

VS-ENET2-EC

Ethernet Communication Expansion Card User's Guide

● Forward

The VS-ENET2-EC Communication Expansion Card is a dual ports card. It offers two Ethernet ports could be used to monitor data and project loading, also with two non-isolated RS-485 serial communication ports to transfer data.

There is a RJ-45 jack at the top to connect with Ethernet; lower part with two RS-485 interfaces to connect with serial communication devices.

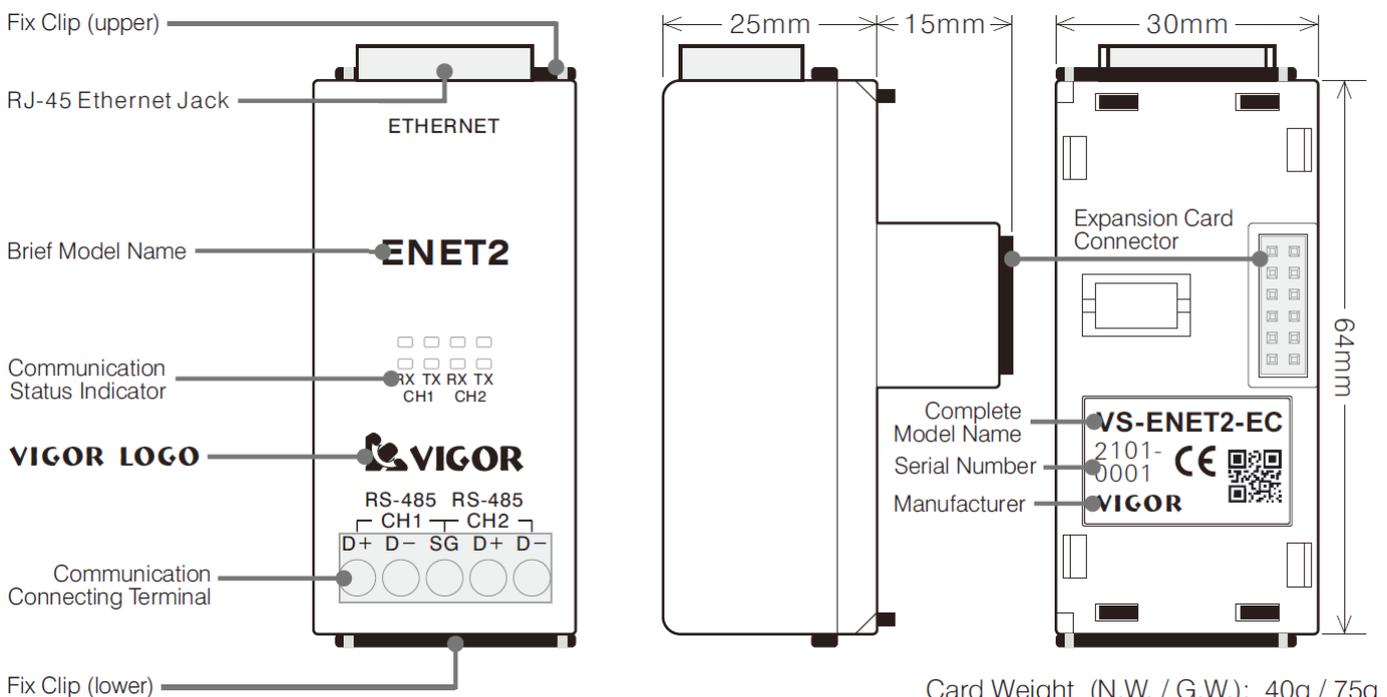
When the card is installed in a Main Unit's EC1 socket, the Ethernet command for CH1 will convert to both the PLC's CP2 and the card's CH1 RS-485 in parallel, or CH2 to PLC's CP3. Thus, the Ethernet communication can use the card to connect with this PLC's CP2 or CP3 also bridge that to other VS PLCs by the left CH1 RS-485 indirectly. Besides, this PLC may become a communicative Master, via the card to send a command to particular IP / port on the Ethernet, and its right CH2 (CP3) could be used to connect with other RS-485 devices.

The instruction below is a card installed on the EC1 socket (ports are CP2 & CP3). When it is on the EC3 of the VS3, its ports are CP4 & CP5. However, all usages are the same as EC1.

● Specification

Item		Specification
Inter- face	Ethernet	RJ-45 jack; 10 BASE-T / 100 BASE-TX, wiring length 100M Max.
	RS-485 × 2	Wiring with devices by D+ / D- / SG terminals, Half-duplex, Non-isolated, Dist. 50M
Net- work	Portocol	Vigor TCP / UDP (Transparent); Modbus TCP IP / UDP Protocol; Non Protocol
	Connection	4 TCP connections
Power Request		DC 5V 235mA (from PLC Main Unit)

● Product Exterior

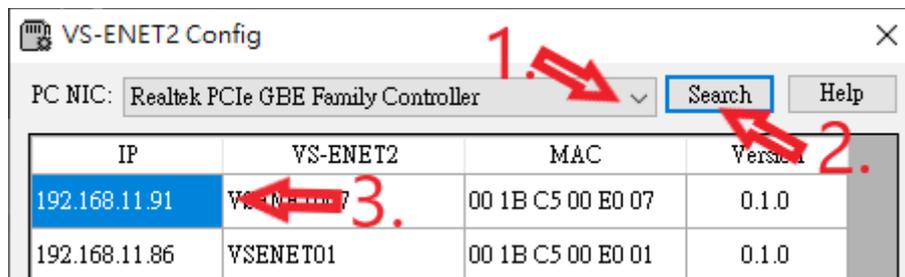


● Indicator

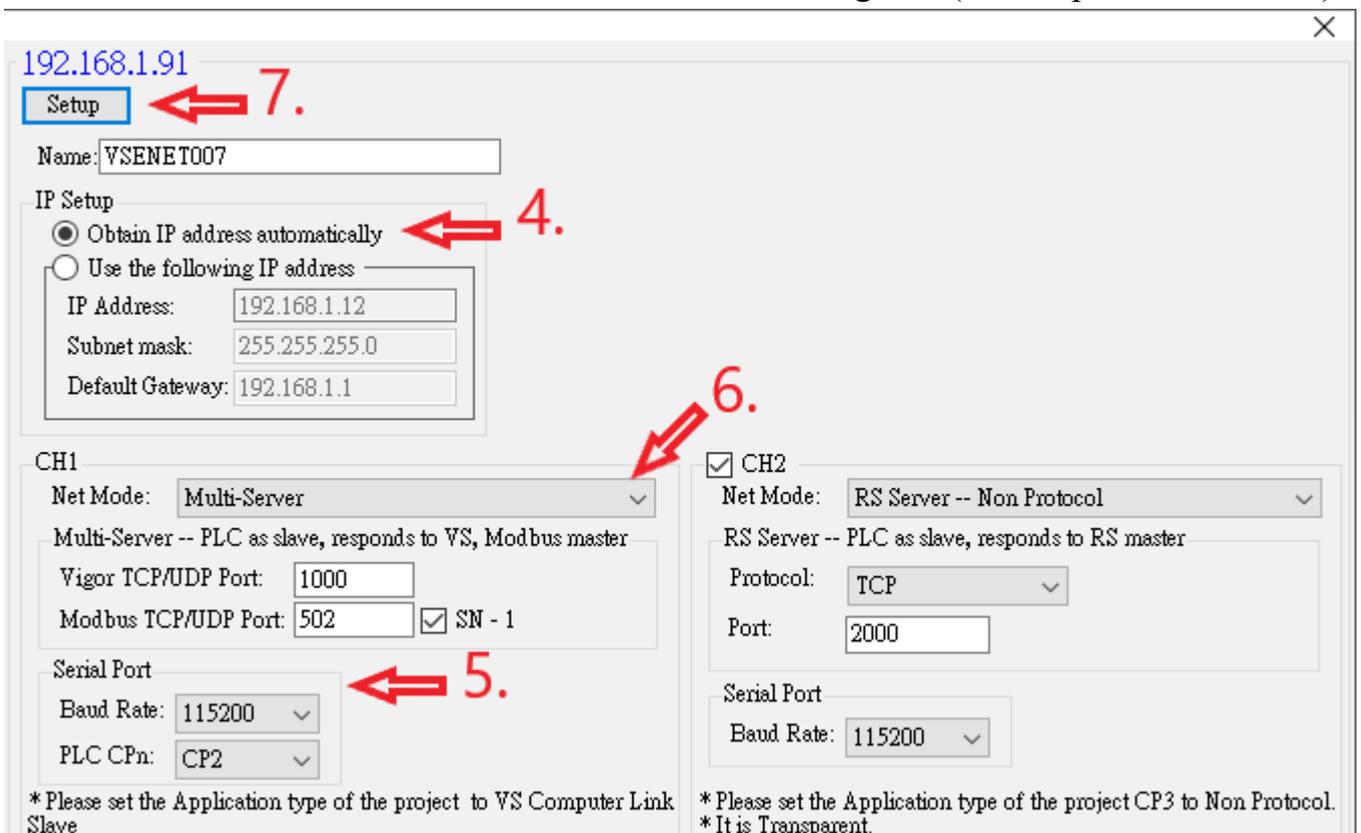
Item	Description
CH1 RX	CH1 data receive (Blinking if the CP2 is received from either Ethernet or RS-485)
CH1 TX	CH1 data send (Blinking if the CP2 is sending out to Ethernet)
CH2 RX	CH2 data receive (Blinking if the CP3 is received from either Ethernet or RS-485)
CH2 TX	CH2 data send (Blinking if the CP3 is sending out to both Ethernet and RS-485)
Ethernet Link	Ethernet is linked up (Green, next to the RJ-45 jack)
Ethernet Data	Blinking indicates traffic/usage on the local network (Yellow, next to the RJ-45 jack)

● Configuration Software at Computer

Please go to www.vigorplc.com to download and install the new Ladder Master S software. At the Windows [Star] will have the [Ladder Master S] folder, click the [VS-ENET2 Config] to open the software. This software requires an Ethernet cable to complete the settings.



1. Pick a Network: The PC may have many network interface controllers, please choose one.
2. Search the LAN: Click [Search] to found all VS-ENET2-EC in the local area network.
3. Choose a VS-ENET2-EC: Pick one from the list to configure. (Will expand more items)



4. IP Setup: Could use the obtain IP (DHCP auto assigns) or static IP (assign by user).
5. PLC Serial Port: Select baud bate to match the PLC port; If installed on EC1, use CP2.

6. Net Mode & Port#: CH1's default is “Multi-Server”, see the examples below for details.
7. [Setup] Button: Click it to send out all the settings to the selected VS-ENET2-EC card.

● Net Mode Discription and Example

I. Multi-Server Mode (only the CH1 provides this mode)

This mode has the Vigor TCP Server, Vigor UDP Server, Modbus TCP Server and Modbus UDP Server. Those servers will transfer the Masters' communication requests from the Ethernet Clients to the connected PLC at the same time.

1. At the configuration software to assign the Net Mode and Port#s. Assume its IP is 192.168.11.91, Vigor Port# 1000, Modbus Port# 502 and the Baud Rate of Serial Port is 115200. Click the [Setup] to write these settings to the card when the config is complete.

CH1

Net Mode: Multi-Server

Multi-Server -- PLC as slave, responds to VS, Modbus master

Vigor TCP/UDP Port: 1000

Modbus TCP/UDP Port: 502 SN - 1

Serial Port

Baud Rate: 115200

2. Open the Ladder Master S to edit a PLC project, under the menu bar's [Project] – [COM Port Setup...] to let the PLC's CP2 become “VS Computer Link Slave”, Baud Rate 115200 (should match with card's CH1) and the Station Number use default #0. Then, use a Mini USB cable to load this project to the PLC.

CP2

Application: VS Computer Link Slave

Baud Rate: 115200

Station Number: 0

3. Change the connect type of the Ladder Master S from the USB to the Ethernet, that is under the menu bar's [System] – [Connection Type Setup...]. The Mode could use UDP Client or TCP Client also set the Host IP 192.168.11.91 (IP of the card), Port #1000 and the Station Number #0 (match to the PLC's CP2). Than, Click [OK] to finish the switch.

Connection Setup

Connect Type: Ethernet

Mode: UDP Client

Host: 192.168.11.91

Port: 1000

WAN IP:

Station Number : 0

4. After completing previous 3 steps, the Ladder Master S could become a Client via the Vigor TCP / UDP network protocol to monitor the Server VS PLC's CP2 or load project. Also, a Master VS PLC (Client) could use this way to access data. However, if the CP2 settings at the newly loaded project do not match, the Ethernet connection will be lost.

5. The Modbus TCP / UDP emulator, HMI or SCADA can monitor the PLC through the Ethernet IP. In this mode, its Port #502 of CH1 will transfer the Modbus TCP / UDP protocol to the VS Computer Link protocol and send to PLC's CP2 to access data.
6. When that [SN-1] item is selected, the station number within the Modbus TCP / UDP command will subtract one during it converted to the VS protocol. E.g. the Modbus command for SN#1 will become Vigor ST#0 (Default); Modbus #0 become Vigor #255 (Broadcast). If [SN-1] is not selected, the ST# will not be changed during conversion.
7. If the card's CH1 RS-485 interface is connected with other VS PLCs (each has a unique ST# and all using VS Computer Link Slave, 115200 bps), the Master by Ethernet could use a specific ST# to access data in the other PLC.

II. Modbus TCP/UDP Server Mode (only provides RTU, 8, None, 1 for serial COM port)

This mode has the Modbus TCP Server and Modbus UDP Server. Those will transfer the Modbus requests from the Ethernet Clients to the connected PLC at the same time.

1. At the configuration software to assign the Net Mode and Port#s. Assume its IP is 192.168.11.91, Modbus Port# 502 and the Baud Rate of Serial Port is 115200. Click the [Setup] to write these settings to the card when the config is complete.

The screenshot shows the configuration for CH1. The 'Net Mode' is set to 'Modbus TCP/UDP Server'. Below it, a text field reads 'Modbus TCP/UDP Server--PLC as slave, responds to Modbus master'. The 'Port' is set to '502'. The 'Serial Port' section shows the 'Baud Rate' set to '115200'.

2. Open the Ladder Master S to edit a PLC project, under the menu bar's [Project] – [COM Port Setup...] to let the PLC's CP2 become “MODBUS Slave”, Baud Rate 115200 (should match with card's CH1) and the Station Number use default #1. Then, use a Mini USB cable to load this project to the PLC.

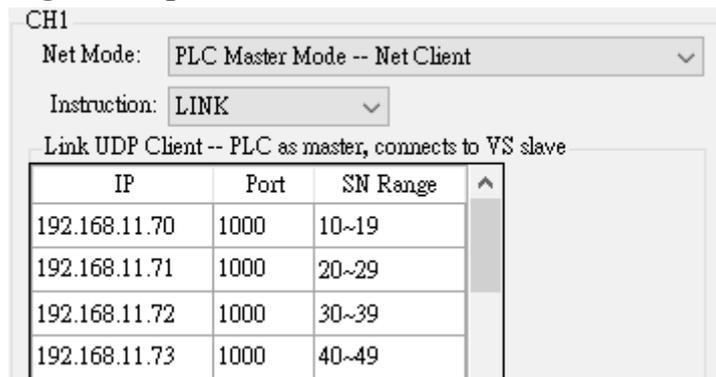
The screenshot shows the configuration for CP2. The 'Application' is set to 'MODBUS Slave'. The 'Baud Rate' is set to '115200'. The 'Station Number' is set to '1'. Under 'Mode', the 'RTU' radio button is selected. Under 'Data Bits', the '8' radio button is selected. Under 'Parity', the 'None' radio button is selected. Under 'Stop Bits', the '1' radio button is selected.

3. Using Modbus TCP / UDP emulator, HMI or SCADA be the Master to monitor the PLC through the Ethernet IP. In this mode, its Port #502 of CH1 will transfer the Modbus TCP / UDP protocol to the Modbus RTU protocol and send to PLC's CP2 to access data.
4. If its CH1 RS-485 interface is connected with some Modbus RTU devices (115200, 8, None, 1 and each has a unique ST#), the Master by Ethernet could use a specific ST# to access data in that device. However, the CH2's RS-485 not provides the bridge function.

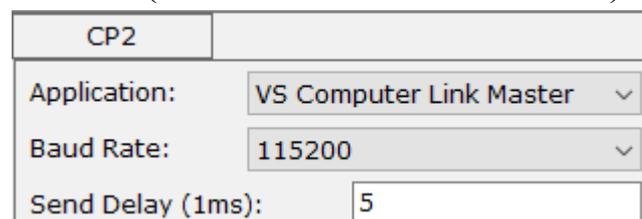
III. PLC Master Mode -- Net Client + LINK Instruction

This mode works with the LINK instruction in PLC, make that PLC becomes a Vigor UDP Client (Master) to access Vigor UDP Servers (up to 8 Slave groups) by the IP mapping list.

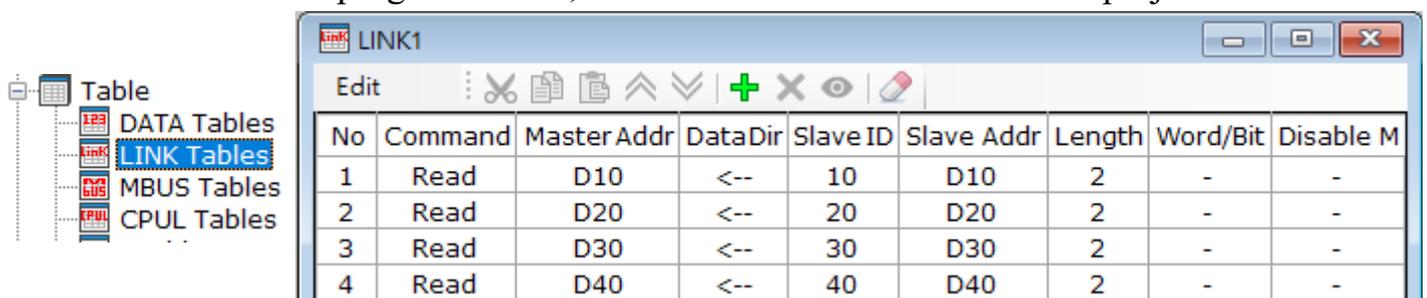
1. At the configuration software to assign the Net Mode, Instruction, Protocol, Serial Port's Baud Rate 115200 and edit the mapping list (IP, Port# & SN Range of each Slave group). As the picture below, when this Master PLC's CP2 want to send a request to a Slave and that Slave's SN is between #10 to #19, this card will be an Ethernet Client to send the request to another VS-ENET2-EC which is using the Multi-Server mode, IP: 192.168.11.70, Port #1000. If the request is for SN #20 ~ #29, will send to IP: 192.168.11.71, Port #1000, and so on. Click the [Setup] to write these settings to the card when the config is complete.



2. Open the Ladder Master S to edit the Master PLC's project, under the menu bar's [Project] – [COM Port Setup...] to let the PLC's CP2 become “VS Computer Link Master”, Baud Rate 115200 (should match with card's CH1).



3. Under the [Project] – [LINK Tables] to edit a table. Finish the table and add the LINK instruction in the program. Then, use a Mini USB cable to load this project to the PLC.

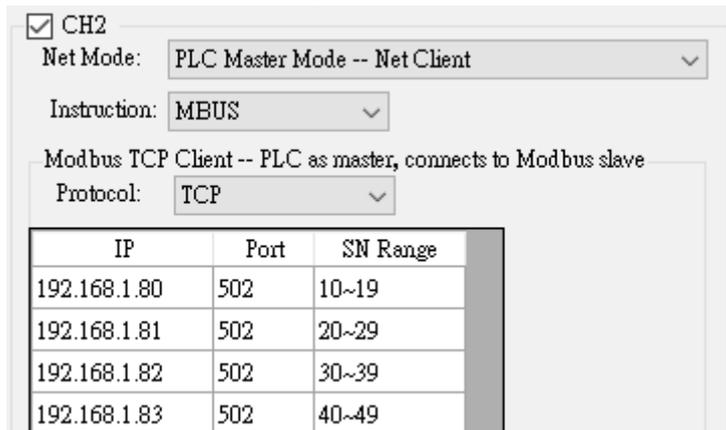


4. After completing previous 3 steps, this Master PLC with the LINK table and instruction will become a Client. Then, the Master by the Vigor UDP network protocol and IP to connects with other VS-ENET2-EC (Multi-Server mode), thus by the command transfer to access data in that Slave VS PLC. In addition, if the Master port is the VS PLC's CP3, could via the wiring of card's CH2 RS-485 serial interface to access Slaves. However, the CH1 RS-485 interface in the card (PLC's CP2) could not be a RS-485 Master.
5. If the Master PLC does not get the correct response from the Slave, the Master will wait for the communication time out before to process the next command.

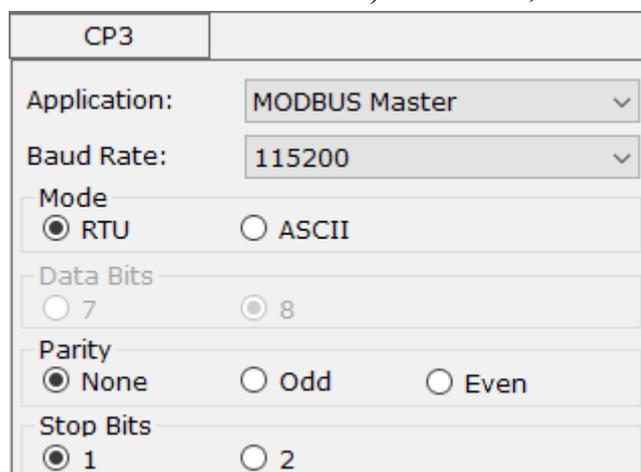
IV. PLC Master Mode -- Net Client + MBUS Instruction + TCP or UDP Protocol

This mode works with the MBUS instruction in PLC, make that PLC becomes a Modbus TCP/UDP Client (Master) to access Modbus Server devices (up to 4 Slave groups) by the IP mapping list.

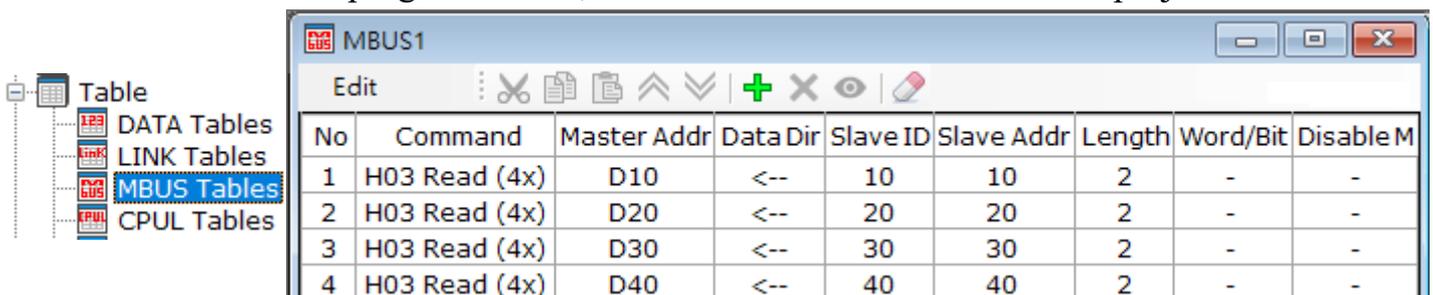
1. At the configuration software to assign the Net Mode, Instruction, Protocol, Serial Port's Baud Rate 115200 and edit the mapping list (IP, Port# & SN Range of each Slave group). As the picture below, when this Master PLC's CP2 want to send a Modbus RTU request to a Slave and that Slave's SN is between #10 to #19, this card will be an Ethernet Client to transfer the request to a Modbus TCP/UDP Server, IP: 192.168.11.80, Port #502. If the request is for SN #20 ~ #29, will transfer to IP: 192.168.11.81, Port #502, and so on. Click the [Setup] to write these settings to the card when the config is complete.



2. Open the Ladder Master S to edit the Master PLC's project, under the menu bar's [Project] – [COM Port Setup...] to let the PLC's CP2 become “MODBUS Master”, Baud Rate 115200 (should match with card's CH1) and RTU, 8 None,1.



3. Under the [Project] – [MBUS Tables] to edit a table. Finish the table and add the MBUS instruction in the program. Then, use a Mini USB cable to load this project to the PLC.



4. After completing previous 3 steps, this Master PLC with the MBUS table and instruction will become a Client. Then, the card will transfer the Modbus RTU command to the Modbus TCP/UDP IP protocol to access data in Slave devices. In addition, if the Master

port is the VS PLC's CP3, could via the wiring of card's CH2 RS-485 interface to access Slaves. However, the CH1 RS-485 in the card (PLC's CP2) can not be a RS-485 Master.

5. If the Master PLC does not get the correct response from the Slave, the Master will wait for the communication time out before to process the next command.

V. PLC Master Mode -- Net Client + RS Instruction (only 8, None, 1 for serial port)

This mode works with the RS instruction in PLC, to make that PLC becomes a Non Protocol TCP or UDP Client. This mode will package up the data sending out from the RS instruction, then becomes an Ethernet Client to deliver the data packet to the Server's IP.

1. At the configuration software to assign the Net Mode, Instruction, protocol then appoint the Slave's IP, Port# and the select the Baud Rate of Serial Port as 115200 for the CH2. Click the [Setup] to write these settings to the card when the config is complete.

Configuration window for CH2:

- CH2
- Net Mode: PLC Master Mode -- Net Client
- Instruction: RS
- RS Client -- PLC as master, connects to RS slave
- Protocol: TCP
- IP: 192.168.11.90
- Port: 2000

2. Open the Ladder Master S to edit the PLC's project, under the menu bar's [Project] – [COM Port Setup...] to let the PLC's CP3 become “Non Protocol”, Baud Rate 115200, 8 None,1. After the COM port setting, add the RS instruction and data related process sections into the program. Then, use a Mini USB cable to load this project to the PLC.

Configuration window for CP3:

- Application: Non Protocol
- Baud Rate: 115200
- Data Bits: 7 8
- Parity: None Odd Even
- Stop Bits: 1 2

3. Thus, the data from the RS instruction through PLC's CP3 will be transferring to IP 192.168.11.90, Port #2000.

VI. RS Server – Non Protocol + TCP or UDP Protocol (only 8, None, 1 for serial port)

This mode works with the RS instruction in PLC, to make that PLC becomes a Non Protocol TCP or UDP Server. This mode will receive the packet from the Client, unpack and transfer that content to PLC's COM port for combination with the RS instruction.

1. At the configuration software to assign the Net Mode, protocol, Port# and the select the Baud Rate of Serial Port as 115200 for the CH2. Click the [Setup] to write these settings to the card when the config is complete.

Configuration window for CH2:

- CH2
- Net Mode: RS Server -- Non Protocol
- RS Server -- PLC as slave, responds to RS master
- Protocol: TCP
- Port: 2000

2. Open the Ladder Master S to edit the PLC's project, under the menu bar's [Project] – [COM Port Setup...] to let the PLC's CP3 become “Non Protocol”, Baud Rate 115200, 8 None,1. After the COM port setting, add the RS instruction and data related process sections into the program. Then, use a Mini USB cable to load this project to the PLC.

CP3	
Application:	Non Protocol
Baud Rate:	115200
Data Bits	<input type="radio"/> 7 <input checked="" type="radio"/> 8
Parity	<input checked="" type="radio"/> None <input type="radio"/> Odd <input type="radio"/> Even
Stop Bits	<input checked="" type="radio"/> 1 <input type="radio"/> 2

3. Thus, when the Client sends a packet through the Ethernet IP and Port #2000 to this RS Server mode card, will be converted to the PLC's CP3 serial communication port. Then, the PLC could use the RS instruction to analyze the data.

● Note

1. There is a connection station number SN# included in the network command of Master software or HMI. Therefore, the SN# of the Slave PLC should match with that command. If the communication is via the Vigor protocol, the default is SN #0; if the MODBUS TCP/UDP protocol is used, the default is SN #1 and the Port is #502.
2. If the Client computer at the network has more than one NIC (Network Interface Controller), please close the unnecessary interface, only keep the one is used to link with the VS-ENET2-EC. In addition, if there is not having a DHCP Server on this LAN to manage IP address, all the devices at this network should use the Static IP, also under the same subnet mask and Gateway.
3. About the LINK, MBUS and RS instructions, please refer to related sections of the VS programming manual.
4. If the Ethernet port of the CH2 on this card is not used, please remove the tick mark in front of the CH2.