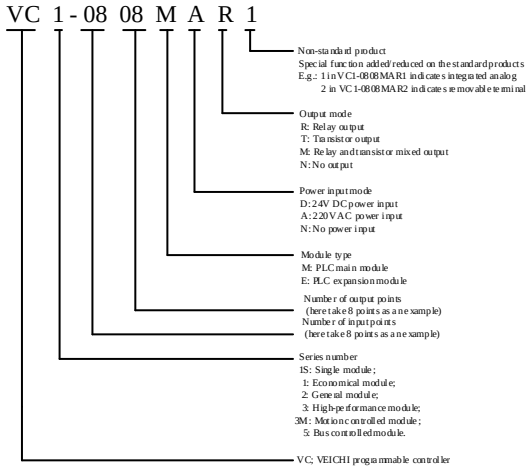
VC1-0808MAR1 PLC Quick Reference Manual

This manual provides a quick on-site access for users to the information of the design, installation, connection and maintenance of the VC1-0808MAR1 series PLC. It briefly describes the hardware specifications, features and usage of the VC1-0808MAR1 Series PLC, as well as the associated accessories, answers to the frequently asked questions, and other information for easy reference. For more detailed product information, please refer to the "VC Series Programmable Controller Manual" and "AutoStudio Programming Software Manual" issued by VEICHI. Please consult with the supplier if needed. Users can also download PLC related technical information or give feedback on PLC related questions on https://www.veichi.com.

1 Production Introduction

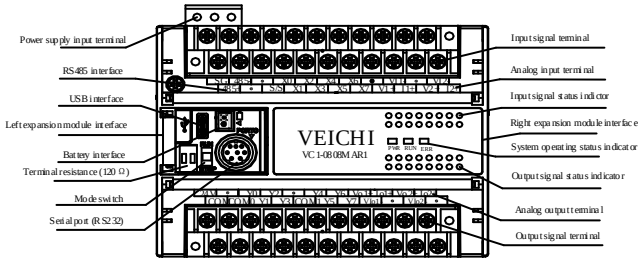
1.1 Module Description

Module description is shown below:



1.2 Appearance and Structure

The appearance and structure of VC1-0808MAR1 is shown below:



VC1-0808MAR1 adopts RS232 and Mini DIN8 socket, 1 channel of RS485 and Type-C USB interface. The right expansion module interface is used to connect the expansion module, the left one is used to connect the expansion communication module. There are two options for the mode switch, ON/OFF, and one RS485 terminal resistor with a resistance of 120 Ω (DIP No. 1).

1.3 Terminal Introduction

Terminal Arrangement

Input terminal:

SG	485-	•	X0	X2	X4	X6	•	VI1-	•	VI2-
485+	•	S/S	X1	X3	X5	X7	V1+	I1+	V2+	I2+

Output terminal:

24V	•	Y0	Y2	•	Y4	Y6	Vo1+	Io1+	Vo2+	Io2+
COM	COM0	Y1	Y3	COM1	Y5	Y7	VIo1-	•	VIo2-	•

Input	Description	Output	Description
SG	485 signal ground	24V	Analog power supply 24V positive
485+	485 signal positive	COM	Analog power supply 24V negative
485-	485 signal negative	COM0	Y-point common ground 1
S/S	Common terminal for input signal	Y0	Channel1 signal output terminal
X0	Channel1 signal input terminal	Y1	Channel2 signal output terminal
X1	Channel2 signal input terminal	Y2	Channel3 signal output terminal
X2	Channel3 signal input terminal	Y3	Channel4 signal output terminal
X3	Channel4 signal input terminal	COM1	Y-point common ground 2
X4	Channel5 signal input terminal	Y4	Channel5 signal output terminal
X5	Channel6 signal input terminal	Y5	Channel6 signal output terminal
X6	Channel7 signal input terminal	Y6	Channel7 signal output terminal
X7	Channel8 signal input terminal	Y7	Channel8 signal output terminal
V1+	Channel1 voltage input signal positive	Vo1+	Channel1 voltage signal output terminal
I1+	Channel1 current input signal positive	Io1+	Channel1 current signal output terminal
VI1-	Channel1 AI common ground	VIo1-	Channel1 AO common ground
V2+	Channel2 voltage input signal positive	Vo2+	Channel2 voltage signal output terminal
I2+	Channel2 current input signal positive	Io2+	Channel2 current signal output terminal
VI2-	Channel2 analog signal common ground	VIo2-	Channel2 AO common ground

2 Power Supply Specification

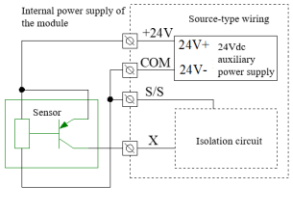
The specifications of the built-in power supply of the main module and those that the main module can supply to expansion modules are shown as below.

Item		Unit	Min.	Typ.	Max.	Description
Input voltage range		Vac	120	220	264	Voltage range for proper start and operation
Input current		A	/	/	1.5	120Vac input, full-load output
Rated output current	5V/GND	mA	/	1500	/	The sum power of 5V/GND and 24V/GND shall not exceed 26W.
	+15V/ GND	mA	/	100	/	
	-15V/ GND	mA	/	100	/	
	24V/GND	mA	/	750	/	
	24V/COM	mA	/		/	

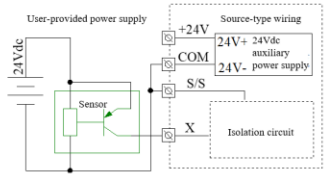
3 Switch Input and Output Characteristics

3.1 Input Characteristics and Signal Specifications

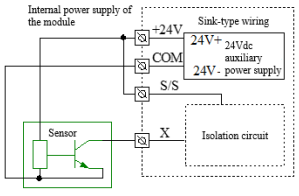
The PLC provides the “S/S” port for selecting the signal input mode, which can be set as source-type or sink-type mode. Connecting “S/S” to “+24V” means users select the sink-type mode, and then an NPN-type sensor can be connected.



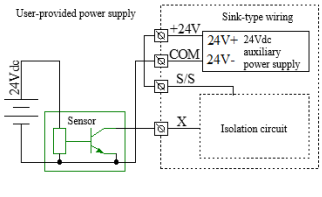
Wiring of source-type input using module internal power



Wiring of source-type input using external auxiliary power



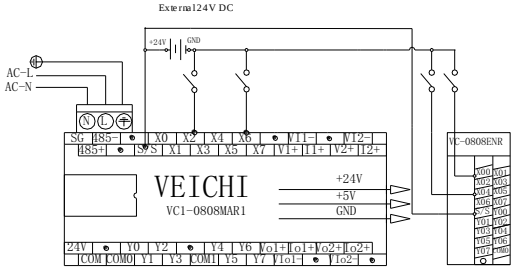
Wiring of sink-type input using module internal power



Wiring of sink-type input using module internal power

Input connection instance

The following figure shows the connection between the VC1-0808MAR1 main module and the VC-0808ENR expansion module, and the user signals can be distributed among the X0 to X7 input terminals.



3.2 Output Characteristics and Signal Specifications

The comparison of relay and transistor output types is shown below.

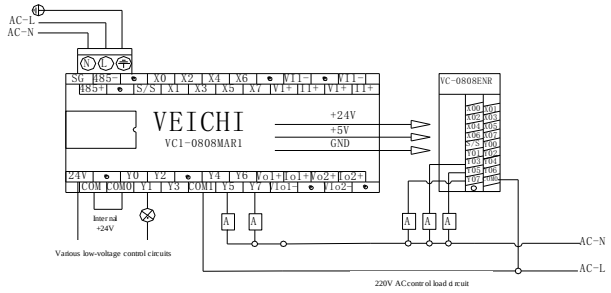
Item	Relay	Transistor
Mode	The output is connected when the its status is ON; and it's disconnected when the status is OFF.	
Common terminal	Several groups are there with a common terminal COMn in each group, adapting to control circuits in different potentials. All common terminals are isolated from each other.	
Voltage	220Vac, 24Vdc, no polarity requirements	24Vdc with polarity requirements
Current	In accordance with the output electrical codes	
Characteristics	High drive voltage and high current	Low drive current, high frequency, long service life
Application	Loads with low operating frequency of intermediate relay, contactor coil, indicator light, etc.	Scenarios with high operating frequency and long service life of control servo amplifier, frequently operated electromagnet, etc.

The output electrical codes are as below.

Item		Relay	Transistor
Circuit power supply voltage		Below 250Vac, 30Vdc	5~24Vdc
Circuit insulation		Mechanical insulation	Optocoupler insulation
Operation indication		The relay output contact is connected and the indicator light is on	The indicator light is on when the optocoupler is driven
Leakage current in open circuit		/	Less than 0.1mA/30Vdc
Min. load		2mA/5Vdc	5mA (5~24Vdc)
Max. output current	Resistive load	2A/1-point 8A/4-point group of COM 8A/6-point group of COM 8A/8-point group of COM	Y0/Y1/Y2: 0.3A/ 1-point group Others: 0.3A/1-point Above 8 points, total current increases 0.1A at each point increase
	Inductive load	220Vac, 80VA	Y0/Y1/Y2: 7.2W/24Vdc Others: 12W/24Vdc
	Lamp load	220Vac, 100W	Y0/Y1/Y2: 0.9W/24Vdc Others: 1.5W/24Vdc
Response time	OFF→ON	20ms Max	Y0/Y1/Y2: 10μs Others: 0.5ms
	ON→OFF	20ms Max	
Y0,Y1,Y2 max. output frequency		/	Each channel: 100kHz
Output common terminal		Y0/Y1/Y2/Y3—COM0. Y4/Y5/Y6/Y7—COM1. One COM can be shared by a maximum of 8 terminals after Y10, all common terminals are isolated from each other	
Fuse protection		None	

Output connection instance

The following diagram shows the connection between VC1-0808MAR1 main module and VC-0808ENR expansion module. Different output groups can be connected to different signal circuits with different voltages. Some (like Y1-COM0) are connected to the 24Vdc circuit powered by the 24V COM of this controller. Some (like Y5, Y7) are connected to the 220Vac voltage signal circuit. That is, different output groups can operate in circuits with different voltage levels.



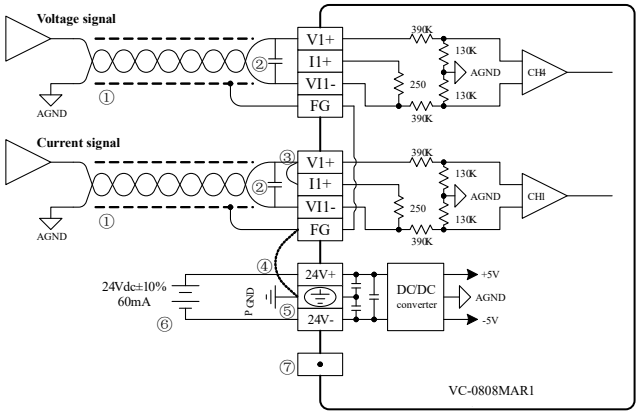


Figure 4-1 Wiring of user terminals

In the figure, ① to ⑦ refers to the 7 notes for wiring:

1. It is recommended to connect the analog inputs via twisted shielded cables. Lines should be routed away from power cables or other lines that may cause electrical disturbance.
2. Connect a smoothing capacitor (0.1μF~0.47μF/25V) if there are any input signal fluctuations or electrical disturbances in the external wiring.
3. If it is a channel for current input, please short the voltage input to the current input for that channel.
4. If there are too many electrical disturbances, connect the shielding ground FG to the module ground terminal PG.
5. Ground the module's ground terminal PG well.
6. The analog power supply can adopt the 24Vdc power supply output by the main module, or any other power supply that meets the requirements.
7. Do not use the NC on the user terminal.

Table 4-2 Performance indicator

Item		Description	
Conversion speed		2ms/channel	
AI	Voltage input	-10Vdc to +10Vdc, input impedance: 1MΩ	4 channels can be used simultaneously.
	Current input	-20mA to +20mA, input impedance: 250Ω	
DO		Current setting range: -2000~+2000 Voltage setting range: -10000~+10000	
Limit voltage		±12V	
Limit current		±24mA	
Resolution	Voltage input	<1mV	
	Current input	10μA	
Accuracy		±0.5% of the full scale	
Isolation		The analog and digital circuits are isolated by optocouplers. The analog circuit is internally isolated from the 24Vdc power supply for module charging. Analog channels are not isolated from each other.	

4 Analog I/O Characteristics

4.1 AI Wiring Instruction

The wiring requirements of user terminals are shown in Figure 4-1.

4.2 AO Wiring Instruction

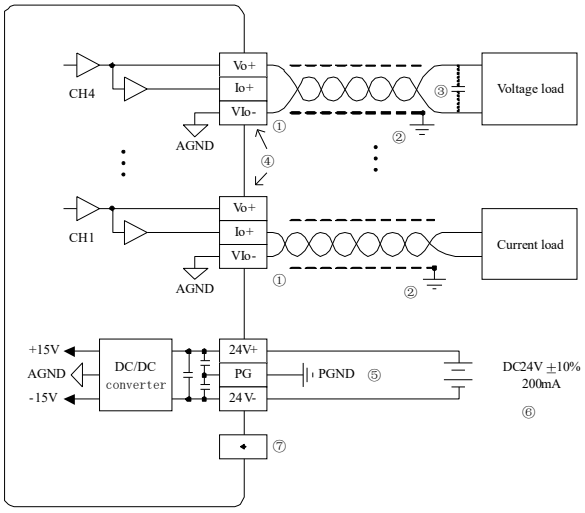


Figure 4-3 Wiring of user terminals

The wiring requirements of user terminals are shown in the figure. For wiring, please pay attention to the 7 notes:

1. It is recommended to connect the analog outputs via twisted shielded cables. Lines should be routed away from power cables or other wires that may cause electrical disturbance.
2. Adopt a single-point grounding on the load end of the output cable.
3. Connect a smoothing capacitor (0.1μF~0.47μF/25V) if there's any electrical noise or voltage fluctuations.
4. The VC-4DA may be damaged if the voltage output is short-circuited or if a current load is connected to the voltage output.
5. Ground the module's ground terminal PG well.
6. The analog power supply can adopt the 24Vdc auxiliary power supply output by the main module, or any other power supplies that meets the requirements.
7. Do not use the NC on the user terminal.

Table 4-4 Performance indicator

Item		Description
Occupied I/O points		None
Conversion speed		2ms per channel (the number of channels that used in changing does not change the conversion speed)
AO	Voltage output	-10~10Vdc (external load impedance of not less than 2kΩ)
	Current output	0~20mA (external load impedance of 500Ω or less)

Item	Indicator
AO mode	Digital quantity
Channel closed	
Output range (-10V~10V)	-10000~10000
Output range (0mA~20mA)	0~2000
Output range (4mA~20mA)	0~2000

Item		Description
DI		Default setting: -10000~10000; Allowed range: -10000~10000
Resolution	Voltage output	1mV (10V/10000)
	Current output	2μA (20mA/10000)
Overall accuracy		±1% (for full range of 10V) ±1% (for full range of 20mA)
Isolation		The analog and digital circuits are isolated by optocouplers. The analog circuit power supply and the external power supply are isolated by DC/DC. Analog channels are not isolated from each other.

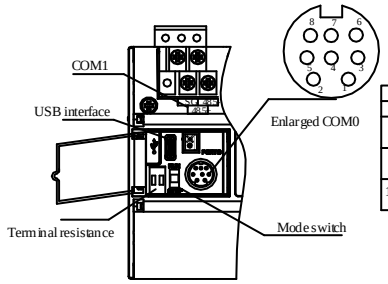
4.3 Integrated Analog Setting and Readout

Address	Name	R/W	Default
SD67	AD Channel 0 mode word	R/W	Default to 0
SD68	AD Channel 0 sampling times	R/W	1~1000, default to 8
SD69	AD Channel 0 sampling average	R	-10000~10000
SD70	AD Channe l mode word	R/W	0 by default
SD71	AD Channel 1 sampling times	R/W	1~1000, default to 8
SD72	AD Channel 1 sampling average	R	-10000~10000
SD79	DA Channel 0 mode word	R/W	Default to 0
SD80	DA Channel 0 output	R/W	-10000~10000
SD81	DA Channel 1 mode word	R/W	Default to 0
SD82	DA Channel 1 output	R/W	-10000~10000

Analog channel x mode word	AD	DA
0	Channel closed	Channel closed
1	-10V~10V (-10000~10000)	-10V~10V (-10000~10000)
2	-20~20mA (-2000~+2000)	0~20mA (0~2000)
3	4mA~20mA (0~2000)	4mA~20mA (0~2000)

5 Communication

The VC1 series PLC main module provides 2 asynchronous serial communication ports, namely COM0 and COM1 which support the baud rates of 115200, 57600, 38400, 19200, 9600, 4800, 2400, and 1200 bps. The communication protocol for COM0 is determined by the mode switch as below.



Pin	Name	Description
3	GND	Grounding pin
4	RXD	Serial data receiving pin (from RS232 to the PLC)
5	TXD	Serial data transmitting pin (from the PLC to RS232)
1,2, 6, 7, 8	Reserved	Serial data receiving pin (from RS232 to the PLC)

As a dedicated interface for user programming, COM0 can be forcefully switched to the programming protocol via the mode switch. The relationship between PLC operation status and COM0 usage protocol is shown in the table below.

Mode switch position	Status	COM0 operating protocol
ON	RUN	It can be programming protocol, or Modbus protocol as determined by user program and system configuration.
OFF	STOP	If the system configuration of user program is Modbus protocol, it converts to programming protocol automatically after stop. Otherwise, the system protocol keeps unchanged.

The COM1 port is ideal for connection with communication-supported production equipment (such as drives). With Modbus protocol or RS485 free protocol, a drive can control multiple devices through the network. Its terminals are fixed with screws. Communication signal cables are at users' discretion. It is recommended to use a twisted shielded pair as the signal cable to connect communication ports.

The USB is Type-C interface. The supported functions include upload, download, online upgrade firmware and monitoring.

6 Installation

The PLC is applicable to Installation Category II, Pollution degree 2.

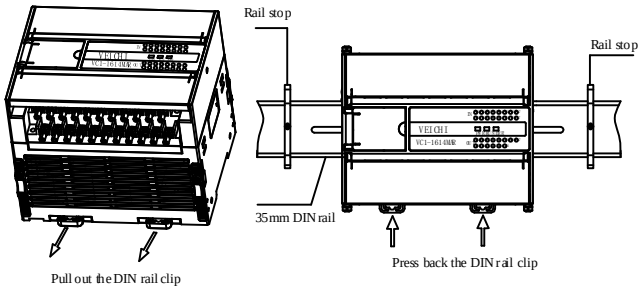
6.1 Dimensions

Model	Length	Width	Height
VC1-0808MAR1	115mm	90mm	92.7mm

6.2 Installation Instruction

Use DIN rail

Generally, the PLC can be mounted onto a 35mm-wide rail (DIN), as shown in the following figure.



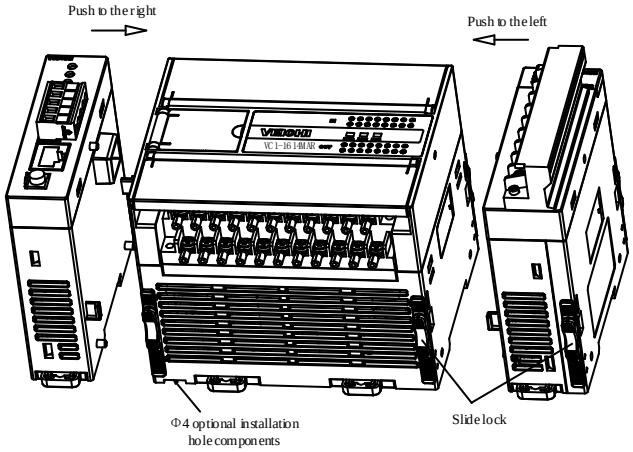
The specific installation steps are as follows:

1. Fix the DIN rail horizontally on the mounting backplane.
2. Pull out the DIN rail buckle under the bottom of the module.
3. Hang the module on the DIN.
4. Press the buckle back to its original position to lock the module.
5. Finally, fixed both ends of the module with DIN rail clips to avoid sliding.

Other VC1 series PLCs can be mounted on DIN rail according to the above.

Use screws

For applications with large oscillations, the main module can be installed with screws. When installing the expansion module, first pull the slide lock up to the top, align it and push it toward the main module. After that, pull it down to the end to complete the fixation. This is shown in the figure below. (Note: The main module requires optional accessories for screw installation, and the expansion module does not support screw installation.)

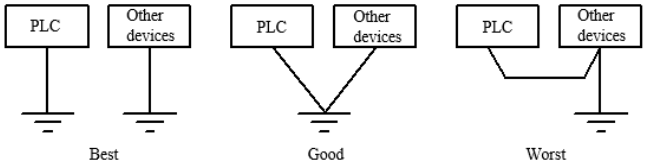


6.3 Cable Connection and Specification

For power and grounding cable connection, it is recommended to add an air switch and fuses to the PLC power input to protect the circuit.

Reliable grounding cables can enhance equipment safety and improve the PLC's electromagnetic immunity. Please connect the power supply ⏚ end of the PLC to the earthing conductor during installation. It is recommended to use connection wires of AWG12 to AWG16 and shorten the wires as much as possible.

An independent grounding device is also recommended to set. Keep the grounding cables away from those of other devices (especially the devices cause strong disturbance), as shown below.



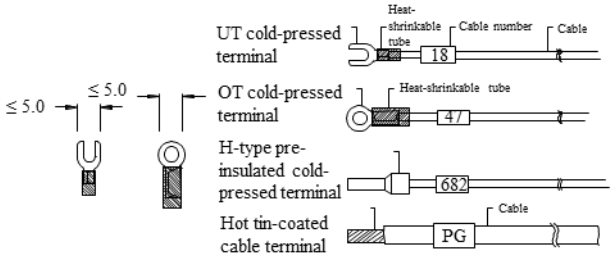
Cable specification

For the wiring of the PLC, it is recommended to use multi-strand copper wire and ready-made insulated terminals to ensure the wiring quality. The recommended cross-sectional areas and models of the cable are shown in the following table.

Cable	Cross-sectional area	Recommendation	Compatible wiring terminal and heat-shrinkable tube
AC power cable (L, N)	1.0~2.0mm²	AWG12, 18	H1.5/14 pre-insulated tube-like terminal, or hot tin-coated cable terminal
Grounding cable (⏚)	2.0mm²	AWG12	H2.0/14 pre-insulated tube-like terminal, or hot tin-coated cable terminal
Input signal cable (X)	0.8~1.0mm²	AWG18, 20	UT1-3 or OT1-3 cold-pressed terminal Φ3 or Φ4 heat-shrinkable tube
Output signal cable (Y)	0.8~1.0mm²	AWG18, 20	

Fix the processed cable terminals onto the wiring terminals of PLC by screws. Pay attention to the positions of the screws. The tightening torque for the screws is 0.5 to 0.8 Nm, which ensures complete reliable connection without damaging the screws.

The recommended cable processing-method is shown in the following figure.



7 Power-up for Operation and Routine Maintenance

7.1 Power-up for Operation

After the wiring is complete, check all the connections. Ensure that no foreign matters have dropped inside the housing and heat dissipation is in good conditions.

1. Power on the PLC. The PWR indicator of the PLC is on.
2. Start the AutoStation software on the PC and download the compiled user program to the PLC.
3. After the program is downloaded and verified, set the mode switch to ON. The RUN indicator is on. If the ERR indicator is on, it indicates that errors occur on the user program or the system. In this case, rectify the errors by referring to the instructions in the "VC Series Small-sized PLC Programming Manual".
4. Power on the PLC external system to perform commissioning on the system.

7.2 Routine Maintenance

Pay attention to the following notes for routine maintenance and inspection:

1. Ensure that the PLC operates in a clean environment, preventing foreign matters or dust from dropping into the machine.
2. Keep the PLC in good ventilation and heat dissipation conditions.
3. Ensure that the wiring is properly performed and all the wiring terminals are well fastened.

Warning

1. Never connect the transistor output to an AC circuit (like 220VAC). The design of the output circuit must abide by the requirements of electric parameters, and no overvoltage or overcurrent is allowed.
2. Use the relay contacts only when necessary, because the use life of relay contacts depends largely on its action times.
3. The relay contacts can support loads smaller than 2A. To support larger loads, use external contacts or mid-relay.
4. The relay may fail to connect when the current of its contact is smaller than 5mA.

User Notice

1. The warranty covers only the PLC machine.
2. The warranty period is eighteen months. VEICHI provides free-of-charge maintenance for the product if it is faulty or damaged in normal use within the warranty period.
3. The warranty period starts from the factory date of the product. The machine code is the only basis for determining whether the product is in the warranty period. An equipment without the machine code is deemed as out of warranty.
4. Maintenance and repair services are charged in the following scenarios even the product is within the warranty period:
   - Faults are caused by not complying with the user manual;
   - The damage caused by fire, flood, or voltage anomalies;
   - The PLC is damaged by the unsupported functions.
5. The service charge will be calculated based on actual cost, and if there is a contract, the provisions stated in the contract prevail.
6. Please make sure that you keep this card and present it to the service unit at the time of warranty.
7. Please contact the agent or VEICHI directly if there's any questions.

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Product Feedback Form

User name		Tel	
Address		Postal code	
Product name & model		Installation date	
Machine code			
Appearance or structure			
Performance			
Package			
Materials			
Quality in use			
Comments or suggestions			

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