![Delta Electronics, Inc. logo]

DVPDNET-SL

DeviceNet Network Scanner

Application Manual

⚠ **Warning**

✓ *Please read this instruction carefully before use and follow this instruction to operate the device in order to prevent damages on the device or injuries to staff.*

✓ *Switch off the power before wiring.*

✓ *DVPDNET-SL is an OPEN TYPE device and therefore should be installed in an enclosure free of airborne dust, humidity, electric shock and vibration. The enclosure should prevent non-maintenance staff from operating the device (e.g. key or specific tools are required for operating the enclosure) in case danger and damage on the device may occur.*

✓ *DVPDNET-SL is to be used for controlling the operating machine and equipment. In order not to damage it, only qualified professional staff familiar with the structure and operation of DVPDNET-SL can install, operate, wire and maintain it.*

✓ *DO NOT connect input AC power supply to any of the I/O terminals; otherwise serious damage may occur. Check all the wirings again before switching on the power and DO NOT touch any terminal when the power is switched on. Make sure the ground terminal ⏚ is correctly grounded in order to prevent electromagnetic interference.*

📖 **Table of Contents**

1   Introduction

1. To ensure correct installation and operation of DVPDNET-SL, please read this chapter carefully before using your DVPDNET-SL.

2. This chapter only provides introductory information on DVPDNET-SL. For more detailed information on DeviceNet protocol, please refer to relevant references or literatures.

3. DVPDNET-SL is a DeviceNet master module operating on the left side of DVP-SV series PLC MPU. When DVP-SV is connected to DeviceNet through DVPDNET-SL, DVPDNET-SL will serve as the data exchange interface between DVP-SV and other slaves on the bus. DVPDNET-SL is in charge of sending the data in DVP-SV to the slaves on the bus, and at the same time collecting the data returned from each slave and sending them back to DVP-SV.

1.1   Features

- Supports Group 2 server device and Group 2 only server device.
- Supports explicit connection via predefined Master/Slave connection set.
- Supports DeviceNet Master mode and Slave mode.
- Supports EDS configuration in DeviceNet configuration tools.

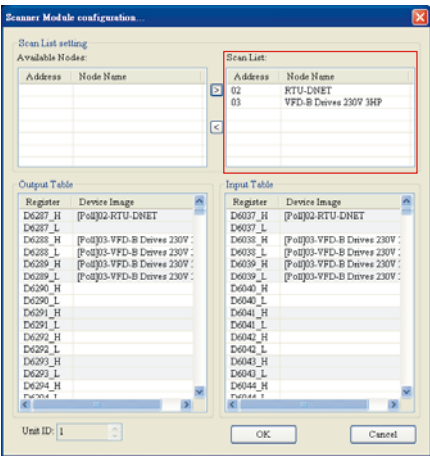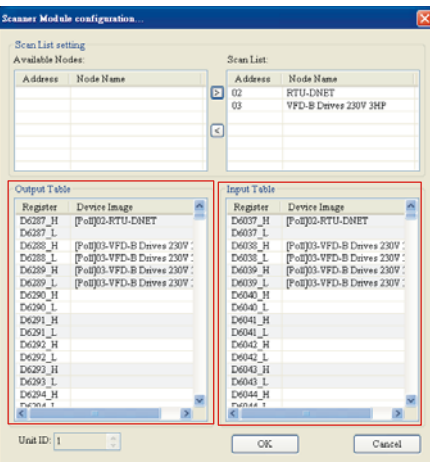## 1.2   Basic Functions of DVPDNET-SL

DVPDNET-SL DeviceNet Network Scanner can be used both as a master or a slave in DeviceNet. When being used as a master, it supports the following functions:

- Client function of explicit message.
- All kinds of I/O connections established between the slave: polled, bit-strobed, change of state and cyclic.
- As the connection interface between DeviceNetBuilder configuration software and DeviceNet network. The configuration software is able to directly configure the network through DVPDNET-SL.
- Sending explicit messages for reading/writing the data in slave through PLC ladder diagrams.
- Automatically exchanging data with PLC MPU. The user needs only to edit the D register in the PLC without using FROM/TO instruction. When connected to DVP-SV/DVP-EH2-L MPU, registers after D6000 will be adopted temporarily.
- Offering 380-byte space for I/O input data and another 380 bytes for I/O output data.

When being used as a slave, it supports the following functions:

- Explicit message serve and Group 2 only serve connection mode.
- Polling
- Offering 256 bytes for input data and 256 bytes for output data in data exchange with master.
- Automatically exchanging data with PLC MPU. The user needs only to edit the D register in the PLC without using FROM/TO instruction.

1.3   I/O Scan List

Item	Explanation	Software screen
Scan Table	Before DVPDNET-SL starts its operation, you have to configure its scan list through the configuration software. The scan list is a list consisting of the information of slave devices with data, e.g. slave address, I/O type, I/O data length and so on, to be exchanged with DVPDNET-SL. DVPDNET-SL is responsible for managing the slave devices in the scan list, establishing connections and exchanging I/O data with them. DVPDNET-SL will not establish connections and exchange I/O data with slave devices which are not configured in the network.	
I/O Table	DVPDNET-SL provides an Input Table (380 bytes) and an Output Table (380 bytes) for the data exchange with slaves. When a slave device is configured into the scan list, the software will automatically allocate a I/O data exchange are of corresponding length to the slave from the mapping table. The I/O table is the data exchange interface between the PLC MPU and the slave device. It corresponds the I/O data in the D register of the MPU with the I/O data in the slave. After you configure the network, download the configured data to DVPDNET-SL, and it will start the I/O data exchange with the corresponding slave device according to the configured data received. Data in Output Table will be sent to the salve, and data returned from the slave will be filled into Input Table.	

1.4   Specifications

■ DeviceNet connection

Transmission method	CAN
Electrical isolation	500 VDC
Interface	Removable connector (5.08mm)
Transmission cable	2-wire twisted shielded cable with 2-wire bus power cable and drain

■ Communication

Message type	I/O polled, bit-strobe, change of state, cyclic
Baud rates	125 kbps; 250 kbps; 500 kbps

■ Electrical specification

Voltage	11 ~ 25 VDC supplied by the power cable in the network
Current	28mA (typical), 125mA impulse current (24 VDC)

■ Environment

Noise immunity	ESD (IEC 61131-2, IEC 61000-4-2): 8KV Air Discharge EFT (IEC 61131-2, IEC 61000-4-4): Power Line: 2KV, Digital I/O: 1KV Analog & 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
Operation	0ºC ~ 55ºC (temperature); 50 ~ 95% (humidity); pollution degree 2
Storage	-25ºC ~ 70ºC (temperature); 5 ~ 95% (humidity)
Vibration/shock resistance	Standard: IEC 61131-2, IEC 68-2-6 (TEST Fc)/IEC 61131-2 & IEC 68-2-27 (TEST Ea)
Certificates	IEC 61131-2, UL508

2 Product Profile & Outline

2.1 Dimension
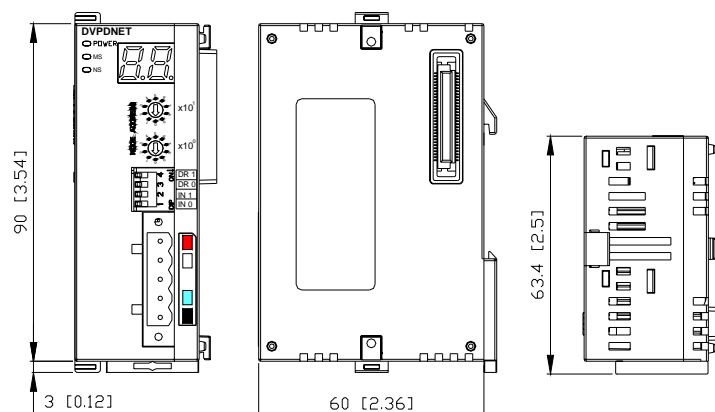
2.2 Product Profiles
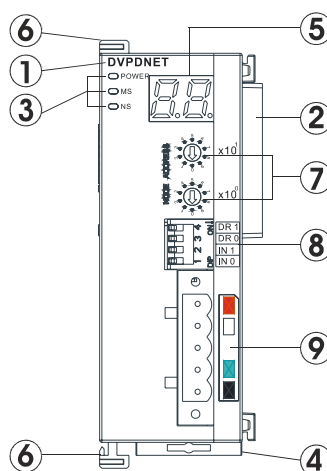
1. Model name	6. Extension clip
2. Extension port	7. Addres switch

3. Power, MS, NS LED	8. Function switch
4. DIN rail clip	9. DeviceNet connection port
5. Digital indicator	

2.3   DeviceNet Connection Port

The connector is used on the connection to DeviceNet. Wire by using the connector enclosed with DVPDNET-SL.

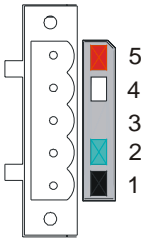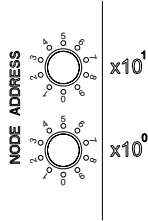| PIN	Signal	Color	Content
1	V-	Black	0 VDC
2	CAN_L	Blue	Signal-
3	SHIELD	-	Shielded
4	CAN_H	White	Signal+
5	V+	Red	24 VDC

2.4   Address Switch

The switch is used on setting up the node address of DVPDNET-SL on DeviceNet. Range: 00 ~ 63 (64 ~ 99 are forbidden).

Switch setting	Content
0 … 63	Valid DeviceNet node address
64…99	Invalid DeviceNet node address

Example: If you need to set the node address of DVPDNET-SL to 26, simply switch the corresponding switch of $x10^1$ to 2 and the corresponding switch of $x10^0$ to 6.

Note:

● Please set up the node address when the power is switched off. After the setup is completed, re-power DVPDNET-SL.

● When DVPDNET-SL is operating, changing the setting of node address will be invalid.

● Use slotted screwdriver to rotate the switch carefully in case you scratch the switch.

2.5   Function Switch

The function switches are for:

■   Setting up the work mode (IN0)

■   Setting up the baud rate of DeviceNet (DR0 ~ DR1)

DR1	DR0	Baud rate
OFF	OFF	125 kbps
OFF	ON	250 kbps
ON	OFF	500 kbps
ON	ON	Incorrect setting
IN0	ON	When the slave is off-line, the I/O data in the buffer area will be held.

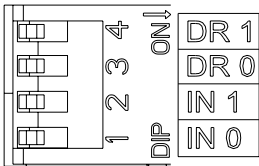|	OFF	When the slave is off-line, the I/O data in the buffer area will be cleared.
IN1		Reserved

Note:

- Please set up the function switch when the power is switched off. After the setup is completed, re-power DVPDNET-SL.
- When DVPDNET-SL is operating, changing the setting of the function switch will be invalid.
- Use slotted screwdriver to adjust the DIP switch carefully in case you scratch the switch.

2.6   Digital Indicator

The digital indicator provides the following two functions:
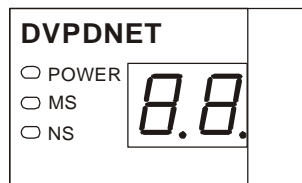
1. Displaying the node address and error messages of DVPDNET-SL and error messages.
2. Displaying the error message of slave.

2.7   Extension Port

The extension port is used on connecting DVPDNET-SL to the left-side extension port on DVP-SV PLC MPU or to other extension modules connected to the left side of DVP-SV.

3   Basic Operation

3.1   Connecting DVPDNET-SL to DVP-SV MPU

- Adjust the extension clip on the left side of DVP-SV.
- Meet the extension port of the MPU with DVPDNET-SL as shown in the figure below.
- Fasten the extension clip.
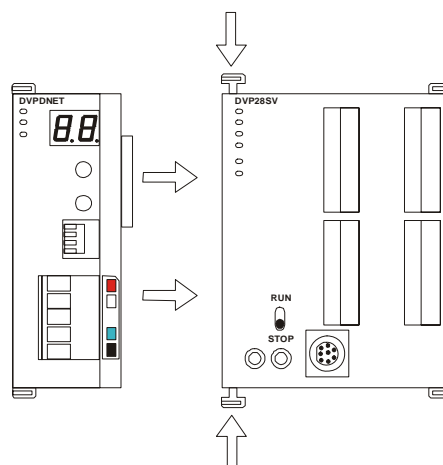
3.2   Installing DVPDNET-SL and DVP-SV MPU on DIN Rail

- Use 35mm DIN rail.

■ Open the DIN rail clip on DVP-SV and DVPDNET-SL. Insert DVP-SV and DVPDNET-SL onto the DIN rail.

■ Clip up the DIN rail clips on DVP-SV and DVPDNET-SL to fix DVP-SV and DVPDNET-SL on the DIN rail, as shown below.
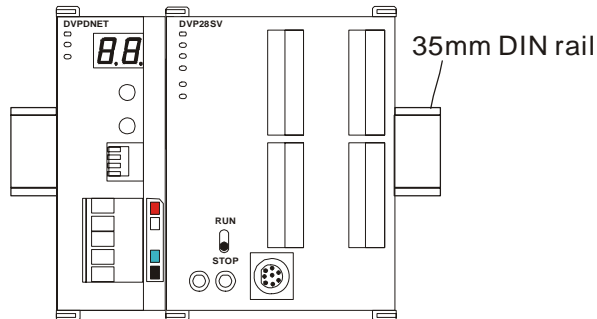
3.3 Connecting to DeviceNet Connection Port

■ The colors on the PINs on the DeviceNet connection port match the colors of the connection cables. Make sure you connect the cable to the right PIN.

■ We recommend you also apply Delta's power module in the connection.
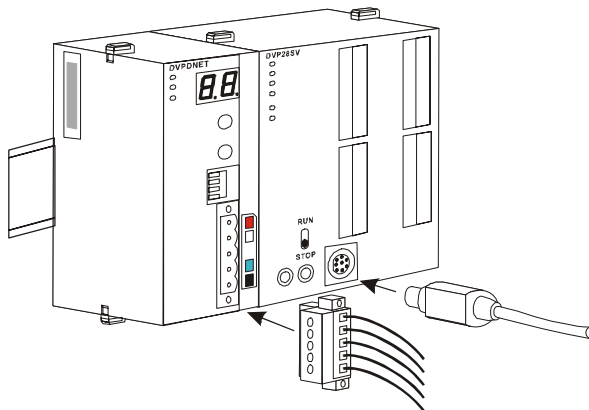
4 Configuration

4.1 Corresponding Relation between DVPDNET-SL and DVP-SV

After all DVPDNET-SL are connected to DVP-SV, DVP-SV will distribute data mapping areas to every DVPDNET-SL.
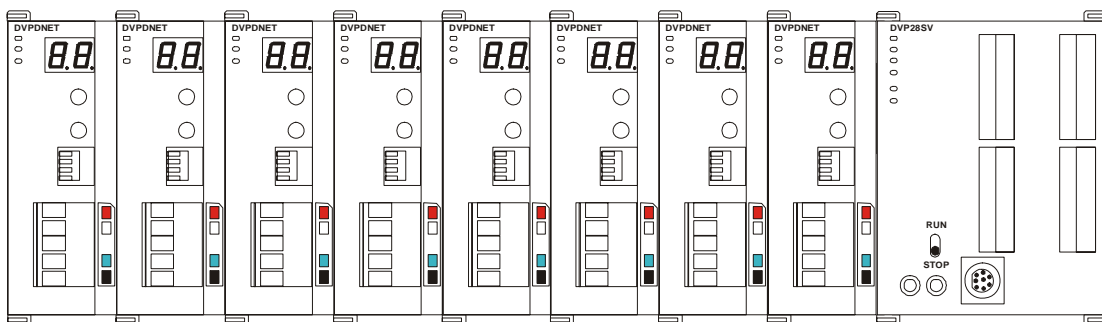
The index of DVPDNET-SL is its number. The first DVPDNET-SL on the left hand side of DVP-SV is No. 1, the following DVPDNET-SL modules are No.2, No.3, No.4 and so on.

DVPDNET-SL index	Mapped D registers	
	Output mapping	Input mapping
1	D6250 ~ D6497	D6000 ~ D6247
2	D6750 ~ D6997	D6500 ~ D6747
3	D7250 ~ D7497	D7000 ~ D7247
4	D7750 ~ D7997	D7500 ~ D7747
5	D8250 ~ D8497	D8000 ~ D8247
6	D8750 ~ D8997	D8500 ~ D8747
7	D9250 ~ D9497	D9000 ~ D9247
8	D9750 ~ D9997	D9500 ~ D9747

4.2   I/O Mapping Table

Output mapping are			Input mapping area		
D register	Mapping area	Data length	D register	Mapping area	Data length
D6250 ~ D6281	Explicit message program request	32 words	D6000 ~ D6031	Explicit message program response	32 words
D6282 ~ D6285	Bit-strobe command	4 words	D6032 ~ D6035	Status of nodes in the scan list	4 words
D6286	Reserved	1word	D6036	DVPDNET-SL status	1 word
D6287 ~ D6476	DeviceNet output data	190 words	D6037 ~ D6226	DeviceNet input data	190 words
D6477 ~ D6497	Reserved	21 words	D6227 ~ D6247	Reserved	21 words

5   Constructing DeviceNet Network

In this section, we will present an application example, illustrating how to construct a DeviceNet network and the configuration of the network. Before constructing a network, you have to first know clearly what the network is for and start a preliminary planning for the data to be exchanged. The plan shall include the maximum communication distance, slaves to be used, total length of data to be exchanged and so on. These information will decide whether the network you construct is a reasonable one, or if it satisfies your needs, and even affect the later-on network sustainability and flexibility of network capacity upgrade.

5.1   How to Construct a DeviceNet Network

Target	Using a remote digital I/O module to control RUN/STOP of VFD-B AC motor drive.

1. The connection
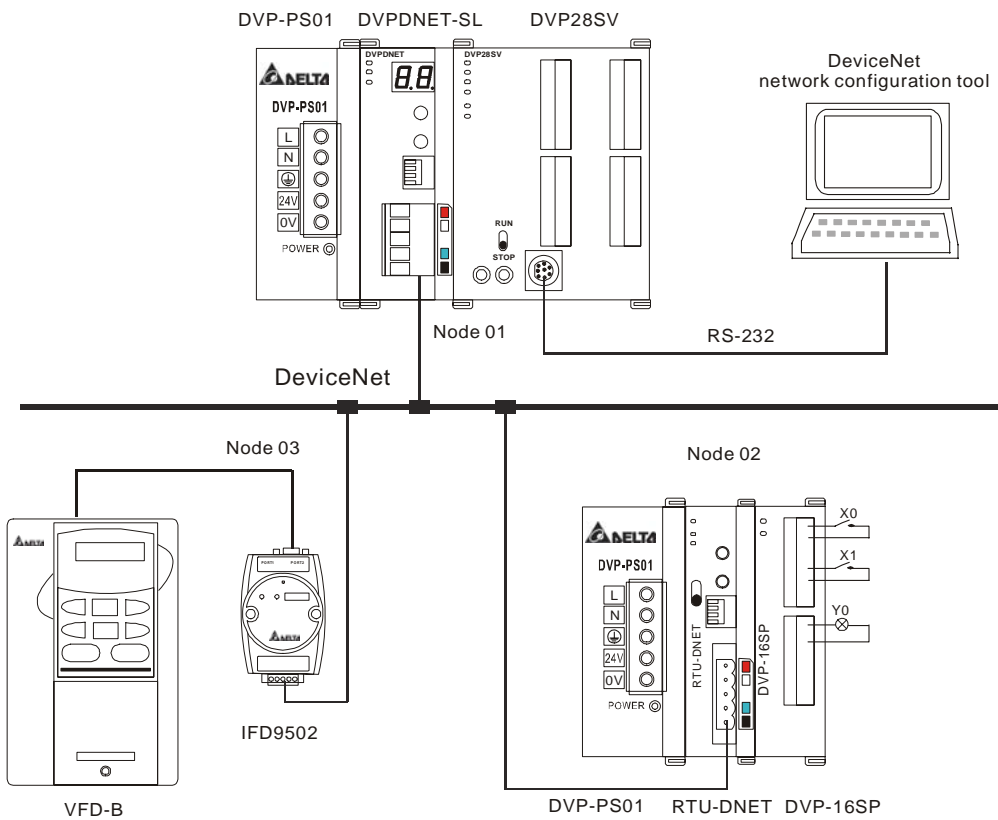
2. Set up DVPDNET-SL, DNA01 and RTU-DNET according to the table below.

Module	Node address	Baud rate
DVPDNET-SL	01	500 kbps
IFD9502	02	500 kbps
RTU-DNET	03	500 kbps

5.2   How to Configure Network by DeviceNet Network Configuration Tool

1.   Configuration of DeviceNet slave

(1) Open DeviceNetBuilder software, as below:
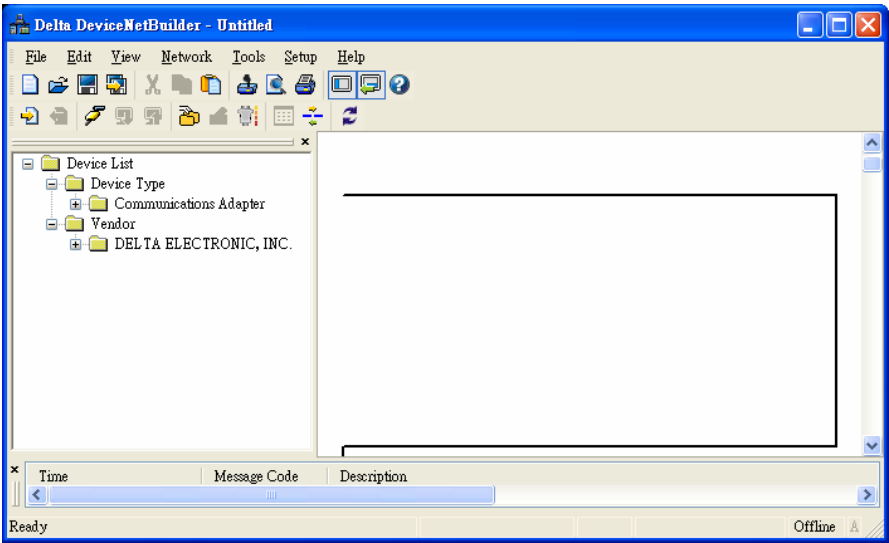
(2) Select "Setup" => "Communication Setting" => "System Channel", and the "Serial Port Setting" dialog box will appear.
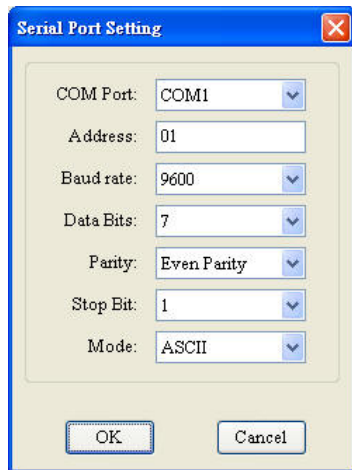
(3) Set up the communication parameters in the PC and DVP-SV, e.g. the communication port, address, baud rate and communication format.

Item	Function	Default
COM Port	COM port on the PC to be used to communicate with DVP-SV	COM1
Address	Communication address of DVP-SV	01
Baud rate	Communication speed between the PC and DVP-SV	9,600 (bps)
Data Bits	Communication protocol between the PC and DVP-SV	7
Parity		Even Parity
Stop Bit		1
Mode	Communication mode between the PC and DVP-SV	ASCII

Click on "OK" and return to the main page.
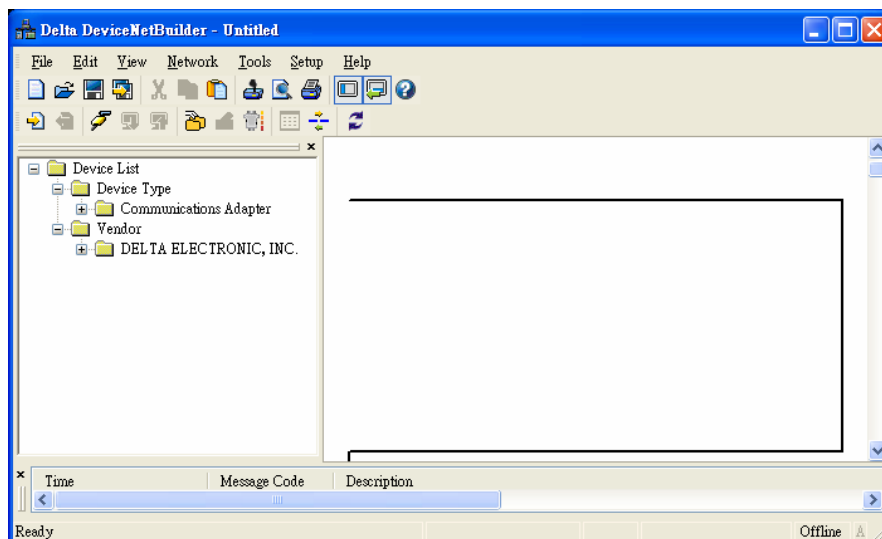
(4) Select "Network" => "Online", and the "Select Communication Channel" dialog box will appear.
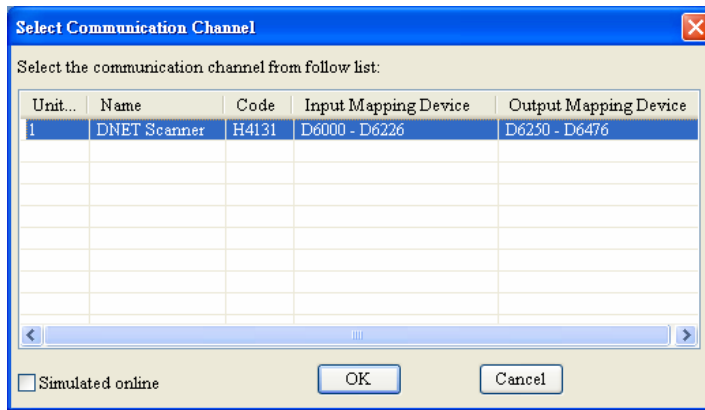
(5) Click on "OK", and DeviceNetBuilder will start to scan the entire network.
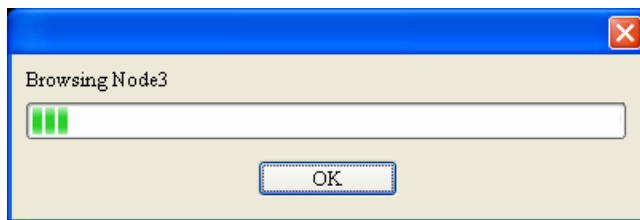
(6) If the bar on the dialog box does not progress, it means the connection between the PC and DVP-SV is abnormal, or there are other programs also using the COM port on the PC. After the scan is completed, the dialog box will tell you that the scan is completed, and the icons and device names of all the nodes scanned on the network will be shown on the screen. See the figure below, in which the node address of DVPDNET-SL is 01.
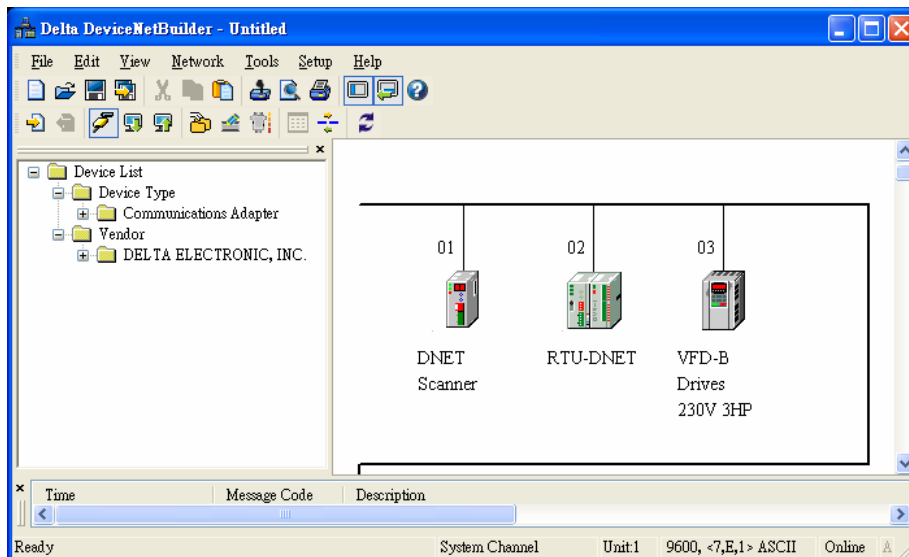
(7) Double click on RTU-DNET (node 02), and the "Node Configuration…" dialog box will appear.
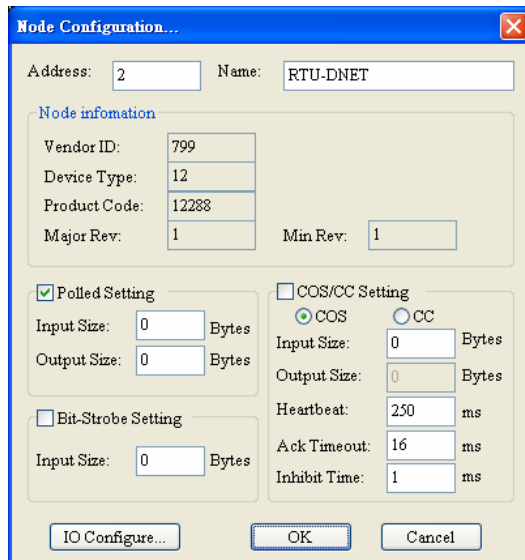
(8) Click on "IO Configure…" button in "Node Configuration" dialog box, and you will then see "RTU Configuration" page.
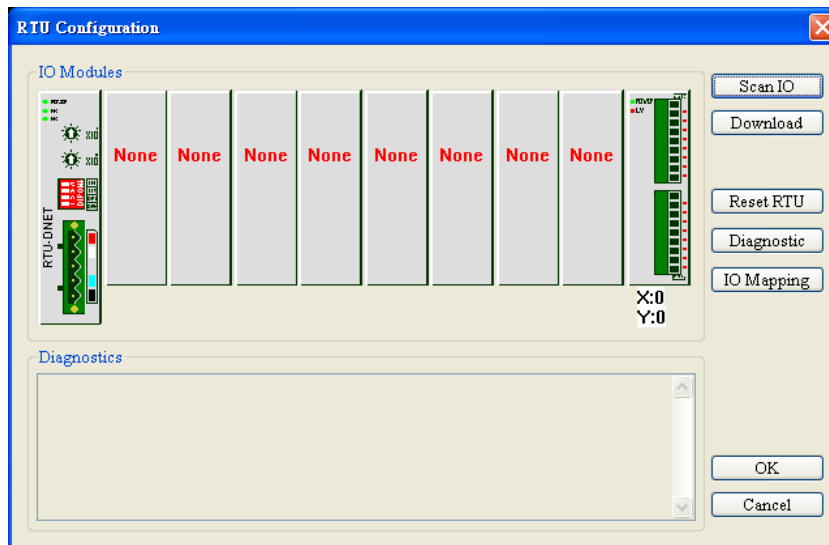
(9) Click on "Scan IO", and the "Warning" dialog box will appear.
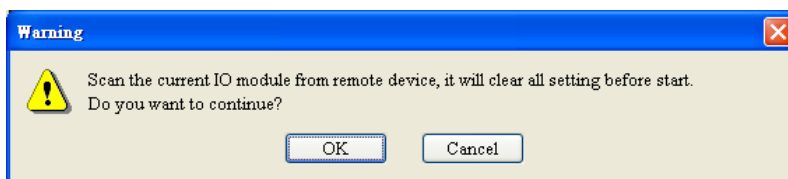
(10) Click on "OK". DeviceNetBuilder will then detect the special module connected to RTU-DNET and the number of points in the DI/DO module and display the information on "RTU Configuration" page.
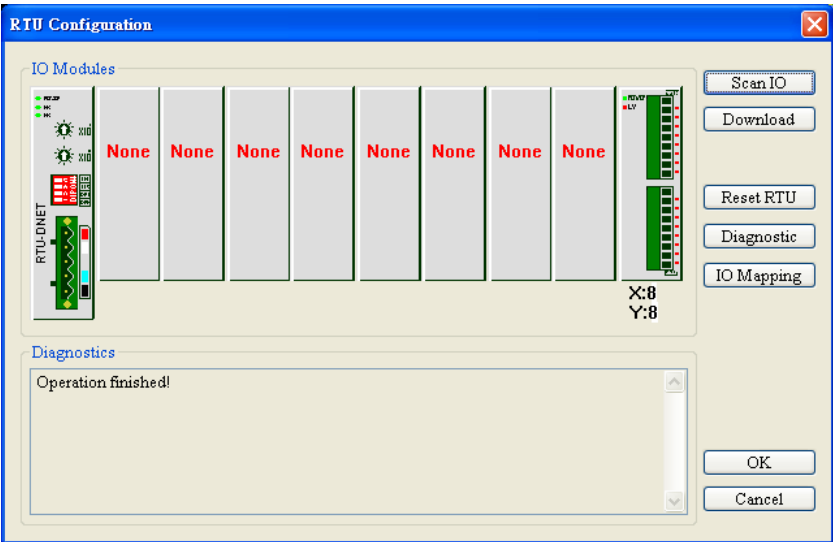
(11) Double click on RTU-DNET icon, and you will then see "RTU Setup" dialog box.
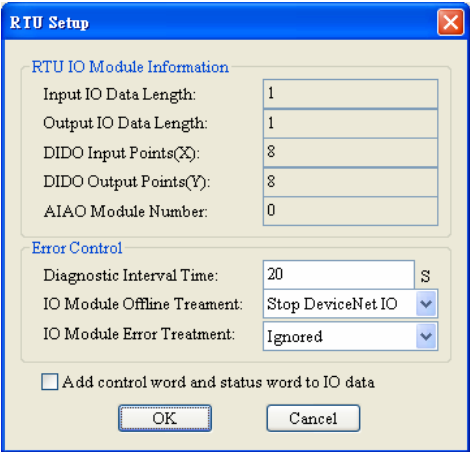
(12) Set up the parameters in RTU-DNET and confirm its I/O information.

Item	Function	Default
Input IO Data Length	The sum of the length of the status word of RTU-DNET and the input data of the special module connected to it. The status word of RTU-DNET occupies 2 bytes. One input channel of the special module occupies 2 bytes. 8 points of the digital input are counted as 1 byte.	N/A
Output IO Data Length	The sum of the length of the control word of RTU-DNET and the output data of the special module connected to it. The control word of RTU-DNET occupies 2 bytes. One output channel of the special module occupies 2 bytes. 8 points of the digital output are counted as 1 byte.	N/A
DIDO Input Points (X)	The digital input points shall be 8's multiple. The number will be regarded as 8 when it is less than 8 and regarded as 16 when it is bigger than 8 but less than 16.	N/A

Item	Function	Default
DIDO Output Points (Y)	The digital output points shall be 8's multiple. The number will be regarded as 8 when it is less than 8 and regarded as 16 when it is bigger than 8 but less than 16.	N/A
AIAO Module Number	The number of special modules connected to RTU-DNET. Range: 0 ~ 8	N/A
Diagnostic Interval Time	The interval when RTU-DNET executes diagnosis. Range: 1~ 65 secs	5 (sec)
IO Module Offine Treatment	How RTU-DNET will react when the special module connected to it is offline. You can choose "Ignored", "Alarm" or "stop DeviceNet IO".	Alarm
IO Module Error Treatment	How RTU-DNET will react when it detects errors. You can choose "Ignored", "Alarm" or "Stop DeviceNet IO".	Alarm
Add control word and status word to IO data	For you to decide whether to add control word and status word to I/O data. When you choose not to do it, the I/O data in RTU-DNET and DeviceNet master will not include control word and status word. If you choose to add them in, the I/O data in RTU-DNET and DeviceNet master will include control word and status word.	Not to add

(13) Confirm all the configurations are correct and click on "Download" to download the configurations to RTU-DNET. After the download is completed, click on "OK".

(14) After the configuration o f RTU-DNET is completed, you will return to the main page.
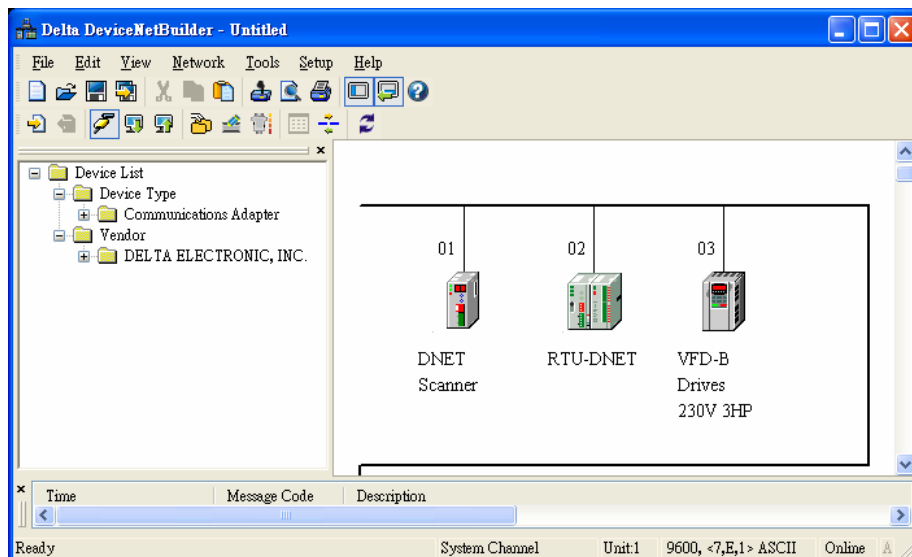
(15) Double click on VFD-B Drives (node 03), and the "Node Configuration..." dialog box will appear.
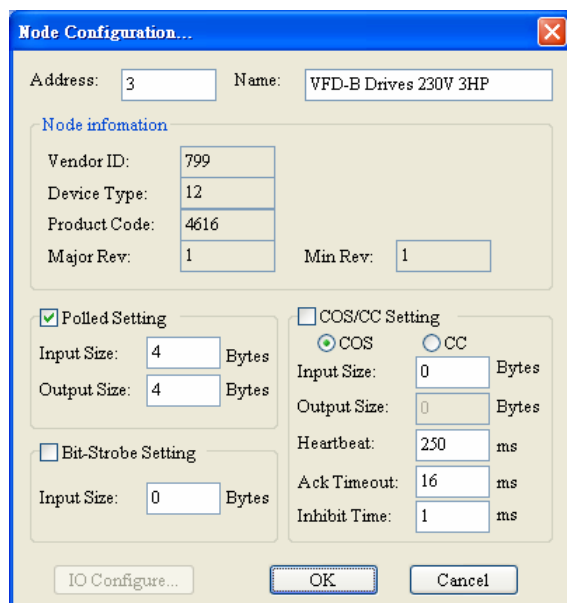
(16) Confirm the parameters and I/O data in VFD-B and click on "OK".

2. Configuration of DVPDNET-SL

   (1) Double click on DNET Scanner (node 01), and the "Scan Module Configuration..." dialog box will appear. You can find the currently available nodes, RTU-DNET and VFD-B Drives 230V 3HP, in the list on the left side. On the right side, there is an empty "Scan List".
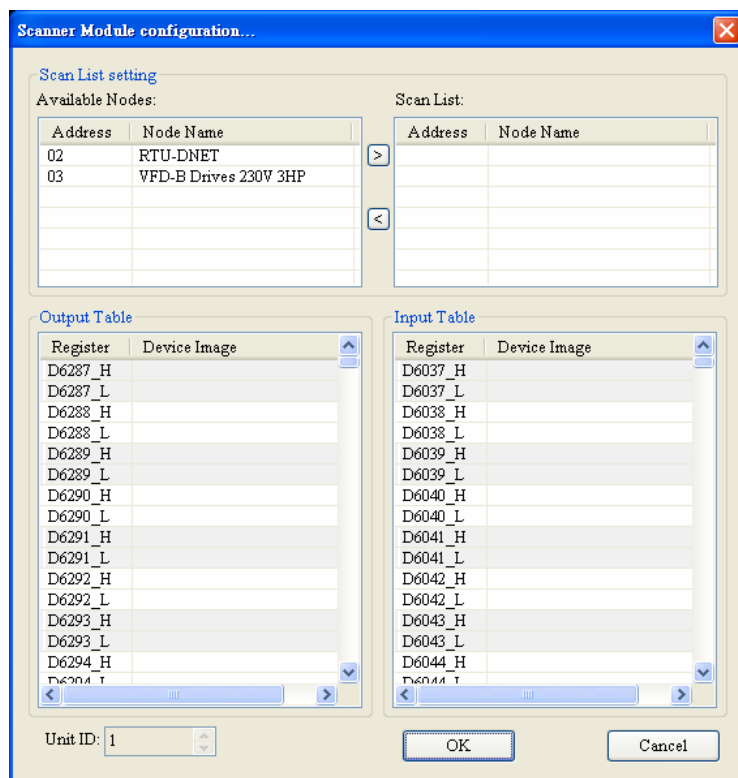
   (2) Move the slave devices on DeviceNet in the "Available Nodes" list on the left side to the "Scan List"on the right side. Select a node and click on ▷. Follow the steps to move all the nodes to the scan list.
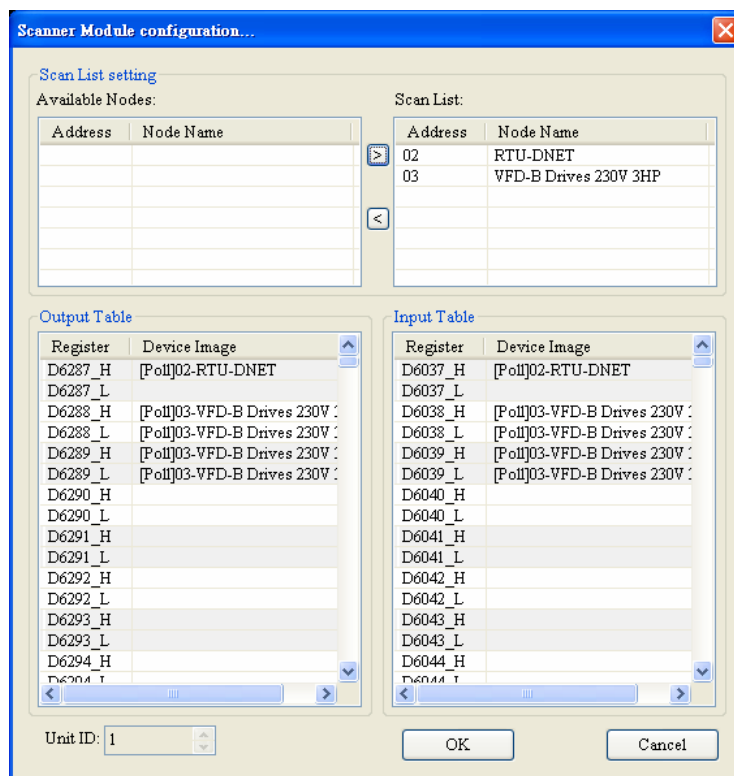
(3) Confirm all the settings and click on "OK". Next, download the configuration to DVPDNET-SL. If DVP-SV is in RUN mode while you are downloading the configuration, a "Warning" dialog box will appear.
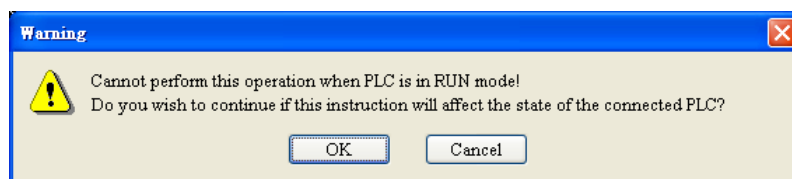
(4) Click on "OK" to continue the download. Make sure DVP-SV is in RUN mode.

■ Follow the steps given above to configure DeviceNet network. If the I/O data do not include control word and status word of RTU-DNET, the I/O data mapping of DVPDNET-SL and its slave devices will be:

DVPDNET-SL → slave

Register in DVPDNET-SL		Devices in slave	
D6287H		DI/DO module	Y0 ~ Y7 on DVP-16SP
D6287L		N/A	
D6288H			High byte of command in VFD-B
D6288L			Low byte of command in VFD-B
D6289H		AC motor drive	High byte of frequency in VFD-B
D6289L			Low byte of frequency in VFD-B

Slave → DVPDNET-SL

Register in DVPDNET-SL		Devices in slave	
D6037H		DI/DO module	X0 ~ X7 on DVP-16SP
D6037L		N/A	
D6038H		AC motor drive	Status of LED on VFD-B
D6038L	⇦		Status of VFD-B
D6039H			High byte of frequency in VFD-B
D6039L			Low byte of frequency in VFD-B

■ If the I/O data include control word and status word of RTU-DNET, the I/O data mapping of DVPDNET-SL and its slave devices will be:

DVPDNET-SL → slave

Register in DVPDNET-SL		Devices in slave	
D6287H		RTU-DNET control word	High byte of control word in RTU-DNET
D6287L			Low byte of control word in RTU-DNET
D6288H		DI/DO module	Y0 ~ Y7 on DVP-16SP
D6288L	⇨	N/A	
D6289H		AC motor drive	High byte of command in VFD-B
D6289L			Low bye of command in VFD-B
D6290H			High byte of frequency in VFD-B
D6290L			Low byte of frequency in VFD-B

Slave → DVPDNET-SL

Register in DVPDNET-SL		Devices in slave	
D6037H		RTU-DNET status word	High byte of status word in RTU-DNET
D6037L			Low byte of status word in RTU-DNET
D6038H		DI/DO module	X0 ~ X7 on DVP-16SP
D6038L	⇦	N/A	
D6039H		AC motor drive	Status of LED on VFD-B
D6039L			Status of VFD-B
D6040H			High byte of frequency in VFD-B
D6040L			Low byte of frequency in VFD-B

3. Saving the configuration data

Select "File" => "Save" to save the current network configuration.

5.3   DeviceNet Network Control

In this section, we will introduce how to compile WPL program and control DeviceNet. The example given below is particularly for I/O data excluding RTU-DNET control word and status word. You will have to slightly modify the example program if the I/O data include RTU-DENT control word and status word.

Target	When X0 = On, VFD-B will start to run, and Y0 indicator will be On.
	When X1 = On, VFD-B will stop, and Y0 indicator will be Off.

1. PLC program:

```
M1000
 ┤├──┬──────────┤ MOV │ D6037 │ K4M0 │ Send the content in D6037 to K4M0.
    │
    └──────────┤ MOV │ D6038 │ K4M20 │ Send the content in D6038 to K4M20.

 M8   M9
 ┤├───┤/├───────┤ MOV │  H2   │ D6288 │ When X0 = On, start VFD-B.

 M9   M8
 ┤├───┤/├───────┤ MOV │  H1   │ D6288 │ When X1 = On, stop VFD-B.

 M20
 ┤├────────────┤ MOV │ H0100 │ D6287 │ When VFD-B runs, Y0 = On.

 M21
 ┤├────────────┤ MOV │ H0000 │ D6287 │ When VFD-B stops, Y0 = Off.

 ─────────────┤ END │
```
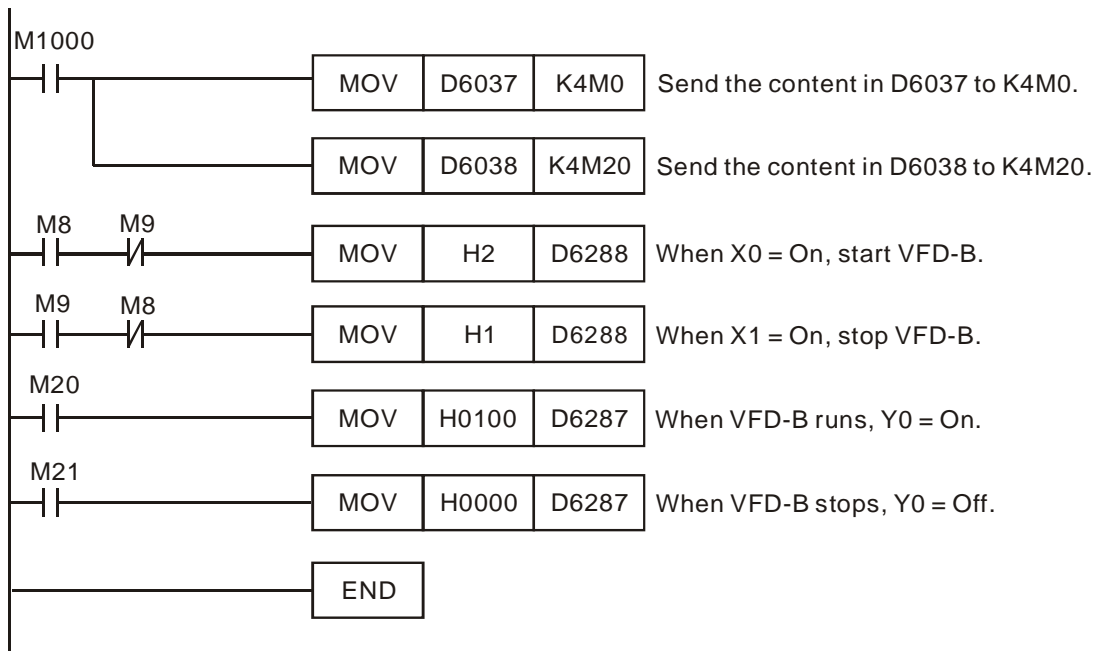
2. Program explanations:

- The head instruction in the program, MOV, corresponds the content in D6037 to M0 ~ M15 and the content in D6038 to M20 ~ M35.

- See the table below for the corresponding relation between DeviceNet slave and PLC devices.

	PLC device	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Input data	D6037	X7	X6	X5	X4	X3	X2	X1	X0	N/A							
	D6038	Status of VFD-B								Status of LED on VFD-B							
	D6039	Frequency of VFD-B															
	D6040																
	…																

	PLC device	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Output data	D6287	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0	N/A							
	D6288	Control word in VFD-B															
	D6289	Frequency in VFD-B															
	D6290																
	…																

- When X0 = On, b8 of D6037 = 1. b8 of D6037 corresponds to M8, and therefore M8 = On. That is, when X1 = On, M9 will be On.

- D6288 corresponds to the control word in VFD-B. When M8 = On, execute [MOV   H2   D6288] to run VFD-B. When M9 = On, execute [MOV   H1   D6288] to stop VFD-B.

- b0 of D6038 corresponds to M20, b1 to M21, and so on. When VFD-B is in RUN status, b0 of D6038 = 1 and M20 will be On to execute [MOV   H0100   D6287], which leads to Y0 = On. That is, when VFD-B is in STOP status, M21 will be On to execute [MOV   H0000   D6287], which leads to Y0 = Off.

6 Sending Explicit Message from Ladder Diagram

DVPDNET-SL supports the sending of explicit messages through WPL programs.

6.1 The Principle of Explicit Message Sending
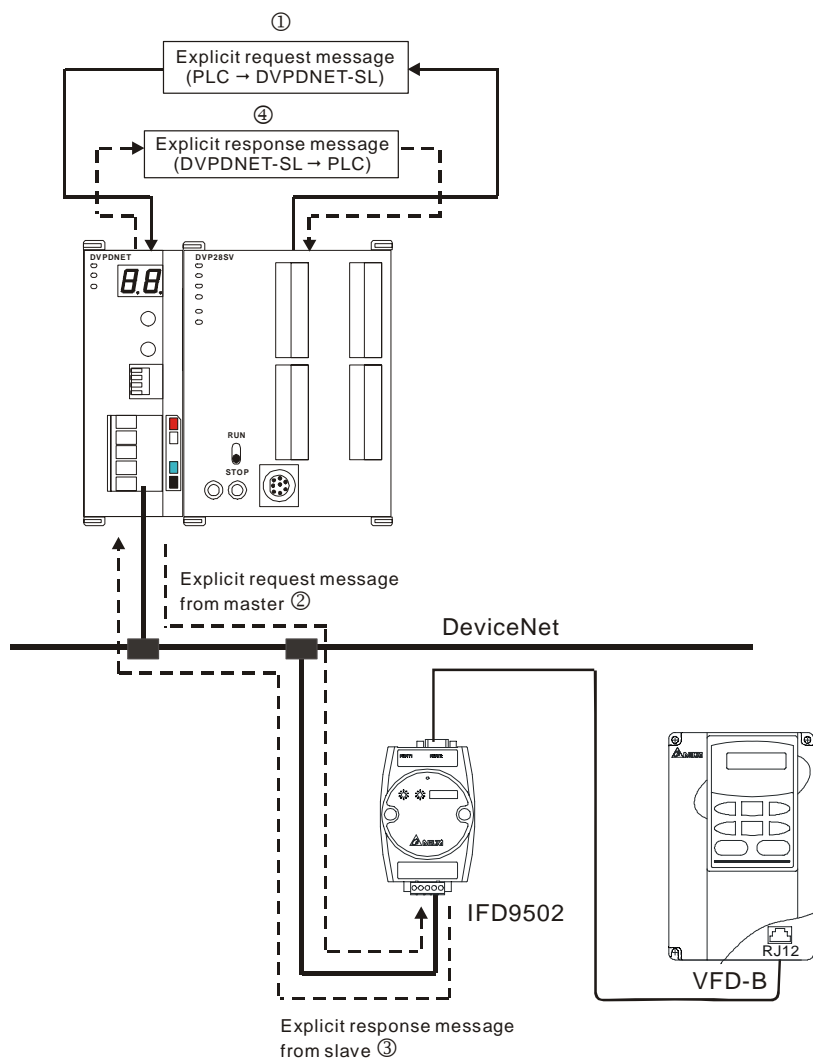
①: DVP-SV MPU sends out explicit request message to DVPDNET-SL according to WPL program.

②: DVPDNET-SL sends out request message to the target equipment.

③: The target equipment processes the request message and responds DVPDNET-SL.

④: DVP-SV MPU stores the response message from DVPDNET-SL to D register. One explicit message transmission is therefore completed.

6.2 Structure of Explicit Message

You can edit explicit messages in "explicit request message editing area" and "explicit response message editing area". See the table below for the corresponding relation between the two areas and PLC devices. If you transmit the request message to be sent out to D6250 ~ D6281, DVPDNET-SL will fill the response message to D6000 ~ D6031.

PLC device	Mapping area	Mapping length
D6000 ~ D6031	Explicit response message editing area	64 bytes
D6250 ~ D6281	Explicit request message editing area	64 bytes

1. Structure of request message

See the table below:

PLC device		Request Message															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
D6250	Message Header	ReqID								Command							
D6251		Port								Size							
D6252		Service Code								MAC ID							
D6253	Message Data	High byte of Class ID								Low byte of Class ID							
D6254		High byte of Instance ID								Low byte of Instance ID							
D6255		Reserved								Attribute ID (optional)							
D6256 ~ D6281		Service Data															

- Command: Fixed to "01Hex".

- ReqID: The request ID. Whenever an explicit message is sent out, the message will be given a ReqID for DVPDNET-SL to identify. For the next explicit message to be sent out, you have to change the ID number. ReqID = 0 refers to DVPDNET-SL will not send out explicit message. Range of ReqID: 00Hex ~ FFHex.

- Size: The length of the message, starting from D6253. The high bytes of D6255 are reserved. When the data length is being calculated, D6255 is counted as 1 byte. The maximum data length is 58 bytes. Errors will occur when the length is longer than 58 bytes. Unit: byte.

- Port: The communication port. Fixed to "00Hex".

- MAC ID: The node address of the target equipment on DeviceNet.

- Service Code: The service code of the explicit message. See the meanings of the codes in the table below:

Service Code	Explanation
01Hex	Read all attributes (Get_Attribute_All)
02Hex	Set up all attributes (Set_Attribute_All)
0EHex	Read a single attribute (Get_Attribute_Single)
10Hex	Set up a single attribute (Set_Attribute_Single)

2. Structure of response message

See the table below:

PLC device		Response Message															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
D6000	Message Header	ReqID								Status							
D6001		Port								Size							
D6002		Service Code								MAC ID							
D6003 ~ 6031	Message Data	Service Response Data															

- The definitions of ReqID, Port, Service Code and MAC ID are the same as their definitions in request message.

- Size: The length of the message, starting from D6003. Max. 58 bytes. Errors will occur when the length is longer than 58 bytes. Unit: byte.

- See the table below for the meanings of Status (status codes):

Status	Explanation
0	No explicit message is sent out.
1	The communication of explicit message is successful.
2	The explicit message is being sent out.
3	Error: No response from the target equipment.
4	Error: Command is invalid.
5	Error: Size of request message is invalid.
6	Error: Size of reponse message is invalid.
7	Error: Failing to establish a connection to the target equipment.
8 ~ 255	Reserved

3. Notes:

   ■ DVPDNET-SL can only send out 1 explicit message at a time.

   ■ Before sending explicit message by using WPL program, we suggest you clear the request message editing area and response message editing area to 0.

   ■ If the slava responds with standard error code, and DVPDNET-SL also consider the communication being successful, "The communication of explicit message is successful." will indicate that the communication has been completed successfully.

4. Application example (I)

Target	When M0 = On, read Class 1>>Instance 1>>Attribute 1 of IFD9502

   (1) The connection

Node Address:00

DeviceNet

Node Address:02

RJ12

   (2) Compulsory settings and explanations on devices

      ■ Compulsory settings in DVPDNET-SL

Parameter	Set value	Explanation
Node address	00	Set the node address of DVPDNET-SL to "00".
Baud rate	500kbps	Set the communication speed of DVPDNET-SL and bus to "500kbps".

■ Compulsory settings in IFD9502

Parameter	Set value	Explanation
Node address	02	Set the node address of IFD9502 to "02".
Baud rate	500kbps	Set the communication speed of IFD9502 and bus to "500kbps".

■ Compulsory settings in VFD-B

Parameter	Set value	Explanation
02-00	04	The main frequency is operated on RS-485 interface.
02-01	03	The operation commands are operated on the communication interface. Operation by keys is valid.
09-00	01	Communication address of VFD-B: 01
09-01	03	Baud rate: 38,400
09-04	03	Modbus RTU mode. Data format <8, N, 2>

■ Explanations on devices

PLC device		Content	Explanation 15 14 13 12 11 10 9 8	Explanation 7 6 5 4 3 2 1 0
Request message editing area	D6250	0101Hex	ReqID = 01Hex	Command = 01Hex
	D6251	0005Hex	Port = 00Hex	Size = 05Hex
	D6252	0E02Hex	Service Code = 0EHex	MAC ID = 02Hex
	D6253	0001Hex	High bye of Class ID =00Hex	Low byte of Class ID = 01Hex
	D6254	0001Hex	High byte of Instance ID = 00Hex	Low byte of Instance ID = 01Hex
	D6255	0001Hex	N/A	Attribute ID = 01Hex
Response message editing area	D6000	0101Hex	ReqID = 01Hex	Status = 01Hex
	D6001	0002Hex	Port = 00Hex	Size = 02Hex
	D6002	8E02Hex	Service Code = 8EHex	MAC ID = 02Hex
	D6003	031FHex	High byte of Service Data = 03Hex	Low byte of Service Data = 1FHex

(3) PLC program
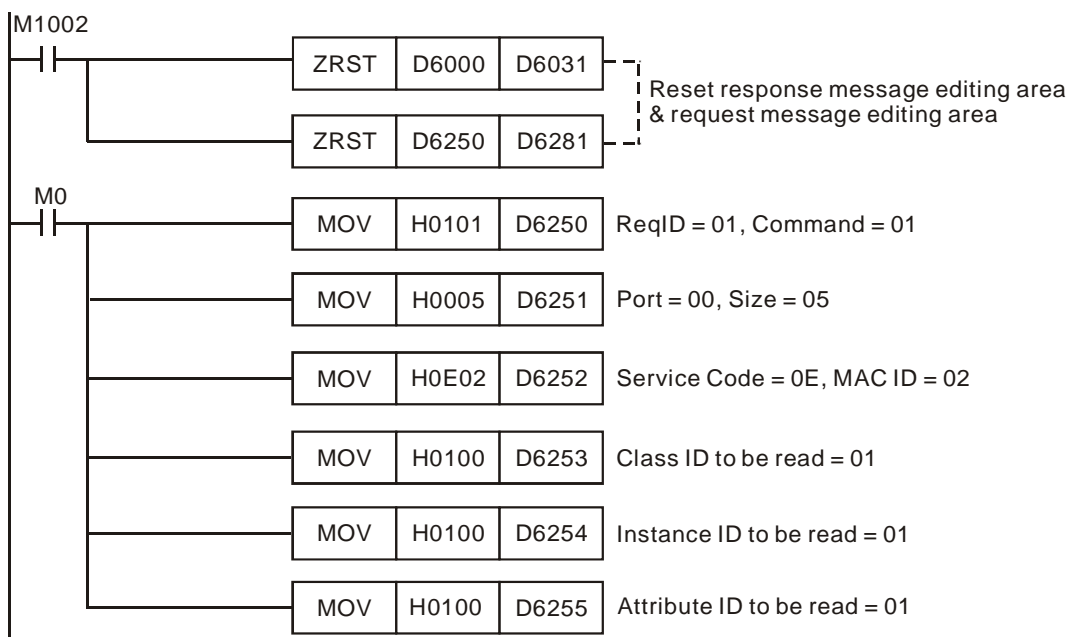

```
M1002
─┤├──────┬───── ZRST  D6000  D6031 ──┐
         │                            ├─ Reset response message editing area
         │                            │  & request message editing area
         └───── ZRST  D6250  D6281 ──┘

M0
─┤├──────┬───── MOV  H0101  D6250    ReqID = 01, Command = 01
         │
         ├───── MOV  H0005  D6251    Port = 00, Size = 05
         │
         ├───── MOV  H0E02  D6252    Service Code = 0E, MAC ID = 02
         │
         ├───── MOV  H0100  D6253    Class ID to be read = 01
         │
         ├───── MOV  H0100  D6254    Instance ID to be read = 01
         │
         └───── MOV  H0100  D6255    Attribute ID to be read = 01
```

(4) Program explanations:

■ In the beginning of the program, clear the response message editing area and request message editing area to 0.

■ When M0 = On, DVPDNET-SL will send out request message, reading Class 1>>Instance 1>> Attribute 1 of the target equipment (node address: 02). If the communication of explicit message is successful, the slave will return with a response message.

■ When M0 = On, DVPDNET-SL will only send out request message once. If you would like it to sendout request message again, you will have to change ReqID.

■ When the reading is successful, the message responded from the target equipment will be stored in D6000 ~ D6003.

5. Application example (II)

Target	M1 = On, set 0x99>>Instance 1>>Attribute 2 of IFD9502 to "0004Hex".

(1) The connection

Node Address:00

DeviceNet

RS-485 communication

Node Address:02

(2) Compulsory settings and explanations on devices

■ Compulsory settings in DVPDNET-SL

Parameter	Set value	Explanation
Node address	00	Set the node address of DVPDNET-SL to "00".
Baud rate	500kbps	Set the communication speed of DVPDNET-SL and bus to "500kbps".

■ Compulsory settings in IFD9502

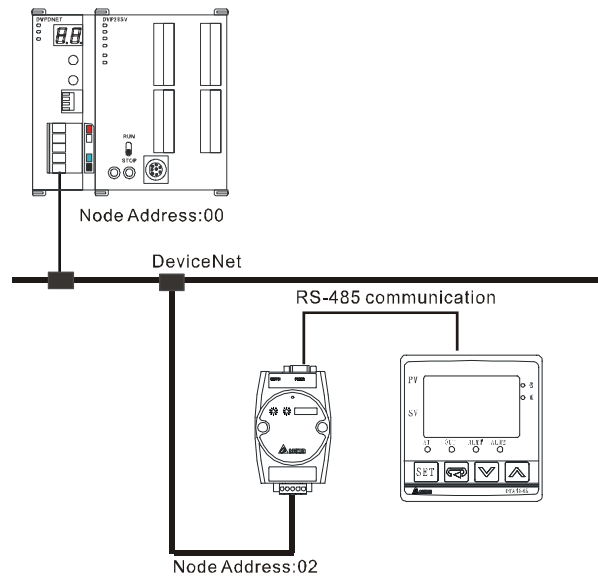| Parameter	Set value	Explanation
Node address	02	Set the node address of IFD9502 to "02".
Baud rate	500kbps	Set the communication speed of IFD9502 and bus to "500kbps".

■ Compulsory settings in VFD-B

Parameter	Set value	Explanation
02-00	04	The main frequency is operated on RS-485 interface.

Parameter	Set value	Explanation
02-01	03	The operation commands are operated on the communication interface. Operation by keys is valid.
09-00	01	Communication address of VFD-B: 01
09-01	03	Baud rate: 38,400
09-04	03	Modbus RTU mode. Data format <8, N, 2>

■ Explanations on devices

PLC device		Content	Explanation																
			15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Request message editing area	D6250	0101Hex	ReqID = 01Hex								Command = 01Hex								
	D6251	0005Hex	Port = 00Hex								Size = 07Hex								
	D6252	0E02Hex	Service Code = 10Hex								MAC ID = 02Hex								
	D6253	0099Hex	High byte of Class ID = 00Hex								Low byte of Class ID = 99Hex								
	D6254	0001Hex	High byte of Instance ID = 00Hex								Low byte of Instance ID = 01Hex								
	D6255	0002Hex	N/A								Attribute ID = 02Hex								
	D6256	0004Hex	High byte of data = 00Hex								Low byte of data = 04Hex								
Response message editing area	D6000	0101Hex	ReqID = 01Hex								Status = 01Hex								
	D6001	0002Hex	Port = 00Hex								Size = 02Hex								
	D6002	9002Hex	Service Code = 90EHex								MAC ID = 02Hex								
	D6003	0004Hex	High byte of Service Data = 00Hex								Low byte of Service Data = 04Hex								

(3) PLC program
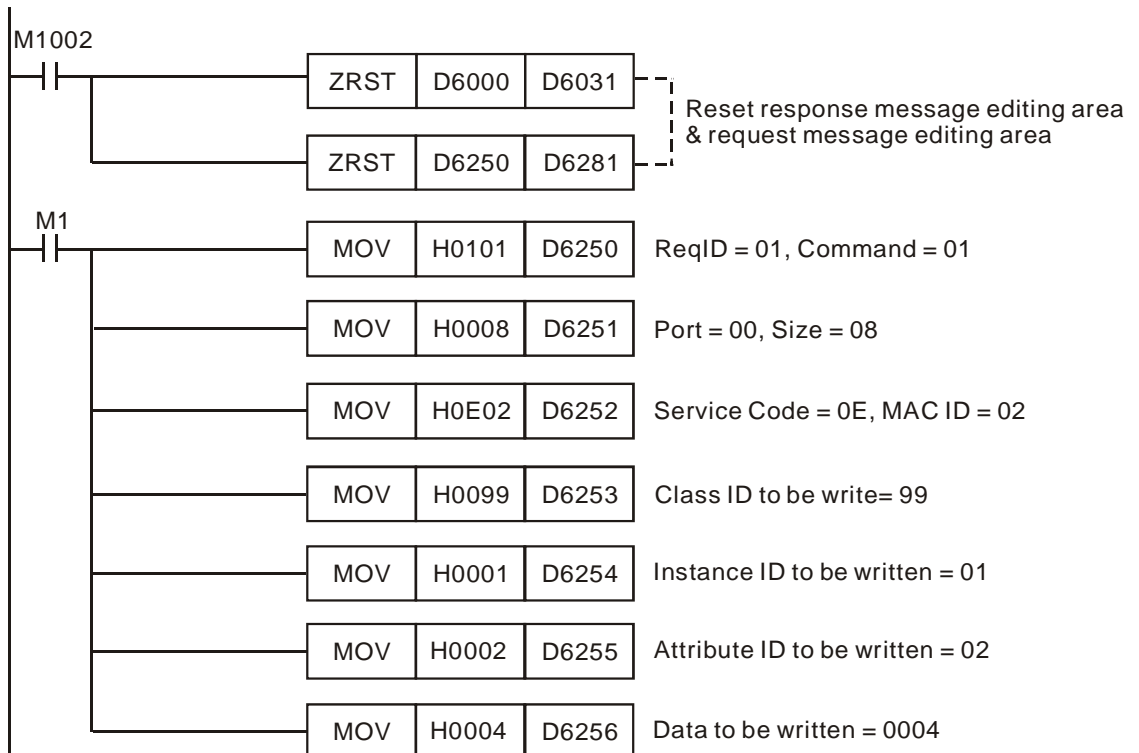
(4) Program explanations

■ In the beginning of the program, clear the response message editing area and request message

editing area to 0.

- When M1 = On, DVPDNET-SL will send out request message. Write 0004Hex into Class 99 >> Instance 1 >> Attribue 2 of the target equipment (node address: 02). If the communication of explicit message is successful, the slave will return with a response message.

- When M1 = On, DVPDNET-SL will only send out request message once. If you would like it to send out request message again, you will have to change ReqID.

- When the writing is successfully done, the message responded from the target equipment will be stored in D6000 ~ D6003.

7 Bit-Strobe Command

7.1 Principle of Bit-Strobe

Bit-strobe is one of the standard I/O transmission methors for DeviceNet. The length of command is fixed to 8 bytes (i.e. 64 bits), and every bit corresponds to a slave.

PLC device	Corresponding nodes on the network					
	b15	b14	b13	…	b1	b0
D6282	Node 15	Node 14	Node 13	…	Node 1	Node 0
D6283	Node 31	Node 30	Node 29	…	Node 17	Node 16
D6284	Node 47	Node 46	Node 45	…	Node 33	Node 32
D6285	Node 63	Node 62	Node 61	…	Node 49	Node 48

When b0 of D6282 = 0, the node 0 equipment will be selected, and it will need to respond with a message to the master. When b0 and b1 of D6282 = 0, the node 0 and node 1 equipment will be selected, and they will beed to respond with a message to the master.
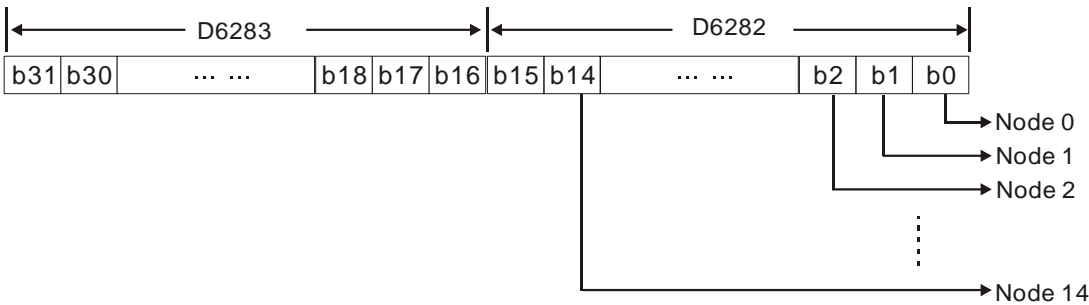
In the bit-strobe mode, the master will not send control data to the slave node. However, when its corresponding bit is set to 0, the slave node will have to respond with I/O data to the master. When its corresponding bit is set to 1, the slave node will not have to respond with I/O data to the master.

8 Display of Node Status on Network

8.1 Display of Node Status in Scan List

DVPDNET-SL does read-time monitoring to the nodes in the scan list and maps the status of every node to a bit. You can acquire the node status by monitoring D6032 ~ D6035. See the table below for the corresponding relation between PLC devices and the nodes on the network:

PLC device	Corresponding nodes on the network					
	b15	b14	b13	…	b1	b0
D6032	Node 15	Node 14	Node 13	…	Node 1	Node 0
D6033	Node 31	Node 30	Node 29	…	Node 17	Node 16
D6034	Node 47	Node 46	Node 45	…	Node 33	Node 32
D6035	Node 63	Node 62	Node 61	…	Node 49	Node 48

When the node in the scan list is normal, the corresponding bit will be Off. If the node occurs abnormality, its corresponding bit will be On.

8.2   Status of DVPDNET-SL

You can acquire the real-time status of DVPDNET-SL by monitoring D6036. When DVPDNET-SL runs normally, D6036 = 0. When DVPDNET-SL is being initialized, the high byte of D6036 = 1 and the low byte = 0. When error occurs in DVPDNET-SL, the high byte of D6036 = 2. The low bytes are for error codes. For detailed information on error codes, please refer to 9.5. Digital Indicator LED.

PLC device	Explanation															
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
D6036	Status of DVPDNET-SL (0: normal, 1: initializing, 2: error)								Error codes of DVPDNET-SL (See 9.5)							

9   LED Indicator & Trouble-shooting

There are three LED indicators and one digital indicator on DVPDNET-SL. POWER LED displays if the power of DVPDNET-SL is working normally; NS LED and MS LED display the communication connection status of DVPDNET-SL; digital indicator displays the node addresses, error information and the error messages from the slave.
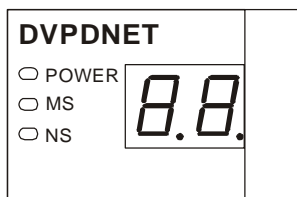
9.1   POWER LED

LED status	Indication	How to correct
Off	Power is abnormal.	Make sure DVPDNET-SL is powered.
Green light on	Power is normal.	--

9.2   NS LED

LED status	Indication	How to correct
Off	No power or duplicate ID check has not completed	1. Make sure DVPDNET-SL is powered. 2. Make sure at least 1 node or more are communicating on the network.
Green light blinking	No communication	No correction is needed, or check the digital indicator for the error.
Green light on	Normal operation	--

LED status	Indication	How to correct
Red light blinking	Error in communication	Check the digital indicator and eliminate the error.
Red light on	Network error; cannot check duplicate ID; bus-off (chek the digital indicator)	1. Make sure all the devices have their unique node address. 2. Check the network for correcting media installation and baud rate. 3. Check if the node address of DVPDNET-SL is valid. 4. Check if the network power is normal.

9.3   MS LED

LED status	Indication	How to correct
Off	No power	Make sure DVPDNET-SL is powered.
Green light blinking	The master is not configured.	Configure the scan list and re-download it to DVPDNET-SL.
Green light on	Normal operation	--
Red light blinking	Some slaves encounter communication error.	Check the digital indicator and make sure the salve information in the scan list is consistent with the salve actually connected.
Red light on	Internal error	1. Check if the configuration is valid. 2. Re-power it. If the error still exists, send it back to the factory for repair.

9.4   MS & NS LED

LED status		Indication	How to correct
NS LED	MS LED		
Off	Off	No power	Make sure DVPDNET-SL is powered.
Off	Green light on	Duplicate ID check has not completed.	Make sure at least 1 node or more are communicating in the network, and the baud rate is the same as the setting in DVPDNET-SL.
Red light on	Green light on	MAC ID detection failure or bus-off	Change the MAC ID setting and re-power DVPDNET-SL.
Red light on	Red light blinking	No 24 VDC power from DeviceNet network	1. Check if the network cable is correctly connected to DVPDNET-SL. 2. Check the 24 VDC network power.
Red light on	Red light on	Hardware error	Go to your manufacturer or distributor for problem-solving.

9.5   Digital Indicator LED

Code	Indication	How to correct
0 ~ 63	Node address of DVPDNET-SL (in normal operation)	--
80	DVPDNET-SL is in STOP status.	Turn the PLC MPU to RUN and start I/O data exchange.
F0	Duplicate MAC ID check failure	Check the node address and re-power DVPDNET-SL.
F1	No slave device in the scan list.	Configure the scan list and download it to DVPDNET-SL.

Code	Indication	How to correct
F2	Low voltage is detected.	Check if the power of DVPDNET-SL and PLC MPU is normal.
F3	Entering test mode	Switch IN1 from On to Off and re-power DVPDNET-SL.
F4	Bus-off	1. Check if the network cable is normal. 2. Check if the baud rate is correct. 3. Re-power DVPDNET-SL.
F5	No network power	Make sure the cable is correctly connected and check if the network power is normal.
F6	Internal error; Flash or RAM check error	If the error still exists after re-power, send your DVPDNET-SL back to the factory for repair.
F7	Internal error; GPIO check error	If the error still exists after re-power, send your DVPDNET-SL back to the factory for repair.
F8	Error produced in factory manufacturing	If the error still exists after re-power, send your DVPDNET-SL back to the factory for repair.
F9	Internal error; EEPROM access failure	If the error still exists after re-power, send your DVPDNET-SL back to the factory for repair.
FA	Invalid configuration data	1. Configure the network correctly and re-download it to DVPDNET-SL. 2. Check if the node address of the slave in the scan list is the same as the node address of DVPDNET-SL.
E0	Device key parameter does not match the scan list table.	Make sure that the device parameter in the scan list matches the desired key parameter, including vendor ID, product code, device type and version.
E1	Data size returned does not match the scan list.	Re-configure the scan list using correct data size.
E2	Slave device in the scan list does not exist.	Add device to the network.
E3	DVPDNET-SL fails to transmit a message.	Make sure that the connection is valid and check if the baud rate is correct.
E4	Error detected in sequence of fragmented I/O messages from device	Check if the slave is operating normally.
E5	Slave device returns error when DVPDNET-SL attemps to communicate with it.	Check if the slave is operating normally.
E6	Data size returned is bigger than expected.	Check the configuration of slave device and scan list.
E7	DVPDNET-SL is checking MAC ID.	Check if thenetwork connection is normal; otherwise no correction is needed.

MEMO