Inovance

inovA automation Monarch

H3U

High Performance Small PLC

Part II Technology

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Dec,2016

Version 1.0

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Technical

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1. Installation Practice

1.1 Installation Environment

1.2 Mounting Orientation and Clearance

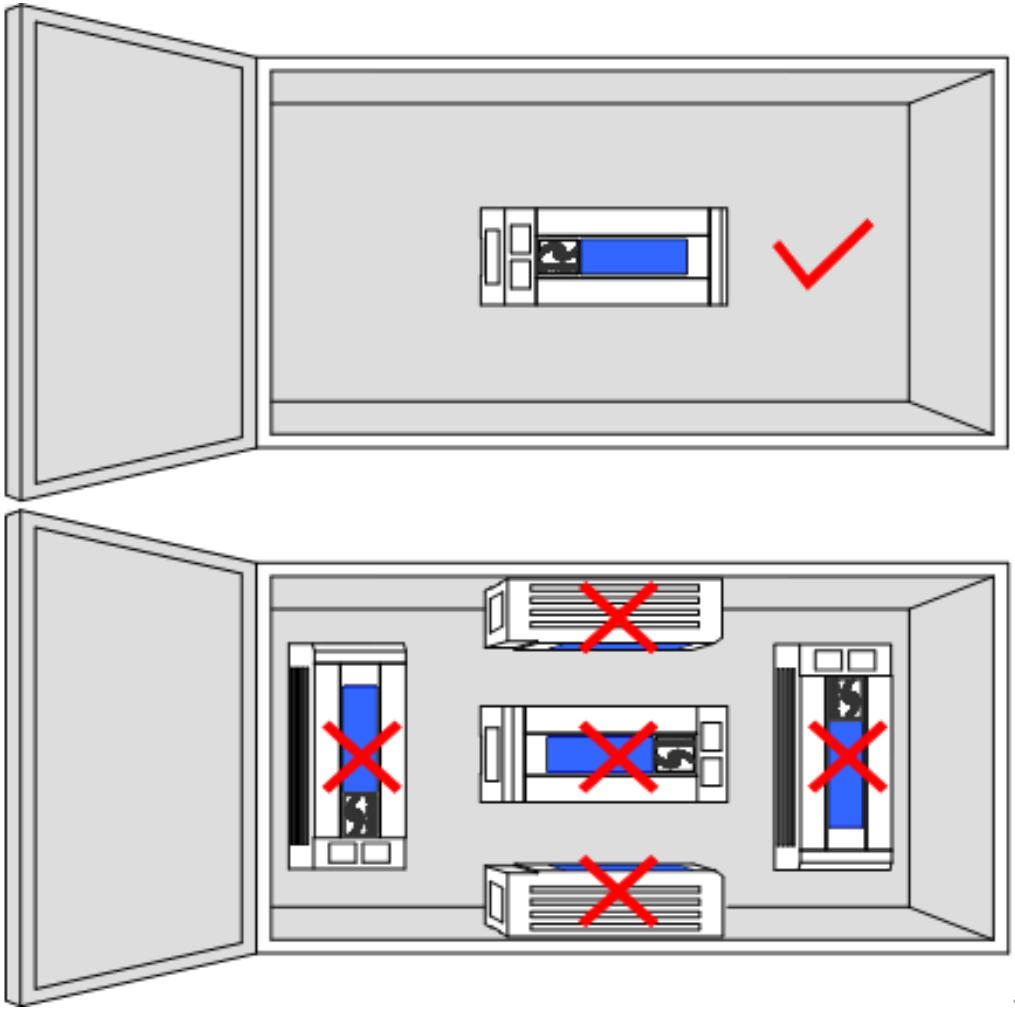
1.3 Installation Method and Procedures

1.4 Recommended External Components

1.1 Installation Environment

Item	Specifications				
Ambient temperature	Running: -5~55°C, storage: -25~75°C				
Relative humidity	Running: 5~95%RH (non-condensing)				
Vibration		Frequency (Hz)	Acceleration (m/s^2)	One-way amplitude (mm)	Ten times in each of the X, Y and Z direction for 80 minutes
	When DIN rail is installed	10~57	--	0.035	
		57~150	4.9	--	
	When PLC is directly installed	10~57	--	--	
		57~150	9.8	0.075	
Working environment	Do not use the PLC in environments with strong erosive and flammable gases or conductive dust.				
Elevation	Below 2000 m				

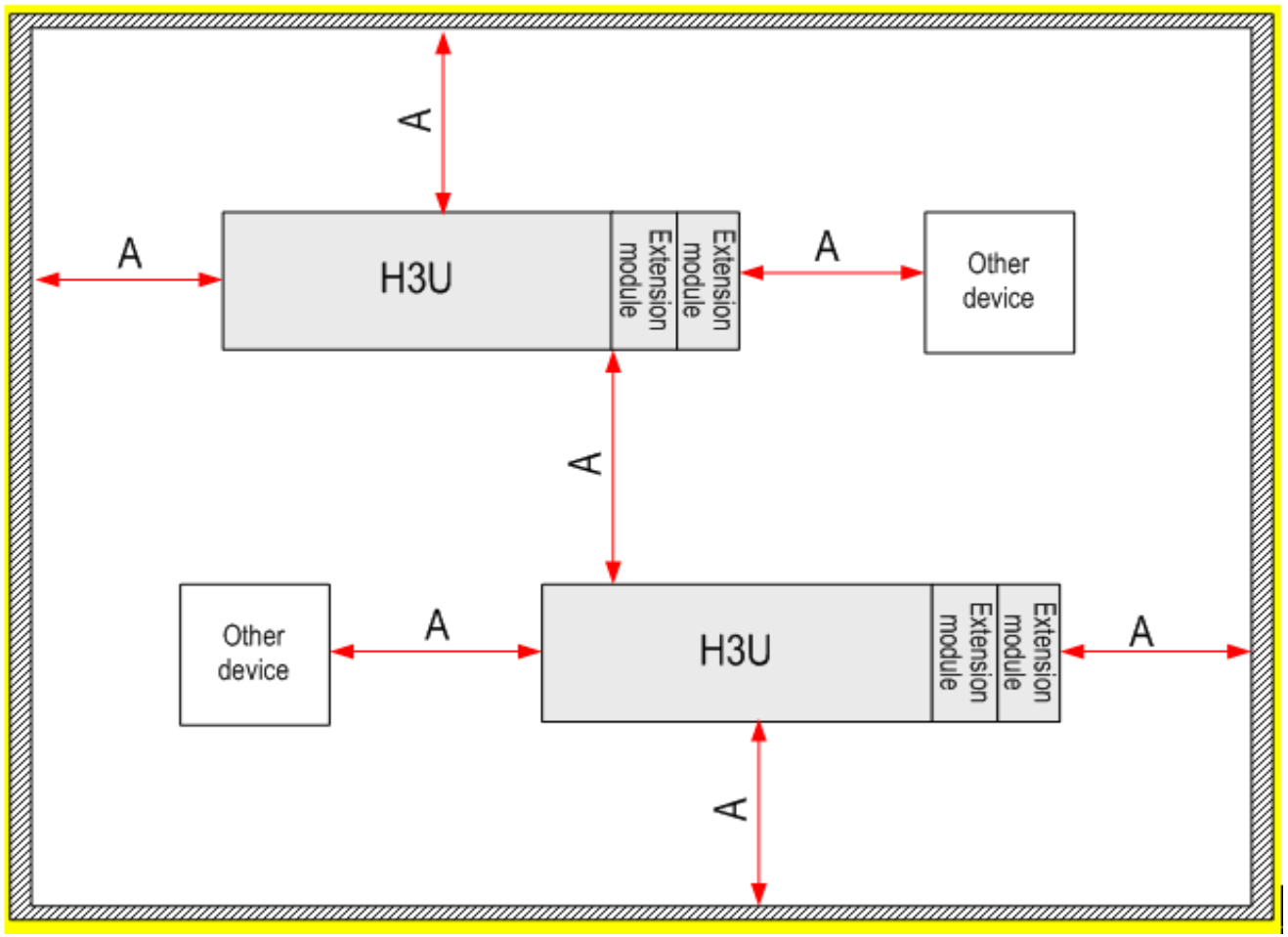
1.2 Mounting Orientation and Clearance



Vertical upward installation

1.2 Mounting Orientation and Clearance

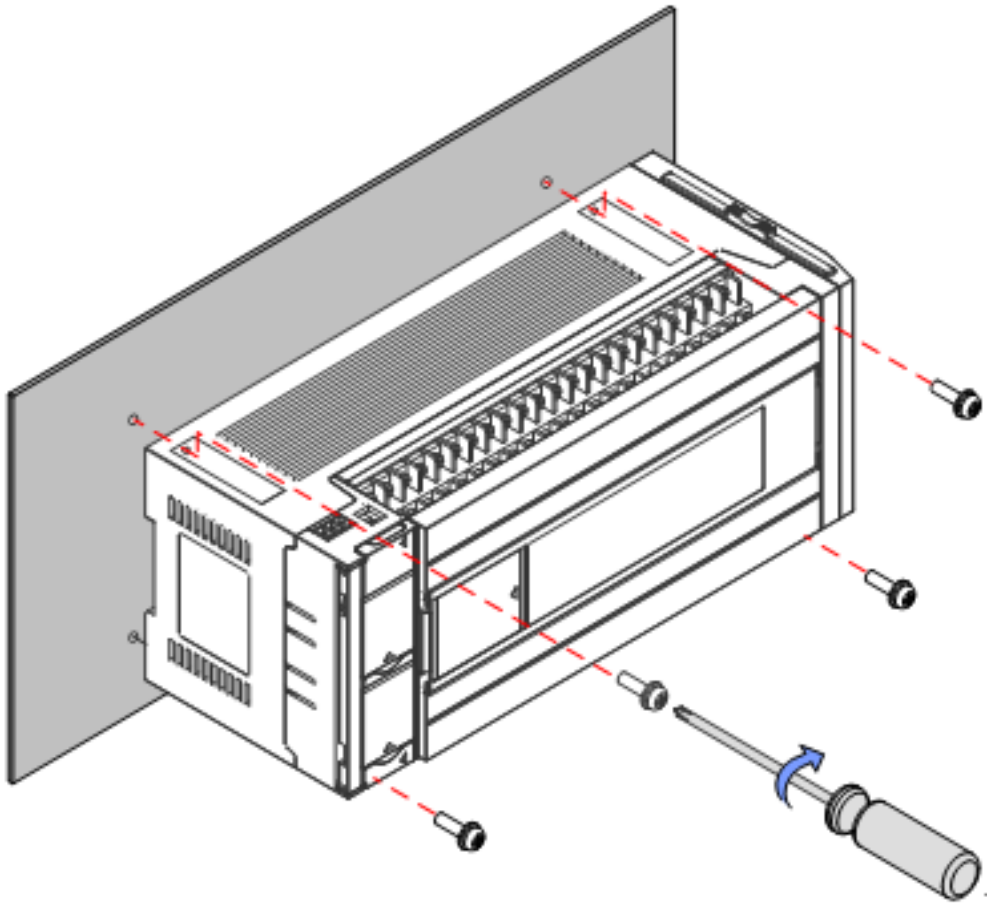
To ensure properly ventilation, the distance A between the PLC and modules should be larger than 50 mm.



1.3 Installation Method and Procedures

☐ Backplate Mounting

Use M4 screws to fix the PLC on the installation surface in the control cabinet through the mounting holes on four corners

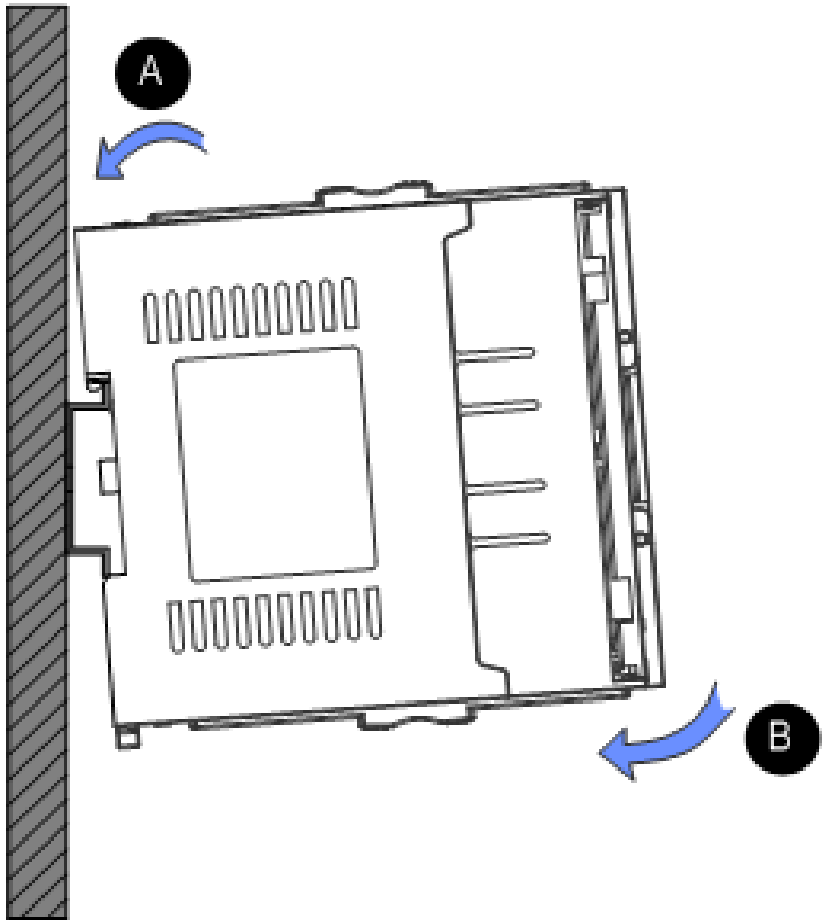


1.3 Installation Method and Procedures

DIN Rail Mounting

1.Clip the mounting slot on the rear side of the PLC in the upper edge of the rail.

2. Press the PLC in the direction B until you hear the click sound. Check if the PLC is fully and vertically clipped in on the DIN rail.

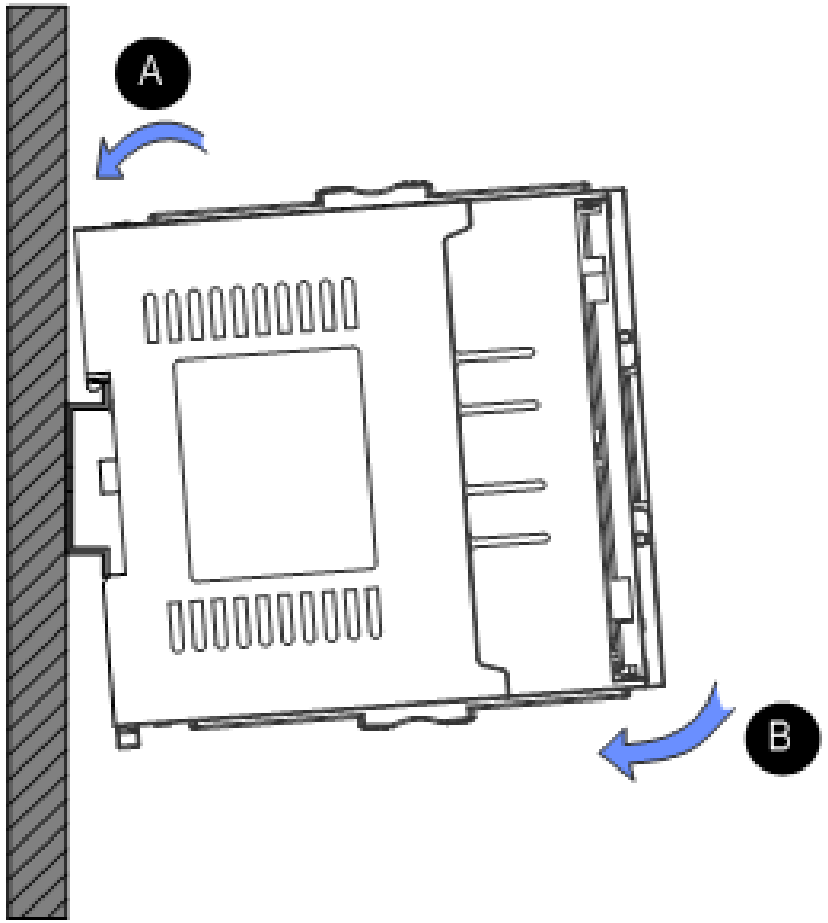


1.3 Installation Method and Procedures

DIN Rail Mounting

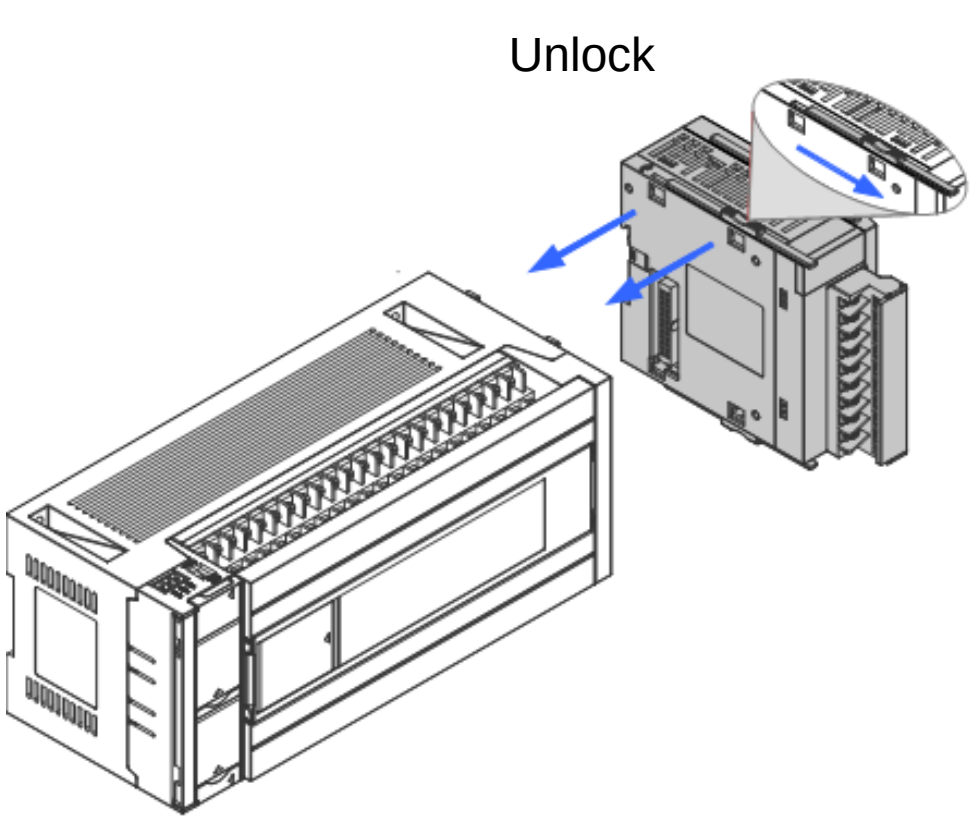
1.Clip the mounting slot on the rear side of the PLC in the upper edge of the rail.

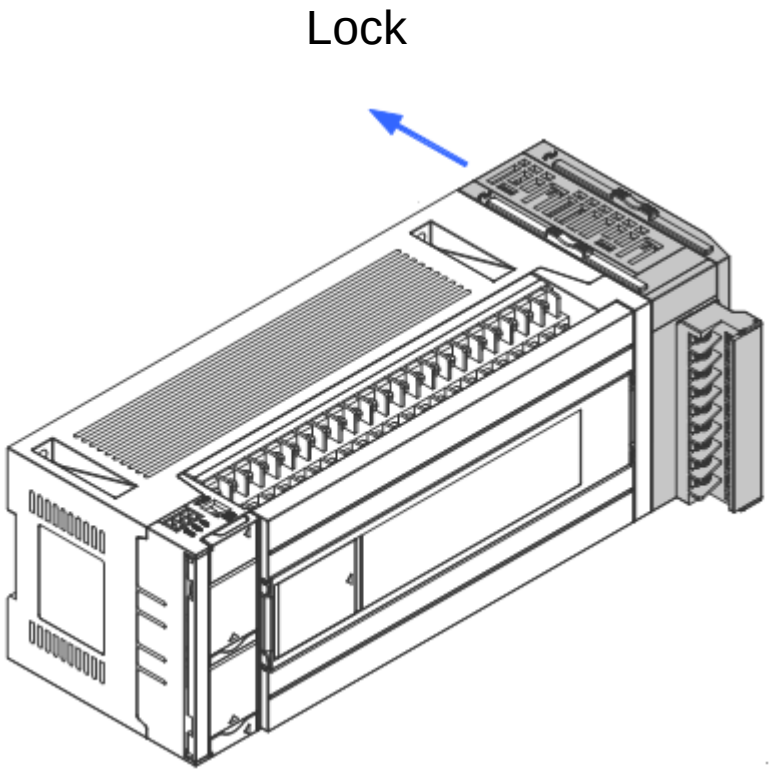
2. Press the PLC in the direction B until you hear the click sound. Check if the PLC is fully and vertically clipped in on the DIN rail.



1.3 Installation Method and Procedures

Expansion Modules Installation





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2. Wiring Specifications

2.1 Terminals

2.2 Input Wiring

2.3 Output Wiring

2.4 Communication Instructions

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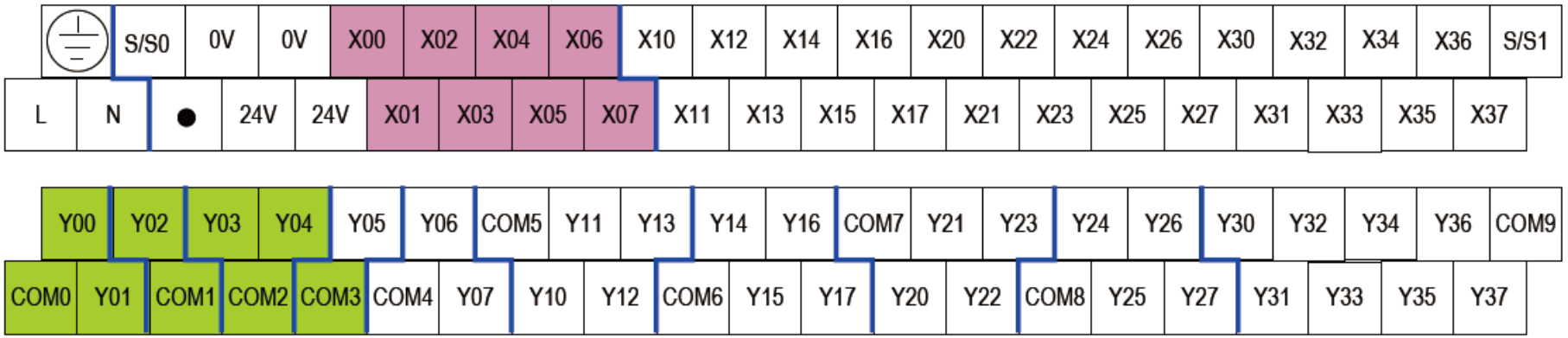
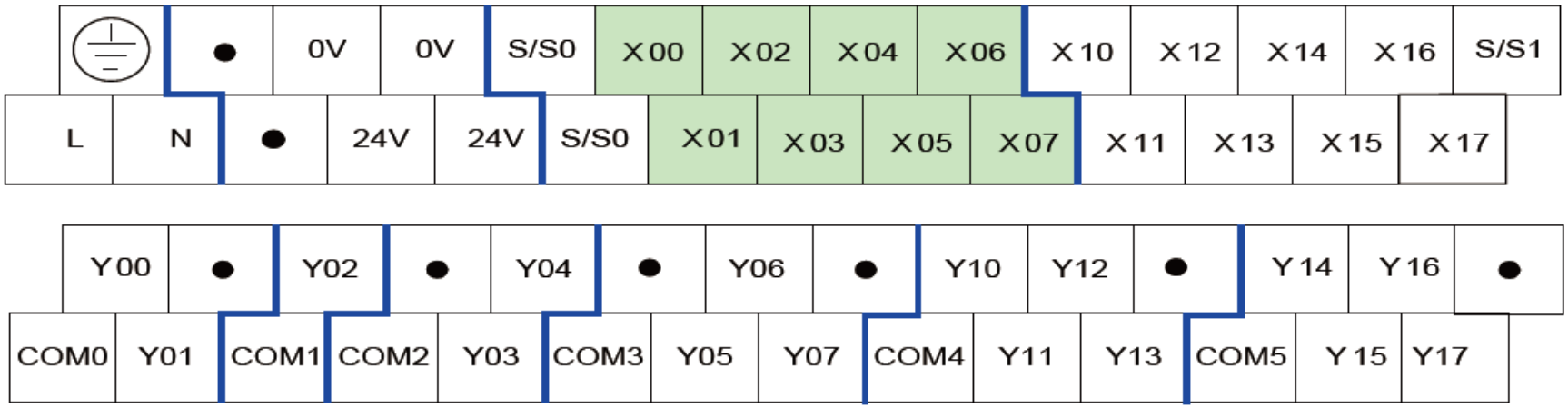
Wiring Specifications

2.1 Terminals

Terminals of H_{3U}-3232MT/R



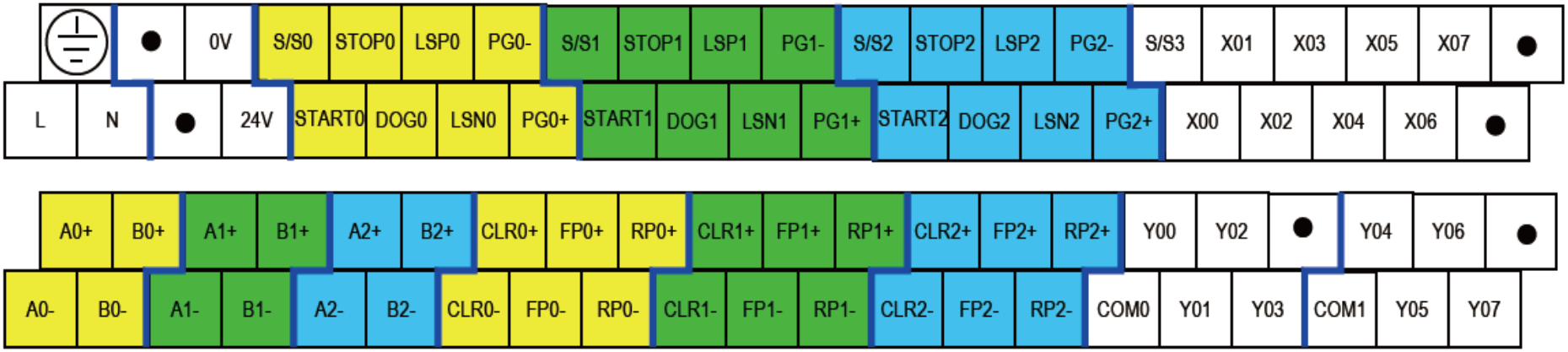
Terminals of H_{3U}-1616MT/R-XP



Wiring Specifications

2.1 Terminals

Terminals of H_{3U}-0808PMRTA



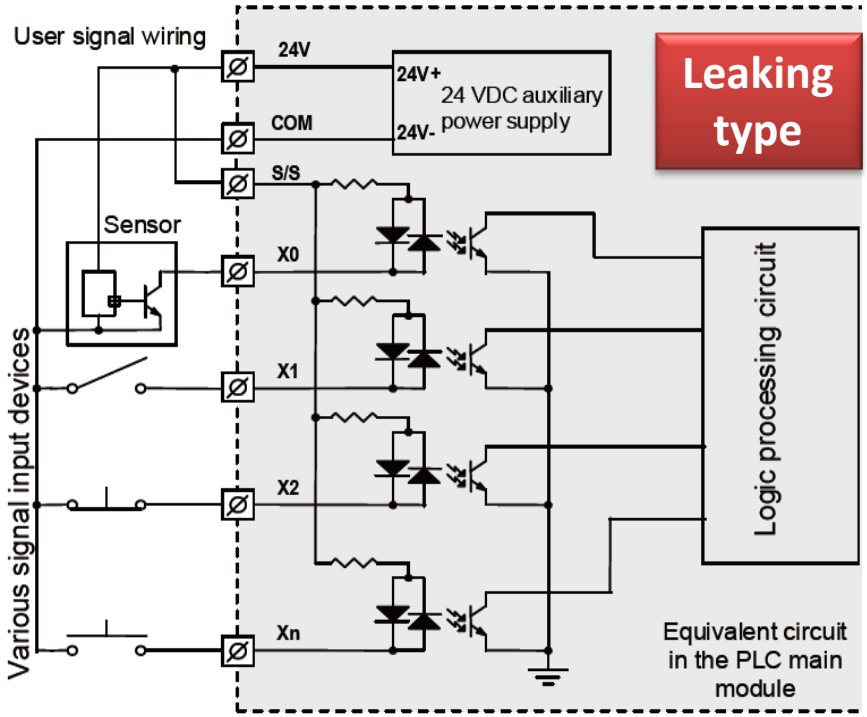
Wiring Specifications

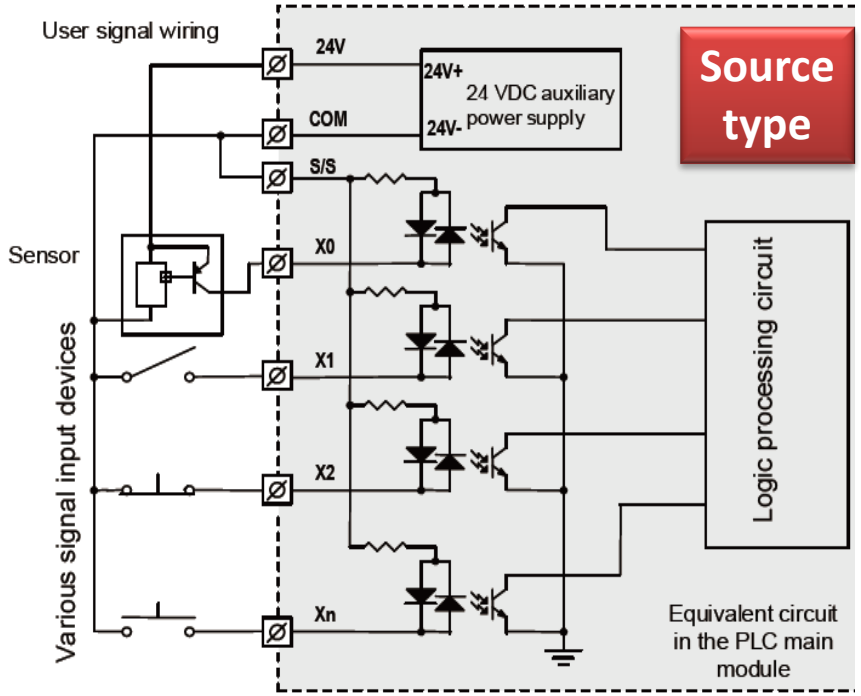
2.1 Terminals

Function	Terminals of standard models		Terminals of motion control models
	H_{3U}-3232MT/R	H_{3U}-1616MT/R-XP	H_{3U}-0808PMRTA
Power input	L, N, PE		L, N, PE
Power output	24V, 0V		24V, 0V
Normal transistor NPN output	Y05~Y37	Y05~Y17	Y00~Y03
High-speed transistor NPN output	Y00~Y04	Y00~Y04	-
Relay output	Y00~Y37	Y00~Y17	Y04~Y07
High-speed differential output	-		FPx+, FPx-, RPx+, RPx
Normal transistor zero-clearing NPN output	-		CLRx+, CLRx- (CLRx-common terminal)
Normal input	X10~X37	X10~X17	STOPx, LSPx, LSNx, DOGx, STARTx
High-speed input	X00~X07	X00~X07	-
High-speed differential input	-		Ax+, Ax-, Bx+, Bx-, PGx+ and PGx-, leakage-type and source-type input

2.2 Input Wiring

Normal input wiring

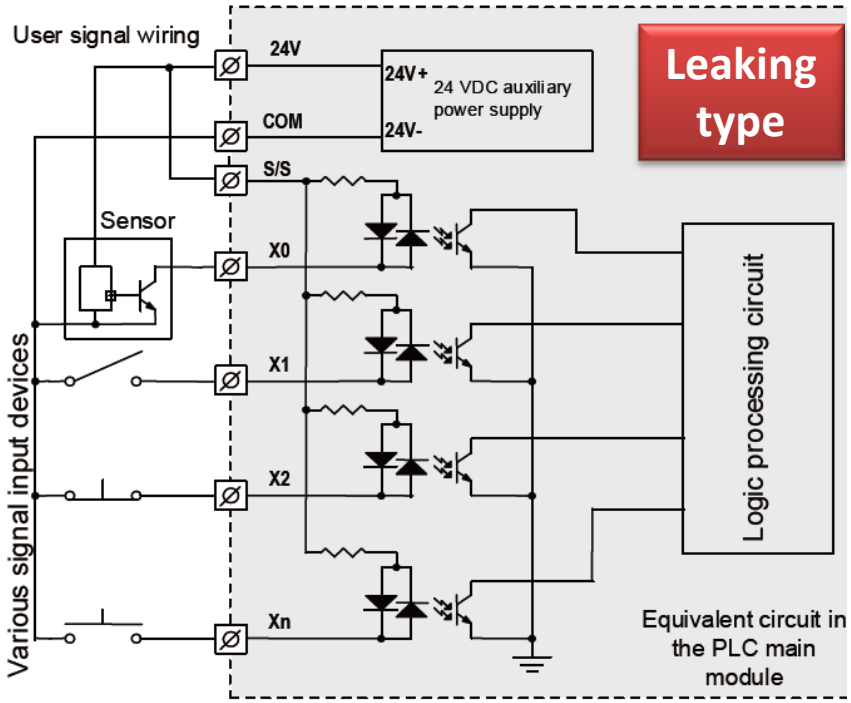


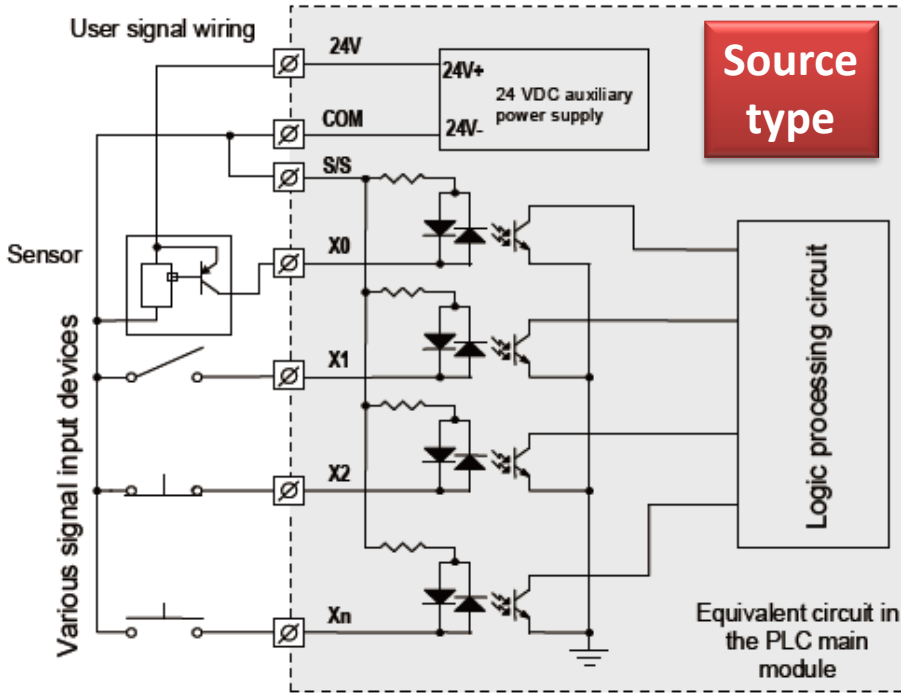


Item		Description
Signal input mode		It can be leakage and source type. When S/S and 24 V are shorted, it is the leakage-type input; when S/S and COM are shorted, it is the source-type input.
Electric parameters	Detection voltage	DC 24V[1]
	Input resistance	4.3k
	Input is ON	The input current is larger than 3.5 mA.
	Input is OFF	The input current is smaller than 1.5 mA.
Filter function	Hardware filter	IO port is hardware RC filter. The RC constant time is 10 ms.
Common wiring terminal		The input common terminal is S/Sx. The x depends on the input group.

2.2 Input Wiring

High-speed input wiring



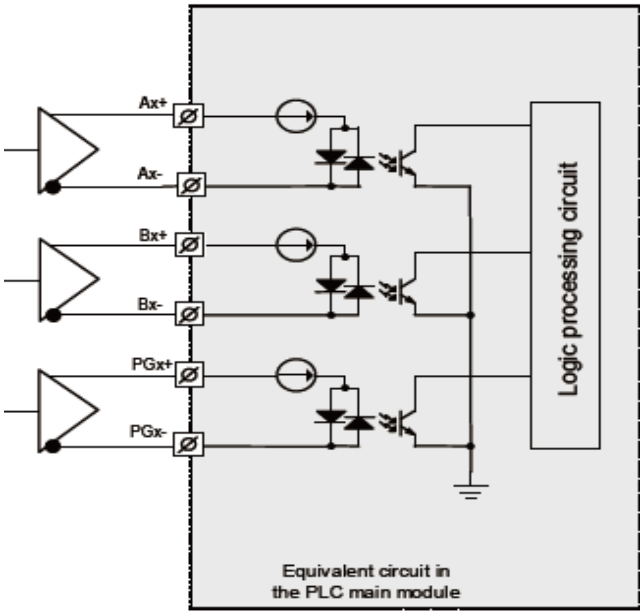


Item		Description
Signal input mode		It can be leakage and source type. When S/S and 24 V are shorted, it is the leakage-type input; when S/S and COM are shorted, it is the source-type input.
Electric parameters	Detection voltage	DC24V[1]
	Input resistance	3.3k
	Input is ON	The input current is larger than 5.0 mA.
	Input is OFF	The input current is smaller than 1.5 mA.
	Maximum input fre-quency	200kHz
	Smallest identifiable pulse width	1.5us[2]
Filter function	Hardware filter	X0~X7 have the digital filter function. It can be configured when the filter time is between 1 and 60 ms. The unit is 1 ms.
Common wiring terminal		The input common terminal is S/Sx. The x depends on the input group.

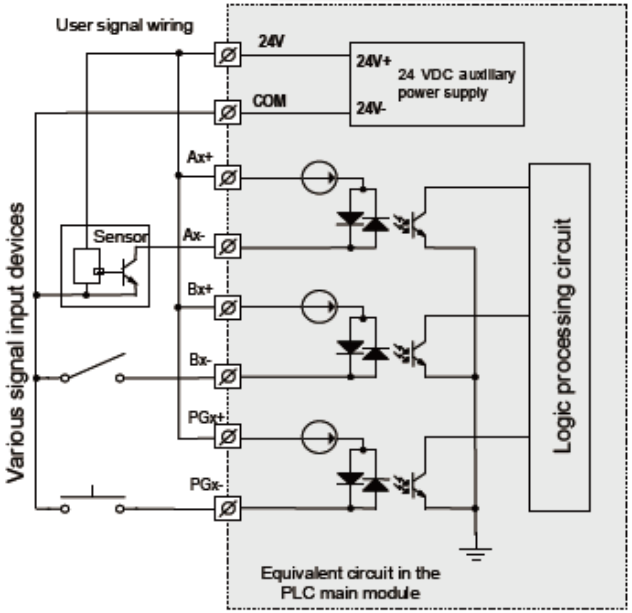
2.2 Input Wiring

Differential input wiring

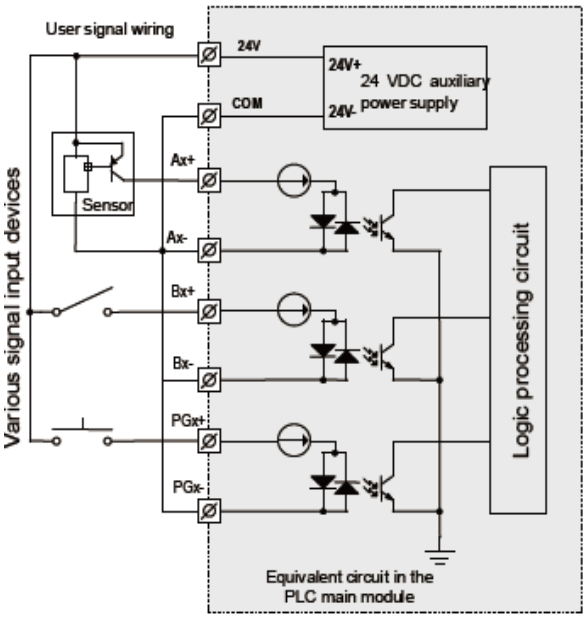
Standard method



Leaking type



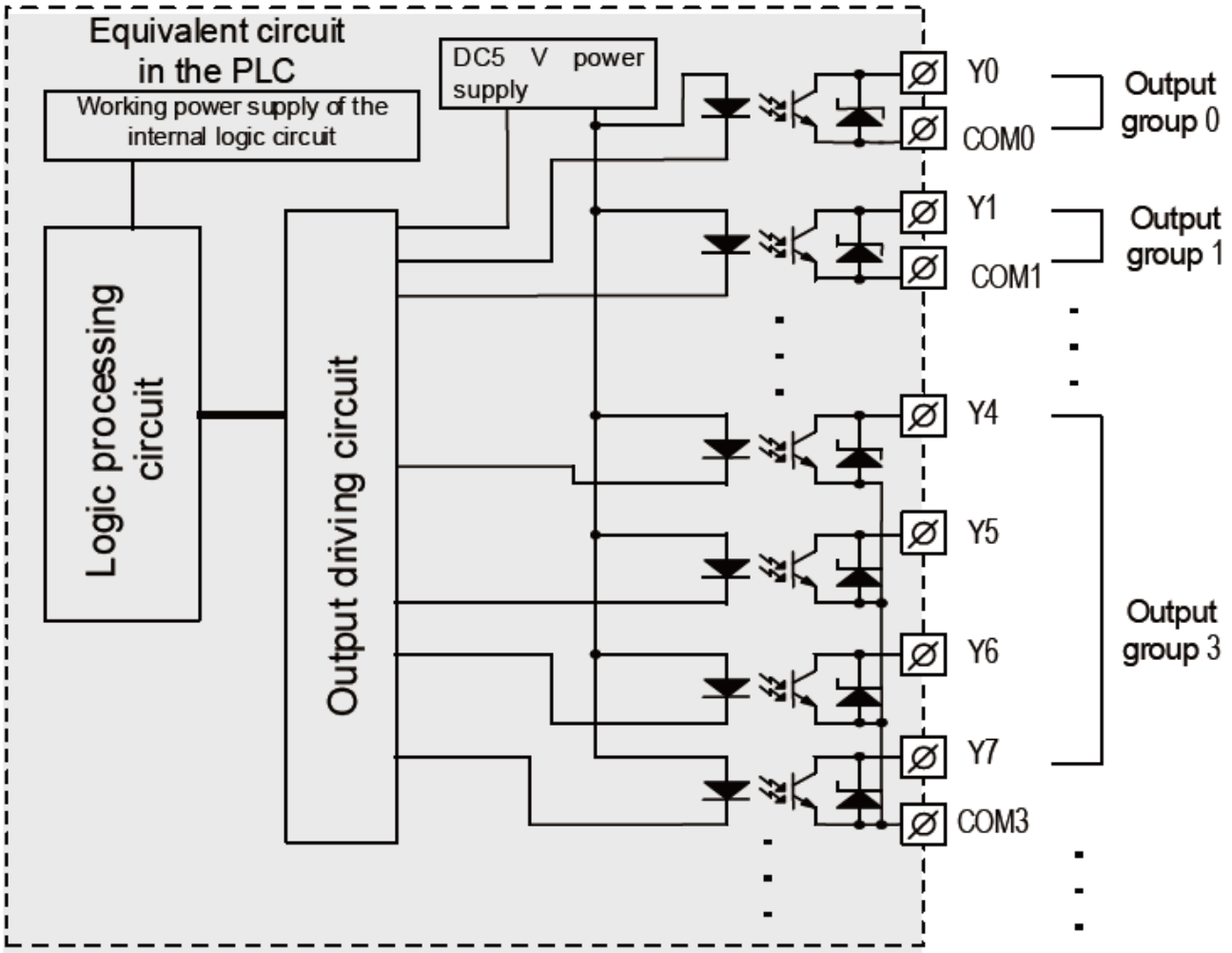
Source type



Item	Description
Detection voltage	When the voltage is larger than 3V, it is ON; when the voltage is smaller than 2V, it is OFF.
Input is ON	When the positive terminal of the differential input is 3V larger than the negative terminal, it is ON. The difference of the maximum V+ and V- is 30V. When it is ON, the input current is 6 mA.
Input is OFF	When the difference between V+ and V- is smaller than 2V, it is OFF. The minimum value is -30V.
Maximum input frequency	200kHz
Smallest identifiable pulse width	1.5us[1]

2.3 Output Wiring

Normal/high-speed transistor output wiring

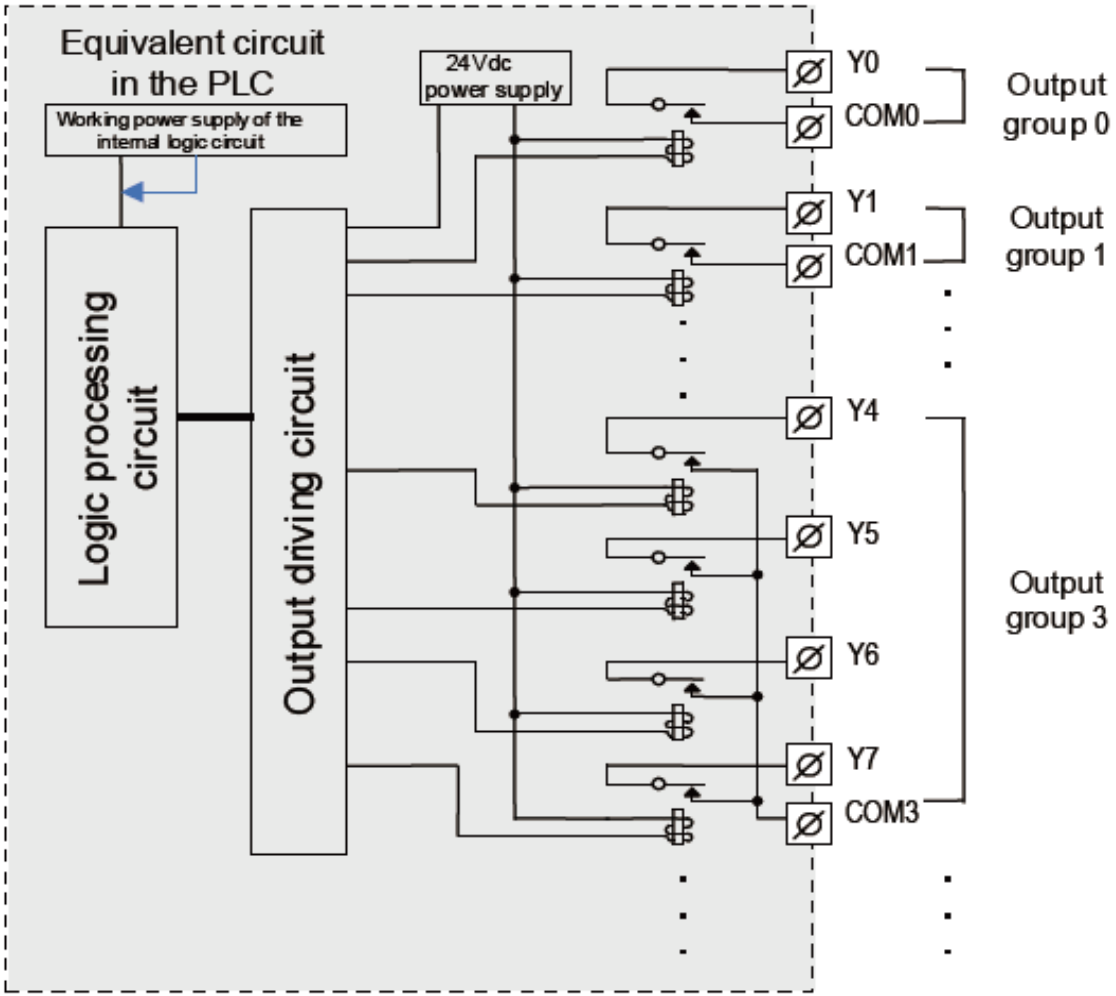


2.3 Output Wiring

Item		High-speed transistor NPN output	Normal transistor NPN output
Circuit power voltage		DC5~24V	DC5~24V
Circuit insulation		Opto-coupler insulation	Opto-coupler insulation
Action instruction		LED becomes ON when the opto-coupler is driven.	LED becomes ON when the opto-coupler is driven.
Leak current in an open circuit		Smaller than 0.1 mA/DC30 V	Smaller than 0.1 mA/DC30 V
Smallest load		5mA (DC5~24V)	5mA (DC5~24V)
Maximum Output Current	Resistive load	0.5 A/point; 0.8 A/4 points; 1.6 A/8 points	0.5 A/point; 0.8 A/4 points; 1.6 A/8 points
	Inductive load[1]	7.2W/DC24V	12W/DC24V
	Lamp load[2]	0.9W/DC24V	1.5W/DC24V
ON response time		1us	0.5ms
OFF response time		1us	
High-speed output frequency		200 kHz[3] for each channel (maximum)	/
Output common terminal		Each group shares one common terminal. One group is isolated from another group	
Fuse protection		None, needs external fuse	

2.3 Output Wiring

Wiring of relay outputs

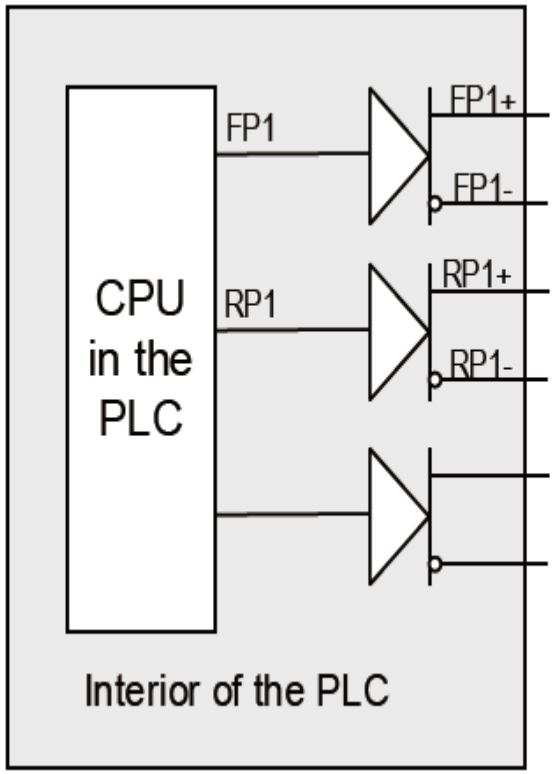


2.3 Output Wiring

Item		Relay output
Circuit power voltage		Below AC250 V, DC30 V
Circuit insulation		Relay mechanical insulation
Action instruction		When the relay output contact is closed, the LED becomes ON.
Leak current in an open circuit		/
Smallest load		2mA/DC5V
Maximum Output Current	Resistive load	2 A/1 point; 8 A/4 point common terminal; 8 A/8 point common terminal
	Inductive load[1]	AC220V, 80VA
	Lamp load[2]	AC220V, 100W
ON response time		20ms Max
OFF response time		20ms Max
High-speed output frequency		/
Output common terminal		Each group shares one common terminal. One group is isolated from another group
Fuse protection		None

2.3 Output Wiring

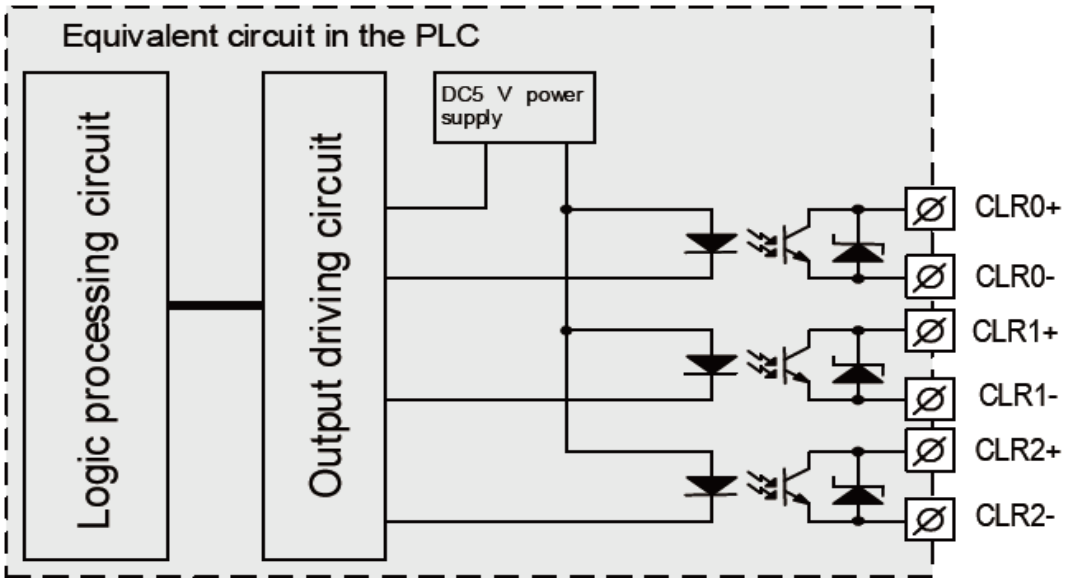
Wiring of High-speed differential outputs



Item	Differential output
Circuit power voltage	Active output, external power supply is not needed
Circuit isolation	No isolation inside the PLC, no isolation between channels
Action instruction	When the output + is larger than -, it is ON and the LED is ON.
Maximum frequency	500kHz
Output voltage	±5 V (3.1 V when the load is 100 Ω)
ON status	Subtracting VOx- from VOx+ equals to 5 V.
OFF status	Subtracting VOx- from VOx+ equals to -5 V.

2.3 Output Wiring

CLR outputs of H3U-0808PMRTA

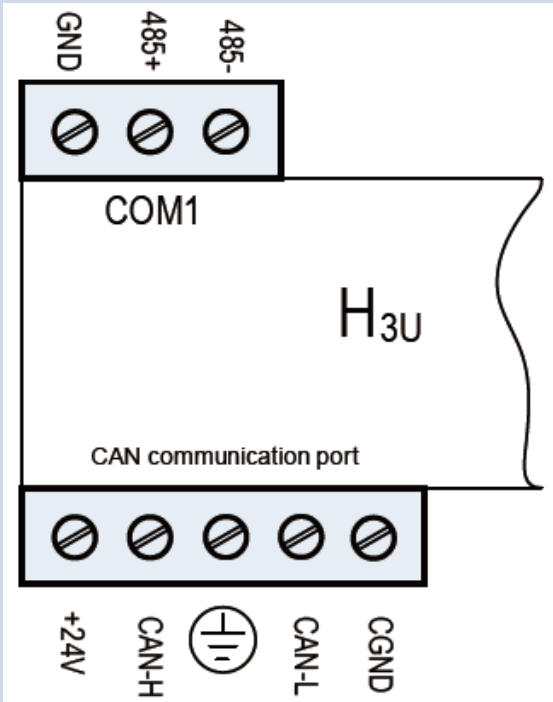


Item	Normal transistor NPN output	Description
Circuit power voltage	DC5-24 V	The normal transistor zero-clearing NPN output is the motion control pin of H_{3U}-0808PMRTA. It is designed for error resetting signal of servo. It is generally used for original point returning and electronic cam synchronization signal output.
Circuit isolation	Opto-coupler isolation, isolation between channels	
Action instruction	LED becomes ON when the opto-coupler is driven.	
Leak current in an open circuit	Smaller than 0.1 mA/DC30 V	
Smallest load	5 mA (DC5-24 V)	
Maximum Output Current Resistive load	0.1 A	
ON response time	0.1 ms	
OFF response time		
High-speed output frequency	/	

2.4 Communication Instructions

Functions of communication terminals

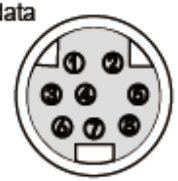
Name	Description
+24V,CGND	CAN communication power supply, setting range is between 9-30 V
CANL,CANH	CAN communication cable, the reference level is CGND. CGNDs must be connected to each other when there are multiple stations.
	It is the shield layer, which should be connected according to the actual need.
485+, 485-	It is used to connect the RS485 communication signal cable.
GND	It is for the reference signal of the RS485 communication signal.

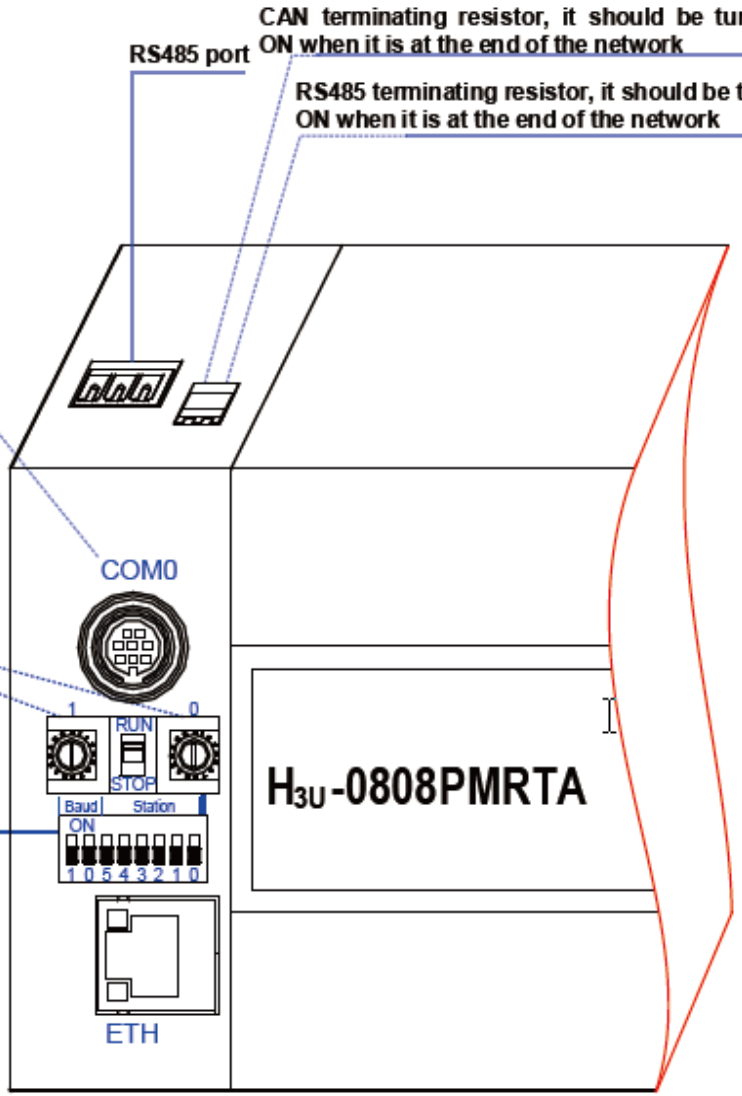


2.4 Communication Instructions

Communication configuration of H3U-3232MT/R and H3U-0808PMRTA

Description of pin signals
1: RXD- receive negative data
2: RXD+ receive positive data
3: GND grounding, PLC internal working reference grounding
4: TXD-/RXD- External send negative data
5: +5 V, external power supply +5V, same as the logic +5V used internally
6: CCS communication direction control cable
7: TXD+/RXD+ external send positive data
8: NC no pin



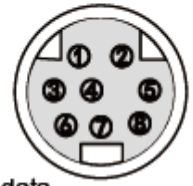


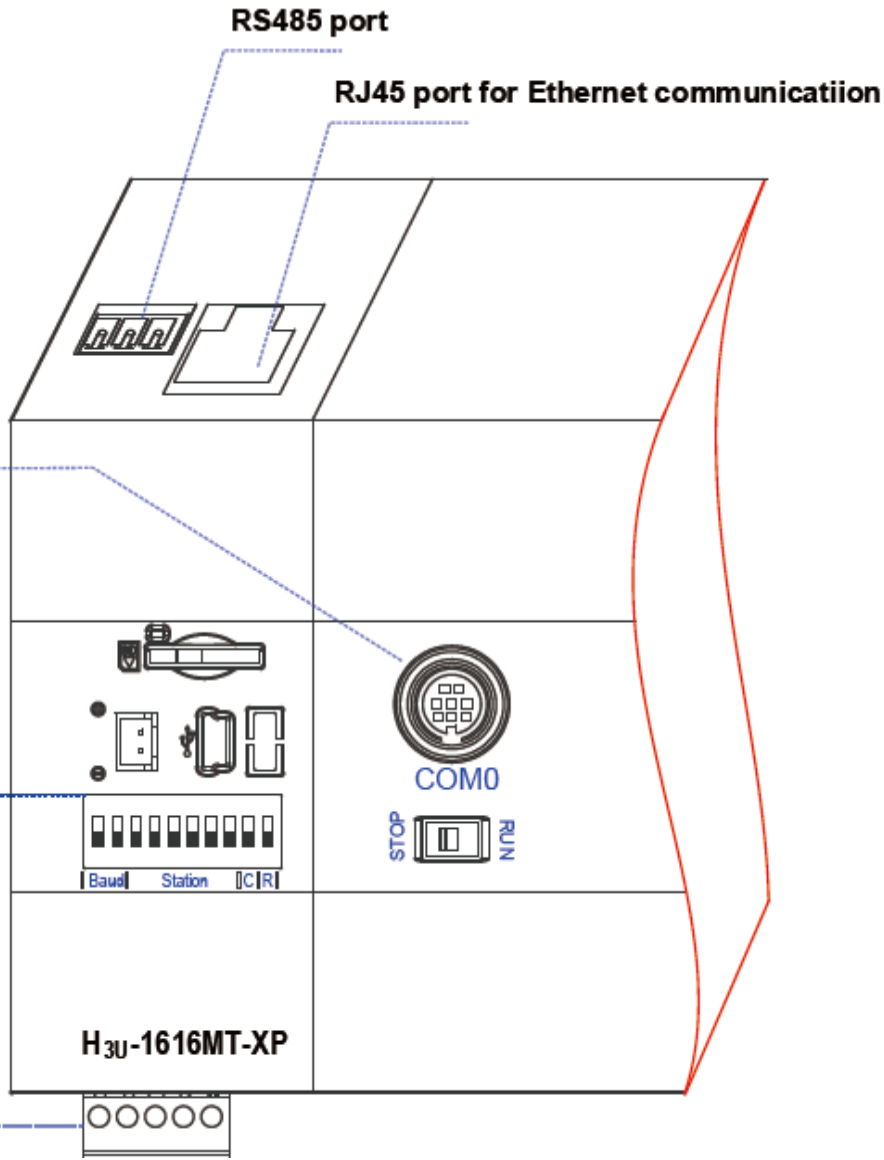
Baud rate setting:2Bits			Station number setting:6Bits					
Baud rate	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
500K	0	0	The value is set in the binary system: For example, Bit5-Bit0 is 011011. It means that the station number is 27.					
100K	0	1						
1M	1	0						
50K	1	1						

2.4 Communication Instructions

Communication configuration of H3U-1616MT/R-XP

Description of pin signals
1: RXD- receive negative data
2: RXD+ receive positive data
3: GND grounding, PLC internal working reference grounding
4: TXD-/RXD- External send negative data
5: +5 V external power supply +5V, same as the logic +5V used internally
6: CCS communication direction control cable
7: TXD+/RXD+ external send positive data
8: NC no pin





Station number, Baud rate and IP address setting:

Baud rate setting:2Bits			Station number and IP address setting:6Bits						CAN	RS485
Baud rate	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
500K	0	0	The value is set in the binary format: the station number and IP address's fourth segment share the same one. For example, Bit7-Bit2 is 011011. It means that the station number and IP address's fourth segment is 27.						Terminal resistor switch: Bit0: RS485 communication Bit1: CAN communication	
100K	0	1								
1M	1	0								
50K	1	1								

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3. Getting Started

3.1 Tools Requirements

3.2 Hardware Connection

3.3 Installation of AutoShop

3.4 Program Download Procedure

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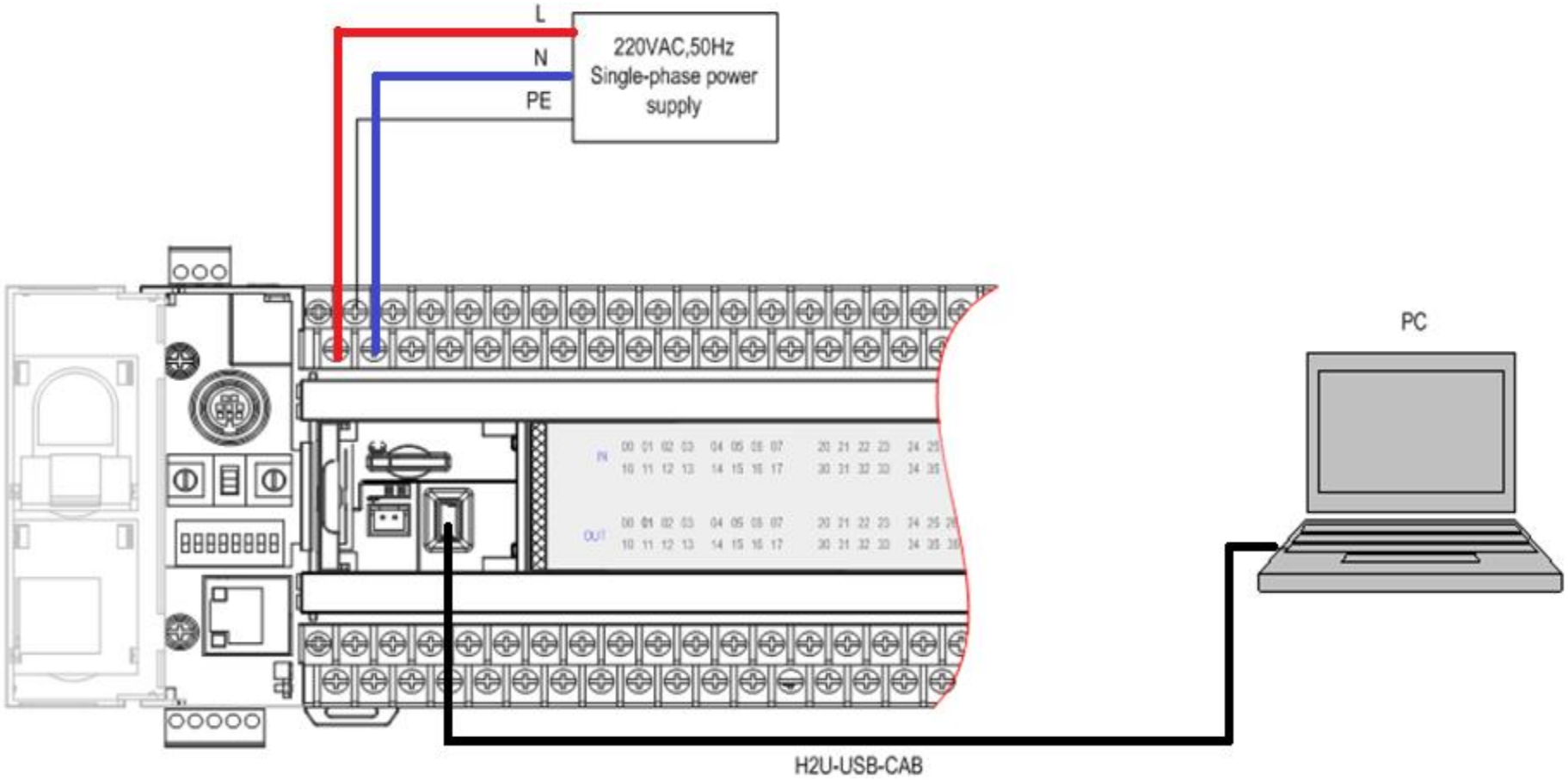
3.1 Tools Requirements

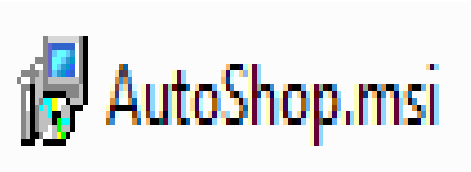
Hardware Tool Kit	
i.) USB download cable for PLC Part Code：15041200	 USB2.0 to Laptop mini USB to PLC
ii.) Laptop for Firmware Update (Windows 7)	
Software Tool on Laptop	
iii.) AutoShop (free installation, English, support Windows XP, Windows 7, Windows 8, Windows 10)	

3.2 Hardware Connection

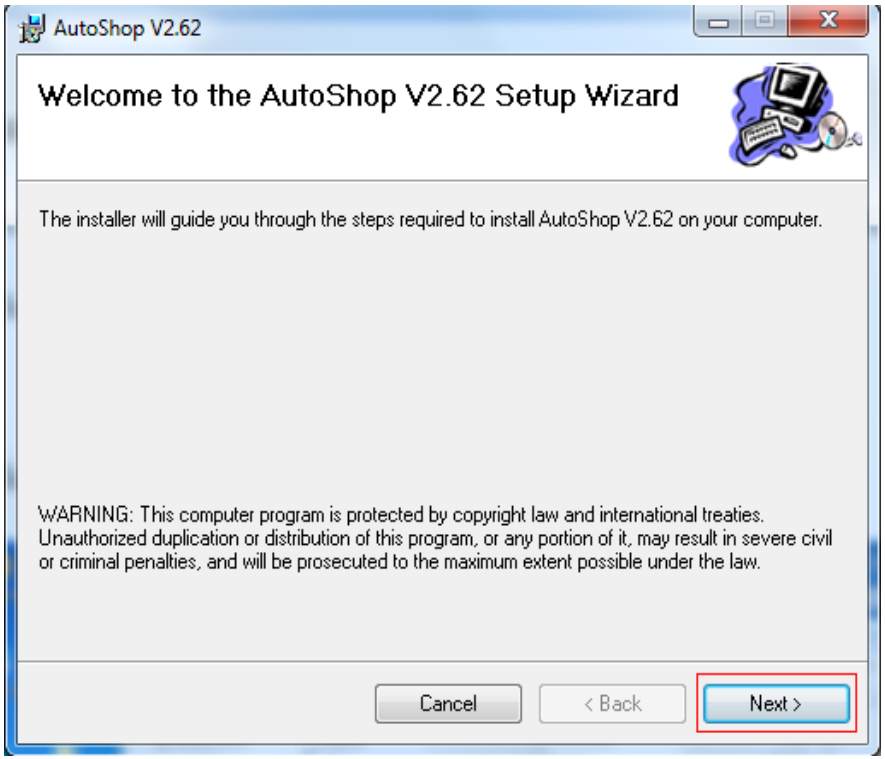


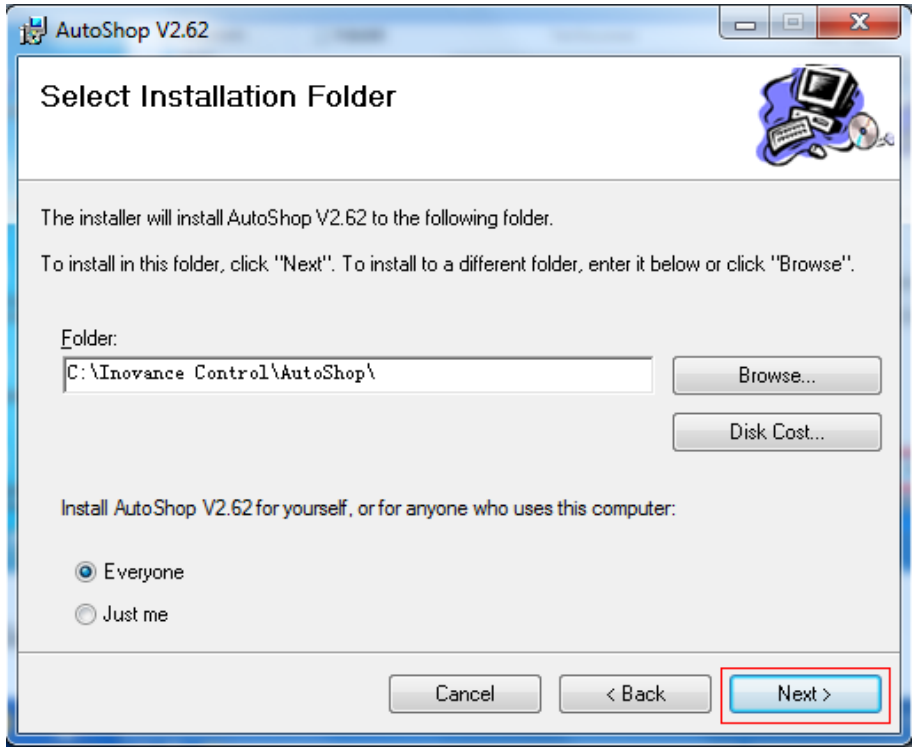
3.3 Installation of AutoShop

Step 1: Double click the(the present version is V2.62 for English.)

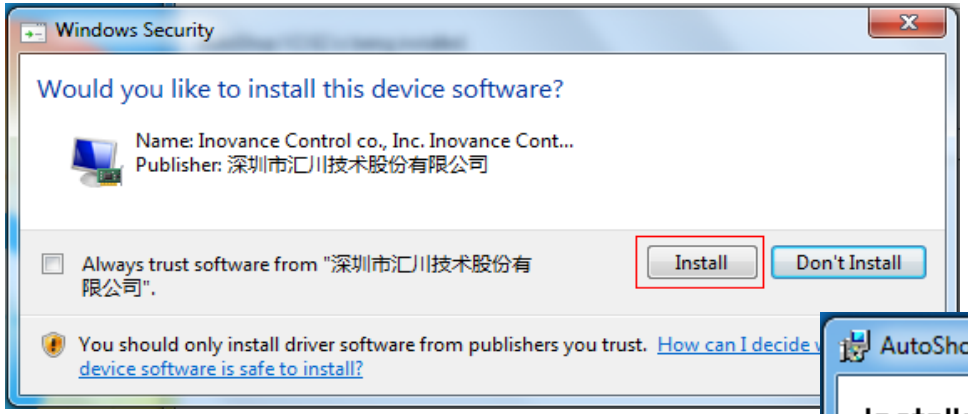


Step 2: Click “Next” and “Next” .



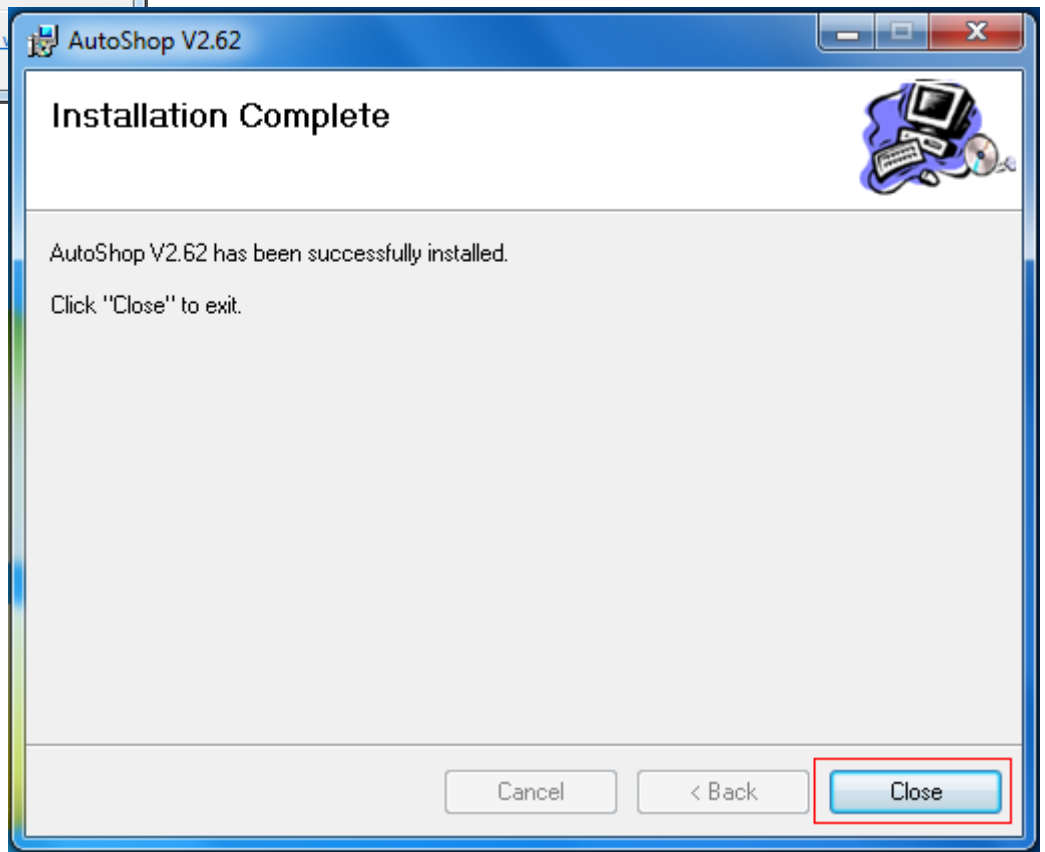


3.3 Installation of AutoShop



Step 3: Click “Install”.

Step 4: Wait until the installation complete, click “Close”. Finished



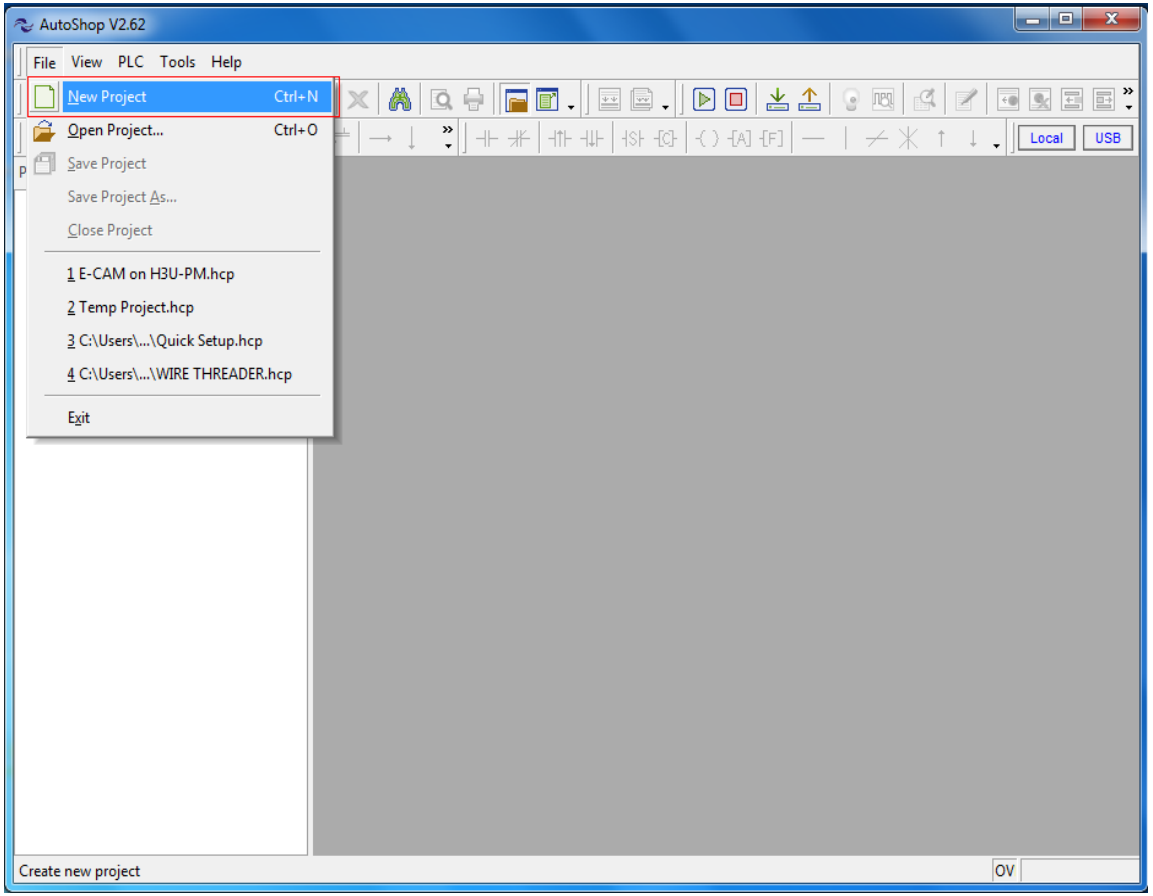
3.4 Program Download Procedure

Step 1:

1.Power on PLC

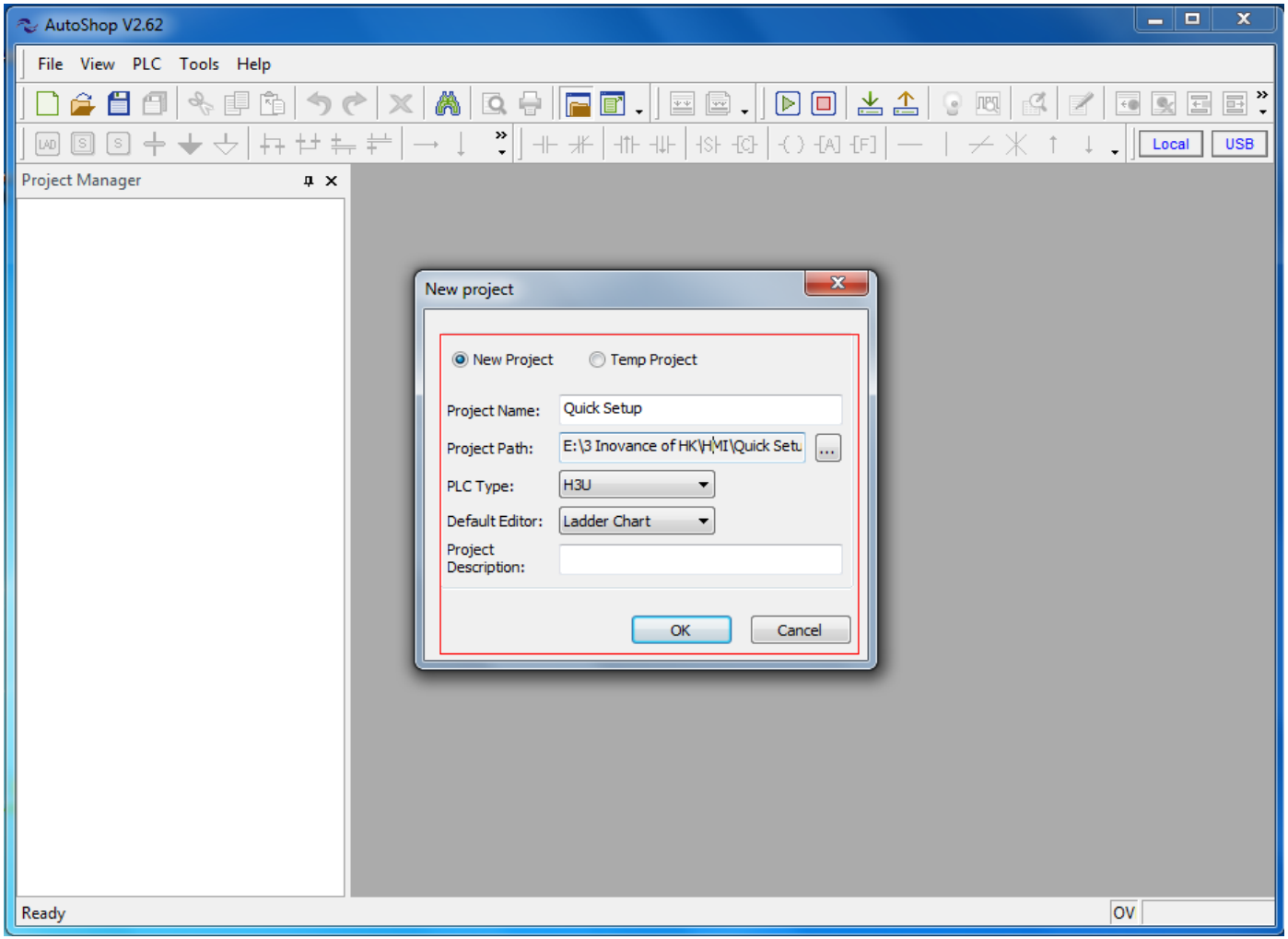
2.Double click the “AutoShop”

3.Click “File” and select “New Project”



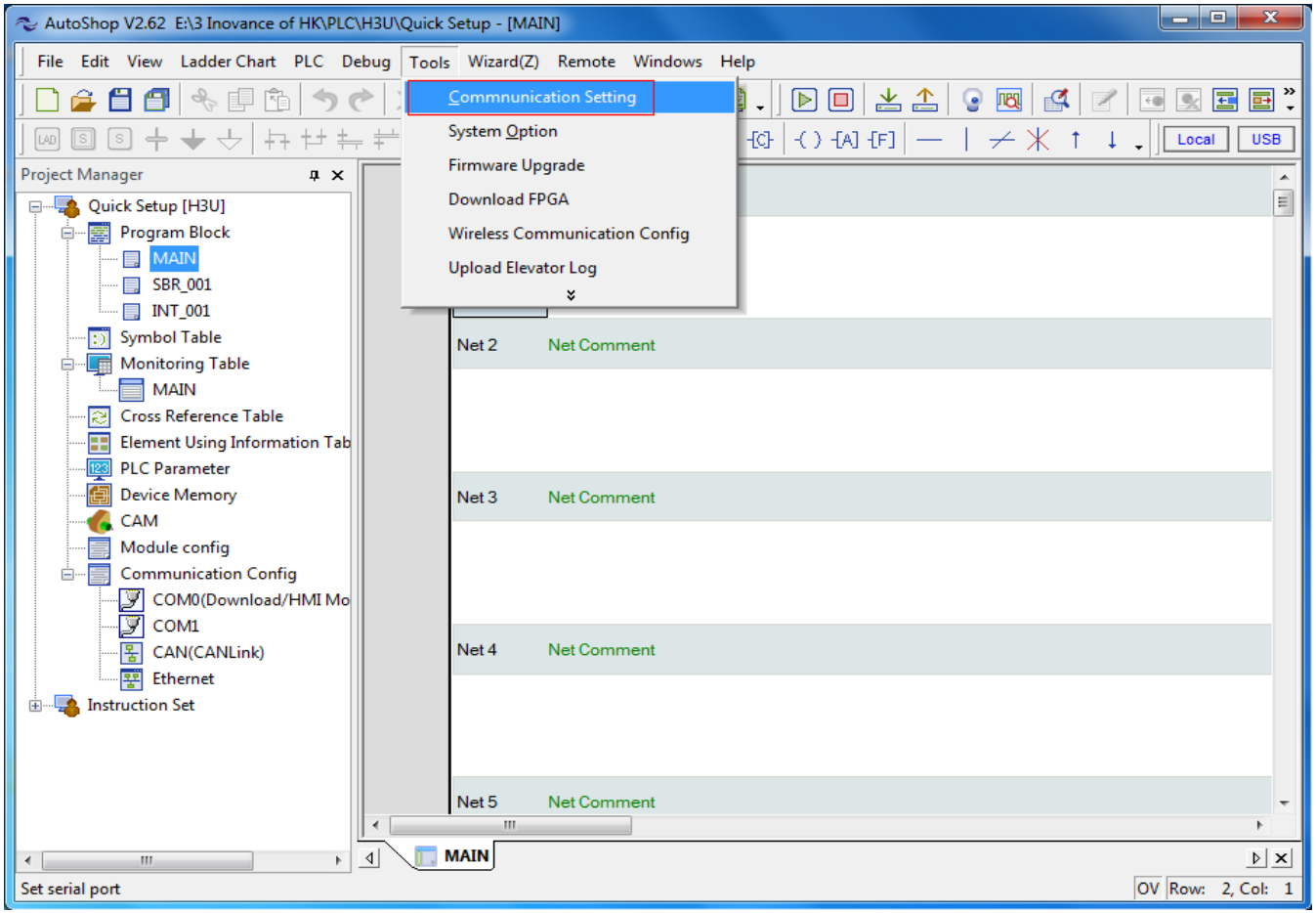
3.4 Program Download Procedure

Step 2: Set as follows figure.



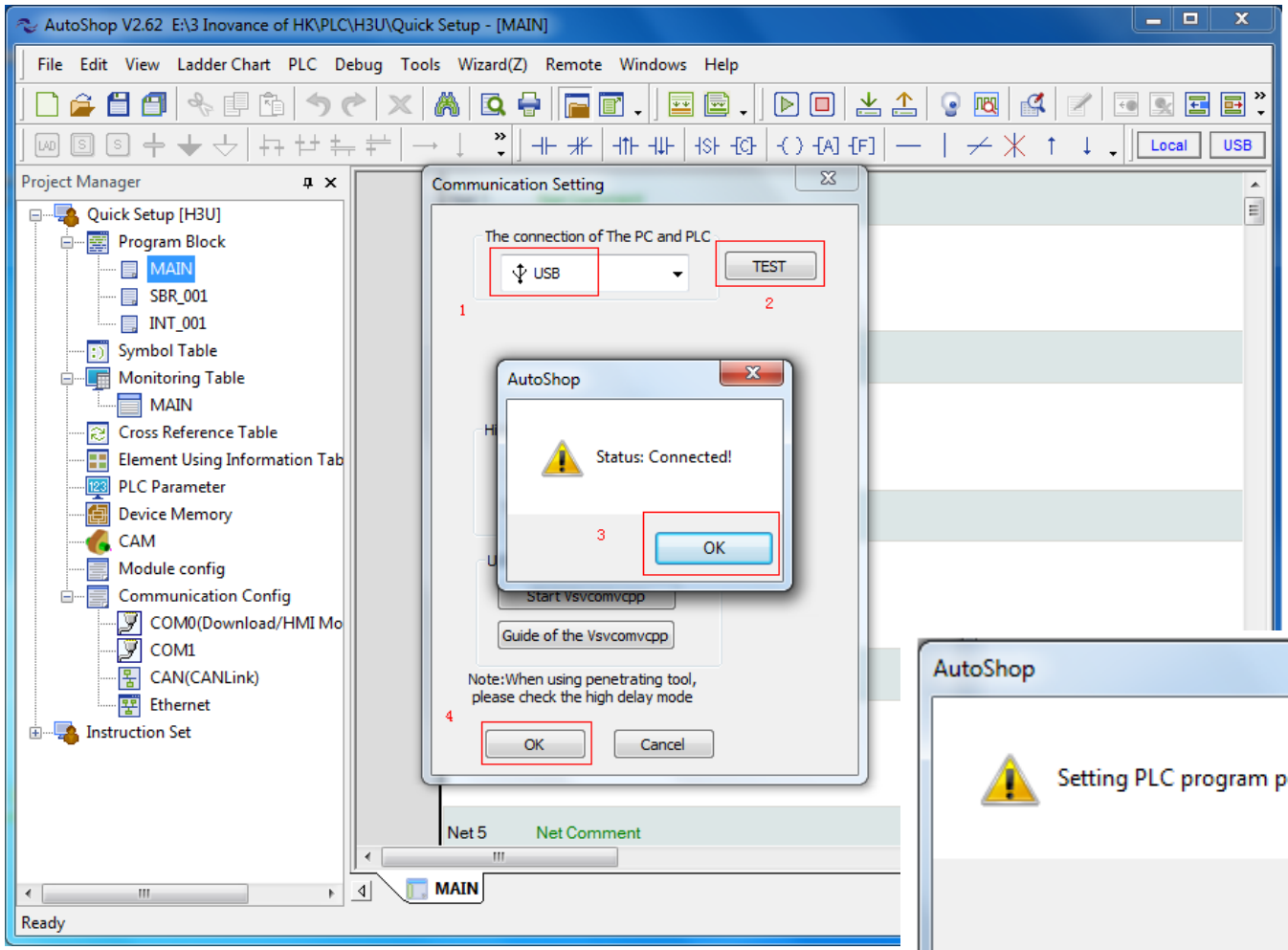
3.4 Program Download Procedure

Step 3:Click “Tools” and select “Communication Setting” .



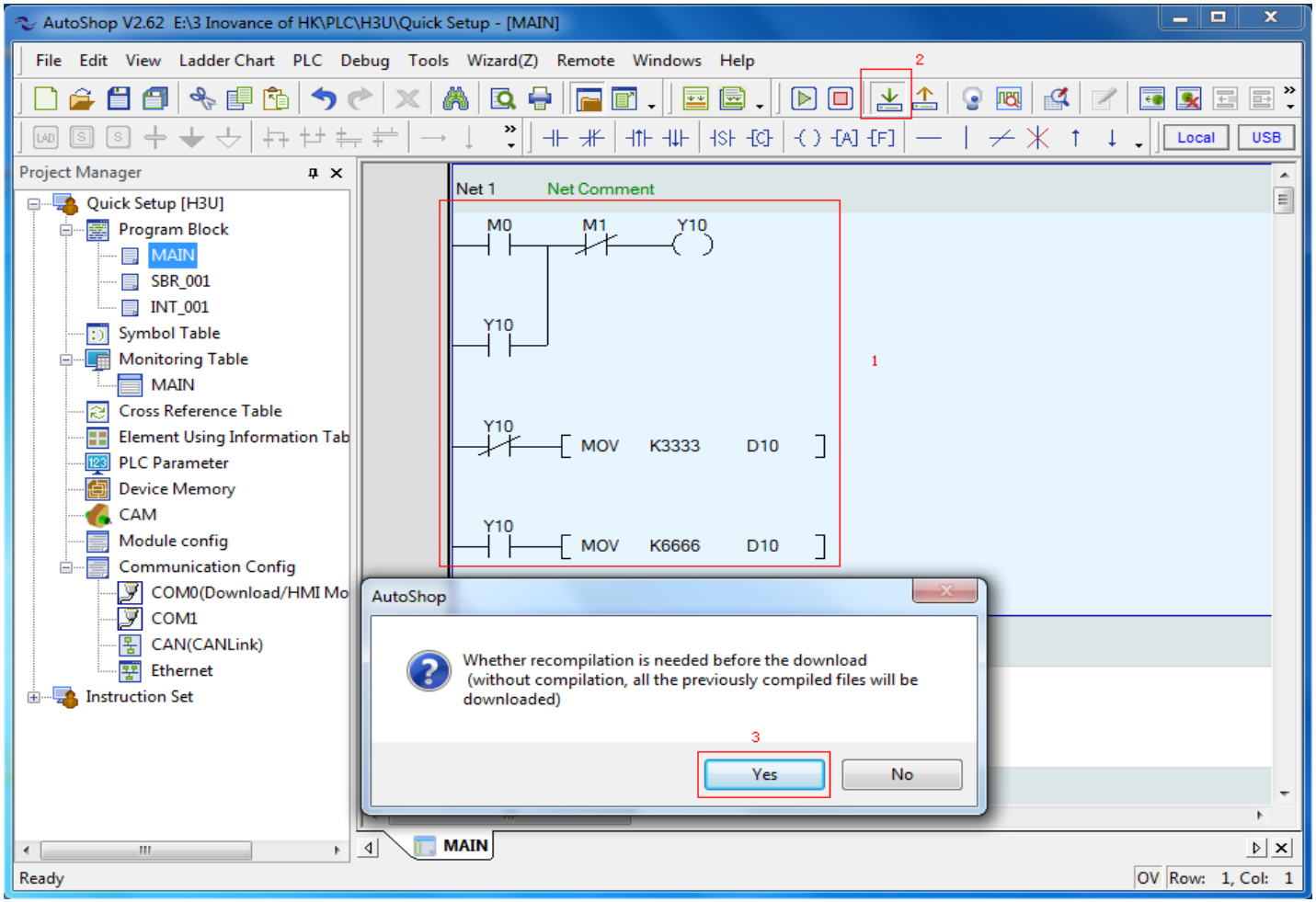
3.4 Program Download Procedure

Step 4: Follow below steps1-2-3-4.



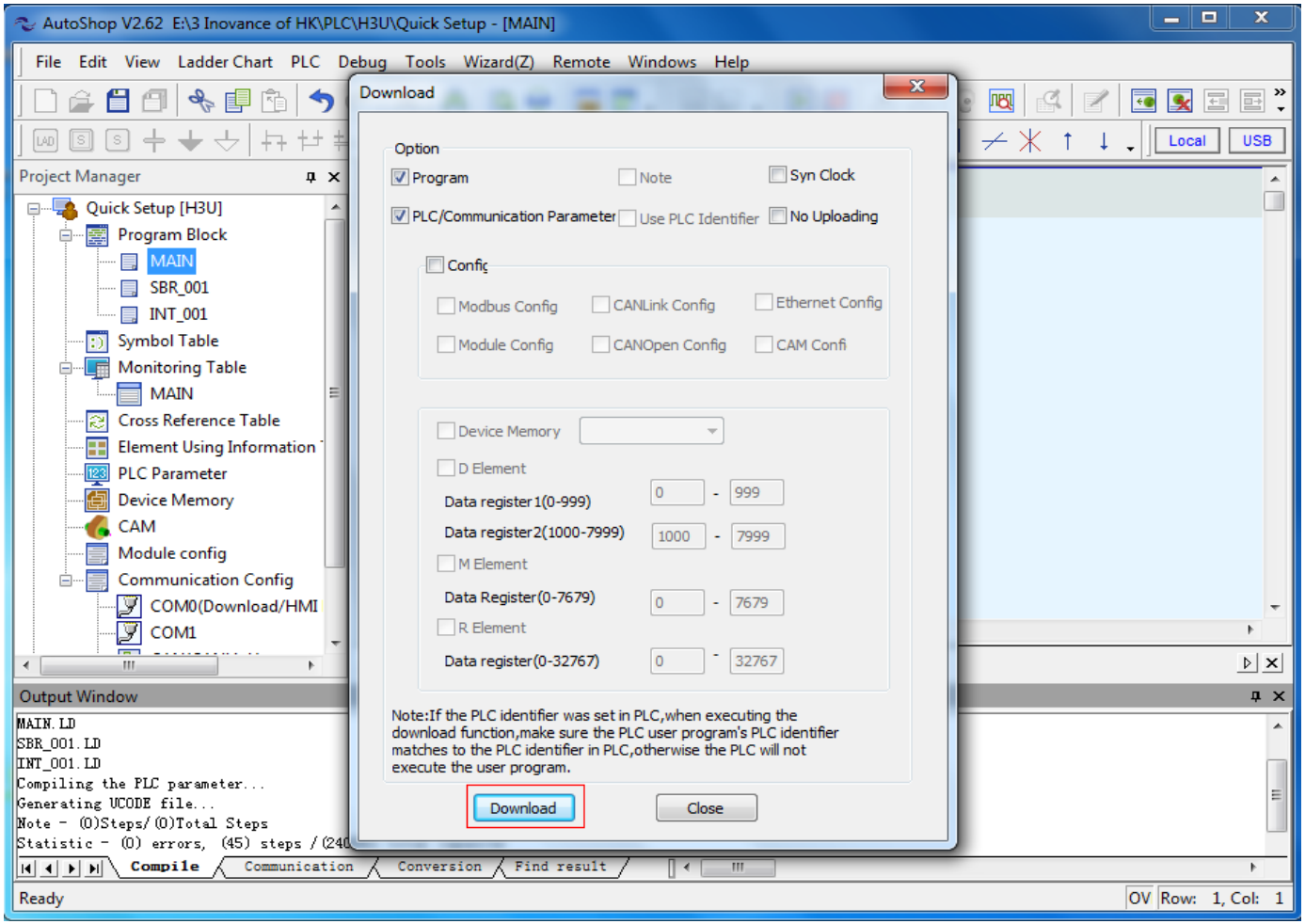
3.4 Program Download Procedure

Step 5: When you finish coding, follow below step to download program.



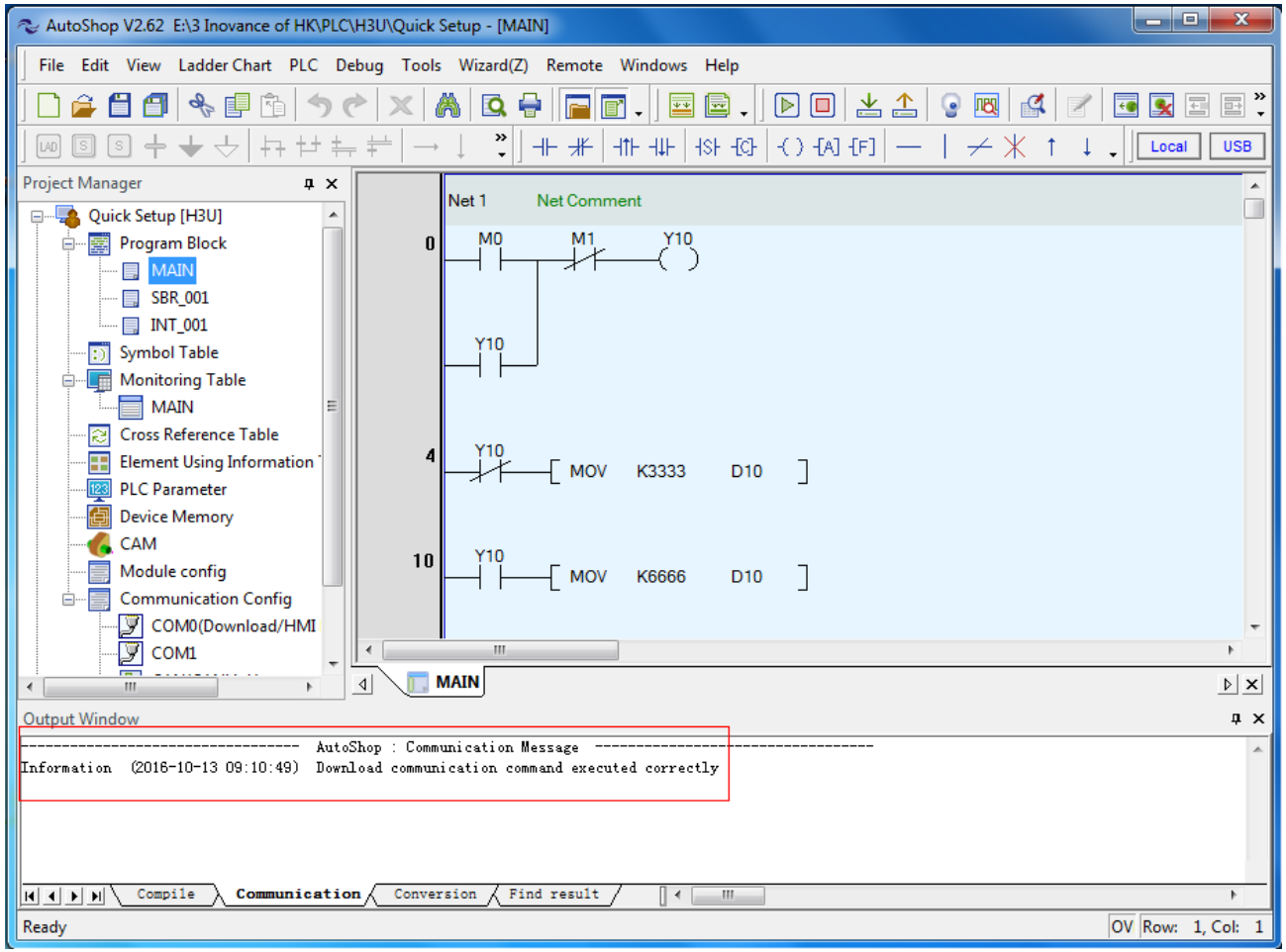
3.4 Program Download Procedure

Step 5: When you finish coding, follow below step to download program.



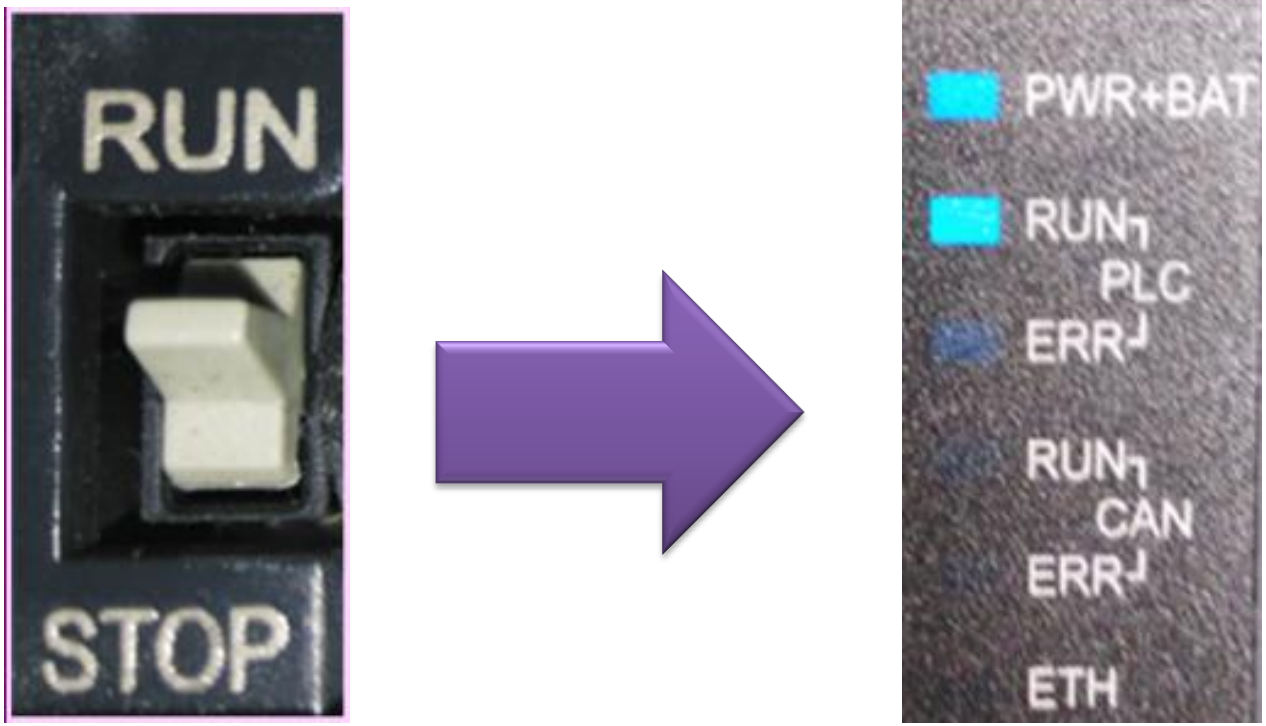
3.4 Program Download Procedure

Step 6:The output window indicates the download executed .



3.4 Program Download Procedure

Step 9:
1.Switch to the “RUN”.
2.The RUN light is ON.

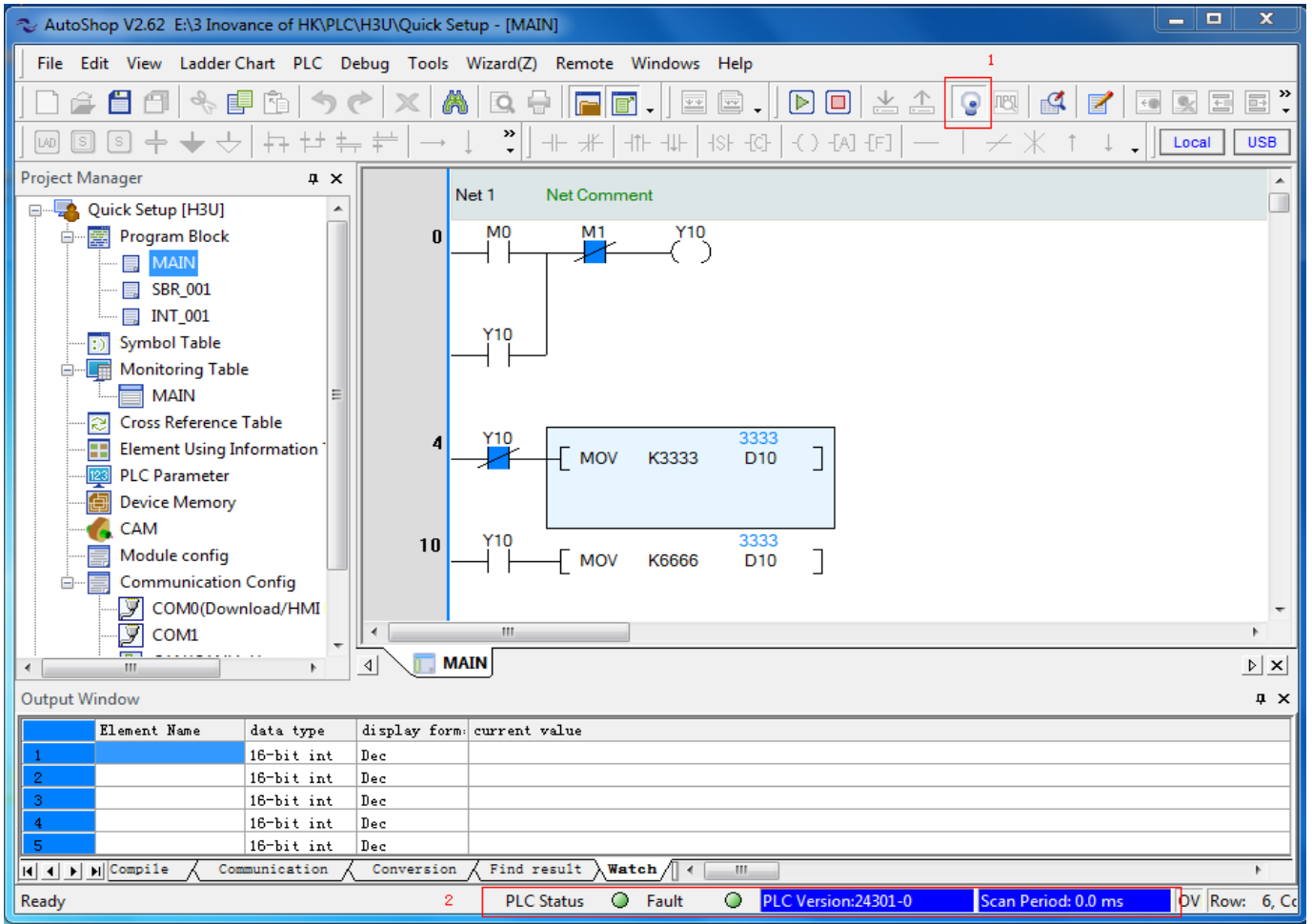


3.4 Program Download Procedure

Step 10:

1.Click “monitor” widget to start monitoring program.

2.The lamps of PLC Status and Fault turn green.



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4. Diagnostics

4.1 Common Faults Expressed by Fault Codes

4.1 Common Faults Expressed by Fault Codes

Error Code	Content
D8060	I/O range or setting error
1000-1377	X input signal error, serial number error or exceeding limit
0000-0377	Y input signal error, serial number error or exceeding limit

4.1 Common Faults Expressed by Fault Codes

Error Code	Content
D8061	PC hardware error definition
6101	RAM error
6102	Operation loop error
6103	I/O hardware connection error
6104	External 24V power error
6105	System monitor error
6106	System flash read/write error
6107	System I/O setting error
6108	FPGA download error
6109	FPGA configuration data error in flash
6110	Ethernet hardware initialization failure
6111	Extension module configuration different from the actual
6112-6199	Reserved
16100-16199	Reserved
26100-26199	Reserved

Error Code	Content
D8062	**Communication error in control panel or program connection port**
6200-6279 serial communication and configuration error codes	
6201	Receiving timeout
6202	CAN transmitting busy
6203	CAN receiving busy
6204	Data format incorrect
6205	Instruction incorrect
6206	Communication element exceeding range
6207	Communication port exceeding range or not existing
6208-6279	Reserved
6280-6299	CAN communication configuration error code
16200-16219 Ethernet configuration error code	
16200	Reserved
16201	Ethernet configuration: function codes not supported
16202	Ethernet configuration: register start address incorrect or start address plus number of registers incorrect
16203	Ethernet configuration: number of registers too large
16204	Ethernet configuration: reading/writing register failed.
16205	Ethernet configuration: ACK signal
16206	Ethernet configuration: slave busy
16207	Ethernet configuration: station number incorrect
16208	Ethernet configuration: memory check error
16209	Reserved
16210	Ethernet configuration: gateway path error
16211	Ethernet configuration: destination gateway path error
16212-16215	Reserved
16216	Ethernet configuration: IP address illegal
16217-16219	Reserved
16220-16239	Extension module configuration error code
16240-16259	USB communication configuration error code
16260-16279 motion control configuration error code	

4.1 Common Faults Expressed by Fault Codes

Error Code	Content
D8062	**Communication error in control panel or program connection port**
16260	Mechanical unit setting value incorrect
16261	Electronic gear ratio setting value incorrect
16262	Cam table not configured in software being used
16263	No external input master axis selected for electronic cam
16264	Electronic cam slave axis speed exceeding maximum output speed allowed
16265	Synchronization lower limit larger than upper limit
16266	Master axis setting exceeding range
16267	Delayed startup pulses setting incorrect
16268	Instruction written in cam key point, value of key point illegal
16269	Cam encrypted, not allowing instruction to read key point data
16270	Electronic cam slave axis zooming incorrect
16271	Electronic cam configuration unit incorrect
16272	Failure in modifying electronic cam during running
16273	Electronic cam modification instruction used repeatedly
16274-16279	Reserved
16280-16299	Reserved
26200-26299	Reserved

4.1 Common Faults Expressed by Fault Codes

Error Code	Content
D8063	**Communication error**
6300-6379 COM0 to COMx serial communication error code	
6301	Odd/Even check error, overflow error, frame error
6302	Communication character incorrect
6303	Communication data sum inconsistent
6304	Data format incorrect
6305	Instruction incorrect
6306	Monitor timer timeout
6307	Reserved
6308	Reserved
6309	Reserved
6310	Reserved
6311	Reserved
6312	Parallel control (1:1) protocol character incorrect
6313	Parallel control (1:1) protocol sum incorrect
6314	Parallel control (1:1) protocol format incorrect
6315	Parallel control (1:1) protocol communication timeout
6316-6329	Reserved

4.1 Common Faults Expressed by Fault Codes

Error Code	Content
D8063	**Communication error**
6330+10*X	Modbus slave address setting incorrect, address larger than 247
6331+10*X	Data frame length incorrect, returned frame length not meeting requirement, or smaller than 5
6332+10*X	Address incorrect, standard error frame; transmit/receive addresses inconsistent
6333+10*X	CRC check error
6334+10*X	Instruction code not supported, standard error frame; transmit/receive instructions inconsistent; instruction not supported
6335+10*X	Receiving timeout
6336+10*X	Data error, standard error frame
6337+10*X	Reserved
6338+10*X	Frame error, standard error frame
6339+10*X	Serial protocol error, not configuring corresponding protocol when using Modbus or RS instruction

4.1 Common Faults Expressed by Fault Codes

Error Code	Content
D8063	**Communication error**
6380– 6399: CAN communication error code	
6380	Transmitting timeout
6381	Receiving timeout
6382	CAN transmitting busy
6383	CAN receiving busy
6384-6399	Reserved
16300-16319 Ethernet communication error code	
16300-16311	Reserved
16312	Protocol designator error Modbus protocol
16313	Frame length error
16314	Frame timeout error
16315	Frame not recognized by slave (only for master)
16316	IP address illegal
16317-16319	Reserved
16320-16339	Extension module communication error code
16340-16359	USB communication error code
16360-16379	Control panel and interface communication error code
16380-16399	Reserved
26300-26399	Reserved

4.1 Common Faults Expressed by Fault Codes

Error Code	Content
D8064	**System parameter setting incorrect**
6401	Program and parameter inconsistent
6402	Program capacity setting incorrect
6403	Changeable power failure retentive area of soft element setting incorrect
6404	Parameter area setting incorrect
6405	Program area setting incorrect
6406-6424	Reserved
6425	User program check error, download data incorrect
6426	User program, including motion control subroutine program, incomplete
6427	PLC designator and user program designator not matching
6428	Factory commissioning error
6429-6452	Reserved
6453-6465	Changeable power failure retentive area of soft element setting incorrect
6466-6499	Reserved
16400-16499	Reserved
26400-26499	Reserved

4.1 Common Faults Expressed by Fault Codes

Error Code	Content
D8065	**User program grammar error**
6501	Reserved
6502	Reserved
6503	Instruction parameter error
6504	Label definition repeated
6505	Reserved
6506	Non-defined instruction used
6507	Label P definition incorrect
6508	Label I definition incorrect
6509	Reserved
6510	Reserved
6511	High-speed counter and interrupter using same input
6512-6599	Reserved
16500-16599	Reserved
26500-26599	Reserved

Error Code	Content
D8066	**User program logic loop error**
6601-6604	Reserved
6605	Incorrect instruction used in STL
6606	Incorrect instruction in incorrect position
6607	FOR-NEXT operation error
6608	MC-MCR operation error
6609-6617	Reserved
6618	Instructions allowed only in main program exist in other areas
6619	Instructions cannot be used in FOR_NEXT
6620	Nesting level in FOR_NEXT exceeded
6621	FOR_NEXT quantitative relationship incorrect
6622	No NEXT instruction
6623	No MC instruction
6624	No MCR instruction
6625	STL used for above consecutive nine times
6626	Certain instructions cannot be used in STL-RET
6627	No RET instruction
6628	Instructions useless in main program
6629	No P or I
6630	No SRET or IRET instruction
6631	SRET cannot be used in the position
6632	FEND cannot be used in the position
6633-6699	Reserved
16600-16699	Reserved
26600-26699	Reserved

Error Code	Content
D8067	**Instruction parameter & running parameter incorrect**
6701	CALL&CJ invoking error
6702	CALL running times larger than 6
6703	Reserved
6704	Communication parameter area setting incorrect
6705	Element not existing or exceeding range
6706	Data incorrect or exceeding range
6707	FOR&NEXT, MC, MCR, STL, subroutine program, interruption program relationship not clear
6708	FROM or TO instruction incorrect
6709	IRET, SRET, FOR~NEXT relationship not in a match
6710	Local variable used in main program
6711	Soft element using in instruction repeated or conflict
6712	Non-defined interrupt used in system
6713-6719	Reserved
6720	CALL instruction SRET not in a match
6721	Parameter incorrect in subroutine program with parameters
6722	Manipulator instruction port function conflict
6723-6729	Reserved
6730	Sampling time TS < 0
6731	Reserved
6732	Input filter constant object abnormal

Error Code	Content
D8067	**Instruction parameter & running parameter incorrect**
6733	Input proportional coefficient abnormal
6734	Integral time abnormal
6735	Differential gain abnormal
6736	Differential time abnormal
6737	Reserved
6738	Reserved
6739	Reserved
6740	Sampling time abnormal
6741	Reserved
6742	Measured variable overflow
6743	Offset abnormal
6744	Integral term abnormal
6745	Differential value overflow due to differential restrictor
6746	Differential term abnormal
6747	PID result abnormal
6748-6759	Reserved
6760-6799 High-speed input/output error code	
6760	Number of high-speed input instruction running entries exceeding limit
6761	High-speed input C counter multiplexing error
6762	High-speed input instruction port repeated or conflict

Error Code	Content
D8067	**Instruction parameter & running parameter incorrect**
6763	High-speed input instruction element exceeding range
6764	High-speed input instruction data exceeding range
6765	High-speed output instruction element exceeding range
6766	High-speed output instruction data exceeding range
6767	Conflict in comparison objects setting of high-speed interruption comparison instruction
6768	Reserved
6769	Reserved
6770	High-speed output instruction port repeated or conflict
6771	High-speed output instruction signal incorrect
6772	Motion control subroutine program instruction incorrect, compiling incorrect or not existing
6773	Motion control subroutine program invoking error
6774	Reserved
6775	Motion control subroutine program instruction element exceeding range, function word not matching or existing
6776	Motion control subroutine program data incorrect or exceeding range
6777	High-speed interpolation instruction arc length too small
6778	High-speed interpolation instruction arc parameter incorrect (center or circle setting incorrect, radius too long), resulting in arc generating failure
6779	Helical curve 3rd axis pulses of high-speed output interpolation instruction exceeding range
6780-6799	Reserved
16700-16799	Reserved
26700-26799	Reserved

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