VIPA SLIO Remote I/O

The remote I/O system, Yaskawa Smart Pendant & Yaskawa Robot Controller Tutorial
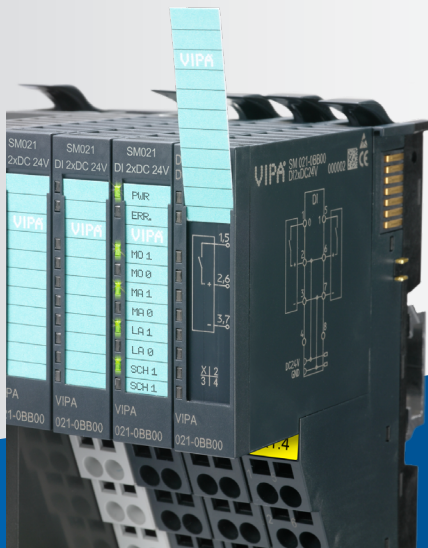
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General Comments:

Read the tutorial carefully before installation, operation maintenance, inspection or troubleshooting.

This tutorial doesn't replace the proper use of the manuals for each module and software.

Please download SLIO remote I/O here: https://vipausa.com/pages/downloads/manuals.html.

This tutorial is subject to change and recommendations for improvement are always appreciated.

Regarding the SLIO remote I/O please inform support@vipausa.com.

Any safety comments and legal comments of Yaskawa Europe GmbH can be found in each manual.

VIPA I/O Expansion Kit for Smart Series

This document describes how to configure and test a VIPA EtherNet/IP Coupler with the YRC1000 and YRC1000 Micro Controllers (collectively referred to as YRC Controller in this document). These instructions should be valid for any number of modules; however, the exact configuration used in this example is shown below:

EtherNet/IP Coupler Interface
(053-1IP01)

Configurable SLIO Modules
(Digital, Analog, etc.)

Kit Contents

Three different I/O expansion kits are available for Yaskawa robot controllers from VIPA. These are:

16 IN, 16 OUT Digital IO: Part number 099-1IP20

Includes

- SLIO 053-1IP01 / EtherNet/IP Interface Module
- SLIO 007-0AA00 / Power Module (embedded with Interface Module)
- SLIO 021-1BF00 / 8 Digital Inputs PNP
- SLIO 021-1BF00 / 8 Digital Inputs PNP
- SLIO 022-1BF00 / 8 Digital Outputs PNP, 0.5A
- SLIO 022-1BF00 / 8 Digital Outputs PNP, 0.5A

8 DI, 8 DO, 8 AI, 4 AO Current IO: Part number 099-1IP50

Includes

-   SLIO 053-1IP01 / EtherNet/IP Interface Module
-   SLIO 007-0AA00 / Power Module (embedded with Interface Module)
-   SLIO 021-1BF00 / 8 Digital Inputs PNP
-   SLIO 022-1BF00 / 8 Digital Outputs PNP, 0.5A
-   SLIO 031-1BF60 / 8 Analog Inputs, 12Bits. 0/4...20mA
-   SLIO 032-1BD40 / 4 Analog Outputs 12Bits. 0/4...20mA

8 DI, 8 DO, 8 AI, 4AO Voltage IO: Part number 099-1IP90

Includes

-   SLIO 053-1IP01 / EtherNet/IP Interface Module
-   SLIO 007-0AA00 / Power Module (embedded with Interface Module)
-   SLIO 021-1BF00 / 8 Digital Inputs PNP
-   SLIO 022-1BF00 / 8 Digital Inputs PNP, 0.5A
-   SLIO 031-1BF74 / 8 Analog Inputs, 12 Bits. +-10V
-   SLIO 032-1BD70 / 4 Analog Outputs, 12 Bits. +-10V

Custom Kit: Part number 099-1IP99

-   Any other variation is available upon request. Examples of variations are NPN IO, Analog IO with current output, power distribution module for powering external devices, etc. Please contact sales@vipausa.com.

What's Not Included in the Kit

Customer must provide the following:

-   24 V, 10 A power supply
-   Din rail
-   Discrete and power supply wiring
-   Cat 5 or higher Ethernet cables of desired length
-   Networking switch for connecting VIPA module, a PC, and YRC controller on the same network

Setting up VIPA Kit and Robot Controller

These instructions will be used to configure a VIPA I/O Expansion Kit on a Smart Series system.

Connect Power

- Ethernet coupler with EtherNet/IP for max. 64 peripheral modules
- I/O access of up to 8 stations
- Online configuration via integrated Web server
- RJ45 jack 100BaseTX, 10BaseTX
- Automatic polarity and speed recognition (auto negotiation)
- Automatic recognition of parallel or crossed cable (auto crossover)
- Network LEDs for link/activity
- Status LEDs for Ready and Error
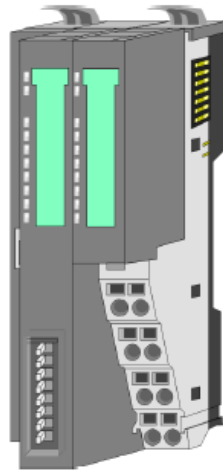
PM - Power module
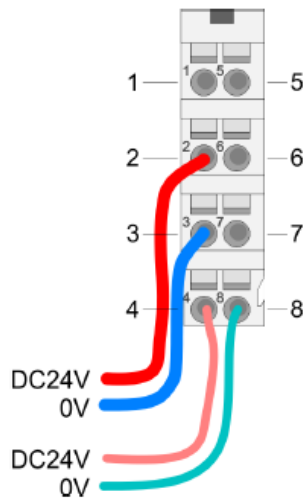
For wires with a core cross-section of 0.08mm² up to 1.5mm².

Pos.	Function	Type	Description
1	---	---	not connected
2	DC 24V	I	DC 24V for power section supply
3	0V	I	GND for power section supply
4	Sys DC 24V	I	DC 24V for electronic section supply
5	---	---	not connected
6	DC 24V	I	DC 24V for power section supply
7	0V	I	GND for power section supply
8	Sys 0V	I	GND for electronic section supply

I: Input

**EtherNet/IP interface X1** EtherNet/IP interface to connect to a EtherNet/IP network. EtherNet/IP can be operated in star topology via an already existing company network. To operate an EtherNet/IP network at least 1 scanner (master) is required.

Note: For most applications, connection point 2 and 4 will be connected to the same point from the power supply. The same for connections 3 and 8.

The following figure shows the standard cabling of the power supply by means of a bus coupler.
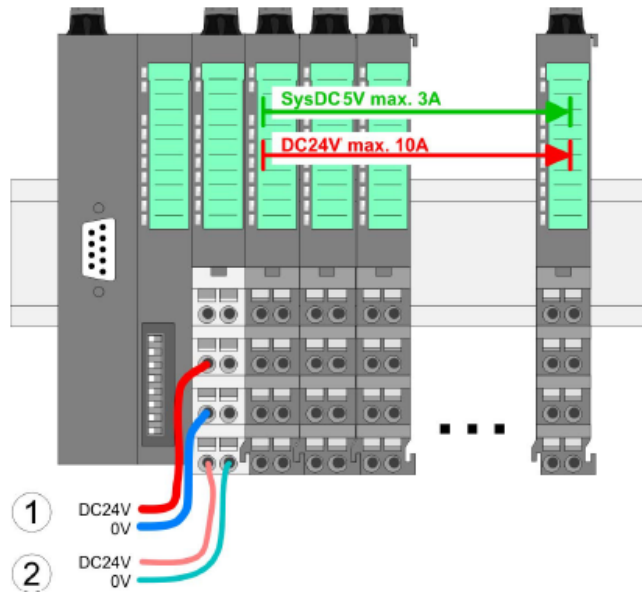

1   DC 24V for power section supply I/O area (max. 10A)
2   DC 24V for electronic power supply bus coupler and I/O area

Configure VIPA IP Address

The factory default IP address for the EtherNet/IP coupler is:

Subnet mask:	255.255.255.0
IP address:	192.168.1.1

If the address "192.168.1.1" is not available (i.e. conflicting with another device with this address), the fourth octet of the IP Address can be changed using the DIP switches on the Interface Module unit. For example, switching switches 2, 4, and 6 to ON would change the address to "192.168.1.21" (i.e. 1+4+16).
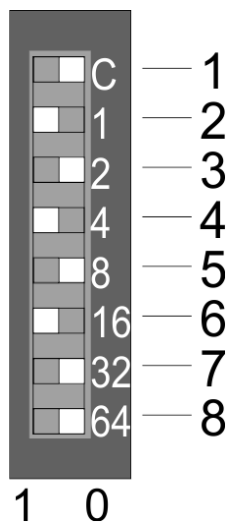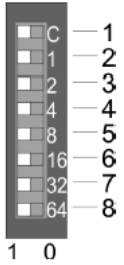
Setting the IP address via address switch	The address switch serves for the configuration of the IP address. On delivery the switch 2 (Position 2) is switched to "1". Here the EtherNet/IP coupler has the following IP address data:

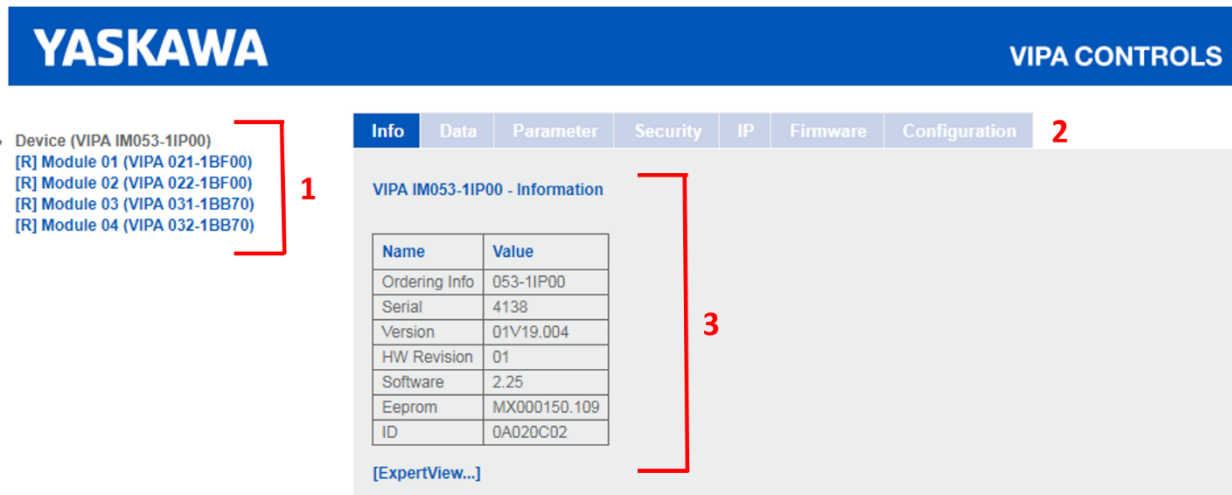- Subnet mask: 255.255.255.0
- IP address: 192.168.1.1

The address switch has the following assignment:

Position	Description
1	0 = DHCP off
	1 = DHCP on
	4. Octet (x) of the IP address 192.168.1.x
	(max. value for x = 127)
2	$2^0 = 1$ (default switched to "1")
3	$2^1 = 2$
4	$2^2 = 4$
5	$2^3 = 8$
6	$2^4 = 16$
7	$2^5 = 32$
8	$2^6 = 64$

VIPA Web Server

The web server can be opened from any browser. The server is built dynamically and will display the number of modules connected to the EtherNet/IP coupler.

1. Module list: EtherNet/IP coupler and System SLIO modules in installed order
2. Functions for the module selected in the module list
3. Information respectively input area of the corresponding function

Additional information about other functions supported by the web server is available in the manual 053-1IP01, in Chapter 4, 4.5 Webserver.

If the device needs to be configured on a network outside of 192.168.1.x, this can be changed from the IP tab of the Web Server. For example, below shows changing the IP Address to "10.7.3.21".

Note: after changing the IP Address, all DIP switches need to be reset to 0 or the DIP switch address will take precedence over the Web Server setting.
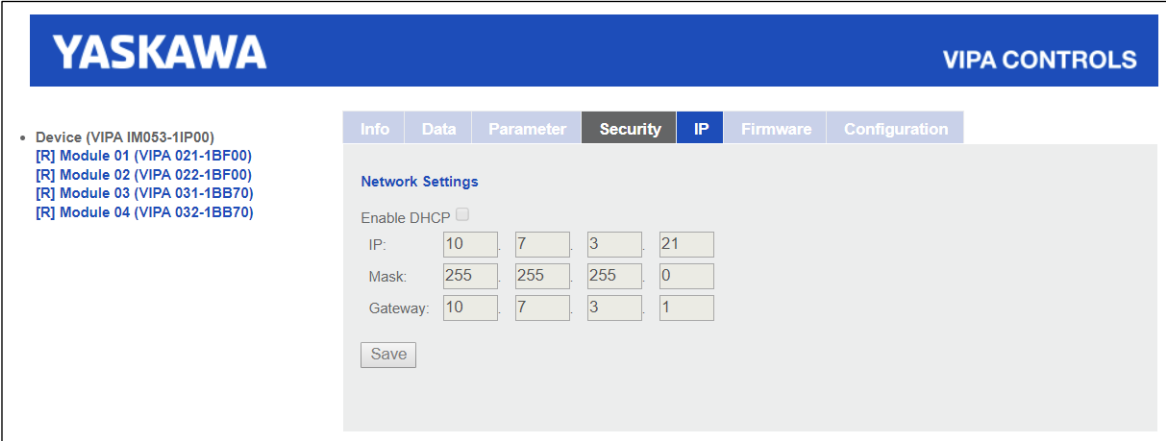
Ping both the VIPA unit and the YRC Controller from a PC to verify communication has been established.

Configure YRC Robot Controller

1. **Network Connection between VIPA Unit and YRC Controller**

   The VIPA Unit should be connected to the YRC Controller through an Ethernet Switch. To connect to the Web Server and configure the device, a PC should also be connected through the same switch. For YRC1000micro, the Ethernet 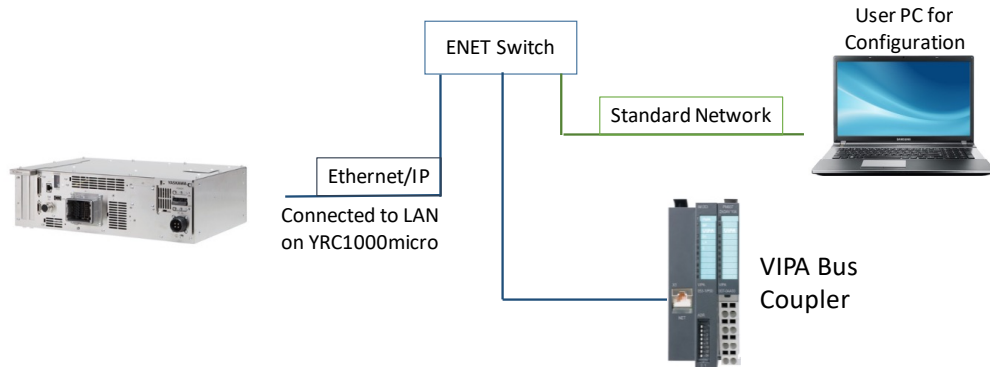cable should be inserted into the LAN port on the outside of the Controller. For YRC1000, the Ethernet cable should be inserted into the LAN2 port inside the Controller. This is shown in the schematics below:

   YRC1000micro Layout

   YRC1000 Layout
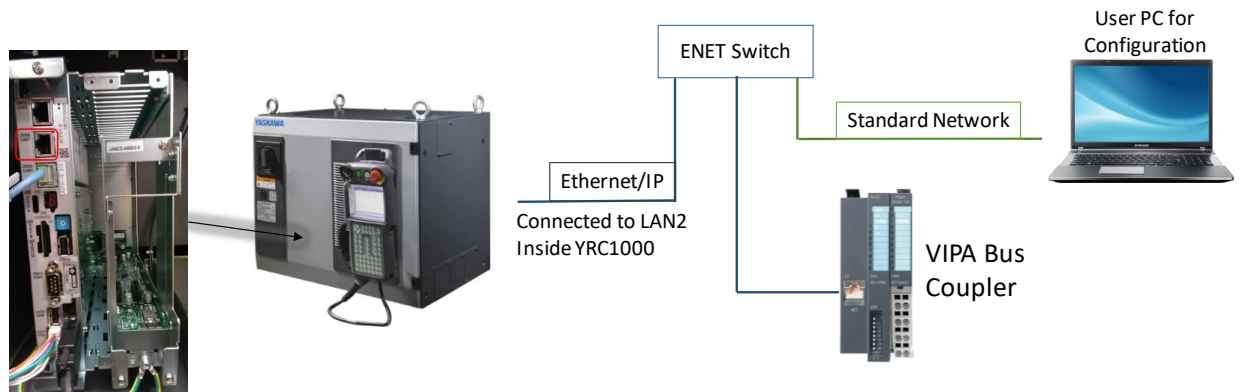
2. **Determine Configuration of VIPA Unit using Web Server**

The next step is to configure the VIPA unit on the YRC robot controller. Connect to the device Web Server by entering the IP Address into a web browser on the same network as the device (e.g. "http://192.168.1.8"). From the Web Server, verify the Input and Output sizes by selecting the Interface Module device and navigating to the "Data" tab. For example, the screenshot below shows an Input Size of 8 bytes and Output Size of 5 bytes. These numbers will be used to populate EtherNet/IP settings in the Controller.
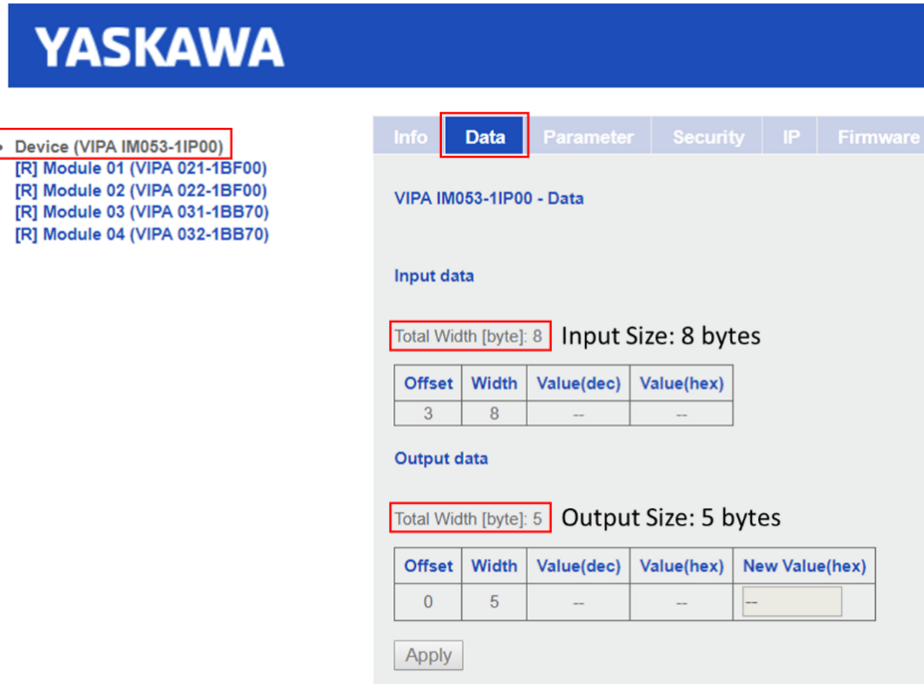
3. **Navigate to I/O Configuration Screen on Smart Pendant**

On Smart Pendant, use the "List Tab" on the {Menu} -> {System Settings} -> {I/O Configuration} screen to view a list of configured devices on the Controller and/or add a new device. Selecting a device will display its details on the bottom panel.
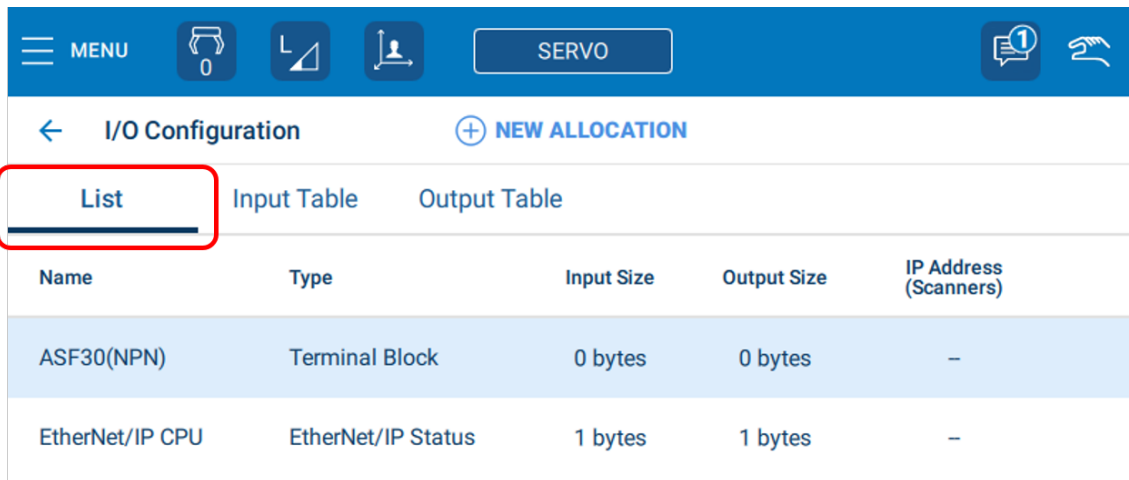
4. **Create a "New Allocation" for VIPA with Data from Web Server**

   1. Press {+ New Allocation} at the top of the I/O Configuration Screen. Select EtherNet/IP from the drop down menu. Manual (Teach) mode and Management Security Level are required.

   2. Enter the IP Address of the VIPA kit and give the unit a name. Also, populate the respective fields with the Size values identified in Step #1 and the following Instance IDs:

        i. Input ID = 60 // Output ID = 50 // Configuration ID = 30

3. After all the data has been entered, review and press {Save}

Note: The Instance IDs documented in the official [VIPA documentation](#) use Input = 20 and Output = 10. However, these values only work if the Input/Output sizes are set to 496 bytes – this is too large for the YRC1000micro controller. When using Input=60/Output=50 the sizes will be dynamic, but must exactly match the sizes shown in the Web Server.

4. **Review (and edit) Location of VIPA Allocation**

In Step #3, the Starting Group #'s were automatically set to the first available range of bytes in the table. If the user would like to customize where the VIPA IO Kit lands, the Input Table and Output Table tabs can be used.

These tables provide a visual representation of the Inputs and Outputs allocated on the Controller. Select the Input/Output Table tabs and find the orange range of bytes allocated for the VIPA kit. If a different location is required, the user can edit the Starting Group # directly or use the {Select Inputs} button to change its location (light blue squares represent areas of available space).

In the special case where the "Size (bytes)" or "Starting Group #" are modified, the Smart Pendant will also check whether the new settings conflict with any other devices. If they do, a message like the one below will be shown, and the user cannot save the data until the conflict is resolved:

5. **Reboot Controller to Activate New Configuration**

In Steps #3 and #4, new data was entered/edited for the VIPA I/O kit and saved by the user. When the edited data is saved, a message will appear alerting the user to reboot the controller to activate the new devices configuration. Modified device(s) will also have an icon next to it in the list:
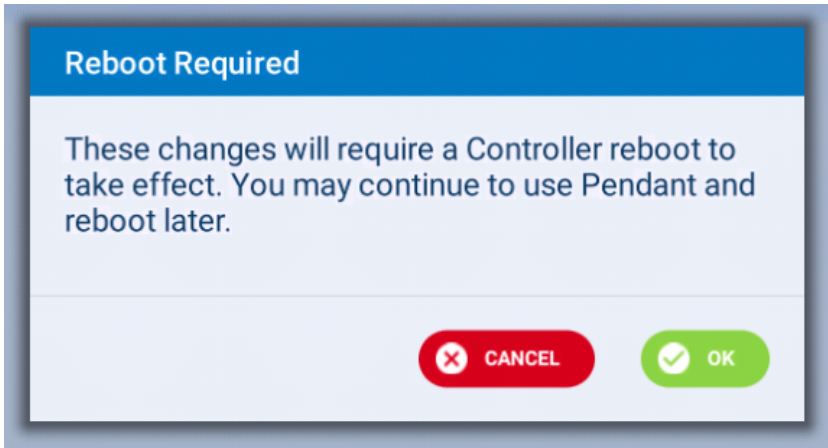
Name	Type	Input Size	Output Size	IP Address (Scanners)	
ASF30(NPN)	Terminal Block	0 bytes	0 bytes	–	
EtherNet/IP CPU	EtherNet/IP Status	1 bytes	1 bytes	–	
⚠ Vipa IO Kit	EtherNet/IP Scanner	8 bytes	5 bytes	192.168.1.8	🗑

6. **Confirm Communication Established between YRC Controller and VIPA Kit**

To verify communication has been established, the "MS" LED on the VIPA EtherNet/IP Interface Module should be solid green. The following table shows the meanings of the various status bits:

LED			Description
PWR	green		Bus interface is power supplied.
SF	red		Error at Ethernet or at the System SLIO bus. Please perform a power cycle.
	red 2Hz		Unrecoverable error [1].
MS	green	☐	Module state: Operational.
	green 2Hz	☐	Module state: Standby (Idle) - BASP activated.
	☐	red	Unrecoverable error [1]. Please perform a power cycle.
	☐	red 2Hz	Recoverable error (e.g. error in configuration).
	green	red	Module state: self-test (1x blinking: green, red).
NS	green	☐	Network state: EtherNet/IP communication: RUN.
	green 2Hz	☐	There is no connection to a Scanner.
	☐	red 2Hz	Recoverable Ethernet/IP error.
	green	red	Module state: self-test (1x blinking: green, red).
LNK1	green		Network activity
	☐		No network activity

1) Please contact VIPA.

On Smart Pendant, the user can find and use the EtherNet/IP Status byte on the {Menu} -> {Program/Operate} -> {I/O} screen to diagnose communication. This byte should be equal to zero if communication has been established and working without error.

Using the VIPA Kit

Data Layout

The data in the EtherNet/IP communications packet will be automatically laid out based on the physical configuration of the devices in the rack. There is also 3 byte buffer at the front of the Input data. For example, see the example configuration shown below. In this configuration, the device in Slot 1 has 1 byte of Input Data and thus this data will be the first byte of Input data after the 3 byte header. The next device with Input Data is in Slot 3, and this will take the next 4 bytes of Input Data, etc.
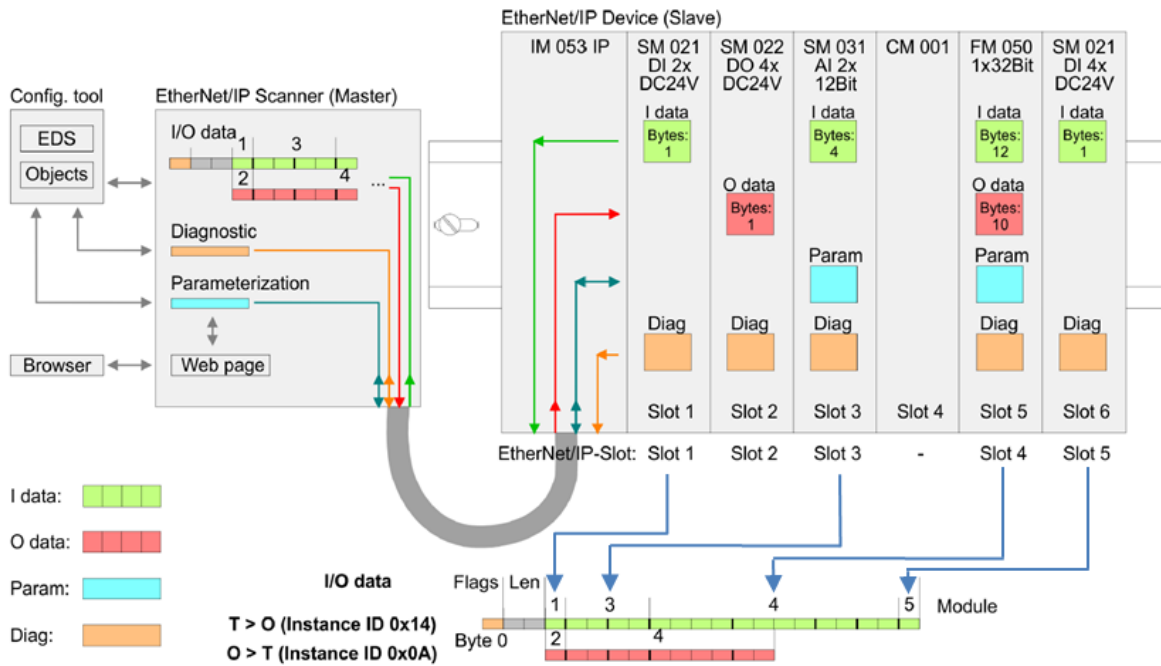
The Web Server can also be used to easily identify where the data for a specific device is located. For example, below shows the data for an Input Module. The "Offset" value is the location from the start of the Input Data. For example, if the data is mapped to Input Group #5 (20070) as in this example, then this data will be located at Input Group #8 (3+5) and will take 1 byte of data.

Device (VIPA IM053-1IP00)
- [A] Module 01 (VIPA 021-1BF00)
  [A] Module 02 (VIPA 022-1BF00)
  [A] Module 03 (VIPA 031-1BB70)
  [A] Module 04 (VIPA 032-1BB70)

Info   **Data**   Parameter

VIPA 021-1BF00 - Data

Input data

Total Width [byte]: 1

Offset	Width	Value(dec)	Value(hex)
3	1	0	00

Note: there is a way to remove the 3 byte buffer at the beginning of the Input Data for advanced users. For this procedure, contact Yaskawa support and request document SSGW-633. For most users, this is not recommended as the data in the Web Server will no longer directly map to the Controller data.

Another example is shown below for an Analog Output. The first output has an Offset of 1 and Width of 2 which means the data is located in Output Group #6-7. The second output has an Offset of 3 and Width of 2 which means the data is located in Output Group #8-9.

Device (VIPA IM053-1IP00)
[A] Module 01 (VIPA 021-1BF00)
[A] Module 02 (VIPA 022-1BF00)
[A] Module 03 (VIPA 031-1BB70)
- [A] Module 04 (VIPA 032-1BB70)

Info   **Data**   Parameter

VIPA 032-1BB70 - Data

Output data

Total Width [byte]: 4

Offset	Width	Value(dec)	Value(hex)	New Value(hex)
1	2	26112	6600	6600
3	2	113	0071	0071

Apply

Using Digital I/O

Menu > Set Security Level to Management > Menu > Program/Operate > I/O > Select Outputs > Check on Enable Toggle > Select Outputs Group # 5 > Select various Outputs on right hand side of I/O screen, using toggle button to turn ON/OFF Outputs and verify on VIPA Bus Coupler.
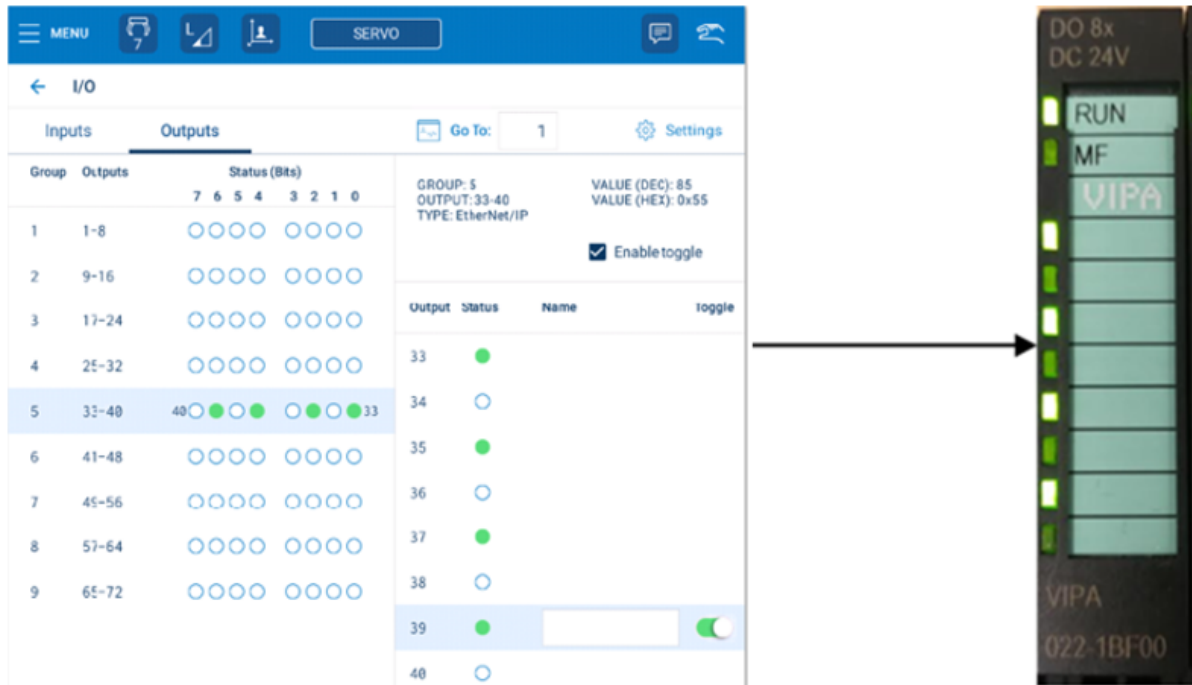
For Digital Inputs, apply a voltage to the device and verify that the LEDs on the device toggle as well as the IN# values on the YRC Pendant.

For wiring examples for digital IO, see Section Wiring Examples.

Using Analog I/O

The VIPA Analog I/O devices have a variety of configurations as shown below. The device used in this example uses the 12 bit configuration from this table.

Resolution	Analog value															
	High byte (byte 0)								Low byte (byte 1)							
Bit number	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Resolution	SG	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
12Bit	SG	Analog value (word)												X	X	X
15Bit	SG	Analog value (word)														

As discussed earlier, the first Analog Output is mapped to Output Group #6-7 for this example. This means that the data has the following layout:

OUT#56	OUT#55	OUT#54	OUT#53	OUT#52	OUT#51	OUT#50	OUT#49
#10077	#10076	#10075	#10074	#10073	#10072	#10071	#10070
SIGN	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8

OUT#48	OUT#47	OUT#46	OUT#45	OUT#44	OUT#43	OUT#42	OUT#41
#10067	#10066	#10065	#10064	#10063	#10062	#10061	#10060
2^7	2^6	2^5	2^4	2^3	X	X	X

The procedure for setting the Analog Output is:

1. Select desired Voltage
2. Convert Voltage into decimal value (*decimal* = 27648*voltage/10)
   For example, to output 5.5V: decimal = 27648*5.5/10 = 15206
   The binary representation of 15206 is: 00111011 01100110
3. Assign the decimal values to Output Group #6-7 using the layout shown above.

After doing this, the desired voltage can be measured from the device. An example job to perform this operation is included below.

For wiring examples for analog IO, see Section Wiring Examples.

```
/JOB
//NAME SETVOLTAGE
//POS
 ///NPOS 0,0,0,0,0,0
//ARGINFO
///ARGTYPE B,,,,,,,
///COMMENT
Voltage

//INST
///DATE 2019/10/31 00:21
///ATTR SC,RW
///GROUP1 RB1
///LVARS 5,0,10,10,0,0,0,0
NOP
GETARG LR000 IARG#(1)
SET LD000 0
ADD LD000 LR000
IFTHENEXP LD000<0
      SET LD001 32768
ELSE
      SET LD001 0
ENDIF
SET LR001 LR000
DIV LR001 10
MUL LR001 27648
ADD LD001 LR001
SET LD002 LD001
DIV LD002 256
MUL LD002 256
SET LD003 LD001
SUB LD003 LD002
SET LB000 LD003
DIV LD001 256
SET LB001 LD001
DOUT OG#(6) LB000  // Edit OG#(6) to match your setup configuration
DOUT OG#(7) LB001  // Edit OG#(7) to match your setup configuration
END
```

Wiring Examples

The following sections provide some wiring examples for typical configurations.

Wiring Example for PNP Input

021-1BF00 - DI 8xDC 24V

Pin assignment For wires with a cross section of 0.08mm^2 (30AWG) up to 1.5mm^2 (16AWG).
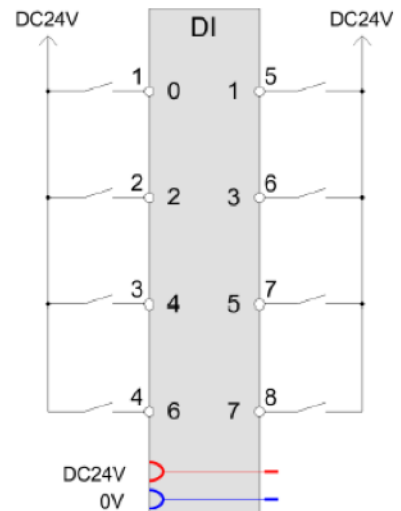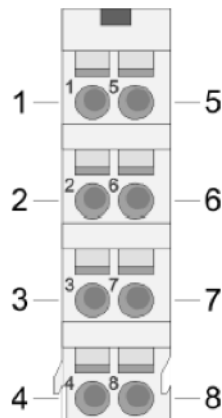
Pos.	Function	Type	Description
1	DI 0	I	Digital input DI 0
2	DI 2	I	Digital input DI 2
3	DI 4	I	Digital input DI 4
4	DI 6	I	Digital input DI 6
5	DI 1	I	Digital input DI 1
6	DI 3	I	Digital input DI 3
7	DI 5	I	Digital input DI 5
8	DI 7	I	Digital input DI 7

I: Input

Wiring Example for PNP Output

022-1BF00 - DO 8xDC 24V 0.5A

Pin assignment   For wires with a cross section of 0.08mm^2 up to 1.5mm^2.
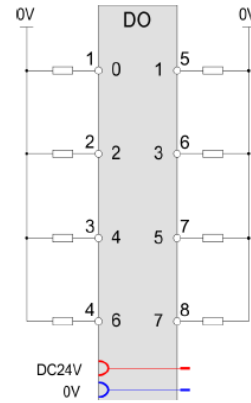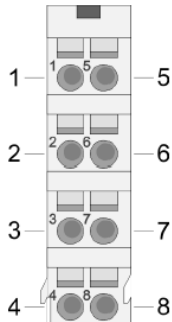
Pos.	Function	Type	Description
1	DO 0	O	Digital output DO 0
2	DO 2	O	Digital output DO 2
3	DO 4	O	Digital output DO 4
4	DO 6	O	Digital output DO 6
5	DO 1	O	Digital output DO 1
6	DO 3	O	Digital output DO 3
7	DO 5	O	Digital output DO 5
8	DO 7	O	Digital output DO 7

O: Output

Wiring Example for Analog Output
032-1BB70 - AO 2x12Bit ±10V

Pin assignment

For wires with a cross section of $0.08mm^2$ up to $1.5mm^2$.
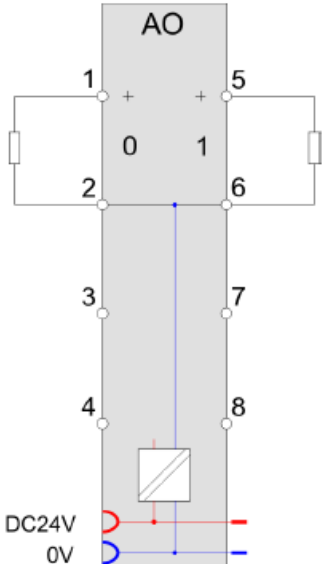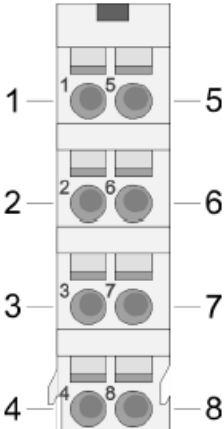
Pos.	Function	Type	Description
1	AO 0	O	Channel 0
2	AGND	O	Ground channels
3	---	---	not connected
4	---	---	not connected
5	AO 1	O	Channel 1
6	AGND	O	Ground channels
7	---	---	not connected
8	---	---	not connected

O: Output

Wiring Example for Analog Input

031-1BB70 - AI 2x12Bit ±10V

Pin assignment   For wires with a cross section of 0.08mm^2 up to 1.5mm^2.
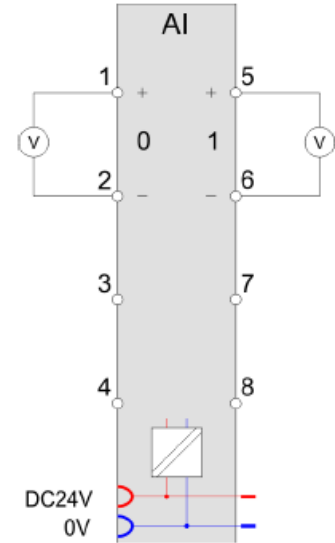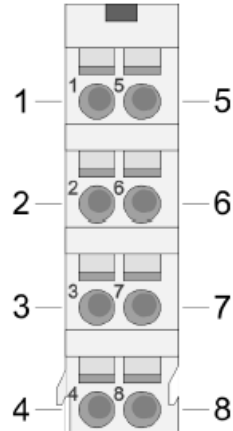
Pos.	Function	Type	Description
1	+AI 0	I	+ Channel 0
2	-AI 0	I	Ground Channel 0
3	---	---	not connected
4	---	---	not connected
5	+AI 1	I	+ Channel 1
6	-AI 1	I	Ground Channel 1
7	---	---	not connected
8	---	---	not connected

I: Input

SLIO Product Line   (subject to change)

Item No.	Name / Description
Clamp Modules	
001-1BA00	**CM 001 - Potential distributor module**, 8x24VDC clamps
001-1BA10	**CM 001 - Potential distributor module**, 8x0VDC clamps
001-1BA20	**CM 001 - Potential distributor module**, 4x24VDC, 4x0VDC clamps
Power Modules	
007-0AA00	**PM 007 - Power module spare for fieldbus**, Power supply 24VDC - SPARE PART for PLC and IM ONLY
007-1AB00	**PM 007 - Power module**, Power supply 24VDC, 10A, Reverse polarity protection, Overvoltage protection, incl. terminal
007-1AB10	**PM 007 - Power module**, Power supply 24VDC, 4A, Power supply 24VDC for bus supply 5V, 2A, Reverse polarity protection, Overvoltage protection, incl. terminal
Digital Input Modules	
021-1BB00	**SM 021 - Digital input**, 2 inputs, incl. terminal
021-1BB10	**SM 021 - Digital input**, 2 fast inputs, Input filter time delay parameterizable 2µs…4ms, incl. terminal
021-1BB50	**SM 021 - Digital input**, 2 inputs, NPN Active low input, incl. terminal
021-1BD00	**SM 021 - Digital input**, 4 inputs, incl. terminal
021-1BD10	**SM 021 - Digital input**, 4 fast inputs, Input filter time delay parameterizable 2µs…4ms, incl. terminal
021-1BD10	**SM 021 - Digital input**, 4 fast inputs, Input filter time delay parameterizable 2µs…4ms, incl. terminal
021-1BD40	**SM 021 - Digital input**, 4 inputs, Connect 2/3 wire, incl. terminal
021-1BD50	**SM 021 - Digital input**, 4 inputs, NPN Active low input, incl. terminal
021-1BD70	**SM 021 - Digital input**, 4 inputs, Timestamp, incl. terminal
021-1BF00	**SM 021 - Digital input**, 8 inputs, incl. terminal
021-1BF01	**SM 021 - Digital input**, 8 inputs, 0.5ms, incl. terminal
021-1BF50	**SM 021 - Digital input**, 8 inputs, NPN Active low input, incl. terminal
021-1DF00	**SM 021 - Digital input**, 8 inputs, detection of wiring errors, incl. terminal
021-1SD00	**SM 021 - Digital input**, 4 inputs, Safety, incl. terminal
Digital Output Modules	
022-1BB00	**SM 022 - Digital output**, 2 outputs, 0.5A, incl. terminal
022-1BB20	**SM 022 - Digital output**, 2 outputs, 2A, incl. terminal
022-1BB50	**SM 022 - Digital output**, 2 Low-Side outputs NPN, 0.5A, incl. terminal
022-1BB70	**SM 022 - Digital output**, 2 outputs, Timestamp, 0.5A, incl. terminal
022-1BB90	**SM 022 - Digital output**, 2 outputs, PWM, incl. terminal
022-1BD00	**SM 022 - Digital output**, 4 outputs, 0.5A, incl. terminal

Item No.	Name / Description
022-1BD20	**SM 022 - Digital output**, 4 outputs, 2A, incl. terminal
Digital Output Modules	
022-1BD50	**SM 022 - Digital output**, 4 Low-Side outputs NPN, 0.5A, incl. terminal
022-1BD70	**SM 022 - Digital output**, 4 outputs, Timestamp, 0.5A, incl. terminal
022-1BF00	**SM 022 - Digital output**, 8 outputs, 0.5A, incl. terminal
022-1BF50	**SM 022 - Digital output**, 8 Low-Side outputs NPN, 0.5A, incl. terminal
022-1DF00	**SM 022 - Digital output**, 8 outputs, 0.5A, detection of wiring errors, incl. terminal
022-1HB10	**SM 022 - Digital output**, 2 Relay outputs, 30VDC/230VAC, 3A, incl. terminal
022-1HD10	**SM 022 - Digital output**, 4 Relay outputs, 30VDC/230VAC, 1.8A, incl. terminal
022-1SD00	**SM 022 - Digital output**, 4 outputs, Safety, 0.5A, incl. terminal
Analog Input Modules	
031-1BB10	**SM 031 - Analog input**, 2 inputs 12Bit / 20 Parameter Bytes, Current 0(4)…20 mA, ISO 2/3 wire, incl. terminal
031-1BB30	**SM 031 - Analog input**, 2 inputs 12Bit / 6 Parameter Bytes, Voltage 0…10 V, incl. terminal
031-1BB40	**SM 031 - Analog input**, 2 inputs 12Bit / 6 Parameter Bytes, Current 0(4)…20mA, 2 wire, incl. terminal
031-1BB60	**SM 031 - Analog input**, 2 inputs 12Bit / 6 Parameter Bytes, Current 0(4)…20mA, 2/3 wire, incl. terminal
031-1BB70	**SM 031 - Analog input**, 2 inputs 12Bit / 6 Parameter Bytes, Voltage -10V…+10V, incl. terminal
031-1BB90	**SM 031 - Analog input**, 2 inputs 16Bit / 22 Parameter Bytes, Thermocouple, Voltage -80mV…+80mV, incl. terminal
031-1BD30	**SM 031 - Analog inpu**t, 4 inputs 12Bit / 8 Parameter Bytes, Voltage 0…10V, incl. terminal
031-1BD40	**SM 031 - Analog input**, 4 inputs 12Bit / 8 Parameter Bytes, Current 0(4)…20mA, 2 wire, incl. terminal
031-1BD70	**SM 031 - Analog input**, 4 inputs 12Bit / 8 Parameter Bytes, Voltage -10V…+10V, incl. terminal
031-1BD80	**SM 031 - Analog input**, 4 inputs 16Bit / 34 Parameter Bytes, 0…3000 ohm resistance, Resistance measurement with 2-, 3- and 4-wires, incl. terminal
031-1BF60	**SM 031 - Analog input**, 8 inputs 12Bit / 14 Parameter Bytes, Current 0(4)…20mA, 2 wire, incl. terminal
031-1BF74	**SM 031 - Analog input**, 8 inputs 12Bit / 14 Parameter Bytes, Voltage -10V…+10V, incl. terminal
031-1CB30	**SM 031 - Analog input**, 2 inputs 16Bit / 20 Parameter Bytes, Voltage 0…10V, incl. terminal
031-1CB40	**SM 031 - Analog input**, 2 inputs 16Bit / 20 Parameter Bytes, Current 0(4)…20mA, 2 wire, incl. terminal
031-1CB70	**SM 031 - Analog input**, 2 inputs 16Bit / 20 Parameter Bytes, Voltage -10V…+10V, incl. terminal
031-1CD30	**SM 031 - Analog input**, 4 inputs 16Bit / 32 Parameter Bytes, Voltage 0…10V, incl. terminal

Item No.	Name / Description
031-1CD35	**SM 031 - Analog input**, 4 inputs 16Bit / 9 Parameter Bytes, Voltage 0… 10 V, incl. terminal
Analog Input Modules	
031-1CD40	**SM 031 - Analog input**, 4 inputs 16Bit / 32 Parameter Bytes, Current 0(4)…20mA, 2 wire, incl. terminal
031-1CD45	**SM 031 - Analog input**, 4 inputs 16Bit / 9 Parameter Bytes, Current 0(4)…20 mA, 2 wire, incl. terminal
031-1CD70	**SM 031 - Analog input**, 4 inputs 16Bit / 32 Parameter Bytes, Voltage -10V…+10V, incl. terminal
031-1LB90	**SM 031 - Analog input**, 2 inputs 16Bit / 10 Parameter Bytes, Thermocouple, Voltage -80mV…+80mV, incl. terminal
031-1LD80	**SM 031 - Analog input**, 4 inputs 16Bit / 12 Parameter Bytes, 0…3000 ohm resistance, Resistance measurement with 2, 3 and 4-wires, incl. terminal
DMS-Module	
031-1CA20	**SM 031 - Analog input**, Direct connection of a resistor full bridge (DMS) or load cell, 4- or 6-wire connection, 16 (24) Bit resolution, Auto/self-calibration zero point and final value, Absolute exactness radical error ±0.1% (±0.01%), Onboard power supply 2V5, 5V, 7V5, 10V and 12V, incl. terminal
Power Measurement Module	
031-1PA00	**SM 031** - Power measurement module, 1/3-phase 230/400V 5A, resolution measured value 24 Bit, incl. terminal
Analog Output Modules	
032-1BB30	**SM 032 - Analog output**, 2 outputs 12Bit / 8 Parameter Bytes, Voltage 0…10V, incl. terminal
032-1BB40	**SM 032 - Analog output**, 2 outputs 12Bit / 8 Parameter Bytes, Current 0(4)…20mA, incl. terminal
032-1BB70	**SM 032 - Analog output**, 2 outputs 12Bit / 8 Parameter Bytes, Voltage -10V…+10V, incl. terminal
032-1BD30	**SM 032 - Analog output**, 4 outputs 12Bit / 10 Parameter Bytes, Voltage 0…10V, incl. terminal
032-1BD40	**SM 032 - Analog output**, 4 outputs 12Bit / 10 Parameter Bytes, Current 0(4)…20mA, incl. terminal
032-1BD70	**SM 032 - Analog output**, 4 outputs 12Bit / 10 Parameter Bytes, Voltage -10V…+10V, incl. terminal
032-1CB30	**SM 032 - Analog output**, 2 outputs 16Bit / 8 Parameter Bytes, Voltage 0…10V, incl. terminal
032-1CB40	**SM 032 - Analog output**, 2 outputs 16Bit / 8 Parameter Bytes, Current 0(4)…20mA, incl. terminal
032-1CB70	**SM 032 - Analog output**, 2 outputs 16Bit / 8 Parameter Bytes, Voltage -10V…+10V, incl. terminal
032-1CD30	**SM 032 - Analog output**, 4 outputs 16Bit / 10 Parameter Bytes, Voltage 0…10V, incl. terminal
032-1CD40	**SM 032 - Analog output**, 4 outputs 16Bit / 10 Parameter Bytes, Current 0(4)…20mA, incl. terminal
032-1CD70	**SM 032 - Analog output**, 4 outputs 16Bit / 10 Parameter Bytes, Voltage -10V…+10V, incl. terminal

Item No.	Name / Description
RS232/422/485 – and Other CPs	
040-1BA00	**CP 040 - Communication processor**, RS232 interface, incl. terminal
040-1CA00	**CP 040 - Communication processor**, RS422/485 interface, incl. terminal
Motion Modules	
054-1BA00	**FM054 - Stepper motor module, incl. terminal**
054-1CB00	**FM054 - DC Motor module, incl. terminal**
054-1DA00	**FM054 - Pulse Train output module, incl. terminal**
Counter Modules	
050-1BA00	**FM 050 - Counter module**, 1 Counter 32 Bit (AB), 24VDC, DO1 0.5A, incl. terminal
050-1BA10	**FM 050 - Counter module**, 1 Counter 32 Bit (AB), 5VDC, 2MHz, incl. terminal
050-1BB00	**FM 050 - Counter module**, 2 Counter 32 Bit (AB), 24VDC, incl. terminal
050-1BB30	**FM 050 - Counter module**, 2 Counter 32 Bit (AB), 24VDC ECO, incl. terminal
050-1BB40	**FM 050 - Counter module**, 2 Channels 24 Bit (AB), 24VDC, 600kHz, incl. terminal
SSI Modules	
050-1BS00	**FM 050S - SSI module**, SSI Encoder, Master or slave mode, Encoder frequency 125 kHz…2 MHz, µs timestamp for encoder value, incl. terminal
Fieldbus Slave Modules without I/Os	
053-1CA00	**IM 053CAN - CANopen slave**, 16Rx and 16 Tx PDOs, 2SDOs, PDO-Linking, PDO-Mapping: fix, up to 64 peripheral modules, incl. PS
053-1DN00	**IM 053DN - DeviceNet slave**, Group 2 only Device, Poll only Device, Baud rate: 125, 250 and 500KBit/s, up to 64 peripheral modules, incl. PS
053-1DP00	**IM 053DP - Profibus-DP slave**, 244 Byte input and 244 Byte output data, up to 64 peripheral modules, incl. PS
053-1EC01	**IM 053EC - EtherCAT Slave** incl. Power Module, 2-Port Switch, supports FMM, CoE, EoE, FoE, HotConnect, Web Server
053-1IP01	**IM 053IP - EtherNet/IP slave**, 1xRJ45, CIP, up to 64 peripheral modules, incl. PS
053-1ML00	**IM 053ML -** MECHATROLINK according to IEC 61158, IEC 61784 incl. PS, Up to 64 peripheral modules, Standard I/O profile (16byte and 64byte mode), Multi slave node with max. 9 stations, Max. 492byte input and 492byte output data, Integrated Web server
053-1MT00	**IM 053MT - Modbus/TCP slave**, 2xRJ45, I/O configuration via fieldbus, adjustable I/O cycle (0.5…4 ms), up to 64 peripheral modules, incl. PS
053-1PN00	**IM 053PN - PROFINET slave**, 2xRJ45, Transfer rate 100Mbit/s, up to 64 peripheral modules, incl. PS
Line Extension	
060-1AA00	**IM060 bus extension**, Master module for extension of the SLIO bus to another line, Connector: 1x RJ45 plug connector, Module width 25.8 mm, Connection cable: VIPA 950-0KD30. Module is installed at the last place in the line, IM060 and IM061 always form a pair

Item No.	Name / Description
Line Extension	
061-1BA00	**IM061 bus extension**, Slave module for extending SLIO bus up to 8 additional lines (up to 64 modules), Connector: 1x RJ45 plug connector, Module width 25.8 mm, Connection cable: VIPA 950-0KD30. Module is installed at the first place in the line, IM060 and IM061 always form a pair
Cable	
950-0KD30	**SLIO Line Extension Cable**, length 2m
35mm Profile Rail	
290-1AF30	**35 mm profile rail**, Length 530mm
Miscellaneous	
000-0AA00	**SLIO Bus cover**, 1 pc
000-0AB00	**SLIO Shield bus carrier**, 10 pcs
000-0AC00	**SLIO Coding keys**, keys for secure coding of SLIO modules, 100 pcs
000-0DN00	**SLIO DeviceNet jack for IM**, DeviceNet jack for IM053-1DN00, Contact surface: gold, Pole number: 5, Contact termination: spring force connection

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