H1U Series PLC User Manual

Data: 19010084 V0.0

Thank you for purchasing the PLC of Inovance control technology co., Ltd.

Before using H2U series PLC, please read this manual carefully in order to use the products correctly.

This manual mainly describes specifications, features and usage of H2U series PLC, and there are PLC instructions set summaries for easy reference. For both the user program development environment usage and programming methods of this product, please refer to our company's "Auto-Shop programming software user's Guide "," H2U series PLC programming reference manual " and " H2U series communication manual".

Features of H1U Series Programmable Controller:

Building-in large program memory space without an external extension memory card, it can up to 8K steps.

User program and all the power-down devices can be permanent backup in the power-off status, and the real-time clock can keep at least 20 days in power-down situations without batteries (power-on time is longer than 5 minutes).

Provide high-speed, multi-channel and high frequency I/O ports , as well as excellent operation and positioning control functions.

Integrate two independent communication ports, providing excellent communication protocols and MODBUS instruction, which is convenient for system integration.

Comprehensive encryption features can protect users' intellectual property rights.

With powerful networking and support CAN-BUS.

Safety Precautions

DESIGN PRECAUTIONS

Danger

Provide a safety circuit on the outside of the PLC so that the whole system operates to ensure the safety even when external power supply trouble or PLC failure occurs. To be considered in the design includes:

- On the outside of the PLC, an emergency stop circuit, a protection circuit, an interlock circuit, or a positioning limit circuit may be necessary for preventing damage to the machine.
- Ensure the safe operation of equipment, please design external protection circuit and safety mechanics for the PLC output signals.
- When the PLC CPU detects the system abnormal, all outputs may be turned off. During the controller circuit failure, it may cause the output out of controlled. Design external circuits to ensure safe operations of the machine in such a case.
- When some sort of error occurs in a relay or transistor of the output unit, output may be kept on or off.
- PLC design is applied to the indoor electric environment, its power system-level should have lightning protection device, make sure that they will not lightning imposed on the PLC power input-side or signal input, control output terminal, avoid damage the device.

INSTALLATION PRECAUTIONS

Note

- Do not use the PLC in the place of dust, oil smoke, conducting dust, corrosive gas, and combustible gas, exposure to the high temperature, dew, wind and rain, vibration and shock. Electric shock, fire, operator errors can also cause the product damage and deterioration.
- When processing for screw holes and wiring, do not make the metal filings and wires falling into the controller ventilation hole, this may cause a fire, failure, and malfunction.
- When the installation work of the new PLC is over, it needs to ensure that there is no foreign body on the face of ventilation, including dust-proof and so on, otherwise, it may cause poor heat dissipation during running, a fire, failure and malfunction.
- Avoid charged state for wiring and plugging the cable plug, otherwise easily cause electric shock, or cause damage to the circuit.
- The Installation and wiring should be fixed and reliable, poor contact may cause incorrect operation.
- If there is serious interference, the communications and high-frequency signal cable should be shielded cables, to improve system anti-interference capacity.

WIRING PRECAUTIONS

Danger

- Turn off all the power supply externally before installation or wiring work in order to avoid electric shock or damage of product.
- Please connect AC power supply to the special terminal.
- Make sure to attach the terminal cover offered as an accessory to the product before turning on the power or starting the operation after installation or wiring work.
- When processing for screw holes and wiring, do not make the metal filings and wires falling into the controller ventilation hole, this may cause a fire, failure, and malfunction.

Note

- For of the main unit terminal or the extension unit terminal, do not use external power supply. Do not wire vacant terminals externally.
- For applications where serious interference, high-frequency signal input or output cable selection shielded cables should be to enhance the system of anti-interference capacity.
- Please use the wire above 2mm2 to avoid connecting the grounding terminal at the same point as a heavy electrical system.

STARTUP AND MAINTENANCE PRECAUTIONS

Danger

- Do not touch any terminal while the PLC is power on. Doing so may cause electrical shock or malfunctions;
- Before cleaning or retightening terminals, externally cut off all phases of the power supply. Failure to do so may expose you to shock hazard.
- Please connect or remove the wire, the extension module and control unit wire after cutting off all power supply, otherwise it may cause failures and malfunctions.
- For online modify, coercible output, RUN, STOP and so on, you should read the instruction manual, and operate the PLC after fully confirm its safety.

Note

- When handling extension card, be sure to cut off the power supply.
- Please follow the industrial wastes disposal for the waste products.

Product Information

Designation Rules

H1U-0806MRAX
①②③④⑤⑥⑦⑧

①	Product Information	H: Inovance controller
②	Series No.	1U: 1U series controller
③	Input points	08: 8 points input
④	Output points	06: 6 points input
⑤	Module classification	M: Main module of general purpose controller;P: Positioning controller; N: Network controller;E: Expansion module
⑥	Output type	R: Relay output type;T: Transistor output type
⑦	Power Supply type	A: AC 220V Input omitted default:AC220V;B: AC110V input; C: AC24V input;D: DC24V
⑧	Special function identification	Such as high speed I/O and analog function, etc.

Basic Parameters

Table 1 Basic Parameters

Model	Total I/Os	I/O Features					
		Total I/Ps	Hi-speed I/Ps	Input voltage	Total O/Ps	Hi-speed O/Ps	Output Type
H1U-0806MR	14	8	Two 60 kHz Four 10 kHz	DC24V	6	/	Relay
H1U-0806MT						Three 100 kHz	Transistor
H1U-1410MR	24	14	Two 60 kHz Four 10 kHz	DC24V	10	/	Relay
H1U-1410MT						Three 100 kHz	Transistor
H1U-1614MR	30	16	Two 60 kHz Four 10 kHz	DC24V	14	/	Relay
H1U-1614MT						Three 100 kHz	Transistor

General Specifications

Table 2 General Specifications

Environmental parameter				Ambient condition	Transport ambient condition Type	Storage ambient condition Parameter
Type		Parameter	Unit			
Climatic Condition	Ambient Temperature	Low Temperature	℃	Climatic- condition	Ambient temperature	Low temperature
		High Temperature	℃			High temperature
	Humidity	Relative Humidity	%		Humidity	Relative humidity
	Atmospheric Pressure	Low Pressure	kPa		Atmospheric pressure	Low pressure
		High Pressure	kPa			High pressure
Mechanical Stress	Sine Vibration	Displacement	mm	Mechanica-l stress	Sine vibration	Displacement
		Acceleration	m/s^2			Acceleration
	Random vibration	Acceleration Spectral Density	m^2/s^3(dB/Oct)		Random vibration	Acceleration spectral density
		Frequency Range	Hz			Frequency range
		Vibration Direction	/			Vibration direction
	Shock	Type	/		Shock	Type
		Acceleration	m/s^2			Acceleration
	Dipping	Dipping Height	m		Dipping	Dipping height

Mechanical Design Reference

Mounting Dimension

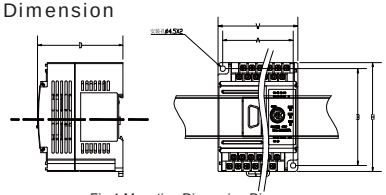


Fig.1 Mounting Dimension Diagram

Table 3 Mounting Dimension

Model	Total I/Os	Mounting Dimension		Physical Dimension
		A（mm）	B（mm）	W×H×D（mm）
H1U-0806M_	14	62	80	70×90×75
H1U-1410M_	24	83	80	93×90×75
H1U-1614M_	30	100	80	110×90×75

Product Structure

Product Structure

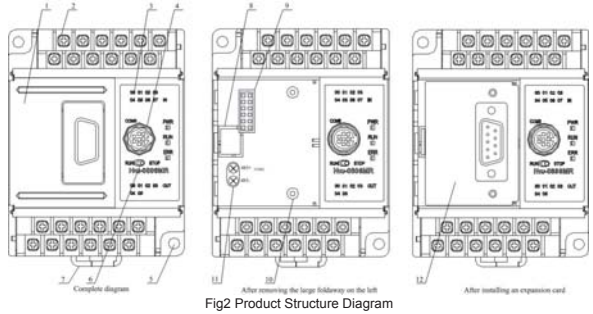


Fig2 Product Structure Diagram

Component names and Function descriptions:

1. Big foldaway
2. Power supply, auxiliary power supply and removable terminal for input signal
3. LEDs for indicating the input status
4. Download port for user program
5. Mounting screw holes(two)
6. RUN/STOP switch
7. Buckle for two DIN rail mounting
8. System program download port (Do not operate for non-professional)
9. Special function expansion card interface
10. Special function expansion card fixed bolts(Screw specification: M2.6×6)
11. Wiring terminal for RS485 communication port
12. Special function expansion card(Available only after the user selection and installation)

System Expansion

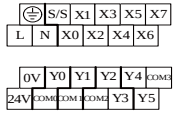
H1U series PLC supports only remote the expansion modules, do not support the local expansion modules. If you need to connect the remote expansion modules to conduct the function expansion, you need to install CAN-BUS communication expansion cards, and then conduct networking connection via CAN-BUS communication expansion cards and remote expansion modules. The model of CAN-BUS communications expansion card is H1U-CAN-BD which should be purchased separately, as well as making sure that the main module of the software version supports CAN-BUS functions. Otherwise the networking can not be performed. Please refer to the "H1U-CAN-BD user manual," for the application of H1U-CAN-BD, refer to "H2U series expansion module user manual" for the application of remote expansion modules, and refer to "H1/2U PLC instruction and programming manual." for CAN-BUS functions.

System can be extended up to 64 points (support CAN-BUS devices), including the main module. As long as the CAN-BUS protocol meets any device that can be hung on the bus.

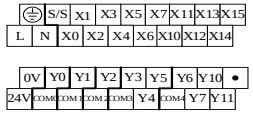
Hardware Interface

Terminal Block Definition

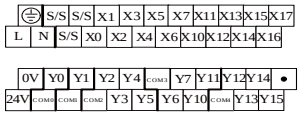
Terminal block definition of H1U-0806MR, H1U-0806MT



Terminal block definition of H1U-1410MR, H1U-1410MT



Terminal block definition of H1U-1614MR, H1U-1614MT



Terminal block specification: 22-14AWG wire.

When loosen the screw at two sides, loosen both sides of the terminal screws alternately, pay attention not to completely one screw and then the other screw, just loosen the screw about half and then the other screw, two screws alternately until the whole screw are loosened, then you can gently raise up terminal head to finish the dismantling work of the terminal.

When mounting terminals, put the terminal head into position, and then tighten a screw to confirm the screw will not fall off and then tighten the other screw, alternately tighten the screws on both sides until complete the process. Note that during the entire fixed process, insert two sides of the terminal as balance as possible, otherwise the terminals may damage by poor contact or short circuit.

Communication Interface Definition

The main PLC unit provides two communications ports.COM0 hardware has standard RS422 and RS485. COM1 hardware is standard RS485.The terminal interface is Mini-DIN8 socket.

Fig.3 COM0 Communication Port

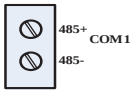


Fig.4 COM1 Communication Port

Table 4 COM0 Port Definition

Pin No.	Signal	Description
1	RXD-	Receive negative data
2	RXD+	Receive positive data
3	GND	Grounding, no electrical connections for 9 and 10
4	TXD-/RXD-	External transmit negative data. It can receive negative data if it is RS485.
5	+5V	External power supply +5V, the same with the internal logic +5V.
6	CCS	Communication direction control wire
7	TXD+/RXD+	External send positive data. It can receive negative data if it is RS485.
8	NC	Non-pin

■ Power Supply Circuit Specification

Table 5 Power Supply Circuit Specification

Item		Unit	Min. Value	Typical Value	Max. Value	Remark
Rated operating voltage		Vac	100	220	240	Normal startup and operating range
Limit input voltage		Vac	85	/	264	Derating for usage When AC85 to100V and AC240 to 264V,see Figure 3-2.
Input current		A	/	/	1	AC 85V input,full-loading output
Input power		W/VA	/	/	15W/25VA	
Output voltage	5V/GND	V	4.5	5	5.5	Output1
	24VDD/GND	V	21.6	24	26.4	Output2
	24VCC/COM	V	21.6	24	26.4	Output3
Output current	5V/GND	mA	50	500	500	The sum of capacity load is the internal consumption and the expansion module. The maximum output power shall be the sum of each full load . The cooling method is a natural cool.
	24VDD/GND	mA	10	200	200	
	24VCC/COM	mA	10	200	200	

Output3 in table 5 is the sensor power supply, and it can also provide external power supply to the special function module. Output2 provides power supply to the main module and the relay of IO expansion module. Output1 provides power to all modules. During the system configuration, make sure that power supply demand is not exceed its maximum capacity.

■ Input Specifications

Table 6 Input Specifications

Item		High-speed inputs X0～X5	General inputs
Signal input mode		Sink/Source mode.It is sink input when S/S terminal and 24V are shorted connection,it is source when s/s terminal and COM are shorted connection.	
Electrical parameters	Detection voltage	DC24V	
	Input resistance	3.3k	4.3k
	Input :ON	Input current is more than 4.5mA.	Input current is less than 3.5 mA.
	Input : OFF	Input current is less than 1.5mA	Input current is less than 1.5mA.
Filter function	Digital Filter	X0 to X7 has digital filter function, the filter time can be set during the range of 0 to 60 msec.	
	Hardware Filter	The other I/O port is hardware filter except X0 to X7, the filter time is about 10 msec.	
High-speed Function		X0 to X5 can realize the function with high-speed counting,interrupt and pluse capture,etc. The maximum frequency of the X0 to X1 port counting up to 60kHz. The maximum frequency of the X2 to X5 port counting up to 10kHz.	
Common connection terminal		Only a common terminal：S/S	

Note: S/S connecting to 24V+ or COM determines the SINK or SOURCE input mode, the selection is effective to all the input points' signals in main unit

■ Output Specifications

Table 7 Output Specifications

Item	Relay outputs	Transistor outputs
Circuit Voltage	Less than AC250V and DC30V	DC5V to DC24V
Circuit Insulation	Relay Mechanical Insulation	Light coupling insulation
LED	When the relay output contacts close, the LED light is on.	When the light coupling is drove,the LED light is on.
Leakage current during open circuit	None	Less than 0.1mA/DC30V
Min.load	2mA/DC5V	5mA（DC5V～DC24V）

Item		Relay outputs	Transistor outputs
Max. output current	Resistive load	2A/1 point : 8A/4 points common port, 8A/8 points common port	Max. output current
	Inductive load	AC220V，80VA	
	Lamp Load	AC220V，100W	
ON response delay		20 msec Max.	High speed output: 10μs Others: 0.5msec
OFF response delay		20 msec Max.	
High-speed output frequency		None	100kHz per channel(Max.)
Output common ports		Each group shared a common port, there is insulated gap between the groups.	
Fuse protection		None	

Internal equivalent circuit

PLC has a built-in power supply (DC24V) to detect user Xi input state, the user only needs to ON/OFF(dry-contact switch) signal between Xi and COM, if a transistor output signal form the active sensor, it should be OC output signal type.

PLC signal input and internal equivalent circuit is shown in the following figure, users' circuit and PLC internal circuit to connect via the terminal blocks. Figure 3-5 shows the SINK input method, "S/S" " and "24V terminals are short connection.

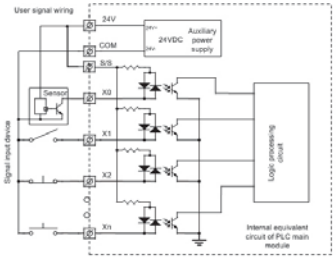


Fig. 5 Sink Input Connection

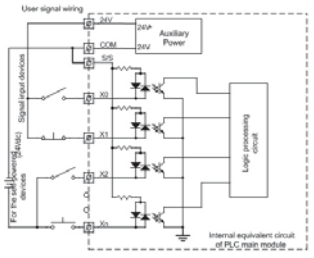


Fig. 6 Source Input Connection

In some special applications, you may need to adopt SOURCE input methods, its equivalent input circuit shown in Figure 6, "S/S" terminal and the "COM" terminals are short circuit.

Figure 7 shows the internal equivalent circuit diagram of the relay output module, the output terminal is divided into several groups, each group is electrical isolation, and the contacts of different groups can connect with different power circuits.

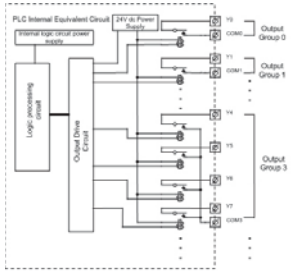


Fig. 7 Relay Output Equivalent circuit

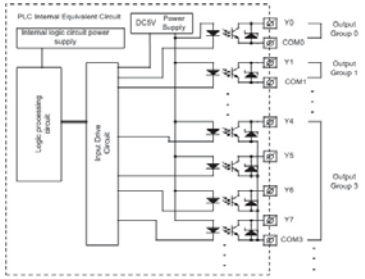


Fig. 8 Transistor Output Internal Equivalent circuit

The internal equivalent circuit diagram of the transistor-output-type PLC as shown in Figure 8. In which we can see the output terminal is divided into several groups, and groups are electrical isolated each other. The transistor output level can only be used for DC-DC24V load circuit.

For the inductive load in DC circuit, you should add a freewheeling diode, while the inductive load in AC circuit, and add a RC component instead. As shown in Figure 9.

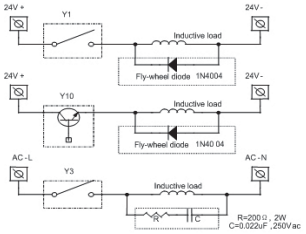


Fig. 9 Diagram for Inductive Load Absorbing Circuit

Programming Reference

■ Soft component arrangement and power-off retentive description

Table 8 Soft component arrangement

	H_{1U}-0806M	H_{1U}-1410M	H_{1U}-1614M
Input relay X	X000~X007 8 points	X000~X015 14 points	X000~X017 16 points
Output relay Y	Y000~Y005 6 points	Y000~Y011 10 points	Y000~Y015 14 points

Auxiliary Relay M	[M0~M383] 384 points General	[M384~M1535] 1152 points Latched		M8000~M8255 256 points Special
State	[S0-S999] 1000 points Retentive			
Timer	T0~T199 200 points 100ms General	T200~T245 46 points 10ms General	[T246~T249] 4 points 1ms Accumulative, retentive	[T250~T255] 6 points 100ms Actuarial, retentive
Counter	16 bit count-up counter		32 bit count-up/down counter	High-speed counter
	C0~C 15 16 points General	[C16~C199] 168 points Retentive	C200~C219 20 points General	[C220~C234] 15 points Retentive	[C235~C255] 21 points Retentive
Data register D，V，Z	D0~D127 128 points General	[D128~D7999] 7872 points Retentive	[D1000~D7999] Max.7000 points It can be set to the file register.	[D8000~D8255] 256 points Special	V7~V0， Z7~Z0 16 points Index
Nesting pointer	N0~N7 8 points Master Control		P 0~P127 128 points Jump subprogram		I00*~I50* 6 points Input interrupt pointers
Countants K	16 bit -32,768~32,767		32 bit -2,147,483,648~2,147,483,647		
Countants H	16 bit 0~FFFFH		32 bit 0~FFFFFFFFH		

The soft components of H1U series PLC are permanent backup, which means that all soft components are not loss after the module power-down. The real-time clock can hold for 15 days, which means that the clock is still the current time after the module power-down and then restart within 15 days. The power-on time of the main module must be more than 1 minute, otherwise the power-down may abnormal. The longer the power-on time is, the longer the holding time will be, and the power-down time can hold up to 25 days.

Inovance

Product Warranty Card

Customer information	Add. of unit:	
	Name of unit:	Contact person:
	P.C.:	Tel.:
Product information	Product model:	
	Body barcode (Attach here):	
	Name of agent:	
Failure information	(Maintenance time and content): Maintenance personnel:	

Inovance

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