

VC-4TC Thermocouple Type Temperature Input Module User Manual

Thank you for purchasing the VC-4TC thermocouple type temperature input module developed and manufactured by Suzhou VEICHI Electric Technology Co., Ltd. Before using our VC series PLC products, please read this manual carefully in order to have a clearer understanding of the product features and to install and use it correctly. You can make full use of the rich functions of this product for a safer application.

Tip:

Please read the operating instructions, precautions and cautions carefully before starting to use the product in order to reduce the risk of accidents. Personnel responsible for the installation and operation of the product must be strictly trained to comply with the safety codes of the relevant industry, strictly observe the relevant equipment precautions and special safety instructions provided in this manual, and carry out all operations of the equipment in accordance with the correct operating methods.

1 Interface description

1.1 Interface description

The expansion interface and user terminals of the VC-4TC are covered with flaps, the appearance of which is shown in Figure 1-1. Opening each cover reveals the expansion interface and user terminals, as shown in Figure 1-2

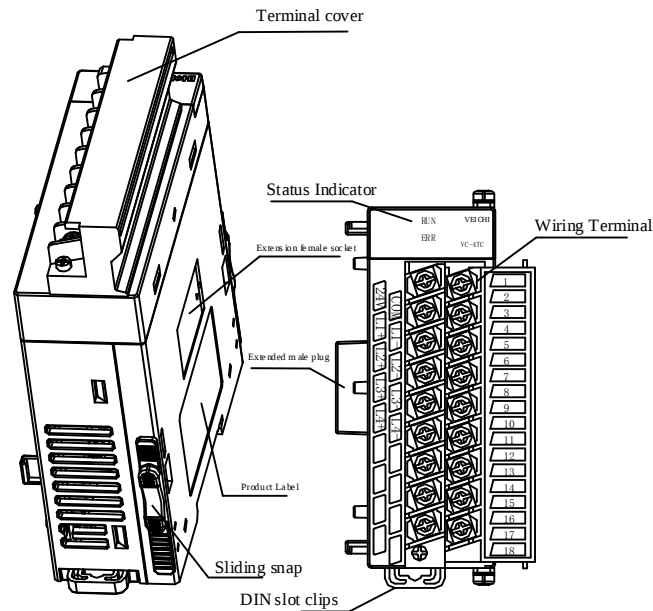


Figure 1-1 Appearance of the module interface

Figure 1-2 Module interface terminal diagram

1.2 Product information

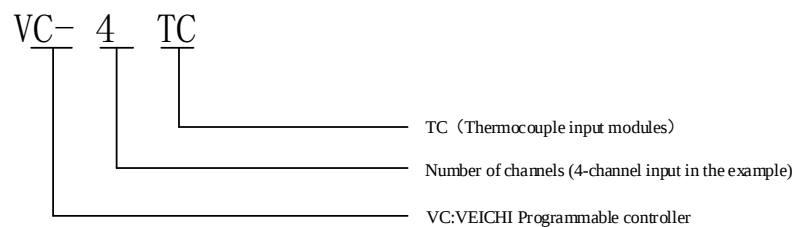


Figure 1-2 Product type description

1.3 Definition of terminal

No.	Marking	Description	No.	Marking	Description
1	24V	Analogue power supply 24V positive	2	COM	Analogue power supply 24V negative
3	L1+	Channel 1 thermocouple positive	4	L1-	Channel 1 thermocouple negative
5	L2+	Channel 2 thermocouple positive	6	L2-	Channel 2 thermocouple negative
7	L3+	Channel 3 thermocouple positive	8	L3-	Channel 3 thermocouple negative
9	L4+	Channel 4 thermocouple positive	10	L4-	Channel 4 thermocouple negative
11~18	Reserved				

Figure 1-3 Terminal definition

1.4 Access system

The VC-4TC is used in VC series programmable controller systems and can be plugged into the system by hardwiring it, see Figure 1-3 for the access method and plugging it into the expansion interface of the main module or any expansion module in the system.

Once the VC-4TC is connected to the system, its expansion interface can also be used to connect other expansion modules of the VC series, such as IO expansion modules, VC-4DA, VC-4PT, etc., and of course the VC-4TC.

The main module of the VC series programmable controller can be extended with several IO expansion modules and special function modules. The number of expansion modules to be connected depends on the amount of power the modules can provide, as described in 4.7 Power Supply Specifications in the VC Series Programmable Controller User Manual.

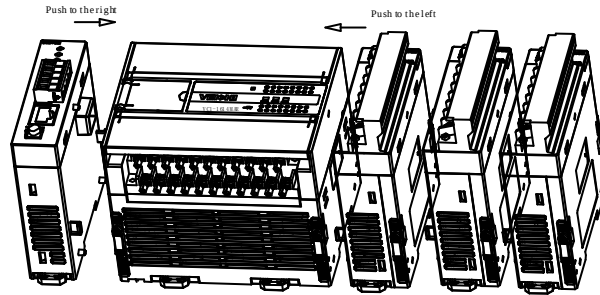


Figure 1-4 Schematic diagram of the connection of the VC-4TC to the main module and other expansion modules

1.5 Wiring instruction

User terminal wiring requirements, as shown in Figure 1-4

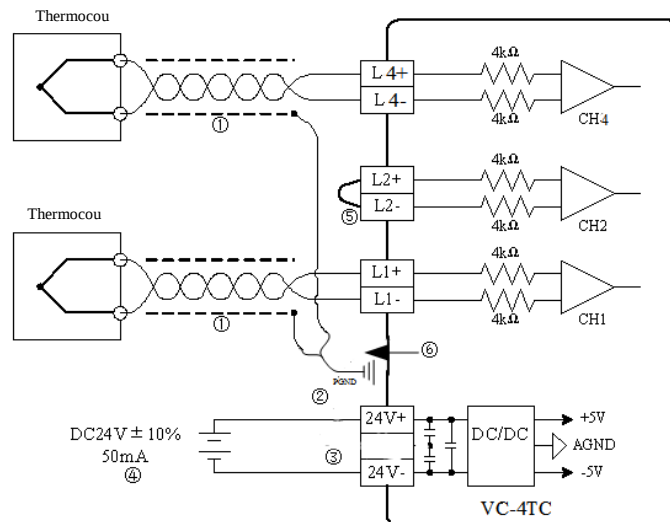


Figure 1-5 Diagram of VC-4TC user terminal wiring

For user terminal wiring requirements, please refer to Figure 1-5. when wiring, you are requested to pay attention to the following 7 aspects.

The diagrams ① to ⑥ indicate the six aspects that must be taken into account when wiring.

① The thermocouple signal is recommended to be connected via a shielded compensation cable. The cable should be routed away from power lines or other wires that may cause electrical interference. The use of long compensation cables is susceptible to noise interference and it is recommended that compensation cables less than 100 metres in length are used. The presence of impedance in the compensation cable introduces measurement errors, which can be resolved by characteristic adjustment, as described in section 3 of this manual under Characteristic settings.

② If there is excessive electrical interference, connect the shield ground to earth.

③ Ground the ground terminal PE of the switching power supply well.

④ The analogue power supply can use the auxiliary output 24Vdc power supply of the main module or another power supply that meets the requirements.

⑤ Short the connection between the positive and negative terminals of the channel not in use, in case incorrect data will be detected on this channel.

⑥ If all multiplexed thermocouples need to be connected to the shield, the terminals can be externally expanded.

2 Instructions for use

2.1 Power indicator

Table 2-1 Power supply indicators

Project	Indicator
Analog circuits	24Vdc (-10% to +10%) max. allowable ripple voltage 5% 55mA (from mains module or external power supply)
Digital Circuit	5Vdc, 70mA (from the main module)

2.2 Performance indicator

Table 2-2 Performance indicator

Project	Indicator			
	Celsius (℃)		Fahrenheit (℉)	
Number of I/O points occupied	No			
Input signal	Thermocouples: types K, J, E, N, T, R, S (all 7 types available for each channel), 4 channels in total.			
Conversion speed	(240±2%) ms × 4 channels (no conversion for channels not in use)			
Rated temperature range	Type K	－100℃～1200℃	Type K	－148 ℉～2192 ℉
	Type J	－100℃～1000℃	Type J	－148 ℉～1832 ℉
	Type E	－100℃～1000℃	Type E	－148 ℉～1832 ℉
	Type N	－100℃～1200℃	Type N	－148 ℉～2192 ℉
	Type T	－200℃～400℃	Type T	－328 ℉～752 ℉
	Type R	0℃～1600℃	Type R	32 ℉～2912 ℉
	Type S	0℃～1600℃	Type S	32 ℉～2912 ℉
Digital output	16-bit AD conversion, stored as 16-bit binary complement			
	Type K	－1000～12000	Type K	－1480～21920
	Type J	－1000～10000	Type J	－1480～18320
	Type E	－1000～10000	Type E	－1480～18320
	Type N	－1000～12000	Type N	－1480～21920
	Type T	－2000～4000	Type T	－3280～7520
	Type R	0～16000	Type R	320～29120
	Type S	0～16000	Type S	320～29120
Minimum resolution	Type K	0.8℃	Type K	1.44 ℉
	Type J	0.7℃	Type J	1.26 ℉
	Type E	0.5℃	Type E	0.9 ℉
	Type N	1℃	Type N	1.8 ℉
Minimum resolution	Type T	0.2℃	Type T	0.36 ℉
	Type R	1℃	Type R	1.8 ℉
	Type S	1℃	Type S	1.8 ℉
Total accuracy correction point	± (0.5% full range + 1 ℃), pure water condensation point: 0 ℃/32 ℉			
Isolation	Isolation between analogue and digital circuits with optocouplers.			
	Isolation between the analogue circuit power supply and the 24 Vdc supply by DC/DC.			
Note: With the appropriate mode setting, both ℃ and ℉ data can be obtained.				

2.3 Indicator light description

Projects	Description
Signal indicator	RUN status indicator, blinking when normal ERR error status indicator, illuminated on failure
Expansion module rear stage interface	Connection of rear modules, hot-swappable not supported
Expansion module front interface	Connection of front-end modules, hot-swappable not supported

3 Characteristic settings

(1) The input channel characteristics of the VC-4TC are the linear relationship between the channel analogue input temperature A and the channel digital quantity D , which can be set by the user. Each channel can be understood as the model shown in Figure 3-1, and since it is linear, the characteristics of the channel can be determined by determining two points $P_0 (A_0, D_0)$ and $P_1 (A_1, D_1)$, where D_0 indicates the channel output digital quantity when the analogue input is A_0 , and D_1 indicates the channel output digital quantity when the analogue input is A_1 .

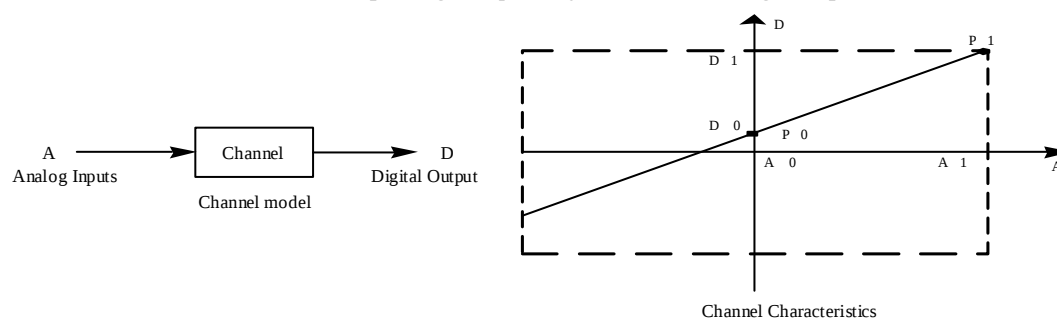
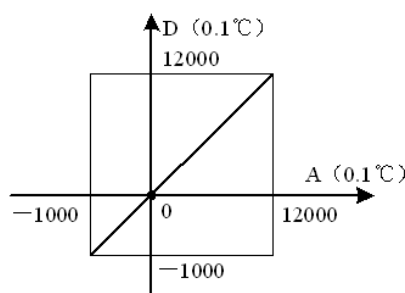


Figure 3-1 Schematic diagram of the channel characteristics of the VC-4TC

(2) The measurement error is caused by the impedance of the connection cable, which can be eliminated by setting the channel characteristics. Considering the user's ease of use and without affecting the function, in the current mode, A_0 and A_1 are corresponding to [Measured Value 1] and [Measured Value 2] respectively, and D_0 and D_1 are corresponding to [Standard Value 1] and [Standard Value 2] respectively, as shown in Figure 3-1, the user can change the channel characteristics by adjusting (A_0, D_0) and (A_1, D_1) , the factory default (A_0, D_0) is the external The factory default (A_0, D_0) is the 0 value of the external analogue temperature, (A_1, D_1) is the maximum value of the external analogue temperature 12000 (unit: 0.1°C). Factory setting as shown in Figure 3-2, A_0 is 0, A_1 is 12000 (unit is 0.1°C)



Factory setting (no adjustment)

Figure 3-2 Corresponding channel characteristics for each mode without changing the D_0 and D_1 values for each channel

(3) The channel characteristics can be changed if the D0 and D1 values of the channel are changed. If the VC-4TC measurement value is 5 °C (41 °F) higher in practice, the error can be eliminated by setting the two points P0 (0,-50) and P1 (12000,11950) of the characteristic adjustment, see Figure 3-3 for an example.

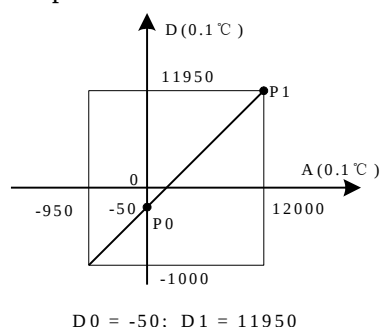
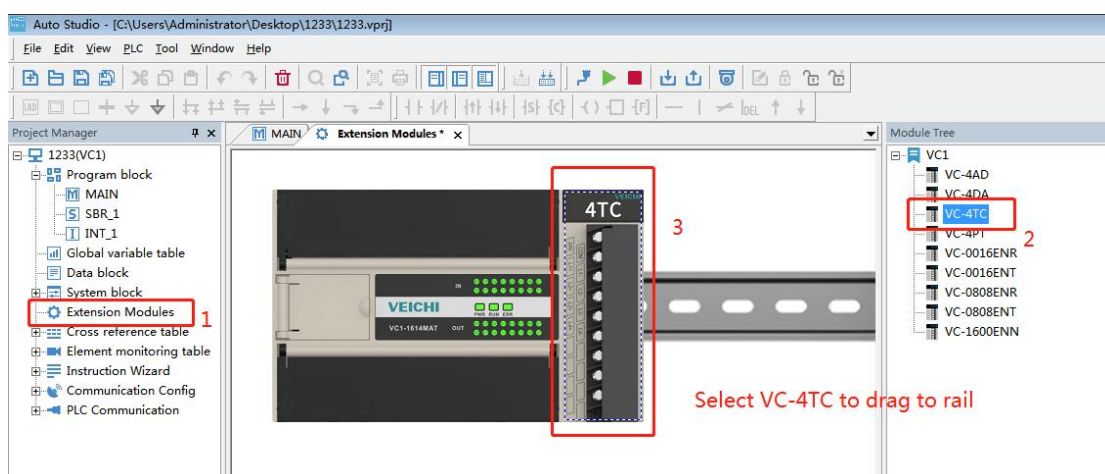


Figure 3-3 Example of characteristic change

4 Programming example

4.1 Programming example for VC series + VC-4TC module

As shown in the example below, the VC-4TC is connected to position 1 of the expansion module and uses channel 1 to access thermocouple type K for Celsius temperature, channel 2 to access thermocouple type J for Celsius temperature, channel 3 to access thermocouple type K for Fahrenheit temperature, channel 4 is switched off, the average number of points is set to 8 and the average conversion result is received using data registers D1, D3 and D5. The settings are shown in Figures 4-1 to 4-3. See the VC Series Programmable Controllers Programming Reference Manual for further details. Create a new project and configure the hardware for the project, as shown below



As shown in Figure 4-1

2) Double click on the "4TC" module to enter the 4TC setup screen - as shown below

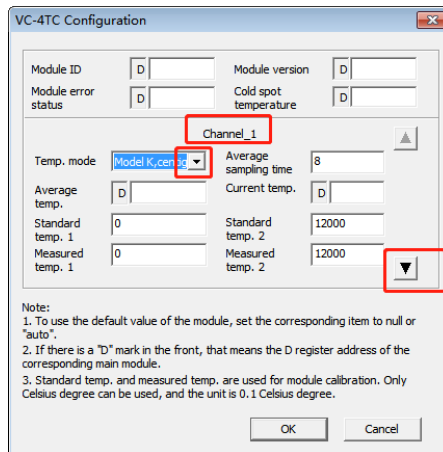


Figure 4-1 Basic application channel one setup

3) Click on "▼" for the second channel mode configuration.

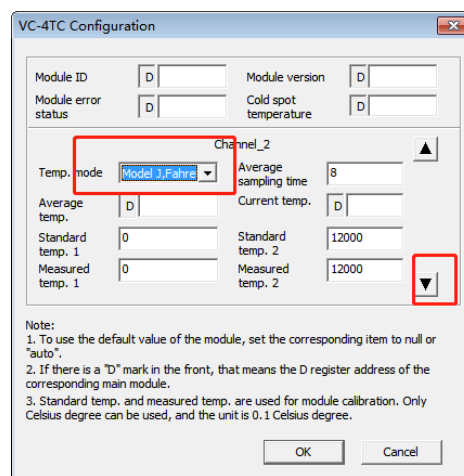


Figure 4-2 Basic Application Channel 2 Setup

4) Click on "▼" to configure the third channel mode and click on "Confirm" when finished.

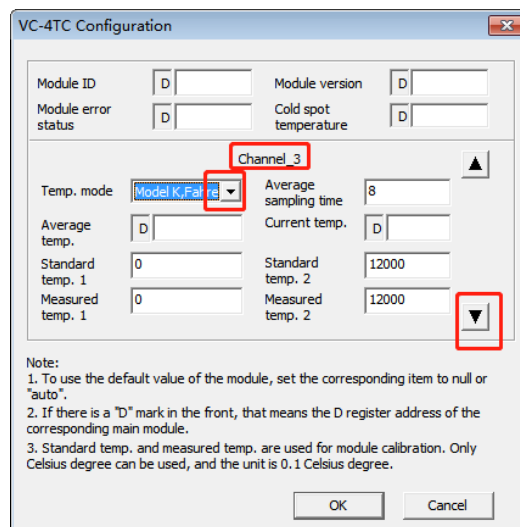


Figure 4-3 Basic application channel three settings

5 Installation

5.1 Mounting dimensions

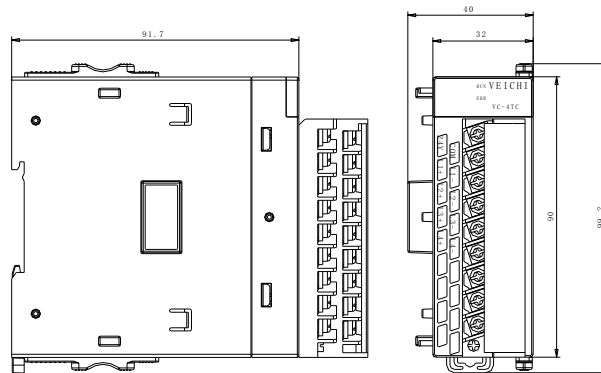


Figure 5-1 Mounting dimensions (in mm)

5.2 Mounting method

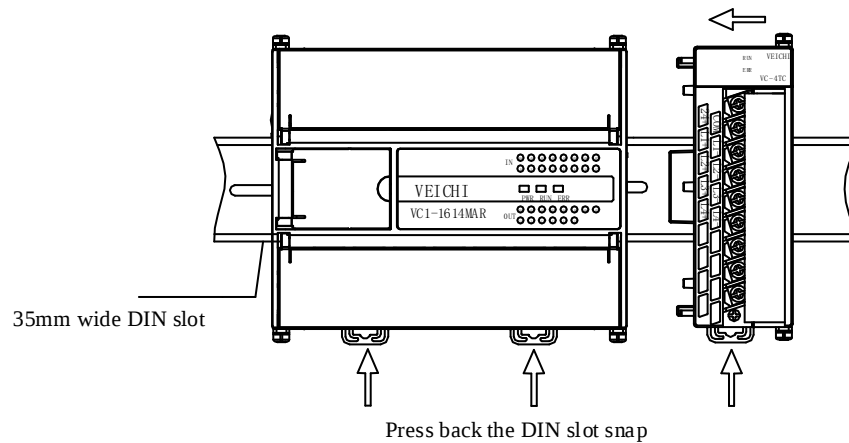


Figure 5-2 Module mounting method

6 Operational check

6.1 Routine check

1. Check that the analogue input wiring meets the requirements, refer to 1.4 Wiring instructions.
2. Check that the VC-4TC is reliably plugged into the expansion connector.
3. Check that the 5V and 24V power supplies are not overloaded. Note: The power supply for the digital part of the VC-4TC comes from the main module and is supplied via the expansion interface.
4. Check the application to ensure that the correct operating method and parameter range has been selected for the application.
5. Set the main module to which the VC-4TC is connected to RUN status.

6.2 Fault checking

If the VC-4TC is not operating properly, check the following items.

- Checking the status of the main module "ERR" indicator.

Blinking: Check the connection of the expansion module and the consistency between the configuration model of the special module and the actual connected module model.

extinguished: the expansion interface is correctly connected.

- Check the analog wiring.

Check that the wiring is accurate, refer to Figure 1-5.

Check the status of the module's "ERR" indicator

If the 24Vdc power supply is normal, then the VC-4TC is faulty.

Off: 24Vdc power supply is normal.

Check the status of the "RUN" indicator

Blinking: The VC-4TC is operating normally.

For Users

1. The scope of the warranty refers to the programmable controller body.
2. The warranty period is eighteen months. If the product fails or is damaged during the warranty period under normal use, we will repair it free of charge.
3. The start of the warranty period is the date of manufacture of the product, the machine code is the only basis for determining the warranty period, equipment without the machine code is treated as out of warranty.
4. Even within the warranty period, a repair fee will be charged for the following cases.
failure of the machine due to non-operation in accordance with the user manual.
Damage to the machine caused by fire, flooding, abnormal voltage, etc..
Damage caused when using the programmable controller for a function other than its normal function.
5. The service charge will be calculated on the basis of the actual cost, and if there is another contract, the contract will take precedence.
6. Please make sure that you keep this card and present it to the service unit at the time of warranty.
7. If you have a problem, you can contact your agent or you can contact us directly.

Suzhou VEICHI Electric Technology Co., Ltd

China Customer Service Center

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Service hotline: 400-600-0303 website: www.veichi.com

Data version v1.0 filed on July 30, 2021

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VEICHI Product warranty card

Customer information	Company address:	
	Company name:	contacts:
		contact number:
Product information	Product model:	
	Body barcode:	
	Name of agent:	
Fault information	Maintenance time and content:	
	Repairer:	
Mailing address	Suzhou VEICHI Electric Technology Co., Ltd Address: No. 1000, Songjia Road, Wuzhong Economic and Technological Development Zone	