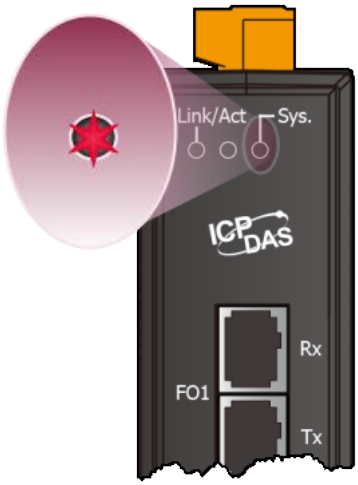


Figure 3-3

3.2 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/

3.3 Configuring Network Settings

1. Double click the VxComm Utility shortcut on the desktop.
2. Click the **"Search Servers"** button to search for the PDS-220Fx.
3. Once the search process is complete, double-click the name of the PDS-220Fx to open the **"Configure Server"** dialog box.

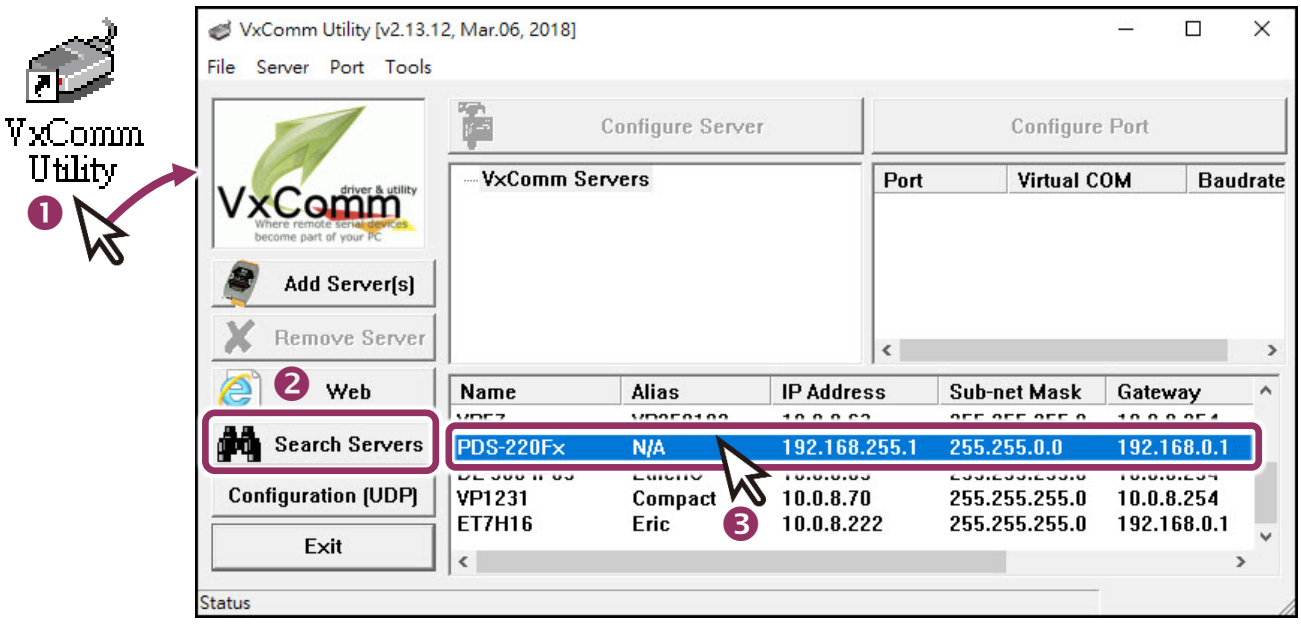


Figure 3-4

Factory Default Settings of PDS-220Fx:

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-220Fx will take effect within 2 seconds. If you don't know the correct network configuration information, contact your Network Administrator to obtain the details.

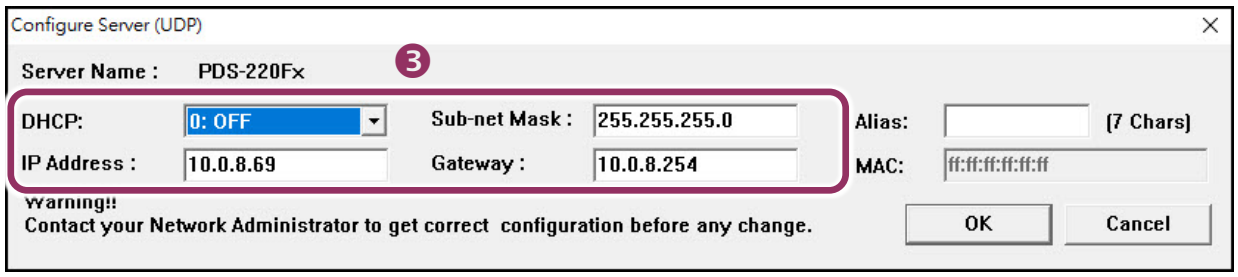


Figure 3-5

3.5 Configuring the Virtual COM Ports

1. Wait 2 seconds and then click the **"Search Servers"** button again to ensure that the PDS-220Fx is working correctly with the new configuration.
2. Click the name of PDS-220Fx to select it.

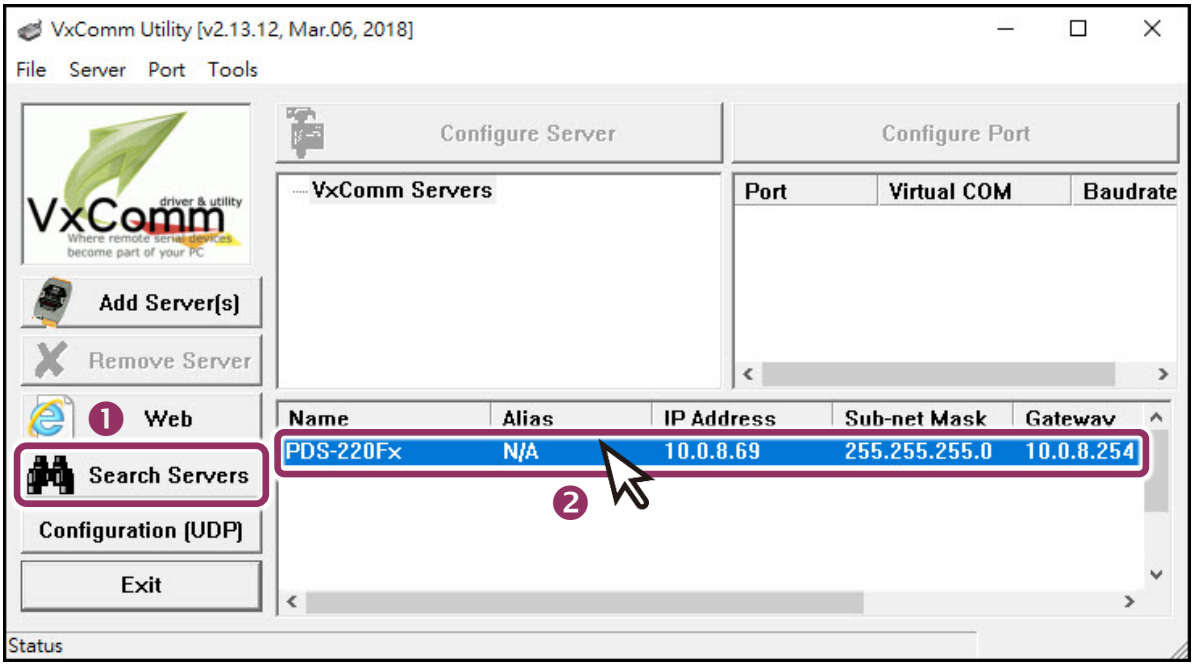


Figure 3-6

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

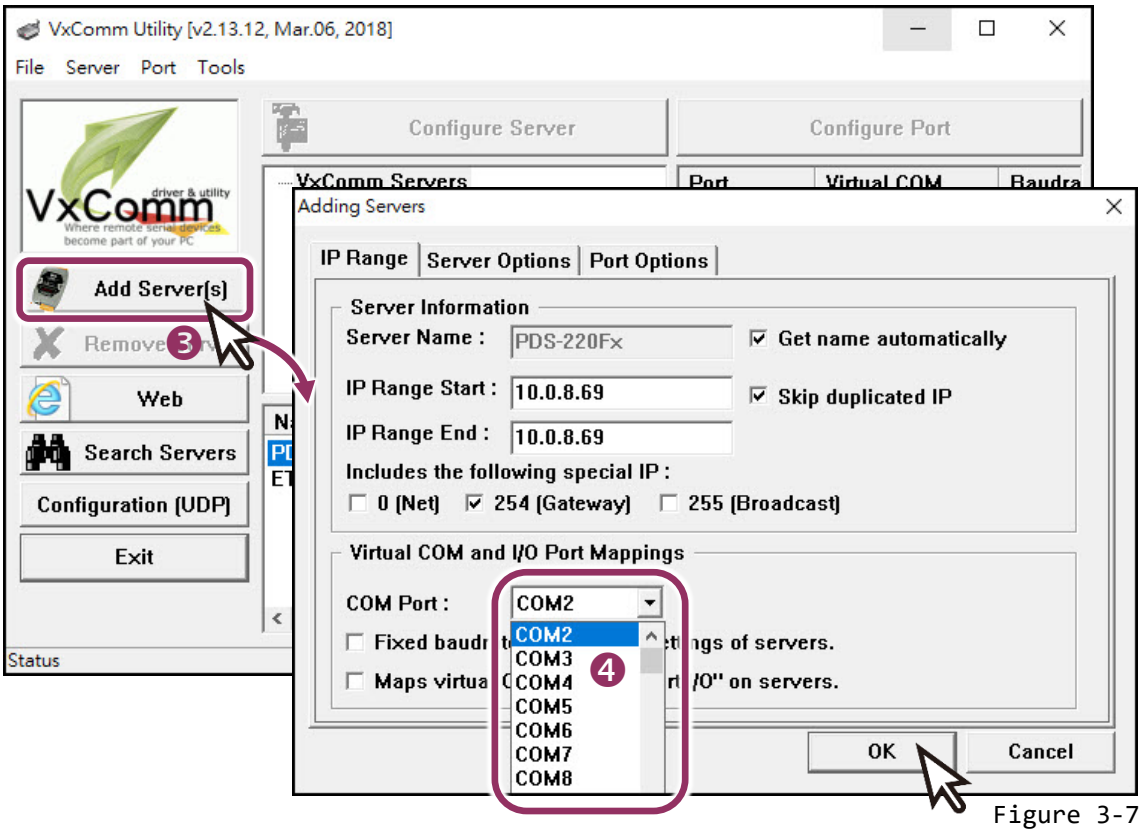


Figure 3-7

5. Click on PDS-220Fx name, and then check the virtual COM port mappings on the PC.

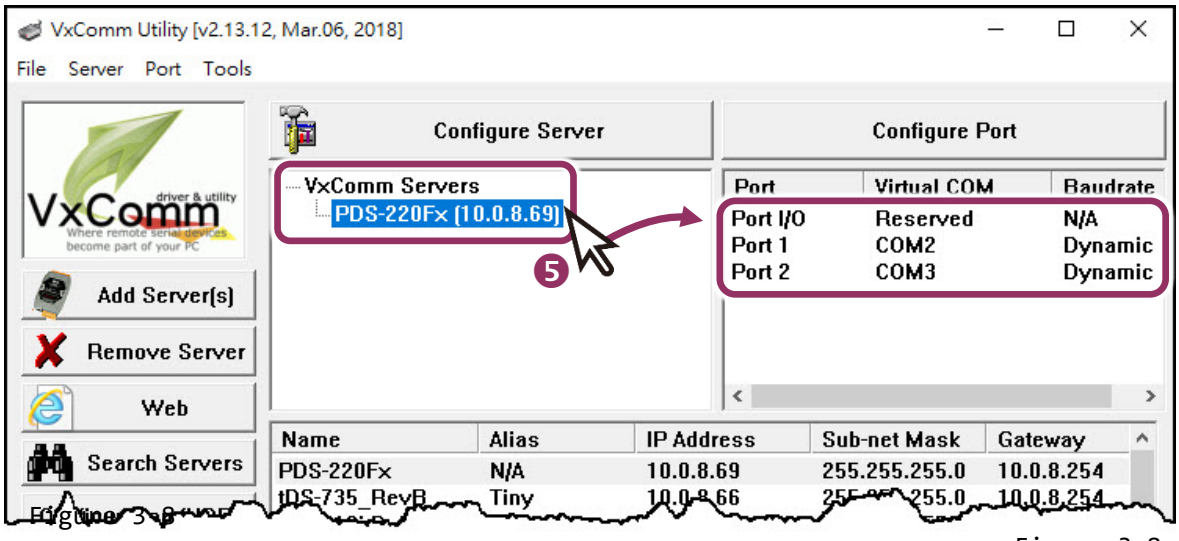


Figure 3-8

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

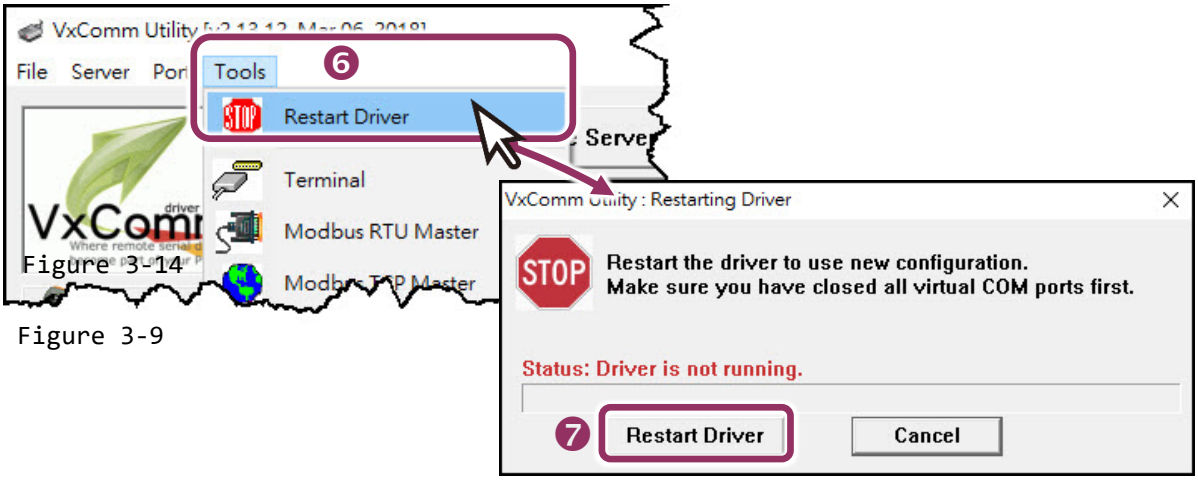


Figure 3-14

Figure 3-9

3.6 Testing your PDS-220Fx Module

1. **Right click Port 2** and choose the "**Open COM Port**" item.

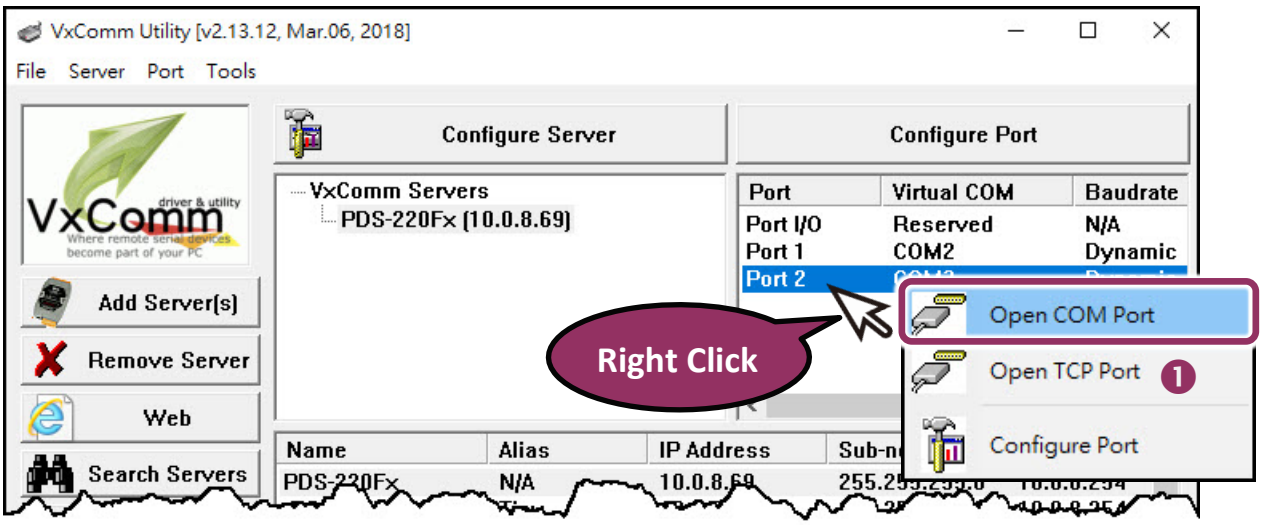


Figure 3-10

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

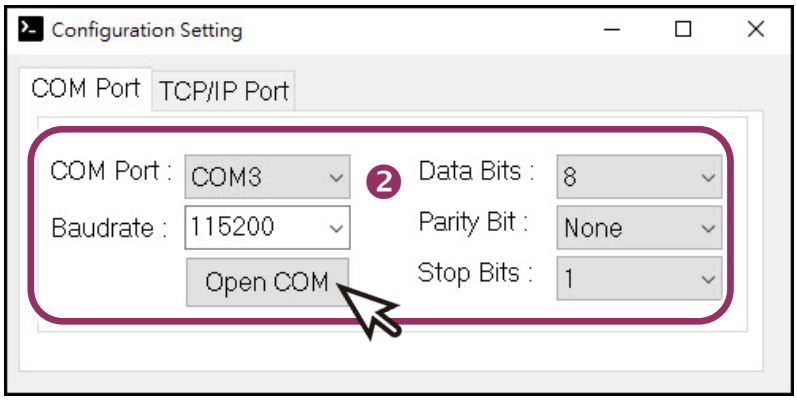


Figure 3-11

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.

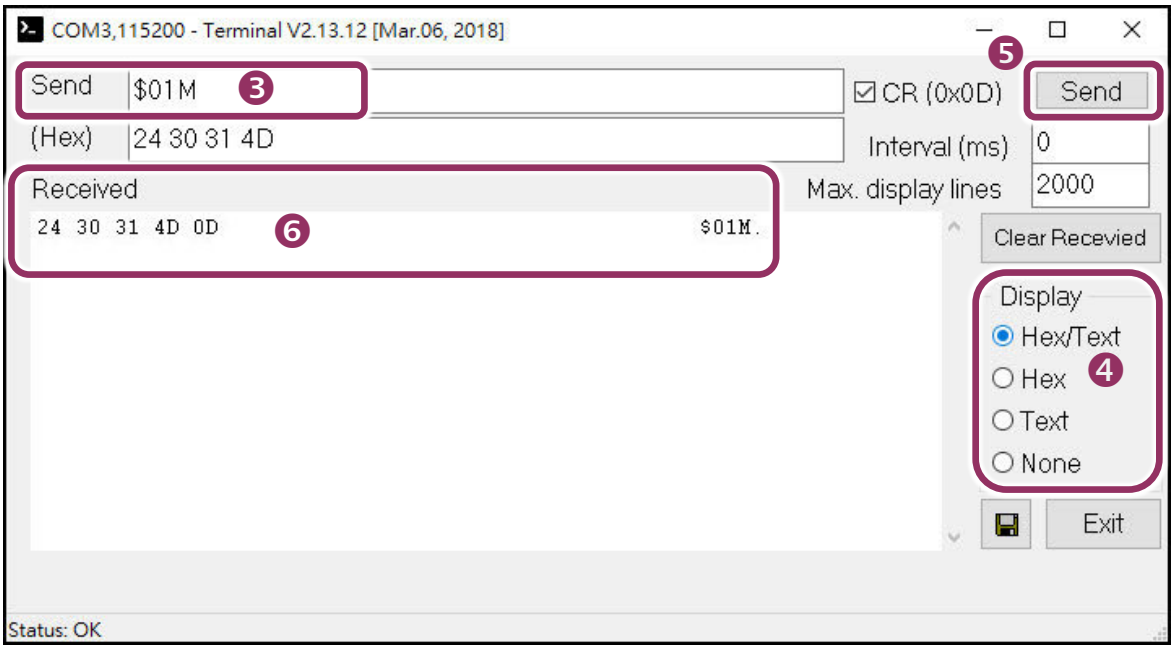


Figure 3-12

4. Web Configuration

Once the PDS-220Fx 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-220Fx Web Server

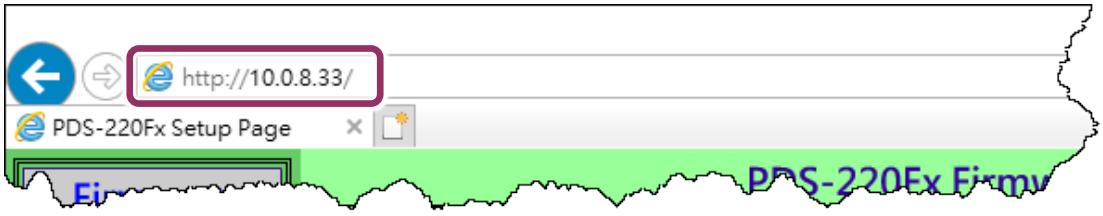
The embedded PDS-220Fx web server can be accessed from any computer that has an Internet connection.

➢ 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-220Fx.

➢ Step 2: Enter the URL for the PDS-220Fx web server

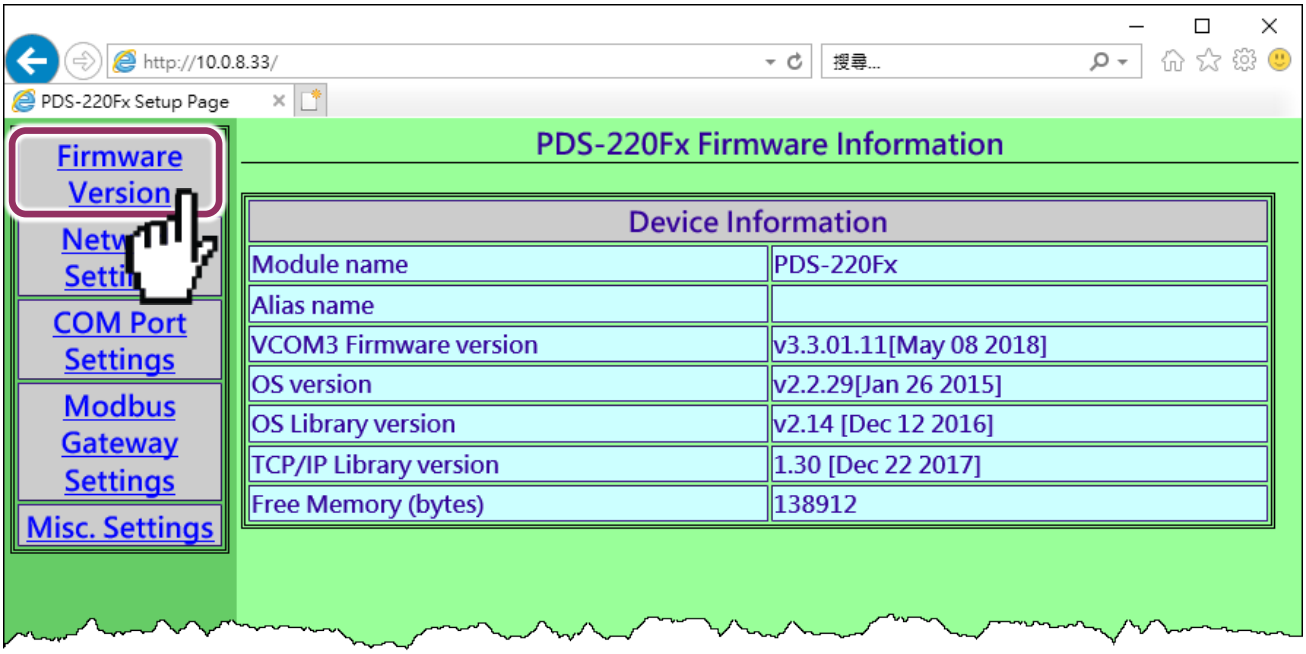
Ensure that you have correctly configured the network settings for the PDS-220Fx (refer to Chapter 3 “Setting up the PDS-220Fx Module” for detailed instructions), and then enter the URL address of the PDS-220Fx in the address bar of the browser or click the **“Web”** button in the VxComm Utility to log in to the web configuration pages.



➢ Step 3: Log in to the PDS-220Fx Web Server

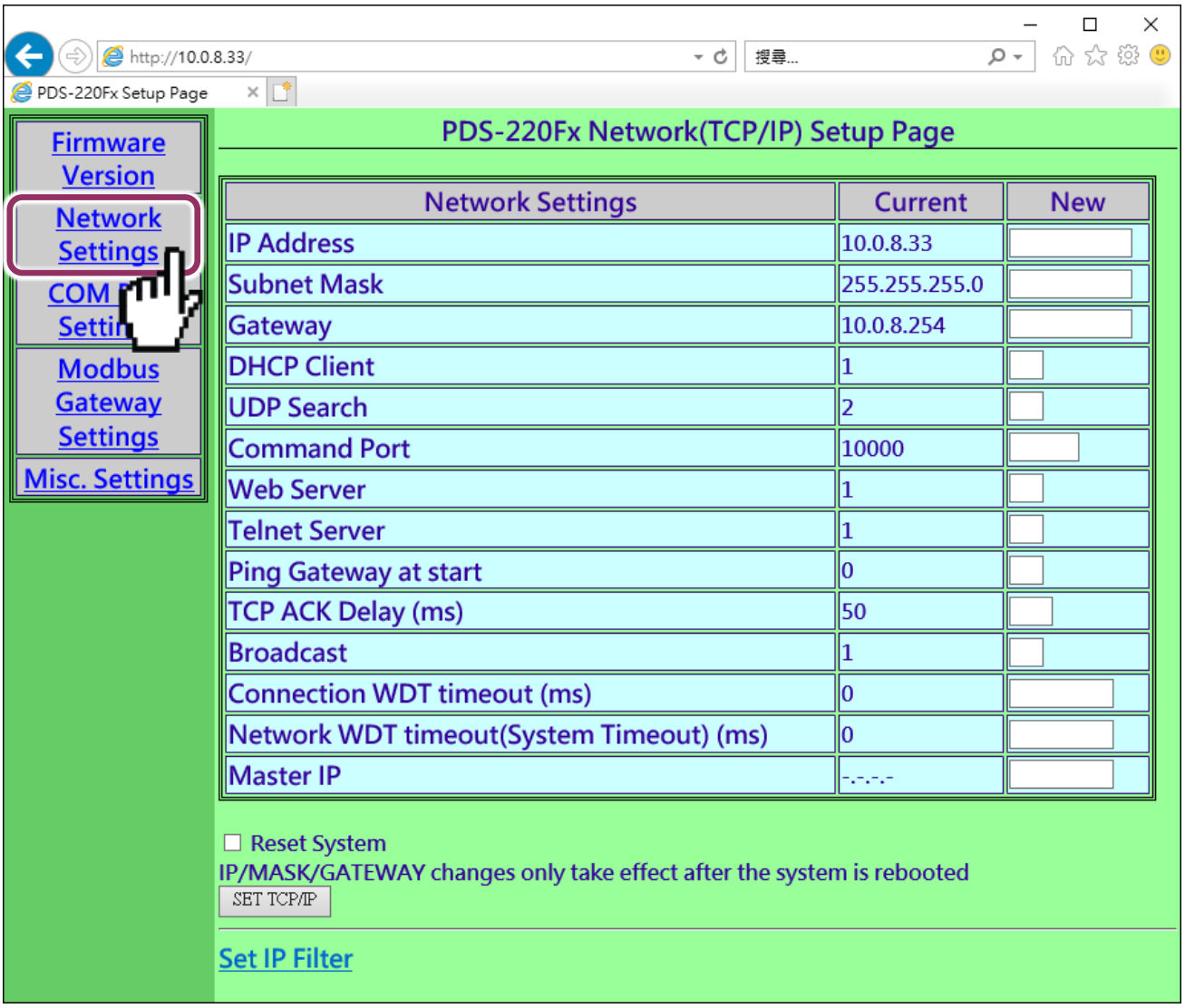
After logging into the PDS-220Fx web server, the main page will be shows **firmware information** of the PDS-220Fx series module.

If you update the firmware for the PDS-220Fx, this page can be used to check the software version information of the PDS-220Fx.



4.2 Network Setting

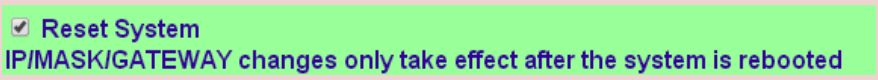
The **Network Settings** section provides information related to most important network settings for the PDS-220Fx, including the **IP Address, Subnet Mask** and **Default Gateway** values, etc. If they do not match, the PDS-220Fx will not operate correctly. If the settings are changed while the module 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:

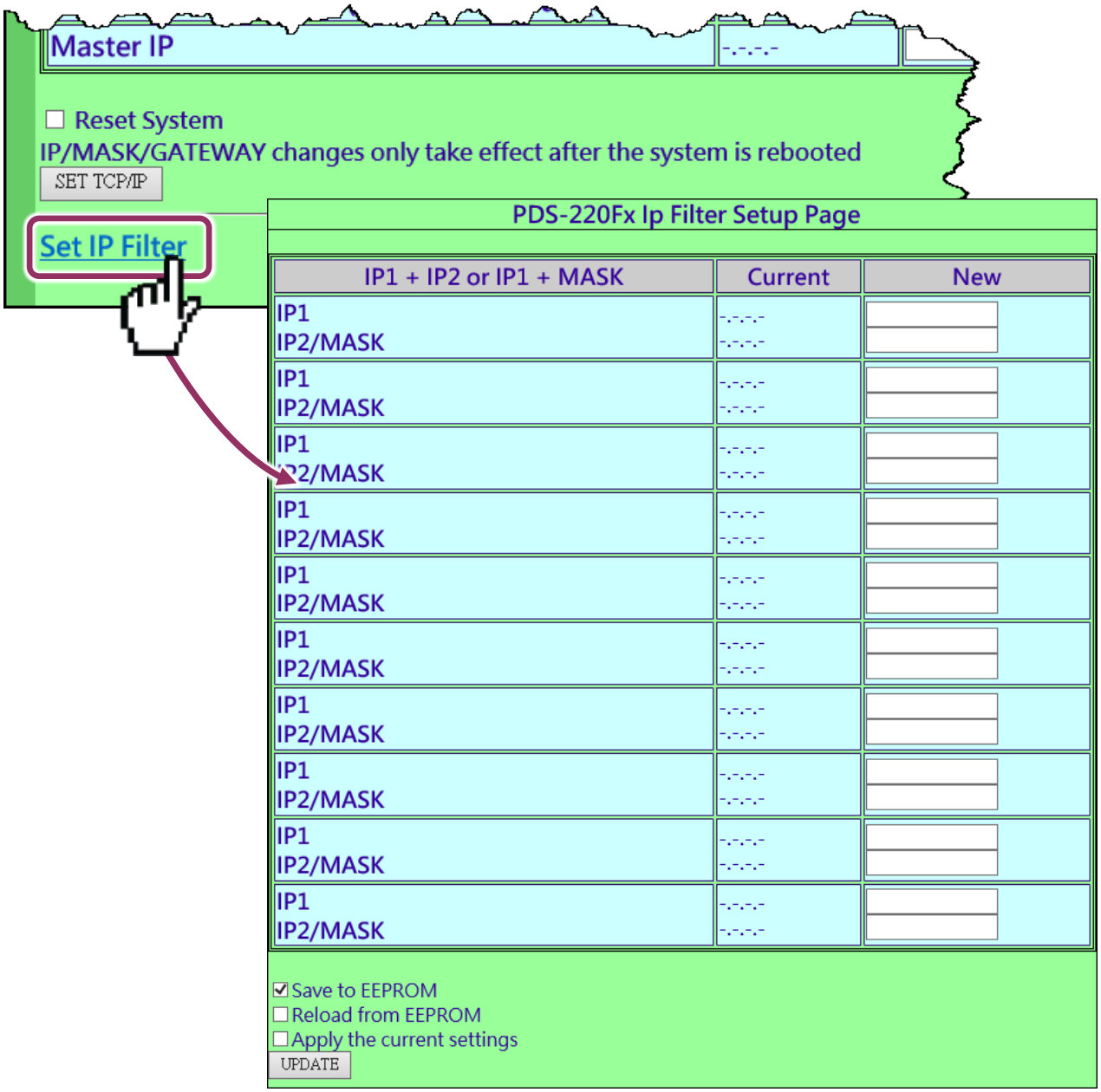
Item	Description	Default
IP Address	If no DHCP server is installed on the network, the network settings can be configured manually.	
Subnet Mask	This parameter is used to assign the subnet mask for the PDS-220Fx. The subnet mask indicates which portion of the IP address is used to identify the local network or subnet.	
Gateway	This parameter is used to assign the IP Address of the Gateway to be used by the PDS-220Fx. 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-220Fx 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-220Fx 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-220Fx 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-220Fx will send a ping packet to the gateway during the power-on stage. It is used to inform the gateway that a PDS-220Fx (itself) has joined the network. 0 = Disabled, 1 = Enabled	0 (Disabled)
TCP ACK Delay (ms)	PDS-220Fx 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-220Fx 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)

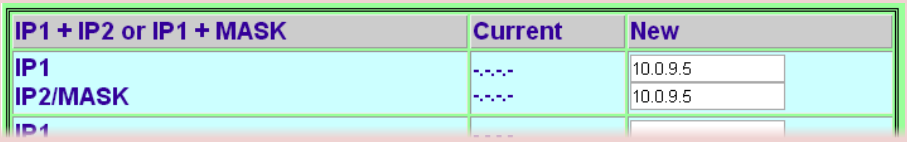
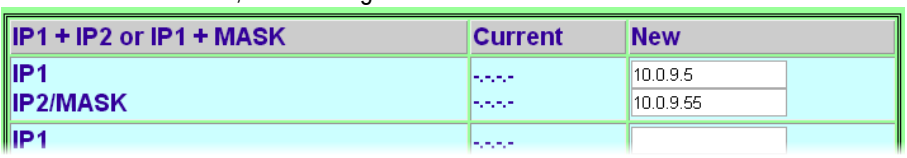
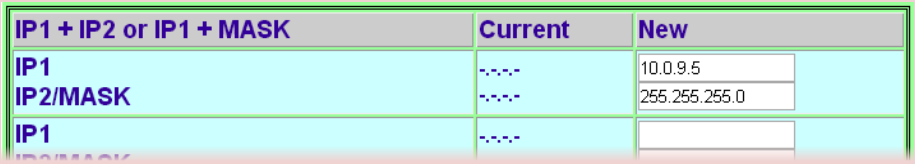
Item	Description	Default
Network WDT timeout (System Timeout) (ms)	If the PDS-220Fx does not receive any data from any of the clients within the period of the "Network WDT timeout", the module will reboot itself. This setting is the same as "SystemTimeout" setting (unit: ms) on Console/Telnet command, 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-220Fx 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-220Fx.	

4.2.1 IP Filter Setting

The **Set IP Filter** limits which client PCs are able to link to the PDS-220Fx 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-220Fx. Any requests from other PCs will be rejected.

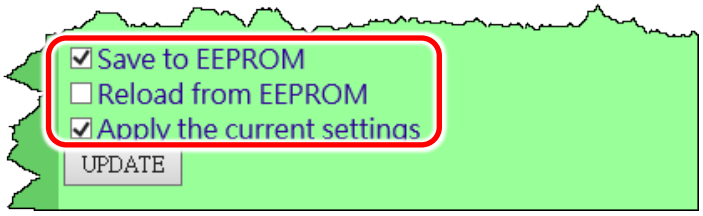


➢ The following is an overview of the parameters contained in the **IP Filter Setup Page** section:

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-220Fx. 
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-220Fx.
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-220Fx. 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

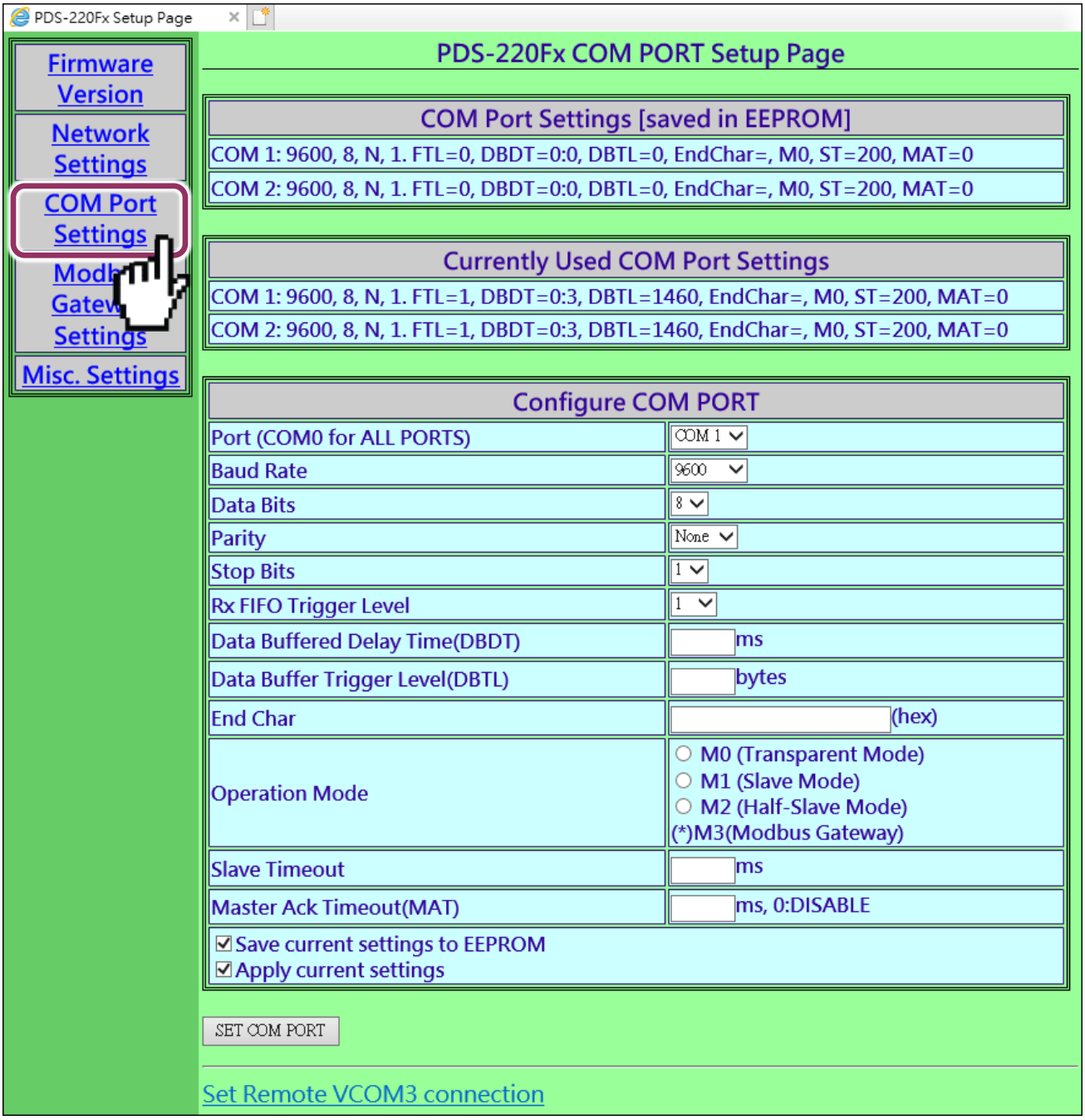
Item	Description
Save to EEPROM	If the "UPDATE" button is clicked with checking "Save to EEPROM" option, the new settings will be saved to the PDS-220Fx only and the new settings will be valid after the next power-on.
Reload from EEPROM	If the "UPDATE" button is clicked with checking "Reload from EEPROM" option, PDS-220Fx 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-220Fx.

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-220Fx.

COM Port Settings [saved in EEPROM]
COM 1: 9600, 8, N, 1. FTL=0, DBDT=0:0, DBTL=0, EndChar=, M0, ST=200, MAT=0
COM 2: 9600, 8, N, 1. FTL=0, 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
COM 2: 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

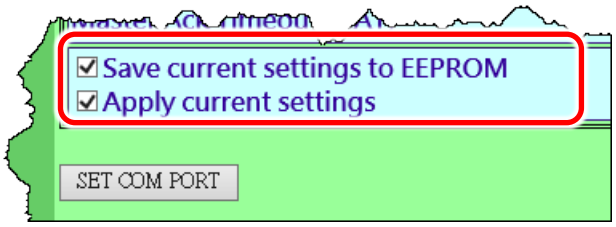
Set Remote VCOM3 connection

➢ 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-220Fx.	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-220Fx will move the data from the COM Port FIFO to the PDS-220Fx. 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-220Fx 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-220Fx 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-220Fx will return a timeout error and process next request.	200 ms
Master ACK timeout (MAT)	If the PDS-220Fx does not receive any data from Slave for a certain period, the PDS-220Fx 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-220Fx 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-220Fx.	

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.

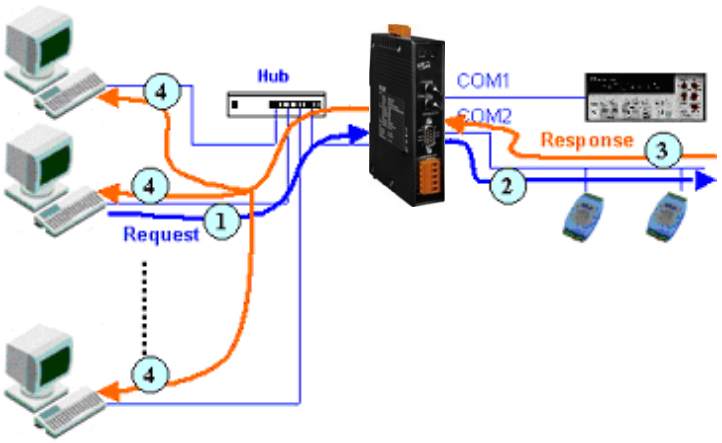


4.3.1 Operation Mode: M0, M1, M2 and M3

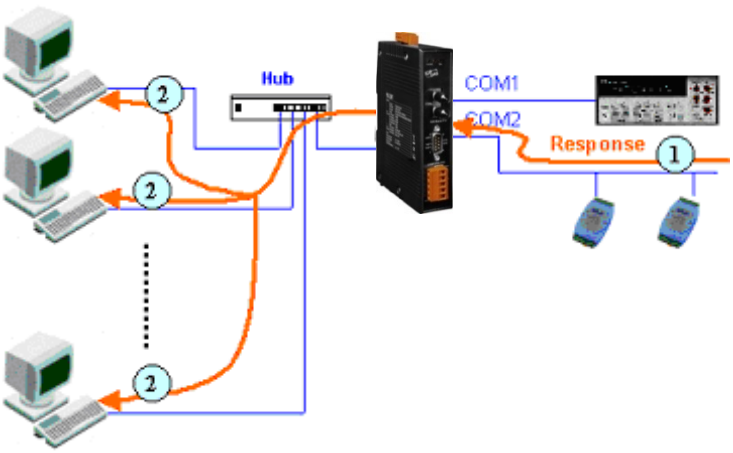
M0: Transparent Mode (Multi-echo, shared)

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-220Fx.

Condition 1: One client sends a request to the PDS-220Fx to access a device. The PDS-220Fx transmits the data from device to each connected client.



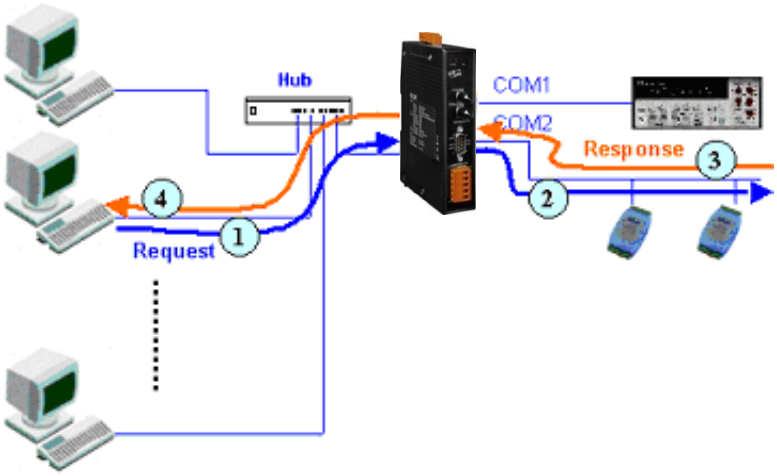
Condition 2: No clients send any requests to the PDS-220Fx. The PDS-220Fx transmits data from the device to each connected client.



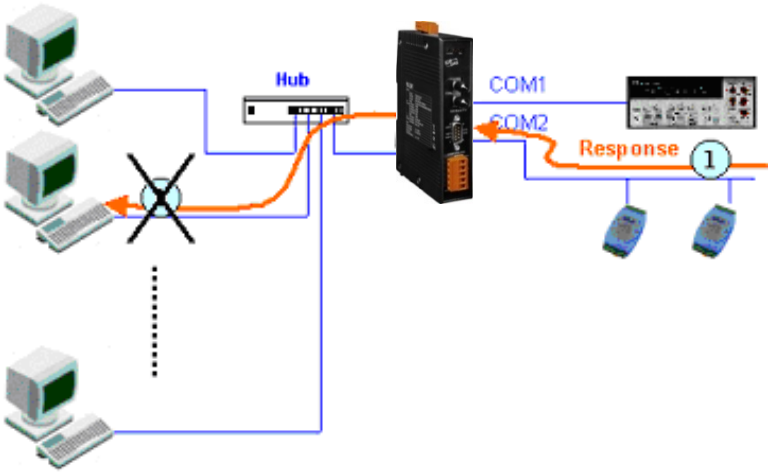
M1: Slave Mode (Single-echo, Non-shared)

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 220Fx, then the module won't return any data to it.

Condition 1: One client sends a request to the PDS-220Fx to access a device. The PDS-220Fx transmits data from the device to the client that requested the service.



Condition 2: No clients send any requests to the PDS-220Fx. The PDS-220Fx doesn't transmit any data from the device to any client.



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

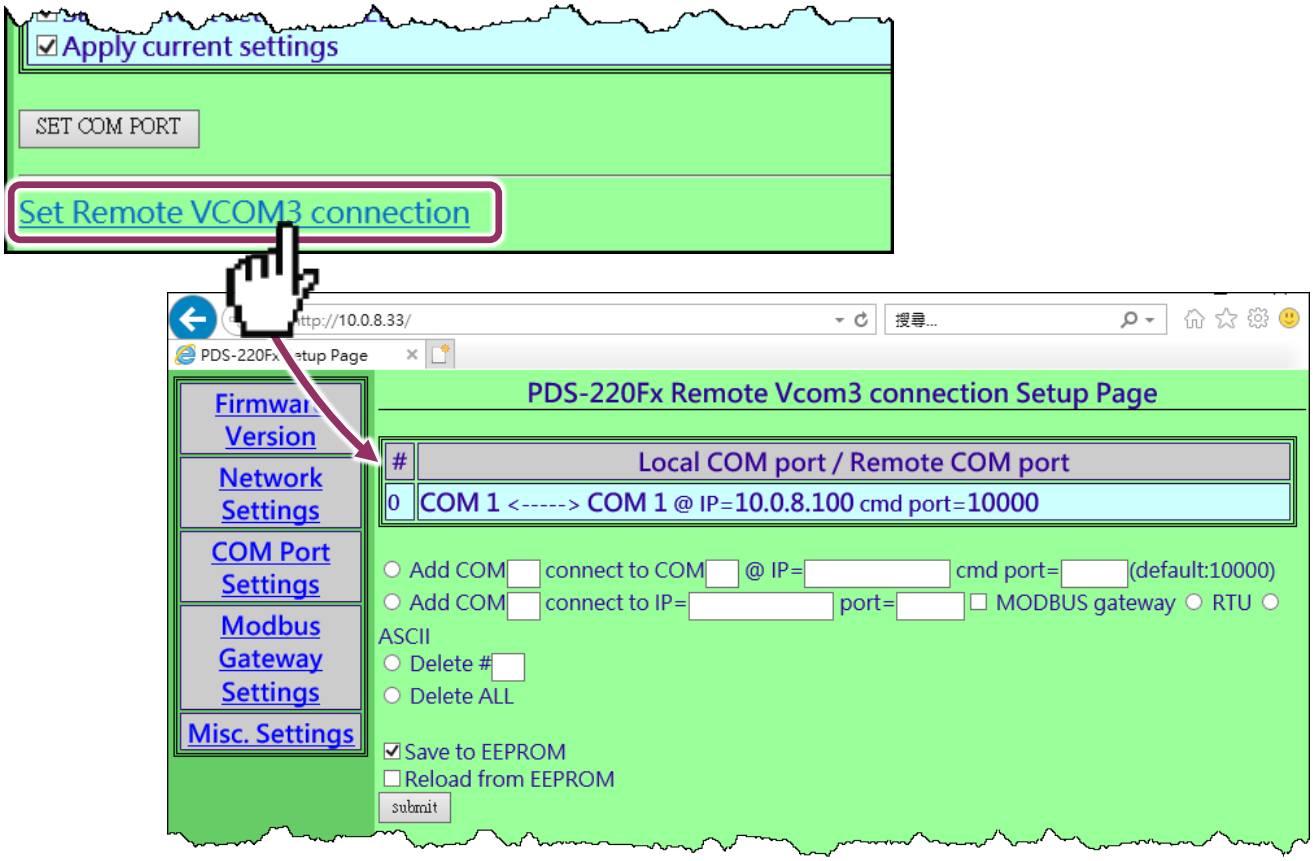
M2 is used for Virtual COM and TCP/IP connections. If only one client connects to the PDS-220Fx, the operation mode same as M0 mode (Multi-echo, shared), refer to Section "M0: Transparent Mode". If there are two or more clients connecting to the PDS-220Fx, the operation mode same as M1 mode (Single-echo, Non-shared), refer to Section "M1: Slave Mode". PDS-220Fx sends data to the last client when data is available but no request from any client.

M3: Modbus Gateway

When PDS-220FX is 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-220Fx, 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:

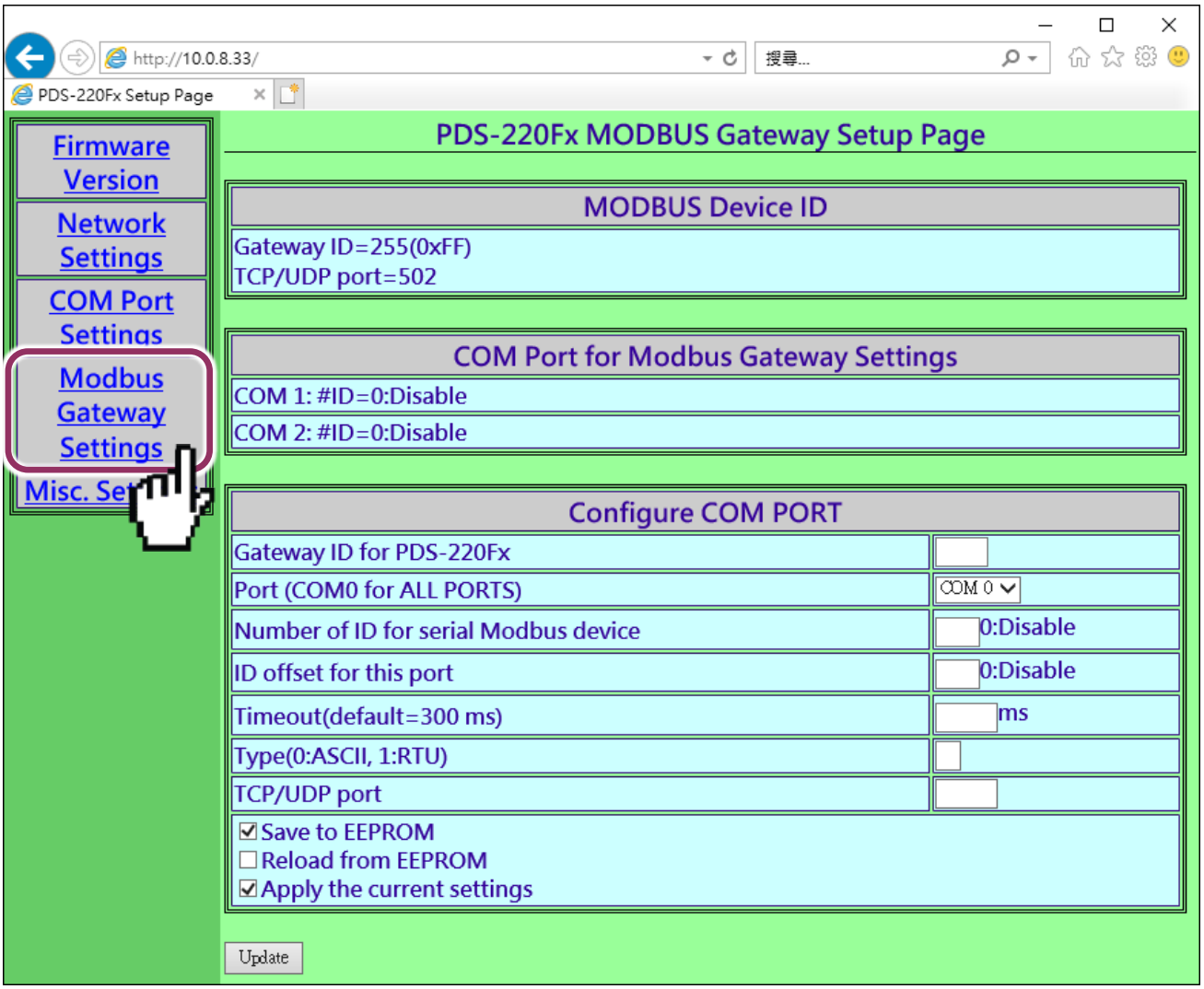
Item	Description
Add COM "Number"	Serial COM port number of the local device (Master)
connect to COM "Number"	Serial COM port number of the remote device (Slave)
@ IP= "IP Address"	IP address of the remote device (Slave)
cmd port= "command port" (default: 10000)	Command Port number of the remote device (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-220Fx 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-220Fx can apply the settings from EEPROM immediately.
Submit	Click this button to save the revised settings to the PDS- PDS-220Fx r.

Note:
After setting the pair-connection functions, please power-on reboot the PDS-220Fx, and then setting is complete.

4.4 Modbus Gateway Settings

The **"Modbus Gateway Settings"** section provides sets the Modbus Gateway functions for PDS-220Fx, 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".



➢ Check the Modbus Device ID of PDS-220Fx.

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

MODBUS Device ID
Gateway 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
COM 2: #ID=0:Disable

➢ The COM Port Settings section:

Configure COM PORT	
Gateway ID for PDS-220Fx	
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	

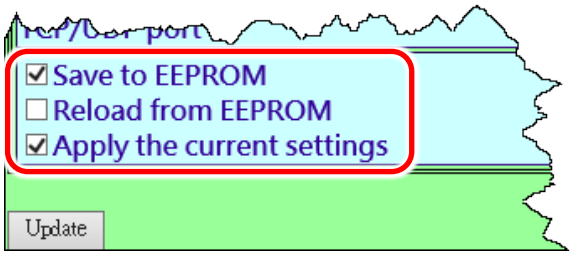
Update

➢ 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-220Fx. ⚠ 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-220Fx.
Number of ID for serial Modbus device	This parameter is used to configure the slave device ID range of your Modbus device. 0 = Disable

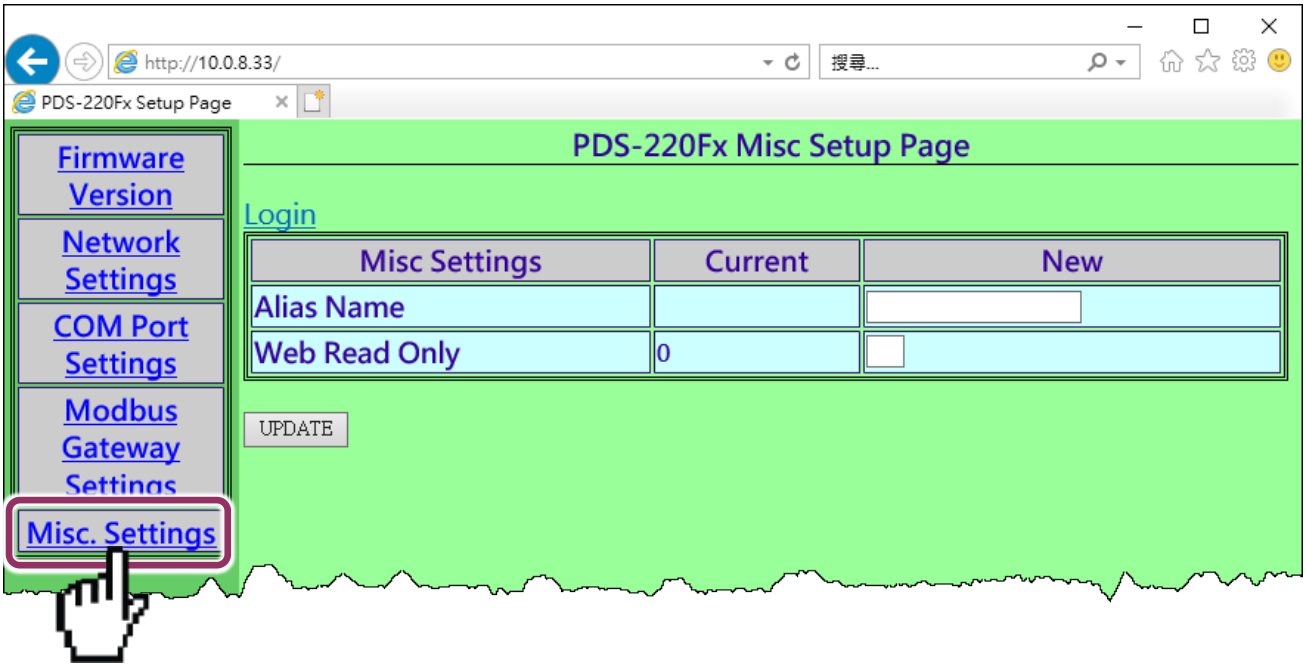
Item	Description
ID offset for this Port	This parameter is used to set the slave device ID offset. For example: Virtual Device ID (Device ID of Modbus command) = 3, Offset = 2, Physical Device ID (Modbus Device) = 5
Timeout (default = 300 ms)	If the PDS series does not receive any data from RTU Slave for a certain period, the PDS-220Fx 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-220Fx 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-220Fx 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-220Fx.

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.



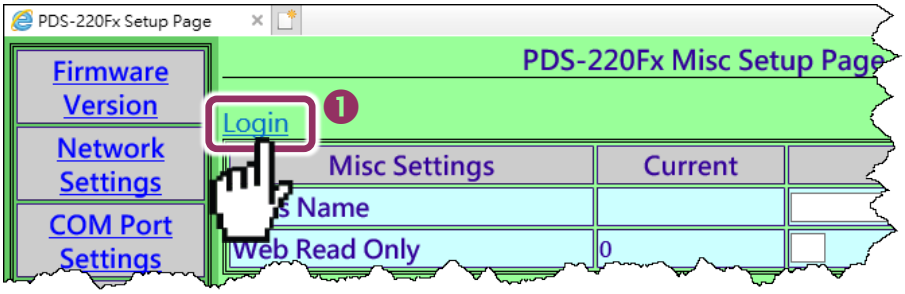
➢ The following is an overview of the parameters contained in the **Misc. Setup Page** section:

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-220Fx 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-220Fx. The default setting should be 0 (Disabled). 0 = Disabled, 1 = Enabled
UPDATE	Click this button to save the revised settings to the PDS-220Fx.

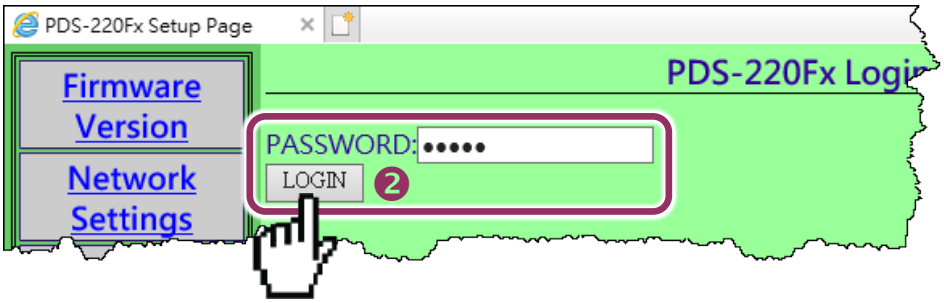
4.5.1 Disable the "Web Read Only" Function

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

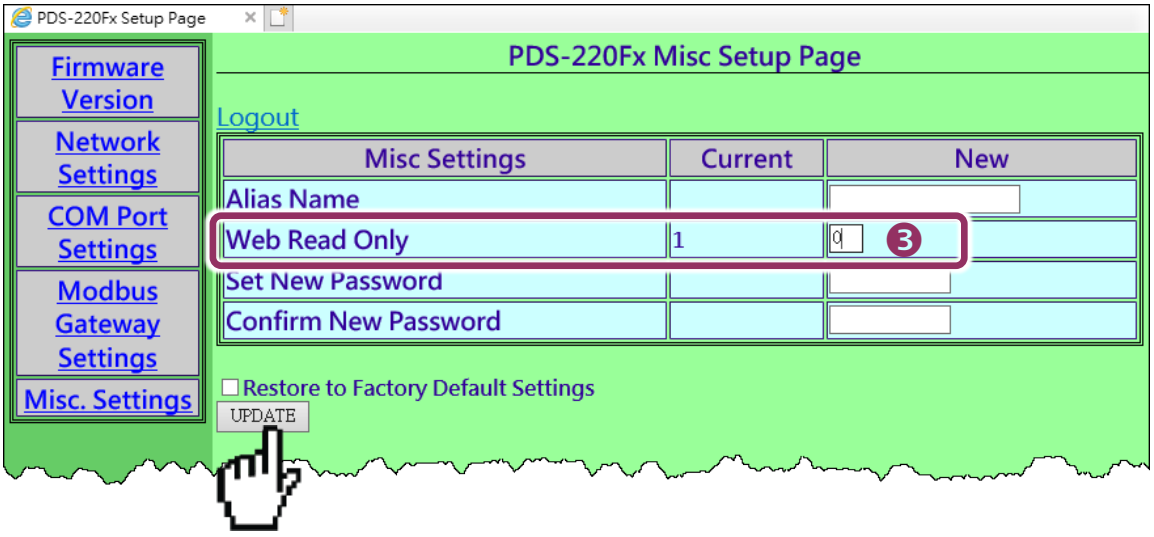
Step 1: Click the "**Login**" tab at the PDS-220Fx Misc Setup Page to proceed to the Login Page.



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".

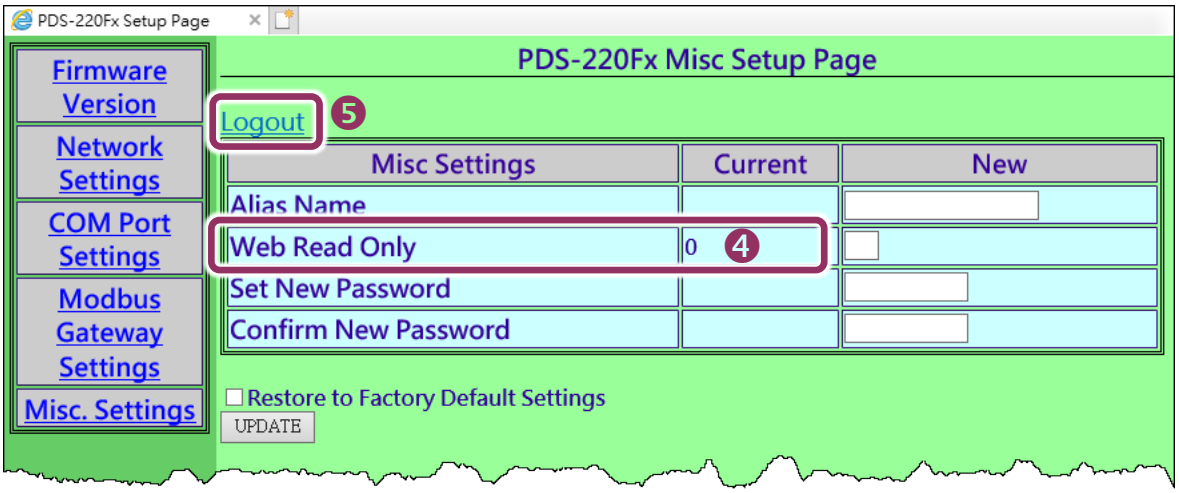


Step 3: Set the new "**Web Read Only**" **properly = 0** and click the "**UPDATE**" button to update the settings.



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

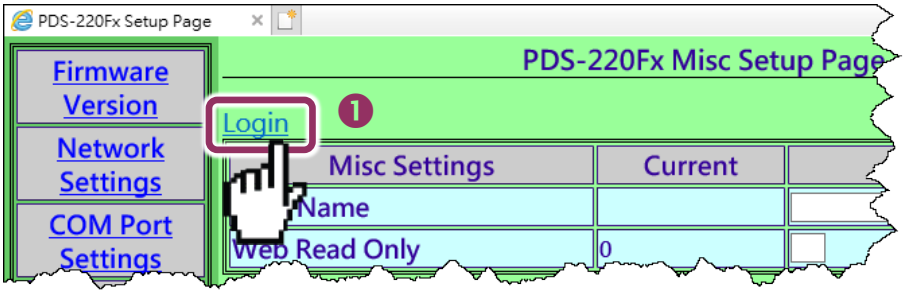
Step 5: Click "**Logout**" to complete the operation.



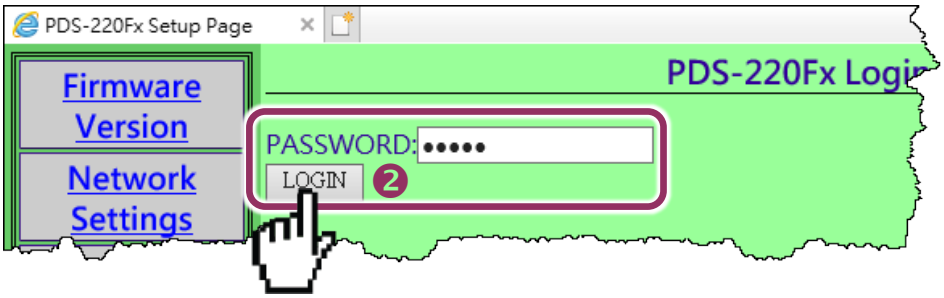
4.5.2 Change Password

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

Step 1: Click the "**Login**" tab at the PDS-220Fx Misc Setup Page to proceed to the Login Page.



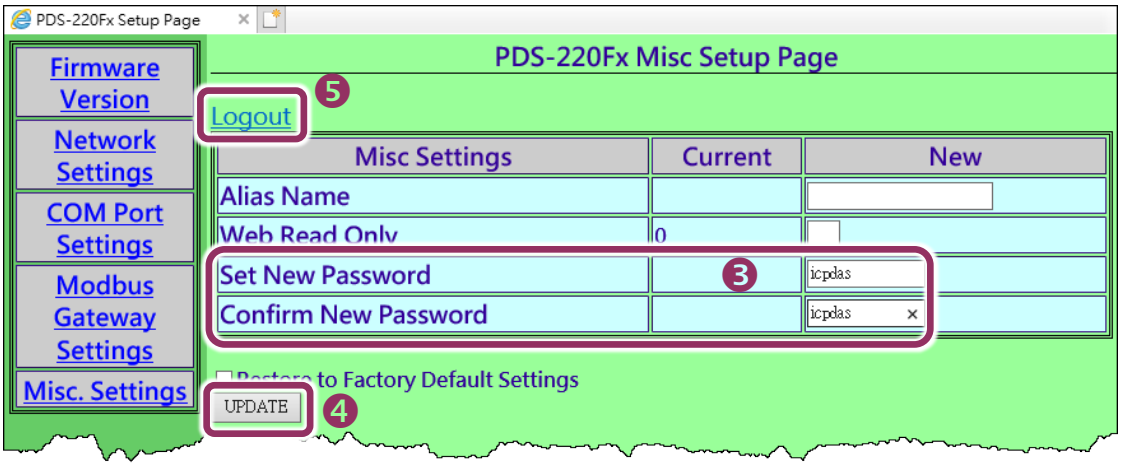
Step 2: Enter the password in the **"PASSWORD:"** field (use the default password **"admin"**) and click the "**LOGIN**" button to proceed to the settings page.



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.

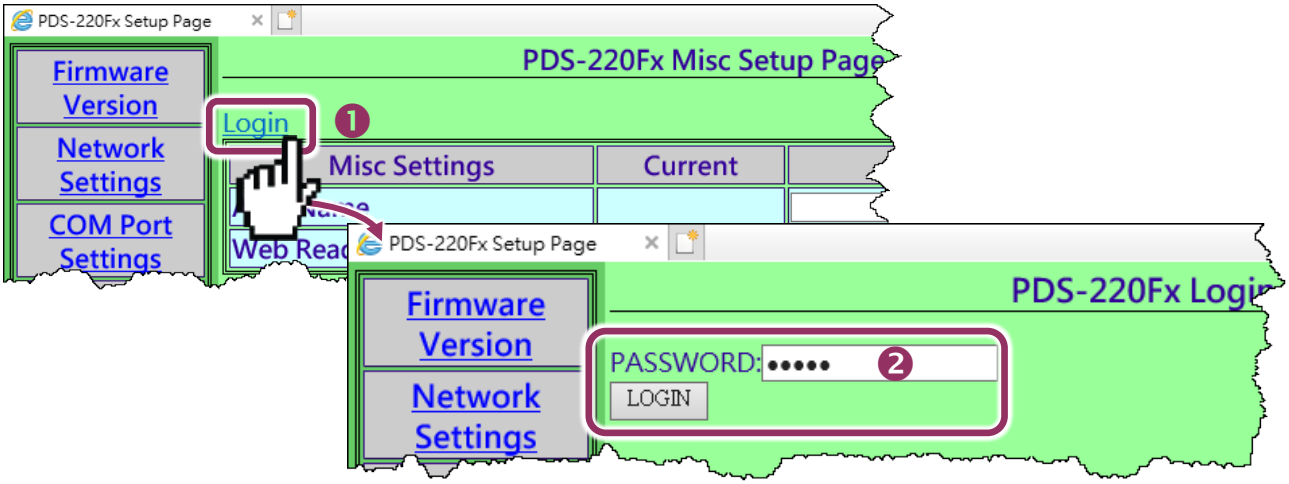


4.5.3 Restore to Factory Default Settings

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

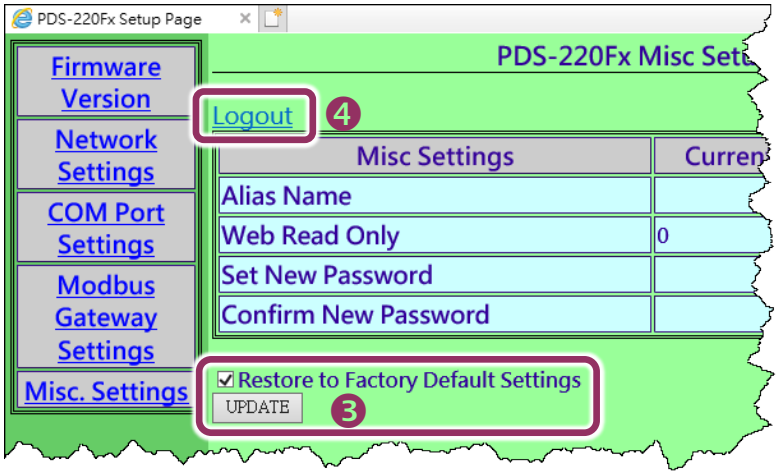
Step 1: Click the "**Login**" tab at the PDS-220Fx Misc Setup Page to proceed to the Login Page.

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-220Fx.



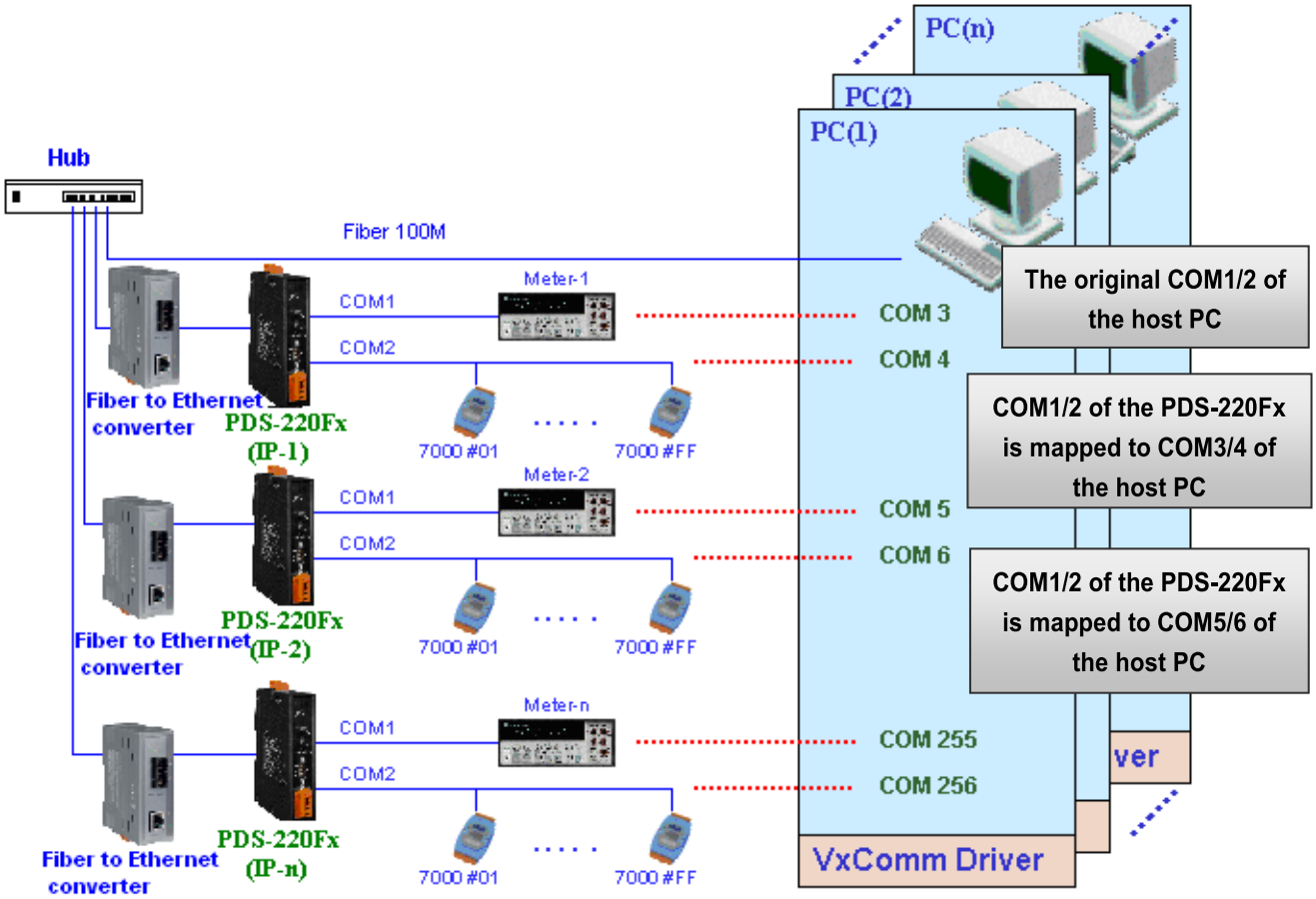
PDS-220Fx Factory Default Settings	
Network Settings	
IP Address	192.168.255.1
Gateway Address	192.168.0.1
Subnet Mask	255.255.0.0
DHCP	Disabled
Basic Settings	
Alias	N/A

Note:
User can restore PDS-220Fx 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-220Fx to factory setting. It requires rebooting the PDS220Fx for loading new configuration (includes default password).

5. Typical Applications

5.1 Virtual COM Application

The PDS-220Fx is designed to link RS-232/422/485 devices to an Ethernet network. The VxComm utility allows the built-in PDS-220Fx 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 Fiber I/O Applications

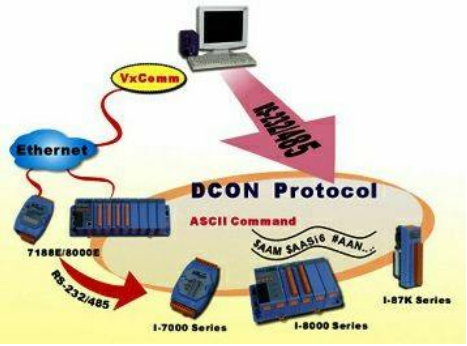
The PDS-220Fx series provides fiber optic I/O solution:

➢ 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-220Fx can be used to link to I-7000 series modules.

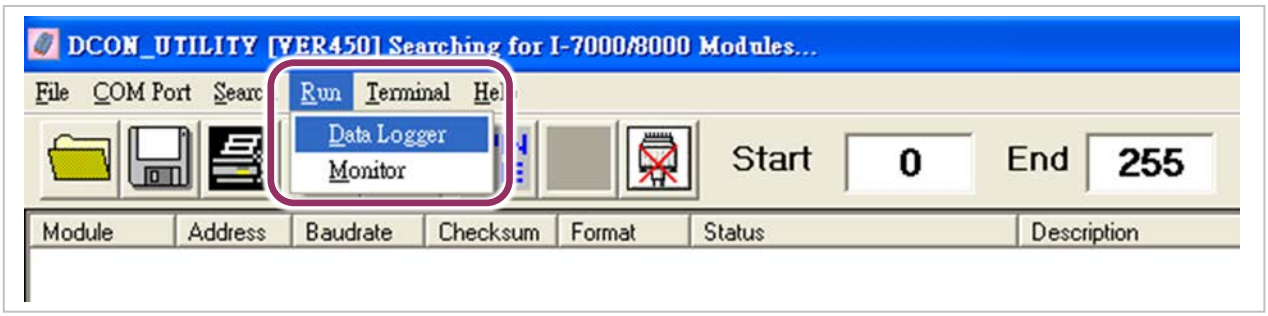
By using VxComm technology, programs that support serial devices on the host PC can be upgraded from an RS-485 network to an Ethernet network without requiring any modifications to the program.

➢ Configurable Ethernet Data Logger

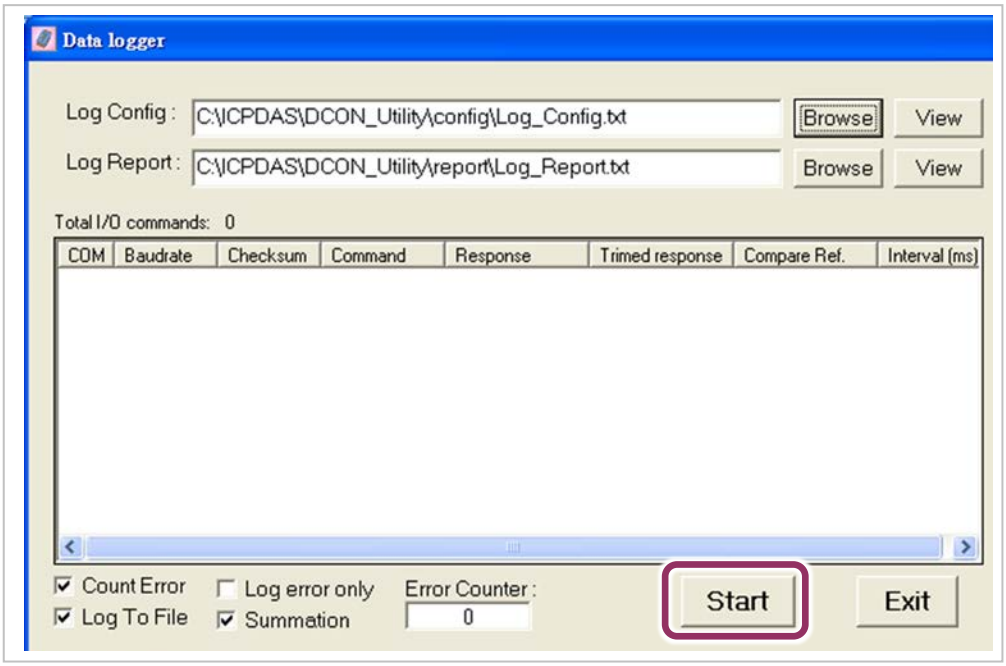


Using the VxComm driver, the PDS-220Fx + 7000 modules can be virtualized to become COM Port + 7000 modules located on the host PC, and then the Data Logger in the DCON Utility can be used to access data related to the I-7000 from the Ethernet. Signal data originating from the I-7000 modules can be analyzed 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:

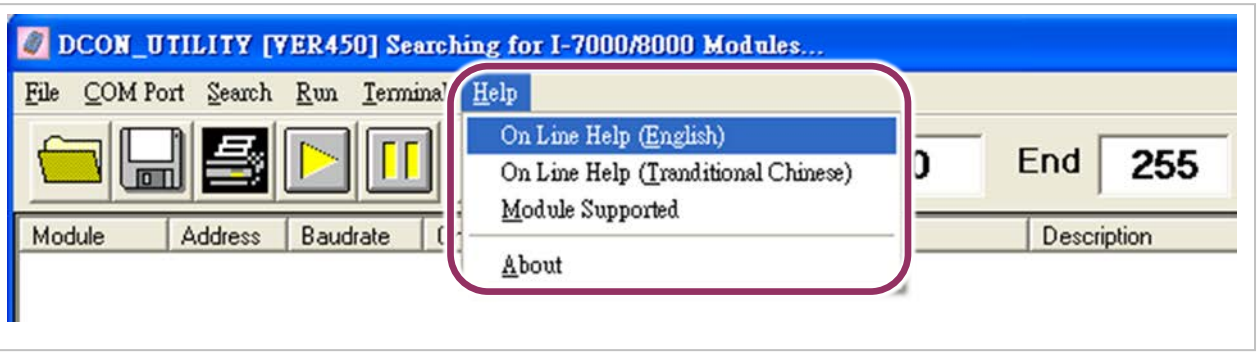
Microsoft Excel - report.log

File Edit View Insert Format Tools Data Window Help

A1 = Start log at

	A	B	C	D	E	F	G	H	I	J
1	Start log at	11/26/01	##########							
2	14:36:1:0	2	9600	0	#010	>+000.00	>+000.62	1000		
3	14:36:2:40	2	9600	0	#010	>+000.00	>+000.65	1000		
4	14:36:3:30	2	9600	0	#010	>+000.00	>+000.65	1000		
5	14:36:4:20	2	9600	0	#010	>+000.00	>+000.60	1000		
6	14:36:5:10	2	9600	0	#010	>+000.00	>+000.66	1000		
7	14:36:6:0	2	9600	0	#010	>+000.00	>+000.66	1000		
8	14:36:7:40	2	9600	0	#010	>+000.00	>+000.66	1000		
9	14:36:8:30	2	9600	0	#010	>+000.00	>+000.71	1000		
10	14:36:9:20	2	9600	0	#010	>+000.00	>+000.69	1000		
11	14:36:10:1	2	9600	0	#010	>+000.00	>+000.67	1000		
12	14:36:11:0	2	9600	0	#010	>+000.00	>+000.71	1000		
13	14:36:12:4	2	9600	0	#010	>+000.00	>+000.65	1000		
14	14:36:13:3	2	9600	0	#010	>+000.00	>+000.72	1000		
15	14:36:14:2	2	9600	0	#010	>+000.00	>+000.66	1000		
16	14:36:15:1	2	9600	0	#010	>+000.00	>+000.60	1000		
17	14:36:16:0	2	9600	0	#010	>+000.00	>+000.70	1000		
18	14:36:17:4	2	9600	0	#010	>+000.00	>+000.65	1000		
19	14:36:18:3	2	9600	0	#010	>+000.00	>+000.72	1000		
20	14:36:19:2	2	9600	0	#010	>+000.00	>+000.73	1000		

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-220Fx 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.

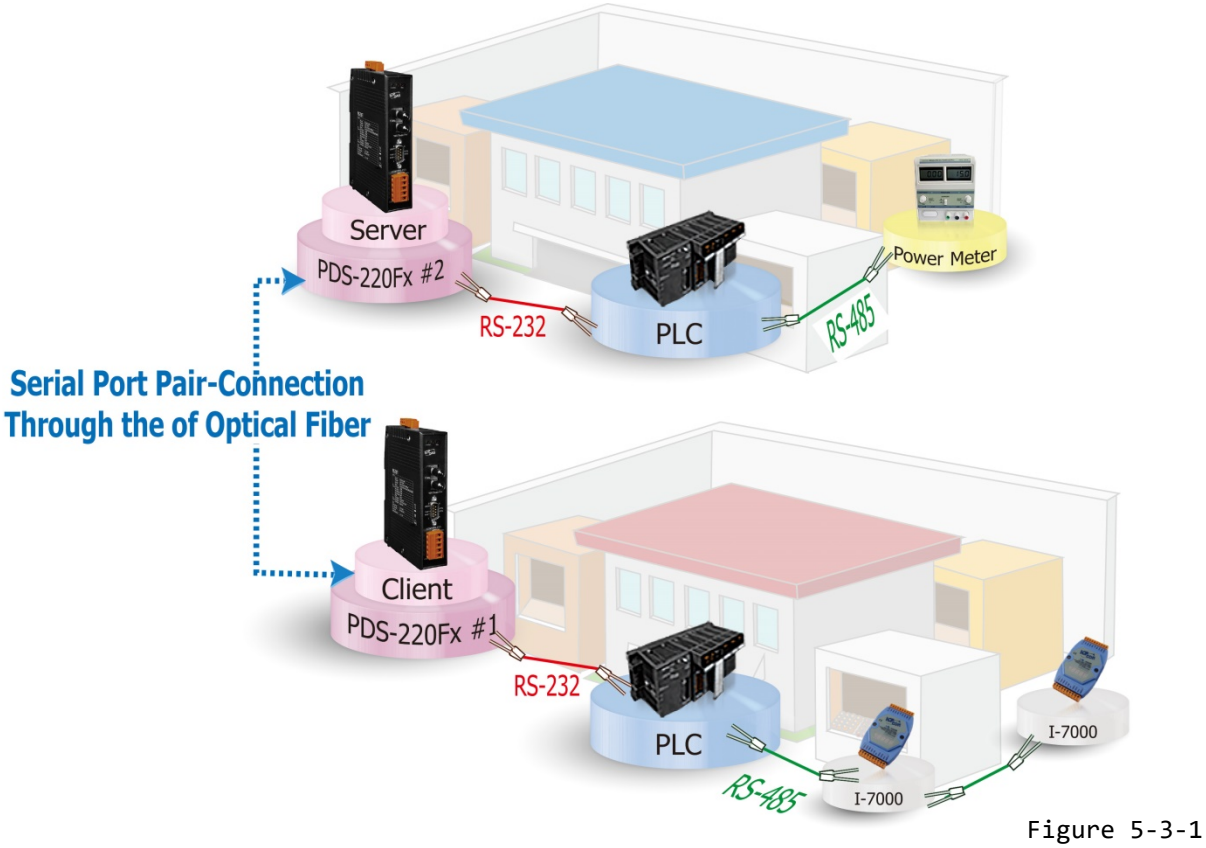


Figure 5-3-1

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-220Fx #1	COM1	115200	8N1	IP Address of PDS-220Fx #2	10001
Server Mode	PDS-220Fx #2	COM1	115200	8N1	-	-

Note: The Baud Rate and Data Format settings of the client and server (PDS-220Fx #1 and #2) depend on the COM ports of the PC (or the connected device).

1. Confirm that the PDS-220Fx are functioning correctly. Refer to Chapter 3 "Setting up the PDS-220Fx Module" for more details.

➢ Step 1: Configuring the PDS-220Fx #1 in Client Mode

2. Enter the configuration of PDS-220Fx (Client) web server (refer to Section 4.1 "Logging in to the PDS-220Fx Web Server") and then check your firmware version is **v3.2.31 [Jun 19 2009] or later**.

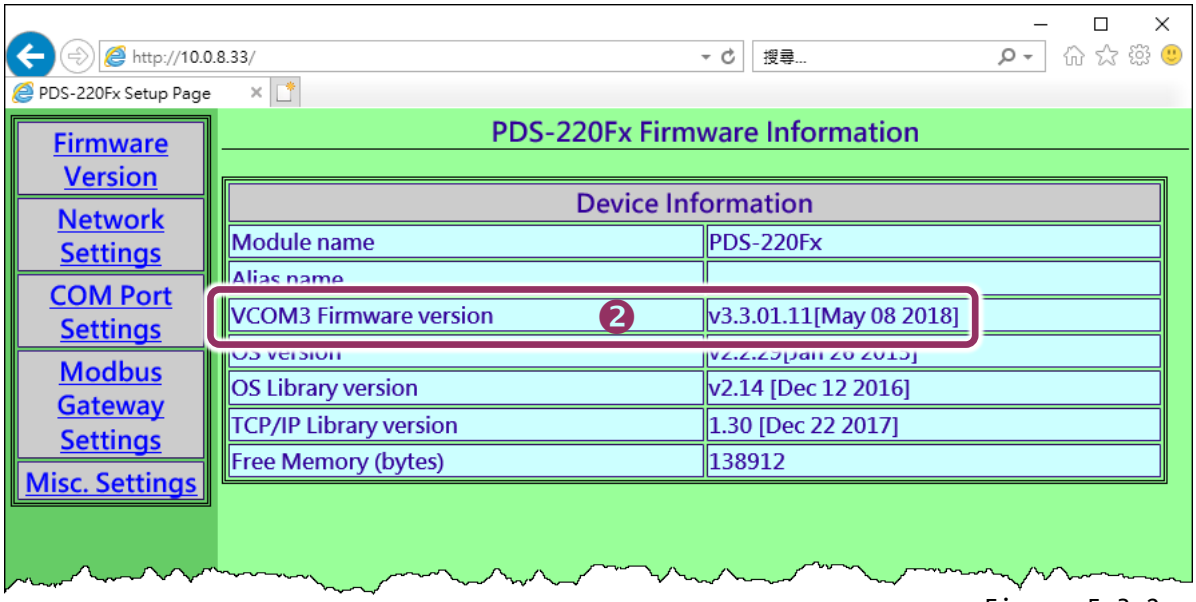


Figure 5-3-2

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 **"115200"**, "**8", "None"** and **1**" .

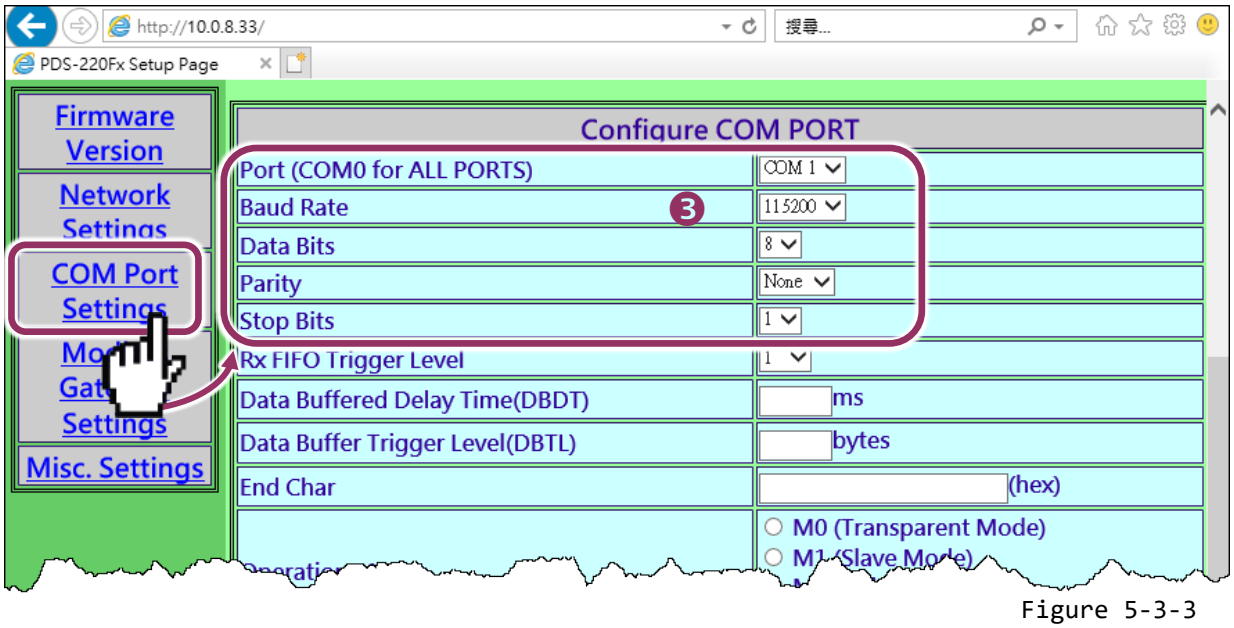


Figure 5-3-3

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 precede to the PDS-220Fx #1(Client) Remote Vcom3 connection Setup Page (Pair-connection settings).

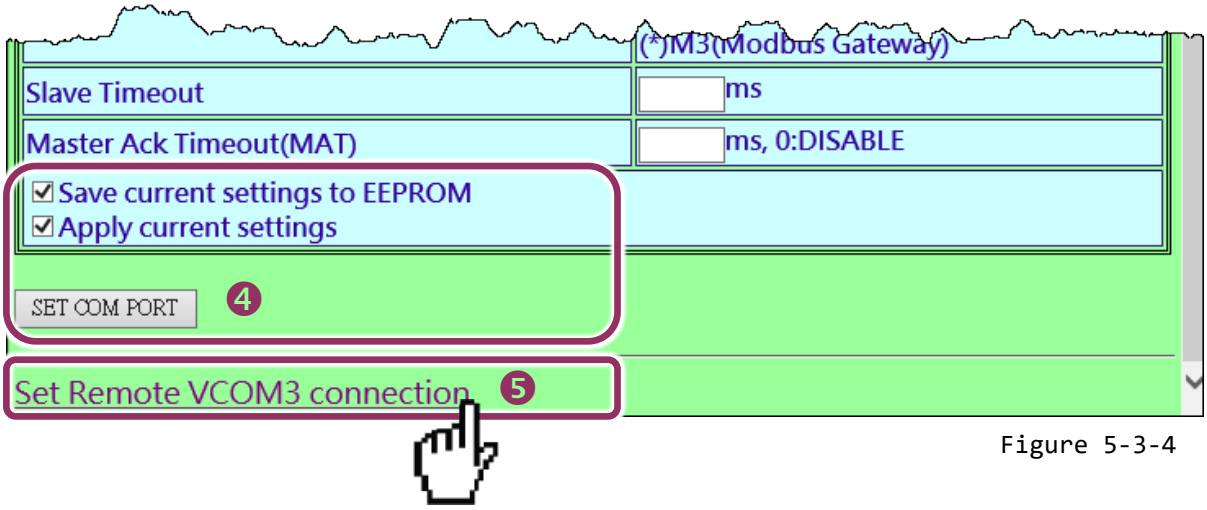


Figure 5-3-4

6. Select "**Add COM**" and type in the COM port of the PDS-220Fx #1 (Client) which you want to use. Type the appropriate **COM Port number, IP address and command port of the PDS-220Fx #2 (Server)** settings in the relevant fields, for example **"COM: 1"**, **"IP: 10.0.8.130" and "cmd port: 10000"**.

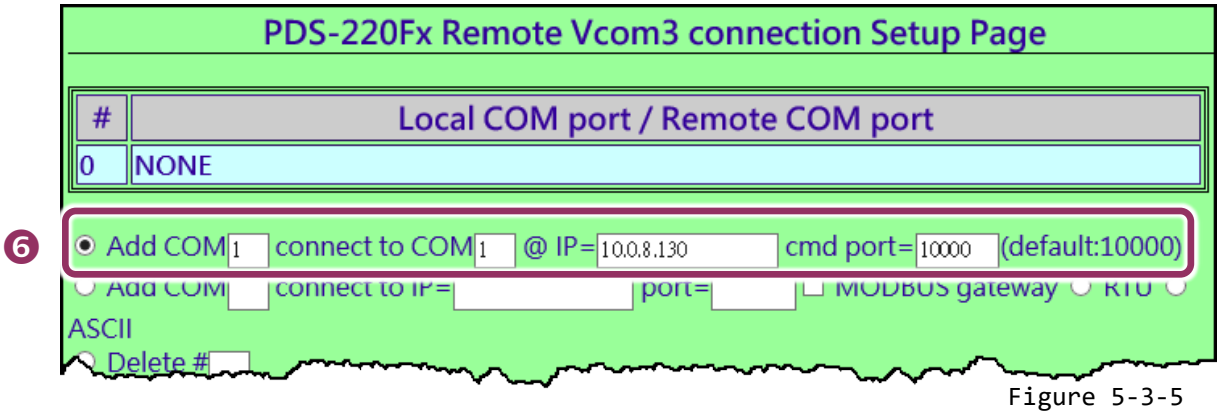


Figure 5-3-5

※ 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-220Fx #1 (Client) which you want to use. Type the appropriate **IP address and TCP Port of the PDS-220Fx #2 (Server)** settings in the relevant fields, for example **"IP: 10.0.8.130" and "port: 10001"**.

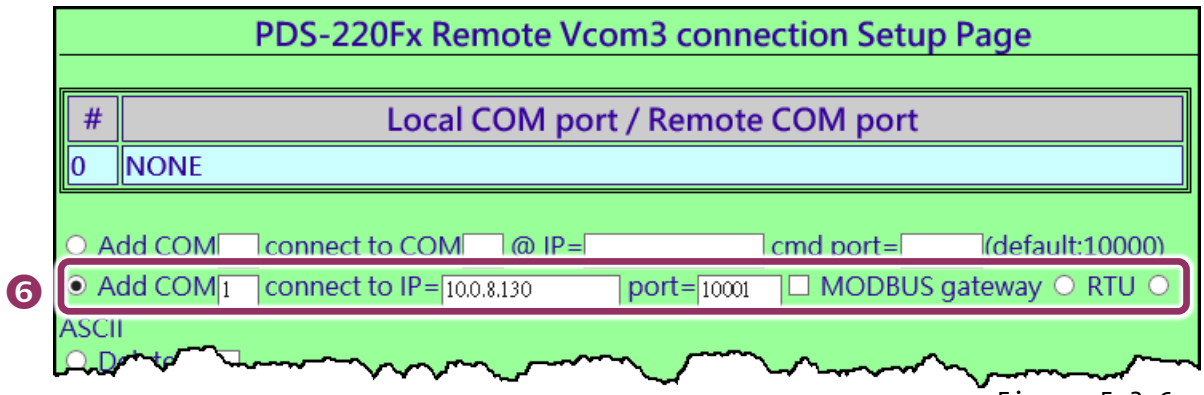


Figure 5-3-6

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

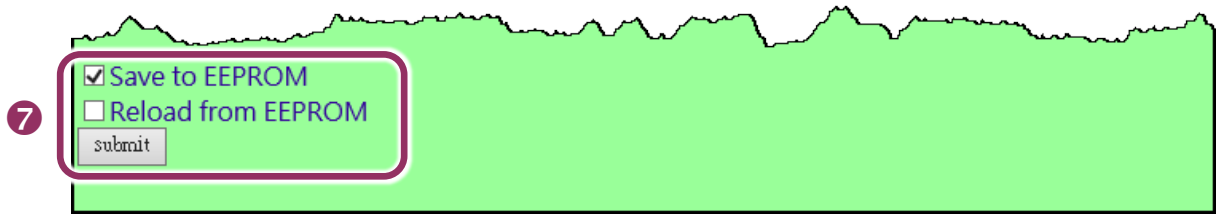


Figure 5-3-7

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

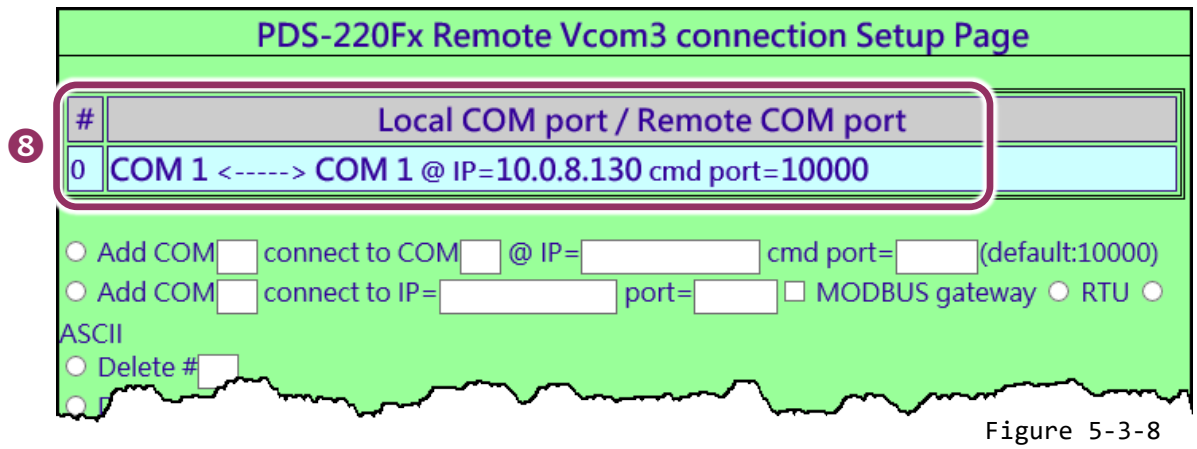


Figure 5-3-8

9. **Reboot PDS-220Fx #1(Client)** and then setting is complete.

➢ Step 2: Configuring the PDS-220Fx #2 in Server Mode

1. Enter the URL address of the PDS-220Fx #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 **"115200"**, "**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-220Fx #2 (Server) COM PORT setup page.

Refer to Figures 5-3-2 to 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-220Fx #2 (Server) is "None"**.

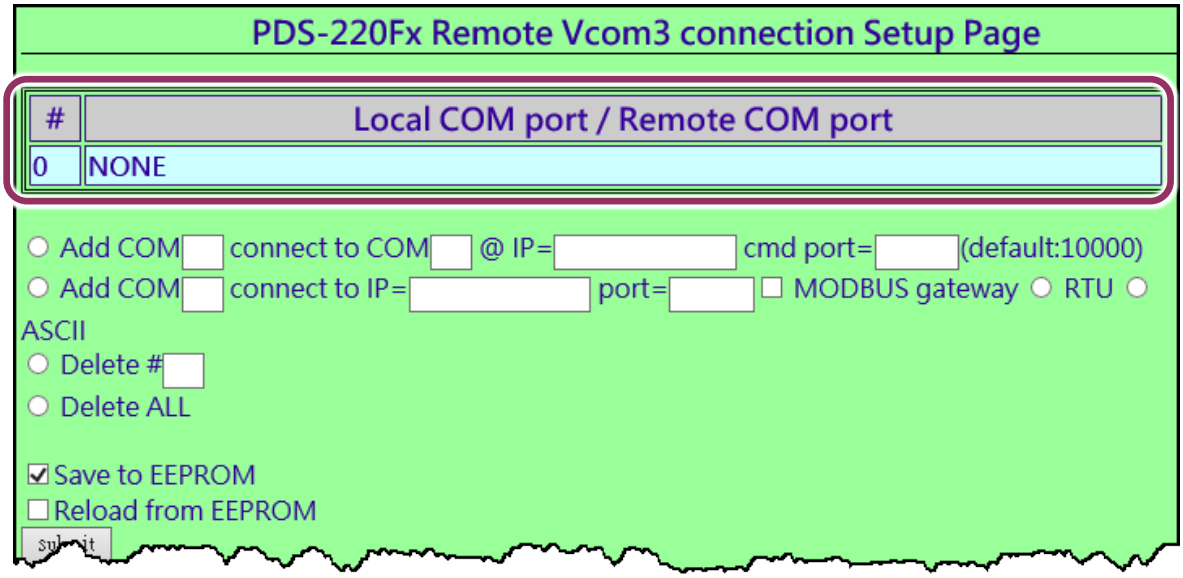


Figure 5-3-9

⚠ Notes:

1. The baud rate and data format settings of the client and server (PDS-220Fx #1 and #2) are depending on COM ports of the connected device. The serial port settings can be different between the PDS-220Fx #1 and #2.
2. PDS-220Fx Pair-connection: Built-in serial software buffer, baud rate and data format must be configured on PDS-220Fx first.
3. I-2541 Pair-connection: No serial software buffer, baud rate and data format cannot be configured on I-2541.

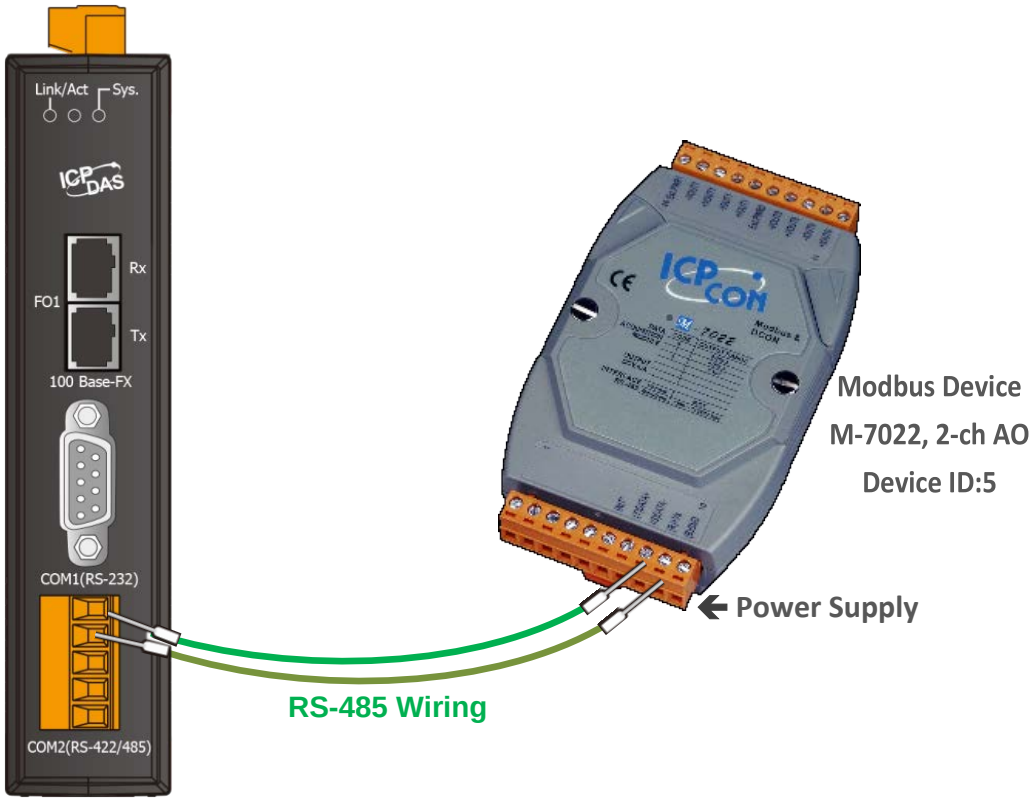
6. Modbus Testing and Protocol

The PDS-220Fx 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-220Fx is operating correctly.

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-220Fx.

1. Keep up network connection and power on status for your PDS-220Fx. Refer to Chapter 3 "Setting up the PDS-220Fx" for more details.
2. Connect the Modbus device (e.g. M-7022, optional) to the COM2 (RS-485 bus) on PDS-220Fx 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-220Fx in the address bar of the browser to log in to the web configuration pages.

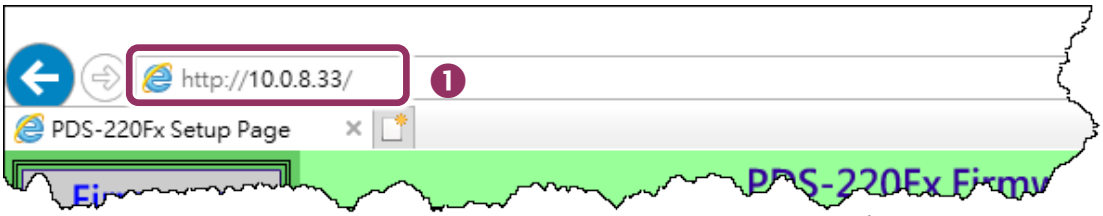


Figure 6-1-1

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: COM2, Baud Rate: 19200, Data Bits: 8, Parity: None, Stop Bits: 2**.
4. Click the **"SET COM PORT"** button to update it to PDS-220Fx.

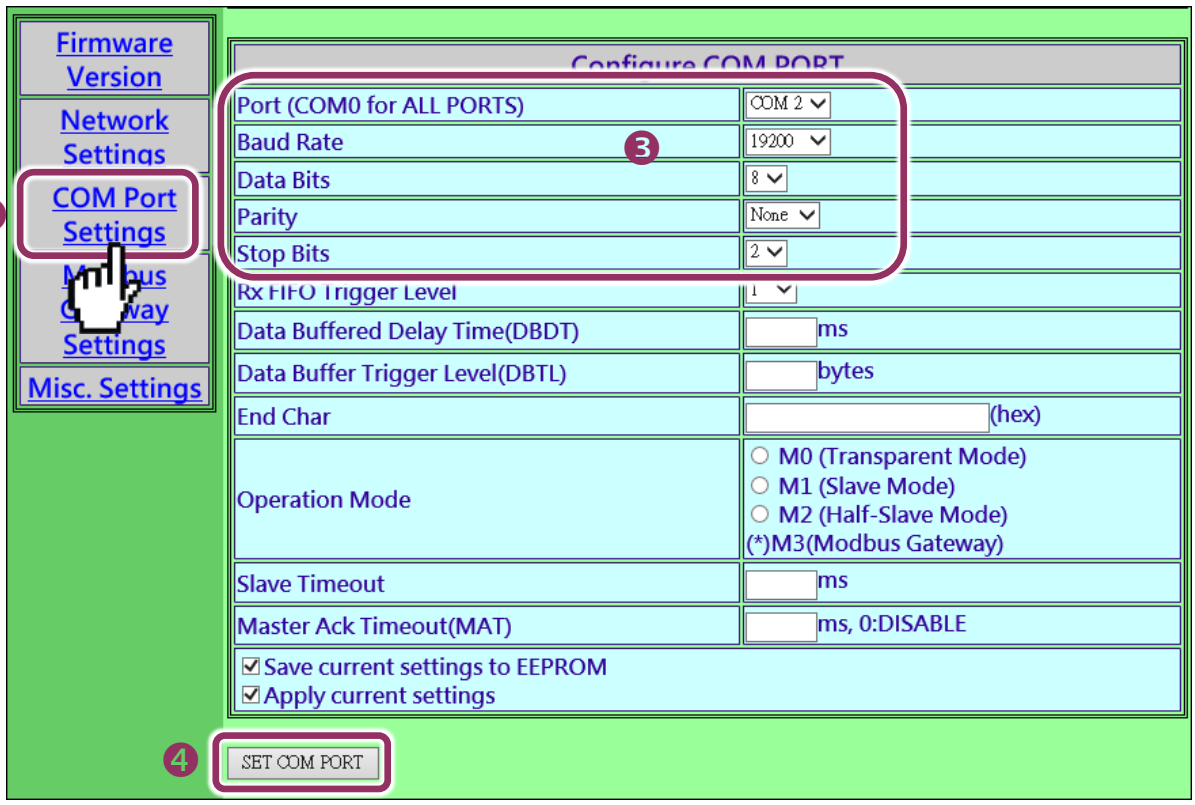


Figure 6-1-2

➢ 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 **"COM2"**.
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-220Fx.

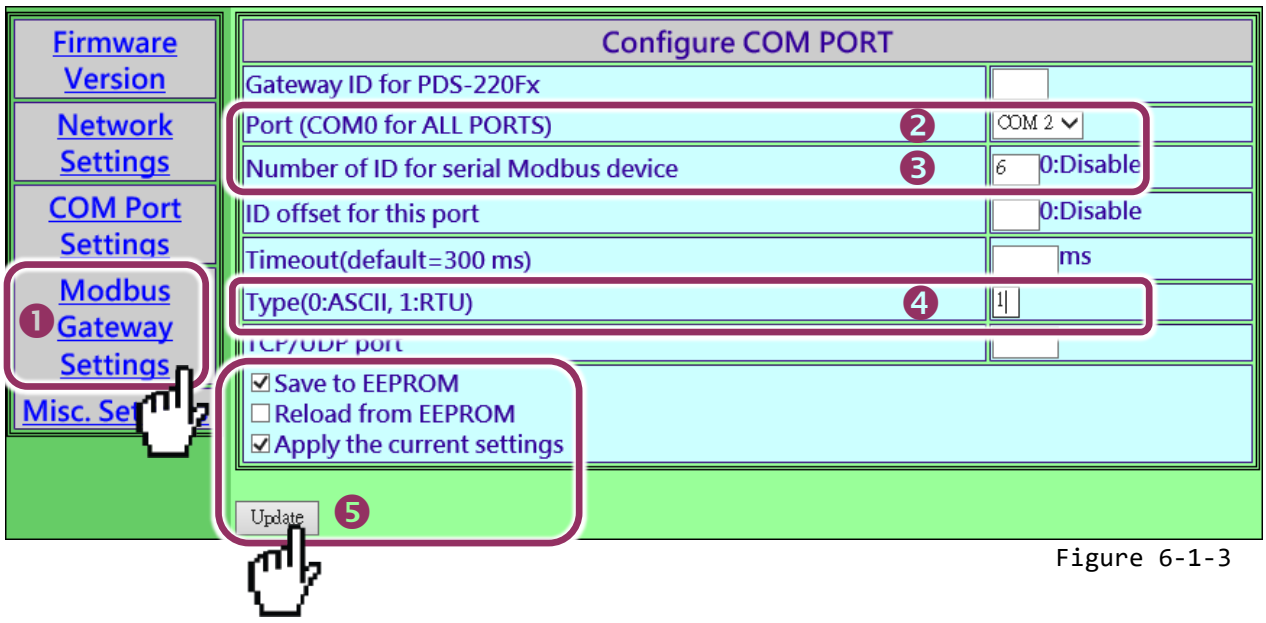


Figure 6-1-3

6. Check the COM Port for Modus gateway settings.

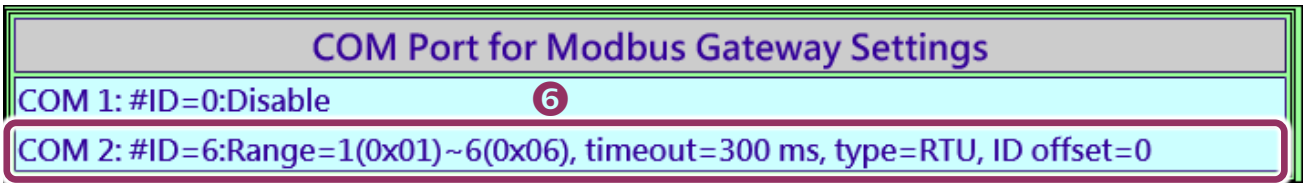


Figure 6-1-4

➢ 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.**

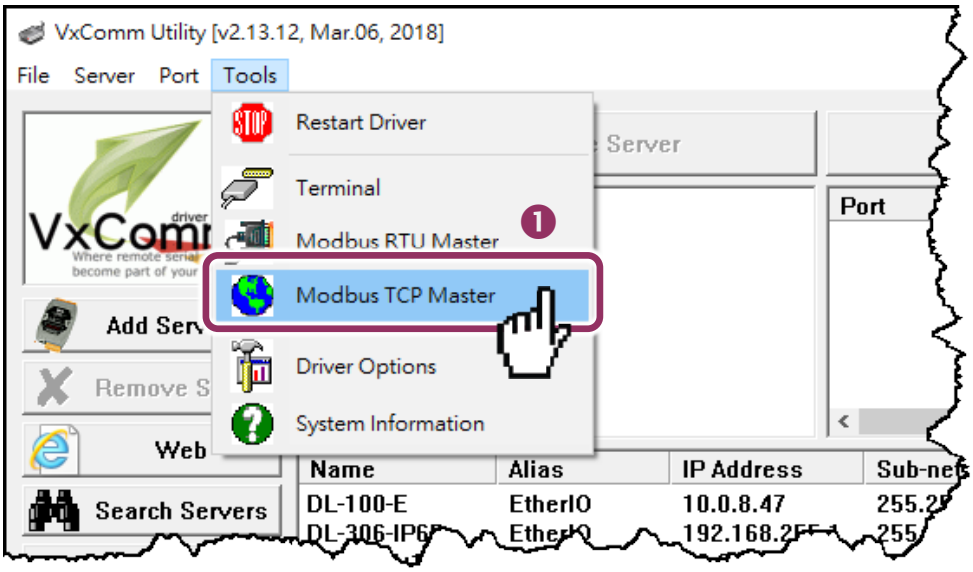


Figure 6-1-5

2. In the Modbus TCP Master Utility, **type the IP address and TCP port of PDS-220Fx** and then click **"Connect"** button to connect the PDS-220Fx.

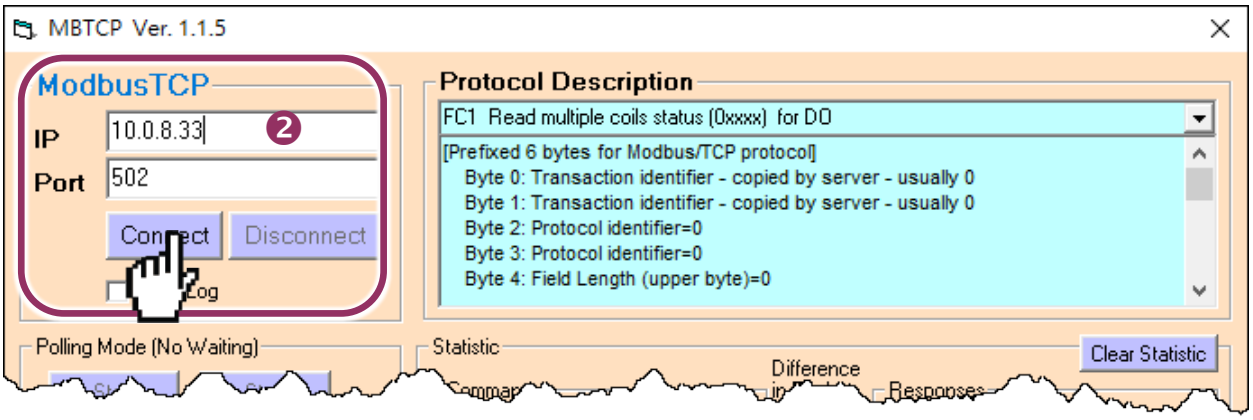


Figure 6-1-6

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.

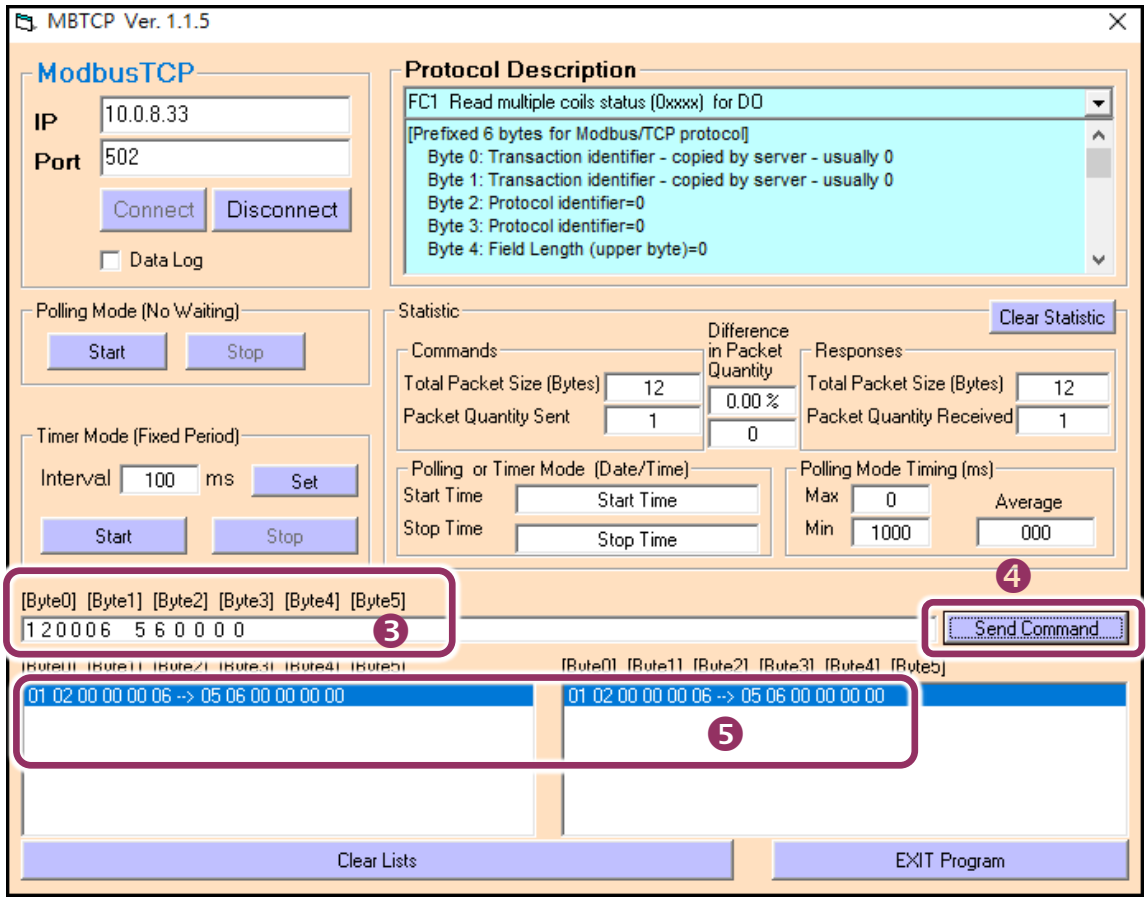


Figure 6-1-7

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-220Fx 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-220Fx are **not in the M3 mode (Modbus Gateway)**.

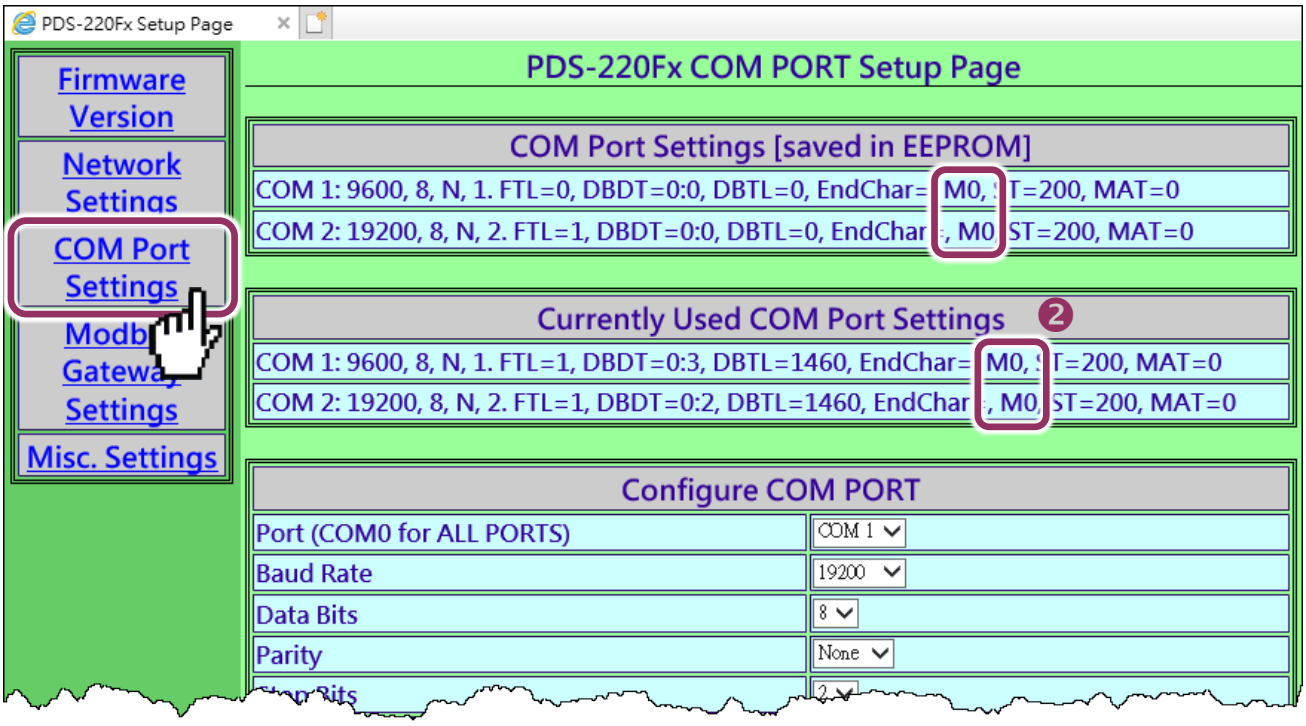


Figure 6-2-1

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 **"COM2"**.
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.

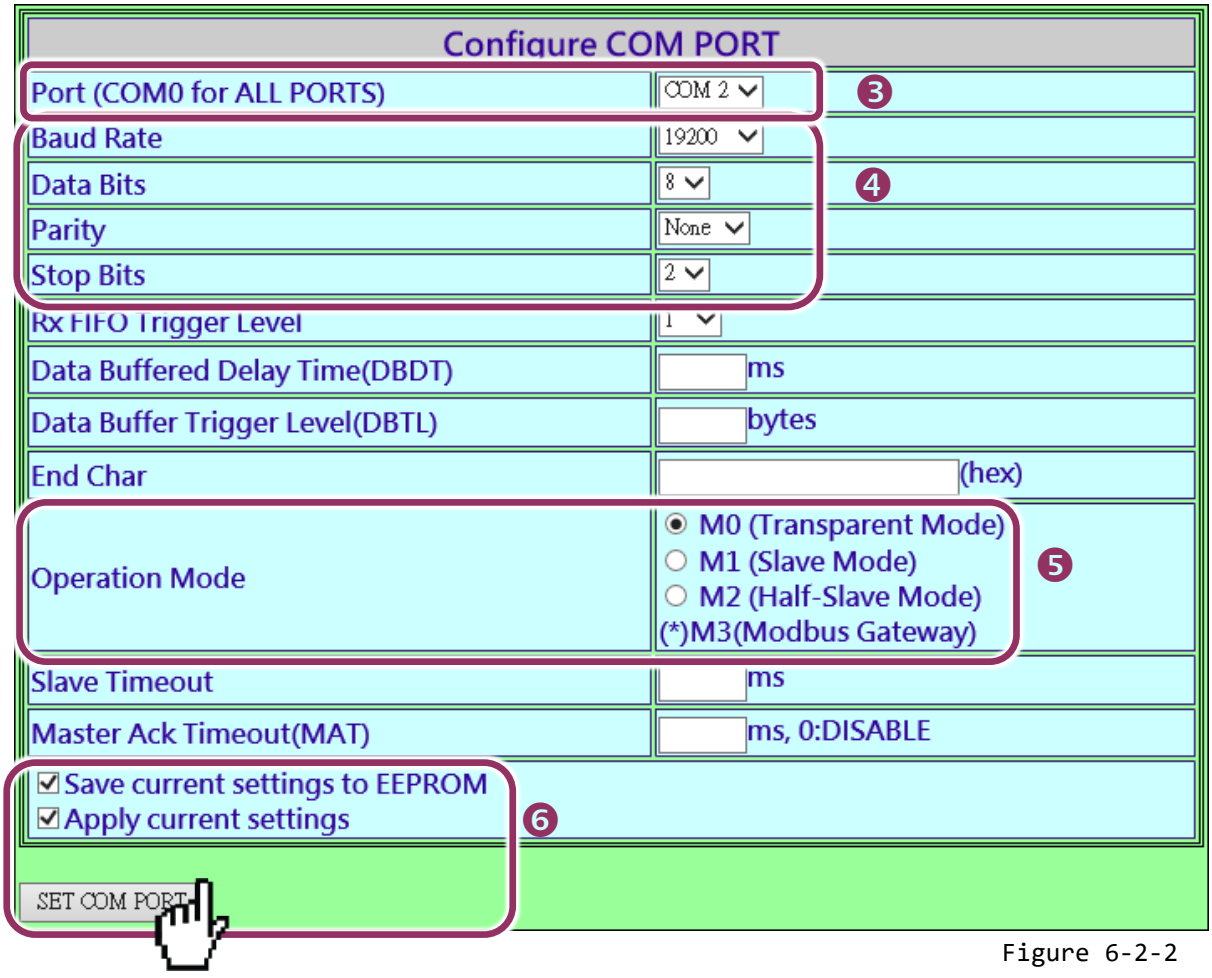


Figure 6-2-2

7. Run VxComm Utility program to the configuring the Virtual COM Ports of the PDS-220Fx, refer to Chapter 3 "Setting up the PDS-220Fx Module" for detail information.

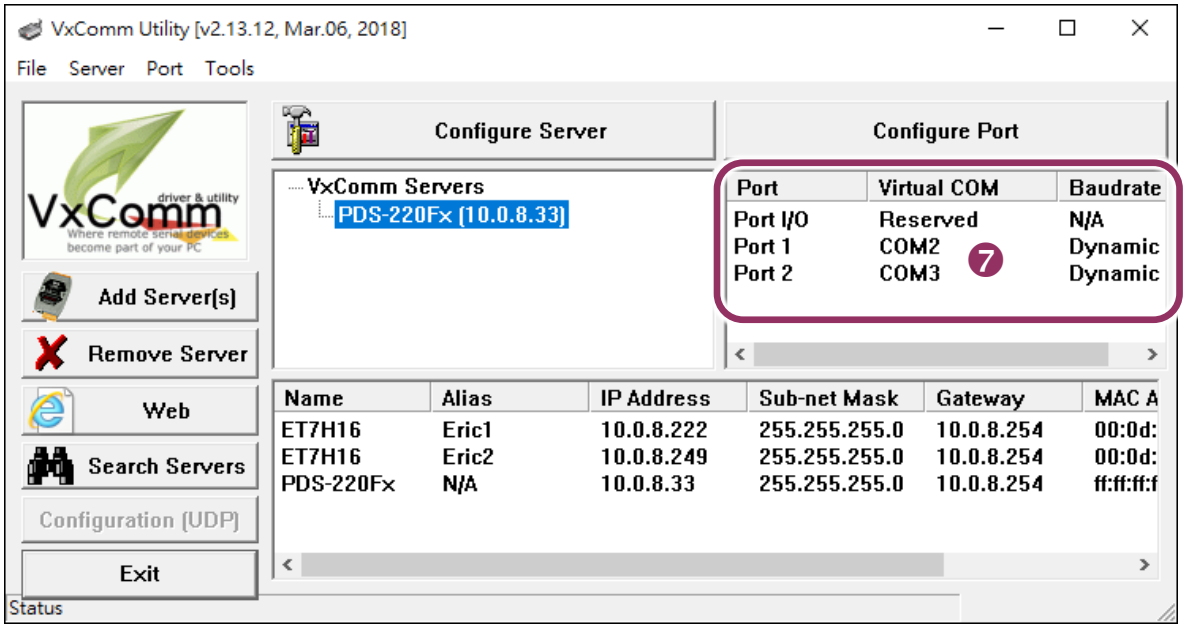


Figure 6-2-3

➢ 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.

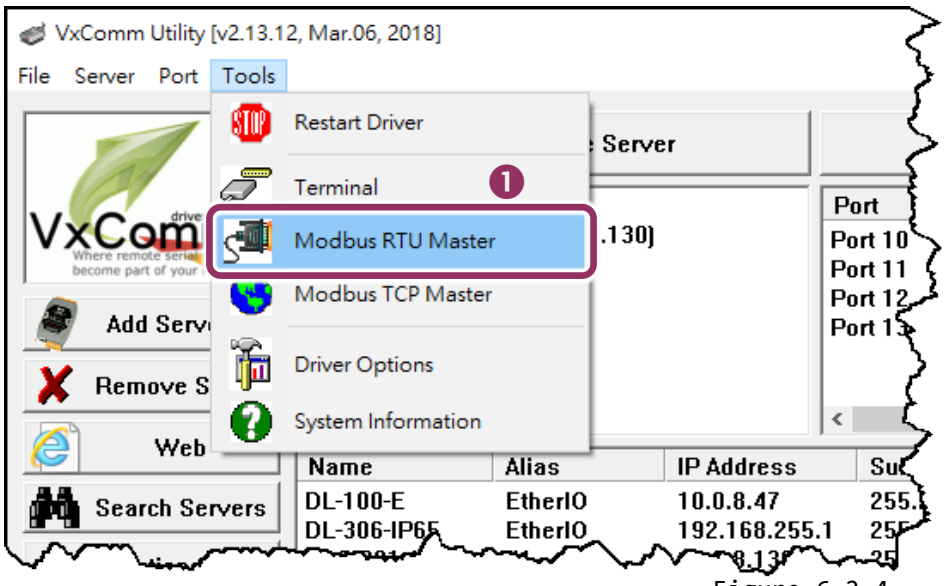


Figure 6-2-4

2. **Select your virtual COM port, Baud Rate and Data Format on PDS-220Fx** and then click **"Open"** button to connect the PDS-220Fx, for example **virtual Port: COM3, Baud Rate: 19200, Line control: N, 8, 2**.

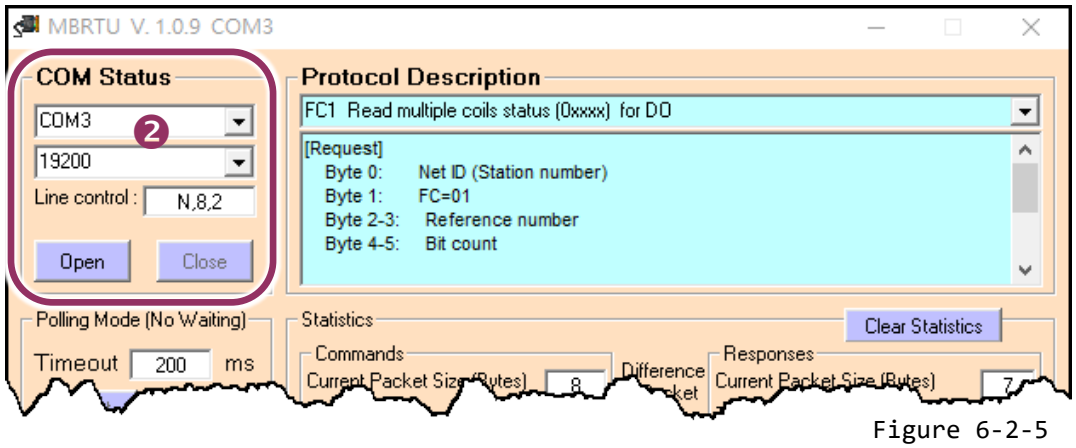


Figure 6-2-5

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.

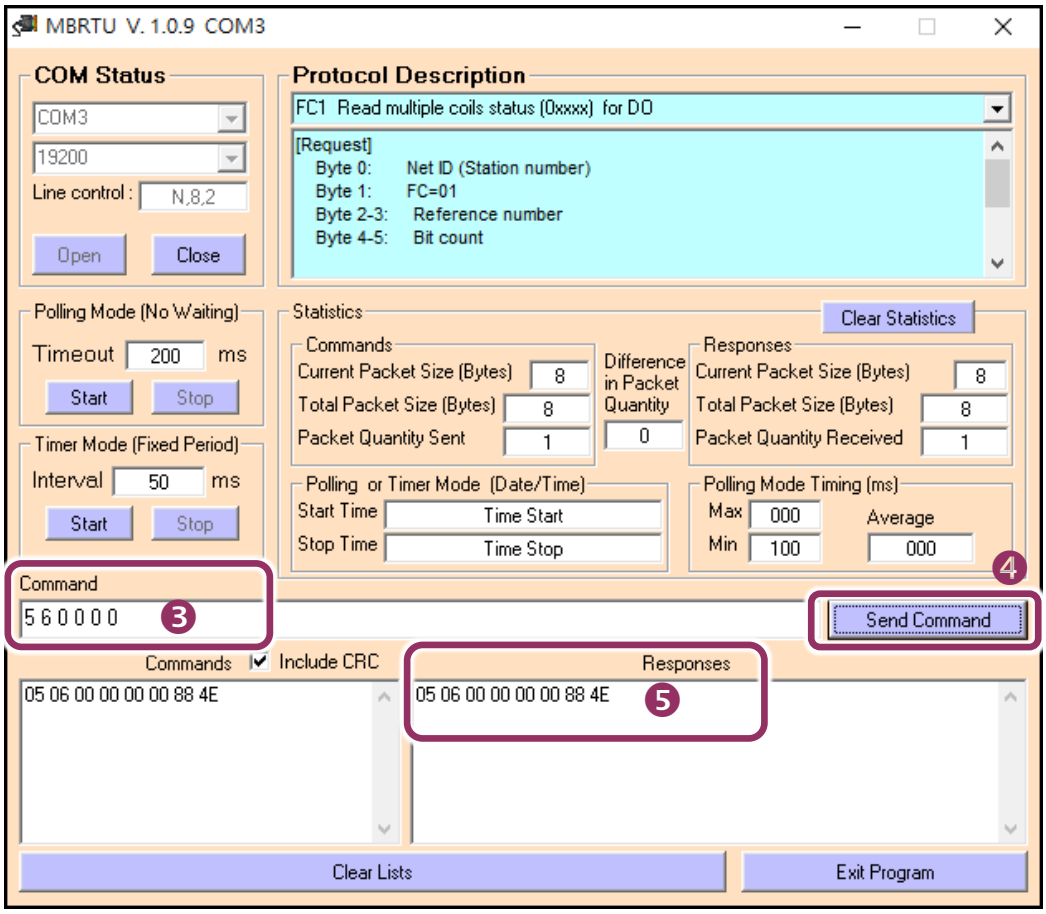


Figure 6-2-6

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.

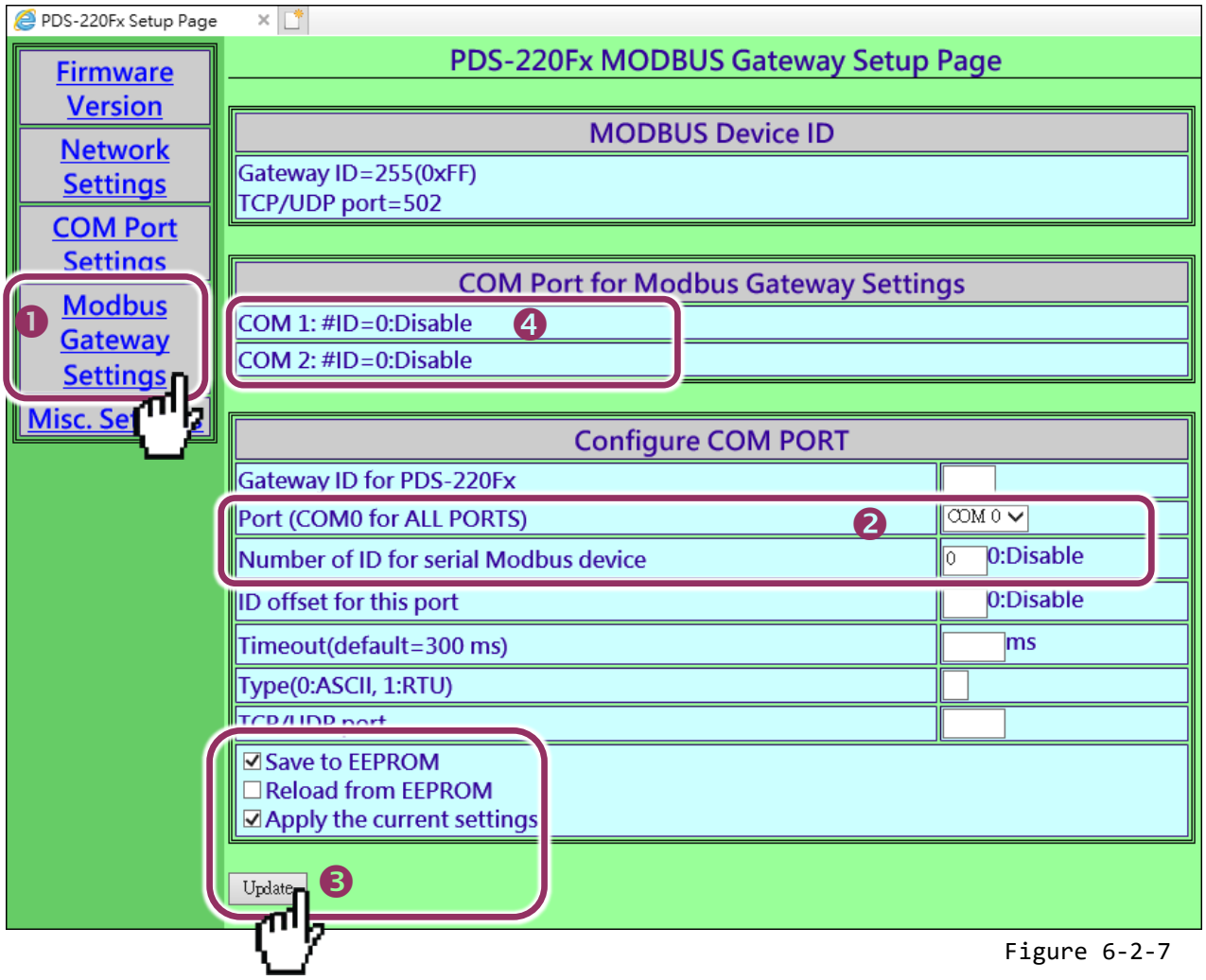
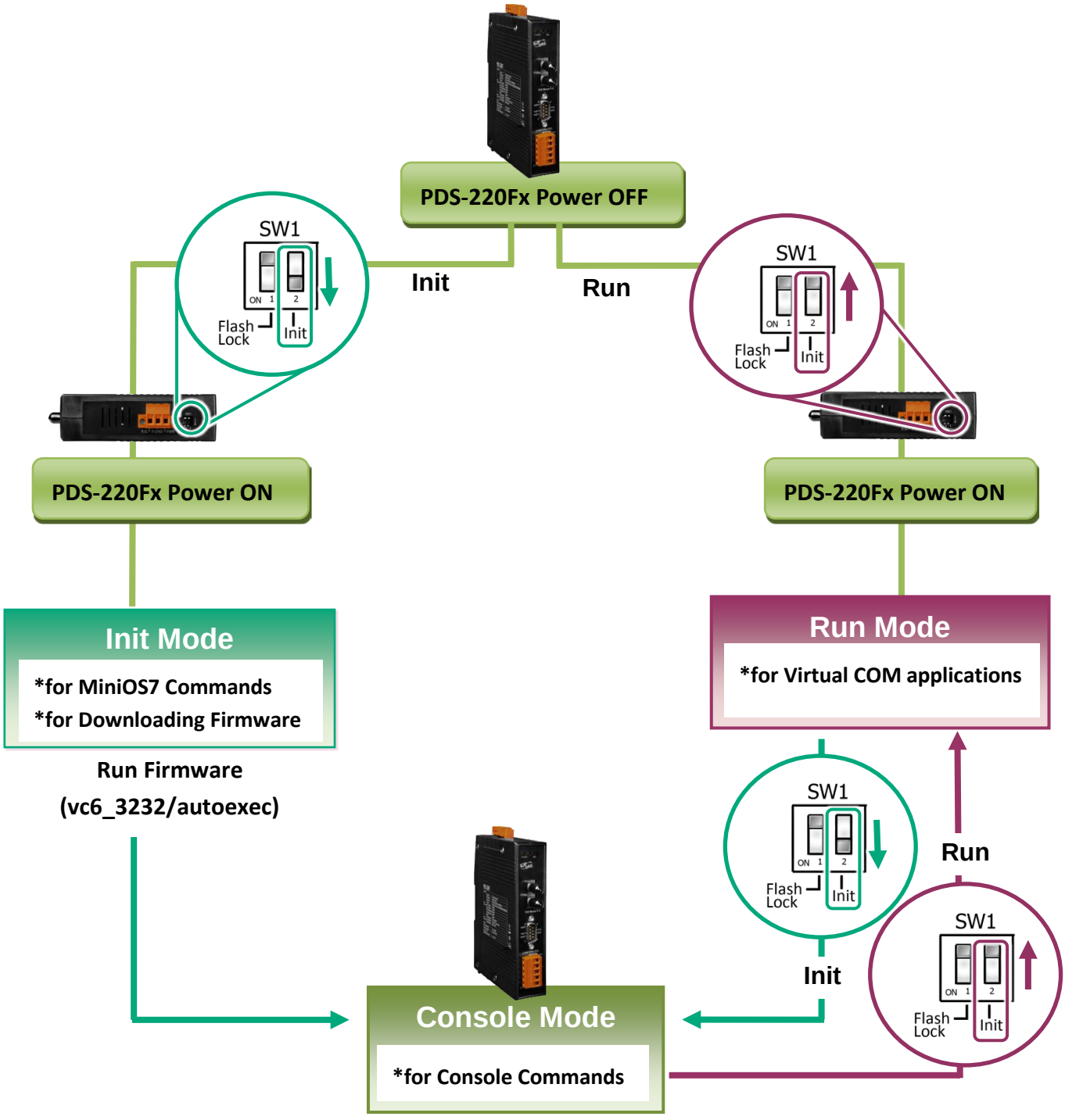


Figure 6-2-7

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-220Fx.
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-220Fx has no network communications during the SystemTimeout period, the PDS-220Fx 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-220Fx 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-220Fx.
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-220Fx . It should be used to update firmware only.
7.3.22	CONFIG	Restores the factory default settings.
7.3.23	RESET	Reboots the PDS-220Fx 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-220Fx.

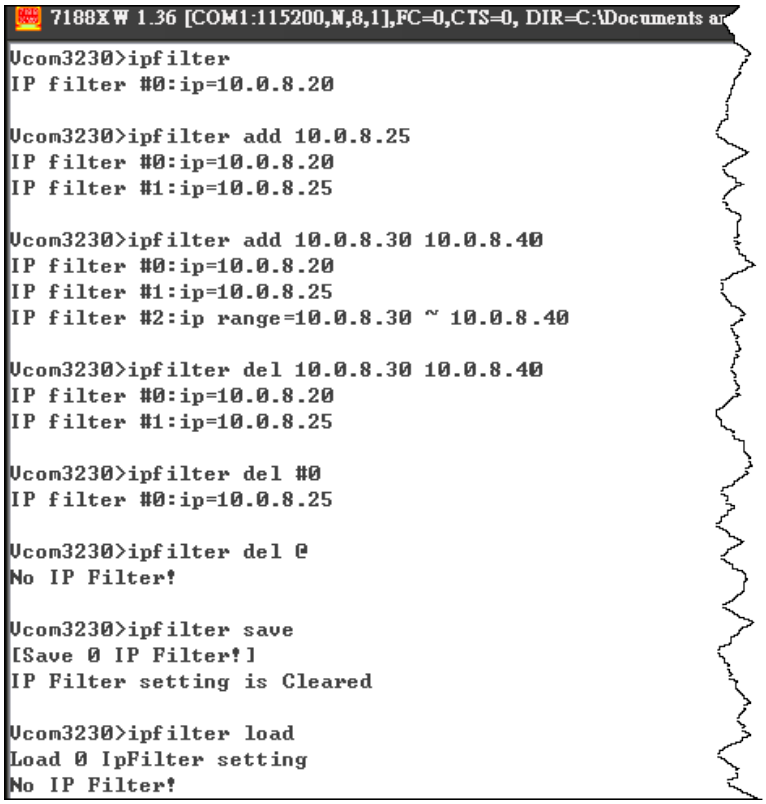
Effect: Immediate

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-220Fx 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.



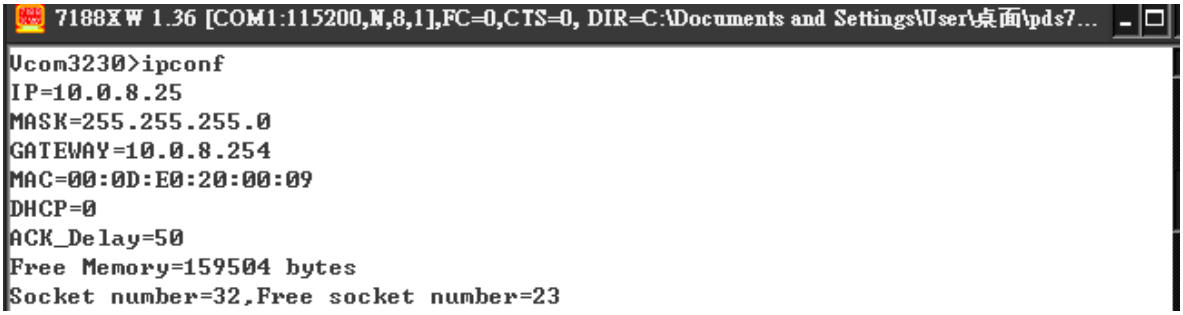
7.3.2 IPCONF

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)

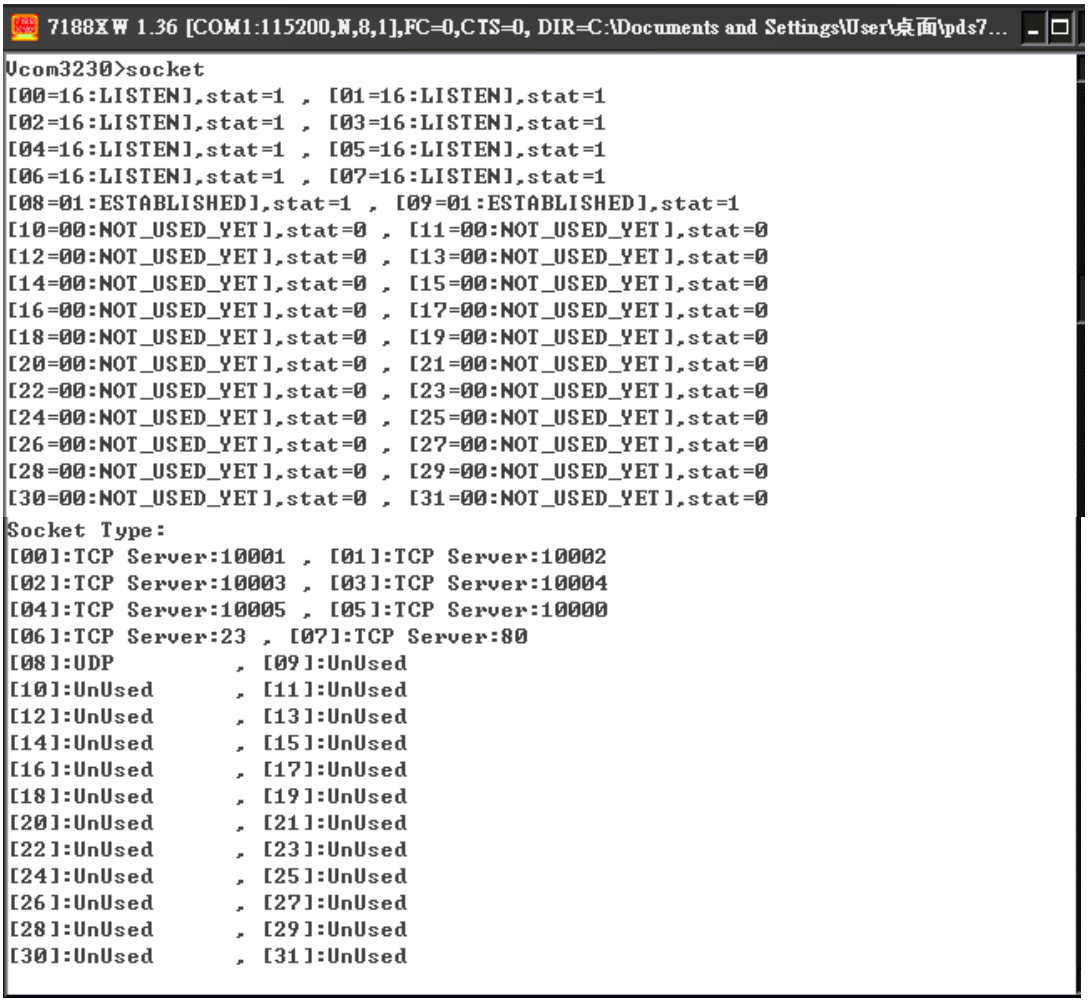
If stat = 1, the socket is used.

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-220Fx.

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

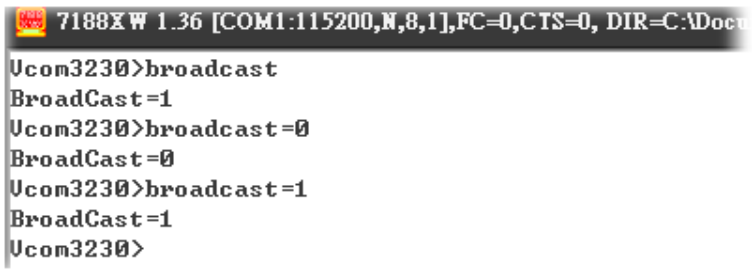
7.3.5 Broadcast

This command is used to Enable/Disable listening broadcast packets on PDS-220Fx.

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

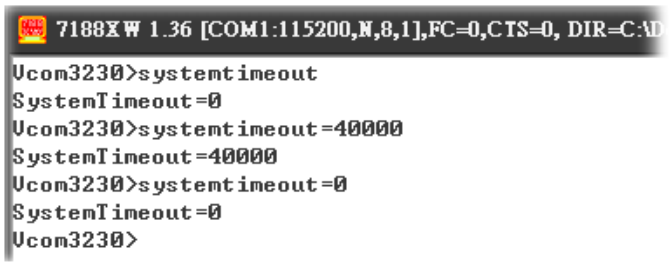
This command queries or sets the system timeout value.

If the SystemTimeout is greater than zero, and the PDS-220Fx does not receive any packets from any client for longer than the SystemTimeout period, the PDS-220Fx 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

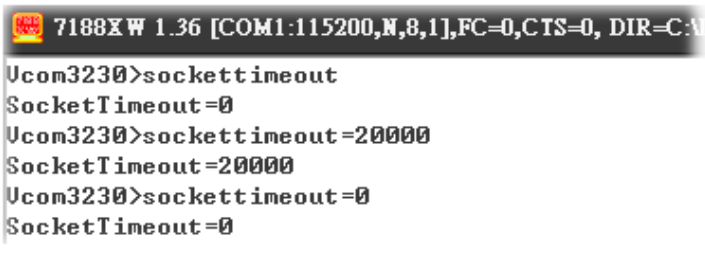
This command is used to query or set the SocketTimeout parameter.

If the SocketTimeout is greater than zero, and the PDS-220Fx does not receive any data from a client PC for longer than the SocketTimeout period, the PDS-220Fx 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.



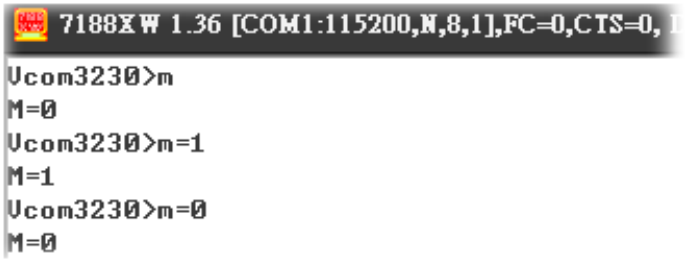
7.3.8 M

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-220Fx 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-220Fx 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-220Fx, the operation mode same as M0 mode; and if there are two or more clients connecting to the PDS-220Fx, 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

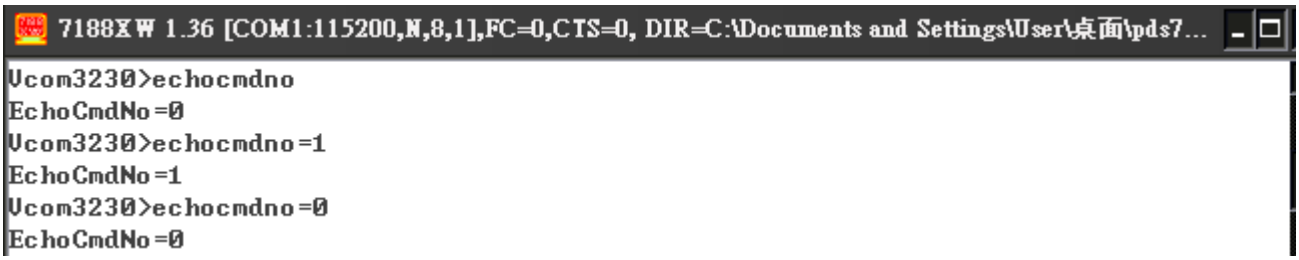
This command is used to query or set the EchoCmdNo parameter.

The EchoCmdNo parameter is used to set whether the PDS-220Fx prefixes the Virtual COM command to the corresponding response. (Virtual COM commands are used to configure a PDS-220Fx through TCP port 10000)

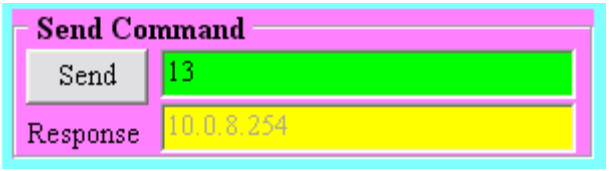
Effect: Immediate

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.

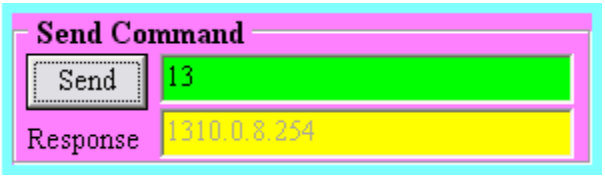
Figure 7-3-9: The figure illustrates is an example of a **EchoCmdNo** configuration.



EchoCmdNo = 0



EchoCmdNo = 1



7.3.10 EndChar

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

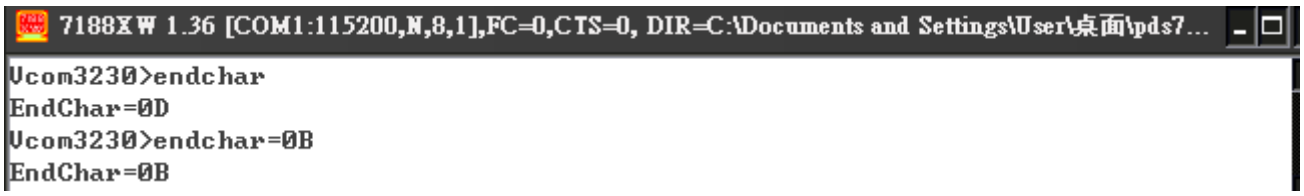
PDS-220Fx sends out the response string from serial port to TCP client immediately when it received a char on the response string that matching the EndChar.

Set EndChar = 00 to disable the EndChar feature.

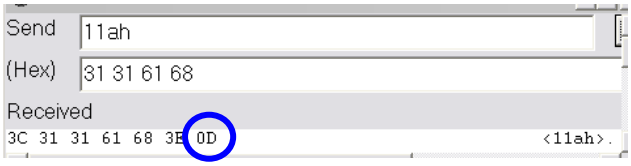
Effect: Immediate

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

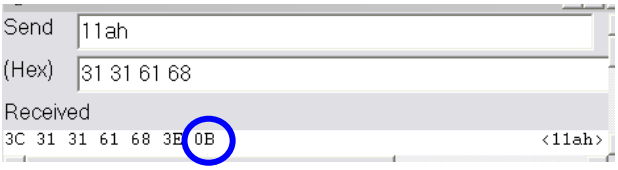
Figure 7-3-10: The figure illustrates is an example of a **EndChar** configuration.



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.

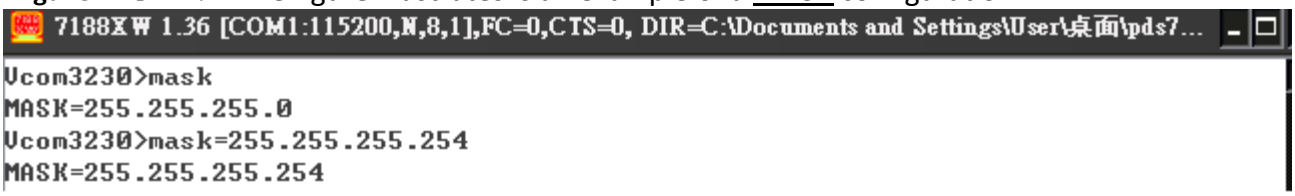
7.3.12 MASK

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.



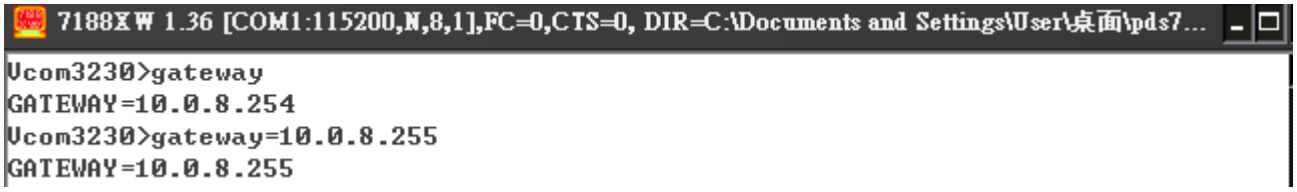
7.3.13 GATEWAY

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.



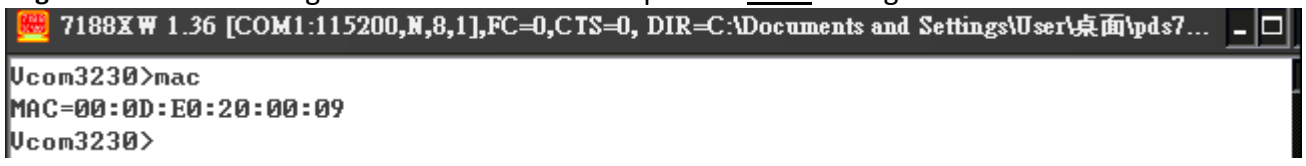
7.3.14 MAC

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.



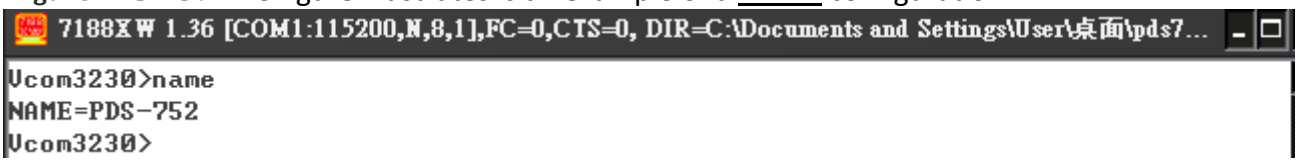
7.3.15 NAME

This command is used to query the name of a PDS-220Fx.

Effect: Setting the address is not allowed.

Command	Arguments	Description
NAME		Queries the name of a PDS-220Fx.

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-220Fx. The maximum character length of PDS-220Fx alias name is 16 bytes.

Effect: Immediate

Command	Arguments	Description
alias		Queries the alias.
alias	= xxxx	Sets the alias of a PDS-220Fx to “xxxx”.

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

7.3.17 DHCP

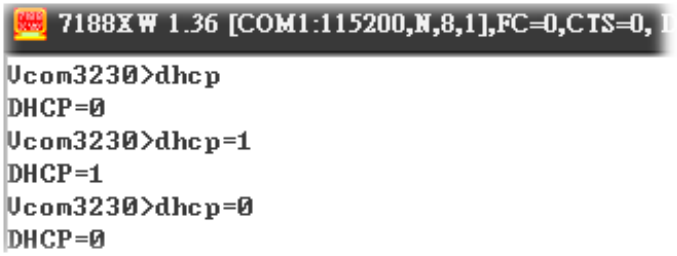
This command is used to set the DHCP client to either enabled or disabled.

DHCP function will get a dynamic IP address setting for PDS-220Fx 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

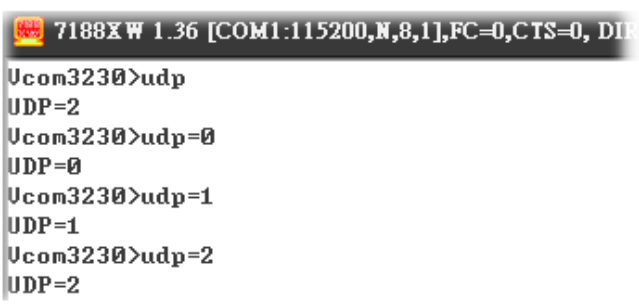
This command is used to configure the UDP Search function.

UDP is used to set the action mode for when a PDS-220Fx receives a UDP search command.

Effect: Immediate

Command	Arguments	Description
UDP	= 0	Rejects UDP search commands. The PDS-220Fx will not reply to the UDP search command, and can not be searched again.
UDP	= 1	Replies to UDP search commands. The PDS-220Fx 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.



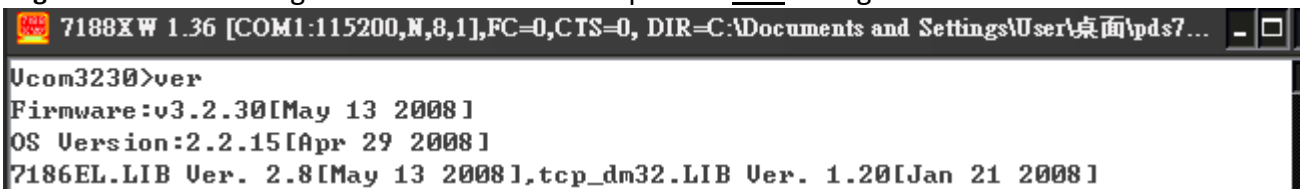
7.3.19 VER

This command is used to query the version information for a PDS-220Fx.

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-220Fx 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

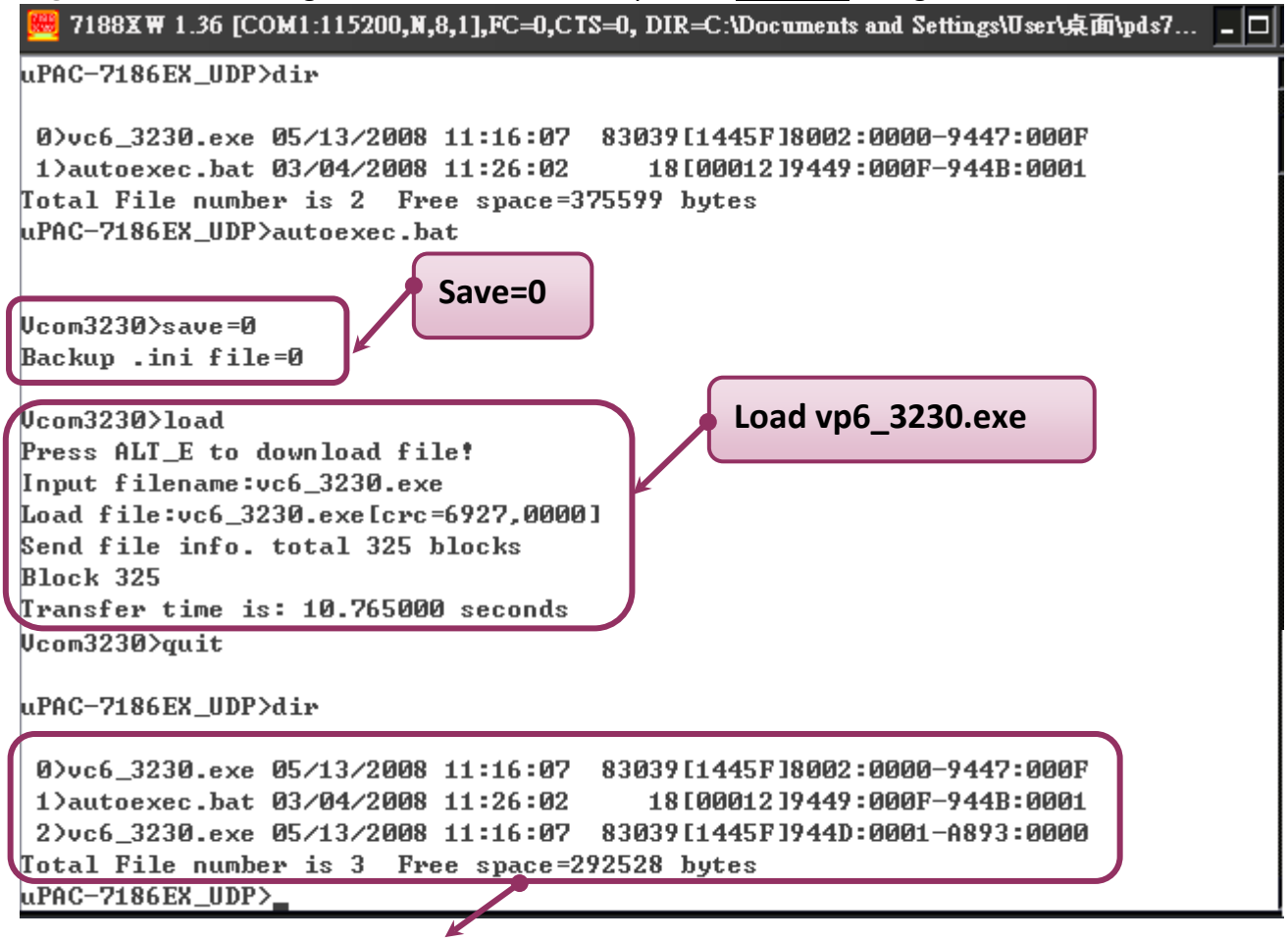
This command is used to loads file to the built-in flash disk on PDS-220Fx. It should be used to update firmware only.

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).

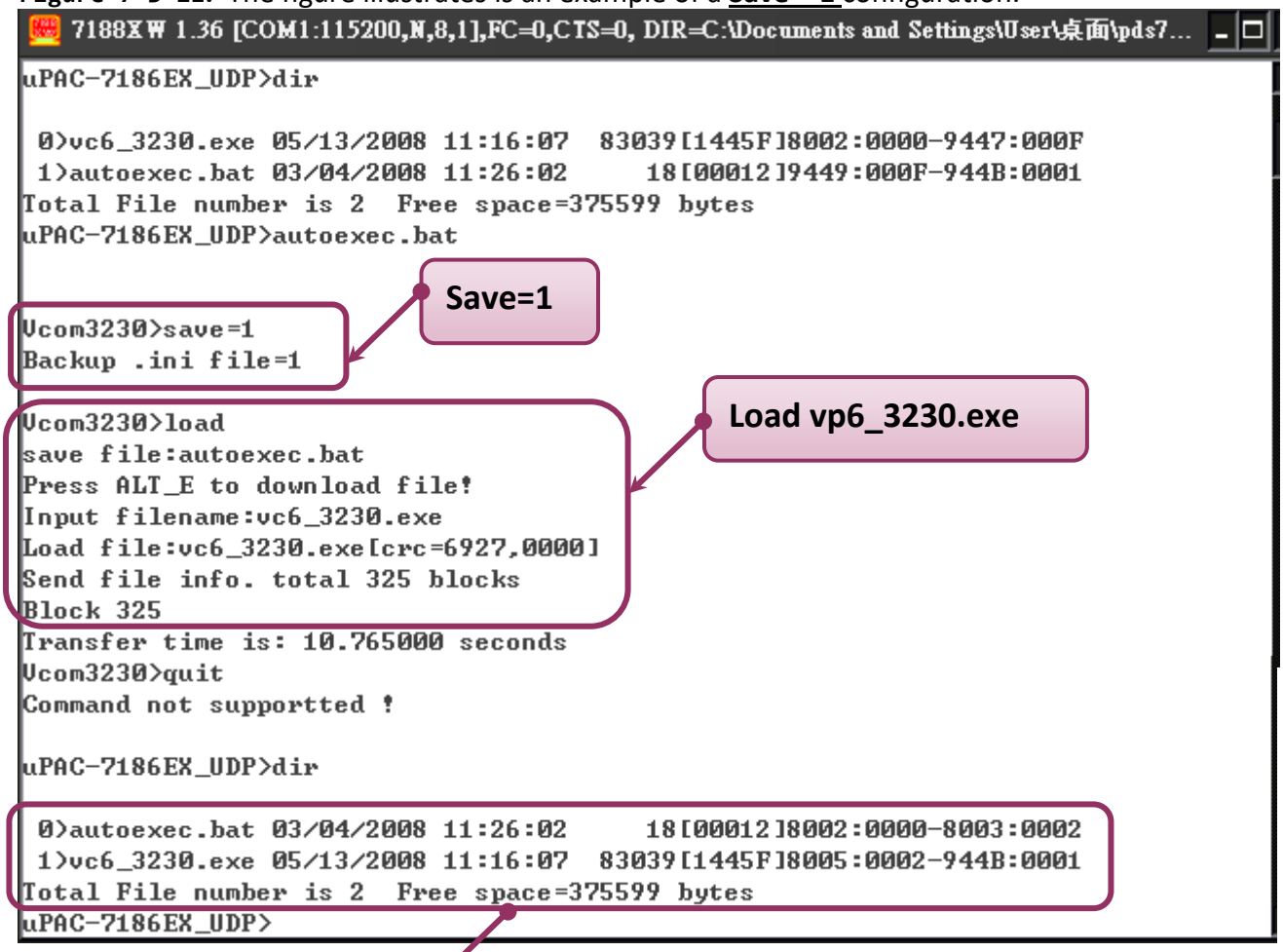
※ "Load" is not a Telnet command.

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.

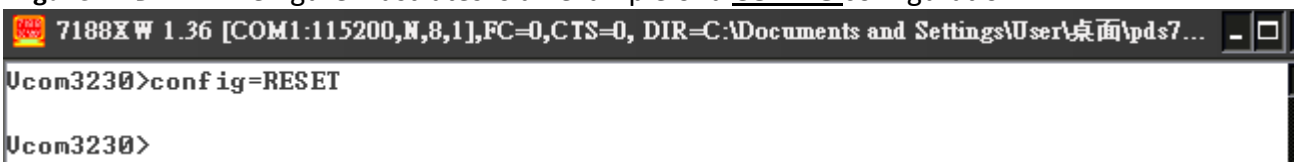
Effect: Immediate

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-220Fx.

Effect: Immediate

Command	Arguments	Description
reset		Reboot the PDS-220Fx.

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

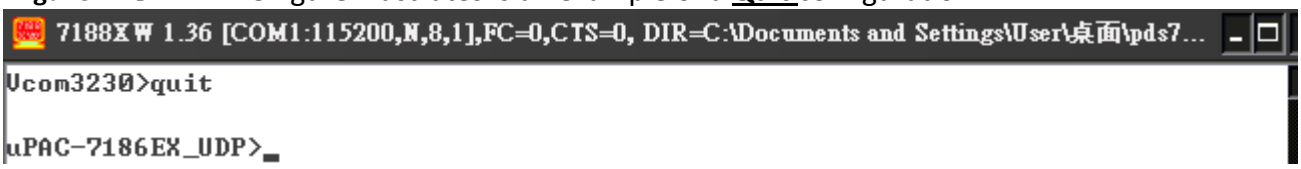
7.3.24 QUIT

This command is used to stop and quit the firmware of PDS-220Fx.

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

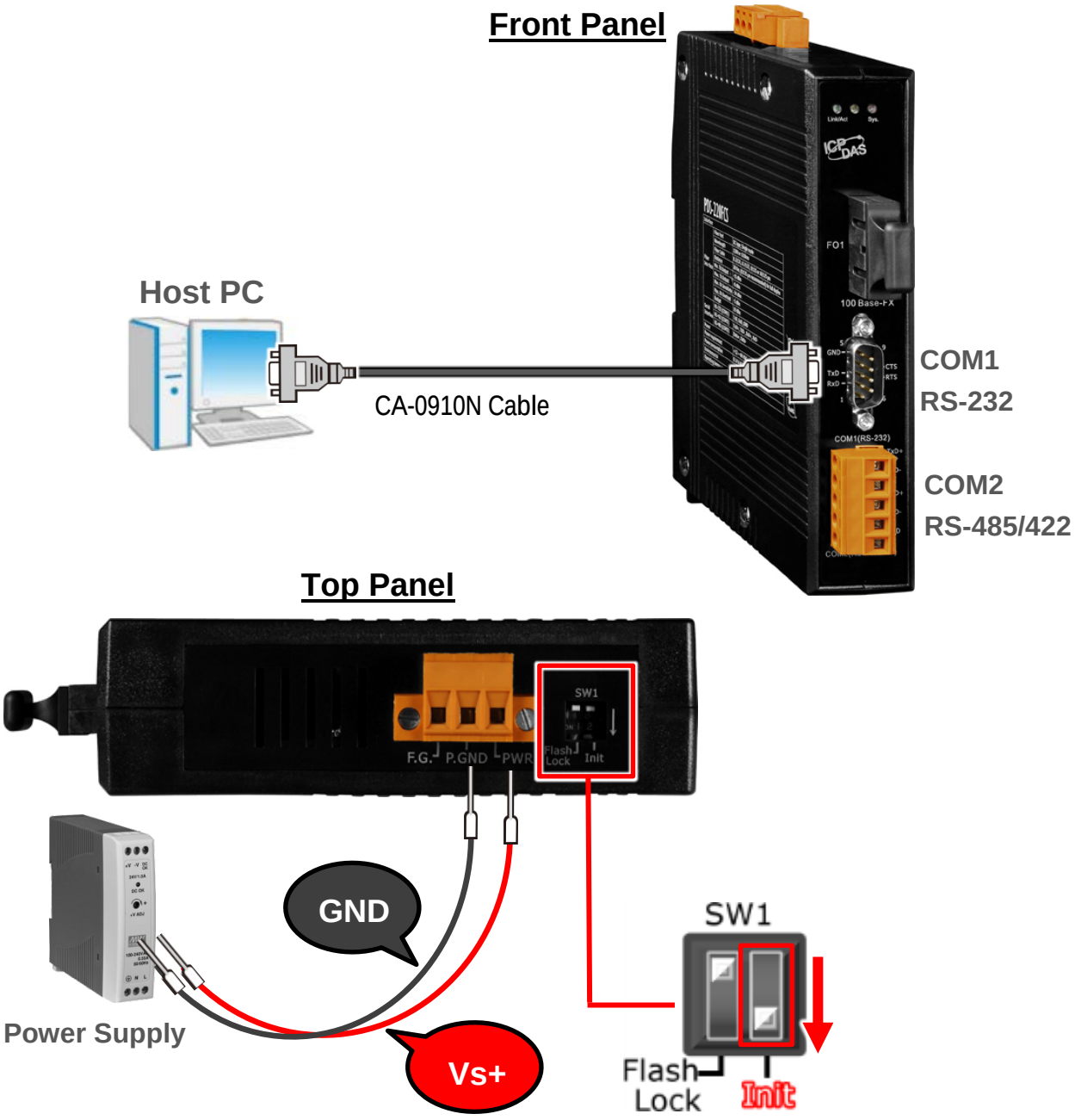
Step 1: Switch off the Power to the PDS-220Fx module.

Step 2: Connect the COM1 (RS-232) connector on PDS-220Fx to COM Port on host PC using the **CA-0910N cable**. Note: CA-0910N is a 3-wire Null-modem cable (optional).

Step 3: Set the **"SW1"** to the **"Init"** position.

Step 4: **Supply +24 V_{DC} (+12 ~ +48 V_{DC}) power** to the PDS-220Fx.

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



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

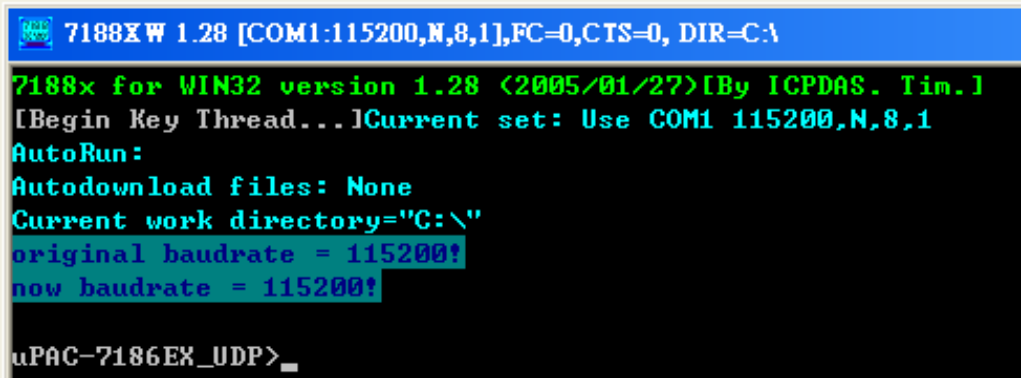
The **"7188XW_yyyymmdd.zip"**can be obtained from either the ICP DAS FTP site or the ICP DAS web site. The location of the download addresses are shown below:

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-220Fx (The following is a default value).

```
uPAC-7186EX_UDP>ip
IP=10.0.8.20
uPAC-7186EX_UDP>mask
MASK=255.255.255.0
uPAC-7186EX_UDP>gateway
Gateway=10.0.8.254
uPAC-7186EX_UDP>mac
Ethernet Address = 00:0d:e0:20:00:07
uPAC-7186EX_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-220Fx as follows can be changed.

Please setting for with your PC same network region **IP/Mask/Gateway addresses**.
This example: **192.168.41.1/255.255.255.0/192.168.41.4**

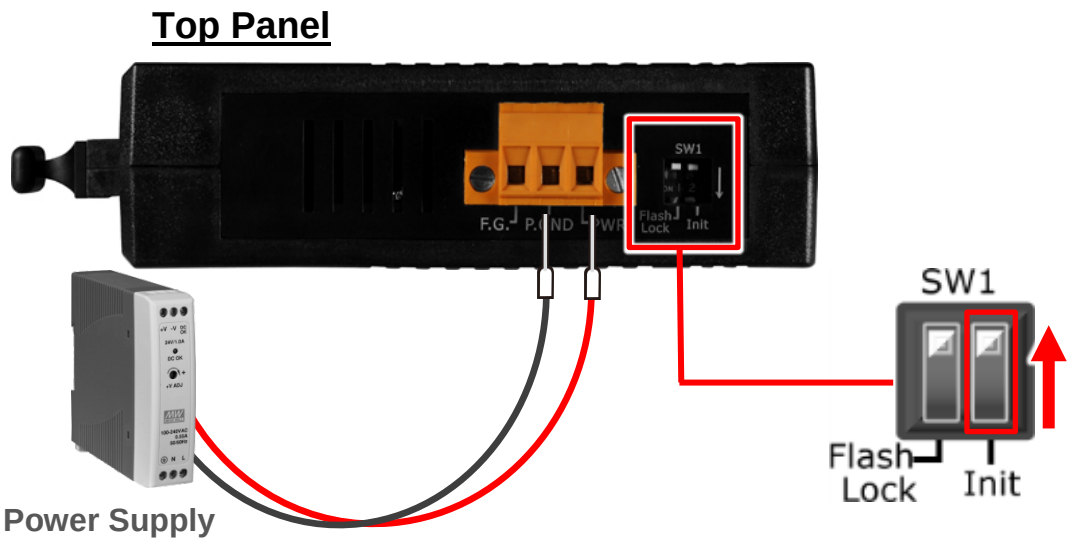
```
uPAC-7186EX_UDP>ip 192.168.41.1
Set IP=192.168.41.1
[ReadBack]IP=192.168.41.1
uPAC-7186EX_UDP>mask 255.255.255.0
Set MASK=255.255.255.0
[ReadBack]MASK=255.255.255.0
uPAC-7186EX_UDP>gateway 192.168.41.4
Set GATEWAY=192.168.41.4
[ReadBack]Gateway=192.168.41.4
uPAC-7186EX_UDP>setcom 1 115200,n,8,1
Current 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]

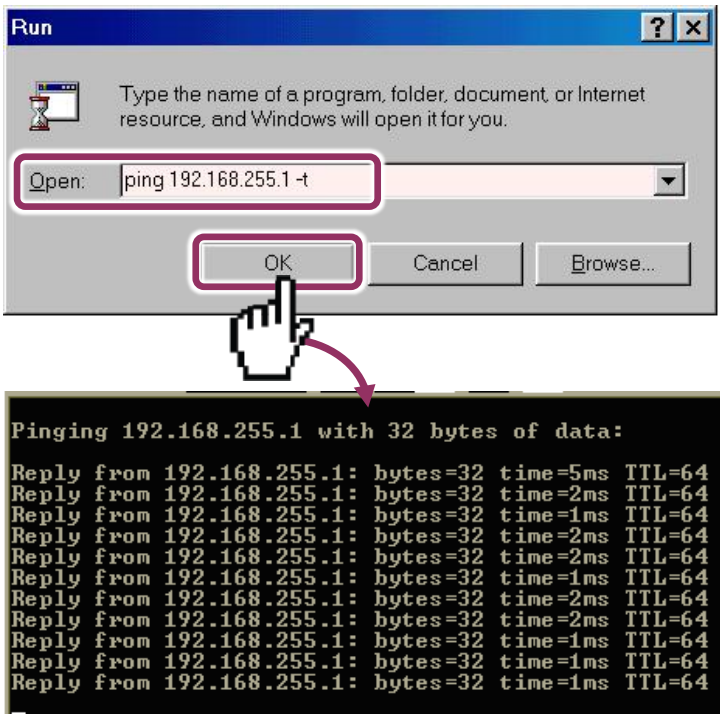
Table A-1: **"setcom"** parameters are as follows.

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 **"SW1"** in **"Run"** position and then **power-on reboot** the PDS-220Fx.



Step 11: Execute ping you setting IP (Example: ping 192.168.255.1 –t) using a run command.



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 192.168.255.1 -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-220Fx. The IP address can be changed using the instructions in Step 8.

2. If the PDS-220Fx cannot be successfully pinged from the PC, refer to Step 8 to change the configuration of the PDS-220Fx. (The mask and gateway addresses of PDS-220Fx and the PC should make the network definition.)

3. The MAC address of the PDS-220Fx should be unique on the same network. Refer to Step 8 for details of how to change the MAC address of the DS-220Fx.

4. Each PDS-220Fx MAC address is unique in the default shipping.

In general, if the host PC can ping the PDS-220Fx smoothly and continuously, all other software and drivers for the PDS-220Fx will operate correctly. Therefore, users should ensure that the development PC is able to ping the PDS-220Fx 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

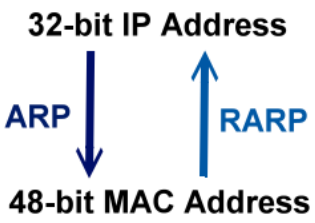
A packet is the unit of data sent across a physical network. It consists of a series of bits containing data and control information, including the source and the destination node (host) address, and is formatted for transmission from one node to another.

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	Jun. 2010	Initial issue
1.1	Dec. 2012	Update manual of style typesetting
1.2	Apr. 2015	-
1.3	Oct. 2018	1.Remove the package CD 2. Add Section DIN-Rail Mounting 3.Update Ch3 Setting up the PDS-220Fx Module 4.Update Ch4 Web Configuration 5. Add Ch5 Typical Applications 6. Update Ch6 Modbus Testing and Protocol 7. Delete Appendix: FAQ 8. Add Appendix C: Revision History