Coolmay®
Automation Expert

MX3G Programmable Logic Controller (PLC) User Manual

Thank you for purchasing Coolmay MX3G series PLC. This manual mainly explains the product features, specifications and wiring methods. For detailed programming, please refer to "Coolmay MX3G PLC Programming Manual". More specifications can be customized in batches.

The MX3G PLC has the following features:

1. Highly integrated. Digital quantity is 16DI16DO at most, digital output can choose transistor output or mixed output; MX3G-32M analog is fixed to 2 channels 0-10V voltage input.
2. Comes with two PLC programming ports: MiniB USB port (faster download and reading speed) and RS232 (8-hole mouse head female seat);
   Generally 2 RS485, or mass-customize them as 1 RS232+1 RS485 communication port.
3. Support several high-speed counting and high-speed pulse. High-speed counting is generally 2 channels single phase 60KHz+4 channels 10KHz or 1 channel AB(Z) phase 30KHz+1 channel AB(Z) phase 5KHz;
   High-speed pulses are generally 100KHz for Y0~Y1 and 50KHz for Y2~Y3, with independent acceleration and deceleration.
   The total of high-speed counting + high-speed pulse cannot exceed 300KHz.
4. Special encryption, setting the password to 12345678 can completely prevent reading the program. [Note: Only 8-bit password encryption is supported]
5. Use 5.0mm pitch pluggable terminals for easy wiring; DIN rail (35mm wide) and fixed holes can be used for installation.
6. Super function. Compatible with FX3S PLC, fast running speed.

Product Details

◆Naming rules MX3G ① - 32 ② - MRT ③④ - 2AD ⑤ - V ⑥ - 1C1 ⑦ - 1P ⑧ - 485/232H ⑨

1. Series MX3G: MX3G PLC
2. Digital input and output (DI/DO) 16: (8DI/8DO) 32: (16DI/16DO)
3. Module type M: Main module of universal controller
4. Digital output (DO) type R: Relay; T: Transistor; RT: Transistor and relay mixed output
5. Analog input (AD) MX3G-32M: 2AD; MX3G-16M has no analog
6. Analog output (DA) MX3G-32M: 0-10V input for 2AD
7. C1: Single-phase high-speed counting, C2: AB-phase counting, C3: ABZ-phase counting.
   Generally, 2 single-phase 60KHz + 4 10KHz or 1 AB (Z) phase 30KHz + 1 AB (Z) phase 5KHz.
8. P0: high-speed pulse 10KHz; P1: high-speed pulse 100KHz.
   Generally, Y0~Y1 is 100KHz for each channel, and Y2~Y3 is 50KHz for each channel.
   The total of high-speed counting + high-speed pulse cannot exceed 300KHz.
9. Optional COM port Refer to [Chart 1: basic parameter]

Basic Parameter

Chart 1: basic parameter

MX3G PLC	Digital points		Analog points (optional)		COM port	High-speed counting			High-speed pulse	Size	
	DI	DO	AD	DA	485/232	Single-phase	AB phase	ABZ phase	Output	Dimensions (mm)	Cutout size (mm)
MX3G-16M	8	8	0	0	Default 2 RS485; Or can be customized 1 RS485, 1 RS232.	Generally single-phase 260KHz+4 channels 10KHz;	Generally AB phase 1 channel 30KHz+1 channel 5KHz;	General ly ABZ phase 1 channel 30KHz+1 channel 5KHz;	Generally 4 channels; Y0-Y1 is 100KHz, Y2-Y3 is 50KHz;	65*90*66	57*99
MX3G-32M	16	16	2	0					High-speed counting + high-speed pulse cannot exceed 300KHz	130*90*66	122*99

MT are transistor output: Y0-Y3 are fixed as transistors; MR are relay output; MRT are mixed output, optional according to customer requirements.

Chart 1: Electrical parameter

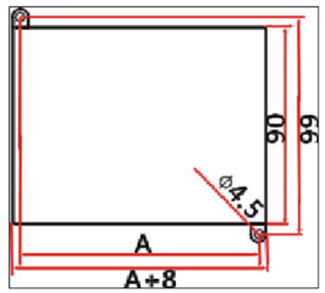
Electrical parameter		
Input voltage	AC 220V	
Digital input indexes		
Isolation mode	Photocoupling	
Input impedance	High-speed input 3.4KΩ	Common input 4.3KΩ

(Continued from above chart)

Input ON	High-speed input: current>5.8mA/24V	Common input: current >9.9mA/24V
Input OFF	High-speed input: current<4.5mA/19V	Common input: current >4mA/17V
Filter function	With filter function, the filter time can be set among 0-60ms, defaulted as 10ms	
High-speed counting	Generally 2 single-phase 60KHz + 4 10KHz or 1 AB (Z) phase 30KHz + 1 AB (Z) phase 5KHz	
Input level	Passive NPN, common terminal isolation, S/S connected to 24V+	
Digital relay output index		
Max current	2A/point, 4A/4point COM, 5A/8point COM, 5A/12point COM	
Circuit power voltage	DC/AC24V~220V	
Circuit insulation	Relay mechanical insulation	
On response time	Approx. 10ms	
Mechanical life (without load)	10 million times	
Electrical life (rated load)	300,000 times	
Output level	Normally open dry contact output, COM can be connected to positive or negative	
Digital transistor output index		
Max current	Y0-Y3 is fixed as MT, 0.1A/point; MT: 0.5A/point, 0.8A/4 points COM, 1.6A/8 points COM;	
Circuit power voltage	DC24V	
Circuit insulation	Optocoupler insulation	
Isolated voltage (power-terminal)	1500VAC	
On response time	High-speed output: 10μs; other 0.5ms	
High-speed output frequency	Generally 4 channels, Y0-Y1 is 100KHz, Y2-Y3 is 50KHz High-speed counting + high-speed pulse cannot exceed 300KHz	
Output level	Y0-Y3 is DC24V active NPN output, others are generally low-level NPN, COM is negative	
Analog input index		
Input signal	0-10V	
Response time	1 scan cycle	
Analog output indexes	2 channels	
Precision	12 bits	
External port		
Programming port	Mini B USB port (faster download speed) and RS232 (8-hole mouse head female socket)	
COM port	Refer to "Chart 1: basic parameter"	
Environment		
Operating temperature	0°C~50°C	
Relative humidity	5%~95%RH	
Storage temperature	-20°C~70°C	
Vibration frequency	10-57Hz, amplitude 0.035mm; 57Hz-150Hz, acceleration 4.9m/s² (X, Y, and Z directions each 10 times, a total of 80 minutes each)	

Mechanical Design

◆ Installation size



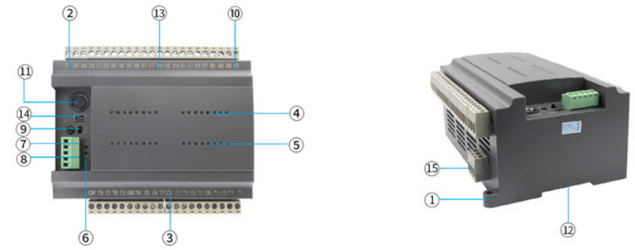
Cutout size: A*99mm
Dimensions: (A+8)*90mm

MX3G-16M A:57mm
MX3G-32M A:122mm

Graph 1 Mounting dimension

Electrical Design

◆ Product structure



Graph 2 product structure

1. Mounting holes
2. Terminal block of power supply
3. Terminal block of digital output
4. Digital input display LED
5. Digital output display LED
6. PWR: power indicator
   RUN: PLC operating indicator
   ERR: light on when the program error occurs
7. RS485/RS232/CAN
8. RS485
9. PLC operation switch RUN/STOP
10. Analog input
11. Analog output
12. RS232
13. DIN rail (35mm wide) installation slot
14. Terminal block of digital input
15. PLC USB programming port

◆ Hardware interface

0V 24V S/S X00~X07
Y24V Y00~Y03 COM0 Y04~Y07
MX3G-16MT/MRT

0V 24V S/S X00~X17 GND1 AD0 GND1 AD1
Y24V Y00~Y03 COM0 Y04~Y07 COM1 Y10~Y13 COM2 Y14 ~Y17
MX3G-32MT/MRT-2AD

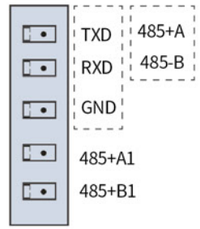
Graph 3 hardware interface

Pin definition of MX3G PLC

Pin No.	Signal	Description
4	RXD	Receive Data
5	TXD	Transmit Data
8	GND	Ground

Graph 4 PLC programming port

Terminals wiring standard: 22-14AWG wire. This series terminals are all pluggable terminals.



Graph 5 optional COM port

COM interface definition:

Comes with two programming ports: Mini B-type usb port (faster download speed) and RS232 (8-hole mouse head female socket)
Default 2 RS485, or can be customized as 1 RS485, 1 RS232.

COM port description:

◆ Serial port 1: RS232 (PLC programming port): supports Mitsubishi programming port protocol, which can be used to download PLC programs or communicate with devices that support Mitsubishi programming port protocol

◆ Serial port 2: RS485 (AB port)/optional RS232: support Mitsubishi programming port protocol, RS protocol and Modbus RTU/ASCII protocol
※ Support RS, WR3A, RD3A, ADPRW instructions

◆ Serial port 3: RS485 (A1, B1 port): support Mitsubishi programming port protocol, RS2 protocol and Modbus RTU/ASCII protocol
※ Support RS2, WR3A, RD3A, ADPRW instructions
Note: For detailed settings, please refer to "Coolmay MX3G PLC Programming Manual"

Equivalent Circuit

◆Digital input wiring

PLC input (X) is external power supply DC24V sink type (passive NPN), and the input signal is isolated from the power supply. When using, you need to connect S/S to the 24V positive of the power supply.

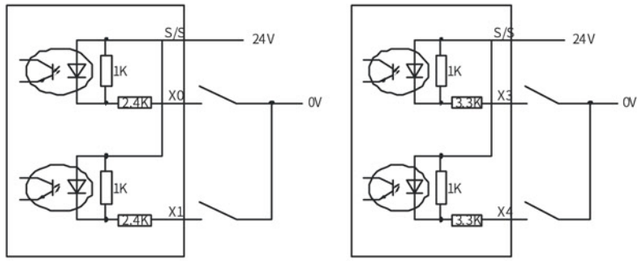


Figure 6 input wiring (left is high-speed contact, right is normal contact)

PLC digital input wiring:

Port short connection: The S/S of the PLC input terminal is connected to 24V, and the X terminal is connected to the power supply 0V, that is, the input has a signal;

Two-wire system (magnetic control switch): PLC digital input is connected to a two-wire magnetic control switch, the positive pole of the magnetic control switch is connected to the X terminal, and the negative pole is connected to 0V;

Three-wire system (photoelectric sensor or encoder): PLC switch is connected to a three-wire photoelectric sensor or encoder, the power supply of the sensor or encoder is connected to the positive pole of the power supply, and the signal cable is connected to the X end. Encoders and photoelectric sensors are required to be of NPN type (PNP needs special customization).

PLC digital output wiring:

Transistor: Y0-Y3 are fixed as pulse output ports, the wiring load is only 0.1A, and the wiring method is DC24V active NPN output;

Other general output is NPN, COM is connected to the negative pole, and Y is connected to the positive pole of the power supply after the load.

Relay: dry contact output, COM can be connected to positive or negative.

◆Digital output wiring

Figure 7 shows the equivalent circuit diagram of the relay output module. The output terminals are in several groups, each group is electrically isolated, and the output contacts of different groups are connected to different power circuits.

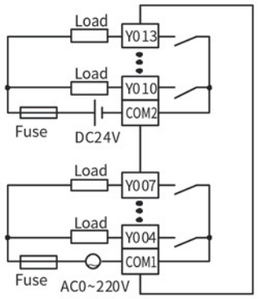


Figure 7 Relay output equivalent circuit

The equivalent circuit of the PLC output part of the transistor output is shown in Figure 8. It can also be seen from the figure that the output terminals are in several groups, and each group is electrically isolated. The output of different groups can be connected to different power circuits; the transistor output can only be used for DC 24V load circuits. The output wiring mode is NPN, COM common cathode.

Among them, Y0-Y3 are fixed as pulse output ports, the wiring load is only 0.1A, and the wiring method is DC24V active NPN output.

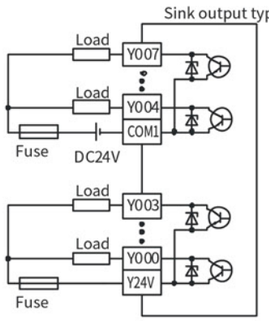


Figure 8 Transistor output equivalent circuit

For the inductive load connected to the AC loop, the external circuit should consider the RC instantaneous voltage absorption circuit; for the load of the DC loop, consider adding a freewheeling diode, as shown in Figure 9.

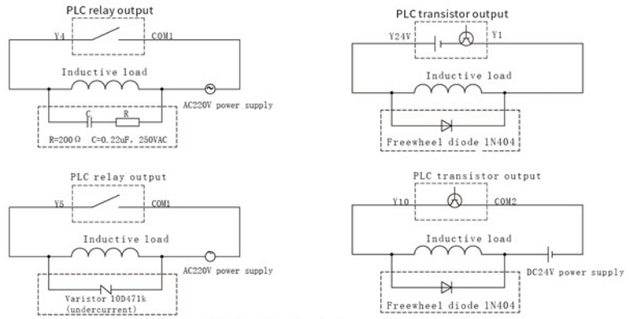
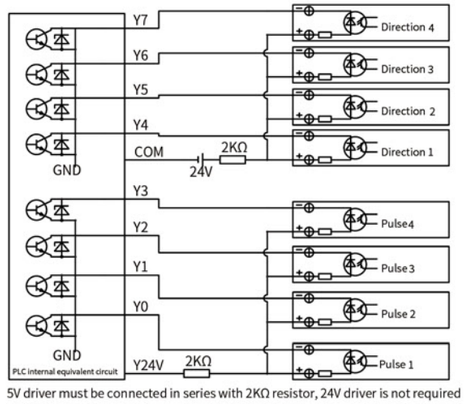


Figure 9 Inductive load absorption circuit

The wiring of stepping or servo motor is shown in Figure 10. MX3G series PLC defaults Y0-Y3 as pulse points, and the direction can be customized. As shown in Figure 10.

Note: 5V drive must connect a 2KΩ resistor in series with DC24V.

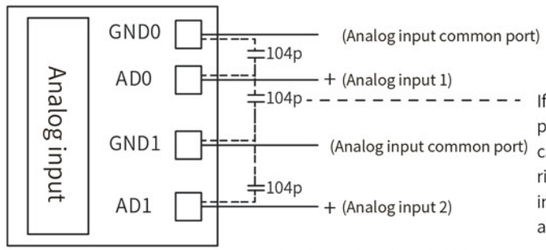


5V driver must be connected in series with 2KΩ resistor, 24V driver is not required

Figure 10 Pulse output wiring

※Note: All the internal circuits in the diagrams are for reference only

◆Analog wiring



If the analog input is unstable, please add 104p ceramic capacitor or external magnetic ring filter as appropriate to increase the anti-interference ability

Figure 11 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 port, and the negative pole of the power supply is connected to the GND port. Generally, it is the wiring method of 0~20mA/4~20mA transmitter;

Three-wire system: the positive pole of the power supply is connected to the positive pole of the transmitter, the negative pole of the power supply and the negative pole of the signal output are the same terminal, and the signal output of the transmitter is connected to the AD port;

Four-wire system: the positive and negative poles of the power supply are connected to the positive and negative poles of the transmitter respectively, and the positive and negative poles of the transmitter signal output are connected to the AD port and GND respectively.

PLC anti-interference processing

1. Strong and weak currents should be separated and wired, and not common ground;when there is strong electric interference, magnetic rings should be added on the power supply side; and properly and effectively grounded according to the type of the chassis.

2. When the analog quantity is disturbed, 104 ceramic capacitors can be added for filtering, and a correct and effective grounding can be performed.

※Note: For more details, please refer to "PLC Anti-interference Processing Method" on Coolmay's official website

Programming Reference

◆ Devices Distribution and Statement of Power-down Save

Max digital points		MX3G-16M	MX3G-32M
Digital input X		X00~X07 8 point	X00~X17 16 point
Digital output Y		Y00~Y07 8 point	Y00~Y17 16 point
Auxiliary relay M		[M0~M383] 384 point General/ [M384~M511] 128 point Retentive / [M512~M1535] 6144 point General	
		[M8000~M8511] 512 point Special	
State S		[S0-S9] 10 point Initial state/ [S10~S127] 118 point Retentive/ [S128~S255] 128 point General	
Timer T		[T0~T31] 32 point 100ms General / [[T32~T62] 31 point 100ms ,M8028 =ON becomes 10ms	
		[T128~T131] 4 point 1ms accumulated retention / [T132~T137] 6 point 100ms accumulative retention	
Counter C		16-bit up counter [C0~C15] 16 point General/[C16~C31] 16 point Retentive	
		32-bit up/down counter [C200~C234] 35 point General	
		High-speed counter[C235~C245 Single phase single count] [C246~C250 SS Single phase double count] [C251~C255 dual phase dual count]	
Data register D		[D0~D127] [D256~D2999] 2872 point General/ [D128~D255] [D1000~D3999]3128 point Retentive / [D8000~D8511] 512 point Special	
Data register V, Z		[V0~V7] [Z0~Z7] 16 point Index	
Pointer JUMP, CALL branch		[P0~P255] 256 point / [P0～P1280] 1281 point (26232 version or above)	
Nested Pointer		[N0~N7] 8 point Master control	
Interruption		[I0□□~I5□□] 6 point Input interruption / [I6□□~I8□□] 3 point Timer interruption	
Constant	K	16bit-32,768~32,767	32bit -2,147,483,648~2,147,483,647
	H	16bit 0~FFFFH	32bit 0~FFFFFFFFH

The MX3G PLC's device power-off maintenance is permanently maintained, that is, all the devices in the holding area are not lost after the module is powered off. The real-time clock uses a rechargeable battery to ensure that the clock is the current time. All power-down hold functions must ensure that the voltage of the DC24V power supply is above 23V with load, and the PC power-on time is longer than 2 minutes, otherwise the power-down function will be abnormal.

Programming software compatible with programming software GX Developer8.86Q and GX Works2

For details, please refer to: "Coolmay MX3G PLC Programming Manual"

"MX3G Programmable Logic Controller (PLC) User Manual"

"Coolmay PLC instruction programming manual"

Tips

MX3G Programmable Logic Controller (PLC) User Manual

—— Before using this product, please read the relevant manual Carefully use the product under the environmental conditions specified in the manual.

1. Please confirm the power supply voltage range of this product (conventional product power supply AC220V!) and correct wiring before turning on the power to avoid damage.
2. When installing this product, please be sure to tighten the screws or clamp the guide rails to avoid falling off.
3. Please do not wire or plug or unplug the cable plug when the power is turned on, otherwise it is easy to cause electric shock or circuit damage. Please turn off the power switch immediately when the product emits a peculiar smell or abnormal sound. Do not drop metal shavings and wire ends into the ventilation holes of the controller during screw hole processing and wiring; otherwise, it may cause product failure and misoperation.
4. Do not tie the power cord and the communication cable together or put them too close together, should keep them at a distance of more than 10cm; strong and weak currents need to be separated and properly and effectively grounded. In severe interference situations, shielded cables should be used for communication and high-frequency signal input and output cables to improve anti-interference performance. The grounding terminal FG on the machine must be grounded correctly to improve the anti-interference ability.
5. The switch input is external power supply DC24V drain type (passive NPN), and the input signal is isolated from the power supply. When in use, the S/S should be connected to the 24V positive of the external power supply.
6. The Y24V of the digital output common terminal is actively output.
7. Please do not disassemble the product or modify the wiring at will. Otherwise it may cause failure, malfunction, loss, or fire.
8. Please turn off all power when installing and disassembling the product, otherwise it will cause equipment malfunction and error.

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Catalog