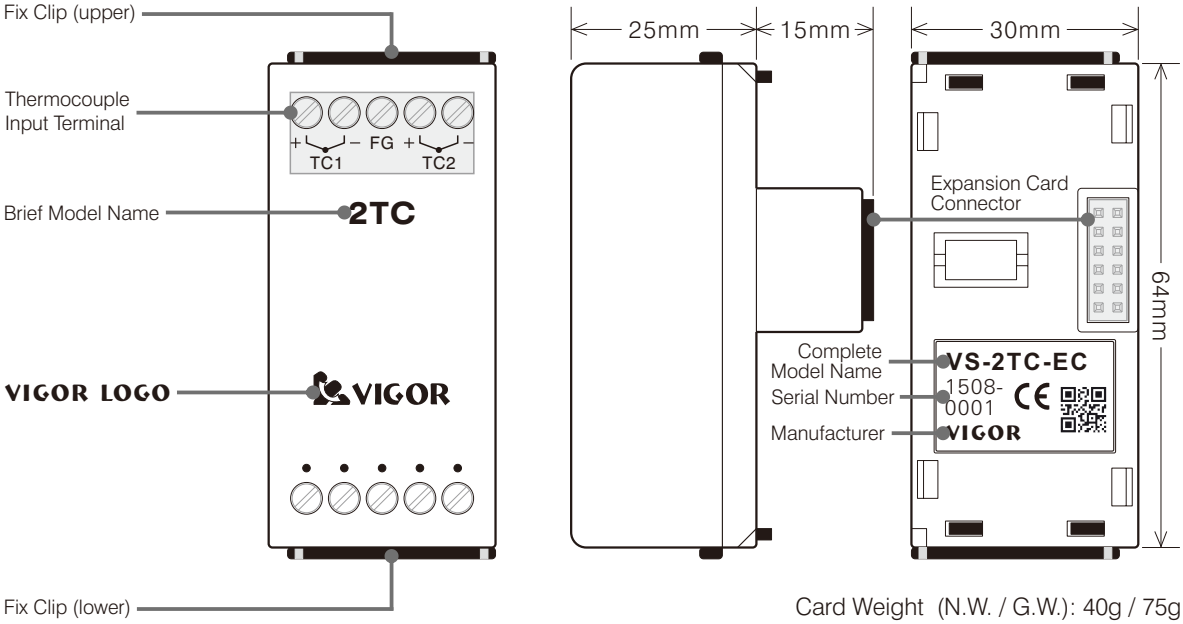
# VS-2TC-EC Temperature Input Expansion Card

The VS-2TC-EC Temperature Input Expansion Card can receive external 2 channels of thermocouple signal input, and converts those into temperature related digital values. When the END instruction is executed, the VS Main Unit reads out temperature conversion data from the VS-2TC-EC card and stores the values to respective EC card registers. Thus, it provides the reference data for digital monitoring or control.

Since between the input channels are non-isolated, the isolated (ungrounded) thermocouple sensors are required. Thus, the VS-2TC-EC Temperature Input Expansion Card is non-isolated. Please read following instructions before use.

- Product Exterior




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

- Product Specification

Basic Specification

| Item | Specification |
|---|---|
| Power Consumption | DC5V 7mA, DC12V 0mA (from PLC Main Unit) |

Performance Specification of Temperature Input

| Item | | Specification |
|---|---|---|
| Sensor Type | | K, J, R, S, T, E, B or N type isolated (ungrounded) thermocouple |
| Measurable Range | K | –200 ℃ ~ 1200 ℃ (–328 ℉ ~ 2192 ℉) |
| | J | –160 ℃ ~ 1200 ℃ (–256 ℉ ~ 2192 ℉) |
| | R | 0 ℃ ~ 1768 ℃ (32 ℉ ~ 3214.4 ℉) |
| | S | 0 ℃ ~ 1768 ℃ (32 ℉ ~ 3214.4 ℉) |
| | T | –220 ℃ ~ 400 ℃ (–364 ℉ ~ 752 ℉) |
| | E | –220 ℃ ~ 1000 ℃ (–364 ℉ ~ 1832 ℉) |
| | B | 300 ℃ ~ 1800 ℃ (572 ℉ ~ 3272 ℉) |
| | N | –200 ℃ ~ 1300 ℃ (–328 ℉ ~ 2372 ℉) |
| Converted Value | | The measurement results are indicated by the unit of 0.1 ℃ or 0.1 ℉. |
| Resolution | | 0.2 ℃ ~ 0.3 ℃ (0.36 ℉ ~ 0.54 ℉) |
| Overall Accuracy | | ± 1% (Overall Max.) ± 1 ℃ |
| Response Time | | 100 ms, the temperature values will be renewed at the END instruction. |
| Isolation Method | | No isolation between PLC and input channels.<br>No isolation between input channels. Please use the isolated (ungrounded) thermocouple sensors. |

- EC Card Register (Simple Code) Related to VS-2TC-EC

| EC1 | EC2 | EC3 | Component Description | |
|---|---|---|---|---|
| EC1D0 | EC2D0 | EC3D0 | To assign the thermocouple types for TC1～TC2. | |
| EC1D1 | EC2D1 | EC3D1 | To assign the unit of temperature measurement. 0:℃; 1:℉; other values: ℃. | |
| EC1D2 | EC2D2 | EC3D2 | Converted temperature value of TC1, with unit as 0.1 ℃ or 0.1 ℉. | |
| EC1D3 | EC2D3 | EC3D3 | Converted temperature value of TC2, with unit as 0.1 ℃ or 0.1 ℉. | |
| EC1D6 | EC2D6 | EC3D6 | To set the average times of TC1 | Usable set value is 1～32767; other values = 5. |
| EC1D7 | EC2D7 | EC3D7 | To set the average times of TC2 | |
| EC1D17 | EC2D17 | EC3D17 | Status and error flag | |
| EC1D18 | EC2D18 | EC3D18 | Identification code: K105 (If code = K240, means connecting error between Main Unit and card) | |
| EC1D19 | EC2D19 | EC3D19 | The version number of this card. (the content value □□ indicates Ver. □.□) | |

Assign Thermocouple Type:

| b15 | | | | b0 |
|---|---|---|---|---|
| Nibble #4 | Nibble #3 | Nibble #2 | Nibble #1 | |
| Null | Null | TC2 | TC1 | |

| Value of Nibble | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| Thermocouple Type | K | J | R | S | T | E | B | N |

If Value of Nibble is not 0～7, the channel is disabled.

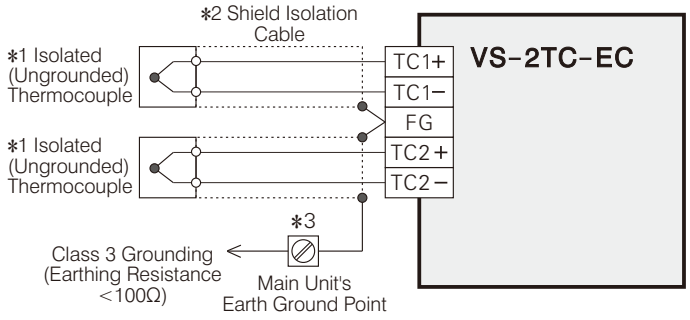
Example: If a VS-2TC-EC is installed at the EC1, and its EC1D0 is set to be H0010, then
TC1: K Type of thermocouple input, TC2: J Type thermocouple input.

Status and Error Flag:

| b15～b5 | b4 | b3 | b2 | b1 | b0 |
|---|---|---|---|---|---|

- b0: TC1 disconnected or converted value exceeds the range
- b1: TC2 disconnected or converted value exceeds the range
- b4: The hardware error flag of this card

- External Wiring




∗1: Always use isolated (ungrounded) thermocouple sensor

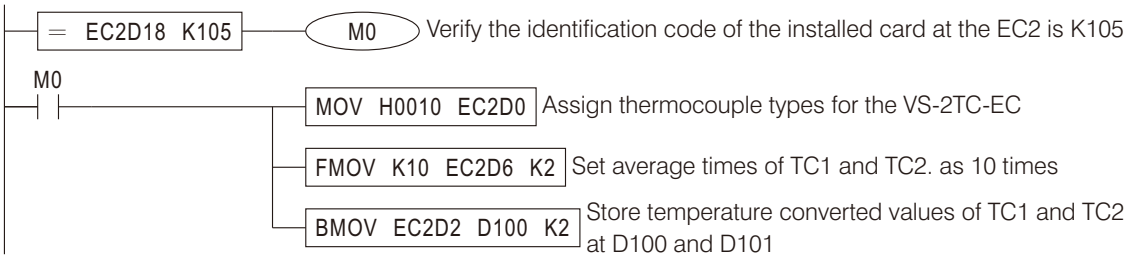
∗2: Please use the shield isolation cable for every temperature input. Must keep the signal cable away from any power line (including the power of motor, valve or contactor) to prevent external interference or card damage.

∗3: First, please connect the end of the covering layer of shielded cables to the FG terminal. Then, connect the FG to the earth ground point of Main Unit. After that, make use of class 3 grounding for the point.

∗4: Please use appropriate compensating cables for thermocouple extension.

- Example Program

The VS-2TC-EC is installed at the EC2, its TC1 is for the K Type thermocouple and TC2 is for the J Type thermocouple; the average times of each temperature input is set to be 10 times.
The input converted values of TC1～TC2 are sequentially stored at D100～D101.

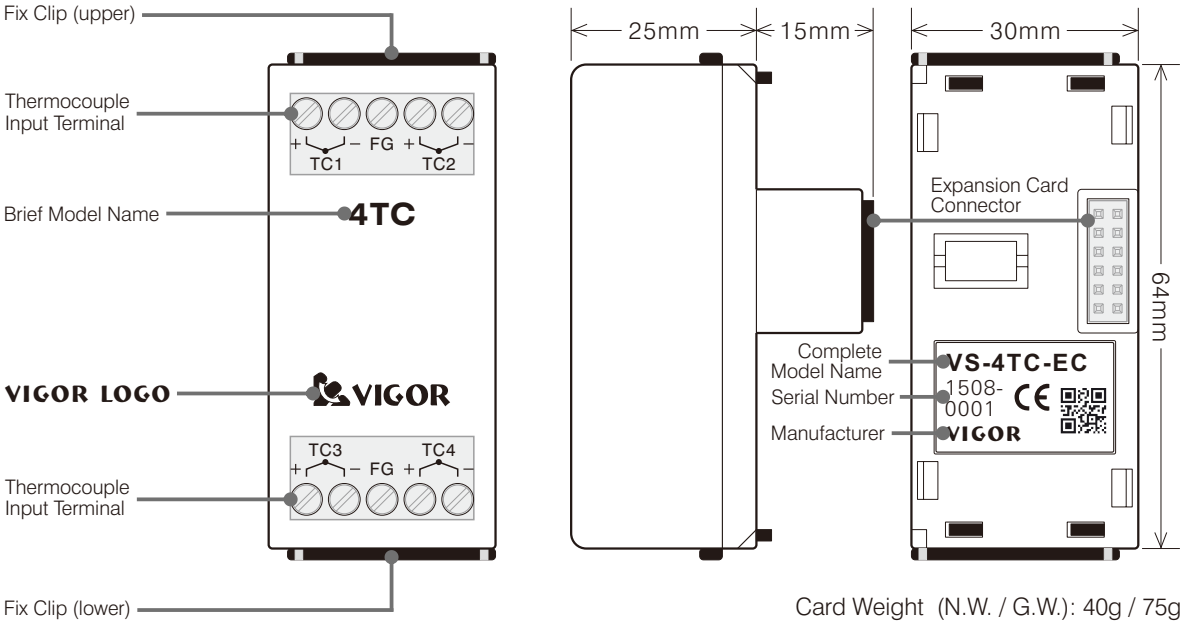


# VS-4TC-EC Temperature Input Expansion Card

The VS-4TC-EC Temperature Input Expansion Card can receive external 4 channels of thermocouple signal input, and converts those into temperature related digital values. When the END instruction is executed, the VS Main Unit reads out temperature conversion data from the VS-4TC-EC card and stores the values to respective EC card registers. Thus, it provides the reference data for digital monitoring or control.

Since between the input channels are non-isolated, the isolated (ungrounded) thermocouple sensors are required. Thus, the VS-4TC-EC Temperature Input Expansion Card is non-isolated. Please read following instructions before use.

- Product Exterior




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

- Product Specification

Basic Specification

| Item | Specification |
|---|---|
| Power Consumption | DC5V 7mA, DC12V 0mA (from PLC Main Unit) |

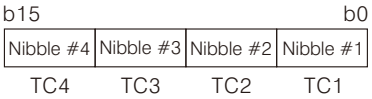
Performance Specification of Temperature Input

| Item | | Specification |
|---|---|---|
| Sensor Type | | K, J, R, S, T, E, B or N type isolated (ungrounded) thermocouple |
| Measurable Range | K | –200 ℃ ~ 1200 ℃ (–328 ℉ ~ 2192 ℉) |
| | J | –160 ℃ ~ 1200 ℃ (–256 ℉ ~ 2192 ℉) |
| | R | 0 ℃ ~ 1768 ℃ (32 ℉ ~ 3214.4 ℉) |
| | S | 0 ℃ ~ 1768 ℃ (32 ℉ ~ 3214.4 ℉) |
| | T | –220 ℃ ~ 400 ℃ (–364 ℉ ~ 752 ℉) |
| | E | –220 ℃ ~ 1000 ℃ (–364 ℉ ~ 1832 ℉) |
| | B | 300 ℃ ~ 1800 ℃ (572 ℉ ~ 3272 ℉) |
| | N | –200 ℃ ~ 1300 ℃ (–328 ℉ ~ 2372 ℉) |
| Converted Value | | The measurement results are indicated by the unit of 0.1 ℃ or 0.1 ℉ |
| Resolution | | 0.2 ℃ ~ 0.3 ℃ (0.36 ℉ ~ 0.54 ℉) |
| Overall Accuracy | | ±1% (Overall Max.) ±1 ℃ |
| Response Time | | 100 ms, the temperature values will be renewed at the END instruction. |
| Isolation Method | | No isolation between PLC and input channels.<br>No isolation between input channels. Please use the isolated (ungrounded) thermocouple sensors. |

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

| EC1 | EC2 | EC3 | Component Description | |
|---|---|---|---|---|
| EC1D0 | EC2D0 | EC3D0 | To assign the thermocouple types for TC1~TC4. | |
| EC1D1 | EC2D1 | EC3D1 | To assign the unit of temperature measurement. 0:℃; 1:℉; other values:℃. | |
| EC1D2 | EC2D2 | EC3D2 | Converted temperature value of TC1, with unit as 0.1 ℃ or 0.1 ℉. | |
| EC1D3 | EC2D3 | EC3D3 | Converted temperature value of TC2, with unit as 0.1 ℃ or 0.1 ℉. | |
| EC1D4 | EC2D4 | EC3D4 | Converted temperature value of TC3, with unit as 0.1 ℃ or 0.1 ℉. | |
| EC1D5 | EC2D5 | EC3D5 | Converted temperature value of TC4, with unit as 0.1 ℃ or 0.1 ℉. | |
| EC1D6 | EC2D6 | EC3D6 | To set the average times of TC1 | Usable set value is 1~32767; other values = 5. |
| EC1D7 | EC2D7 | EC3D7 | To set the average times of TC2 | |
| EC1D8 | EC2D8 | EC3D8 | To set the average times of TC3 | |
| EC1D9 | EC2D9 | EC3D9 | To set the average times of TC4 | |
| EC1D17 | EC2D17 | EC3D17 | Status and error flag | |
| EC1D18 | EC2D18 | EC3D18 | Identification code: K106 (If code = K240, means connecting error between Main Unit and card) | |
| EC1D19 | EC2D19 | EC3D19 | The version number of this card. (the content value □□ indicates Ver. □.□) | |

To appoint the types of thermocouples:

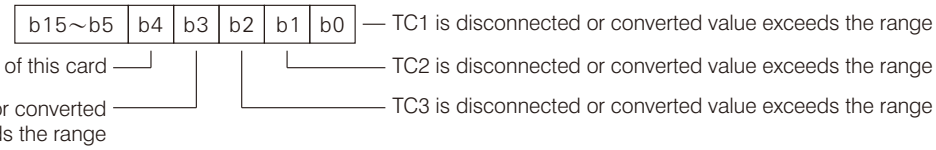



| Value of Nibble | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| Thermocouple Type | K | J | R | S | T | E | B | N |

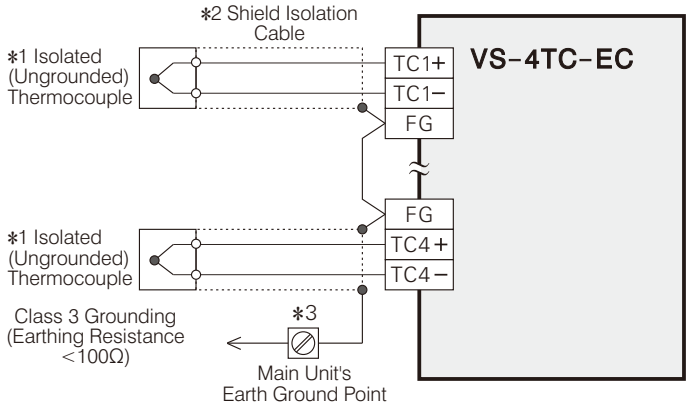
If Value of Nibble is not 0~7, the channel is disabled.

Example: If a VS-4TC-EC is installed at the EC1, and its EC1D0 is set to be H8100, then
TC1 & TC2: K Type of thermocouple input, TC3: J Type thermocouple input, TC4: disabled

Status and Error Flag:




- External Wiring




∗1: Always use isolated (ungrounded) thermocouple sensor

∗2: Please use the shield isolation cable for every temperature input. Must keep the signal cable away from any power line (including the power of motor, valve or contactor) to prevent external interference or card damage.

∗3: First, please connect the end of the covering layer of shielded cables to the FG terminal. Then, connect those FGs to the earth ground point of Main Unit. After that, make use of class 3 grounding for the point.

∗4: Please use appropriate compensating cables for thermocouple extension.

- Example Program

The VS-4TC-EC is installed at the EC2, its TC1 is for the K Type thermocouple and TC2~TC4 are for the J Type thermocouples; the average times of each temperature input is set to be 10 times.
The input converted values of TC1~TC4 are sequentially stored at D100~D103.