Coolmay®
Automation Expert

L02S Series Programmable Controller (PLC) User Manual

Thank you for purchasing the Coolmay L02S series PLC. This manual mainly explains the product characteristics, general specifications, and wiring methods of this series of PLCs. For detailed programming, please refer to the "Coolmay L02S Series PLC Programming Manual".

The L02S series PLC has the following characteristics:

1. Adopting military grade 32-bit CPU+ASIC dual processors, supporting online monitoring and downloading, the fastest execution speed of basic instructions reaches 0.24us
2. Strong scalability, capable of expanding up to 31 I/O modules, with a maximum I/O of 1024 points(modules need to be expanded in the event of a power outage).
3. Supports CAN bus and can control servo motion and controller communication that supports CANBUS (CANOPEN protocol).
4. The transistor outputs high-speed pulses with 8-axis Y0~Y5 can reach 200KHz,Y6~Y7 can reach 100KHz.Supports 8 sets of 100KHz hardware high-speed counters.
5. Supports special functions such as electronic cam and hand wheel.

◆ Electrical parameters

Electrical parameters		
INPUT VOLTAGE	DC24V	
Digital input indicators		
Isolation method	Optocoupler	
Input Impedance	High speed input terminal 2.4K Ω	Normal input terminal 3.3K Ω
Input as ON	The input current at the high-speed input terminal is greater than 5.8mA/24V	The input current of the ordinary input terminal is greater than 9.9mA/24V
Input as OFF	The input current at the high-speed input end is less than 4.5mA/19V	The input current of the ordinary input terminal is less than 4mA/17V
Filtering function	With filtering function, the filtering time can be set within the range of 0-60ms, with a default of 10ms	
High count function	Conventional 8-channel, single-phase 100KHz or 3-channel AB phase 100KHz	
Input level	Passive NPN or PNP, common terminal isolation	
Digital relay output indicators		**Digital transistor output indicators**
Maximum current	2A/point, 4A/4 points COM	0.5A/point, 2A/4 points COM
Circuit power supply voltage	DC/AC24V~220V	DC24V
Circuit insulation	Relay mechanical insulation	Optocoupler insulation
On response time	about10ms	High-speed output: 10μs; others 0.5ms
Mechanical lifespan (no load)	10 million times	/
Electrical lifespan (rated load)	300,000 times	High-speed pulse: conventional 8-channel Y0-Y5 is 200KHz，Y6-Y7 is 100KHz. X6, X7, and Y1 can't be used for high-speed and pulse counting simultaneously, but can be used as regular points.
Output level	Normally open dry contact output, COM can be connected to positive or negative	Low level NPN, COM connected to negative
Analog input indicators		**Analog output indicators**
Analog input/output signals	Comes with 2-channel voltage 0~10V and 2-channel current 0~20mA	Comes with 2-channel voltage 0~10V and 2-channel current 0~20mA
Response time	1 scan cycle	/
Number of analog input/ output points	4 channels	4 channels
Accuracy	12bits	12bits
External Interface		
Program port	Comes with one programming port: Type-C port(faster download speed)	
COM Port	Comes with 2 RS485,1 RS232,1 CAN, 1 network port	
Ambient condition		
Operation temperature	-20℃~50℃	
Relative humidity	5%~95%RH（No condensation）	
S torage temperature	-25℃~70℃	
Vibration frequency	10-57Hz, amplitude 0.035mm; 57Hz-150Hz, acceleration 4.9m/s² (10 times in X, Y, Z directions, totaling 80 minutes each)	

◆ Product Structure

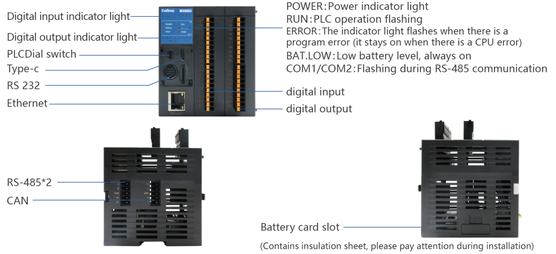


Figure 1 Product Structure

◆ Hardware interface

S/S	C0
X00	Y00
X01	Y01
X02	Y02
X03	Y03
S/S	C1
X04	Y04
X05	Y05
X06	Y06
X07	Y07
S/S	C2
X10	Y10
X11	Y11
X12	Y12
X13	Y13
S/S	C3
X14	Y14
X15	Y15
X16	Y16
X17	Y17

Figure 2 L02S-32MT/L02S-32MR

S/S	C0
X00	Y00
X01	Y01
X02	Y02
X03	Y03
S/S	C1
X04	Y04
X05	Y05
X06	Y06
X07	Y07
S/S	C2
X10	Y10
X11	Y11
X12	Y12
X13	Y13
GND	GND
AD0	DA0
AD1	DA1
AD2	DA2
AD3	DA3

Figure 3 L02S-24MT/L02S-24MR

S/S	1L+
X00	Y00
X01	Y01
X02	Y02
X03	Y03
S/S	2L+
X04	Y04
X05	Y05
X06	Y06
X07	Y07
S/S	3L+
X10	Y10
X11	Y11
X12	Y12
X13	Y13
GND	GND
AD0	DA0
AD1	DA1
AD2	DA2
AD3	DA3

Figure 4 L02S-24MP(Under planning)

Attention: S/S is the common terminal for switch input; Cx is the common terminal of the switch output; GND is the common terminal for analog input/output

Definition of RS-232 programming port pins

pin number	signal	describe
4	RXD	receive
5	TXD	sending
8	GND	Ground wire

Figure 5 RS-232 programming port female socket

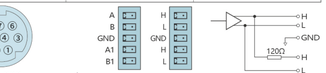


Figure 6 Schematic diagram of RS-485 and CAN interfaces

Communication port description

- Serial port 1: RS-232 (PLC programming port): Supports Mitsubishi programming port protocol,Free-port protocol, and MODBUS RTU/ASCII protocol
- Serial port 2: RS-485 (A1 B1): Supports Mitsubishi programming port protocol, Freeport protocol, and MODBUS RTU/ASCII protocol.
- Serial port 3: RS-485 (A B): Supports Mitsubishi programming port protocol, Freeport protocol, and MODBUS RTU/ASCII protocol.
  ※When the PLC serves as the host, it supports MODRW instructions, MODRD instructions, and MODWR instructions.
- CAN (H L) communication port: Supports CANOPEN protocol (communication wiring needs to be connected to the H L above; short circuit the H L below, CAN with terminal resistance of 120 Ω; Otherwise, there will be no terminal resistance.
- Ethernet: Supports programming port protocol, Modbus TCP/UDP protocol, Ethernet/IP protocol.

Host module size

L02S-32MT, L02S-32MR, L02S-24MT, L02S-24MR, L02S-24MP(Under planning)

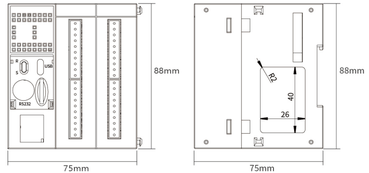


Figure 7: Dimensions of Host Module

◆ Installation instructions

Buckle installation

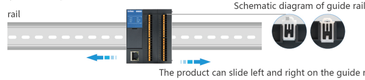
First, open the white buckle, align the expansion interface, and directly push the module in. Press the white buckles on both ends to complete the installation

Neat arrangement of modules　Module push in　Press the buckle

Figure 8 Buckle Installation

Installation method of guide rail

The CPU module and various expansion modules can be directly installed on the standard rail DIN35mm without the need for a backplane; Press the rail buckle to directly lock the product onto the rail



Insert the guide rail card slot, press the guide rail buckle, and the installation is complete

Figure 9 Installation of guide rail

◆ Figure 8 Equivalent Circuit of Card

The L02S series input is a biphasic optocoupler, and users can choose between NPN or PNP connections when using it. However, please note that since the common terminals of the input points are all connected, each module or host can only have one wiring method and cannot be mixed.

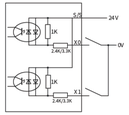


Figure 10 PLC switch NPN wiring

PLC digital NPN input wiring:

Port short circuit: The S/S of the PLC input terminal is connected to 24V, and the X terminal is connected to the power supply 0V, indicating that there is a signal input;
Two wire system (magnetic switch): PLC switch input is connected to a two-wire magnetic switch, with the positive pole of the magnetic switch connected to the X terminal and the negative pole connected to 0V;
Three wire system (photoelectric sensor or encoder): The PLC switch is connected to the photoelectric sensor or encoder of the three wire system. The power supply of the sensor or encoder is connected to the positive pole of the power supply, and the signal line is connected to the X terminal;
Encoders and photoelectric sensors require NPN type.

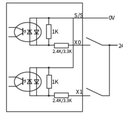


Figure 11 PLC switch PNP wiring

PLC digital PNP input wiring:

Port short circuit: The S/S of the PLC input terminal is connected to 0V, and the X terminal is connected to the 24V power supply, indicating that there is a signal input;
Two wire system (magnetic control switch): PLC switch input is connected to a two-wire magnetic control switch, with the negative pole of the magnetic control switch connected to the X terminal and the positive pole connected to 24V.
Three wire system (photoelectric sensor or encoder): The PLC switch is connected to the photoelectric sensor or encoder of the three wire system. The power supply of the sensor or encoder is connected to the positive pole of the power supply, and the signal line is connected to the X terminal; The encoder and photoelectric sensor require PNP type.

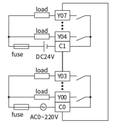


Figure 12 Equivalent circuit of relay output

Digital output wiring circuit

Figure 12 shows the equivalent circuit diagram of the relay output module, with several groups of output terminals that are electrically isolated from each other. The output contacts of different groups are connected to different power circuits.

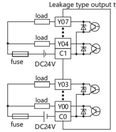


Figure 13 Equivalent circuit of transistor output

The NPN and Cx common cathode output type transistors shown in Figure 13 also have several groups of output terminals, which are electrically isolated from each other. The output contacts of different groups can be connected to different power circuits; The transistor output can only be used for DC 24V load circuits.

For inductive loads connected to AC circuits, external circuits should consider RC instantaneous voltage absorption circuits; For the inductive load of the corresponding DC circuit, consideration should be given to adding a freewheeling diode, as shown in Figure 14.

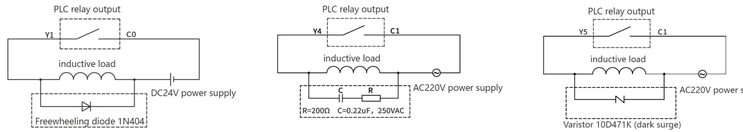


Figure 14 Schematic diagram of inductive load absorption circuit

The wiring of the stepper or servo motor is shown in Figure 15. The L02S series PLC defaults to Y0-Y7 as pulse points, and the direction can be customized. (Note: A 2K Ω resistor must be connected in series with DC24V for a 5V drive.)

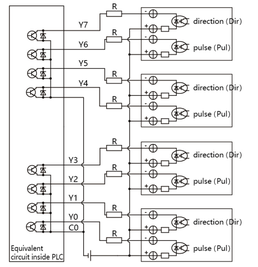


Figure 15 Pulse NPN Output

The L02S-24MT/L02S-24MR host comes with 4 analog inputs and 4 analog outputs; The type of analog input includes 2 sets of 0-10V and 2 sets of 0-20mA. The type of analog output includes 2 sets of 0-10V and 2 sets of 0-20mA.
As shown in Figure 16.

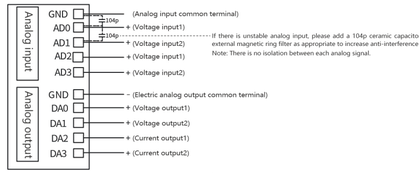


Figure 16 PLC analog wiring

PLC analog wiring

Two wire system: the positive pole of the power supply is connected to the positive pole of the transmitter, the negative pole of the transmitter is connected to the AD terminal, and the negative pole of the power supply is connected to the GND terminal. Generally, this is the connection method for 0-20mA/4-20mA transmitters;
Three wire system: The positive pole of the power supply is connected to the positive pole of the transmitter, and the negative pole of the power supply and the negative pole of the signal output are the same terminal. The positive and negative poles of the transmitter signal output are respectively connected to the AD terminal and GND terminal
Four wire system: Connect the positive and negative poles of the power supply to the positive and negative poles of the transmitter, respectively. Connect the positive and negative poles of the transmitter signal output to the AD and GND terminals, respectively

TIPS

L02S Series Programmable Controller (PLC) User Manual

——Before using this product, please read the relevant manual carefully and use this product within the environmental conditions specified in the instruction manual.

1、Please power on the product after confirming the power supply voltage range (conventional product power supply DC24V!) and correct wiring to avoid damage.
2、When installing this product, please be sure to tighten the screws or clamp the guide rail to avoid detachment.
3、Avoid wiring and plugging cable plugs when they are live, as this can easily cause electric shock or circuit damage; When the product emits an odor or abnormal sound, please immediately disconnect the power switch; When machining screw holes and wiring, do not let metal shavings and wire ends fall into the ventilation holes of the controller, as this may cause product failure and misoperation.
4、Do not tie the power cord and communication cable together or place them too close. Keep a distance of at least 10cm; Strong and weak electricity need to be separated and properly and effectively grounded; In situations with severe interference, shielded cables should be used for communication and high-frequency signal input and output to improve anti-interference performance. The grounding terminal FG on this machine must be correctly grounded to improve its anti-interference ability.
5、The switch input is powered by external DC24V, and the input signal is isolated from the power supply. It supports PNP or NPN connection and can choose one wiring method during use. It does not support mixed connection, otherwise it may cause damage to the machine.
6、The Cx of the output common terminal of the switching transistor is a common cathode, and the common terminal of the relay is not limited.
7、Please do not disassemble the product or modify the wiring at will. Otherwise, it may cause malfunctions, misoperations, losses, and fires.
8. When installing and disassembling the product, please be sure to cut off all power sources, otherwise it will cause equipment malfunction and failure.

Product warranty instructions

Dear customer:

Sincerely thank you for choosing this product. As our user, you will receive our company's high-quality service of "free repair service and lifelong technical support for product quality problems caused by non-human damage or disassembly within two years from the date of purchase (LCD screen and touchpad for one and a half years).".
During the warranty period, if there is a hardware malfunction caused by the product itself, our company will provide customers with free replacement or repair services. Do not disassemble or repair the product on your own. Our company's products are labeled with anti disassembly labels, and only our company and authorized professionals can repair our products. Any unauthorized disassembly or repair by other personnel is equivalent to automatically waiving the warranty service provided by our company.

The following situations do not fall within the scope of free warranty services:

Damage caused by human factors (external impact or collision, improper use, etc.)
Unauthorized disassembly, modification, or repair of the product
Damage caused by external factors (such as lightning strikes, water ingress into the power supply, falling, etc.)
Damage caused by incorrect installation or use by the user
The equipment has expired its warranty service period

If repair is required, please fill in the following entry:

Product Name:　　Customer Name:
Product model:　　Contact phone number:
Product series number:　　Purchase date:
Issue notes:

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The model specifications and information related to the product in this manual are subject to change without prior notice