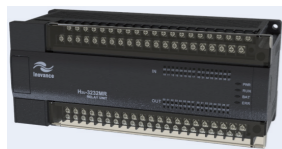


H2U Series PLC User Manual



Thank you for purchasing the H2U series programmable logic controller (PLC) independently developed by Inovance Control Technology Co., Ltd. Read the manual carefully to be familiar with the product features and be able to use the product safely.

This manual describes the specification, features and usage of the H2U series PLC. For the developing environment and design method of user programs, see the Autoshop On-line Help of Inovance.

The H2U series PLC has the following features:

- ◆ The built-in program memory space reaches up to 16K steps.
- ◆ The internal large-capacity power supply can directly apply power to sensors, HMI, and external auxiliary relays.
- ◆ It provides multiple high-speed I/O terminals, and has rich motion and positioning control functions.
- ◆ It has four independent communication ports and supports various communication protocols including Modbus, facilitating system integration.
- ◆ The comprehensive encryption function protects intellectual property rights of the user.
- ◆ It comes with fast execution speed and supports up to 128 subprograms and 21 interrupt subprograms. Each subprogram has the parameter call and independent password security functions.

Safety Information and Precautions

In Design

⚠ DANGER

- ◆ Provide a safety circuit outside the PLC in the application so that the control system can still work safely even if external power failure or PLC fault occurs.
- ◆ In the external circuit of the PLC, an emergency stop circuit, a protection circuit, an interlock circuit of forward/reverse rotation operation, and position upper/lower limit interlock circuit are necessary to prevent equipment damage
- ◆ The PLC is designed for indoor electric environment and is installed in an overvoltage category 2 environment. A lightning protection device must be installed for the power supply system, so that lightning overvoltage is not applied on terminals of the PLC, avoiding damage to the equipment.

During Installation

⚠ WARNING

- ◆ Install the PLC in places free from dust, oil smoke, conducting dust, corrosive gas, combustible gas, high temperature, condensation, wind & rain, vibration and shock. In addition, electric shock, fire, malfunction may also cause damage and deterioration to the equipment.
- ◆ During screw hole processing and wiring, ensure that no metal filing and cable end fall into the ventilation hole of the controller, because such stuff may cause a fire, fault, or malfunction.
- ◆ After installation of the newly purchased PLC is complete, ensure that there is no foreign stuff on the surface of ventilation. Failure to comply may result in poor cooling effect during running, which may lead to a fire, fault or malfunction.
- ◆ The installation and wiring must be secure and reliable. Poor contact may cause malfunction.

At Wiring

⚠ DANGER

- ◆ Ensure that all power supplies are cut off before installation or wiring.
- ◆ During screw hole processing and wiring, ensure that no metal filings or cable end drops into ventilation holes of the controller. Failure to comply may result in a fire, fault or malfunction.
- ◆ Perform wiring or plug/remove the cable connector only after power-off. Failure to comply may result in electric shock or damage to the circuit.

⚠ WARNING

- ◆ Use shielded cables for high-frequency signal input/output in applications with severe interference to enhance anti-interference capacity of the system.
- ◆ Suitable earthing connection shall be provided by the end system. The earth wire must be connected only to the earthing point on terminal which is marked with the earth symbol. The earth must be over 2 mm².

◆ The specification and installation requirement of external cables must comply with the local safety regulations and related IEC standards. The size in the table below is for recommendation.

Copper Wire	Cross-section Area	Recommended Code
AC power wire	1.0-2.0 mm ²	AWG 12, 18
Earthing wire	2.0 mm ²	AWG12
Input signal wire	0.8-1.0 mm ²	AWG18, 20

◆ The terminal of wire must be insulated according to the local safety regulations. Ensure that the insulation distance shall not be reduced when the wire is connected to the terminals. Otherwise, electric shock or damage to circuit may result.

During Running and Maintenance

⚠ DANGER

- ◆ Connection or removal of the communication cable, cables of the extension card and cables of the control unit, or other servicing can be performed only after power-off. Failure to comply may result in damage to the equipment or malfunction.
- ◆ Operations such as online modification, forcible output, RUN and STOP can be performed only after you read the manual and guarantee safety.

⚠ WARNING

- ◆ Installation or removal of the extension card can be performed only after power-off.
- ◆ Make sure to replace button cell after power-off. If replacement at power-on is required, only authorized electrical technician is allowed to complete replacement within 30 seconds. Failure to comply may result in data loss.
- ◆ Treat scrapped PLC as ordinary industrial waste.

Product Information

Designation Rules

H2U-3232MRAX-XP
1 2 3 4 5 6 7 8 9

No.	Name	Description
1	Product information	H: Inovance controller
2	Series No.	2U: Second generation of controller
3	Input points	32: 32 inputs
4	Output points	32: 32 outputs
5	Module classification	M: Main module of general-purpose controller, P: Positioning controller, N: Network controller, E: Extension module
6	Output type	R: Relay, T: Transistor
7	Power supply type	A: 220 VAC (220 VAC by default if null), B: 110 VAC, C: 24 VAC output, D: 24 VDC
8	Special function	High-speed input/output, analog function
9	XP auxiliary version	-

Basic Parameters

PLC Model	Total I/Os	I/O Features (Input Voltage: 24 VDC)				Order Code
		Total Inputs	Hi-Speed Inputs	Total Outputs	High-Speed Outputs	
H2U-1010MR-XP	20	10	2 x 60 kHz 6 x 10 kHz	10	-	Relay 01022078
H2U-1010MT-XP					3 x 100 kHz	Transistor 01022079
H2U-1616MR-XP	32	16	6 x 60 kHz	16	-	Relay 01022040
H2U-1616MT-XP					3 x 100 kHz	Transistor 01022041
H2U-2416MR-XP	40	24	2 x 60 kHz 4 x 10 kHz	16	2 x 100 kHz 5 x 100 kHz	Relay 01022048 Transistor 01022049
H2U-2416MT-XP					2 x 100 kHz 5 x 100 kHz	Transistor 01022049 01028063
H2U-3232MR-XP	60	36	2 x 60 kHz 4 x 10 kHz	24	-	Relay 01022046 Transistor 01022047
H2U-3232MT-XP					2 x 100 kHz	Transistor 01022047
H2U-3232MTQ	64	32	6 x 60 kHz 6 x 100 kHz	32	-	Relay 01022050 Transistor 01022045 5 x 100 kHz 01022015
H2U-3232MTP					8 x 100 kHz	Transistor 01022061
H2U-4040MR-XP	80	40	6 x 60 kHz	40	-	Relay 01022042 Transistor 01022062
H2U-4040MT-XP					3 x 100 kHz	Transistor 01022062
H2U-6464MR-XP	128	64	6 x 60 kHz	64	-	Relay 01022043 Transistor 01022044
H2U-6464MT-XP					3 x 100 kHz	Transistor 01022044

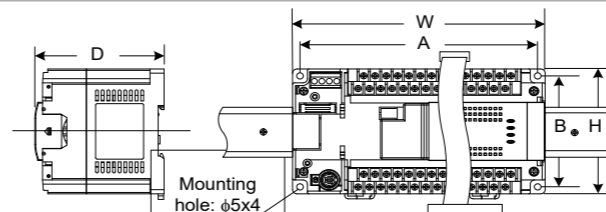
Note: Total inputs include hi-speed inputs. High-speed input terminals can be used for common inputs. Total frequency of H2U-XP high-speed inputs cannot exceed 70 kHz. Total frequency of H2U-3232MTQ and H2U-2416MTQ high-speed inputs cannot exceed 600 kHz. Total frequency of high-speed inputs of other H2U models cannot exceed 100 kHz.

General Specifications

Climate condition	Environment Parameters				
	Type	Parameter	Unit	Use	Transportation
Ambient temperature	Low temperature	°C	-5	-40	-40
	High temperature	°C	55	70	70
Humidity	Relative humidity	%	95	95	-
Air pressure	Low pressure	kPa	70	70	70
	High pressure	kPa	106	106	106

Environment Parameters					
Type	Parameter	Unit	Use	Transportation	Storage
Sine vibration	Shift	mm	3.5 (5-9 Hz)	-	-
	Acceleration	m/s ²	10 (9-150 Hz)	-	-
Random vibration	Acceleration spectral density	m ² /s ³	-	5-20 Hz: 1.92 dB	-
	Frequency range	Hz	-	20-200 Hz: -3 dB	-
	Vibration direction	-	-	X/Y/Z	-
Shock	Type	-	-	Half-sine	-
	Acceleration	m/s ²	-	180	-
Dip	Dip height	m	-	1	-

Mechanical Design



Model	Total I/Os	Mounting Dimension		Dimension W x H x D (mm)
		A (mm)	B (mm)	
H2U-1010M	20	120	80	130 x 90 x 88
H2U-1616M	32	160	80	170 x 90 x 88
H2U-2416M	40	160	80	170 x 90 x 88
H2U-3232M	60	210	80	220 x 90 x 88
H2U-4040M	80	275	80	285 x 90 x 88
H2U-6464M	128	340	80	350 x 90 x 88

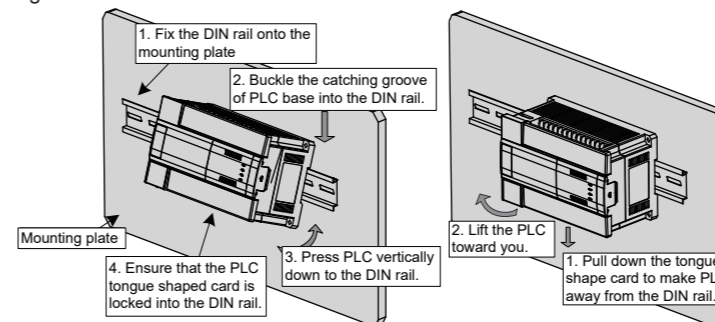
Requirements on Installation Position

- 1) Do not remove the paper tape that prevents foreign objects from dropping into the unit during installation. Once installation is completed, remove the paper tape before power-on so as to prevent overheating.
- 2) To prevent overheating inside the PLC, wall-mount PLC with 300 mm clearance at top and bottom for heat dissipation, as shown in Figure 2.
- 3) Leave 50 mm or more space between PLC and other devices or structures. Keep PLC far away from high-voltage cables and devices, and power devices.

Mounting Methods

- 1) Mounting or removing PLC

Figure 1 Mount or remove PLC

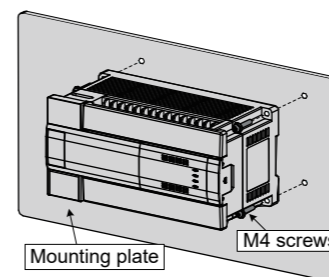


Note: Fix PLC at both ends with DIN rail slot dampers to prevent it from sliding left and right.

- 2) Mounting and fixing PLC with screws (wall-mounting mode)

In applications with big impact, mount and fix PLC with four M4 screws.

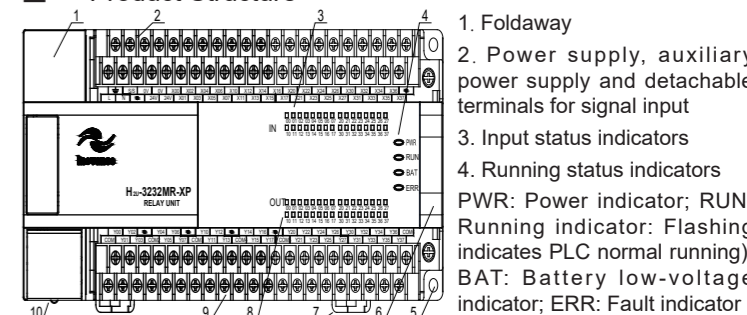
Figure 2 Mount and fix PLC with four M4 screws



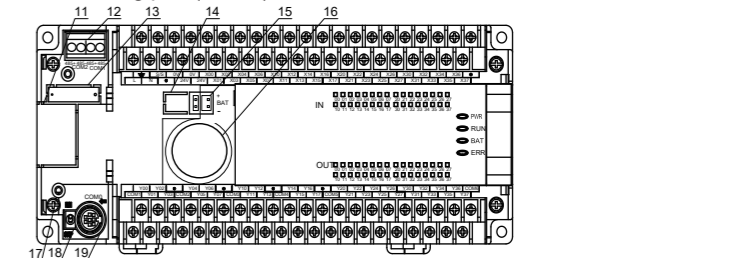
Electrical Design

The following figures show the I/O terminals of the main H2U series PLC unit. The H2U series PLC has different output types, relay and transistor, but has the same terminal configuration.

Product Structure



5. Mounting holes x 4; 6. Cover of extension module interface (R: Relay; T: Transistor) 7. DIN rail slot dampers x 2; 8. Output status indicator LEDs; 9. Detachable terminals for signal output; 10. Cover of user program downloading port (COM0)



11. Special function adapter board knock-down hole (It need be cut off before installation of the board.); 12. Wiring terminal for RS485 communication port (COM1/COM2); 13. Special function extension card and special function adapter board interface; 14. System program downloading port (Unauthorized operation is prevented here.); 15. Battery socket (BAT) (Nebel reverse the polarity.); 16. Coin battery (provided by Inovance); 17. Special function extension card and special function adapter board fixed bolts; 18. RUN/STOP switch; 19. User program downloading port (COM0)

Communication Interface Definition

The H2U series PLC has two communication ports and H2U-XP has four communication ports. The COM0 hardware is standard RS485 and RS422, determined by jumper JP0. If JP0 is connected, RS422 is selected. If JP0 is disconnected, the RS422 and RS485 are compatible. COM0 hardware of H2U-XP is standard RS422, which does not require jumper connection. Otherwise, the PLC cannot work normally.

The terminal interface is mini-DIN8 socket.

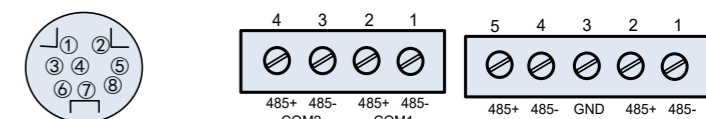


Figure 3 User program downloading port Figure 4 RS485 communication port Figure 5 RS485 communication port

Note: Figure 4 is the communication port of H2U-XP. Figure 5 is the communication port of H2U-1010M_XP. COM2 is the COM0 of H2U.

PLC can be connected to PC or HMI through COM0 in the following ways:

- 1) (JP0 connected): PLC side is RS422 and PC side is USB. PC is connected to the PLC COM0 port via the dedicated USB downloading cable (see Figure 3). (The H2U-XP does not require JP0 connection.)
- 2) (JP0 connected): PLC side is RS422 and the PC side is RS232. PC is connected to the PLC COM0 port via the dedicated serial port download cable (see Figure 3). (The H2U-XP does not require JP0 connection.)
- 3) (JP0 disconnected): PLC side is RS485 and PC side is RS485. They are connected through the terminal as shown in Figure 4. The connecting cable is determined by the user.

COM1/COM2 hardware is standard RS485 and is interface terminal. For definition of COM1/COM2, see Figure 4. They are connected to other devices via on-site wiring by the user. Both support the half-duplex communication mode only. COM3 of H2U-XP can be available through extension card.

Pin No.	Signal	Description	Pin No.	Signal	Description
1	RXD-	Receive negative data.	5	+5V	Provide power supply +5 V to external devices. It is the same with the internal logic +5 V.
2	RXD+	Receive positive data.	6	CCS	Communication direction control cable
3	GND	Must be grounded. No electrical connections for 9 and 10	7	TXD+/RXD-	Send positive data to external devices. If it is RS485, it can receive positive data.
4	TXD-/RXD-	Send negative data to external devices. If it is RS485, it can receive negative data (H2U).	8	NC	Non-pin

Input Specifications

The internal signal circuit composition and external wiring mode of the H2U Series PLC are described here. The terminal names in the wiring example vary with the PLC models.

Table with 3 columns: Item, Hi-speed Inputs X0-X5, General Inputs. Rows include Signal input mode, Electrical parameters (Detection voltage, Input resistance, Input ON/OFF), Filter function (Digital, Hardware), Hi-speed function, and Common connection terminal.

S/S connecting to 24V+ or COM determines the Sink or Source input mode. The connecting mode is effective to all input points of the PLC.

Output Specifications

The H2U series PLC has relay output and transistor output. Their parameters are quite differently. Please select the correct output type so as to avoid misuse. Failure to comply may result in damage to the PLC.

The current of transistor output terminals must be less than the allowable maximum current. If the output current of multiple transistor terminals is greater than 100 mA, they should be evenly arranged but not be arranged adjacently, convenient for heat dissipation.

It is suggested that the output points, which are set to ON simultaneously, do not exceed 70% of total output points for long.

Table with 3 columns: Item, Relay outputs, Transistor outputs. Rows include Circuit power voltage, Circuit insulation, LED indicator, Leakage current, Min. load, Max. output current (Resistive, Inductive, Lamp), ON/OFF response delay, High-speed output frequency, Output common port, and Fuse protection.

Internal Equivalent Circuit

PLC has a built-in power supply (24 VDC) to detect user switch status, so you only need to connect input signals of dry contact. OC output type is needed if you connect an active transistor or sensor.

PLC signal input and internal equivalent circuit are shown as Figure 6 below. Circuit of the user and the PLC internal circuit are connected by the terminal. Figure 6 shows the SINK input mode, determined by short connection of the terminal S/S and the terminal 24V.

Figure 6 SINK input mode

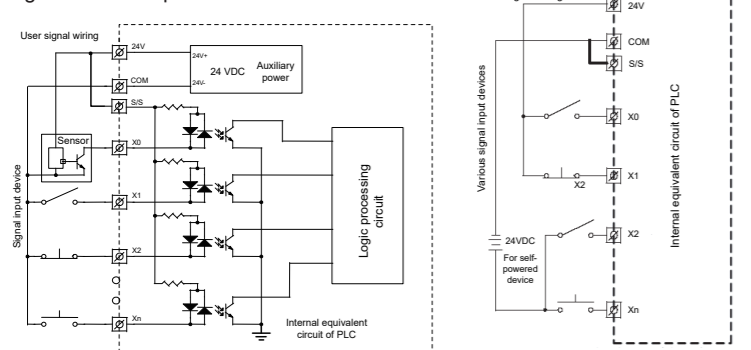
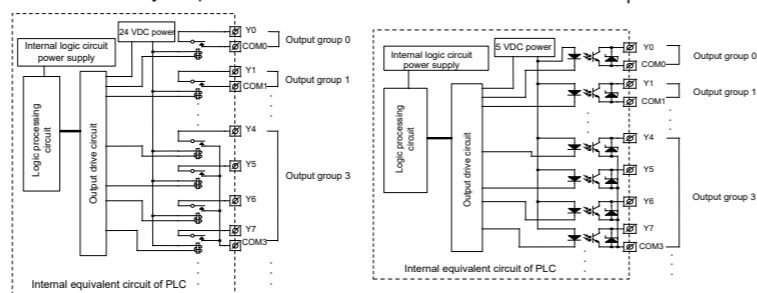


Figure 7 SOURCE input mode

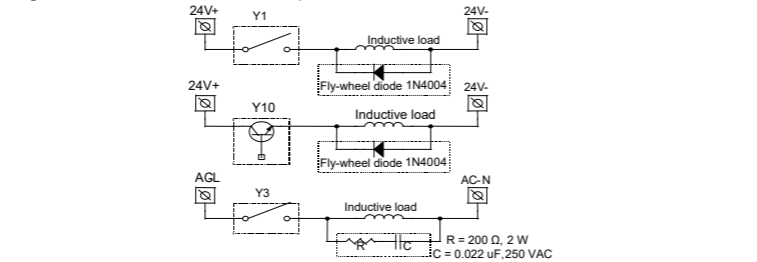
The following figure shows the internal equivalent circuit of PLC in the relay output mode. The output terminals are divided into several groups, and the groups are electrically isolated. The output contacts of different groups are connected with different power circuits.

Figure 8 Internal equivalent circuit of PLC in the relay output mode



For the inductive load in AC circuit, you need add an RC component instead, and for the inductive load in DC circuit, you need add a freewheeling diode, as shown in the following figure.

Figure 10 Inductive load absorption circuit



Power Supply Specification

Table with 5 columns: Item, Unit, Min. Value, Typical Value, Max. Value, Remark. Rows include Rated operating voltage, Input voltage limit, Input current, Input power, Output voltage, and Output current.

Output 3 applies power to sensor. It can also provide external power supply to special function modules. Output 2 provides power supply to the main module and the relay of I/Os of expansion module. Output1 provides power to all modules. During system configuration, make sure that the demand of each power supply does not exceed its maximum capacity.

Power Supply Capacitance and Expansion Capacity

The main module and active expansion module of PLC provide power supply to expansion modules, extension cards and adapters. The I/O points of expansion modules and the number of special function expansion modules must be within the power supply capacitance of the main module or active expansion module.

For calculation on power supply capacitance, take the following aspects into considerations:

- Each power supply capacitance should be calculated independently.
The expansion capacity is decided by the smaller power supply capacitance.

For example: 24VDD allows connection of six expansion modules, while +5V only allows connection of eight expansion modules. So the system can only be extended up to six expansion modules.

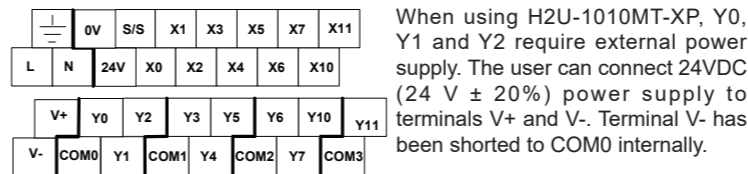
Selection of Extension Device

When designing an H2U series PLC system, we must consider the following aspects:

- Total I/Os should be within 256 for a main PLC system.
Power supply capacitance (see Power Supply Specification)
main modules and active expansion modules can provide 24 VDC and 5 VDC power supply to expansion modules and special modules. But total power consumption of all expansion units should be restricted within the power supply capacitance of main module or the active expansion module.
The H2U series PLC can be connected to maximum 8 special modules.

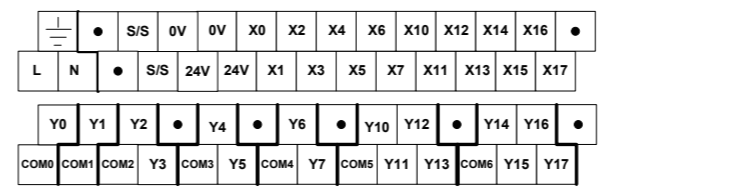
Terminal Block Definition

Terminal block definition of H2U-1010MR-XP and H2U-1010MT-XP

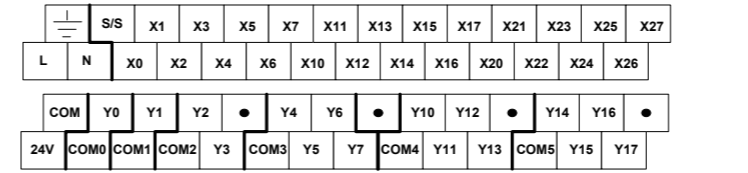


When using H2U-1010MT-XP, Y0, Y1 and Y2 require external power supply. The user can connect 24VDC (24 V ± 20%) power supply to terminals V+ and V-. Terminal V- has been shorted to COM0 internally.

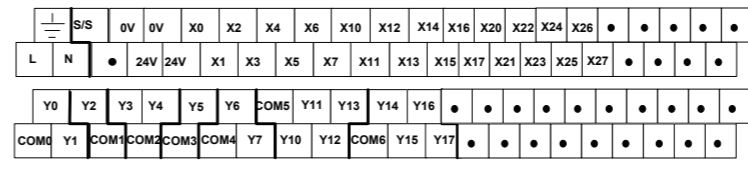
Terminal block definition of H2U-1616MR and H2U-1616MT



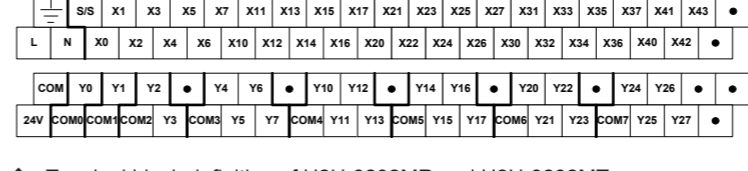
Terminal block definition of H2U-2416MR and H2U-2416MT



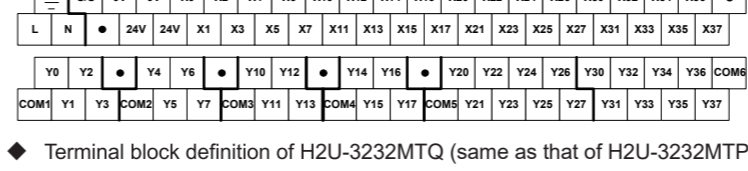
Terminal block definition of H2U-2416MTQ-F01



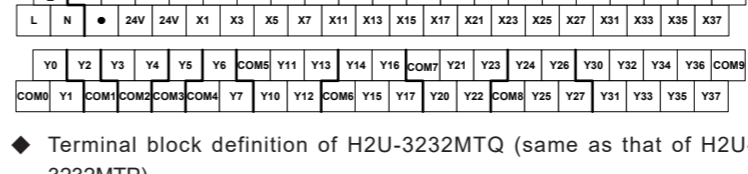
Terminal block definition of H2U-3624MR and H2U-3624MT



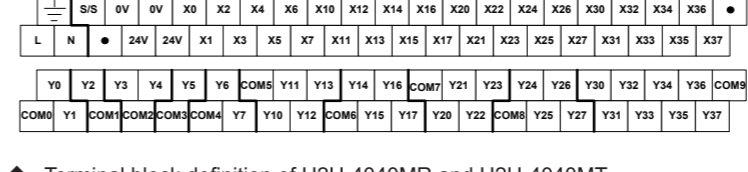
Terminal block definition of H2U-3232MR and H2U-3232MT



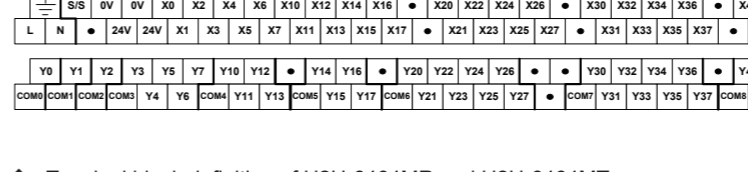
Terminal block definition of H2U-3232MTQ (same as that of H2U-3232MTP)



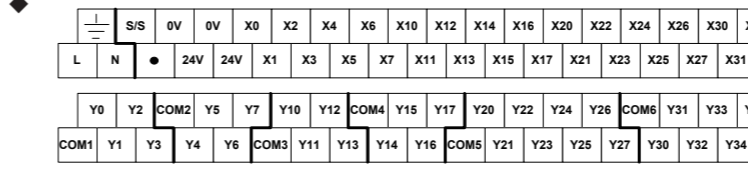
Terminal block definition of H2U-3232MTQ (same as that of H2U-3232MTP)



Terminal block definition of H2U-4040MR and H2U-4040MT



Terminal block definition of H2U-6464MR and H2U-6464MT



Programming

Description of functions of soft components

Table with 5 columns: Component Name, Range, Capacity, and other parameters. Rows include Auxiliary Relay (M), State (S), Timer (T), 16-bit Up Counter (C), 32-bit Counter (C), Data register (D, V, Z), Nesting pointer, and Constants.

The soft components within [] are the battery backup area.

- Note 1: Non-battery backup area can be changed into battery backup area via parameter setting.
Note 2: Battery backup area can be changed into non-battery backup area via parameter setting.
Note 3: Such permanent battery backup area cannot be changed.

Programming requirements

- One PC with Microsoft Windows XP or Windows 7 system
Inovance AutoShop (version 2.0 or above) for the purpose of writing and downloading user programs
Inovance USB-mini DIN8 download cable or mouse head download cable for PC with DB9-type RS232 port

Product Warranty Card

Form for Product Warranty Card with fields for Customer information, Product information, and Failure Description.

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