VS-4A-EC
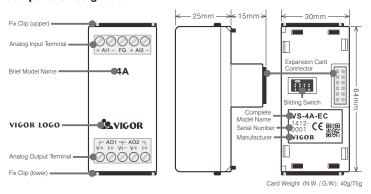## Analog Input and Output Expansion Card

VIGOR

Forward

The VS-4A-EC Analog Input/Output Expansion Card can receive 2 channels of external voltage or current signal inputs then convert the analog signals to 12-bit digital values. When the END instruction is executed, the VS Main Unit reads out AD conversion data from the VS-4A-EC card and stores the values to respective EC card registers. Thus, it provides the reference data for digital monitoring or controls. In addition, this card can generate 2 channels of external voltage or current signal outputs, those are by way of to convert the sources of 12-bit digital set values. When the END instruction is executed, the VS Main Unit sends out source data to the VS-4A-EC card and stores the values to respective EC card registers then its DA circuit converts the data to analog outputs. Thus, it provides two analog signal outputs from digital set values to control the external loads.

The VS-4A-EC Analog Input and Output Expansion Card is non-isolated. Please read following instructions before use.

Component Designation

Fix Clip (upper)
Analog Input Terminal — + AI1 − FG + AI2 −
Brief Model Name — 4A
VIGOR LOGO — VIGOR
Analog Output Terminal — AO1 AO2 / V+ I+ VI− V+ I+
Fix Clip (lower)

25mm / 15mm / 30mm / 64mm

Expansion Card Connector
Sliding Switch
Complete Model Name — VS-4A-EC
Serial Number — 1412-0001
Manufacturer — VIGOR

Card Weight (N.W. / G.W.): 40g/75g

Specification

Basic Specification

Item	Specification
Power Consumption	DC5V 20mA, DC12V 60mA (from PLC Main Unit)

Analog Input Specification

Item	Voltage Input Spec.	Current Input Spec.	
	The voltage or current input switch is located on the card's bottom also the operation mode special register is required to set.		
Analog Input Range	0~10V	4~20mA	0~20mA
Converted Value	0~4000	0~3200	0~4000
Input Resistance	200KΩ	250Ω	250Ω
Max. Resolution	2.5mV	5µA	5µA
Overall Accuracy	± 1% Overall Max.		
Response Time	1.2 ms × (No. of enabled AI CH.) + 15 µs × (No. of enabled AO CH.), the AI/AO values will be renewed or sent at the END instruction		
Isolation Method	No isolation between PLC and inputs; no isolation between input channels		
Max. Input Range	−0.5V~+12V	−2mA~+30mA	−2mA~+30mA
Conversion Curve Diagram			

Analog Output Specification

Item	Voltage Output Spec.	Current Output Spec.	
	The voltage or current output is selected by the EC card mode register, and those signals output through separate terminals.		
Analog Output Range	0~10V	4~20mA	0~20mA
Digital Set Range	0~4000	0~3200	0~4000
Load Resistance	500Ω~1MΩ	500Ω(Max.)	500Ω(Max.)
Max. Resolution	2.5mV	5µA	5µA
Overall Accuracy	± 1.5% Overall Max.		
Response Time	1.2 ms × (No. of enabled AI CH.) + 15 µs × (No. of enabled AO CH.), the AI/AO values will be renewed or sent at the END instruction		
Isolation Method	No isolation between PLC and outputs; no isolation between output channels		
Conversion Curve Diagram			

EC Card Register (Simple Code) Related to VS-4A-EC

EC1	EC2	EC3	Component Description
EC1D0	EC2D0	EC3D0	To assign the input modes of AI1~AI2.
EC1D1	EC2D1	EC3D1	Converted digital value of AI1, 0~4000 or 0~3200.
EC1D2	EC2D2	EC3D2	Converted digital value of AI2, 0~4000 or 0~3200.
EC1D10	EC2D10	EC3D10	To assign the output modes of AO1~AO2.
EC1D11	EC2D11	EC3D11	Digital set value for of AO1, 0~4000 or 0~3200.
EC1D12	EC2D12	EC3D12	Digital set value for value of AO2, 0~4000 or 0~3200.
EC1D18	EC2D18	EC3D18	Identification code: K103 (If get K240, that means the EC card cannot be connected.)
EC1D19	EC2D19	EC3D19	The version number of this card. (the content value XX indicates Ver. X.X)

(Right column)

To appoint the modes of analog inputs: (the sliding switch should also consistent with the modes)

b15 .... b0
| Nibble #4 | Nibble #3 | Nibble #2 | Nibble #1 |
| Null | Null | AI2 | AI1 |
To assign input modes

If the nibble = 0, the channel is assigned for (0~10V) voltage input.
If the nibble = 1, the channel is assigned for (4~20mA) current input.
If the nibble = 2, the channel is assigned for (0~20mA) current input.
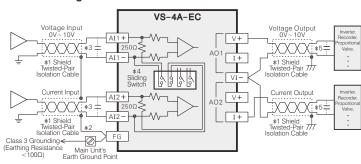If the nibble is any number other than 0, 1 or 2, the channel is disabled.

Example: If a VS-4A-EC is installed at the EC1, and its EC1D0 is set to be H10, then
AI1: voltage input (0~10V)   AI2: current input (4~20mA)

To appoint the modes of analog outputs:

b15 .... b0
| Nibble #4 | Nibble #3 | Nibble #2 | Nibble #1 |
| Null | Null | AO2 | AO1 |
To assign output modes

If the nibble = 0, the channel is assigned for (0~10V) voltage output.
If the nibble = 1, the channel is assigned for (4~20mA) current output.
If the nibble = 2, the channel is assigned for (0~20mA) current output.
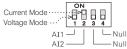If the nibble is any number other than 0, 1 or 2, the channel is disabled.

Example: If a VS-4A-EC is installed at the EC1, and its EC1D10 is set to be H10, then
AO1: voltage output (0~10V)   AO2: current output (4~20mA)

External Wiring

*1: Please use the Shield Twisted-Pair isolation cable for every analog input or output channel and keep the signal cable away from power lines to minimize external interference.

*2: First, please combine the ends of the cable shields. Then, connect that junction to the earth ground point of Main Unit. After that, make use of class 3 grounding for the point.

*3: If a voltage/current ripple occurs at converted value or there is electrically induced noise on the external wiring, please parallel connect a smoothing capacitor (0.1µF~0.47µF, 25V) between the input terminals.

*4 To set the operating modes of AI1~AI4, two things MUST be done:
1. Assign the relative nibbles at the EC card register.
2. Adjust the sliding switches on the bottom of card.
   Upper position (ON) is for current mode.
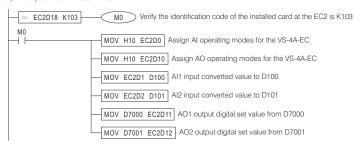   Lower position is for voltage mode.

*5: If a voltage/current ripple occurs at the signal input of the load device, please parallel connect a smoothing capacitor (0.1µF~0.47µF, 25V) between the input terminals to reduce the induced noise. Besides, ground the shield of the cable.

*6: For every analog output channel, either voltage or current output can be used but not both at the same time.
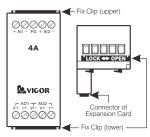
Example Program

Assume that VS-4A-EC is installed at the EC2.
Its AI1 is used for 0~10V input, AI2 is used for 4~20mA input. Input converted values of AI1~AI2 are sequentially stored at D100~D102.
Its AO1 is used for 0~10V output, AO2 is used for 4~20mA output. Output digital set values of AO1~AO2 are sequentially stored at D7000~D7001.

```
= EC2D18 K103        (M0)    Verify the identification code of the installed card at the EC2 is K103

M0
|--                   MOV H10 EC2D0     Assign AI operating modes for the VS-4A-EC
                      MOV H10 EC2D10    Assign AO operating modes for the VS-4A-EC
                      MOV EC2D1 D100    AI1 input converted value to D100
                      MOV EC2D2 D101    AI2 input converted value to D101
                      MOV D7000 EC2D11  AO1 output digital set value from D7000
                      MOV D7001 EC2D12  AO2 output digital set value from D7001
```

Expansion Card Installation Guide

● Every VS Series Expansion Card has 2 black fix clips (upper & lower), those have symbols and grooves.

Use a slot head screwdriver to slide the fix clips.

LOCK ←→ OPEN

Fix clip moves left to fasten card on PLC.   Fix clip moves right to loosen card from PLC.

● To install an expansion card, firstly, slide both the fix clips to the right, and insert the card to EC Socket on the Main Unit, then slide the fix clips to the left to fix the card.

● To remove an expansion card from the Main Unit, must slide both the fix clips to the right first, then pull the card from the Main Unit out.

Slide both the Fix Clips to the right.