http://www.delta.com.tw/industrialautomation/

2007-06-22

5011655400-ENE0

DVPEN01-SL Ethernet Communication Module

Instruction Sheet

⚠ Warning

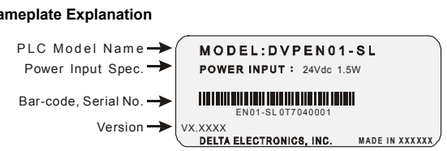
- ✓ *This instruction sheet only provides introductory information on electrical specification, general specifications, installation, basic operation and settings of DVPEN01-SL.. For more detailed information on the network protocols, please refer to relevant references or literatures.*
- ✓ *This is an OPEN TYPE PLC. The PLC should be kept in an enclosure away from airborne dust, humidity, electric shock risk and vibration. Also, it is equipped with protective methods such as some special tools or keys for opening the enclosure, in order to prevent hazard to users or damage on the PLC.*
- ✓ *Please read this instruction sheet carefully before use and follow this instruction to operate the device in order to prevent damages on the product or injuries to staff.*

❶ Introduction

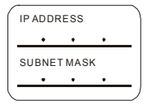
Functions:

- ❖ Supports MODBUS TCP/IP
- ❖ Supports Master and Salve Data Exchange
- ❖ DVP28SV Automatic Time Correction
- ❖ Supports E-Mail
- ❖ RS-232/Ethernet Configuration
- ❖ Transmission Speed: 10/100 Mbps

Nameplate Explanation

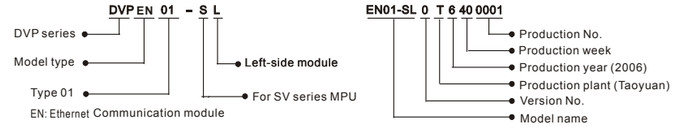


IP Label

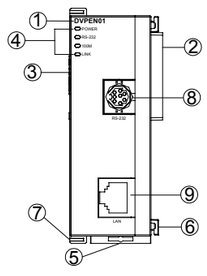


MAC Address

Model Name and Serial Number Explanations:

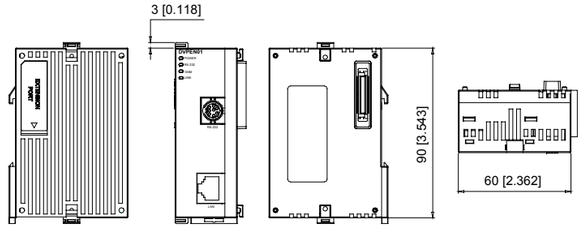


Outline:



①	Model name
②	Extension Port to connect Device
③	Extension Port to connect Extension module
④	POWER, LINK, RS-232, 100M LED
⑤	DIN rail clip
⑥	Extension hole for mounting unit or module
⑦	Extension clip
⑧	RS-232 port
⑨	Ethernet RJ-45 port

Product Profile: Unit mm [inches]



❷ Specifications

Network Interface

Interface	RJ-45 with Auto MDI/MDIX
Number of ports	1 Port
Transmission method	IEEE 802.3, IEEE 802.3u
Transmission cable	Category 5e (TIA/EIA-568-A,TIA/EIA-568-B)
Transmission Rate	10/100 Mbps Auto-Detect
Protocol	ICMP, IP, TCP, UDP, DHCP, SMTP, NTP, MODBUS TCP

Serial Interface

Interface	RS-232
Number of Ports	1 Port
Transmission Cable	DVPACAB230, DVPACAB215, DVPACAB2A30, DVPACAB2B10

Environmental Specifications

Noise Immunity	ESD (IEC 61131-2, IEC 61000-4-2): 8KV Air Discharge EFT (IEC 61131-2, IEC 61000-4-4): Power Line: 2KV, Communication I/O: 1KV Damped-Oscillatory Wave: Power Line: 1KV, Digital I/O: 1KV RS (IEC 61131-2, IEC 61000-4-3): 26MHz ~ 1GHz, 10V/m
Environment	Operation: 0°C ~ 55°C (Temperature), 50 ~ 95% (Humidity), Pollution degree 2; Storage: -40°C ~ 70°C (Temperature), 5 ~ 95% (Humidity)
Vibration/ Shock Resistance	Standard: IEC61131-2, IEC 68-2-6 (TEST Fc)/IEC61131-2 & IEC 68-2-27 (TEST Ea)
Approvals	IEC 61131-2, UL508

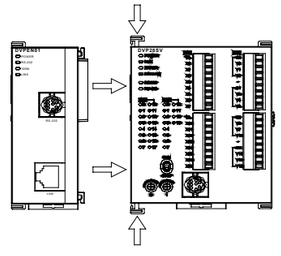
Electrical Specifications

Power supply voltage	24VDC (-15% ~ 20%) (Power is supplied by the internal bus of MPU.)
Power Consumption	1.5W
Insulation voltage	500V
Weight (g)	92 (g)

❸ Installation

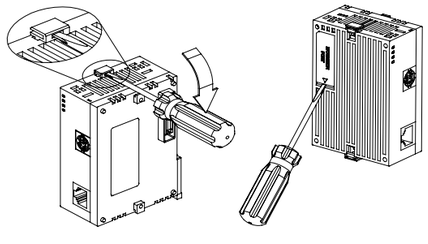
How to Connect DVPEN01-SL with PLC

1. Adjust the extension clip on the left side of the MPU.
2. Meet the extension port of the MPU with DVPEN01-SL and connect them as the figure shown below.
3. Fasten the extension clip.



Install DVPEN01-SL with Other Module

To connect DVPEN01-SL with the other extension module, lift the extension clip of the extension module by a screwdriver and open the side cover.



❹ Control Register (CR)

CR NO. HW	CR NO. LW	Type	Register	Description
	#0	R	Model NO	Read only; DVPEN01-SL model NO.=H'4050
	#1	R	Firmware version	System firmware version; The type is hex. For example, H'0100 means the firmware version is v1.00.
	#2	R	Communication Mode	b0 Modbus TCP mode setting b1 Data Exchange mode setting
	#3	W	E-Mail Event 1 Trigger	Set as 1 to send the E-mail 1.
	#4	W	E-Mail Event 2 Trigger	Set as 1 to send the E-mail 2.
	#5	W	E-Mail Event 3 Trigger	Set as 1 to send the E-mail 3.
	#6	W	E-Mail Event 4 Trigger	Set as 1 to send the E-mail 4.
	#7	R	E-Mail 1, 2 Status Register	b0~b7 Status of E-Mail 2; b8~b15 Status of E-Mail 1
	#8	R	E-Mail 3, 4 Status Register	b0~b7 Status of E-Mail 4; b8~b15 Status of E-Mail 3
	#9	R/W	E-Mail 1 Additional Message	User fills the message, and it will be send by E-Mail.
	#10	R/W	E-Mail 2 Additional Message	User fills the message, and it will be send by E-Mail.
	#11	R/W	E-Mail 3 Additional Message	User fills the message, and it will be send by E-Mail.
	#12	R/W	E-Mail 4 Additional Message	User fills the message, and it will be send by E-Mail.
	#13	R/W	Data Exchange trigger	Set as 1 to start the Data Exchange transaction.
	#14	R	Data Exchange Status Register	Status of Data Exchange transaction
#24 ~ #15			Reserved	Reserved
#26	#25	R/W	Destination IP	Destination IP address for Data Exchange
	#27		Reserved	Reserved
	#28	R/W	Destination Slave ID	Destination Slave ID for Data Exchange
#48 ~ #29		R/W	Default Transmission Buffer	Transmitted data buffer for Data Exchange mode
#68 ~ #49		R	Default Received Buffer	Received data buffer for Data Exchange mode
	#69	R/W	DHCP/Static IP	Select DHCP Mode or Static IP
#71	#70	R/W	IP Address	IP Address
#73	#72	R/W	Subnet Mask	Subnet Mask of DVPEN01-SL
#75	#74	R/W	Gateway	Default gateway IP address
	#76	R	Network Status Register	Status of IP address setting
#80 ~ #77			Reserved	Reserved
	#81	R/W	Slave Transmission Buffer Address	Slave Transmission buffer Address for Data Exchange
	#82	R/W	Number of Received Registers	Number of Received Registers
	#83	R/W	Master Received Buffer Address	Master Received Buffer Address for Data Exchange
	#84	R/W	Slave Received Buffer Address	Slave Received Buffer Address for Data Exchange
	#85	R/W	Number of Sending Registers	Number of Sending Registers
	#86	R/W	Master Transmission Buffer Address	Master Transmission Buffer Address for Data Exchange
#110 ~ #87			Reserved	Reserved
	#111	R/W	Modbus TCP Operating Mode	Set as 1 to configure Modbus TCP be the 8 bits mode.
#113 ~ #112			Reserved	Reserved
	#114	R/W	Modbus TCP Time-Out	Modbus TCP transaction time-out (ms)
	#115	R/W	Modbus TCP Trigger	Set as 1 to send Modbus command.
	#116	R/W	Modbus TCP Status Register	Status of Modbus TCP transaction
#118 ~#117		R/W	Modbus TCP Destination IP	The Destination IP Address of Modbus TCP transaction
	#119	R/W	Modbus TCP Data Length	Data length of Modbus TCP in CR#120 ~ CR#219
#219~#120		R/W	Modbus TCP Data Buffer	Data buffer of Modbus TCP Mode for storing sending/receiving data
#250~#220			Reserved	Reserved
	#251	R	Error Code	The EVPEN01-SL error code
#255~#252			Reserved	Reserved

Symbol definition: R: Read; W: Write

Basic Configuration and Status

❖ CR#2: Communication mode setting: Set as 0 to Disable; Set as 1 to Enable.

bit #	Mode	bit # = 0	bit # = 1
b0	Modbus TCP Mode	Modbus TCP Mode Disable	Modbus TCP Mode Enable
b1	Data Exchange Mode	Data Exchange Mode Disable	Data Exchange Mode Enable

❖ CR#251: Error codes; See the table in the next page.

CR#251	Error status
b0	Not connected.
b1	IP setting error.
b2	CR#13 is set as data sending but data exchange is disabled.
b3	CR#13 is set as data sending but the data exchange mode has not been enabled.
b4	Connecting to NTP Server fails.
b7	Connecting to SMTP Server fails.
b8	DHCP does not acquire correct network parameters.

Sending E-mail Function

- CR#3 ~ CR#6:E-mail will be sent when set as 1. After the E-Mail sending is completed, the CR value will be set as 0. Please use differential command to trigger CR#3 ~ CR#6 in order to avoid continual mails.
- CR#7, CR#8: E-Mail Status. See the table below.

CR Value	E-Mail Status
0	Nothing
1	Processing
2	Success
3 ~ 9	Reserve
10	Cannot connect to SMTP-Server
11	E-mail Address error
12	Error response SMTP-Server transmission error
13	No free TCP connection
14 ~ 255	Reserve

- CR#9 ~ CR#12: The register value will be stored in E-Mail Subject to be the user message.

Data Exchange Function

- CR#13: The data in Data Exchange Buffer will be exchanged when CR#13 is set as 1. CR#13 will be set as 0 when the transaction is finished.
- CR#14: The status register of Data Exchange transaction. CR#14 = 1 refers to the transaction is in progress. CR#14 = 2 refers to the Data Exchange transaction is completed. CR#14 = 3 when an error occurs.
- CR#28: The Destination Salve ID for Data Exchange. Range: K1 ~ K255. DVPEN01-SL will look up the Slave IP address in the Slave ID–IP lists of Data Exchange function. When CR#28 is set as 0, CR#25 and CR#26 will be the Slave IP Address.
- CR#25 ~ CR#26: Before setting up the destination IP address of Data Exchange Mode, please set CR#28 as 0. See CR#70 and CR#71 for the steps of setting up IP address.
- CR#29 ~ CR#48: The default Data Exchange registers for storing the data to be sent to the remote MPU.
- CR#49 ~ CR#68: The default Data Exchange registers for storing the received data from the remote MPU.
- CR#81：Setting the Modbus Address of Sending Buffer in Slave for Data Exchange Mode. It's only permitted to use D Registers. Ex. D0 = H1000.
- CR#82：The number of reading registers for data exchange Mode. Range: K1 ~ K128.
- CR#83：Setting the Modbus Address of Receiving Buffer in Master for Data Exchange Mode. It's only permitted to use D Registers.
- CR#84：Setting the Modbus Address of Receiving Buffer in Slave Data Exchange Mode. It's only permitted to use D Registers.
- CR#85：The number of sending registers for data exchange Mode. Range: K1 ~ K128.
- CR#86：Setting the Modbus Address of Sending Buffer in Master for Data Exchange Mode. It's only permitted to use D Registers. For example, set CR#81 as H1000 (D0), set CR#82 as K1, and set CR#83 as H1064 (D100). When the Data Exchange is executed, It will read the Slave's D0 and write into the D100 in Master. Set CR#84 as H1002 (D2), set CR#85 as K4, and set CR#86 as H1008 (D8). When the Data Exchange is executed, It will read Master's D8~D11 and write into Slave's D2~D5. The sending and receiving functions can be executed at one time. If both values of CR#82 and CR#85 are 0, default sending and receiving buffers (CR#29~CR#68) and default register number (K20) will be used.

Network Configuration Function

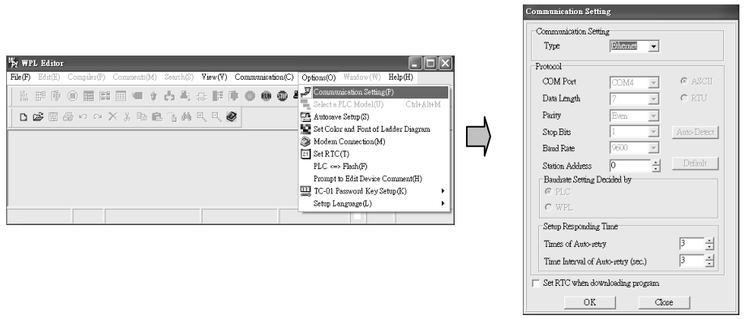
- CR#69: IP mode setting. Set as 0 to be Static IP address; Set as 1 to obtain IP address by DHCP (Dynamic IP).
- CR#70 ~ CR#71: IP Address setting. It's accessed through Hex Mode. It cannot write when in DHCP Mode. For example, if the user wants to set the IP as 192.168.0.2, write H'0002 to CR#70 and H'C0A8 to CR#71. (K192 = H'C0, K168 = H'A8, K0 = H'00, K2 = H'02)
- CR#72 ~ CR#73: Subnet Mask setting. It's accessed through Hex Mode. It cannot write when in DHCP Mode. For example, if the user wants set Subnet Mask as 255.255.255.0, write H'FF00 to CR#72 and H'FFFF to CR#73.
- CR#74 ~ CR#75: Default Gateway IP Address setting. It's accessed through Hex Mode. It cannot write when in DHCP Mode. See CR#70 and CR#71 for the steps of Default Gateway IP Address setting.
- CR#76: Status of IP Address. CR#76 = 0 refers to normal; CR#76 = 1 refers to DHCP transaction is in progress; CR#76 = 2 refers to IP Address setting is in progress.

Modbus TCP Function

- CR#111：The Modbus TCP communicating Mode. Set CR#111 as 1 to be the 8 bits Mode. Set CR#111 as 0 to be the 16 bits Mode.
- CR#114: CR#114 is the time-out of Modbus TCP transaction (ms).
- CR#115: The Modbus TCP transaction will start when CR#115 is set as 1. CR#115 will be set as 0 when the transaction is finished. Please use differential instruction to trigger CR#115.
- CR#116: The status register of Modbus TCP transaction. CR#116 = 1 refers to the transaction is in progress. CR#116 = 2 refers to the Modbus TCP transaction is completed. CR#116 = 3 when an error occurs.
- CR#117 ~ CR#118: Destination IP address of Modbus TCP. See CR#70 and CR#71 for the steps of IP address setting.
- CR#119: The data length of Modbus TCP in CR#120 ~ CR#247. In the 8 bits mode, the range is K1 to K100. In the 16 bits mode, the range is K1 to K200.
- CR#120 ~ CR#247: Modbus TCP registers for storing the data to be sent and received.

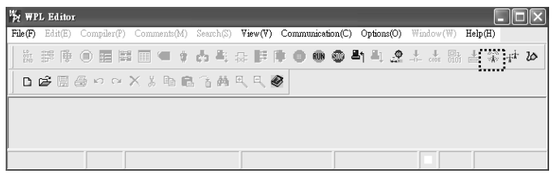
❺ Software Setting

- **Communication:** Start WPLSoft and click on "Options" and select "Ethernet" in "Communication Setting".

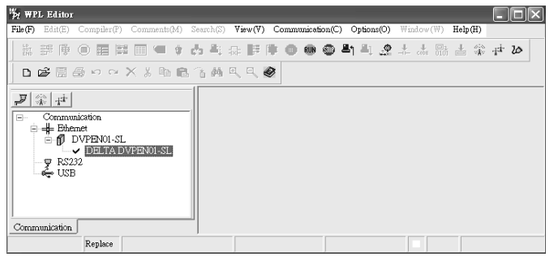


- **DVPEN01-SL Settings**

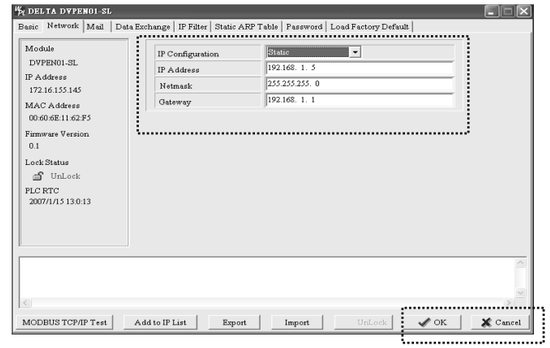
1. Click on the "auto search" and WPLSoft will search for all DVPEN01-SL in the network.



2. WPL displays all DVPEN01-SL in the network. Click on the desired module and click twice again to open the setup screen.



3. Enter the "Network" setup screen to modify the network setting. If there exists DHCP Server in the network, the user may use DHCP to automatically acquire the network configuration parameters or use Static IP to set up the network configuration parameters.
4. Click "OK" after completing the settings.



5. After returning to the screen 2, click on the desired module to start communicating.

❻ LED Indication & Troubleshooting

LED Indication

LED	LED Status	Indication	How to deal with
POWER	Green constantly on	Power supply is normal	None
	Green constantly off	No power supply	Check if the module is powered.
RS-232	Red flashes	Data are being transmitted in the serial port	None
	Red constantly off	No data transmission	Check if the RS-232 cable is connected when using RS-232 communication.
100M	Orange constantly on	Transmission speed: 100M	None
	Orange constantly off	Transmission speed: 10M	Check if the network transmission speed is 100M.
LINK	Green constantly on	Network works normally	None
	Green flashes	Network is working	None
	Green constantly off	Network is not connected	Check if the RJ-45 cable is tightly connected.

Troubleshooting

Abnormality	Cause	How to deal with
POWER LED off	MPU is not powered	Check if the MPU is powered and whether the power supply is normal.
	Not connected to MPU	Check if DVPEN01-SL is tightly connected with MPU.
LINK LED off	Not connected to the network	Check if the RJ-45 cable is correctly connected to the network.
	RJ-45 poor contact	Check if the RJ45 contact is tightly connected to the Ethernet RJ-45 port.
100M LED off	The module is not connected to the network	Check if the RJ-45 cable is correctly connected to the network.
	Transmission speed: 10M	Check if the network transmission speed is 100M.
	RJ-45 poor contact	Check if the RJ45 contact is tightly connected to the Ethernet RJ-45 port.
Unable to locate a module	Not connected to the network	Check if DVPEN01-SL is correctly connected to the network.
	The computer and MPU are blocked by the firewall.	Search by IP address or use RS-232 for settings.
Unable to open DVPEN01-SL setup screen	Not connected to the network	Check if DVPEN01-SL is correctly connected to the network.
	Incorrect communication settings in WPLSoft	Check if you select "Ethernet" in the communication settings.
	The computer and MPU are blocked by the firewall.	Use RS-232 for settings.
Fail to up/down load program and monitor by WPLSoft	The network setting of DVPEN01-SL is incorrect	Check if the network setting of DVPEN01-SL is correct. Consult the IT staff if you are using the Intranet in the company or refer to the network setting instructions provided by your ISP.
Unable to send out emails	DVPEN01-SL settings are incorrect	Check if the settings of DVPEN01-SL are correct.
	Incorrect CR settings	Check if the CR is used correctly.
	Incorrect settings of mail server	Check the IP address of SMTP-Server.