EtherNet/IP DLR
Industrial Ethernet Switches

DVS-103I02C-DLR
Operation Manual

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EtherNet/IP DLR Industrial Ethernet Switches
DVS-103I02C-DLR Operation Manual

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EtherNet/IP DLR Industrial Ethernet Switches

DVS-103I02C-DLR Operation Manual

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Chapter 1 Introduction

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1.1 Introduction

Thank you for choosing Delta DVS-103I02C-DLR. Before using the module, please read this manual for proper installation and operation.

The DVS-103I02C-DLR is an EtherNet/IP DLR Industrial Ethernet Switch, supporting EtherNet/IP Device Level Ring (DLR). The DLR protocol provides high network availability in various topologies, including ring topology, linear topology, and start topology. You can use Delta EtherNet/IP communication software, EIP Builder to configure communication settings through EtherNet/IP network.

DVS-103I02C-DLR features the followings:

1. Supports EtherNet/IP protocol

2. One built-in digital input point and one output point for alarm

3. Redundant power input point

4. Uses external DIP switch to set up IP communications (software, DHCP, BOOTP), restore default values and enable/disable DLR function

5. Provides DLR indicators, showing the status of the ring topology

1.2 General Specification

Item	Specification
Operation temperature	-20°C ~ 70°C
Storage temperature	-40°C ~ 85°C
Operation humidity	5~95%, non-condensing
Storage humidity	5~95%, non-condensing
Operating environment	Corrosive gases do not exist
Installation	Inside a control box
Pollution degree	2
Degree of protection	IP40
EMC Standard (electromagnetic compatibility)	EMI: IEC 61000-6-4, EN 55032, AS/NZS CISPR32, FCC 47 CFR, Part 15 Subpart B, Class A EMS: IEC 61000-6-2: 2016 EN 55024: 2010/A1: 2015 IEC 61000-4-2 level 3, IEC 61000-4-3 level 3, IEC 61000-4-4 level 3, IEC 61000-4-5 level 1, IEC 61000-4-6 level 3, IEC 61000-4-8 level 4
Vibration immunity	Tested with: 5 Hz ≦ f ≦ 8.4 Hz, constant amplitude 3.5 mm; 8.4 Hz ≦ f ≦ 150 Hz, constant acceleration 1g Duration of oscillation: 10 sweep cycles per axis on each direction of the 3 mutually perpendicular axes International standards: IEC61131-2, IEC 68-2-6 (TEST Fc)
Shock	Tested with: Half-sine wave: Strength of shock 15 g peak value, 11 ms duration; Shock direction: The shocks in each direction per axis, on 3 mutually perpendicular axes (total of 18 shocks) International standards: IEC 61131-2 & IEC 60068-2-27 (TEST Ea)
Certificates	EN62368-1, UL61010

1.3 Functional Specification

Item	Specification
Maximum number of Device Level Ring nodes	50
Response time in ring topology	≦ 3 ms
Ring topology	Ring supervisor, ring node
Minimum beacon interval	100 μs
IGMP snooping	V1/V2

1.4 Communication Interface Specification

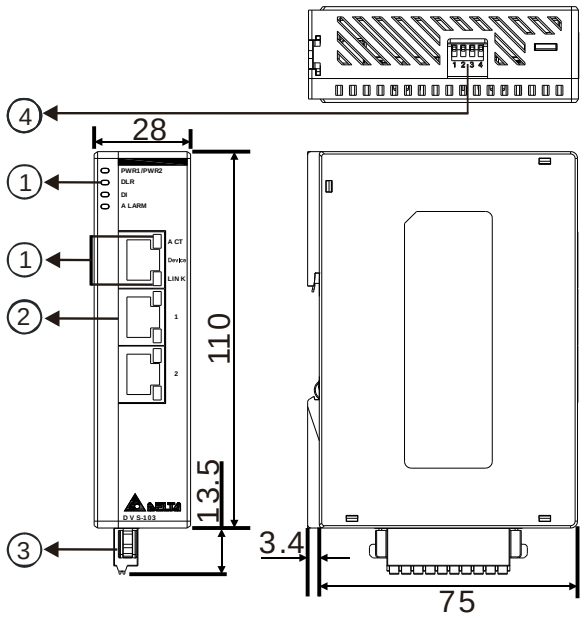
1.4.1 Ethernet/IP

Item	Specification
Connector	RJ-45
Interface	10/100 Base-T (X), auto MDI/MDI-X (medium dependent interface crossover), autonegotiate and forced speed / duplex modes
Number of ports	3 (Device port *1, DLR port *2)
Transmission speed	10/100 Mbps
Communication protocol	ARP, ICMP, IP, TCP, EtherNet/IP
Communication distance	100 m
Ethernet cable type	Category 5e

1.5 Power, Weight and Electric Specification

Item	Specification
Power supply voltage	12 ~ 48 VDC
Insulation voltage	500 V
Consumed power	3.7 W
Weight	126 g

1.6 Dimensions and parts descriptions



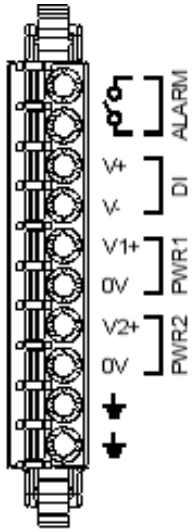
Unit: mm

No.	Name	Description
1	PWR 1 LED / PWR 2 LED (Green)	Power status indicator ON: Normal power supply (as long as any one of the power is normal, the system operates normally) OFF: No power supply
	DLR LED (Green)	DLR status indicator OFF: Not in DLR mode ON: DLR is in operation and ring topology is normal Blinking (200 ms ON/OFF): DLR is in operation but an error occurs in the ring topology
	DI LED	Digital input status indicator OFF: No input ON: Receiving a higher potential input
	ALARM LED	Alarm (output) status indicator OFF: No alarm (no output) ON: Send out a higher potential output
2	Ethernet communication port (RJ45)	Connecting Ethernet cables Device port: Used for non-DLR connection Port 1 and 2: Used for DLR network connection

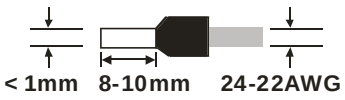
No.	Name	Description	
3	Power supply terminal	12~48 VDC power input, digital input and output (alarm)	
4	Mode settings	DIP1 & DIP2	OFF / OFF: Use EIP Builder to set up the IP address
			ON / OFF: Use BOOTP to set up the IP address
			OFF / ON: Use DHCP to set up the IP address
			ON / ON: Restore to default values
		DIP3	ON: Start DLR supervisor mode
			OFF: Use EIP Builder to set up the mode
		DIP4	Reserved

1.7 Pin Definition and Wiring

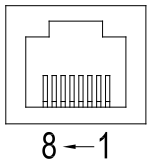
- **Power supply terminal block**

Diagram	Terminal	Description
	Alarm + (or -)	Alarm relay output: Carry current 2A@24 VDC
	Alarm – (or +)	
	V+	Digital Input: OFF (0~+5 V) / ON (+11~30V) Max. input current: 6 mA
	V-	
	V1+	Voltage input 1 (12~48 VDC)
	0 V	0V
	V2+	Voltage input 2 (12~48 VDC)
	0 V	0 V
	⏚	Ground
	⏚	Ground

Note: Use single-wire cables or two-wire cables in a diameter of 24 AWG ~ 22 AWG and with less than 1 mm pin-typed terminals. Only use copper conducting wires with a temperature of 85°C.

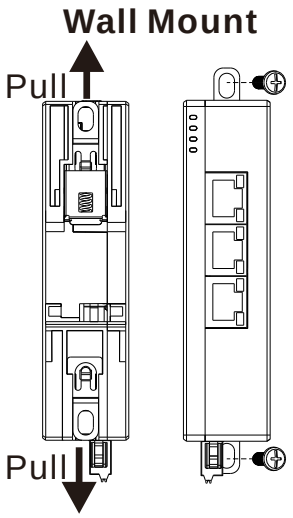


- **RJ-45 terminal block**

Diagram	Terminal no.	Definition	Description
	1	TX+	Transmit data +
	2	TX-	Transmit data -
	3	RX+	Receive data +
	4	--	N/C
	5	--	N/C
	6	RX-	Receive data -
	7	--	N/C
	8	--	N/C

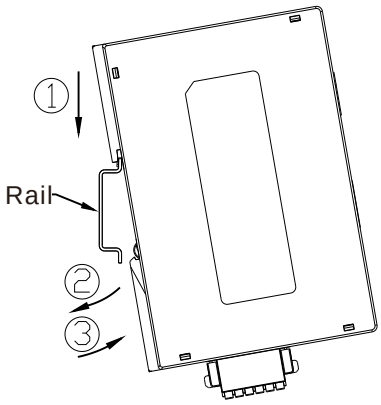
1.8 Installation

- Locking screw method: Use M4 for direct screws-fittings (see below).

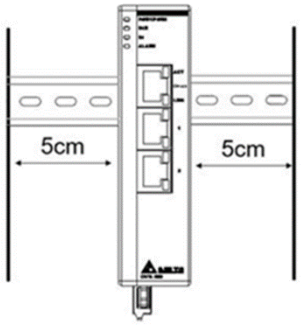


- Installing and dismantling the DIN rail: Attach the back trench of the device to the mounting rail in arrow ① direction and push the device against the rail in arrow ② direction.

  To dismantle, first push down the device in arrow ① direction and follow arrow ③ direction to release the device.

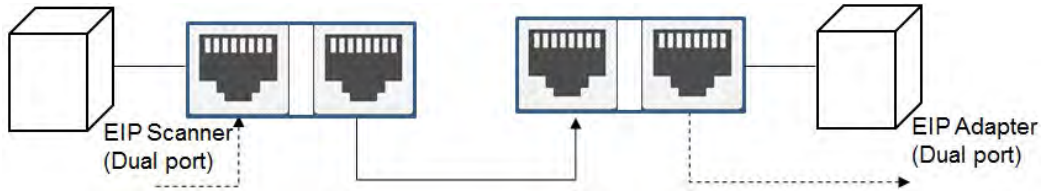


Note: When installing DVS-103I02C-DLR on the Din Rail, it is required to leave a space of 5 cm among devices. Do not block top or bottom ventilation openings.

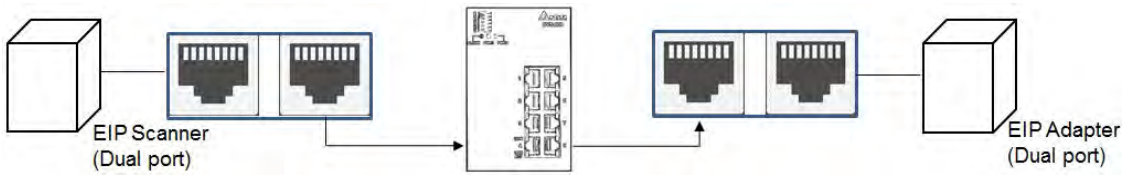


1.9 Network Topology

- **Linear Topology**

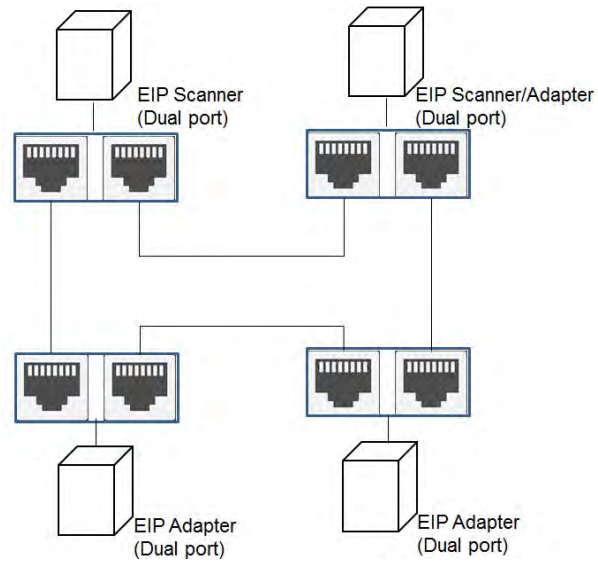


- **Star Topology**

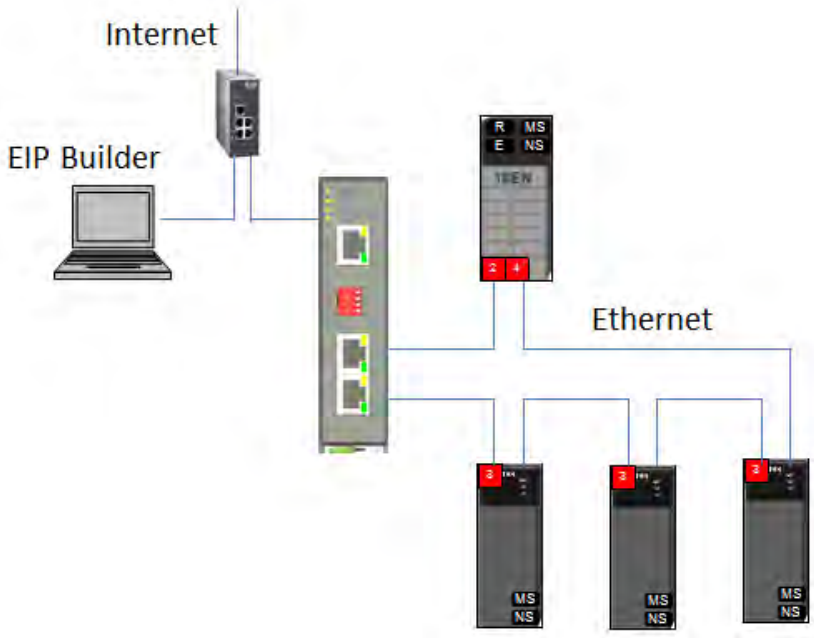


- **Ring Topology**

A DLR function is required to create a ring topology. When a switch is needed for the particular topology, the switch should support the DLR function. If not, the connection might fail.



The EtherNet/IP DLR Industrial Ethernet Switch, DVS-103I02C-DLR, supports DLR function. Use the communication port named port 1 and port 2 to connect DLR network. Use Device port to connect non-DLR network. For example, using the Device port to connect to the computer used for setting up.



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Chapter 2 Software Configuration

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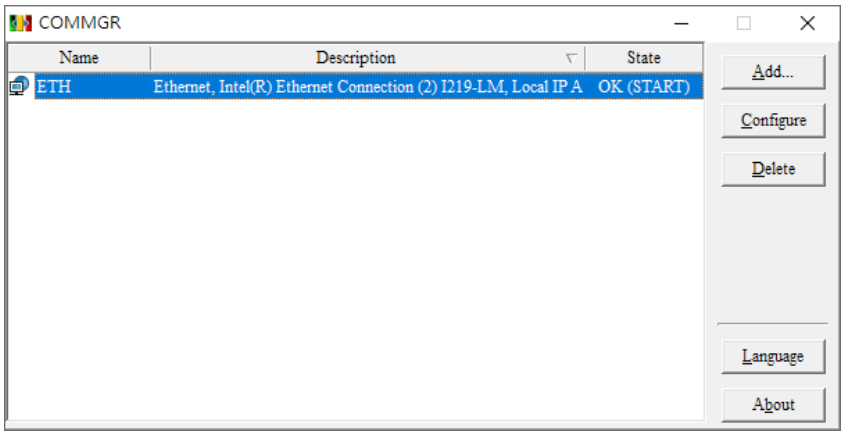
2.1 Software Configuration

2.1.1 Software description

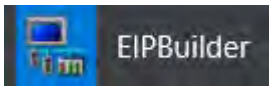
Users must install two basic software – EIP Builder (V1.07 or later) and COMMGR (V1.10 or later) before operating the modules. The main function of COMMGR is being the medium software between a PC end and a device that manages communication interface of devices, while EIP Builder is for setting module parameters.

2.1.2 Procedures

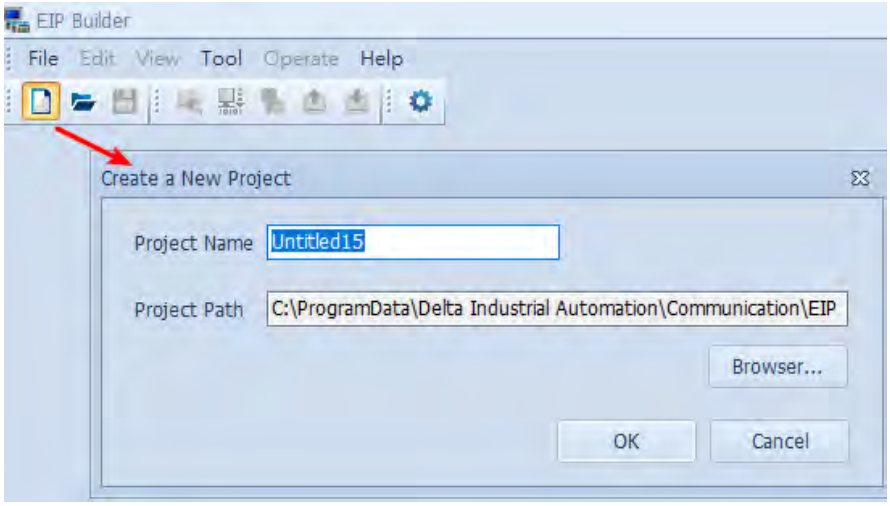
Step 1: For communication type, select Ethernet and name the communication as DLR or any other identifiable name. When setting is complete, you can close COMMGR window, the software continues to work in the background; you can still see the COMMGR icon shown in the system list.



Step 2: Next, double-click EIP Builder to open the software.

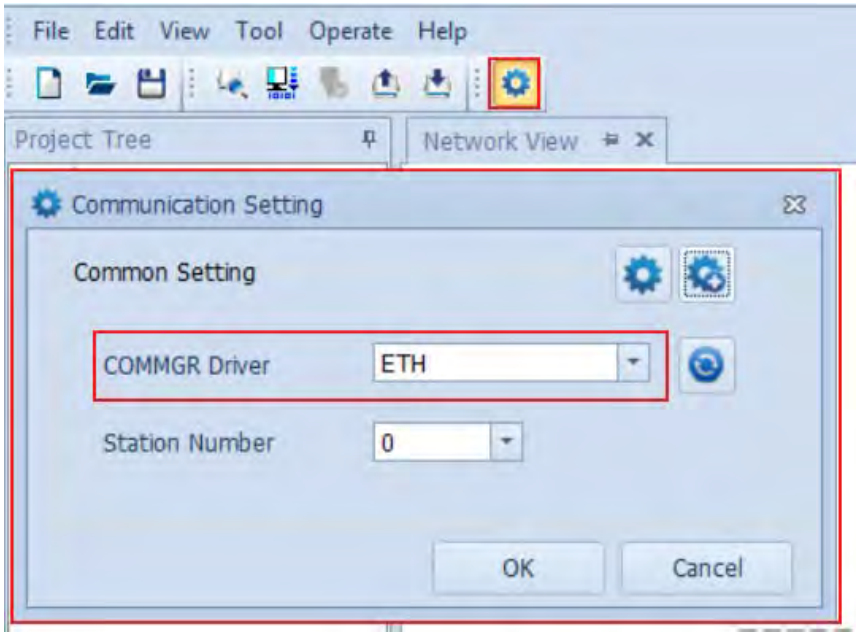


Step 3: Create a new project.

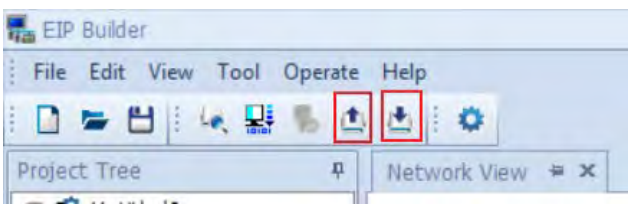


Step 4: Double-click or drag and drop DVS-103I02C-DLR to add the device to the section of Network View.

Step 5: Select  on the toolbar to open the Communication Setting window and select the already set driver from the drop-down list of the COMMGR Driver



You can click Uploader  on the toolbar to view DVS-103I02C-DLR parameters on EIP Builder. Click Downloader  on the toolbar to write modified parameters into DVS-103I02C-DLR. Go to webpage to see DVS-103I02C-DLR firmware version. Refer to Chapter 3 for more details on the webpage.

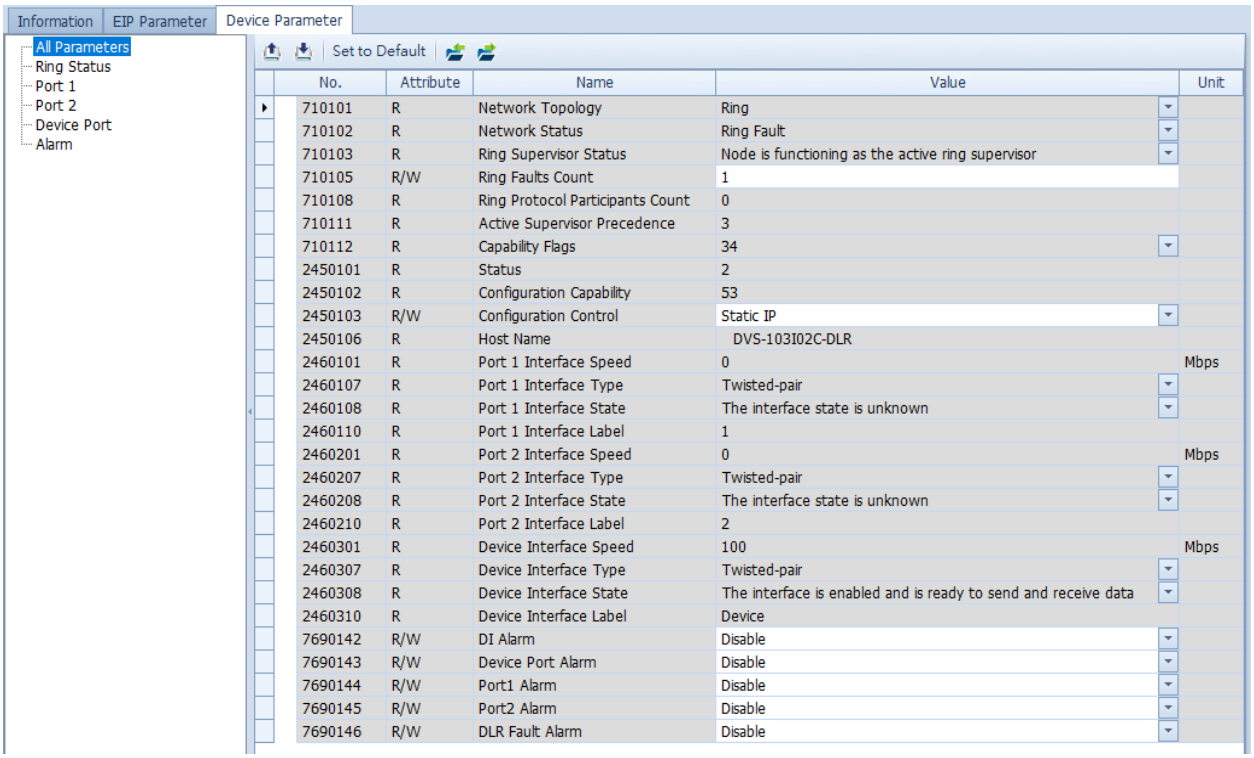


2.2 Parameter Settings

Parameter settings include EIP Parameter and Device Parameter. You need to be in On-Line mode to edit and view the EIP parameters.

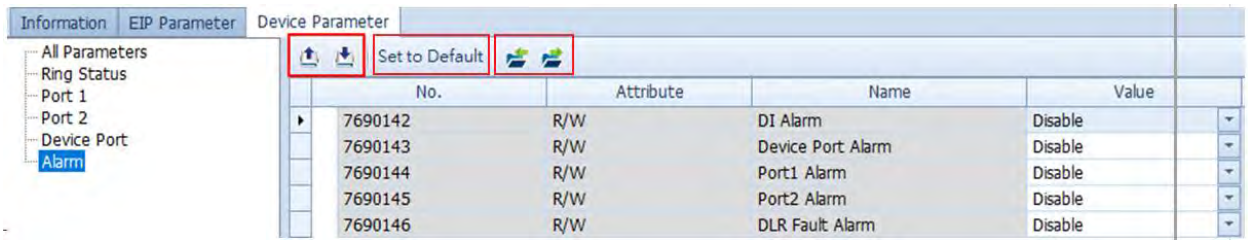
2.2.1 Device Parameters

Click “All Parameters” under the Device Parameter tab, you can see all parameters and status of the device.



No.	Attribute	Name	Value	Unit
710101	R	Network Topology	Ring	
710102	R	Network Status	Ring Fault	
710103	R	Ring Supervisor Status	Node is functioning as the active ring supervisor	
710105	R/W	Ring Faults Count	1	
710108	R	Ring Protocol Participants Count	0	
710111	R	Active Supervisor Precedence	3	
710112	R	Capability Flags	34	
2450101	R	Status	2	
2450102	R	Configuration Capability	53	
2450103	R/W	Configuration Control	Static IP	
2450106	R	Host Name	DVS-103I02C-DLR	
2460101	R	Port 1 Interface Speed	0	Mbps
2460107	R	Port 1 Interface Type	Twisted-pair	
2460108	R	Port 1 Interface State	The interface state is unknown	
2460110	R	Port 1 Interface Label	1	
2460201	R	Port 2 Interface Speed	0	Mbps
2460207	R	Port 2 Interface Type	Twisted-pair	
2460208	R	Port 2 Interface State	The interface state is unknown	
2460210	R	Port 2 Interface Label	2	
2460301	R	Device Interface Speed	100	Mbps
2460307	R	Device Interface Type	Twisted-pair	
2460308	R	Device Interface State	The interface is enabled and is ready to send and receive data	
2460310	R	Device Interface Label	Device	
7690142	R/W	DI Alarm	Disable	
7690143	R/W	Device Port Alarm	Disable	
7690144	R/W	Port1 Alarm	Disable	
7690145	R/W	Port2 Alarm	Disable	
7690146	R/W	DLR Fault Alarm	Disable	

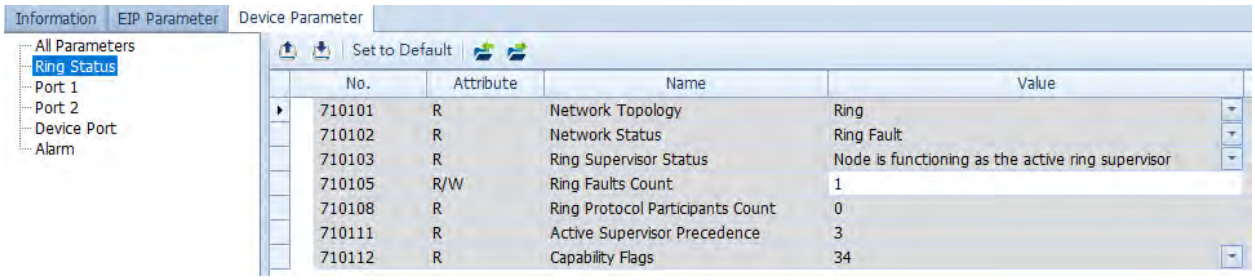
You can use the functional icons including Uploader, Downloader  , Set to Default  , Import and Export  on the Device Parameter window to upload, download, export, import the device the device parameters or restore to default values.



No.	Attribute	Name	Value
7690142	R/W	DI Alarm	Disable
7690143	R/W	Device Port Alarm	Disable
7690144	R/W	Port1 Alarm	Disable
7690145	R/W	Port2 Alarm	Disable
7690146	R/W	DLR Fault Alarm	Disable

2.2.1.1 Ring Status

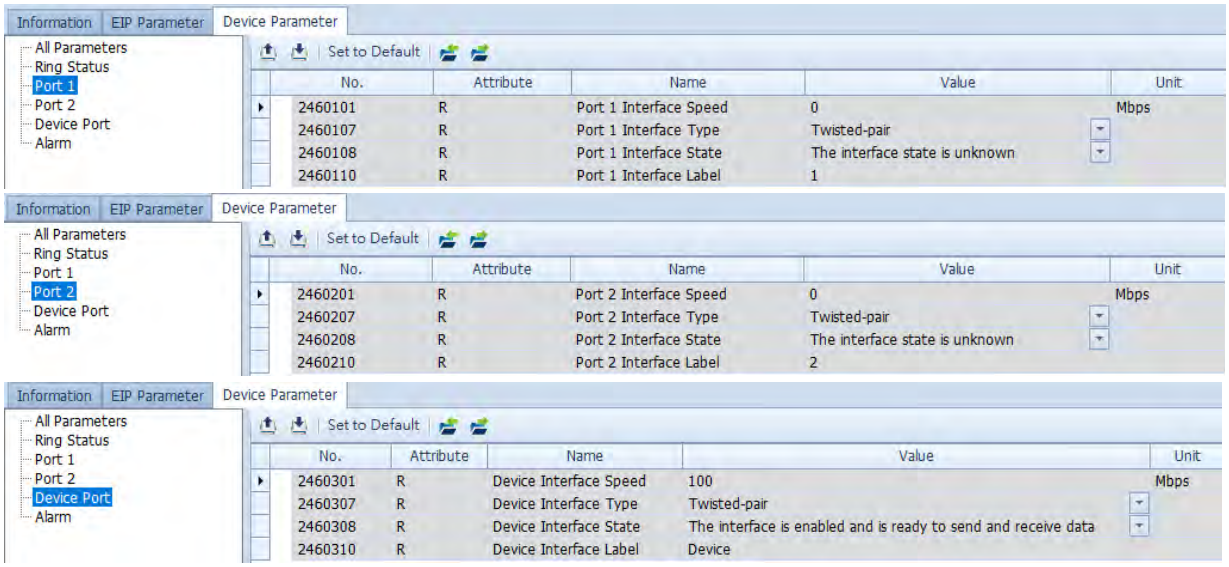
Click “Ring Status” under the Device Parameter tab, you can see all parameters of the ring topology.



Name	Description
Network Topology	Current network topology 1. Linear 2. Ring
Network Status	Current network status 1. Normal 2. Ring fault
Ring Supervisor Status	If the device is the Ring Supervisor 1. Backup ring supervisor 2. Active ring supervisor 3. Ring node 4. Non-DLR topology 5. Beacon interval or Beacon timeout value not support
Ring Faults Count	Number of times that ring fault occurred
Ring Protocol Participants Count	Number of the devices on the ring topology
Active Supervisor Precedence	Active supervisor owns high priority

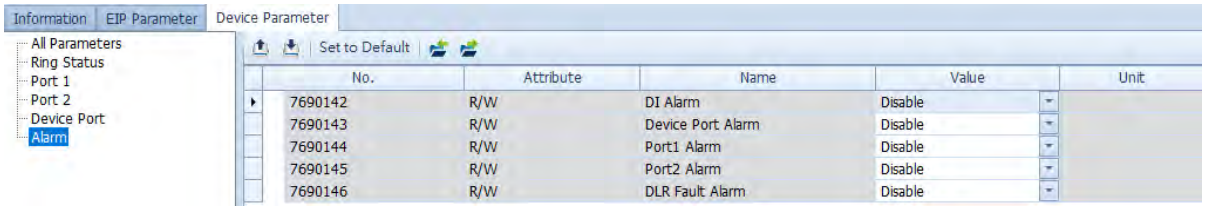
2.2.1.2 Port 1, Port 2, and Device Port

Click “Port 1” or “Port 2” under the Device Parameter tab, you can see the port-related information.



2.2.1.3 Alarm

Click “Alarm” under the Device Parameter tab, you can set the alarm-related parameters.



Name	Description
DI Alarm	Disable: The alarm of DI is disabled. ON to OFF: When DI turns ON to OFF, the alarm is ON. OFF to ON: When DI turns OFF to ON, the alarm is ON.
Device Port Alarm	Disable: The alarm of Ethernet port is disabled. ON to OFF: When Ethernet port turns ON to OFF, the alarm is ON. OFF to ON: When Ethernet port turns OFF to ON, the alarm is ON.
Port1 Alarm	
Port2 Alarm	
DLR Fault Alarm	Disable: The DLR fault alarm is disabled. Enable: The DLR fault alarm is enabled.

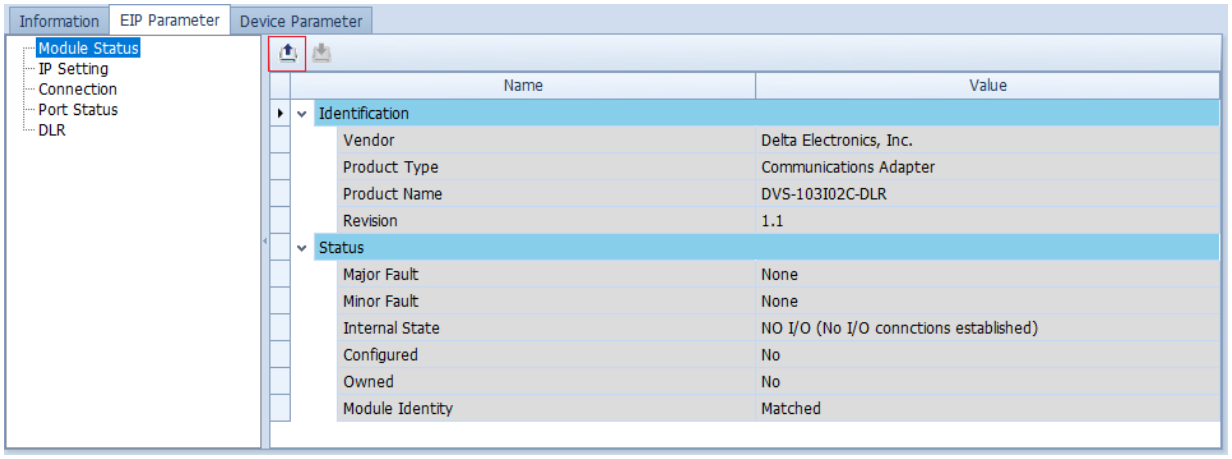
2.2.2 EIP Parameters

You can use explicit message to read and write EIP parameters. And when you are in the On-Line mode, you can set up the IP and DLR related parameters.

But when you are not in the On-Line mode, you can only edit the compatible keying value in the Electronic Keying option.

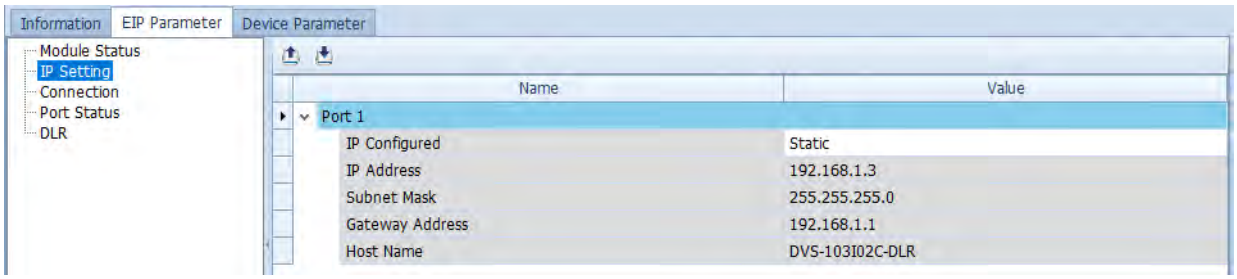
2.2.2.1 Module Status

Click “Module Status” under the EIP Parameter tab, you can see all the module status. Click uploader to view the module information and status in EIP Builder.



2.2.2.2 IP Setting

Click “IP Setting” under the EIP Parameter tab, you can set up IP-related settings. You can also set up the IP settings through DIP 1 and 2. But you need to turn DVS-103I02C-DLR power off and then on again to complete the setting.



DIP1	DIP2	Description
OFF	**OFF**	Use EIP Builder to set up the IP address
ON	**OFF**	Use BOOTP to set up the IP address
OFF	**ON**	Use DHCP to set up the IP address
ON	**ON**	Restore to default values

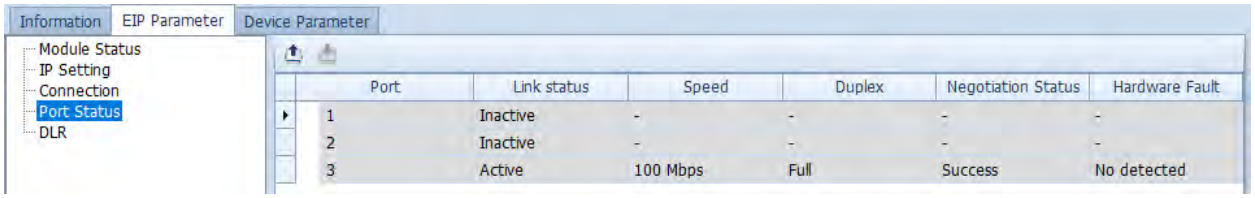
2.2.2.3 Connection

Click “Connection” under the EIP Parameter tab, you can set up rules whether to use EDS file to verify if the device is the right one to be connected.

- Disable Keying: Do NOT check the product information and the product version
- Compatible Keying: Check the product information and if the main version is identical or not.
- Exact Match: Check the product information and if the main and the minor version are matched.

2.2.2.4 Port Status

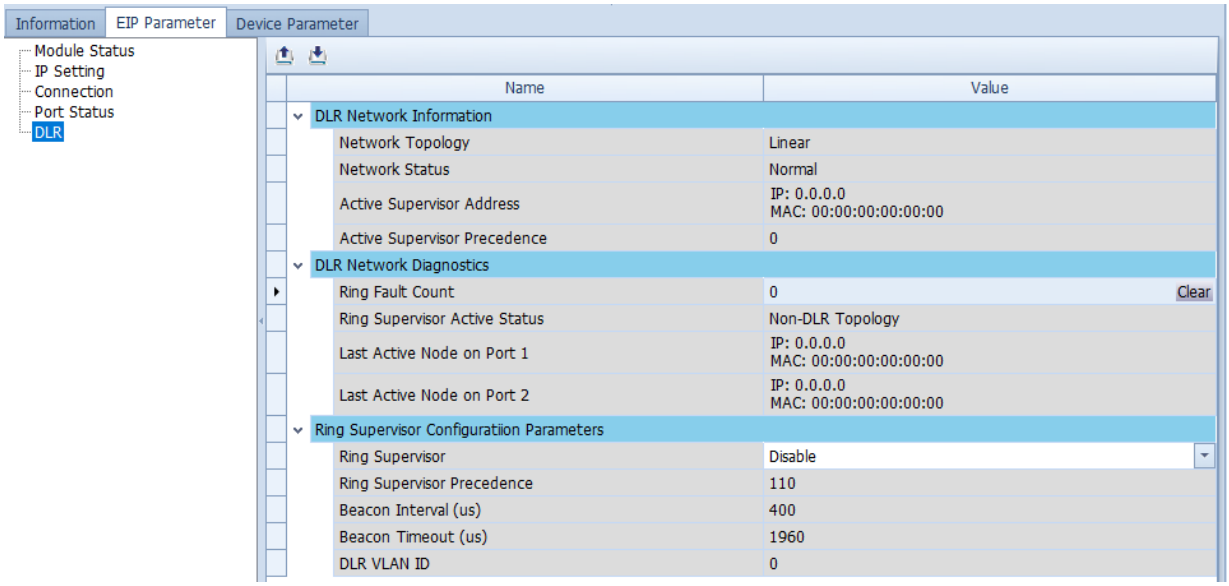
Click “Port Status” under the EIP Parameter tab, you can see the port status, link status, speed, duplex, negotiation status and if there is a hardware fault. Port Number 3 is the device port.



2.2.2.5 DLR

Click “DLR” under the EIP Parameter tab, you can see the DLR information, including DLR Network information, DLR Network Diagnostics, and Ring Supervisor Configuration Parameters. You can use DIP 3 to enable or disable the Ring Supervisor function. But you need to turn DVS-103I02C-DLR power off and then on again to complete the setting.

DIP3	Ring Supervisor Function
ON	Use DIP3 to start DLR supervisor mode
OFF	Use EIP Builder to set up the mode



Name	Description
DLR Network Information	DLR network information is shown here.
Network Topology	Current network topology 1. Linear 2. Ring
Network Status	Current network status 1. Normal 2. Ring fault
Active Supervisor Address	Here shows the IP and MAC address of the active ring supervisor.
Active Supervisor Precedence	Range: 0~255, the greater the number, the greater the priority If there are two active supervisors with the same priority number, whoever has the greater MAC value has a greater priority.
DLR Network Diagnostics	Here shows DLR network diagnostic information.
Ring Fault Count	Number of times that ring fault occurred; click “Clear” to clear all the counts and start counting from zero
Ring Supervisor Active Status	Here shows if the device is the Ring Supervisor 1. Backup ring supervisor 2. Active ring supervisor 3. Ring node 4. Non-DLR topology 5. Beacon interval or Beacon timeout value not support

Name	Description
Last Active Node on Port 1	Here shows the IP address and the MAC address of the last active node on Port 1.
Last Active Node on Port 2	Here shows the IP address and the MAC address of the last active node on Port 2.
Ring Supervisor Configuration Parameters	You can set up Ring Supervisor Configuration settings here.
Ring Supervisor	Here shows the ring supervisor mode. 1. Disable 2. Enable
Ring Supervisor Precedence	Here shows ring supervisor's precedence
Beacon Interval (μs)	Here shows the beacon interval (μs) Minimum: 100 μs; Default: 400 μs; Maximum: 4294967295 μs
Beacon Timeout (μs)	Here shows the beacon timeout (μs) Minimum: 200 μs; Default: 1960 μs; Maximum: 4294967295 μs
DLR VLAN ID	Here shows the DLR VLAN ID. Minimum: 0; Default: 0; Maximum: 4096

3

Chapter 3 Operation on the Web

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3.1 Overview

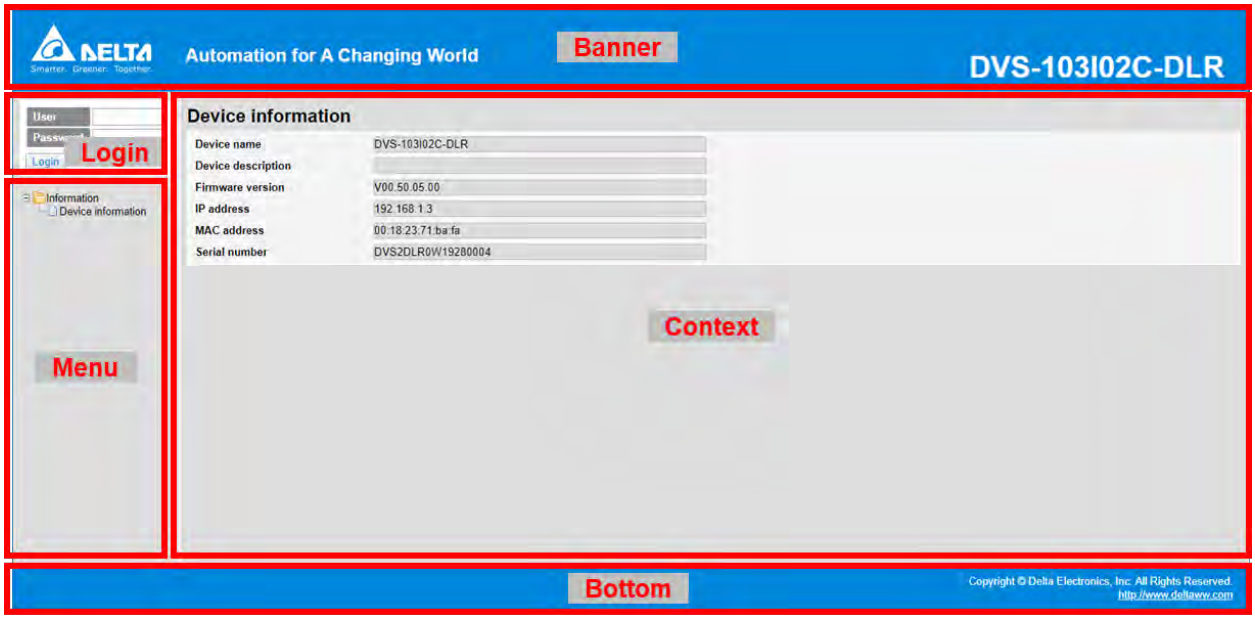
This chapter introduces IABG Ethernet Web Solution and how to operate in this environment.

3.2 Getting Started

You can enter DVS-103I02C-DLR IP address in the search bar of your browser to connect to your device. After that you can set up and DVS-103I02C-DLR.

3.2.1 Exploring the webpage

After connected to the module, you can see the DVS-103I02C-DL webpage with 5 sections as the image shown below.



Descriptions:

Section	Contents
Banner	Delta logo, slogan and the name of the connected device
Login	Username and password
Menu	Sitemap is shown in a tree diagram. (The menu shows data based on the permission of the current user.)
Context	Main contents; click an item on the menu section, its content appears here.
Bottom	Copyright information and Delta webpage information

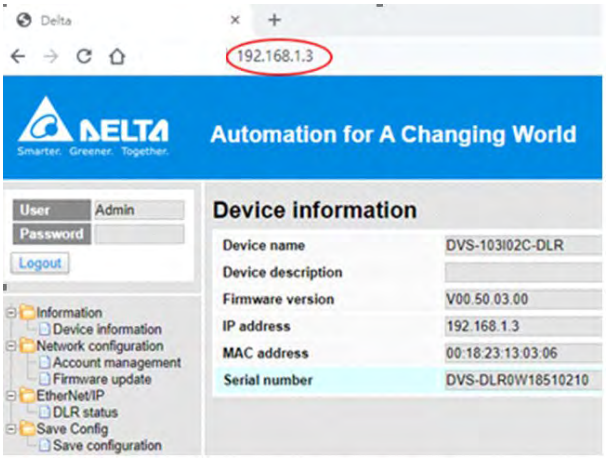
3.2.2 Using the Webpage

List of browsers that support IABG Web Solution webpage:

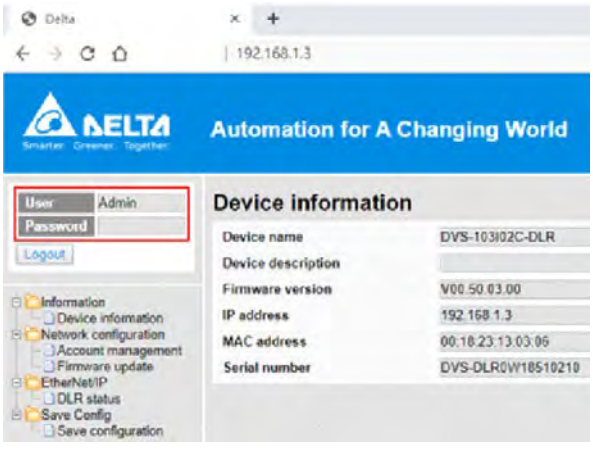
Provider	Browser	Supported versions
Microsoft	Internet Explorer	V10.0 and later
Microsoft	Edge	V20 and later
Google	Chrome	V14 and later
Mozilla	Firefox	V17 and later
Apple	Safari	V5.1 and later

- **Operation Steps:**

a. Open your browser, enter the IP address of the device that you want to connect in the search bar.



b. After the webpage appears, enter “Admin” in the User section and click Login without entering any password. You can set up the password after login.

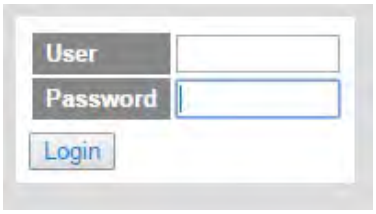


3.2.3 Login

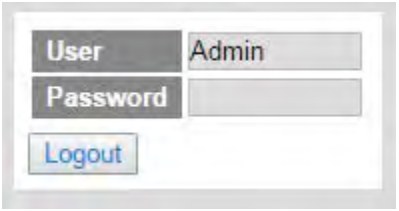
You need to login to your account to set up.

- **Operation Steps:**

a. Provide the login information to login.



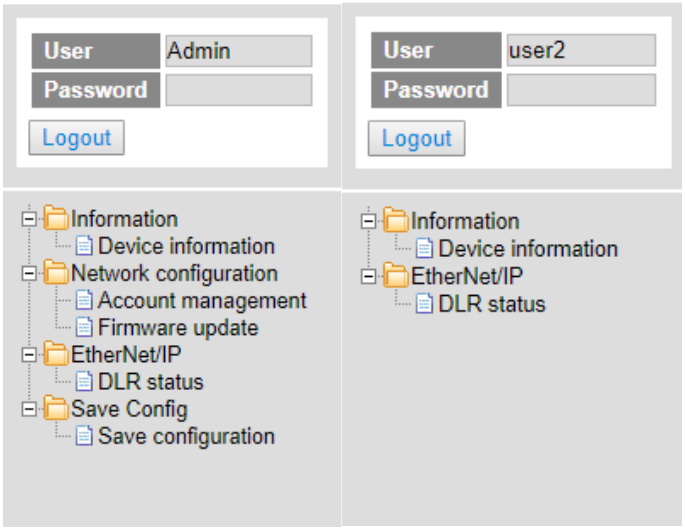
b. After login successfully, the user field shows your account name (read only). After setting up, you can click **Logout** here to leave this webpage.



Item	Description
User	Your account name
Password	Your password
“Login” / “Logout”	Login: to enter the webpage Logout: to leave the webpage

3.2.4 Menu

The menu shows data based on the permission of the current user.



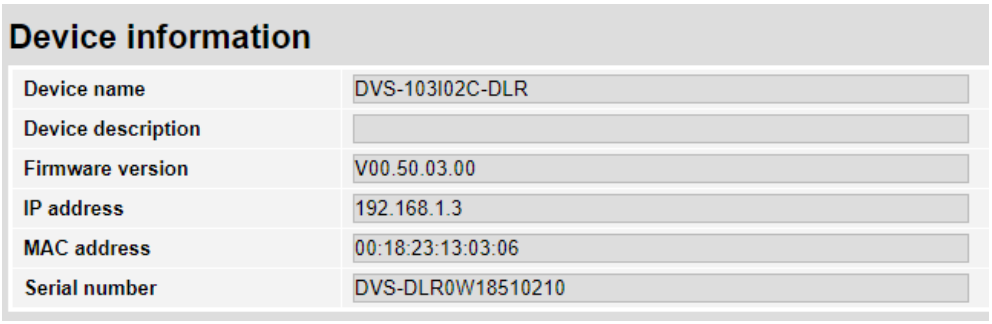
Nodes	Permission	
	Administrator	Read
Device information	V	V
Account management	V	
Firmware update	V	
DLR status	V	V
Save configuration	V	

3.3 Information

Here provides DVS-103I02C-DLR product information.

3.3.1 Device Information

You do not need to log in to see the device information. This page is read only, not for editing.



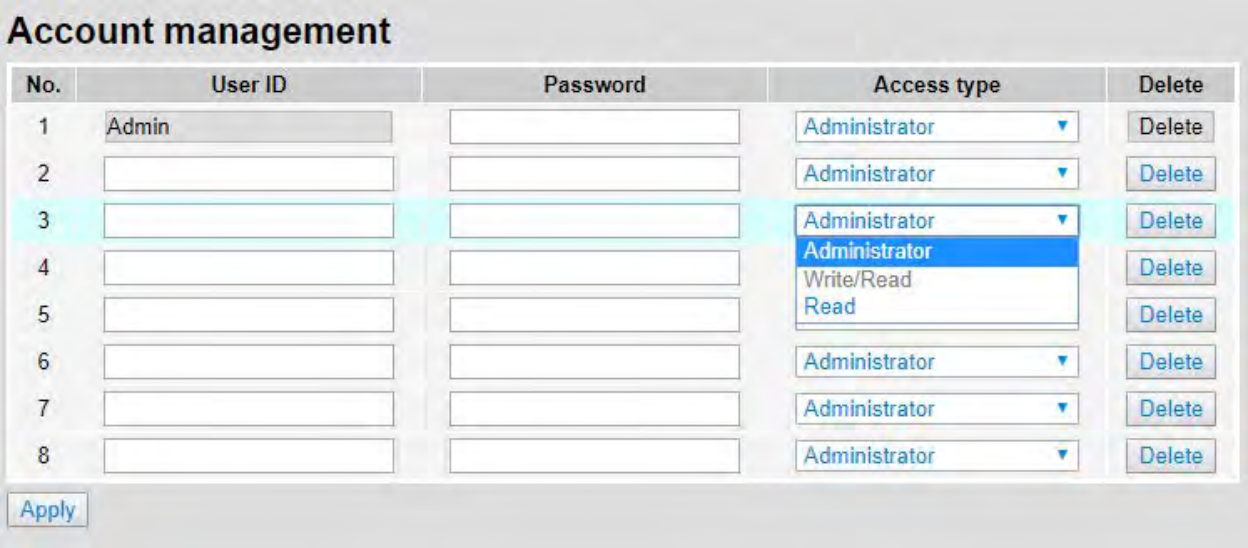
Item	Description
Device name	Product name
Device description	Device description that user defined in EIP Builder
Firmware version	Firmware version
IP address	Product IP address
MAC address	Product MAC address
Serial number	Product serial number

3.4 Network Configuration

You can set network related configurations here.

3.4.1 Account Management

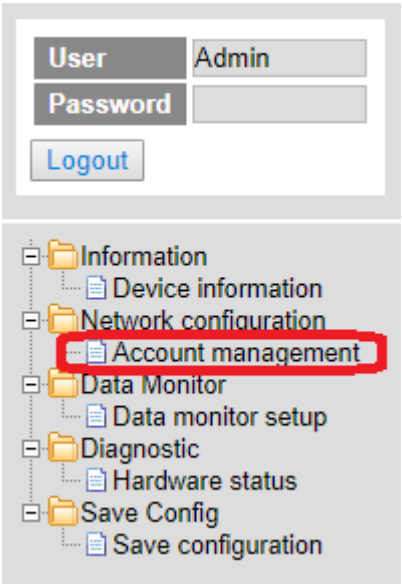
You can set 2 kinds of access types for up to 8 user accounts.



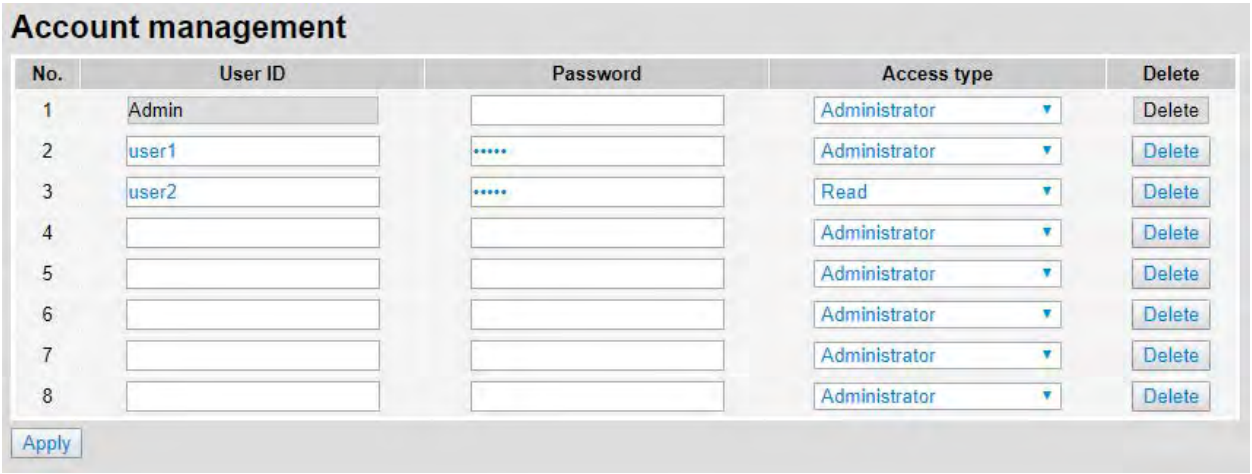
Item	Description
User ID	To name your user ID, you can use up to 16 characters from the following characters, A through Z (case-insensitive), 0 through 9, _ (underscore) , (comma) and . (dot) . ● The first default user ID is “Admin” (read only).
Password	To name your password, you can use up to 16 characters from the following characters, A through Z (case-insensitive), 0 through 9, _ (underscore) , (comma) and . (dot) . ● No password for the default user ID “Admin” (read only), you can set up the password later.
Access type	Administrator: You can set up all parameters and have permission to edit the password and permission. Read: You can open the data monitor pages and the diagnostic page. But you cannot edit parameters. ● Default user is “Administrator”.
“Delete”	Use “Delete” to clear the user ID and password.
“Apply”	Use “Apply” to save the settings.

- **Operation Steps:**

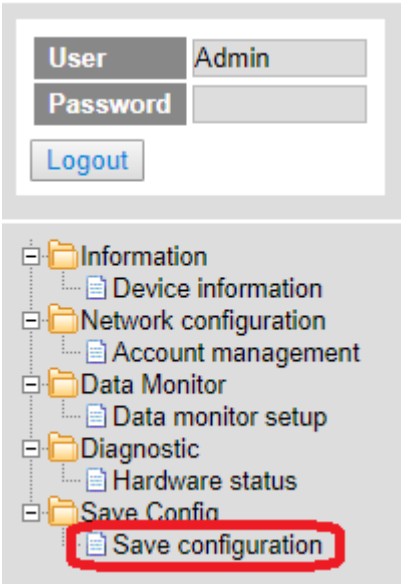
a. After log in, double-click **Account management** to open the setting page.



b. Set up the User ID, the password and the access type. After editing, click “Apply” to save the setting or click “Delete” to clear the account.



c. Double-click **Save configuration** to open the setting page.

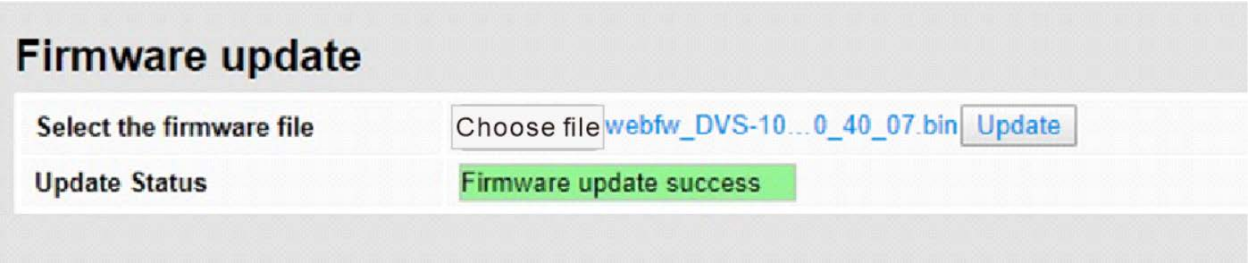


d. Click “Save” to save and download the settings to the device.

e. After download is complete, it will be prompted with a Download successful message.

3.4.2 Firmware Update

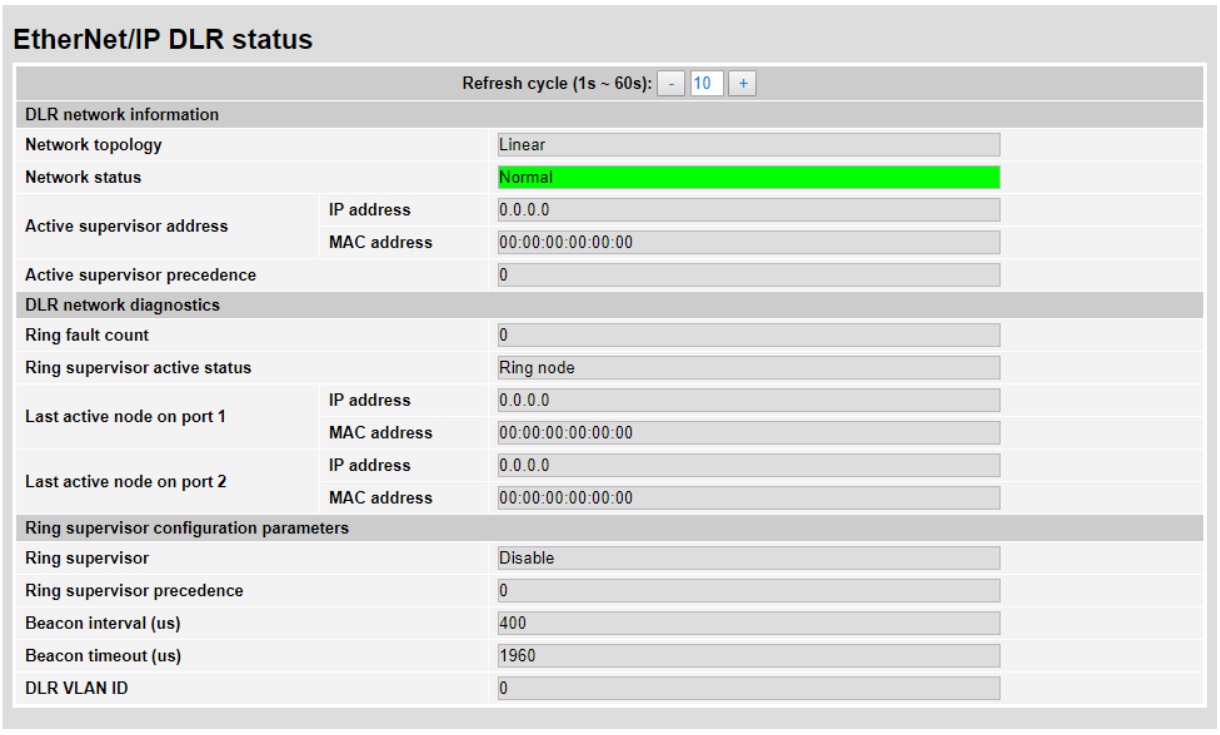
You can set network related configurations here.



Item	Description
Choose file	Select a firmware file; the extension file name should be ".bin"
Update	Click "Update" button to start updating firmware
Update Status	The status of your firmware update

3.5 EtherNet/IP DLR Status

You can check the EtherNet/IP DLR status here. You can modify the Refresh Cycle (1 s to 60 s) to change the refreshing cycle time.

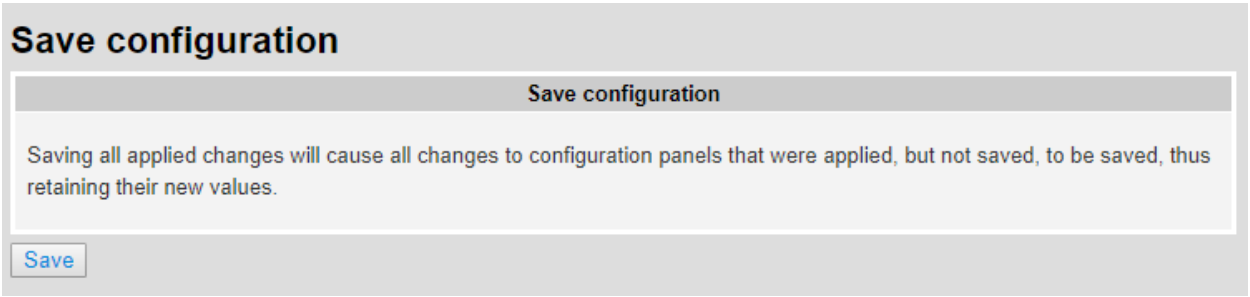


Item	Description
Refresh cycle	Refresh cycle time; default 10 seconds
“ - ”	Use this button to decrement the setting number. The minimum value is 1 second.
“ + ”	Use this button to increment the setting number. The maximum value is 60 seconds.
Network Topology	Current network topology 1. Linear 2. Ring
Network status	Current network status 1. Normal 2. Ring fault
Active supervisor address IP address	Here shows the IP address of the active ring supervisor.
Active supervisor address MAC address	Here shows the MAC address of the active ring supervisor.
Active supervisor precedence	Range: 0~255, the greater the number, the greater the priority If there are two active supervisors with the same priority number, whoever has the greater MAC value has a greater priority.
Ring fault count	Number of times that ring fault occurred
Ring supervisor active status	Here shows if the device is the Ring Supervisor 1. Backup ring supervisor 2. Active ring supervisor 3. Ring node 4. Non-DLR topology 5. Beacon interval or Beacon timeout value not support
Last active node on port 1 IP address	Here shows the IP address of the last active node on Port 1.
Last active node on port	Here shows the MAC address of the last active node on Port 1.

Item	Description
1 MAC address	
Last active node on port 2 IP address	Here shows the IP address of the last active node on Port 2.
Last active node on port 2 MAC address	Here shows the MAC address of the last active node on Port 2.
Ring supervisor	Here shows the ring supervisor mode. 1. Disable 2. Enable
Ring supervisor precedence	Here shows ring supervisor's precedence
Beacon Interval (μs)	Here shows the beacon interval (μs)
Beacon Timeout (μs)	Here shows the beacon timeout (μs)
DLR VLAN ID	Here shows the DLR VLAN ID.

3.6 Save Configuration

You can click "Save" to save and download the parameters to the device.



Note: You need to save and download the parameters to the device or the modified parameters will be lost after logging out, close the setting window, or turning the power off and on again.

4

Chapter 4 Troubleshooting

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4.1.3 Alarm Status Indicators 4-2

4.1 Troubleshooting

This chapter includes the possible errors that can occur during operation and the causes or responses in handling these situations. Before confirming the cause of error, you need to inspect the following:

- Must operate under safe environment (consider environmental, electronic, and vibration safeties).
- Connect power supply correctly.
- Secure the terminal and cable installations.
- All LED indicators are in normal condition.
- Set all DIP switches correctly.

4.1.1 Clear the Error States

When the device is in error condition, use the following solutions to clear the errors. The system will continue to show errors if the error source is not corrected.

(1) Turn the power off and on again.

(2) Switch both DIP1 and DIP 2 to ON to reset the device to default settings.

4.1.2 DLR Status Indicator

LED	Error Description	Solution
ON	DLR is in operation and ring topology is normal	No need to handle.
Blinking every 0.1 second	DLR is in operation but an error occurs in the ring topology	Check the last active node on Port 1 and Port 2 and fix the problem.
OFF	Not in DLR mode	No need to handle.

4.1.3 Alarm Status Indicators

LED	Error Description	Solution
ON	DI alarm	Check DI point
	Port 1	Check Port 1
	Port 2	Check Port 2
	Device Port	Check Device Port
	DLR fault alarm	Check DLR ring nodes
OFF	No alarm	No need to handle