

# Valve island VS18/VS26 with EtherNet/IP Interface

Operation & Service  
Manual

Engineering  
*GREAT* Solutions



**EtherNet/IP™**

## 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                             | Set up initial version                                                                                                                                                                       | 07/03/2017 |      |
| 002   | All                             | Some corrections were made                                                                                                                                                                   | 21/03/2017 |      |
| 003   | 2                               | Chapter „Important hints“ added.                                                                                                                                                             | 20/07/2017 |      |
| 004   | All                             | Changes in IP Address set up, I/O data, solenoid object, ...                                                                                                                                 | 31/07/2017 |      |
| 005   | All                             | ISEM description added, valve island extension added, minor comments                                                                                                                         | 07/11/2017 |      |
| 006   | 2, 4.4, 10.1, 10.11, 12.2, 12.3 | Power-up description updated, ATEX Note added, Mounting kit added, FW version and serial number added, New 2 station SPI board added, soft start valve rules added, technical data corrected | 07/09/2018 |      |

This Operation & Service Manual makes no claims of being complete as it does not cover all variants of the VS18/VS26 valve islands series at the moment.

Therefore this document is subject to extensions or changes.

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## 1. About this documentation

This Operation & Service Manual contains the information to set up and operate the VS18/VS26 valve islands 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 for the VS18/VS26 valve island series are applicable and remain valid. The difference between the both variants consists of the sizes of valves and the resulting maximum flow rate. All electrical connections and parameterization are the same for both variants.

Refer also to the datasheets on the following weblinks:

- ➔ [http://cdn.norgren.com/pdf/en\\_5\\_1\\_250\\_VS18.pdf](http://cdn.norgren.com/pdf/en_5_1_250_VS18.pdf)
- ➔ [http://cdn.norgren.com/pdf/en\\_5\\_1\\_350\\_VS26.pdf](http://cdn.norgren.com/pdf/en_5_1_350_VS26.pdf)

Refer also to the installation video on the following web link:

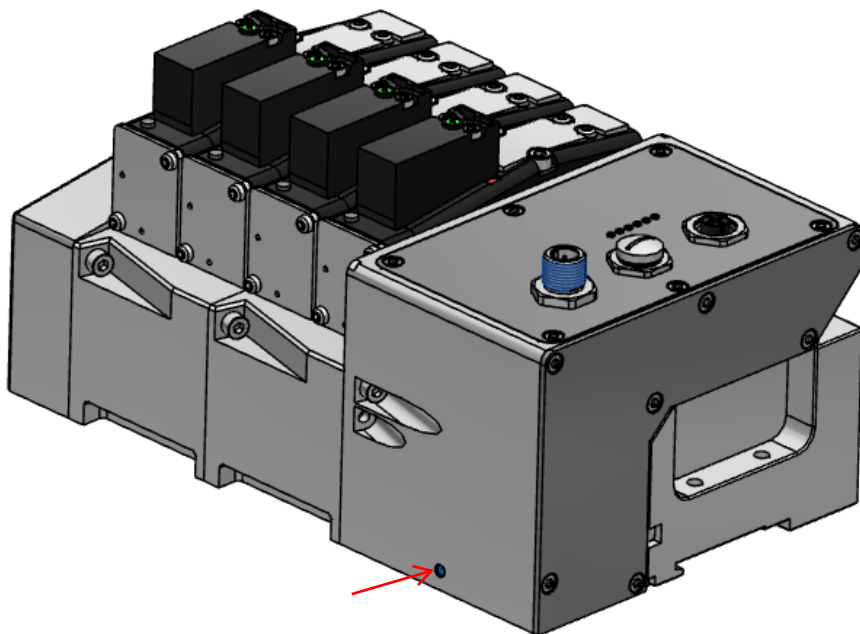
- ➔ <https://player.vimeo.com/video/256919223>

## 2. Important hints

### 2.1 Grounding and equipotential bonding

Proper grounding and equipotential bonding are very important to protect against electromagnetic interferences in Ethernet networks. In order to reduce potential impact, grounding of the Ethernet 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 network and is essential to avoid equipotential bonding currents, which could otherwise flow through the Ethernet cable screen.

Ground connection needs to be established using the M4 thread on the rear of the connection module. Its location shows the red arrow on the following picture.



### 2.2 Intermediate supply/exhaust module (ISEM)

In cases where the channel diagnostics is activated on the valve island, the channel diagnostics setting should be disabled at the position of each ISEM. This needs to be done in order to avoid any misleading failure indication due to missing electronic components in the ISEM.

### 2.3 ATEX Note

Please refer to the corresponding ATEX installation instructions and the maximum permissible operating conditions for valve islands in an ATEX zone.

The maximum allowed power consumption is 20W. This corresponds to 16 simultaneously energized pilot valves. If a configuration consists of more than 16 pilot valves the user must undertake external actions (e.g. power-limited power supplies) to make sure that the power consumption of 20W is not exceeded.

For further details, please refer to the corresponding ATEX installation instructions or contact your Technical Support.

## 2.4 Power-up and initialization phase of the VS18/VS26 valve island

It is possible to read the actual installed firmware release using the Logix-Designer from Allen-Bradley. Please refer to chapter 4.4 for more details.

### 2.4.1 Firmware release V1.001 and lower

The valve island initializes automatically after power-up. During initialization the number of available valve stations is also evaluated, which requires that at this point also the power supply for the valves (VA) is already available during initialization start. Otherwise not all valve stations might be detected and initialization of the valve island fails. This failure case is indicated by the following permanent Status LED states:

- ➔ *P1 – off*
- ➔ *P2 – off*
- ➔ *NS – off*
- ➔ *MS – red*
- ➔ *VB – green*
- ➔ *VA – green*

### 2.4.2 Firmware release V1.002 and higher

The requirement as described in chapter 2.4.1 is not applicable for the firmware release V1.002 and higher.

The initialization of the valve island is performed during the testing in production before delivery.

#### **Note:**

In case any changes are made on the hardware of the valve islands (i.e. adding or removing valve stations), the power supply must be completely disconnected by unplugging the power supply connector.

After the hardware change is completed, the new configuration must be initialized.

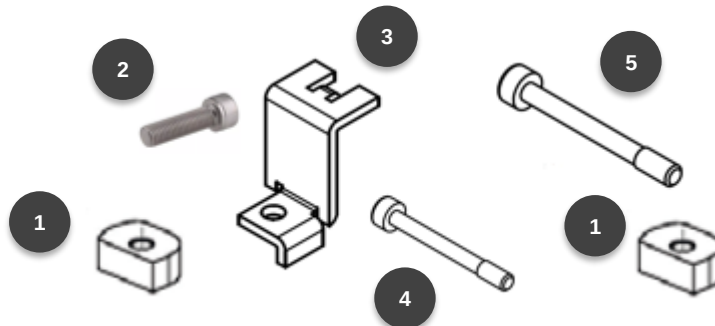
During initialization the number of available valve stations is evaluated, it is therefore required to have both the power supply for electronics (VB) and power supply for the valves (VA) available.

Furthermore it is required to adjust the valve island size in the PLC / Hardware configuration for proper functioning and diagnosis.

## 2.5 Mounting kit 2-in-1

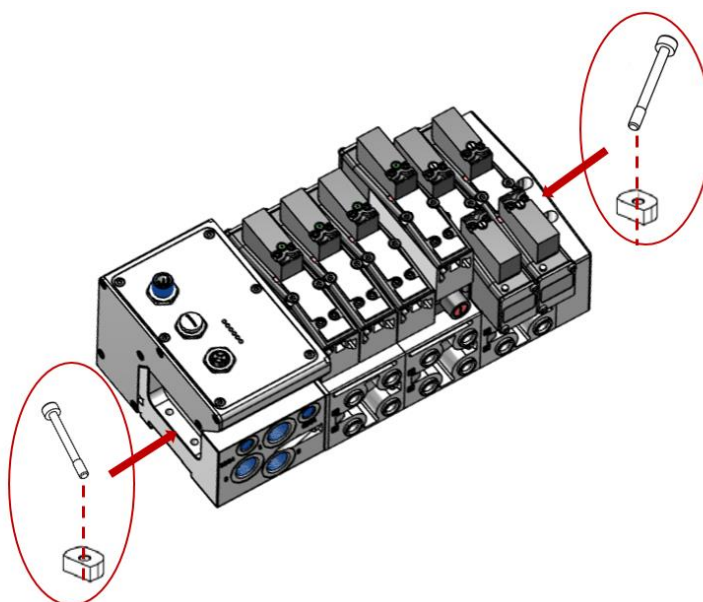
Every valve island delivery contains the mounting kit 2-in-1 (part number VS2672971-KG00) as shown in the below figure. This mounting kit can be used to mount the valve island either to the DIN rail or directly to the mounting panel.

1. Mounting nut DIN rail
2. Cylinder screw M4 x 8
3. Mounting bracket
4. Cylinder screw M4 x 25
5. Cylinder screw M4 x 36



### 2.5.1 DIN-rail assembly without mounting bracket

- ➔ Insert screw M4 x 25 (4) into the left end plate (bus node) and position below the mounting nut (1)
- ➔ Insert screw M4 x 36 (5) into the right end plate and position below the mounting nut (1)
- ➔ Place the valve island on the DIN-rail
- ➔ Orientate straight flange of the mounting nuts towards the DIN rail
- ➔ Push the valve island on the DIN-rail and tighten screws with the torque of 1.0 – 1.1 Nm
- ➔ Check the fit of the valve island

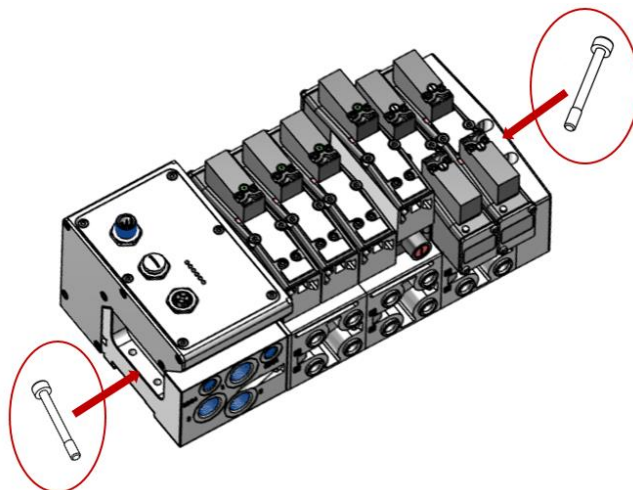


DIN-rail assembly without mounting bracket



### 2.5.2 Mounting panel assembly without mounting bracket

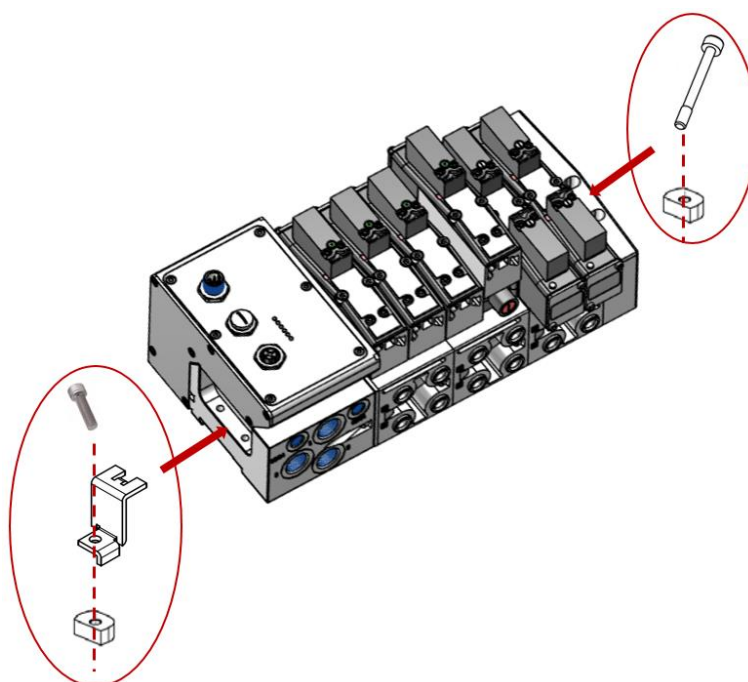
- Insert screw M4 x 25 (4) into the left end plate (bus node)
- Insert screw M4 x 36 (5) into the right end plate
- Place the valve island on the panel/ wall
- Tighten screws with the torque of 1.0 – 1.1 Nm
- Check the fit of the valve island



Mounting panel assembly without mounting bracket

### 2.5.3 DIN-rail assembly using the mounting bracket

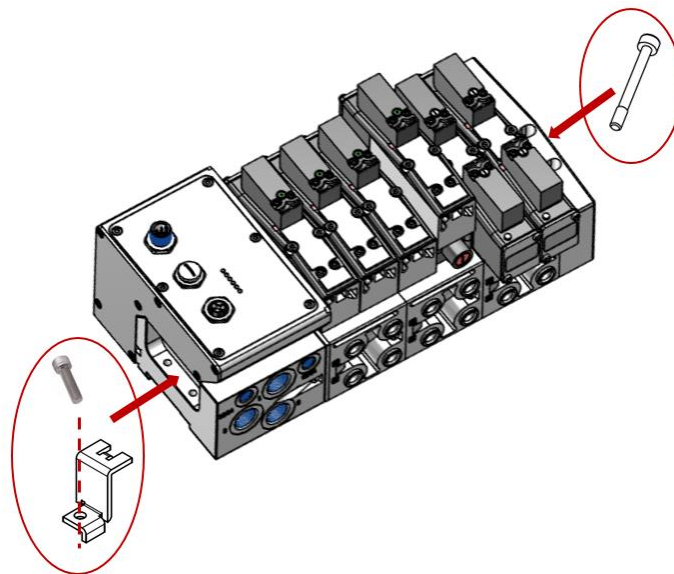
- Hook the mounting bracket (3) into the left end plate (bus node)
- Insert screw M4 x 8 (2) into the mounting bracket (3) and position below the mounting nut (1)
- Insert screw M4 x 36 (5) on the right end plate and position below the mounting nut (1)
- Place the valve island on the DIN-rail
- Orientate straight flange of the mounting nuts (1) towards the DIN rail
- Push the valve island on the DIN-rail and tighten screws with the torque of 1.0 – 1.1 Nm
- Check the fit of the valve island



DIN-rail assembly using the mounting bracket

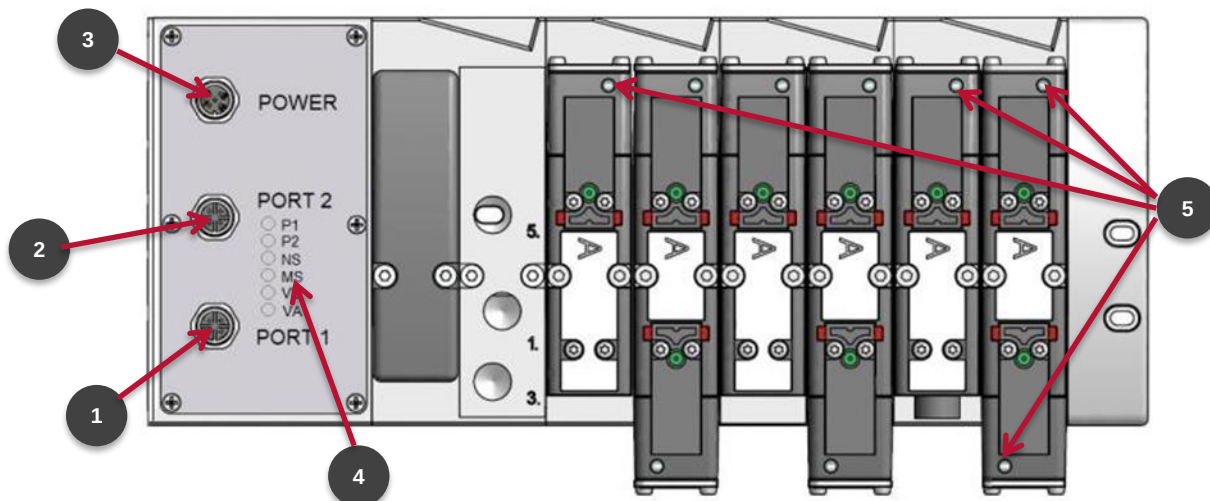
#### 2.5.4 Mounting panel assembly using the mounting bracket

- Hook the mounting bracket (3) into the left end plate (bus node)
- Insert screw M4 x 8 (2) into the mounting bracket (3)
- Insert screw M4 x 36 (5) on the right end plate
- Place the valve island on the mounting panel/ wall
- Tighten screws with the torque of 1.0 – 1.1 Nm
- Check the fit of the valve island



Mounting panel assembly using the mounting bracket

### 3. Electrical Connections of the VS18/VS26 valve islands



Top view VS18 with 8 stations

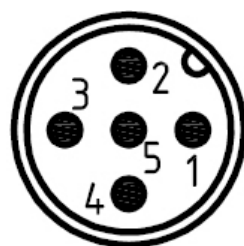
1. Port 1 bus connector for EtherNet/IP  
(4 pins M12 D-coded female connector)
2. Port 2 bus connector for EtherNet/IP  
(4 pins M12 D-coded female connector)
3. Power supply connector  
(5-pins M12 A-coded male connector)
4. Status LEDs
5. Valve status LEDs

### 3.1 EtherNet/IP Bus connectors Port 1 & Port 2



| M12 / 4 pins / female / D-coded |                            |
|---------------------------------|----------------------------|
| Pin no.                         | Function                   |
| 1                               | Transmission Data + (TD+)  |
| 2                               | Receive Data + (RD+)       |
| 3                               | Transmission Data - (TD -) |
| 4                               | Receive Data - (RD -)      |
| Housing                         | FE (functional earth)      |

### 3.2 POWER supply connector



| M12 / 5 pins / male / 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)                 |

## 4. Commisioning

The configuration of the EtherNet/IP valve island is done via inclusion of the device description file (EDS file) „002A002Bxxxx0100.EDS“. The device description file is required to be included for the configuration of the corresponding EtherNet/IP - Controller.

### Note:

XXXX =

- '2000' -> VS18/26 with 4 Stations
- '2100' -> VS18/26 with 6 – 8 Stations
- '2200' -> VS18/26 with 10 – 12 Stations
- '2300' -> VS18/26 with 14 – 16 Stations
- '2400' -> VS18/26 with 18 – 20 Stations

**Note:** All explanations in this manual are based on Rockwell Automations “Studio 5000”.

The following steps are necessary.

### 4.1 EDS File Installation

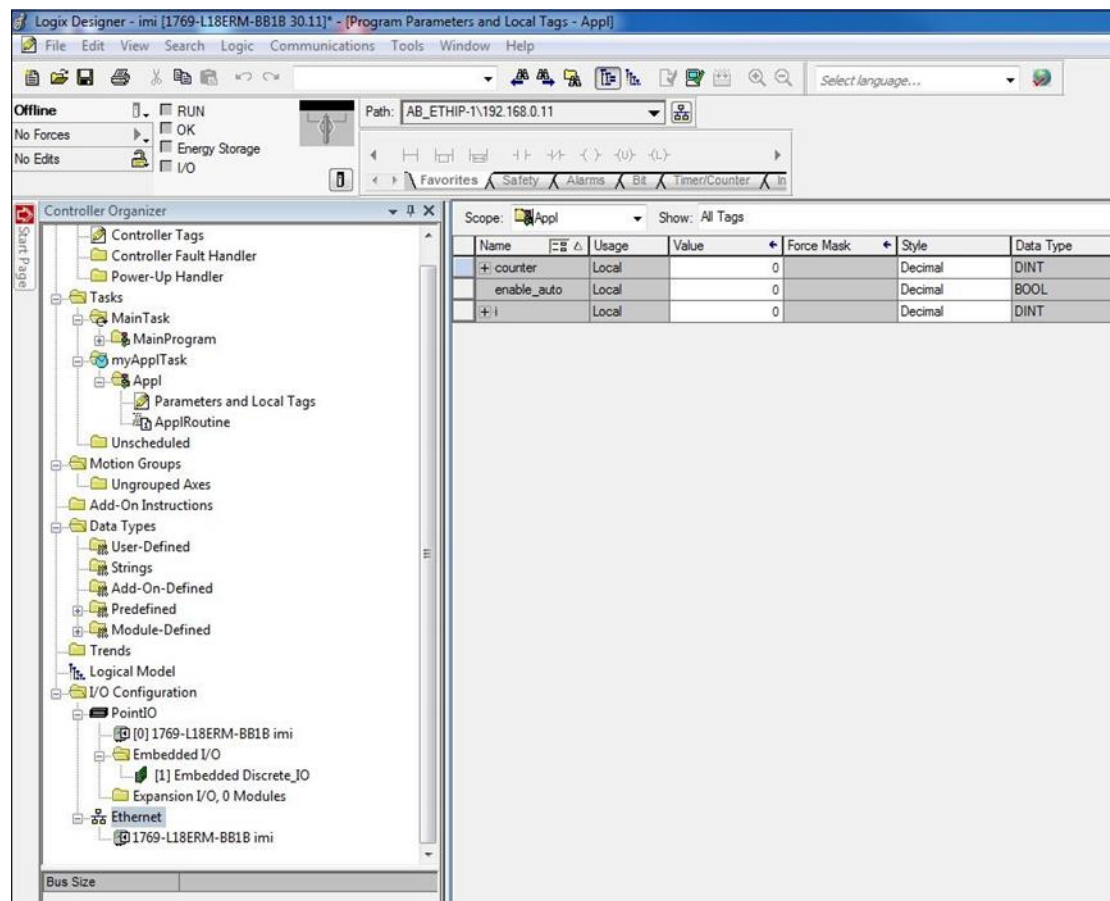
The EDS file is required to configure the VS18/VS26 valve island. A symbol file is necessary to display an icon in the engineering tool.

EDS files are provided by the module vendor and can be downloaded from:

➔ <https://www.imi-precision.com/uk/en/technical-support/software>

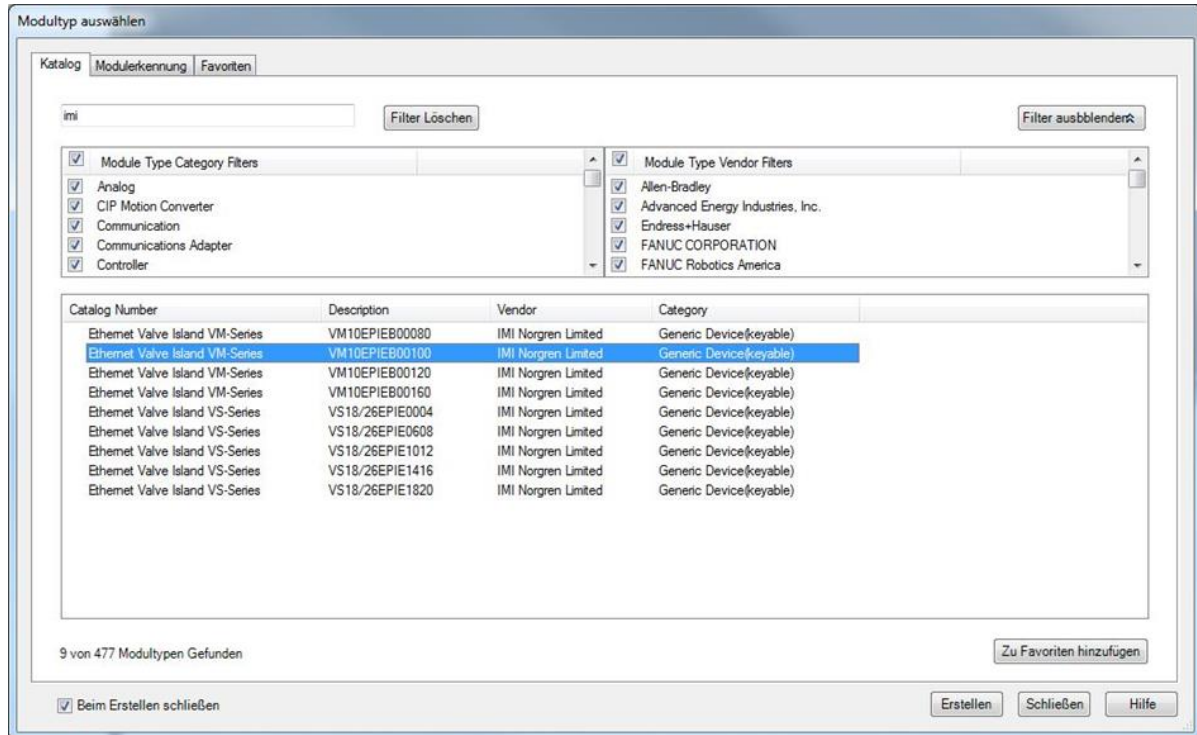
**Note:** The method of module installation strongly depends on the configuration software. Please refer to the configuration software manual.

The following picture shows Startup image of Rockwell Automations “Logix Designer”.



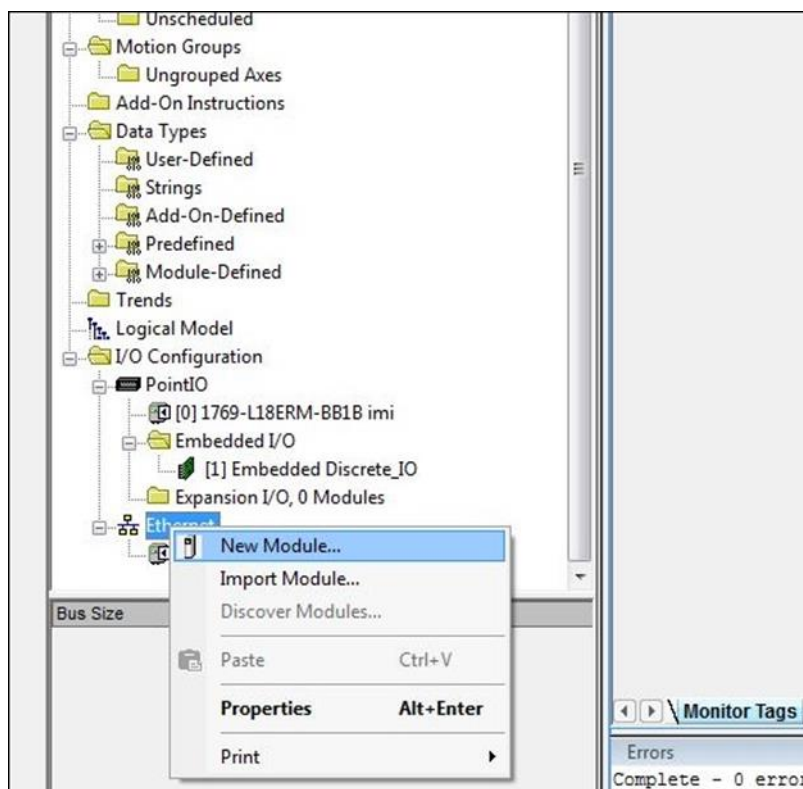
In menu “Tool -> EDS Hardware Installation Tool” start the Installation Wizard. Follow the installation steps described in the wizard.

After the installation the new module is shown in the catalogue.



## 4.2 Hardware configuration: Select valve island

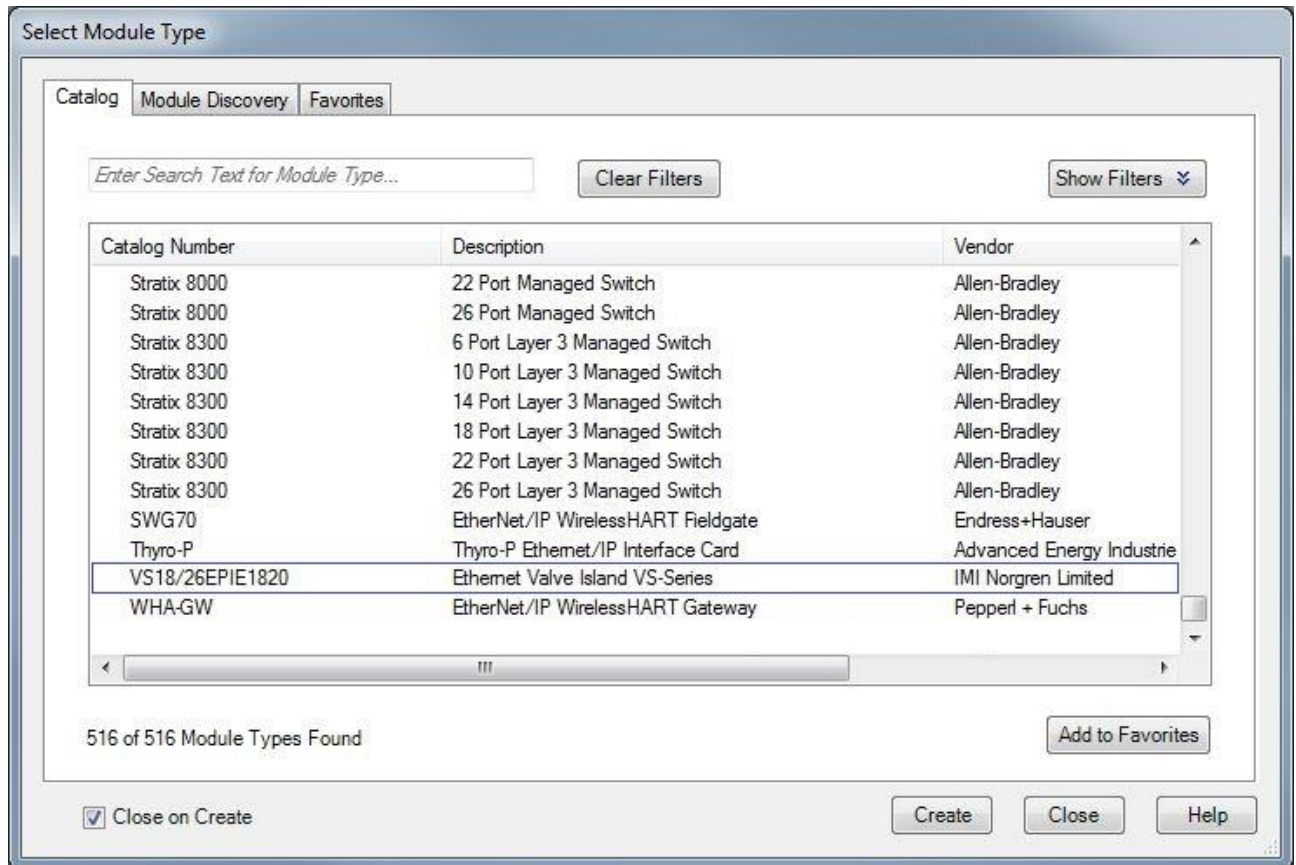
After the successful installation of the EDS file, the module configuration is needed. In context menu choose “New Module” after right-clicking on “Ethernet”.



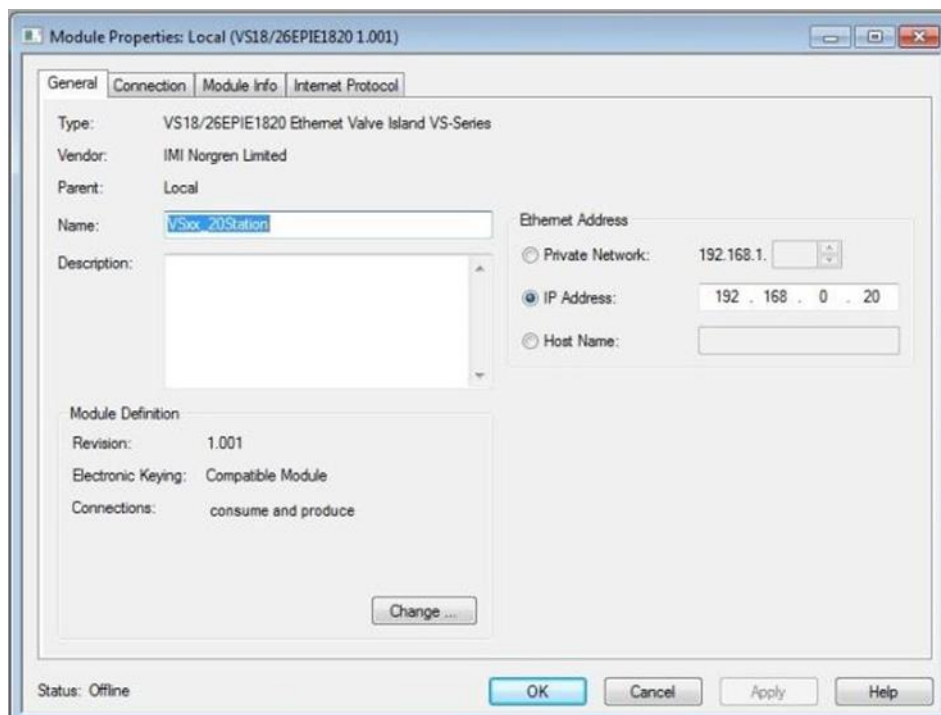


In the module catalog choose the corresponding VS18/VS26 valve island and click on „Create“.

The picture below shows “Select Module Type” – Dialog

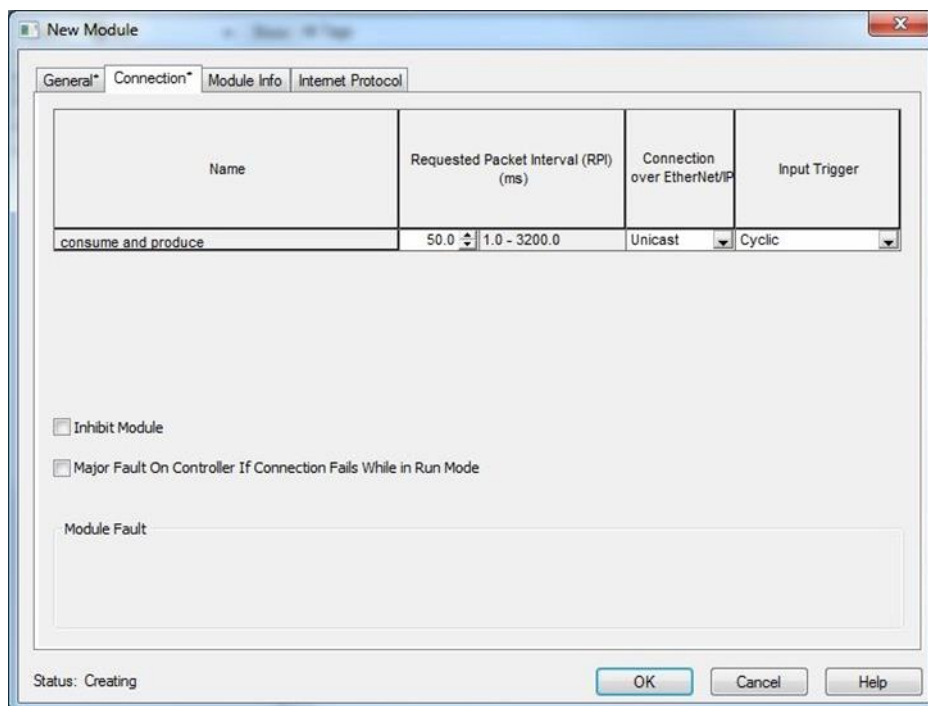


In the following dialogue tab “General” set the “Name” and the correct “IP Address” of the module.

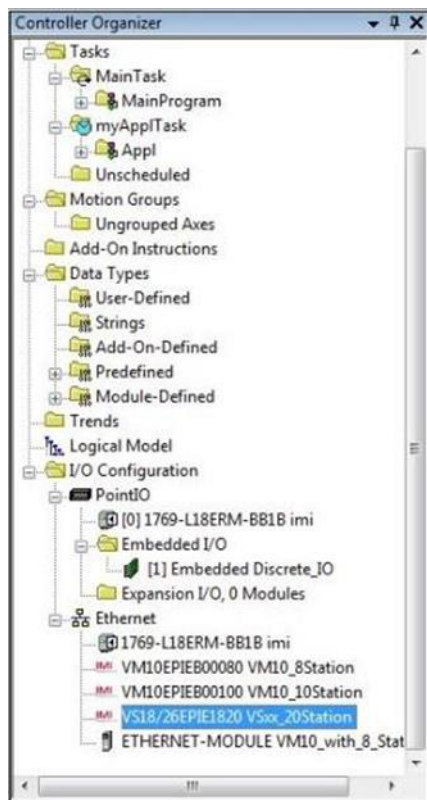


In dialogue tab “Connection” change “Requested Packet Interval (RPI)” greater than or equal to 10 ms and click “OK”. The RPI times has a direct impact to the busload.

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



The picture bellow shows module tree with the new added module.



After successful configuration please perform download by clicking „Download“ in the menu item „Communication“.



## 4.3 Set up IP Address

### 4.3.1 Using a DHCP Server

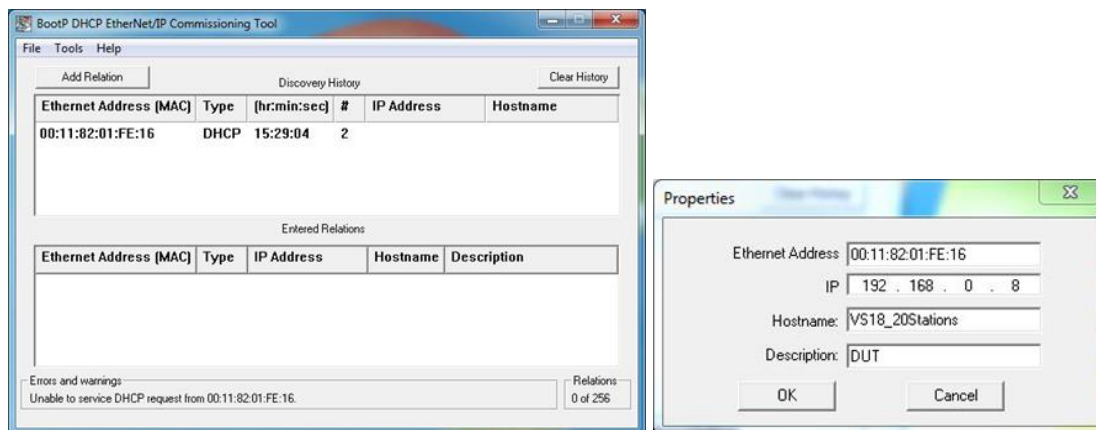
As default the VS18/VS26 valve island is set up as a DHCP client. In this mode IP Address has to be assigned using a DHCP server or a similar tool. This has to be repeated after each power cycle.

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

It is important to ensure that the network adapter set up in the “Network Settings” of the tool is the one, which is connected physically to the VS18/VS26 valve island.

Menu: “Tools” -> “Network Settings”

The VS18/VS26 valve island should then appear in the “Discovery History” list. Double clicking the MAC Address opens the dialog used to set up the IP Address.



The IP Address settings are transferred into the “Discovery History” if they are valid and confirmed with the “OK” button. Pushing the “Enable BOOTP/DHCP” Button enables the IP Address assignment for the chosen entry. The VS18/VS26 valve island will appear with assigned IP Address in “Discovery History” list if address assignment was successful.

### 4.3.2 Static IP Address assignment using TCP/IP Interface Object

Configuration method of the IP Address could also to be set up as a static value. The interface configuration is saved to NV storage. This has to be done once and is valid after a power cycle.

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.<br>1 = The device shall obtain its interface configuration values via BOOTP.<br>2 = The device shall obtain its interface configuration values via DHCP.<br>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 needs 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

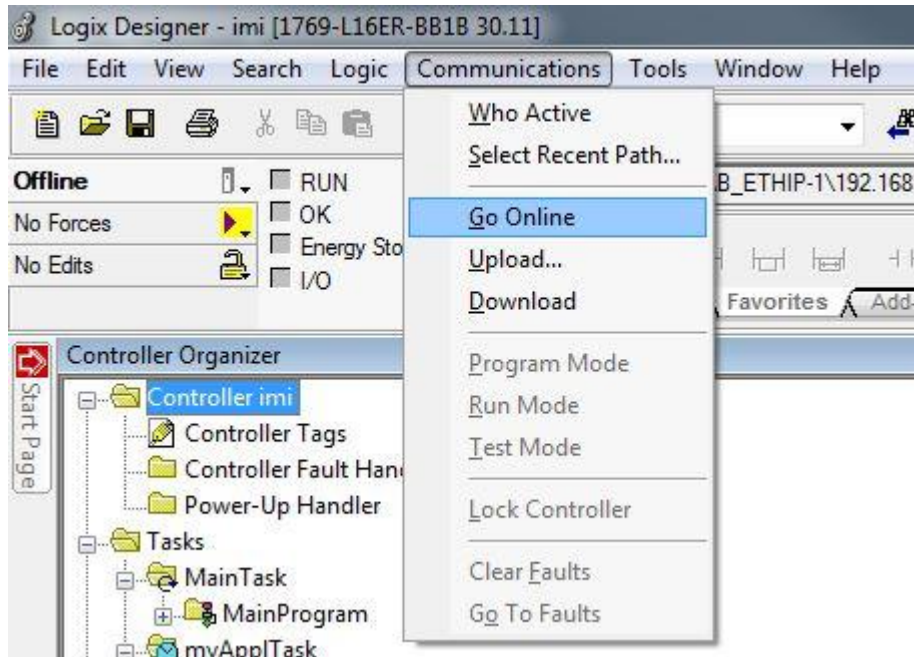
|   | STRUCT of: | Interface Configuration |
|---|------------|-------------------------|
| 5 | UDINT      | IP Address              |
|   | UDINT      | Network Mask            |
|   | UDINT      | Gateway Address         |
|   | UDINT      | Name Server             |
|   | UDINT      | Name Server 2           |
|   | STRING     | Domain Name             |
|   | USINT      | Pad <sup>1</sup>        |

#### Structure of Attribute 5: Interface Configuration

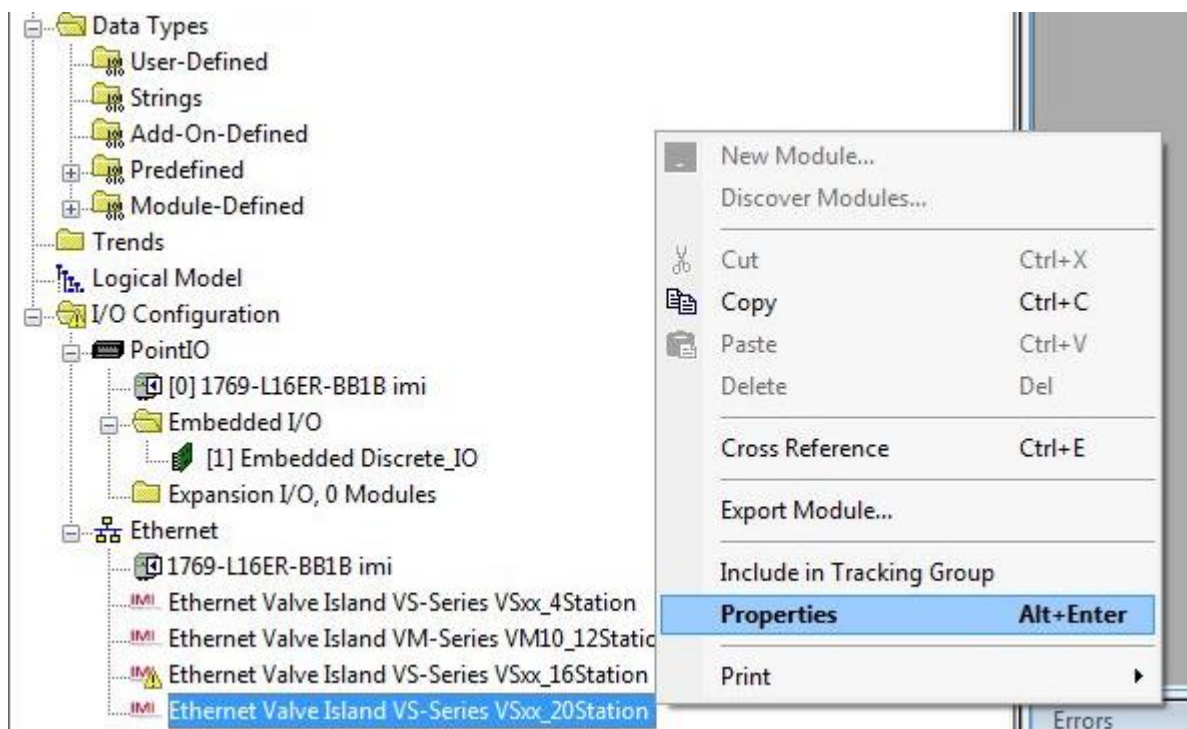
## 4.4 Firmware version and serial number

It is possible to read the actual installed firmware version and serial number of the device using the Logix-Designer (Allen-Bradley). This information is accessible via the Identity Object (Attribute 3) as described in this section.

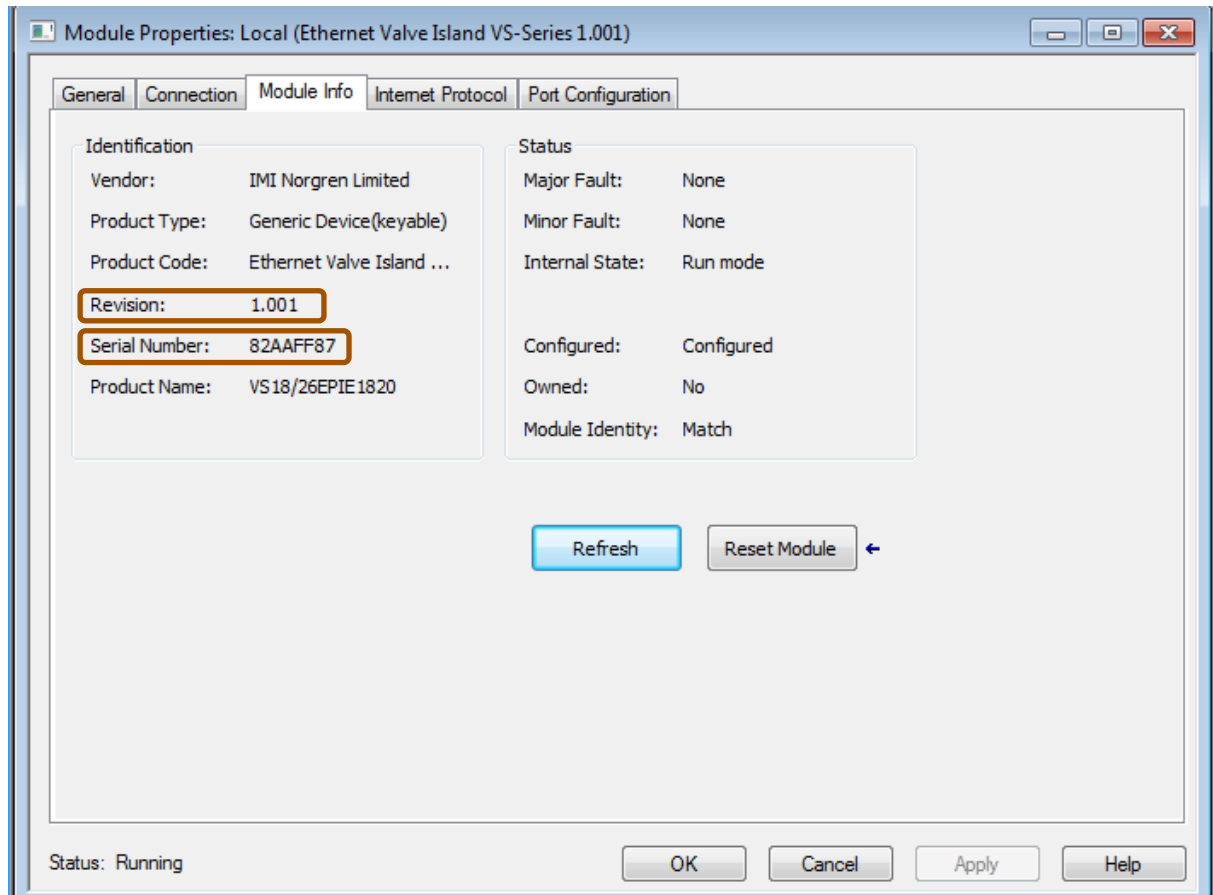
Connect to the PLC by choosing the “Go Online” option in the “Communications” drop-down menu.



As soon as the connection with the PLC is established, select the corresponding Valve Island from the list of Ethernet modules and open the module “Properties” in the context menu or by double-click.



The identification and status data of the selected valve island (such as the software version and serial number) are shown in the Tab „Module Info“.



## 5. I/O connection via Assembly Object

The Assembly Object is used to bundle attributes of different objects, to use only one connection exchanging I/O data. One instance is used for input data and one for output data.

### 5.1 Bit allocation valve stations

The following picture shows exemplarily a VS island with 6 valve stations.

To calculate the length of the used output data (in bytes) for the VS18/VS26 valve configuration please use the following formula:

$$B(\text{Bytes}) = \frac{V * 2 + ((V * 2) \text{MOD} 8)}{8}$$

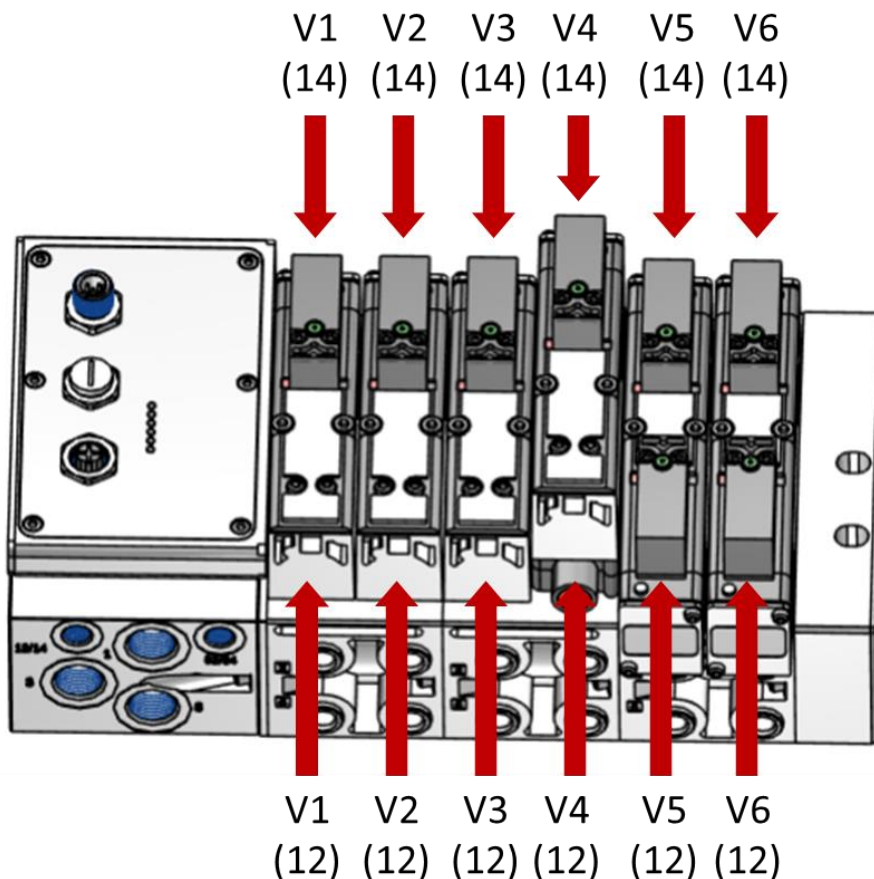
$V \in \{4, 6, 8, 10, 12, 14, 16, 18, 20\}$ .

Whereby 'V' = number of valve stations and 'MOD' = Modulo-Operator.

E.g. valve island with 6 stations

$$B = \frac{6 * 2 + (6 * 2) \text{MOD} 8}{8} = \frac{12 + 12 \text{MOD} 8}{8} = \frac{16}{8} = 2$$

E.g. for 6 stations are 2 bytes reserved



The picture shows VS valve island with 6 stations

The illustration below shows the assignment for maximum configuration. For every valve two bits will be reserved – one bit for solenoid 14 and one bit for solenoid 12.

| byte | Bit  |      |      |      |      |      |      |      | total valve number |   |   |    |    |    |    |    |    |
|------|------|------|------|------|------|------|------|------|--------------------|---|---|----|----|----|----|----|----|
|      | 7    | 6    | 5    | 4    | 3    | 2    | 1    | 0    | 4                  | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
| 0    | V 04 |      | V 03 |      | V 02 |      | V 01 |      | X                  | X | X | X  | X  | X  | X  | X  | X  |
|      | S 12 | S 14 | S 12 | S 14 | S 12 | S 14 | S 12 | S 14 |                    |   |   |    |    |    |    |    |    |
| 1    | V 08 |      | V 07 |      | V 06 |      | V 05 |      |                    | X | X | X  | X  | X  | X  | X  | X  |
|      | S 12 | S 14 | S 12 | S 14 | S 12 | S 14 | S 12 | S 14 |                    |   |   |    |    |    |    |    |    |
| 2    | V 12 |      | V 11 |      | V 10 |      | V 09 |      |                    |   |   | X  | X  | X  | X  | X  | X  |
|      | S 12 | S 14 | S 12 | S 14 | S 12 | S 14 | S 12 | S 14 |                    |   |   |    |    |    |    |    |    |
| 3    | V 16 |      | V 15 |      | V 14 |      | V 13 |      |                    |   |   |    |    | X  | X  | X  | X  |
|      | S 12 | S 14 | S 12 | S 14 | S 12 | S 14 | S 12 | S 14 |                    |   |   |    |    |    |    |    |    |
| 4    | V 20 |      | V 19 |      | V 18 |      | V 17 |      |                    |   |   |    |    |    |    | X  | X  |
|      | S 12 | S 14 | S 12 | S 14 | S 12 | S 14 | S 12 | S 14 |                    |   |   |    |    |    |    |    |    |

(V = Valve no., S = Solenoid side, X = Bytes reserved )

## 5.2 Input data (Assembly Object Instance: 101d)

The right picture shows a valve island with 6 valve stations, side 12 is in the front, side 14 is on the backside.

Used acronym:

UV-VB: Under voltage electronic supply

OV-VB: Over voltage electronic supply

UV-VA: Under voltage valves supply

OV-VA: Over voltage valve supply

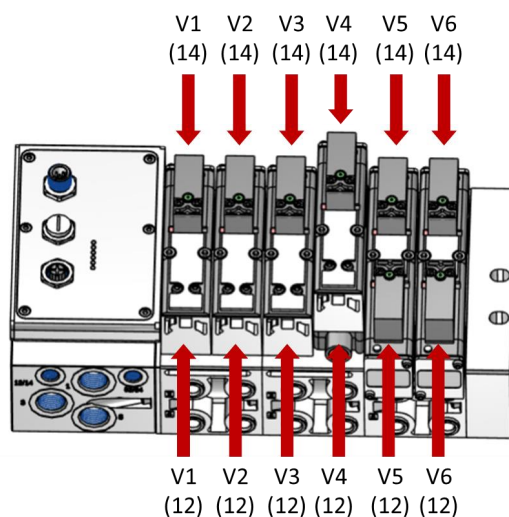
Res: Reserve

„Vnn-ss”: nn - valve number [01, 20]

ss - solenoid side [12, 14]

Example: “V03-12” it means

Valve no. 3, solenoid side 12



The following table shows the bit allocation of the input data for VS18/VS26 valve island.



Table: Input – Bit - assignment for VS18/VS26 valve island with 4, 5 - 8, 9 – 12, 13 – 16 and 17 - 20 stations.

| Valve stations |       |      |     |    | Bit    |        |        |        |        |        |        |        | Function                 |
|----------------|-------|------|-----|----|--------|--------|--------|--------|--------|--------|--------|--------|--------------------------|
| 17-20          | 13-16 | 9-12 | 5-8 | 4  | 7      | 6      | 5      | 4      | 3      | 2      | 1      | 0      |                          |
| Byte#          |       |      |     |    |        |        |        |        |        |        |        |        |                          |
| 0              | 0     | 0    | 0   | 0  | Res    | Res    | Res    | Res    | UV-VB  | OV-VB  | UV-VA  | OV-VA  | Module status            |
|                |       |      |     | 1  |        |        |        |        |        |        |        |        | Short Circuit / Overload |
|                |       |      |     | 2  | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 | Open Load                |
|                |       |      |     |    |        |        |        |        |        |        |        |        |                          |
|                |       |      |     | 1  | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 | Short Circuit / Overload |
|                |       |      |     | 2  | V08-12 | V08-14 | V07-12 | V07-14 | V06-12 | V06-14 | V05-12 | V05-14 | Short Circuit / Overload |
|                |       |      |     | 3  | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 | Open Load                |
|                |       |      |     | 4  | V08-12 | V08-14 | V07-12 | V07-14 | V06-12 | V06-14 | V05-12 | V05-14 | Open Load                |
|                |       |      |     |    |        |        |        |        |        |        |        |        |                          |
|                |       |      |     | 1  | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 | Short Circuit / Overload |
|                |       |      |     | 2  | V08-12 | V08-14 | V07-12 | V07-14 | V06-12 | V06-14 | V05-12 | V05-14 | Short Circuit / Overload |
|                |       |      |     | 3  | V12-12 | V12-14 | V11-12 | V11-14 | V10-12 | V10-14 | V09-12 | V09-14 | Short Circuit / Overload |
|                |       |      |     | 4  | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 | Open Load                |
|                |       |      |     | 5  | V08-12 | V08-14 | V07-12 | V07-14 | V06-12 | V06-14 | V05-12 | V05-14 | Open Load                |
|                |       |      |     | 6  | V12-12 | V12-14 | V11-12 | V11-14 | V10-12 | V10-14 | V09-12 | V09-14 | Open Load                |
|                |       |      |     |    |        |        |        |        |        |        |        |        |                          |
|                |       |      |     | 1  | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 | Short Circuit / Overload |
|                |       |      |     | 2  | V08-12 | V08-14 | V07-12 | V07-14 | V06-12 | V06-14 | V05-12 | V05-14 | Short Circuit / Overload |
|                |       |      |     | 3  | V12-12 | V12-14 | V11-12 | V11-14 | V10-12 | V10-14 | V09-12 | V09-14 | Short Circuit / Overload |
|                |       |      |     | 4  | V16-12 | V16-14 | V15-12 | V15-14 | V14-12 | V14-14 | V13-12 | V13-14 | Short Circuit / Overload |
|                |       |      |     | 5  | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 | Open Load                |
|                |       |      |     | 6  | V08-12 | V08-14 | V07-12 | V07-14 | V06-12 | V06-14 | V05-12 | V05-14 | Open Load                |
|                |       |      |     | 7  | V12-12 | V12-14 | V11-12 | V11-14 | V10-12 | V10-14 | V09-12 | V09-14 | Open Load                |
|                |       |      |     | 8  | V16-12 | V16-14 | V15-12 | V15-14 | V14-12 | V14-14 | V13-12 | V13-14 | Open Load                |
|                |       |      |     |    |        |        |        |        |        |        |        |        |                          |
|                |       |      |     | 1  | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 | Short Circuit / Overload |
|                |       |      |     | 2  | V08-12 | V08-14 | V07-12 | V07-14 | V06-12 | V06-14 | V05-12 | V05-14 | Short Circuit / Overload |
|                |       |      |     | 3  | V12-12 | V12-14 | V11-12 | V11-14 | V10-12 | V10-14 | V09-12 | V09-14 | Short Circuit / Overload |
|                |       |      |     | 4  | V16-12 | V16-14 | V15-12 | V15-14 | V14-12 | V14-14 | V13-12 | V13-14 | Short Circuit / Overload |
|                |       |      |     | 5  | V20-12 | V20-14 | V19-12 | V19-14 | V18-12 | V18-14 | V17-12 | V17-14 | Short Circuit / Overload |
|                |       |      |     | 6  | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 | Open Load                |
|                |       |      |     | 7  | V08-12 | V08-14 | V07-12 | V07-14 | V06-12 | V06-14 | V05-12 | V05-14 | Open Load                |
|                |       |      |     | 8  | V12-12 | V12-14 | V11-12 | V11-14 | V10-12 | V10-14 | V09-12 | V09-14 | Open Load                |
|                |       |      |     | 9  | V16-12 | V16-14 | V15-12 | V15-14 | V14-12 | V14-14 | V13-12 | V13-14 | Open Load                |
|                |       |      |     | 10 | V20-12 | V20-14 | V19-12 | V19-14 | V18-12 | V18-14 | V17-12 | V17-14 | Open Load                |



### 5.3 Output data (Assembly Object Instance: 100d)

The right picture shows a valve island with 6 valve stations, side 12 is in the front, side 14 is on the backside.

Used acronym:

„Vnn-ss: nn - valve number [1, 16]

ss - solenoid side [12, 14]

Example: “V03\_12” it means

Valve no. 3, solenoid side 12

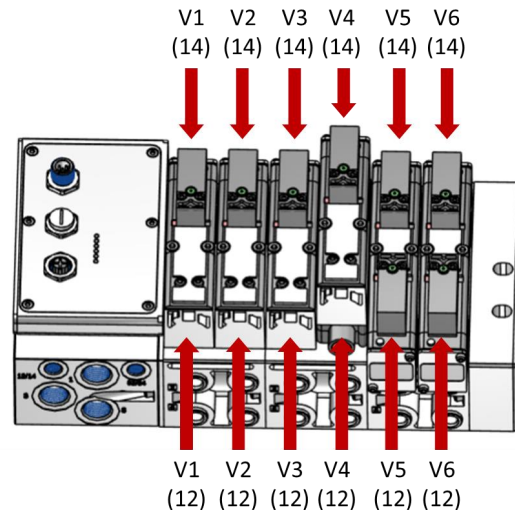


Table: Output – Bit - assignment for valve islands with 4, 5-8, 9-12, 13-16 and 17-20 stations

| Valve stations |       |        |        |        | Bit    |        |        |        |        |        |        |        |
|----------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 18-20          | 13-16 | 9-12   | 5-8    | 4      | 7      | 6      | 5      | 4      | 3      | 2      | 1      | 0      |
| Byte#          |       |        |        |        |        |        |        |        |        |        |        |        |
|                |       |        | 0      |        | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 |
|                |       |        |        |        |        |        |        |        |        |        |        |        |
|                |       |        | 0      | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 |        |
|                |       |        | 1      | V08-12 | V08-14 | V07-12 | V07-14 | V06-12 | V06-14 | V05-12 | V05-14 |        |
|                |       |        |        |        |        |        |        |        |        |        |        |        |
|                |       | 0      | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 |        |        |
|                |       | 1      | V08-12 | V08-14 | V07-12 | V07-14 | V06-12 | V06-14 | V05-12 | V05-14 |        |        |
|                |       | 2      | V12-12 | V12-14 | V11-12 | V11-14 | V10-12 | V10-14 | V09-12 | V09-14 |        |        |
|                |       |        |        |        |        |        |        |        |        |        |        |        |
|                |       | 0      | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 |        |        |
|                |       | 1      | V08-12 | V08-14 | V07-12 | V07-14 | V06-12 | V06-14 | V05-12 | V05-14 |        |        |
|                |       | 2      | V12-12 | V12-14 | V11-12 | V11-14 | V10-12 | V10-14 | V09-12 | V09-14 |        |        |
|                | 3     | V16-12 | V16-14 | V15-12 | V15-14 | V14-12 | V14-14 | V13-12 | V13-14 |        |        |        |
|                |       |        |        |        |        |        |        |        |        |        |        |        |
|                | 0     |        |        |        | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 |
|                | 1     |        |        |        | V08-12 | V08-14 | V07-12 | V07-14 | V06-12 | V06-14 | V05-12 | V05-14 |
|                | 2     |        |        |        | V12-12 | V12-14 | V11-12 | V11-14 | V10-12 | V10-14 | V09-12 | V09-14 |
|                | 3     |        |        |        | V16-12 | V16-14 | V15-12 | V15-14 | V14-12 | V14-14 | V13-12 | V13-14 |
|                |       |        |        |        |        |        |        |        |        |        |        |        |
|                | 0     |        |        |        | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 |
| 1              |       |        |        | V08-12 | V08-14 | V07-12 | V07-14 | V06-12 | V06-14 | V05-12 | V05-14 |        |
| 2              |       |        |        | V12-12 | V12-14 | V11-12 | V11-14 | V10-12 | V10-14 | V09-12 | V09-14 |        |
| 3              |       |        |        | V16-12 | V16-14 | V15-12 | V15-14 | V14-12 | V14-14 | V13-12 | V13-14 |        |
| 4              |       |        |        | V20-12 | V20-14 | V19-12 | V19-14 | V18-12 | V18-14 | V17-12 | V17-14 |        |

## 6. Solenoid Object

Object Class: 100d

Instances: 4 stations 1...8  
5 - 8 stations 1...16  
9 - 12 stations 1...24  
13 - 16 stations 1...32  
17 - 20 stations 1...40

Each solenoid is a separate instance of the Solenoid Object. The allocation between Instance ID and solenoid is shown in the following table:

|               |        |        |        |        |        |        |        |        |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Valve 1...4   | V04-12 | V04-14 | V03-12 | V03-14 | V02-12 | V02-14 | V01-12 | V01-14 |
| Instance ID   | 8      | 7      | 6      | 5      | 4      | 3      | 2      | 1      |
| Valve 5...8   | V08-12 | V08-14 | V07-12 | V07-14 | V06-12 | V06-14 | V05-12 | V05-14 |
| Instance ID   | 16     | 15     | 14     | 13     | 12     | 11     | 10     | 9      |
| Valve 9...12  | V12-12 | V12-14 | V11-12 | V11-14 | V10-12 | V10-14 | V09-12 | V09-14 |
| Instance ID   | 24     | 23     | 22     | 21     | 20     | 19     | 18     | 17     |
| Valve 13...16 | V16-12 | V16-14 | V15-12 | V15-14 | V14-12 | V14-14 | V13-12 | V13-14 |
| Instance ID   | 32     | 31     | 30     | 29     | 28     | 27     | 26     | 25     |
| Valve 17...20 | V20-12 | V20-14 | V19-12 | V19-14 | V18-12 | V18-14 | V17-12 | V17-14 |
| Instance ID   | 40     | 39     | 38     | 37     | 36     | 35     | 34     | 33     |

Following table shows all Instance Attributes of the Solenoid Object:

| Attr. ID | Access Rule | Name                     | Data Type | Description                                              | Schematic of Values                          |
|----------|-------------|--------------------------|-----------|----------------------------------------------------------|----------------------------------------------|
| 1        | Get/Set     | Solenoid Value           | Bool      | Output point value                                       | 0=Off<br>1=On                                |
| 3        | Get/Set     | Enable Diagnostics       | Bool      | Enables/Disables Diagnostics (Channel diagnostics)       | 0=Disabled<br>1=Enabled                      |
| 4        | Get         | Open load                | Bool      | Diagnostics Open Load                                    | 0=OK<br>1=Open Load                          |
| 5        | Get         | Short Circuit / Overload | Bool      | Diagnostics Short Circuit                                | 0=OK<br>1=Short Circuit                      |
| 6        | Get/Set     | Fault Action             | Bool      | Action taken on outputs value in recoverable fault state | 0=Fault Value Attribute<br>1=hold last state |
| 7        | Get/Set     | Fault Value              | Bool      | Value for use with Fault Action attribute                | 0=Off<br>1=On                                |
| 8        | Get/Set     | Idle Action              | Bool      | Action taken on outputs value in idle state              | 0=Idle Value Attribute<br>1=hold last state  |
| 9        | Get/Set     | Idle Value               | Bool      | Value for use with Idle Action attribute                 | 0=Off<br>1=On                                |

## 7. Diagnostics and LEDs

### 7.1 Status LEDs

#### 7.1.1 Status LEDs description

| LED Name | Description                    |
|----------|--------------------------------|
| P1       | Link Port 1 (TX/RX & Link)     |
| P2       | Link Port 2 (TX/RX & Link)     |
| NS       | Network Status                 |
| MS       | Module Status                  |
| VB       | Electronic Power Supply Status |
| VA       | Valves Power Supply Status     |

#### 7.1.2 Link states for Port P1 and Port P2

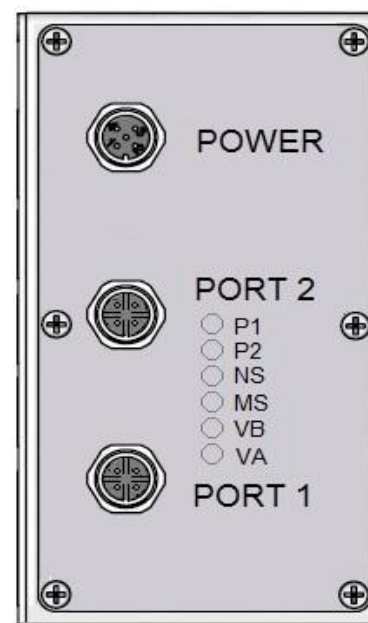
| Link Status                     | LED State               |
|---------------------------------|-------------------------|
| Link Connection Established     | yellow                  |
| Link Communication Active       | flashing yellow / green |
| Link Connection Not Established | off                     |

#### 7.1.3 Network Status LED (NS)

| Module Status      | LED State      |
|--------------------|----------------|
| No Power           | off            |
| Connected          | green          |
| Not Connected      | flashing green |
| Connection Timeout | flashing red   |
| Duplicate IP n/a   | red            |

#### 7.1.4 Module Status LED (MS)

| Network Status        | LED State      |
|-----------------------|----------------|
| No Power              | off            |
| Device Operational    | green          |
| Standby n/a           | flashing green |
| Recoverable fault     | flashing red   |
| Non-recoverable fault | red            |



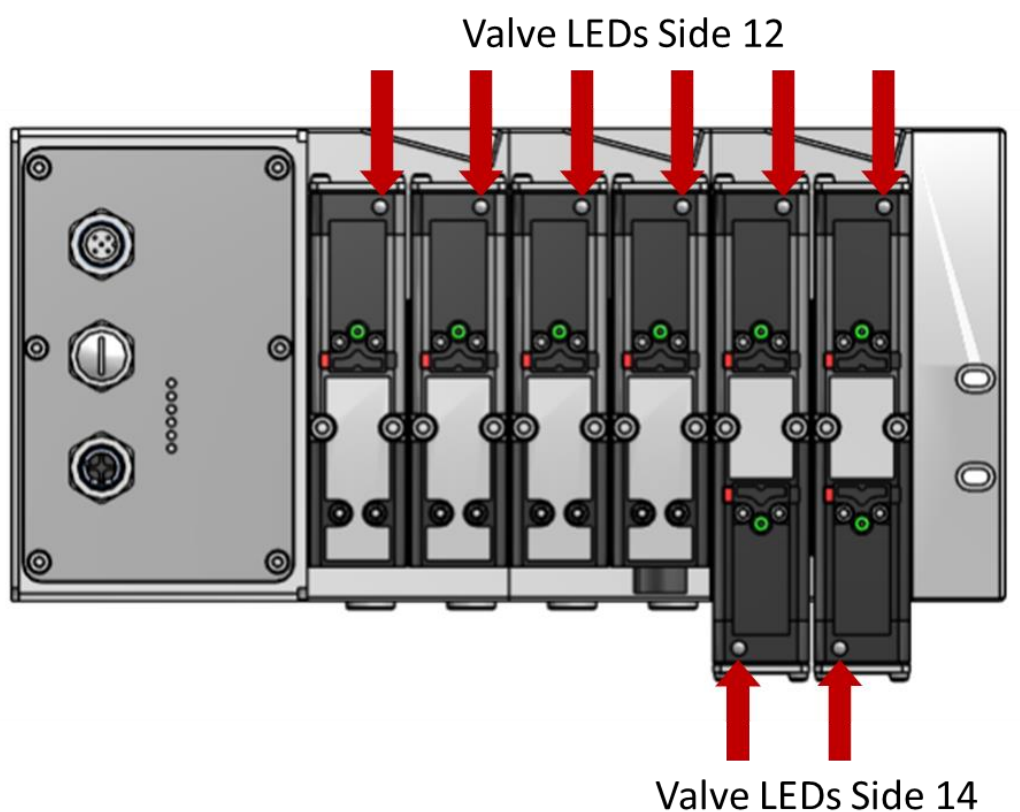
### 7.1.5 Electronics Power Supply Status, LED (VB)

| Electronics Power Supply States | LED State    |
|---------------------------------|--------------|
| Voltage O.K.                    | green        |
| Undervoltage                    | flashing red |
| Overvoltage                     | red          |

### 7.1.6 Valve Power Supply Status, LED (VA)

| Valve Power Supply States | LED State    |
|---------------------------|--------------|
| Voltage O.K.              | green        |
| Undervoltage              | flashing red |
| Overvoltage               | red          |

## 7.2 Valve slice Status LEDs



Each valve station has one or two separate status LEDs depending on its configuration, which indicate the control states “14” and “12” for the corresponding pilot valve solenoids.

| Status            | LED State |
|-------------------|-----------|
| Valve not powered | off       |
| Valve powered     | on        |

## 8. Output behavior in fault condition (Idle mode/Fault mode)

The Fault Mode defines the behavior of the outputs while communication errors. The VS18/VS26 valve island executes the idle mode if requested by the controller.

The following states could be taken by the outputs in case of executing Idle Mode or Fault Mode:

- ➔ *Clear output*
- ➔ *Set output*
- ➔ *Freeze output*

This behavior could be set up for each single solenoid via the following attributes of their instance of the solenoid object:

| Attr. ID                         | Access Rule | Name         | Data Type | Description                                              | Schematic of Values                                 |
|----------------------------------|-------------|--------------|-----------|----------------------------------------------------------|-----------------------------------------------------|
| 6                                | Get/Set     | Fault Action | Bool      | Action taken on outputs value in recoverable fault state | <b>0=Fault Value Attribute</b><br>1=hold last state |
| 7                                | Get/Set     | Fault Value  | Bool      | Value for use with Fault Action attribute                | <b>0=Off</b><br>1=On                                |
| 8                                | Get/Set     | Idle Action  | Bool      | Action taken on outputs value in idle state              | <b>0=Idle Value Attribute</b><br>1=hold last state  |
| 9                                | Get/Set     | Idle Value   | Bool      | Value for use with Idle Action attribute                 | <b>0=Off</b><br>1=On                                |
| Bolded values are default values |             |              |           |                                                          |                                                     |

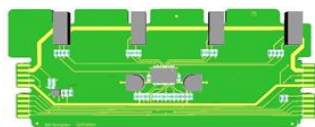
## 9. Properties EtherNet/IP Interface

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

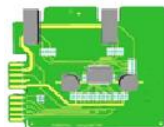
## 10. Valve island extension

Valve islands can be extended using the 2- and 4-station PCBs as described in this chapter.

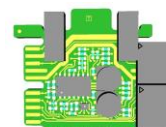
The following PCBs are available for the extension:



VS2672762-KG00  
4 station PCB



VS2672761-KG00  
2 station PCB

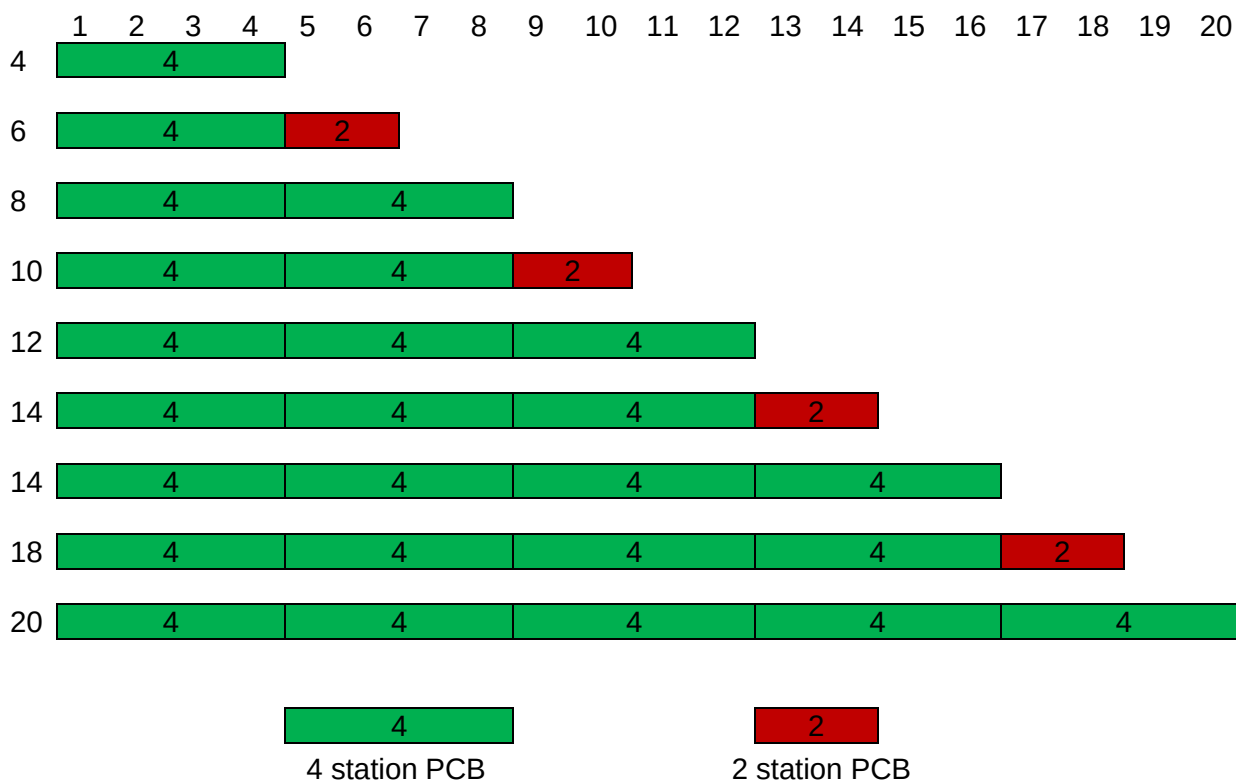


VS2672764-KG00  
(new) 2 station PCB

*shall only be mounted at the end in  
below configurations*

### 10.1 Overview – possible combinations

Below illustration shows an overview of the preferred combinations of existing PCBs in order to build the required number of valve stations.



**Note:**

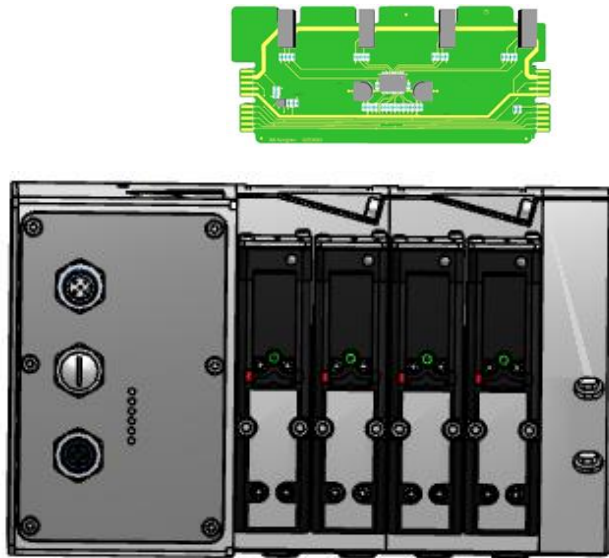
It is generally possible to use the new 2 station PCBs (VS2672764-KG00) on all positions but it is recommended to use the above combinations.

In special cases with increased modularity requirements, the product support should be contacted.

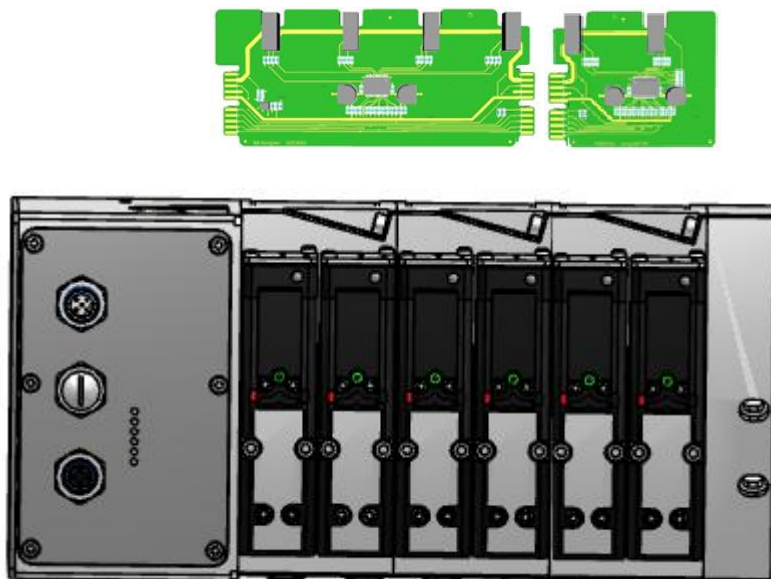
The below sections show the preferred combinations of the existing SPI boards for various valve island configurations.



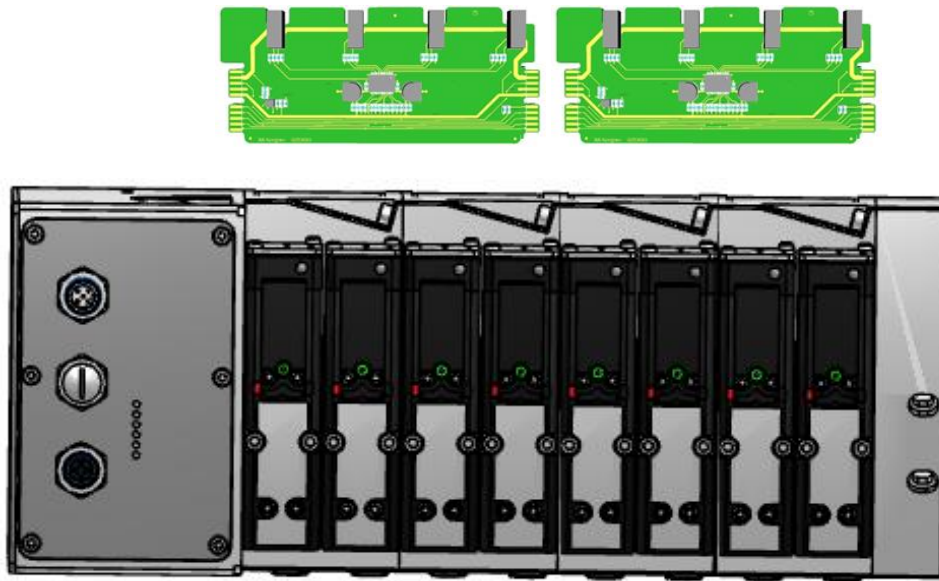
## 10.2 Valve island with 4 stations



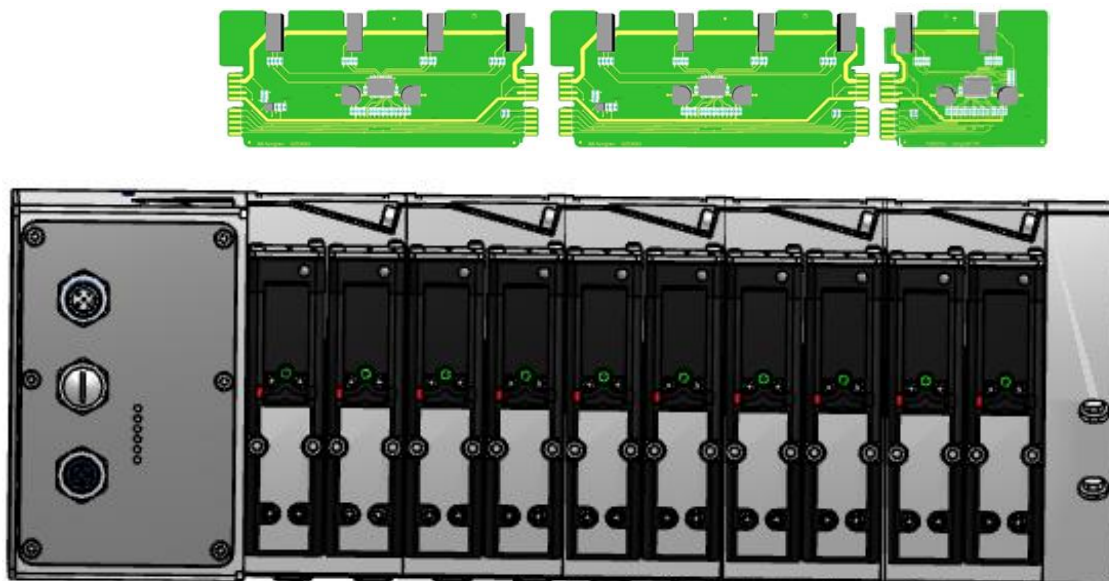
## 10.3 Valve island with 6 stations



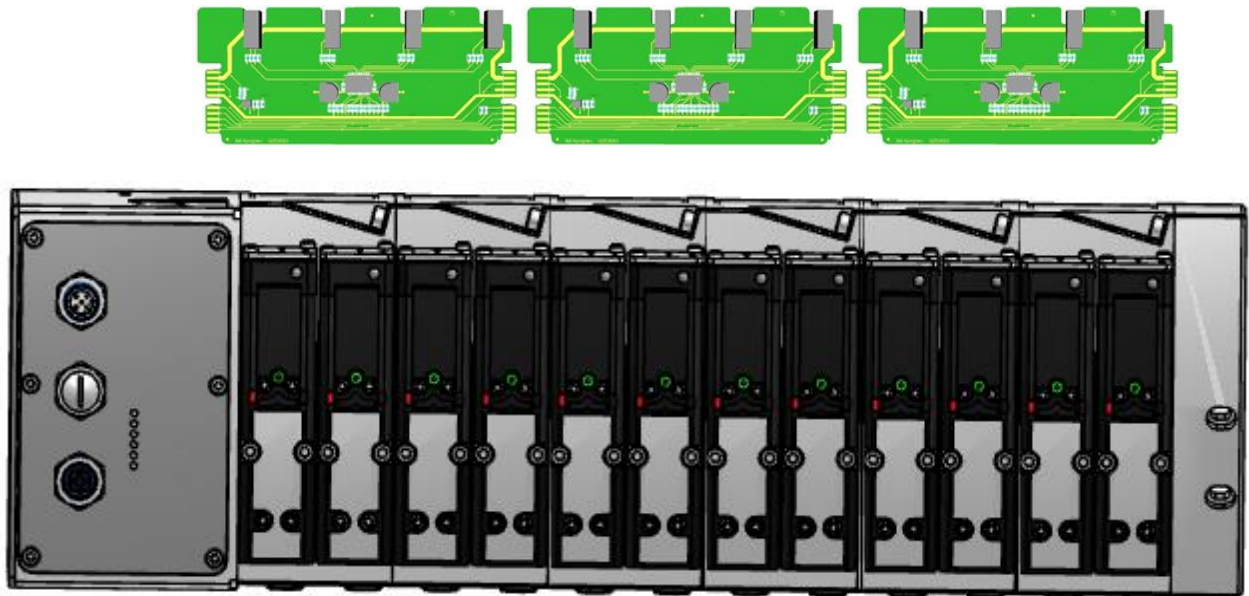
## 10.4 Valve island with 8 stations



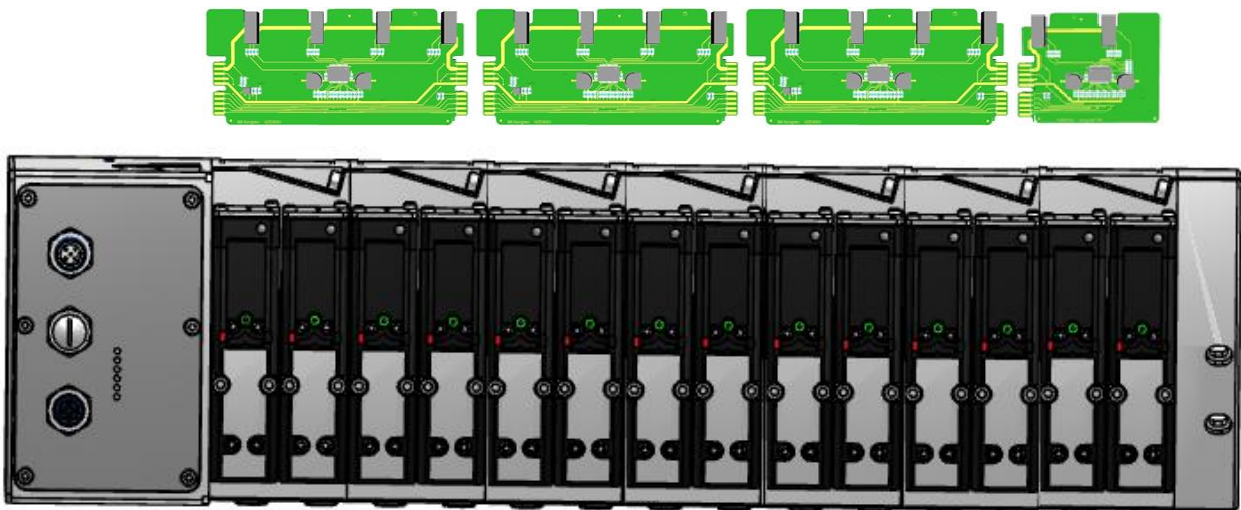
## 10.5 Valve island with 10 stations



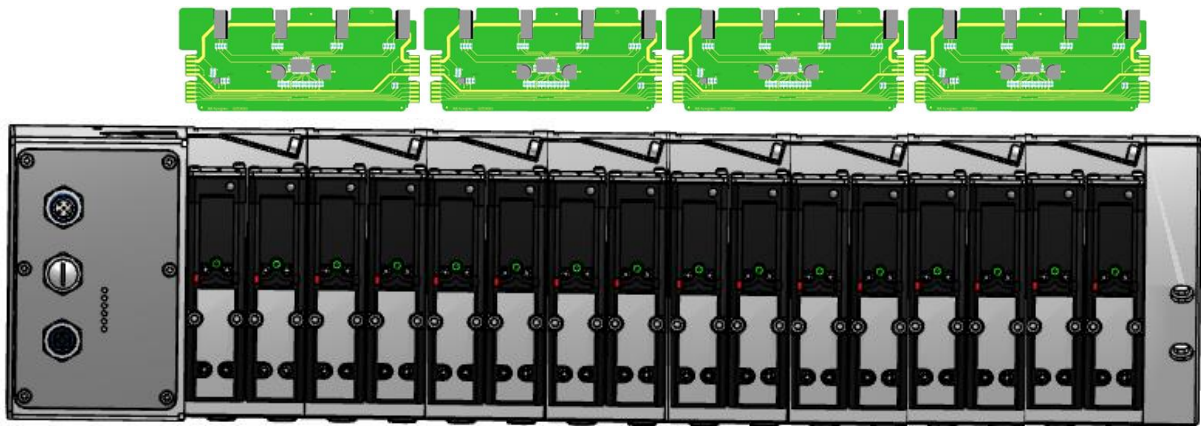
## 10.6 Valve island with 12 stations



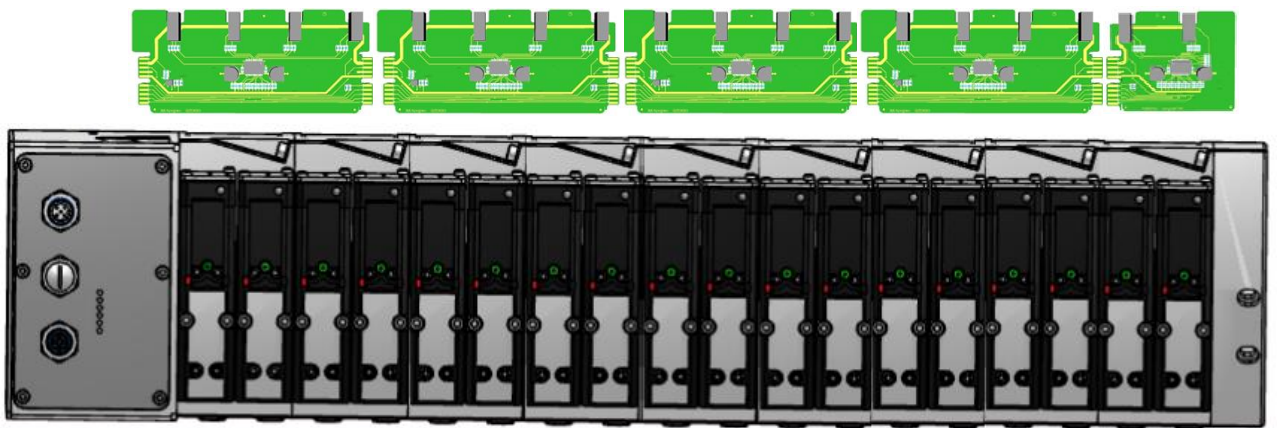
## 10.7 Valve island with 14 stations



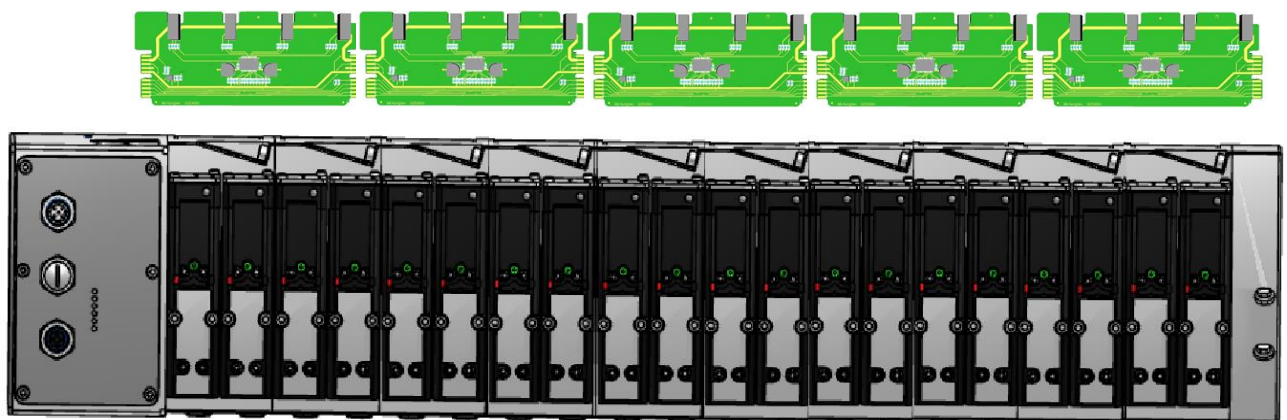
## 10.8 Valve island with 16 stations



## 10.9 Valve island with 18 stations



## 10.10 Valve island with 20 stations



## 10.11 Usage of Soft-start valves

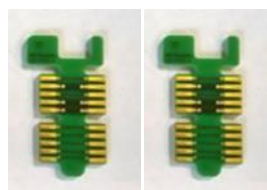
Soft-start valves are only available for VS26.

Maximum number of soft-start valves in one valve island is 4.

Use always 2 single blank PCBs (VS2672763-KG00) with 1 soft-start valve (VS2672530-KG00).



VS2672530-KG00

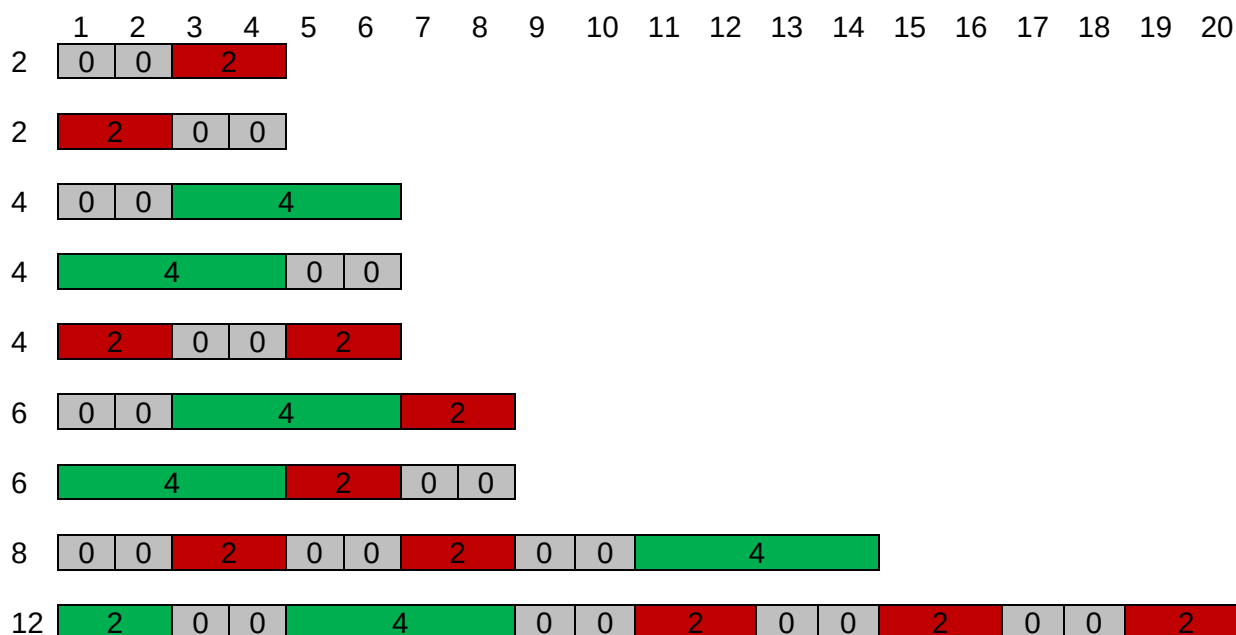


VS2672763-KG00

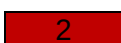
Up to 4 soft-start valves may be added at even positions (0, 2, 4, ...20, 22, 24).

See below some configurations as examples when using the soft-start valve. Only number/positions of valve slices + blanking plates + ISEM plates are counted with respect to station numbering in below configurations.

Note : Only the new 2-station PCB (VS2672764-KG00) should be used in the below configurations.



4-station PCB



new 2-station PCB  
(VS2672764-KG00)



1-station blank PCB



## 11. Electrical data

| Requirement                          |                                                | Comment                                                                                                  |
|--------------------------------------|------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Valve voltage range (VA)             | 24VDC +/-10%                                   | PELV                                                                                                     |
| Electronics voltage range (VB)       | 24VDC +/-25%                                   | PELV                                                                                                     |
| Maximal currents:                    | VA: 150mA + n x 30mA<br>VB: 400mA              | n = number of activated valves                                                                           |
| Voltages are galvanic decoupled      | Yes                                            | --                                                                                                       |
| Protection against polarity reversal | VA, VB                                         | --                                                                                                       |
| Overcurrent protection VB, VA        | irreversible                                   | Protection against overload and short-circuit currents, fused with 2A slow-acting fuse                   |
| PE/FE/Ground connection              | M4 thread on the rear of the connection module | Reference section 2.1                                                                                    |
| Electrical power supply connection   | M12 / 5-pin / A-coded / male connector         | M12-1: L1 (VB+)<br>M12-2: N2 (VA-)<br>M12-3: N1 (VB-)<br>M12-4: L2 (VA+)<br>M12-5: FE (Functional Earth) |
| Bus connection                       | M12 / 4-pin / D-coded / female connector       | M12-1: TD+<br>M12-2: RD+<br>M12-3: TD-<br>M12-4: RD-                                                     |

## 12. Technical data

### 12.1 Technical data VS18 and VS26

**Medium:**

Compressed air, filtered to 40µm, lubricated and non - lubricated

**Operation:**

VS18G / VS26G: Glandless spool valve, solenoid pilot actuated

VS18S / VS26S: Softseal spool valve, solenoid pilot actuated

**Mounting:**

Sub-base

**Operating pressure:**

Maximum pressure

10 bar VS18S / VS26S models and VS18G / VS26G solenoid pilot actuated valves with internal pilot supply

16 bar VS18G / VS26G solenoid pilot actuated valves with external pilot supply

**Ambient temperature:**

-15°C to +50°C

**Medium temperature:**

-5°C to +50°C (Consult our Technical Service for use below +2°C)

**Materials:**

Body/sub-base: die-cast aluminium

Glandless spool & sleeve: Aluminium, hard anodized, Teflon coated

Softseal spool: Aluminium with HNBR seals

Plastic parts: POM, PA, PPA

Mounting sheets / screws: Steel, zinc coated

Springs: Stainless steel

Sandwich plates: Aluminium bar materials, PA

Electrical contacts: Brass, tin coated

PCB: Glass epoxy



## 12.2 Technical data VS18

### Ports 2+4:

G1/8, NPTF 1/8, PIF 8 mm, PIF 6 mm, PIF 1/4

### Valves:

ISO 15407-2 - 18 mm

Flow – values measured at 6 bar inlet pressure and with a pressure drop of 1 bar:

| Series | Function | Q <sub>N</sub><br>[L/min] | C <sub>V</sub><br>[US<br>Gal/min] | K <sub>V</sub><br>[m³/h] |
|--------|----------|---------------------------|-----------------------------------|--------------------------|
| VS18G  | 5/2      | 550                       | 0,56                              | 0,48                     |
| VS18G  | 5/3      | 550                       | 0,56                              | 0,48                     |
| VS18S  | 2x2/2    | 550                       | 0,56                              | 0,46                     |
| VS18S  | 2x3/2    | 600                       | 0,61                              | 0,52                     |
| VS18S  | 5/2      | 650                       | 0,66                              | 0,57                     |
| VS18S  | 5/3      | 650                       | 0,66                              | 0,57                     |

## 12.3 Technical data VS26

### Ports 2+4:

G1/4, NPTF 1/4, PIF 10 mm, PIF 8 mm, PIF 3/8

### Valves:

ISO 15407-2 - 26 mm

Flow – values measured at 6 bar inlet pressure and with a pressure drop of 1 bar:

| Series | Function | Q <sub>N</sub><br>[L/min] | C <sub>V</sub><br>[US<br>Gal/min] | K <sub>V</sub><br>[m³/h] |
|--------|----------|---------------------------|-----------------------------------|--------------------------|
| VS26G  | 5/2      | 1000                      | 1,02                              | 0,87                     |
| VS26G  | 5/3      | 1000                      | 1,02                              | 0,87                     |
| VS26S  | 2x2/2    | 1150                      | 1,17                              | 1,00                     |
| VS26S  | 2x3/2    | 1250                      | 1,27                              | 1,09                     |
| VS26S  | 5/2      | 1350                      | 1,37                              | 1,18                     |
| VS26S  | 5/3      | 1350                      | 1,37                              | 1,18                     |

## Customer support

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