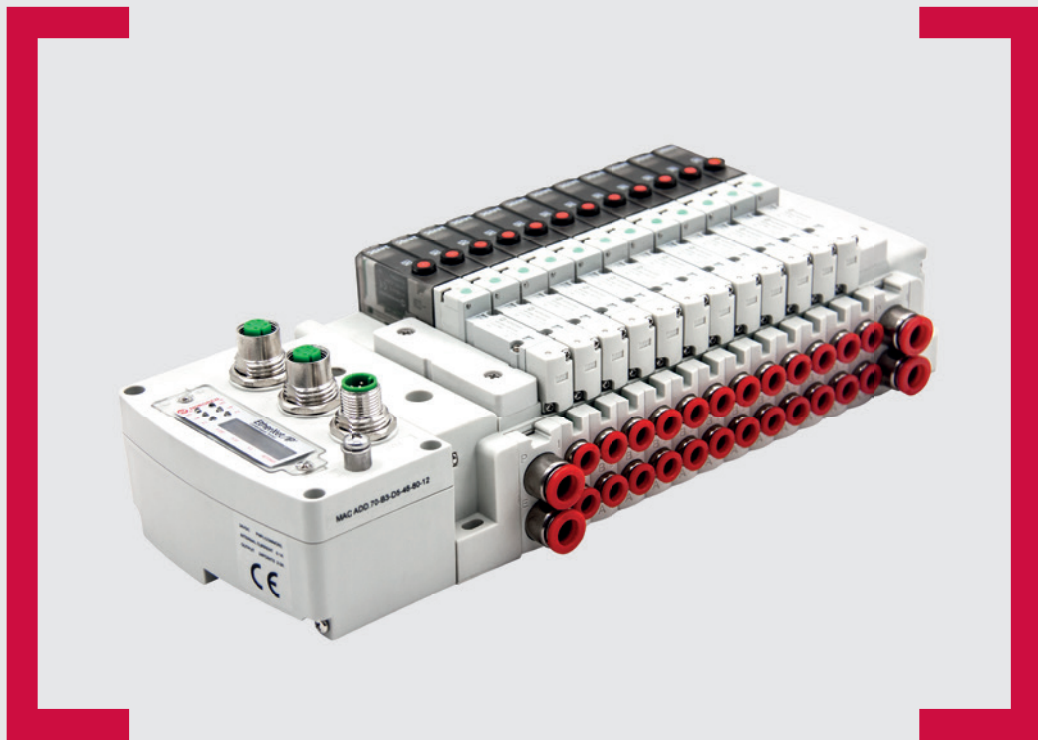


## Operation & Service Manual

# VR10 / VR15

# With EtherNet/IP Interface



**EtherNet/IP**<sup>™</sup>

**Before starting work read these instructions.**

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Change history:

The change history reflects all changes of the Operation & Service Manual, which were done after the initial release.

Index	Chapters	Change description	Date	Name
001	All	New Release	27-Nov-2020	GG
002	All	Minor changes about pictures and texts	25-Jan-2021	GG
003	7	MS LED Description change	28-Jan-2021	GG
004	6.2.2	Minor changes about texts	09-Mar-2021	GG
005	All	Minor changes to text	24-Mar-2021	JR

This Operation & Service Manual makes no claims of being complete as it does not cover all variants of the VR10 / VR15 valve islands.

Therefore, this document is subject to extensions or changes.

Construction & Design is subject to change (A1743-OPM-EP / Rev.004)

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## 2 ABOUT THIS DOCUMENTATION

This User Guide contains the information to set up and operate VR10 / VR15 valve island with EtherNet/IP Interface and to detect and resolve problems.

Note:

In addition to the specific information for the EtherNet/IP variants, all data sheets and VR10 / VR15 PROTOCOL / MULTIPOLE SERIES IP65 VERSION Operation & Service Manual are applicable and remain valid.

Refer also to the data sheets on the following web link:

- <https://www.norgren.com>

Refer also to the valve island installation instruction in the following document:

- "VR10 / VR15 PROTOCOL / MULTIPOLE SERIES IP65 VERSION Operation & Service Manual"
  - This manual can be found on <https://www.norgren.com/uk/en/technical-support/installation-maintenance-instructions/valves>

Basic information about EtherNet/IP could be found in the following documents:

- "Technology Overview Series: EtherNet/IP"
  - <https://www.odva.org/wp-content/uploads/2020/05/PUB00138R6-Tech-Series-EtherNetIP.pdf>

Network Infrastructure for EtherNet/IP could be found in the following documents:

- "EtherNet/IP Network Infrastructure Guide"
  - [https://www.odva.org/wp-content/uploads/2020/05/PUB00035R0\\_Infrastructure\\_Guide.pdf](https://www.odva.org/wp-content/uploads/2020/05/PUB00035R0_Infrastructure_Guide.pdf)

Further information about EtherNet/IP is available on following websites:

- <https://www.odva.org/>
- <https://www.odva.org/technology-standards/document-library/>

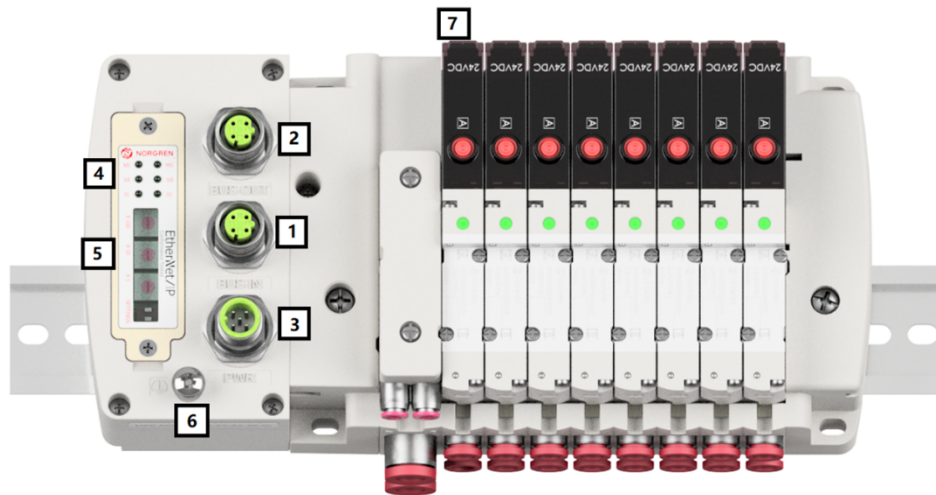
## 3 IMPORTANT HINTS

### 3.1 GROUNDING AND EQUIPOTENTIAL BONDING

Proper grounding and equipotential bonding are very important to protect against electromagnetic interferences in EtherNet/IP networks. To reduce potential impact, grounding of the EtherNet/IP cable screen should be done at both ends of every cable (i.e. at each device). Equipotential bonding ensures that the ground potential is identical throughout the entire EtherNet/IP network and is essential to avoid equipotential bonding currents, which could otherwise flow through the EtherNet/IP cable screen. Please refer for further details to the “Network Infrastructure for EtherNet/IP” provided by the EtherNet/IP user organization ODVA (<https://www.odva.org/>).

For proper grounding please use the earth screw (M4) on the upper side of the valve island. For easy reference see item 6 in chapter 4.

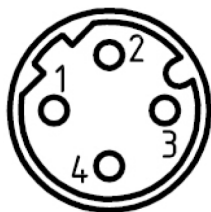
## 4 ELECTRICAL COMPONENTS



- 1- Port 1 for EtherNet/IP  
(M12 x 1 | Female | 4 – pin | D – coded)
- 2- Port 2 for Ethernet/IP  
(M12 x 1 | Female | 4 – pin | D – coded)
- 3- PWR: Power supply connector  
(M12 x 1 | Male | 5 – pin | A – coded)
- 4- Status LEDs
- 5- IP address switch.
- 6- Earth screw (M4)
- 7- Valve status LEDs

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## 4.1 EtherNet/IP PORT 1 & PORT 2

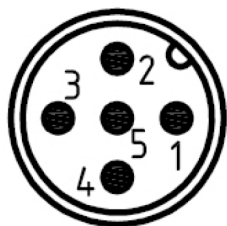


M12 / 4 pins / Female Connector / D-coded

Pin No.	Function
1	Transmission Data + (TD +)
2	Receive Data + (RD +)
3	Transmission Data - (TD -)
4	Receive Data - (RD -)

## 4.2 POWER SUPPLY CONNECTOR

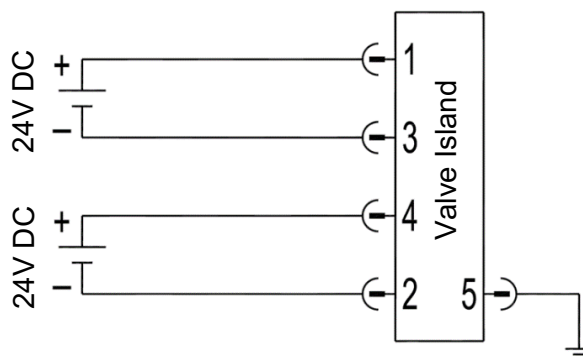
- Pin allocating of power supply connector



M12 / 5 pins / Male Connector / A-coded

Pin No.	Function
1	L1 (VB +) 24V electronics power supply
2	N2 (VA -) 0V valves power supply
3	N1 (VB -) 0V electronics power supply
4	L2 (VA +) 24V valves power supply
5	FE (functional earth)

- Power supply connector wiring diagram



### Notes:

- Make sure electronics power, valves power and their polarities are connected to correct pins respectively before switching on.
- Select the appropriate cables to mate with the connectors mounted on the control module.
- Connect the earth screw to ground.

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### 4.3 ELECTRICAL DATA

Specification		Remark
Valve voltage range (VA)	24VDC +10%/-5%	PELV
Electronics voltage range (VB)	24VDC +/-10%	PELV
Maximum currents	VA: $n \times 40$ mA VB: < 100 mA	n = number of solenoids
Voltages are galvanic decoupled	Yes	---
Protection against polarity reversal	Yes	---
Overcurrent protection VB, VA	Irreversible	---
Output polarity	PNP	---

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## 5 SOLENOID NUMBER, OUTPUT POINT & VALVE STATION MAPPING

### 5.1 MAPPING RULES FOR VALVE STATIONS ≤ 12

- If valve stations ≤ 12, 2 solenoid numbers are always reserved for each valve station. \*

Detailed allocation is shown as below:

Station	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12
<b>Solenoid A</b>	Sol.01	Sol.03	Sol.05	Sol.07	Sol.09	Sol.11	Sol.13	Sol.15	Sol.17	Sol.19	Sol.21	Sol.23
<b>(14 Solenoid)</b>	Output 0	Output 2	Output 4	Output 6	Output 8	Output 10	Output 12	Output 14	Output 16	Output 18	Output 20	Output 22
<b>Solenoid B</b>	Sol.02	Sol.04	Sol.06	Sol.08	Sol.10	Sol.12	Sol.14	Sol.16	Sol.18	Sol.20	Sol.22	Sol.24
<b>(12 Solenoid)</b>	Output 1	Output 3	Output 5	Output 7	Output 9	Output 11	Output 13	Output 15	Output 17	Output 19	Output 21	Output 23

**Notes:**

\* For valve station with single solenoid, only Solenoid A (14 Solenoid) is connected.  
Consider the one which is closest to control module as 1st station (Station #1)

### 5.2 MAPPING RULES FOR 12 < VALVE STATIONS ≤ 24

- If 12 < valve stations ≤ 24, special rules are required since only 1 solenoid number is allocated to valve station with single solenoid:
  - Sequence all solenoids following the rules below by starting from 1st station which is the station closest to control module:
    - If 1st station is with double solenoids, sequence solenoid A as Sol.01, solenoid B as Sol.02, following 2nd station solenoid A as Sol.03, solenoid B as Sol.04.....
    - If 1st station is with single solenoid, sequence solenoid A as Sol.01, following 2nd station solenoid A as Sol.02, solenoid B as Sol.03.....
    - If a station is originally configured as blank, always 2 solenoid numbers are allocated.
    - The rest of stations should also adhere to the sequence rules above.
  - A 16-station 24 solenoids valve island example is shown below:

	Double Solenoids	Double Solenoids	Single Solenoid	Single Solenoid	Double Solenoids	Double Solenoids	Single Solenoid	Double Solenoids	Single Solenoid	Double Solenoids	Single Solenoid	Double Solenoids	Single Solenoid	Single Solenoid	Double Solenoids	Single Solenoid
Station	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16
<b>Solenoid A</b>	Sol.01	Sol.03	Sol.05	Sol.06	Sol.07	Sol.09	Sol.11	Sol.12	Sol.14	Sol.15	Sol.17	Sol.18	Sol.20	Sol.21	Sol.22	Sol.24
<b>(14 Solenoid)</b>	Output 0	Output 2	Output 4	Output 5	Output 6	Output 8	Output 10	Output 11	Output 13	Output 14	Output 16	Output 17	Output 19	Output 20	Output 21	Output 23
<b>Solenoid B</b>	Sol.02	Sol.04	..*	..*	Sol.08	Sol.10	..*	Sol.13	..*	Sol.16	..*	Sol.19	..*	..*	Sol.23	..*
<b>(12 Solenoid)</b>	Output 1	Output 3	..*	..*	Output 7	Output 9	..*	Output 12	..*	Output 15	..*	Output 18	..*	..*	Output 22	..*

**Note:**

\* For valve station with single solenoid, only Solenoid A (14 Solenoid) is allocated & connected.  
Consider the one which is closest to control module as 1st station (Station #1).

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## 6 COMMISSIONING

### Notes:

1. The method of module installation strongly depends on the configuration software. Please refer to the configuration software manual.
2. All examples in this document are made with following tools,  
Hardware: Allen-Bradley PLC CPU 1756-L61, Ethernet/IP Module 1756-ENBT.  
Software (Rockwell Automation): BootP-DHCP, RS-Linx Classic, RS Logix 5000.

### 6.1 EDS FILE INSTALLATION

A device description file is needed for configuration of valve island. The ESD file is provided by NORGREN and can be downloaded from the following web link:

- <https://www.norgren.com/uk/en/technical-support/software>

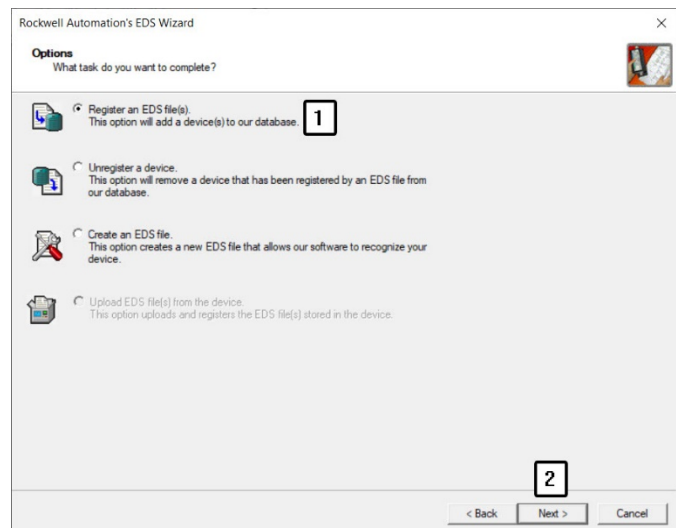
The EDS (Electronic Data Sheet) file could be used for all variants VR10 / VR15:

- “[NORGREN-VR1X-EP-Vxx-JJJJMMDD.eds](#)”

Note: “JJJJMMDD” (JJJJ-year, MM-month, DD-day) is date of release, “Vxx” (xx-version number) is version of release.

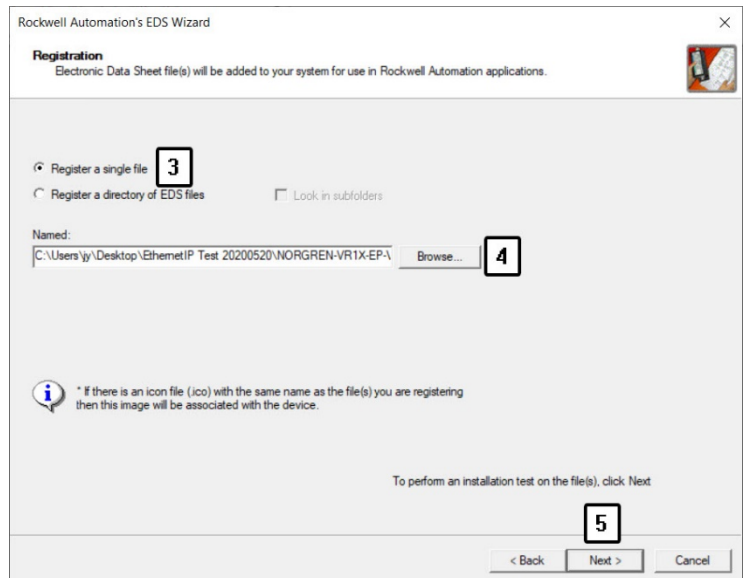
The EDS file can be installed inside the engineering tool of the EtherNet/IP controller by following steps in RS Logix 5000.:

- Click “Tools” menu.
- Choose “EDS Hardware Installation Tool”. Then click on “Next” in Rockwell Automation’s EDS wizard window.
- Select “Register an EDS file(s)”. Click Next. (Tag 1-2)

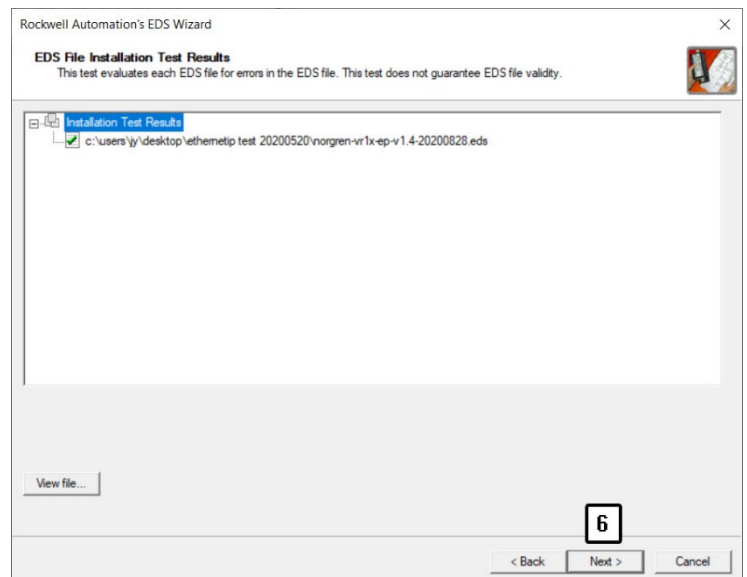


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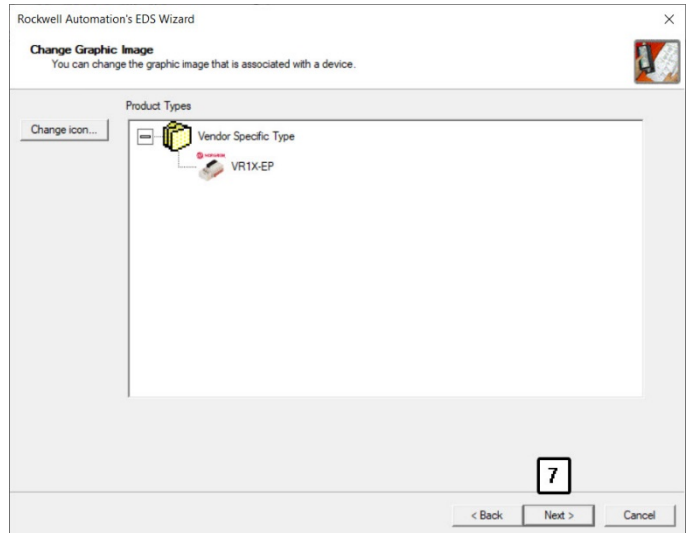
- In next window, click on “Register a single file”. (Tag 3)
- “Browse” to the source path where EDS file is stored, then click on “Next”. (Tag 4-5)



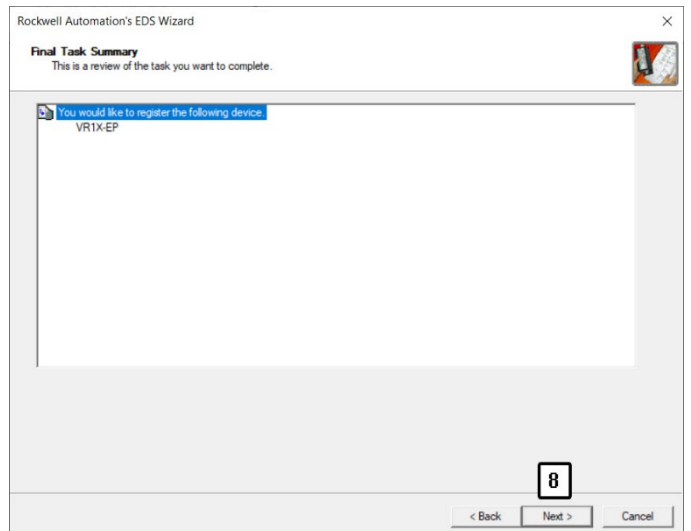
- Click “Next” on the EDS File Installation Test Result window. (Tag 6)



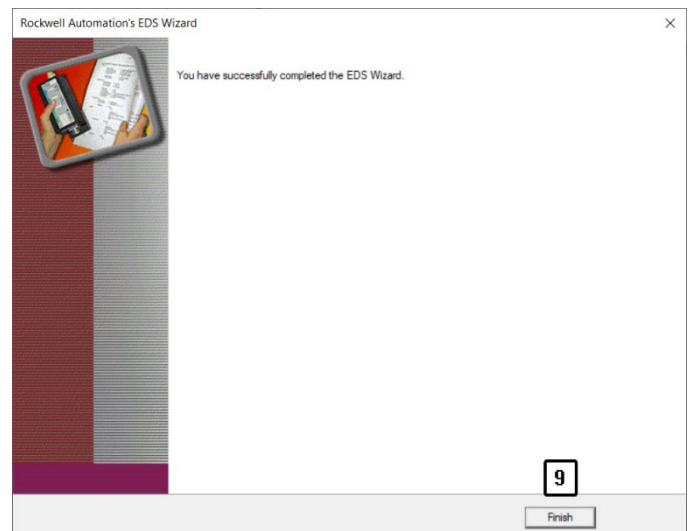
- Click “Next” by accepting the default icon of Norgren valve island. (Tag 7)



- Click “Next” on the task summary window. (Tag 8)



- Click Finish. (Tag 9)



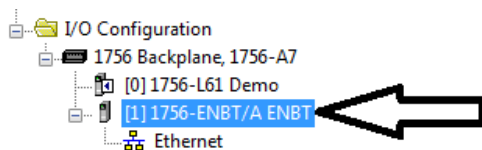
- Now the EDS file is added to the engineering tool.

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## 6.2 HARDWARE CONFIGURATION

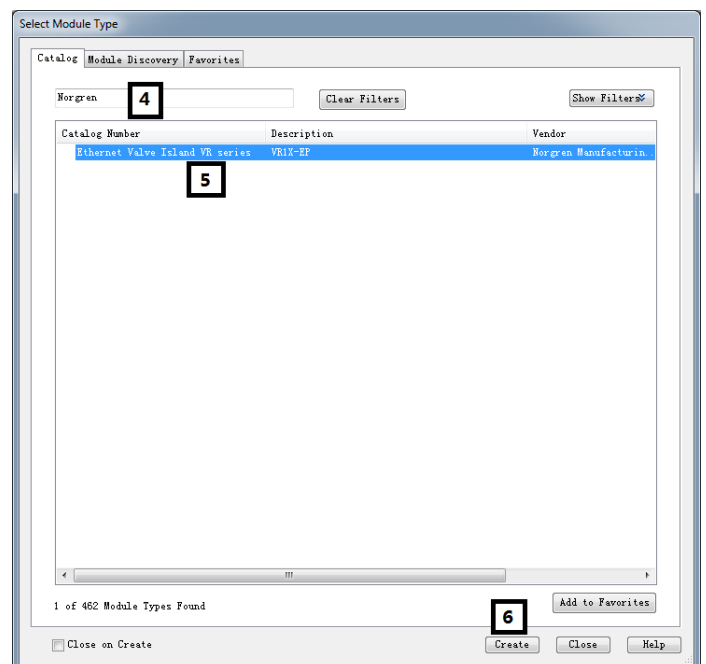
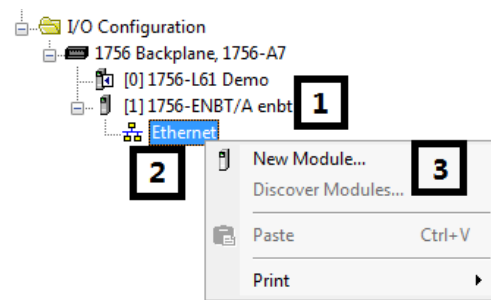
Note: please create a new project or open an existing project before configuring any hardware.

Please make sure the EtherNet/IP module has been configured correctly before add valve island module in the “Controller Organizer” window in RS Logix 5000 as below.



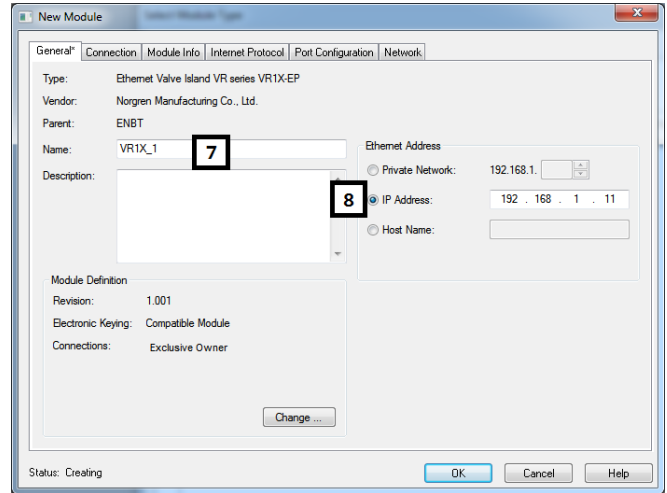
### 6.2.1 Add Valve Island and Configuration

- Find the EtherNet/IP module in controller Organizer. (Tag 1)
- Right-clicking on “Ethernet”. (Tag 2)
- Choose “New Module”. (Tag 3)
- In the “Select Module Type” window, filter by key word “Norgren” if too many module types in “Catalog”. (Tag 4)
- Select correct module type. (Tag 5)
- Click create. (Tag 6)



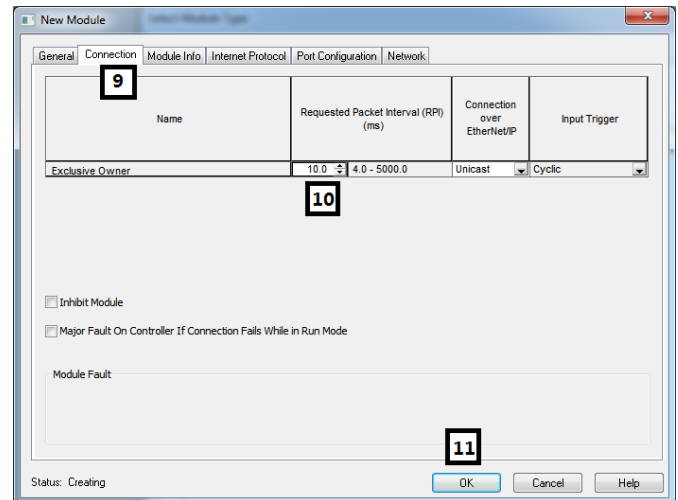
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- In the “New Module” window, select “General” tab, input Name and IP address. (Tag 7-8)

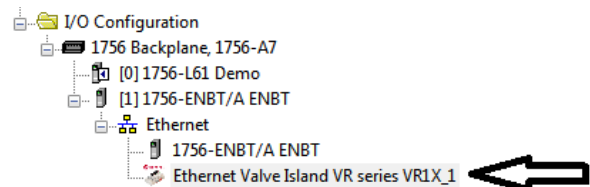


- Select “Connection” tab. (Tag 9)
- Set “Requested Packet Interval (RPI)” greater than or equal to 10ms. The RPI times has a direct impact to the busload. (Tag 10)
- Click “OK”. (Tag 11)

Note: The lower the cycle times, the higher the busload



- Now the valve island is added to the tree “Controller Organizer”.

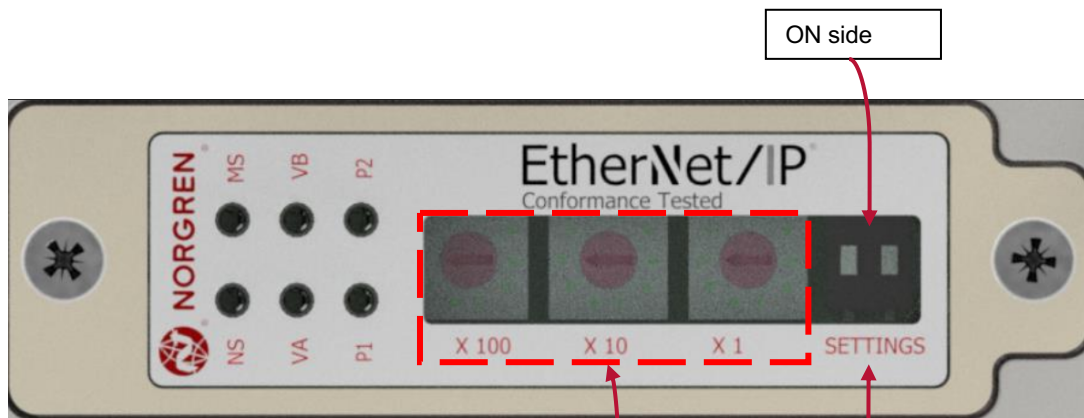


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### 6.2.2 Assign IP Address to Valve Island

VR10/VR15 provides several options to assign IP address to valve island by removing the window to set the rotary and DIP switch with a 2mm slotted screwdriver during power off.

The detail functions of the switches are shown as below:



#### IP address dial panels:

0 0 0: IP address set by Remote Control  
 2 5 5: IP address set by DHCP  
 001-254: IP address set by dial panel.  
 Address from 192.168.\*. 001 to 192.168.\*. 254  
 "\*" is set by "setting switch 1"

#### Settings - Select additional IP address range.

Switch 1 is "ON" side:  
 IP address range: 192.168.1.001 to 192.168.1.254  
 Switch 1 is at opposite "ON" side:  
 IP address range: 192.168.0.001 to 192.168.0.254  
 Notes:  
 001-254 is set by dial panels.  
 Switch 1 does not take effect under Remote control and DHCP mode.  
 Switch 2 is not used.

Note: VR10/15 supports static and DHCP IP assignment method, for users of other IP assignment methods (such as BOOTP), please refer to 6.2.2.1 with BOOTP\_DHCP server or DHCP server which is typically provided by PLC OEM (such as BOOTP\_DHCP tool within RS Logix 5000 software package from Rockwell Automation) to assign IP address.



### 6.2.2.1 IP Address Setting by Remote Control

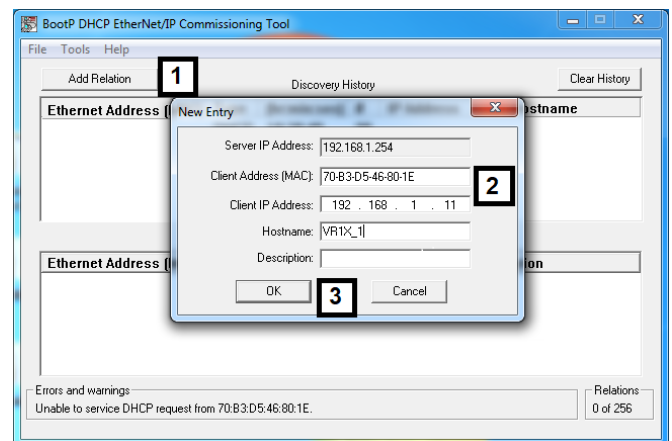
In remote control mode, IP address can be set by DHCP server, or TCP/IP Interface Object.

- IP address set by DHCP Server  
VR10/VR15 is set as a DHCP client in remote control mode by default.  
IP Address must be assigned using a DHCP server or a similar tool.  
The IP address must be set again after each power cycle.

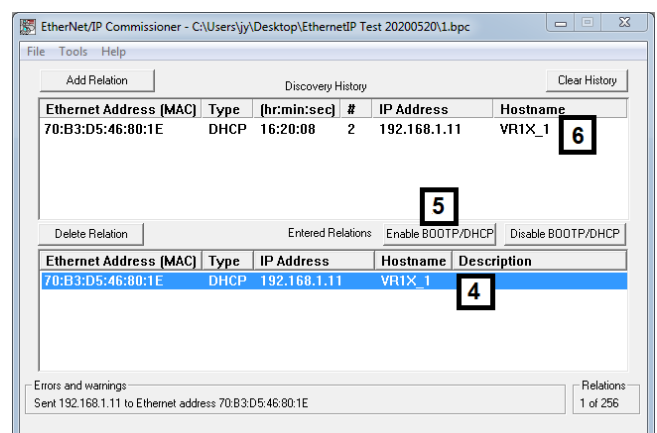
The following example shows the IP Address assignment using Rockwell Automations tool BOOTP\_DHCP.

In the BOOTP\_DHCP tool, making sure network adaptor which is in the network is selected. Then follow the steps below:

- In the “commissioning tool” window, click Add Relation. (Tag 1)
- Enter Client Address (MAC), IP Address and Hostname in the “New Entry” window, Click OK. (Tag 2-3)
- The relation now is added.



- Select the added relation. (Tag 4)
- Click “Enable BOOTP/DHCP”. (Tag 5)
- The VR10/VR15 valve island will appear with assigned IP Address in “Discovery History” list if address assignment was successful. (Tag 6)

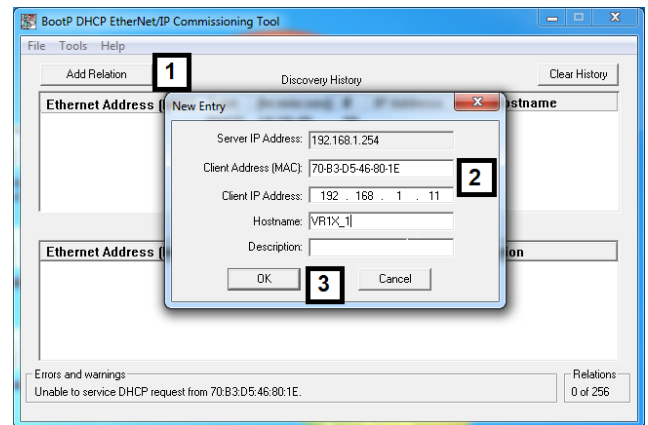


- Static IP Address assignment

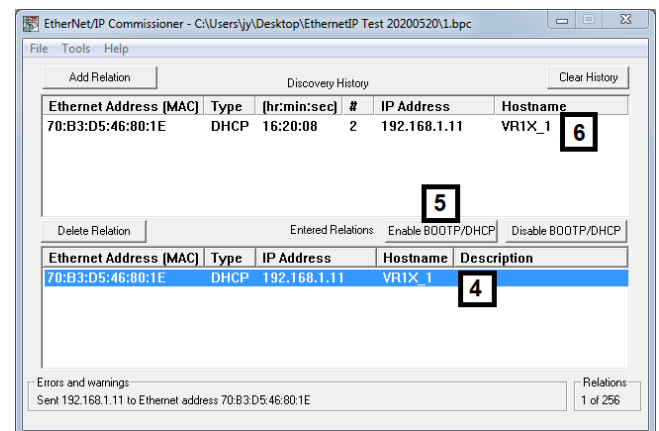
Static IP address must be done once and is valid after power cycles.

The following example shows how to set static IP address by Rockwell Automation tool BOOTP/DHCP.

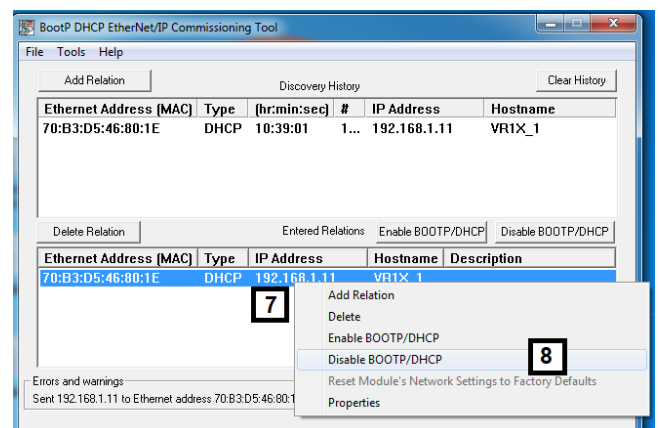
- Click Add Relation. (Tag 1)
- Enter Client Address (MAC), IP Address and Hostname. (Tag 2)
- Click OK. (Tag 3)



- Select the added relation. (Tag 4)
- Click "Enable BOOTP/DHCP". (Tag 5)
- The VR10/VR15 valve island will appear with assigned IP Address in "Discovery History" list if address assignment was successful. (Tag 6)

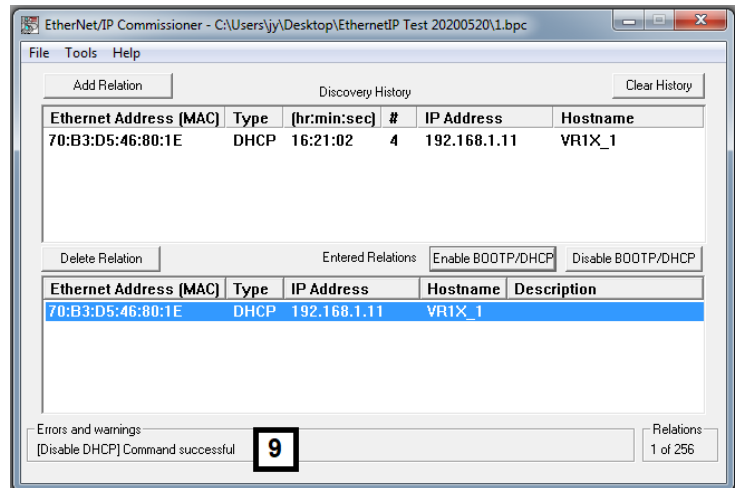


- Right-clicking on the relation. (Tag 7)
- Select "Disable BOOTP/DHCP". (Tag 8)



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- “[Disable DHCP] command successful” will appear in the Errors and warnings status.



- Static IP address can also set by TCP/IP Interface Object.

The Read/Write access to the TCP/IP Interface Object is done via the Explicit Messages communication method.

The configuration method is set up with the bits0-3 in attribute 3. Please use the statically assigned IP configuration set up value "0" for those bits.

Bit(s):	Called:	Definition	
0-3	Configuration Method	Determines how the device shall obtain its IP-related configuration	0 = The device shall use statically assigned IP configuration values. 1 = Not used. 2 = The device shall obtain its interface configuration values via DHCP. 3-15 = Reserved for future use.
4	DNS Enable	If 1 (TRUE), the device shall resolve host names by querying a DNS server.	
5-31	Reserved	Reserved for future use and shall be set to zero.	

**Attribute 3 of TCP/IP Interface Object: Configuration Method**

Attribute 5 contains the configuration parameters required to operate as a TCP/IP node. At least network address and network mask need to be configured.

Name	Meaning
IP address	The device's IP address.
Network mask	The device's network mask. The network mask is used when the IP network has been partitioned into subnets. The network mask is used to determine whether an IP address is located on another subnet.
Gateway address	The IP address of the device's default gateway. When a destination IP address is on a different subnet, packets are forwarded to the default gateway for routing to the destination subnet.
Name server	The IP address of the primary name server. The name server is used to resolve host names. For example, that might be contained in a CIP connection path.
Name server 2	The IP address of the secondary name server. The secondary name server is used when the primary name server is not available or is unable to resolve a host name.
Domain name	The default domain name. The default domain name is used when resolving host names that are not fully qualified. For example, if the default domain name is "odva.org", and the device needs to resolve a host name of "plc", then the device will attempt to resolve the host name as "plc.odva.org".

**Attribute 5 of TCP/IP Interface Object: Interface Configuration**

Next table shows the structure of the interface configuration attribute.

Attribute	STRUCT of:	Interface Configuration
5	UDSINT	IP Address
	UDSINT	Network Mask
	UDSINT	Gateway Address
	UDSINT	Name Server
	UDSINT	Name Server 2
	STRING	Domain Name
	UDSINT	Pad

**Structure of Attribute 5: Interface Configuration**

### 6.2.2.2 IP Address Set by Dial Panels

When the IP address dial panel is set between 001 and 254, the IP address is set by the dial panel. In this way, the first and second positions of the IP address will remain at 192 and 168, and the last two positions shall be set according to the switch setting instructions in chapter 6.2.2.

### 6.2.2.3 DHCP Mode

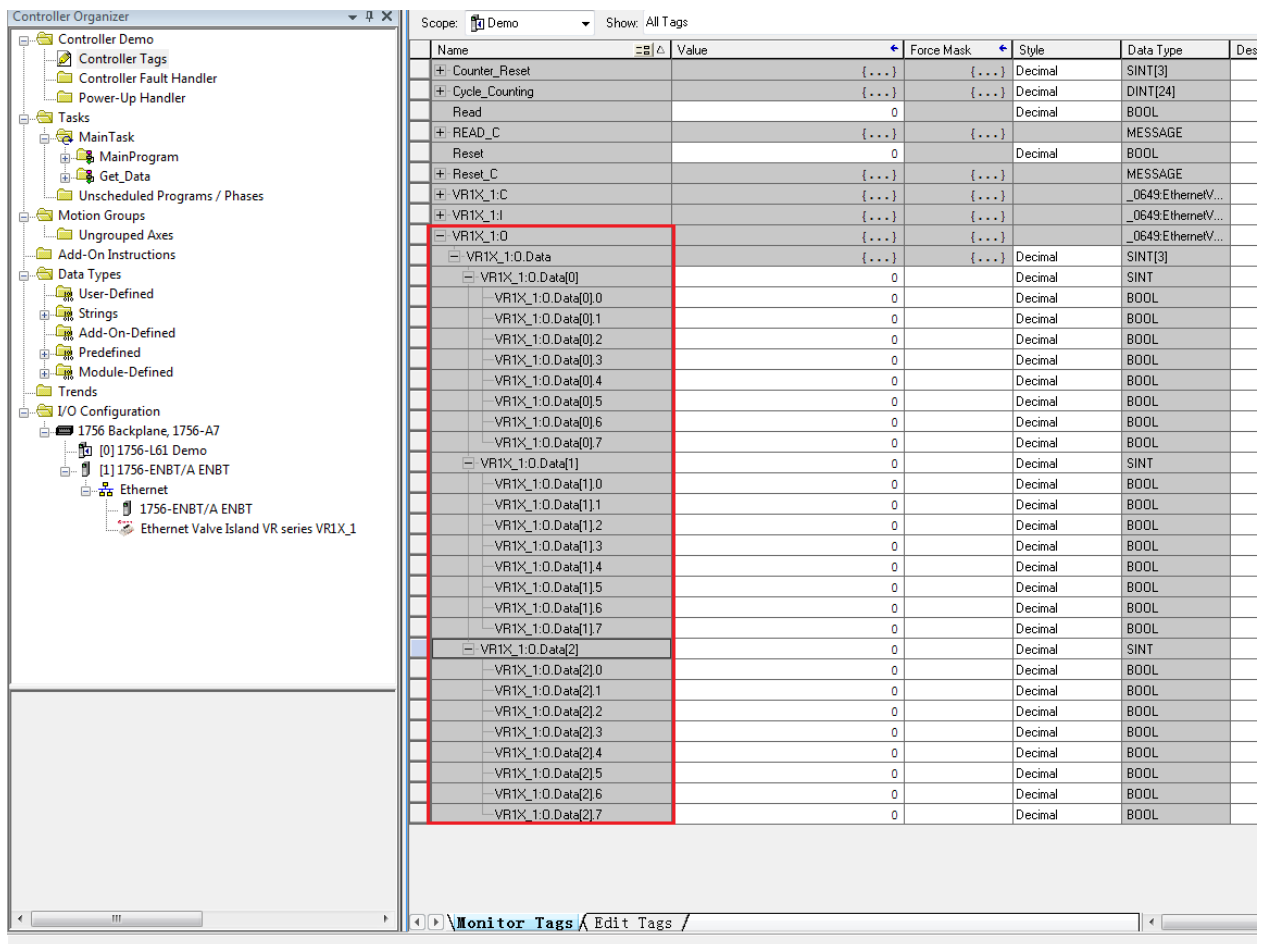
When the IP address dial panel is set to 255 position, IP address setting is in DHCP mode, any static IP address will be cleared automatically, and IP address is set by DHCP server.

Please follow Chapter 6.2.2.1 “a) IP address set by DHCP Server” to set IP address.

### 6.3 DIGITAL OUTPUTS DATA

In EDS file, the digital outputs data is defined as “Assembly Object Instance: 150d, Class: 0x04”.

- VR10 / VR15 valve island channel outputs will be real-time monitored & displayed.
- Channel outputs process codes will be reported by “**Output Byte 0**”, “**Output Byte 1**” and “**Output Byte 2**”.
- The digital outputs data can be found as following capture.
  - Click “Control Tags”.
  - Select “Monitor Tags”.
  - Expand “VR1X\_1:O” and “VR1X\_1:O.Data” (VR1X\_1 is the name of module; it would change if another name used for the module).



Name	Value	Force Mask	Style	Data Type	Des
Counter_Reset	{...}	{...}	Decimal	SINT[3]	
Cycle_Counting	{...}	{...}	Decimal	DINT[24]	
Read	0		Decimal	BOOL	
READ_C	{...}	{...}	MESSAGE		
Reset	0		Decimal	BOOL	
Reset_C	{...}	{...}	MESSAGE		
VR1X_1:C	{...}	{...}		_0649.EthernetV...	
VR1X_1:I	{...}	{...}		_0649.EthernetV...	
VR1X_1:O	{...}	{...}		_0649.EthernetV...	
VR1X_1:O.Data	{...}	{...}	Decimal	SINT[3]	
VR1X_1:O.Data[0]	0	0	Decimal	SINT	
VR1X_1:O.Data[0].0	0	0	Decimal	BOOL	
VR1X_1:O.Data[0].1	0	0	Decimal	BOOL	
VR1X_1:O.Data[0].2	0	0	Decimal	BOOL	
VR1X_1:O.Data[0].3	0	0	Decimal	BOOL	
VR1X_1:O.Data[0].4	0	0	Decimal	BOOL	
VR1X_1:O.Data[0].5	0	0	Decimal	BOOL	
VR1X_1:O.Data[0].6	0	0	Decimal	BOOL	
VR1X_1:O.Data[0].7	0	0	Decimal	BOOL	
VR1X_1:O.Data[1]	0	0	Decimal	SINT	
VR1X_1:O.Data[1].0	0	0	Decimal	BOOL	
VR1X_1:O.Data[1].1	0	0	Decimal	BOOL	
VR1X_1:O.Data[1].2	0	0	Decimal	BOOL	
VR1X_1:O.Data[1].3	0	0	Decimal	BOOL	
VR1X_1:O.Data[1].4	0	0	Decimal	BOOL	
VR1X_1:O.Data[1].5	0	0	Decimal	BOOL	
VR1X_1:O.Data[1].6	0	0	Decimal	BOOL	
VR1X_1:O.Data[1].7	0	0	Decimal	BOOL	
VR1X_1:O.Data[2]	0	0	Decimal	SINT	
VR1X_1:O.Data[2].0	0	0	Decimal	BOOL	
VR1X_1:O.Data[2].1	0	0	Decimal	BOOL	
VR1X_1:O.Data[2].2	0	0	Decimal	BOOL	
VR1X_1:O.Data[2].3	0	0	Decimal	BOOL	
VR1X_1:O.Data[2].4	0	0	Decimal	BOOL	
VR1X_1:O.Data[2].5	0	0	Decimal	BOOL	
VR1X_1:O.Data[2].6	0	0	Decimal	BOOL	
VR1X_1:O.Data[2].7	0	0	Decimal	BOOL	

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- Outputs Value and solenoid number mapping relationships are shown in table below.
  - The bit is “1” means there is output occurred on that solenoid.
  - The bit is “0” means no output.
  - Outputs positioning to valve station follow the mapping rules stated in Chapter 5.

Output Byte 0								
<b>Solenoid</b>	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

Output Byte 1								
<b>Solenoid</b>	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

Output Byte 2								
<b>Solenoid</b>	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

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## 6.4 DIGITAL INPUTS DATA

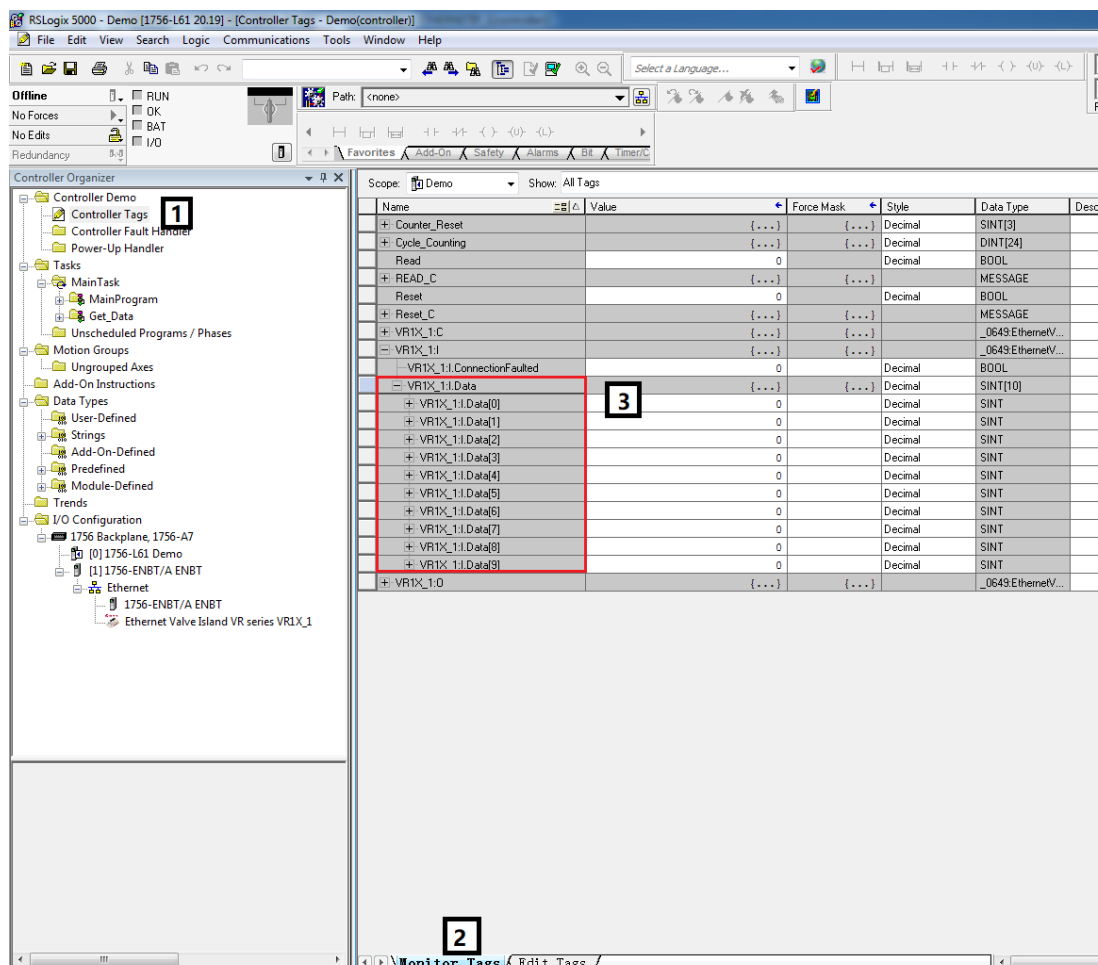
In EDS file, the digital inputs data is defined as “Assembly Object Instance: 100d, Class: 0x04”.

The digital inputs data reflect diagnostic status, it includes 4 parts:

- 1) Overall status diagnostics
- 2) Short circuit diagnostics per solenoid
- 3) Open load diagnostics per solenoid (e.g. wire break of solenoid)
- 4) Cycle overrun diagnostics per solenoid (cycles beyond the count limit)

The digital inputs data can be found as following capture.

- Click “Control Tags”. (Tag 1)
- Select “Monitor Tags”. (Tag 2)
- Expand “VR1X\_1: I” and “VR1X\_1:I.Data” (VR1X\_1 is the name of module, it would change if another name used for the module). (Tag 3)



Name	Value	Force Mask	Style	Data Type	Desc
+ Counter_Reset	{...}	{...}		Decimal	SINT[3]
+ Cycle_Counting	{...}	{...}		Decimal	DINT[24]
Read	0			Decimal	BOOL
+ READ_C	{...}	{...}		Decimal	MESSAGE
Reset	0			Decimal	BOOL
+ Reset_C	{...}	{...}		Decimal	MESSAGE
+ VR1X_1.C	{...}	{...}		Decimal	_0649.EthernetV...
- VR1X_1.I	{...}	{...}		Decimal	_0649.EthernetV...
- VR1X_1.I.ConnectionFaulted	0			Decimal	BOOL
- VR1X_1.I.Data	{...}	{...}		Decimal	SINT[10]
+ VR1X_1.I.Data[0]	0			Decimal	SINT
+ VR1X_1.I.Data[1]	0			Decimal	SINT
+ VR1X_1.I.Data[2]	0			Decimal	SINT
+ VR1X_1.I.Data[3]	0			Decimal	SINT
+ VR1X_1.I.Data[4]	0			Decimal	SINT
+ VR1X_1.I.Data[5]	0			Decimal	SINT
+ VR1X_1.I.Data[6]	0			Decimal	SINT
+ VR1X_1.I.Data[7]	0			Decimal	SINT
+ VR1X_1.I.Data[8]	0			Decimal	SINT
+ VR1X_1.I.Data[9]	0			Decimal	SINT
+ VR1X_1.O	{...}	{...}		Decimal	_0649.EthernetV...

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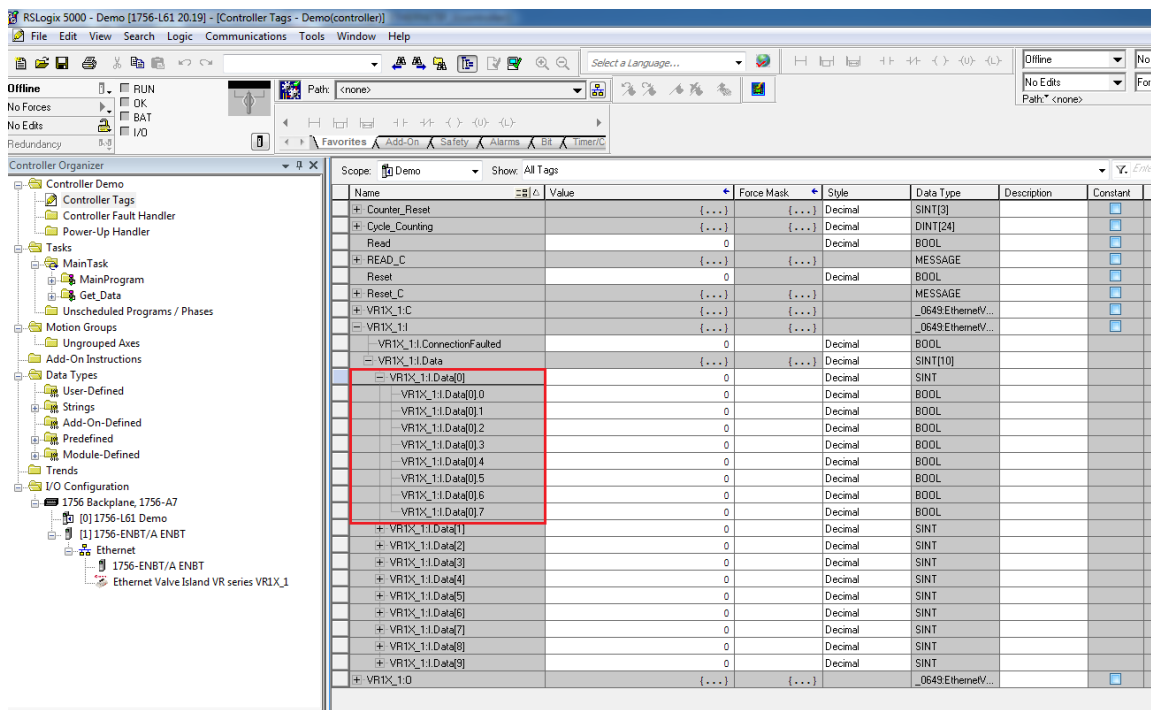
- The diagnostic status and digital inputs data mapping shows in following table:

<b>Overall status diagnostics</b>	<b>Input Byte 0</b>								
	<b>Fault type</b>		OC	SC	COR	UV-VB	OV-VB	UV-VA	OV-VA
	<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Short circuit diagnostics</b>	<b>Input Byte 1</b>								
	<b>Solenoid</b>	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01
	<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	<b>Input Byte 2</b>								
	<b>Solenoid</b>	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09
	<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Open load diagnostics</b>	<b>Input Byte 3</b>								
	<b>Solenoid</b>	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17
	<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	<b>Input Byte 4</b>								
	<b>Solenoid</b>	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01
	<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Cycle overrun diagnostics</b>	<b>Input Byte 5</b>								
	<b>Solenoid</b>	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09
	<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	<b>Input Byte 6</b>								
	<b>Solenoid</b>	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17
	<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Cycle overrun diagnostics</b>	<b>Input Byte 7</b>								
	<b>Solenoid</b>	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01
	<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	<b>Input Byte 8</b>								
	<b>Solenoid</b>	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09
	<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Cycle overrun diagnostics</b>	<b>Input Byte 9</b>								
	<b>Solenoid</b>	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	

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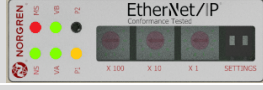
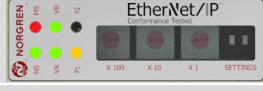

### 6.4.1 Overall Status Diagnostics

- VR10 / VR15 valve island module status will be shown in real-time.
- The overall status diagnostic includes:
  - Over voltage diagnostics for valve power
  - Under voltage diagnostics for valve power
  - Over voltage diagnostics for electronic power
  - Under voltage diagnostics for electronic power
  - Cycle overrun overall diagnostics (cycles beyond the count limit)
  - Short circuit overall diagnostics
  - Open load overall diagnostics (e.g. wire break of solenoid)
- Fault error will be reported by “Input Byte 0”.



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- Common fault errors are shown below:

Fault type	Associated LED & Remark
Over voltage diagnostics for valve power <i>Abbreviation: OV-VA</i>	"VA" LED, red 
Under voltage diagnostics for valve power <i>Abbreviation: UV-VA</i>	"VA" LED, flashing red 
Over voltage diagnostics for electronic power <i>Abbreviation: OV-VB</i>	"VB" LED, red 
Under voltage diagnostics for electronic power <i>Abbreviation: UV-VB</i>	"VB" LED, flashing red 
Cycle overrun diagnostics <i>Abbreviation: COR</i>	"MS" LED, flashing red 
Short circuit diagnostics <i>Abbreviation: SC</i>	"MS" LED, flashing red 
Open load diagnostics <i>Abbreviation: OC</i>	"MS" LED, flashing red  Need to enable open load diagnostics

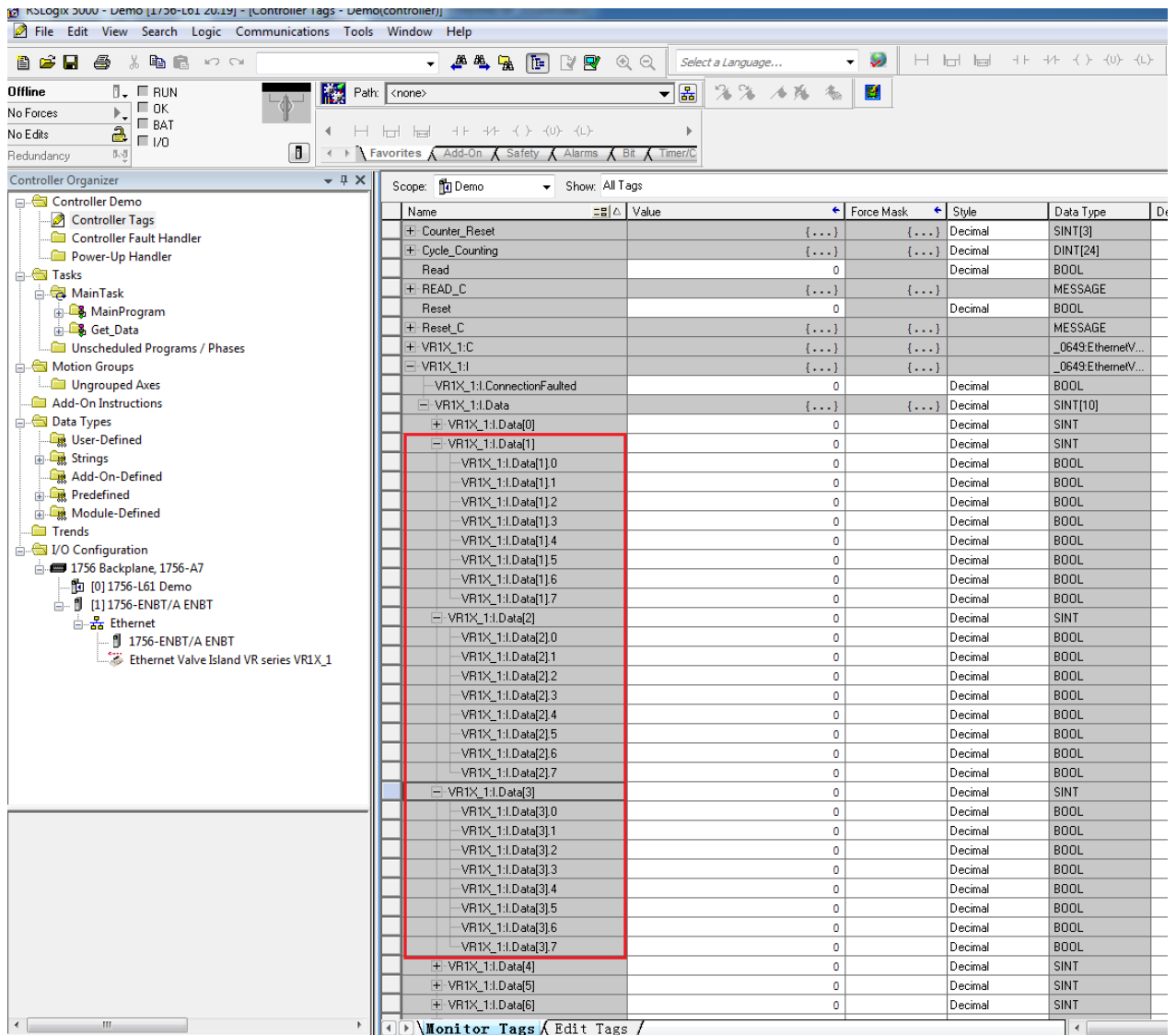
- Binary value and fault type mapping relationships are shown in table below. 0 is no fault, 1 is fault found.

Input Byte 0								
Fault type		OC	SC	COR	UV-VB	OV-VB	UV-VA	OV-VA
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

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### 6.4.2 Short Circuit Diagnostics

- Short circuit fault error codes will be reported by “Input Byte 1”, “Input Byte 2” and “Input Byte 3”.



The screenshot shows the KOLLOGIX 3000 software interface. On the left is the Controller Organizer tree, and on the right is a table of tags. A red box highlights the following tags:

Name	Value	Force Mask	Style	Data Type
VR1X_1.I.Data[1]	0	0	Decimal	SINT
VR1X_1.I.Data[1].0	0	0	Decimal	BOOL
VR1X_1.I.Data[1].1	0	0	Decimal	BOOL
VR1X_1.I.Data[1].2	0	0	Decimal	BOOL
VR1X_1.I.Data[1].3	0	0	Decimal	BOOL
VR1X_1.I.Data[1].4	0	0	Decimal	BOOL
VR1X_1.I.Data[1].5	0	0	Decimal	BOOL
VR1X_1.I.Data[1].6	0	0	Decimal	BOOL
VR1X_1.I.Data[1].7	0	0	Decimal	BOOL
VR1X_1.I.Data[2]	0	0	Decimal	SINT
VR1X_1.I.Data[2].0	0	0	Decimal	BOOL
VR1X_1.I.Data[2].1	0	0	Decimal	BOOL
VR1X_1.I.Data[2].2	0	0	Decimal	BOOL
VR1X_1.I.Data[2].3	0	0	Decimal	BOOL
VR1X_1.I.Data[2].4	0	0	Decimal	BOOL
VR1X_1.I.Data[2].5	0	0	Decimal	BOOL
VR1X_1.I.Data[2].6	0	0	Decimal	BOOL
VR1X_1.I.Data[2].7	0	0	Decimal	BOOL
VR1X_1.I.Data[3]	0	0	Decimal	SINT
VR1X_1.I.Data[3].0	0	0	Decimal	BOOL
VR1X_1.I.Data[3].1	0	0	Decimal	BOOL
VR1X_1.I.Data[3].2	0	0	Decimal	BOOL
VR1X_1.I.Data[3].3	0	0	Decimal	BOOL
VR1X_1.I.Data[3].4	0	0	Decimal	BOOL
VR1X_1.I.Data[3].5	0	0	Decimal	BOOL
VR1X_1.I.Data[3].6	0	0	Decimal	BOOL
VR1X_1.I.Data[3].7	0	0	Decimal	BOOL

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- Binary value and solenoid number mapping relationships are shown in table below. 0 is no fault, 1 is fault found.

Input Byte 1								
<b>Solenoid</b>	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

Input Byte 2								
<b>Solenoid</b>	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

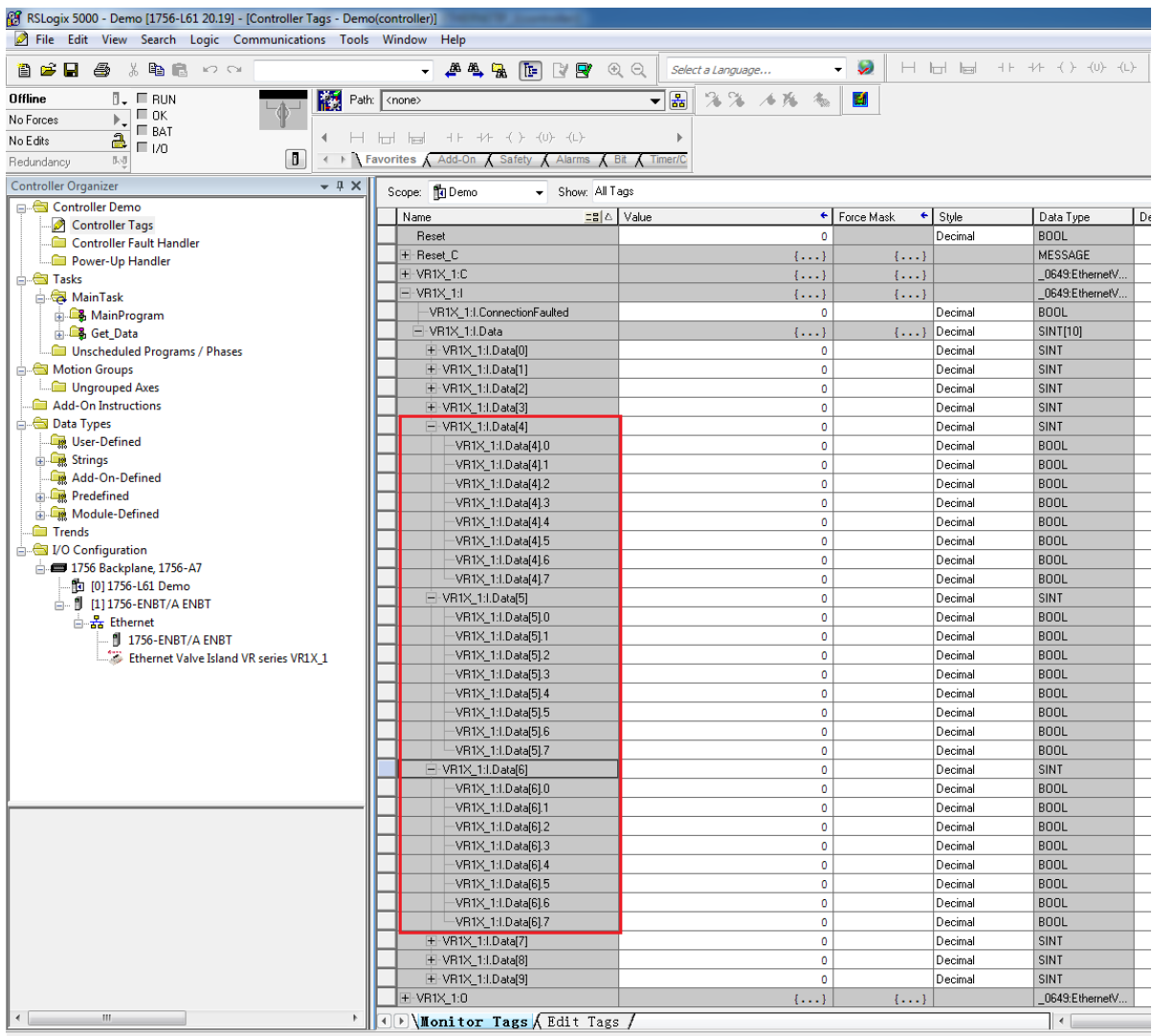
Input Byte 3								
<b>Solenoid</b>	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

Construction & Design is subject to change (A1743-OPM-EP / Rev.004)

### 6.4.3 Open Load Diagnostics

- Open load fault error codes will be reported by “Input Byte 4”, “Input Byte 5” and “Input Byte 6”.

Note: Need to enable open load diagnostics.



The screenshot shows the RSLogix 5000 software interface. On the left is the Controller Organizer tree, and on the right is a table of tags. A red box highlights the following tags in the table:

Name	Value	Force Mask	Style	Data Type
VR1X_1.1.Data[4]	0	0	Decimal	BOOL
VR1X_1.1.Data[4].0	0	0	Decimal	BOOL
VR1X_1.1.Data[4].1	0	0	Decimal	BOOL
VR1X_1.1.Data[4].2	0	0	Decimal	BOOL
VR1X_1.1.Data[4].3	0	0	Decimal	BOOL
VR1X_1.1.Data[4].4	0	0	Decimal	BOOL
VR1X_1.1.Data[4].5	0	0	Decimal	BOOL
VR1X_1.1.Data[4].6	0	0	Decimal	BOOL
VR1X_1.1.Data[4].7	0	0	Decimal	BOOL
VR1X_1.1.Data[5]	0	0	Decimal	SINT
VR1X_1.1.Data[5].0	0	0	Decimal	BOOL
VR1X_1.1.Data[5].1	0	0	Decimal	BOOL
VR1X_1.1.Data[5].2	0	0	Decimal	BOOL
VR1X_1.1.Data[5].3	0	0	Decimal	BOOL
VR1X_1.1.Data[5].4	0	0	Decimal	BOOL
VR1X_1.1.Data[5].5	0	0	Decimal	BOOL
VR1X_1.1.Data[5].6	0	0	Decimal	BOOL
VR1X_1.1.Data[5].7	0	0	Decimal	BOOL
VR1X_1.1.Data[6]	0	0	Decimal	SINT
VR1X_1.1.Data[6].0	0	0	Decimal	BOOL
VR1X_1.1.Data[6].1	0	0	Decimal	BOOL
VR1X_1.1.Data[6].2	0	0	Decimal	BOOL
VR1X_1.1.Data[6].3	0	0	Decimal	BOOL
VR1X_1.1.Data[6].4	0	0	Decimal	BOOL
VR1X_1.1.Data[6].5	0	0	Decimal	BOOL
VR1X_1.1.Data[6].6	0	0	Decimal	BOOL
VR1X_1.1.Data[6].7	0	0	Decimal	BOOL

Construction & Design is subject to change (A1743-OPM-EP / Rev.004)

- Binary value and solenoid number mapping relationships are shown in table below. 0 is no fault, 1 is fault found.

Input Byte 4								
<b>Solenoid</b>	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

Input Byte 5								
<b>Solenoid</b>	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

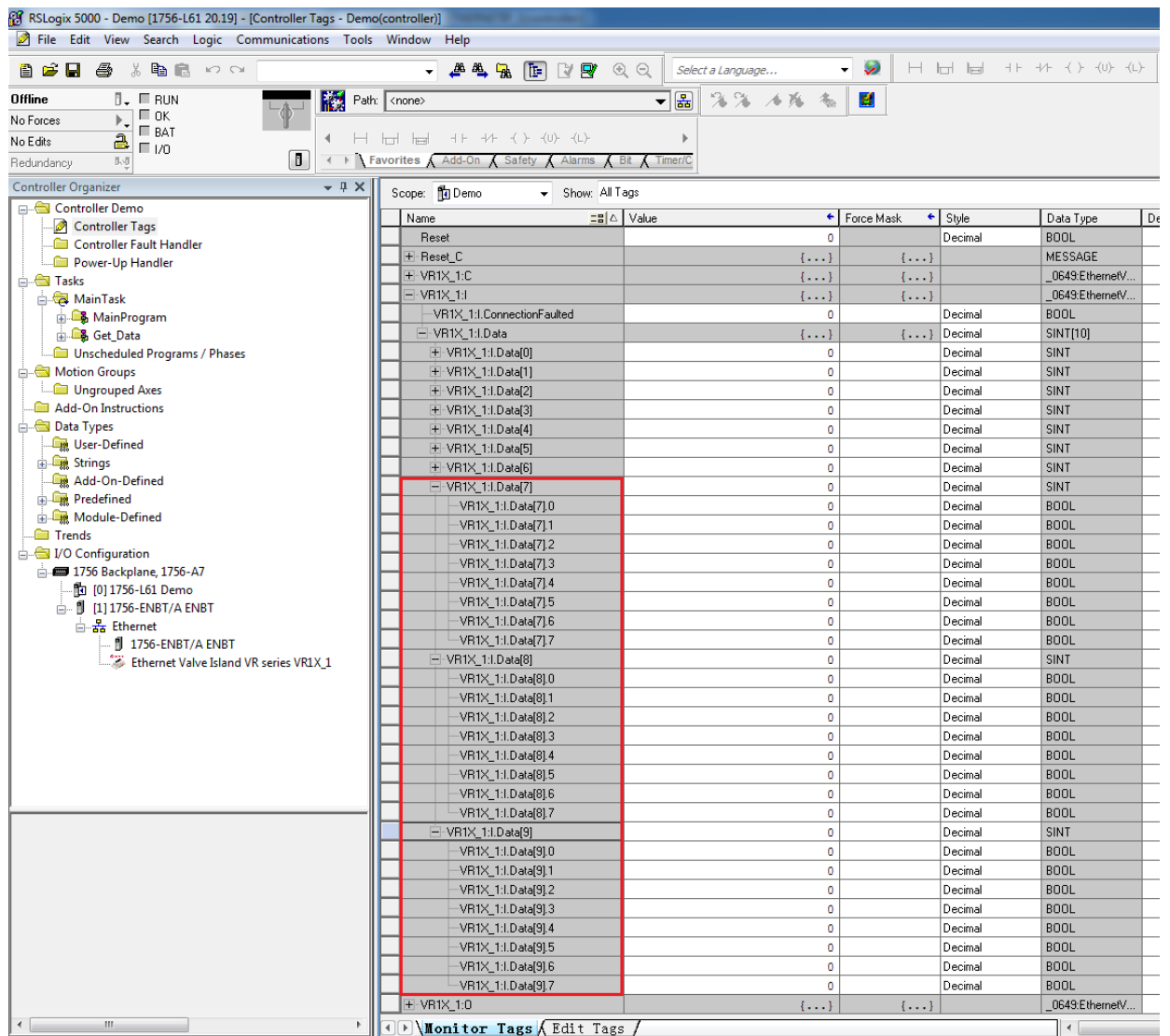
Input Byte 6								
<b>Solenoid</b>	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

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### 6.4.4 Cycle Overrun Diagnostics

- Cycle overrun fault error codes will be reported by “Input Byte 7”, “Input Byte 8” and “Input Byte 9”.

Note: Need to set valid count limit so that this diagnostic function is effective.



The screenshot shows the RSLogix 5000 software interface. On the left is the Controller Organizer tree, and on the right is the Monitor Tags table. The table has columns for Name, Value, Force Mask, Style, and Data Type. A red box highlights the rows for VR1X\_1.1.Data[7], VR1X\_1.1.Data[8], and VR1X\_1.1.Data[9].

Name	Value	Force Mask	Style	Data Type
Reset	0		Decimal	BOOL
Reset_C	{...}	{...}		MESSAGE
VR1X_1.C	{...}	{...}		_0649:EtherneV...
VR1X_1.1	{...}	{...}		_0649:EtherneV...
VR1X_1.1.ConnectionFaulted	0		Decimal	BOOL
VR1X_1.1.Data	{...}	{...}	Decimal	SINT[10]
VR1X_1.1.Data[0]	0		Decimal	SINT
VR1X_1.1.Data[1]	0		Decimal	SINT
VR1X_1.1.Data[2]	0		Decimal	SINT
VR1X_1.1.Data[3]	0		Decimal	SINT
VR1X_1.1.Data[4]	0		Decimal	SINT
VR1X_1.1.Data[5]	0		Decimal	SINT
VR1X_1.1.Data[6]	0		Decimal	SINT
VR1X_1.1.Data[7]	0		Decimal	SINT
VR1X_1.1.Data[7].0	0		Decimal	BOOL
VR1X_1.1.Data[7].1	0		Decimal	BOOL
VR1X_1.1.Data[7].2	0		Decimal	BOOL
VR1X_1.1.Data[7].3	0		Decimal	BOOL
VR1X_1.1.Data[7].4	0		Decimal	BOOL
VR1X_1.1.Data[7].5	0		Decimal	BOOL
VR1X_1.1.Data[7].6	0		Decimal	BOOL
VR1X_1.1.Data[7].7	0		Decimal	BOOL
VR1X_1.1.Data[8]	0		Decimal	SINT
VR1X_1.1.Data[8].0	0		Decimal	BOOL
VR1X_1.1.Data[8].1	0		Decimal	BOOL
VR1X_1.1.Data[8].2	0		Decimal	BOOL
VR1X_1.1.Data[8].3	0		Decimal	BOOL
VR1X_1.1.Data[8].4	0		Decimal	BOOL
VR1X_1.1.Data[8].5	0		Decimal	BOOL
VR1X_1.1.Data[8].6	0		Decimal	BOOL
VR1X_1.1.Data[8].7	0		Decimal	BOOL
VR1X_1.1.Data[9]	0		Decimal	SINT
VR1X_1.1.Data[9].0	0		Decimal	BOOL
VR1X_1.1.Data[9].1	0		Decimal	BOOL
VR1X_1.1.Data[9].2	0		Decimal	BOOL
VR1X_1.1.Data[9].3	0		Decimal	BOOL
VR1X_1.1.Data[9].4	0		Decimal	BOOL
VR1X_1.1.Data[9].5	0		Decimal	BOOL
VR1X_1.1.Data[9].6	0		Decimal	BOOL
VR1X_1.1.Data[9].7	0		Decimal	BOOL
VR1X_1.0	{...}	{...}		_0649:EtherneV...



- Binary value and solenoid number mapping relationships are shown in table below. 0 is no fault, 1 is fault found.

Input Byte 7								
<b>Solenoid</b>	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

Input Byte 8								
<b>Solenoid</b>	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

Input Byte 9								
<b>Solenoid</b>	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

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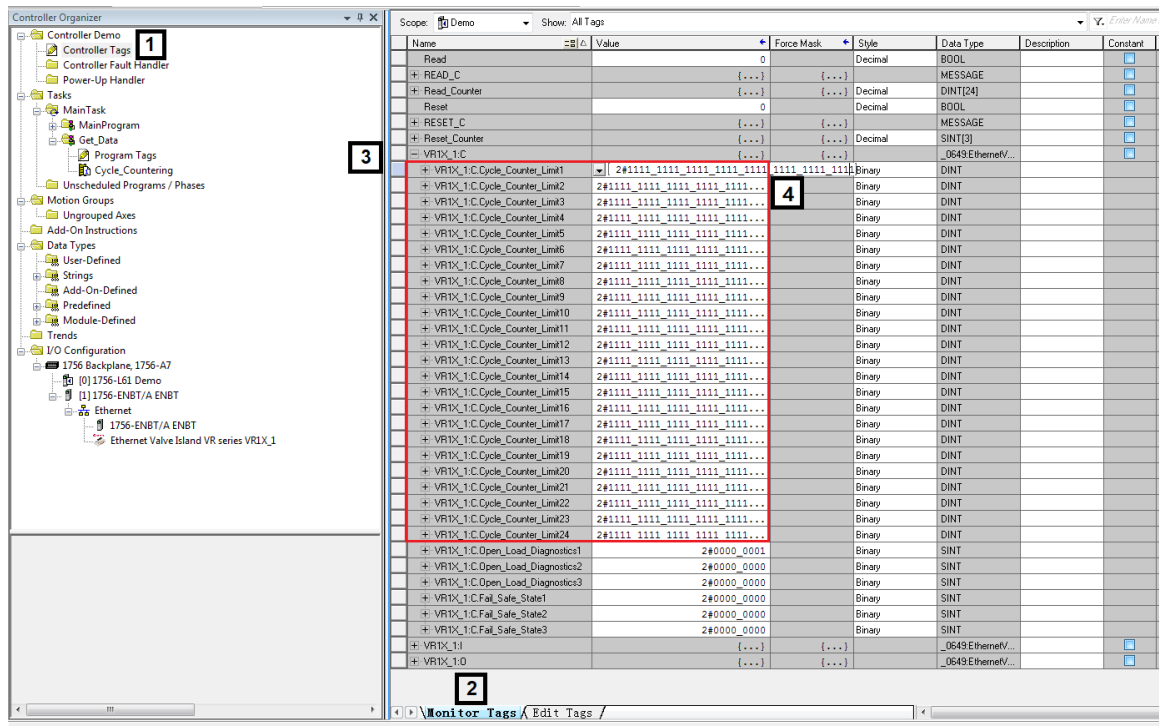
## 6.5 PARAMETERIZATION

In EDS file, the parameterization data is defined as “Assembly Object Instance: 151d, Class: 0x04”. All the parameterization data must be downloaded after setting.

### 6.5.1 Cycle Counter Limit

It is possible for VR10 / VR15 valve island to set cycle counter limit for each solenoid. If count exceeds limit, MS LED on the valve island will change from green to flashing red.

- Click “Control Tags”. (Tag 1)
- Select “Monitor Tag”. (Tag 2)
- Expand the “VR1X\_1:C” (VR1X\_1 is the name of module; it would change if another name used for the module). (Tag 3)
- Set the counter limit value for each solenoid. The default value for each solenoid is 16#ffff\_ffff (HEX Style), the maximum limit value. (Tag 4)



Name	Value	Force Mask	Style	Data Type
VR1X_1:C				0649:EtherNetV...
VR1X_1:C.Cycle_Counter_Limit1	16#ffff_ffff		Hex	DINT
VR1X_1:C.Cycle_Counter_Limit2	2#1111_1111_1111_1111_1111...		Binary	DINT
VR1X_1:C.Cycle_Counter_Limit3	2#1111_1111_1111_1111_1111...		Binary	DINT
VR1X_1:C.Cycle_Counter_Limit4	2#1111_1111_1111_1111_1111...		Binary	DINT
VR1X_1:C.Cycle_Counter_Limit5	2#1111_1111_1111_1111_1111...		Binary	DINT

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- Variable name and solenoid number mapping relation is shown in table below.
- The range of counter limit for each solenoid between 16#0000\_0000 and 16#ffff\_ffff.
- Solenoid number and output point mapping relationships are shown in Chapter 5.

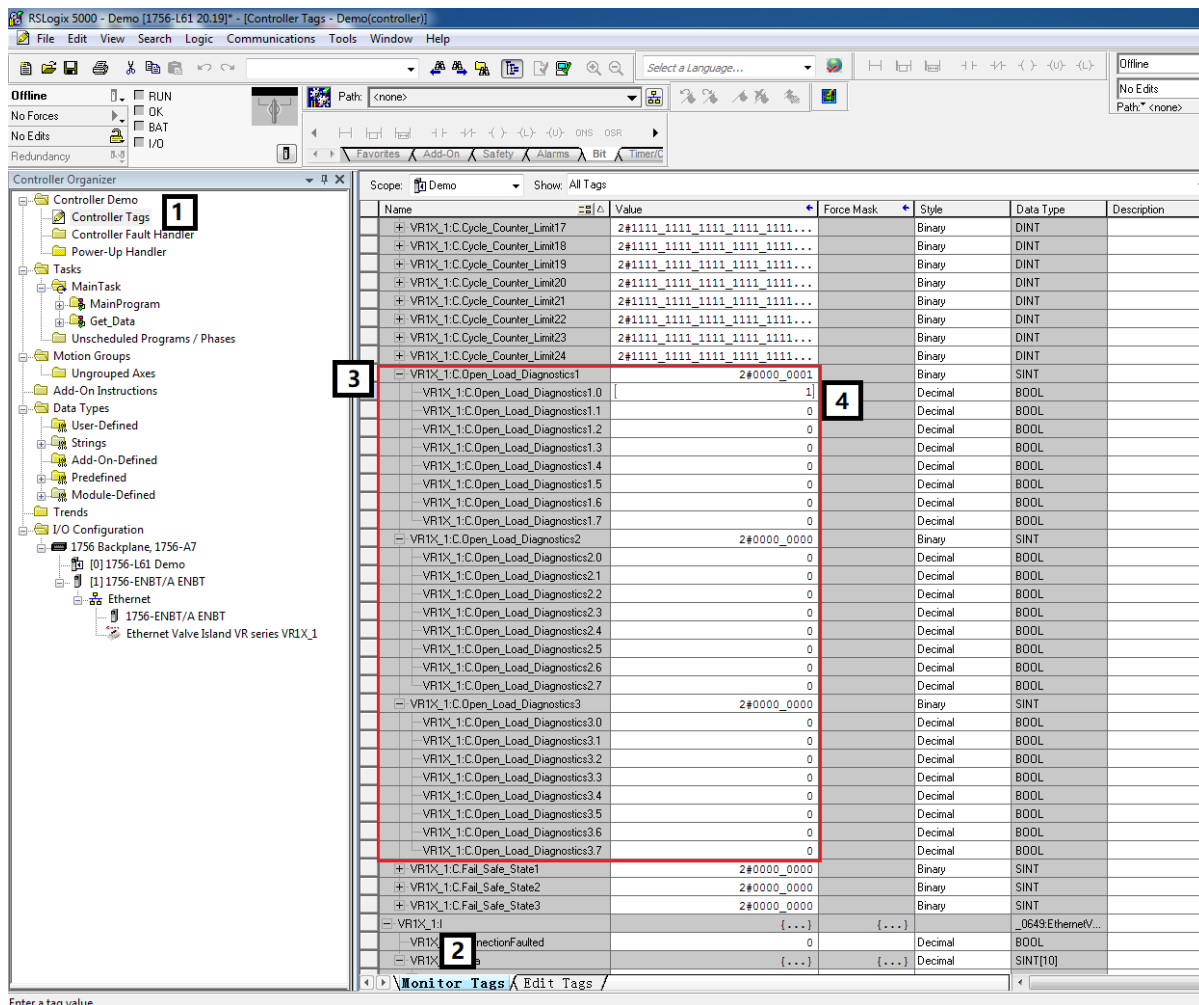
Cycle Count Limit Mapping		
Variable Name	Solenoid	Value Range
Cycle Counter Limit 1	Sol.01	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 2	Sol.02	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 3	Sol.03	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 4	Sol.04	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 5	Sol.05	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 6	Sol.06	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 7	Sol.07	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 8	Sol.08	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 9	Sol.09	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 10	Sol.10	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 11	Sol.11	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 12	Sol.12	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 13	Sol.13	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 14	Sol.14	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 15	Sol.15	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 16	Sol.16	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 17	Sol.17	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 18	Sol.18	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 19	Sol.19	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 20	Sol.20	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 21	Sol.21	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 22	Sol.22	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 23	Sol.23	16#0000_0000 ~ 16#ffff_ffff
Cycle Counter Limit 24	Sol.24	16#0000_0000 ~ 16#ffff_ffff

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## 6.5.2 Open Load Diagnostics Setting

It is possible for VR10 / VR15 valve island to enable / disable the open load diagnostics for each solenoid. If disabled, no EtherNet/IP open load diagnostic error appears. Otherwise MS LED on the valve island change from green to red flashing.

- Click “Control Tags”. (Tag 1)
- Select “Monitor Tag”. (Tag 2)
- Expand the “VR1X\_1:C” (VR1X\_1 is the name of module; it would change if another name used for the module). (Tag 3)
- Set “0” or “1” for each solenoid to enable or disable open load diagnostics function. The default value for each solenoid is “0”, it means open load diagnostic is disabled as default. (Tag 4)



Name	Value	Force Mask	Style	Data Type	Description
+ VR1X_1:C.Cycle_Counter_Limit17	2#1111_1111_1111_1111...		Binary	DINT	
+ VR1X_1:C.Cycle_Counter_Limit18	2#1111_1111_1111_1111...		Binary	DINT	
+ VR1X_1:C.Cycle_Counter_Limit19	2#1111_1111_1111_1111...		Binary	DINT	
+ VR1X_1:C.Cycle_Counter_Limit20	2#1111_1111_1111_1111...		Binary	DINT	
+ VR1X_1:C.Cycle_Counter_Limit21	2#1111_1111_1111_1111...		Binary	DINT	
+ VR1X_1:C.Cycle_Counter_Limit22	2#1111_1111_1111_1111...		Binary	DINT	
+ VR1X_1:C.Cycle_Counter_Limit23	2#1111_1111_1111_1111...		Binary	DINT	
+ VR1X_1:C.Cycle_Counter_Limit24	2#1111_1111_1111_1111...		Binary	DINT	
- VR1X_1:C.Open_Load_Diagnostics1	2#0000_0001		Binary	SINT	
- VR1X_1:C.Open_Load_Diagnostics1.0	0	1	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics1.1	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics1.2	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics1.3	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics1.4	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics1.5	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics1.6	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics1.7	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics2	2#0000_0000		Binary	SINT	
- VR1X_1:C.Open_Load_Diagnostics2.0	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics2.1	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics2.2	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics2.3	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics2.4	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics2.5	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics2.6	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics2.7	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics3	2#0000_0000		Binary	SINT	
- VR1X_1:C.Open_Load_Diagnostics3.0	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics3.1	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics3.2	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics3.3	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics3.4	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics3.5	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics3.6	0	0	Decimal	BOOL	
- VR1X_1:C.Open_Load_Diagnostics3.7	0	0	Decimal	BOOL	
+ VR1X_1:C.Fail_Safe_State1	2#0000_0000		Binary	SINT	
+ VR1X_1:C.Fail_Safe_State2	2#0000_0000		Binary	SINT	
+ VR1X_1:C.Fail_Safe_State3	2#0000_0000		Binary	SINT	
- VR1X_1:ConnectionFaulted	0	{...}	Decimal	BOOL	_0643 EtherNetV...
- VR1X_1:...	{...}	{...}	Decimal	SINT[10]	

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- Value and solenoid number mapping relationships are shown in table below.
- The bit that is set to “1” means enable open load diagnostics function of that solenoid.
- The bit that is set to “0” means disable open load diagnostics function of that solenoid.
- Solenoid number and output point mapping relationships are shown in Chapter 5.

Open Load Diagnostics 1 Byte								
Solenoid	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

Open Load Diagnostics 2 Byte								
Solenoid	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

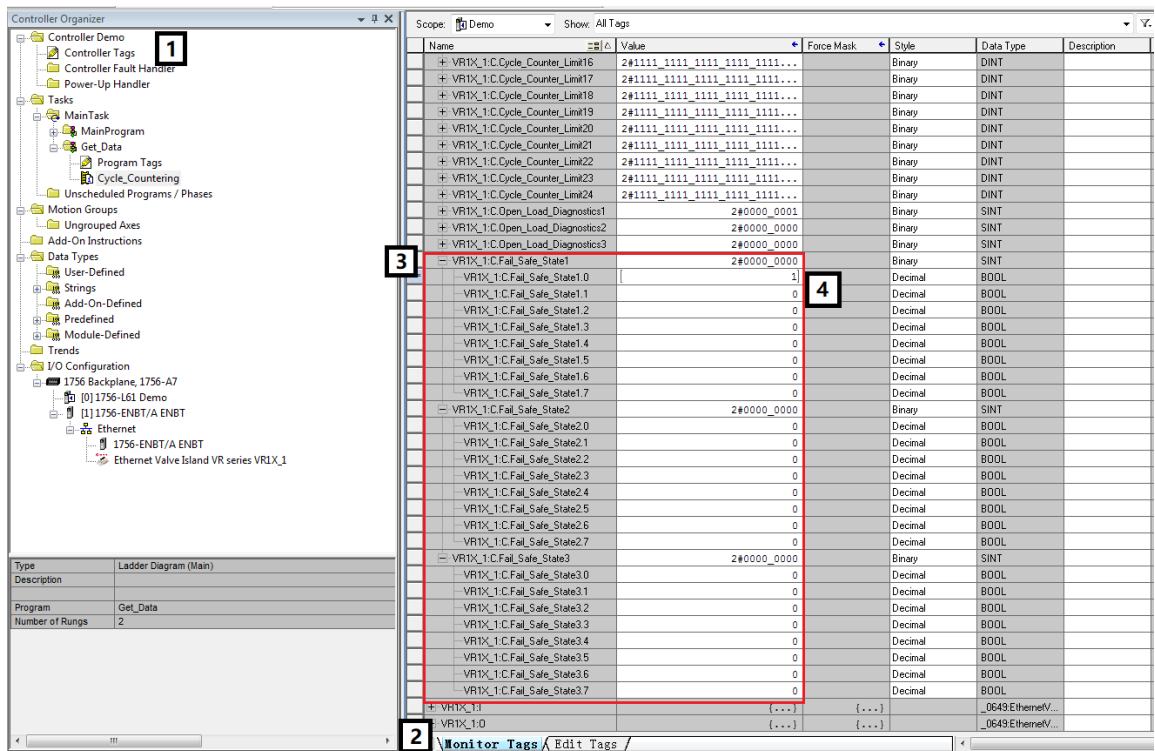
Open Load Diagnostics 3 Byte								
Solenoid	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

Construction & Design is subject to change (A1743-OPM-EP / Rev.004)

### 6.5.3 Fail Safe State Setting

It is possible to define the behaviour of the outputs in case of broken EtherNet/IP communication or PLC stopped.

- Click “Control Tags”. (Tag 1)
- Select “Monitor Tag”. (Tag 2)
- Expand the “VR1X\_1:C” (VR1X\_1 is the name of module; it would change if another name used for the module). (Tag 3)
- Set “0” or “1” for each solenoid to define the behaviour of the outputs in case of broken EtherNet/IP communication or PLC stopped. The default value for each solenoid is “0”, it means no output of that solenoid in case of broken EtherNet/IP communication or PLC stopped as default. (Tag 4)



The screenshot shows the Controller Organizer software interface. On the left, the Controller Organizer tree view is expanded to show the 'Control Tags' section (Tag 1). The main table displays a list of tags with columns for Name, Value, Force Mask, Style, Data Type, and Description. A red box highlights the 'VR1X\_1:C.Fail\_Safe\_State' entries (Tag 3), and a red box highlights the 'Value' column for these entries, where the value '0' is entered for each state (Tag 4). The status bar at the bottom shows 'Monitor Tags / Edit Tags' (Tag 2).

Name	Value	Force Mask	Style	Data Type	Description
VR1X_1:C.Cycle_Counter_Lim16	2#1111_1111_1111_1111_1111...		Binary	DINT	
VR1X_1:C.Cycle_Counter_Lim17	2#1111_1111_1111_1111_1111...		Binary	DINT	
VR1X_1:C.Cycle_Counter_Lim18	2#1111_1111_1111_1111_1111...		Binary	DINT	
VR1X_1:C.Cycle_Counter_Lim19	2#1111_1111_1111_1111_1111...		Binary	DINT	
VR1X_1:C.Cycle_Counter_Lim20	2#1111_1111_1111_1111_1111...		Binary	DINT	
VR1X_1:C.Cycle_Counter_Lim21	2#1111_1111_1111_1111_1111...		Binary	DINT	
VR1X_1:C.Cycle_Counter_Lim22	2#1111_1111_1111_1111_1111...		Binary	DINT	
VR1X_1:C.Cycle_Counter_Lim23	2#1111_1111_1111_1111_1111...		Binary	DINT	
VR1X_1:C.Cycle_Counter_Lim24	2#1111_1111_1111_1111_1111...		Binary	DINT	
VR1X_1:C.Open_Load_Diagnostics1	2#0000_0001		Binary	SINT	
VR1X_1:C.Open_Load_Diagnostics2	2#0000_0000		Binary	SINT	
VR1X_1:C.Open_Load_Diagnostics3	2#0000_0000		Binary	SINT	
VR1X_1:C.Fail_Safe_State1	2#0000_0000		Binary	SINT	
VR1X_1:C.Fail_Safe_State1.0	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State1.1	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State1.2	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State1.3	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State1.4	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State1.5	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State1.6	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State1.7	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State2	2#0000_0000		Binary	SINT	
VR1X_1:C.Fail_Safe_State2.0	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State2.1	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State2.2	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State2.3	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State2.4	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State2.5	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State2.6	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State2.7	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State3	2#0000_0000		Binary	SINT	
VR1X_1:C.Fail_Safe_State3.0	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State3.1	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State3.2	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State3.3	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State3.4	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State3.5	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State3.6	0		Decimal	BOOL	
VR1X_1:C.Fail_Safe_State3.7	0		Decimal	BOOL	
VR1X_1.1	{...}	{...}	{...}	{...}	_0649 EtherNetV...
VR1X_1.0	{...}	{...}	{...}	{...}	_0649 EtherNetV...

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- Value and solenoid number mapping relationships are shown in table below.
- The bit that is set to “1” means last valid value of that solenoid is retained in case of broken EtherNet/IP communication or PLC stopped.
- The bit that is set to “0” means no output of that solenoid in case of broken EtherNet/IP communication or PLC stopped.
- Solenoid number and output point mapping relationships are shown in Chapter 5.

Fail Safe State 1 Byte								
<b>Solenoid</b>	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

Fail Safe State 2 Byte								
<b>Solenoid</b>	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

Fail Safe State 3 Byte								
<b>Solenoid</b>	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

Construction & Design is subject to change (A1743-OPM-EP / Rev.004)

#### 6.5.4 Voltage and Short Circuit Diagnostics

VR10 / VR15 valve island supports voltage diagnostics for both electronic power and valve power and short circuit diagnostics for each solenoid. These two diagnostic functions cannot be disabled.

- In case of over / under voltage the related LEDs on the valve island change colour from green to red.
- In case of a short circuit, MS LED on the valve island will change from green to flashing red.

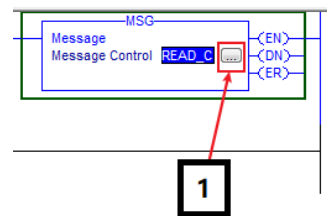


## 6.6 CYCLE COUNTING DATA ACQUISITION

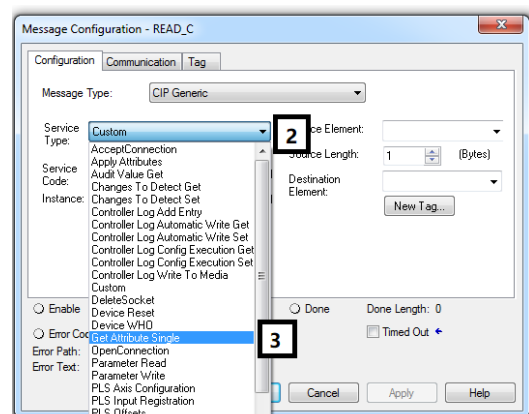
In EDS file, cycle counting data is defined as “Assembly Object Instance: 101d, Class: 0x04”.  
VR10 / VR15 valve island supports cycle counting for each solenoid.

- Cycle counting data can be obtained by ladder Element “MSG”.
- The following steps give a brief instruction of using “MSG” to get data from VR10/VR15.

- In the message configuration of “MSG”. (Tag 1)



- Select Service Type “Get Attribute Single”. (Tag 2-3)

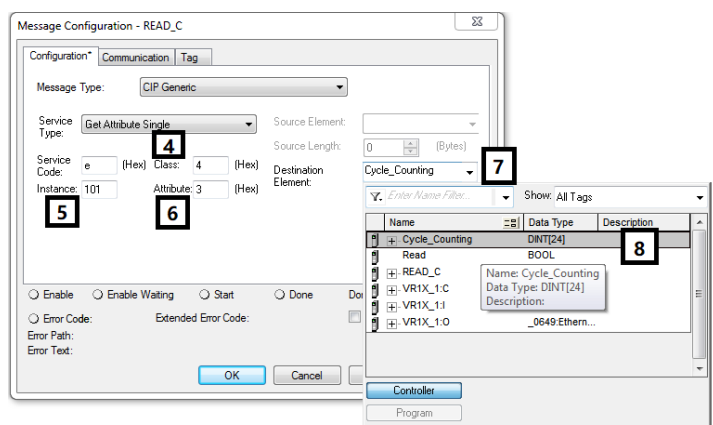


- Set “Class” Value to 4. (Tag 4)

- Set “Instance” Value to 101. (Tag 5)

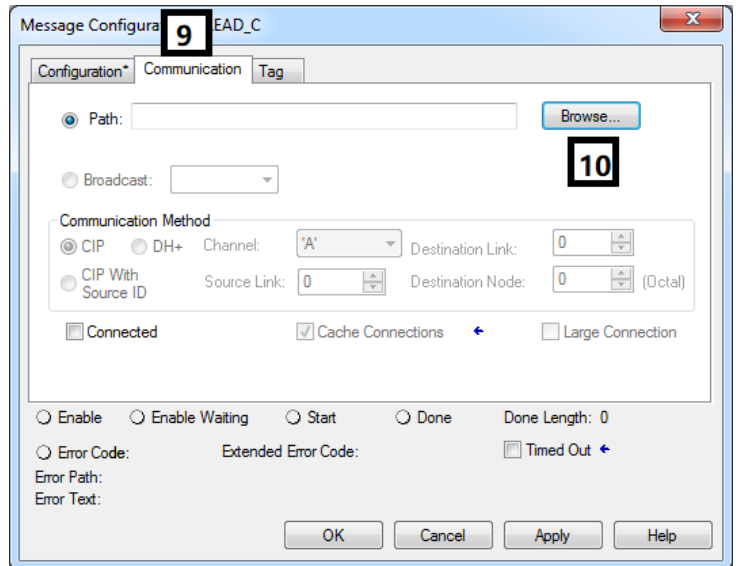
- Set “Attribute” Value to 3. (Tag 6)

- Click “Destination Element”. Select variable which Data Type is “DINT [24]” and created for storing counter, then double click it. (Tag 7-8)

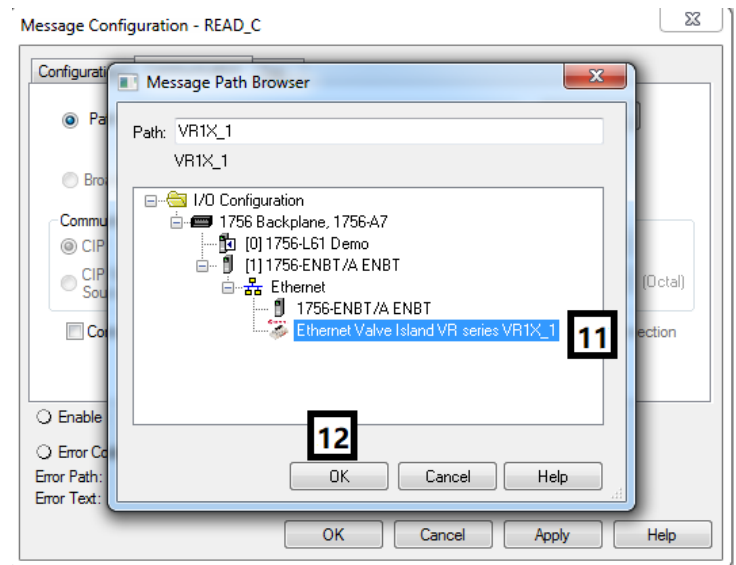


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- Select “Communication” Tab. (Tag 9)
- Click “Browse” button. (Tag 10)

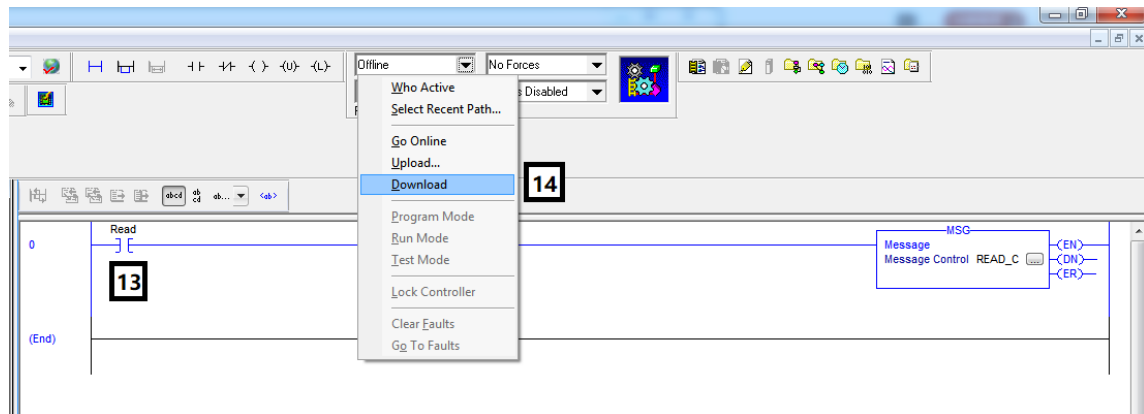


- Select the valve island module and click OK. (Tag 11-12)



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- Add an “Examine On” element connect to “MSG” element. (Tag 13)
- Download the program to PLC and set PLC to Run Mode, then every time getting a rising edge of the “Examine On” element, counter number data can be got by MSG element. (Tag 14)



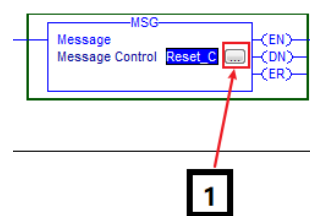
Construction & Design is subject to change (A1743-OPM-EP / Rev.004)

## 6.7 CYCLE COUNTER RESETTING

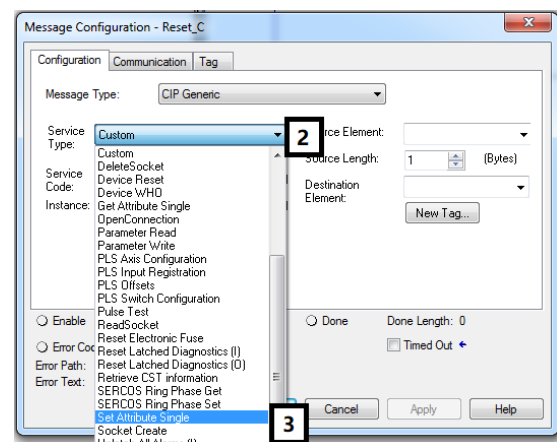
In EDS file, cycle counter resetting data is defined as “Assembly Object Instance: 102d, Class: 0x04”.

VR10 / VR15 valve island supports counter reset for each solenoid.

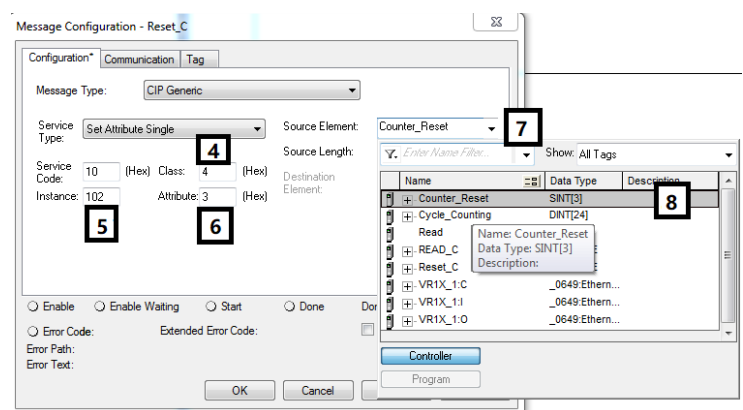
- Cycle counter data can be reset by ladder Element “MSG”.
- The following steps give brief instruction of using “MSG” to reset cycle counter data of VR10/VR15.
- In the message configuration of “MSG”. (Tag 1)



- Select Service Type “Set Attribute Single”. (Tag 2-3)

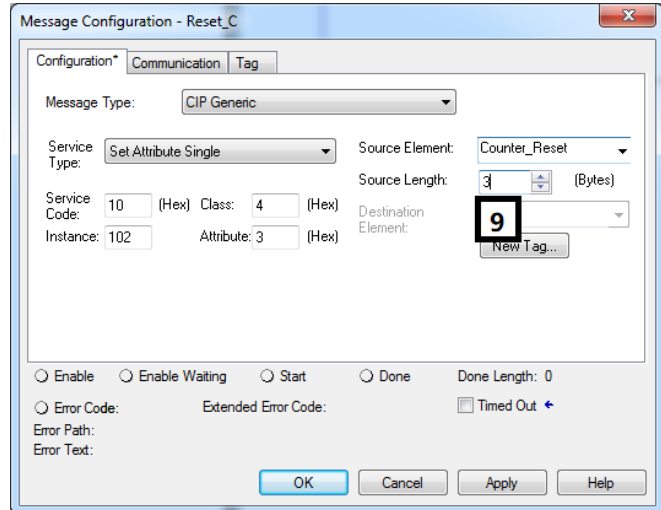


- Set “Class” Value 4. (Tag 4)
- Set “Instance” Value 102. (Tag 5)
- Set “Attribute” Value 3. (Tag 6)
- Click “Source Element”. Select variable which Data Type is “DINT [3]” and created for counter reset, then double click it. (Tag 7-8)

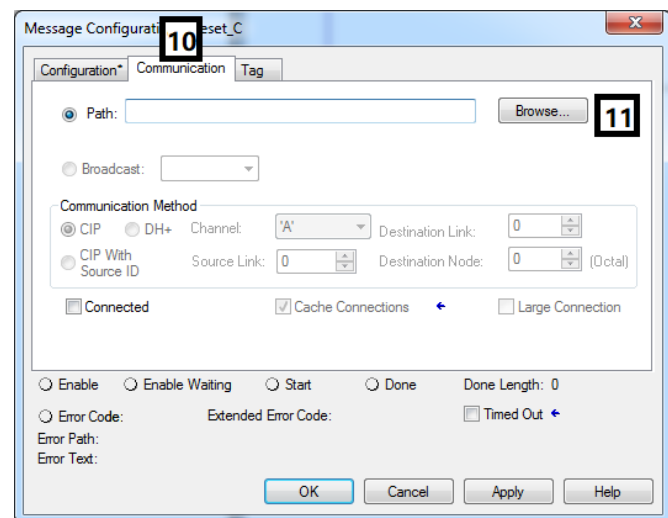


Construction & Design is subject to change (A1743-OPM-EP / Rev.004)

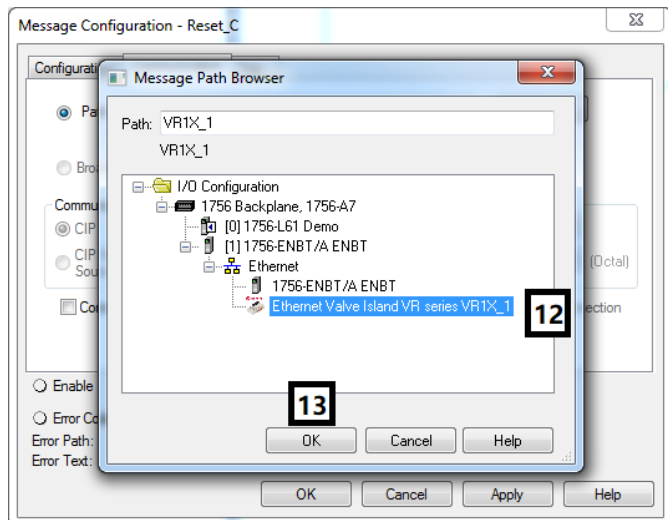
- Set “Source Length” Value 3.  
(Tag 9)



- Select “Communication” Tab.  
(Tag 10)
- Click “Browse” button. (Tag 11)

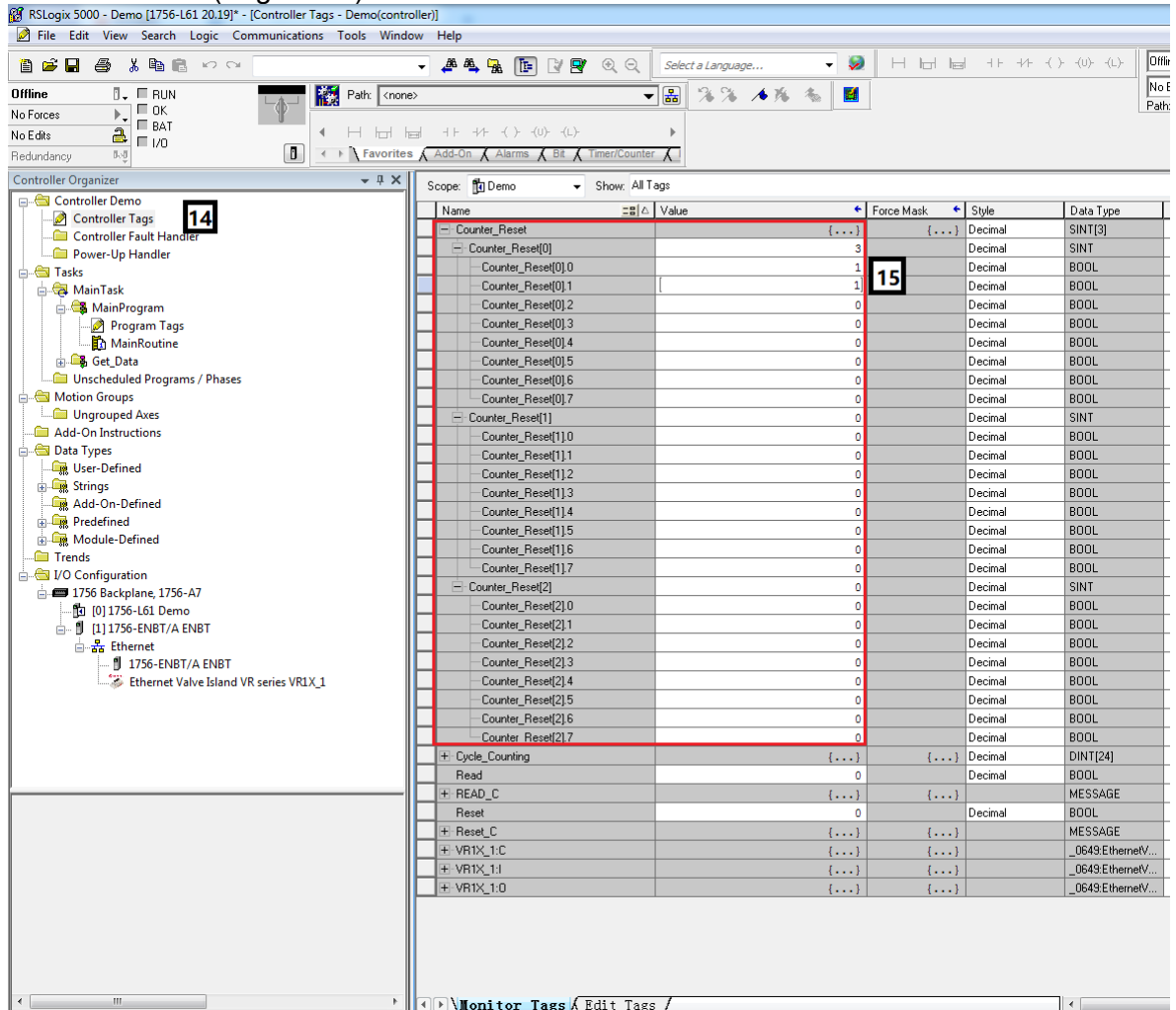


- Select the valve island module and click OK. (Tag 12-13)



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- Expand variable created for counter reset, set value to “1” or “0” as required. All bits are set to “0” as default. (Tag 14-15)



The screenshot shows the RSLogix 5000 software interface. On the left, the Controller Organizer tree shows the 'Controller Tags' folder expanded, with tag '14' highlighted. On the right, the Variable Declaration table is displayed, showing a list of tags. Tag '15' is highlighted in the table, corresponding to the 'Counter\_Reset[0] 1' entry.

Name	Value	Force Mask	Style	Data Type
Counter_Reset	{...}	{...}	Decimal	SINT[3]
Counter_Reset[0]	3		Decimal	SINT
Counter_Reset[0] 0	0		Decimal	BOOL
Counter_Reset[0] 1	1		Decimal	BOOL
Counter_Reset[0] 2	0		Decimal	BOOL
Counter_Reset[0] 3	0		Decimal	BOOL
Counter_Reset[0] 4	0		Decimal	BOOL
Counter_Reset[0] 5	0		Decimal	BOOL
Counter_Reset[0] 6	0		Decimal	BOOL
Counter_Reset[0] 7	0		Decimal	BOOL
Counter_Reset[1]	0		Decimal	SINT
Counter_Reset[1] 0	0		Decimal	BOOL
Counter_Reset[1] 1	0		Decimal	BOOL
Counter_Reset[1] 2	0		Decimal	BOOL
Counter_Reset[1] 3	0		Decimal	BOOL
Counter_Reset[1] 4	0		Decimal	BOOL
Counter_Reset[1] 5	0		Decimal	BOOL
Counter_Reset[1] 6	0		Decimal	BOOL
Counter_Reset[1] 7	0		Decimal	BOOL
Counter_Reset[2]	0		Decimal	SINT
Counter_Reset[2] 0	0		Decimal	BOOL
Counter_Reset[2] 1	0		Decimal	BOOL
Counter_Reset[2] 2	0		Decimal	BOOL
Counter_Reset[2] 3	0		Decimal	BOOL
Counter_Reset[2] 4	0		Decimal	BOOL
Counter_Reset[2] 5	0		Decimal	BOOL
Counter_Reset[2] 6	0		Decimal	BOOL
Counter_Reset[2] 7	0		Decimal	BOOL
+ Cycle_Counting	{...}	{...}	Decimal	DINT[24]
Read	0		Decimal	BOOL
+ READ_C	{...}	{...}		MESSAGE
Reset	0		Decimal	BOOL
+ Reset_C	{...}	{...}		MESSAGE
+ VR1X_1:C	{...}	{...}		_0649:EthernetV...
+ VR1X_1:I	{...}	{...}		_0649:EthernetV...
+ VR1X_1:O	{...}	{...}		_0649:EthernetV...

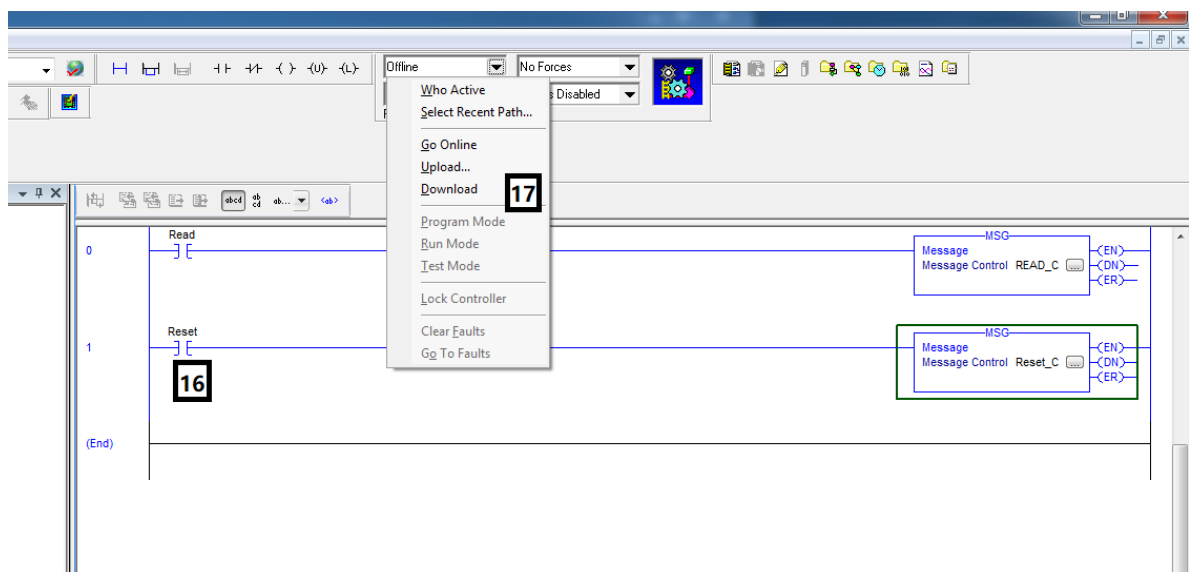
- Value and solenoid number mapping relationships are shown in the table below.
- The bit that is set to “1” means to clear & reset cycle counting value of that solenoid.
- The bit that is set to “0” means no action of clear & reset.

Counter reset [0] Byte								
<b>Solenoid</b>	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

Counter reset [1] Byte								
<b>Solenoid</b>	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

Counter reset [2] Byte								
<b>Solenoid</b>	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17
<b>Bit</b>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<b>Value</b>	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1

- Add an “Examine On” element connect to “MSG” element. (Tag 16)
- Download the program to PLC and set PLC to Run Mode, then every time getting a rising edge of the “Examine On” element, clear & reset action will be executed by MSG element “Reset\_C”. (Tag 17)



Construction & Design is subject to change (A1743-OPM-EP / Rev.004)

## 7 LED STATUS DESCRIPTION



Symbol	LED Status	Description
<b>NS</b>	Off	No IP address or no power
	Green on	Connected
	Flashing green	Not Connected
	Flashing red	Connection Timeout
<b>MS</b>	Off	No power
	Green on	Device Operational
	Flashing red	Recoverable fault
<b>P1</b>	Red on	Non-recoverable fault
	Off	Link Connection Not Established
	Flashing yellow / green	Link Communication Active
<b>P2</b>	Yellow on	Link Connection Established
	Off	Link Connection Not Established
	Flashing yellow / green	Link Communication Active
<b>VA</b> (Valve Power Supply)	Yellow on	Link Connection Established
	Green on	Voltage OK
	Flashing red	Undervoltage
<b>VB</b> (Electronics Power Supply)	Red	Overvoltage
	Green on	Voltage OK
	Flashing red	Undervoltage
	Red	Overvoltage

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## 8 TECHNICAL DATA EtherNet/IP INTERFACE

Specification		Remark
Number of ports	2	--
Link Speed	100Mbit/s	--
Duplex Mode	Full Duplex	--
DLR Mode	Supported	Device Level Ring
EtherNet/IP (ODVA Certification)	Compliant to IEC61158	--
IP Address modes	Static, DHCP	--
EDS languages	EN	--

Note:

EtherNet/IP version:

Volume 1 (Edition 3.24) and Volume 2 (Edition 1.23).

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## 9 CUSTOMER SUPPORT

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