Coolmay®
Automation Expert

FX3GC PLC User Manual

Thank you for choosing Coolmay CX3G series PLC. This manual mainly explains the features general specifications and wiring methods of CX3G series. More detail programming information please refers to Coolmay CX3G&FX3GC PLC Programming Manual.

The FX3GC series is a compact PLC with the following features:

1、Highly integrated. At most 16DI/16DO (digital type can be customized transistor, relayor mixed) Analog at most 8AI6AO，input can be customized temperature, current, voltage or mixed (support-5~5V/-10V~10V)output can be customized current and voltage.

2、Comes with 2 PLC programming ports: Mini typeB usb port(faster downloading speed) andRS422□。

3、Support multi-channels high-speed counting and high-speed pulse. High-speed counting normally single-phase 6 60KHz or AB(Z) phase 2 60KHZ+ 1 10KHz. High-speed pulse normally Y0-Y3 each channel 100KHz ;Y4-Y7 each channel 10KHz;acceleration and deceleration individually;The total amount of HSC and HSPoutput can not exceed 480KHz

4、Support special encryption. Setting 12345678 as password can thoroughly prevent the data from being read.Attention:Only supports 8-bit password encryption

5、Use 5.0mm pitch pluggable terminals for easy wiring;

◆ Production Information

FX3GC - 16 M RT - 8AD 4DA - V - A0 - 1C1 - 1P - 485/CAN
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪

1、Series: FX3GC : FX3GC series PLC
2、I/O points: 16: 8DI 8DO 30: 16DI 14DO 32: 16DI 16DO
3、Module: M: Main Module
4、DO type: R: Relay; T: Transistor; RT: Relay and transistor mixed
5、AI : 0-8 channels are optional
6、AO: 0-6 channels are optional
7、AI type: E: E type thermocouple(K Type/T Type/S Type/J Type can be optional Supports negative temperature) PT: PT100 PT1000: Pt1000 NTC: Thermal resistance(10K/50K/100K) V: 0-10V V5: 0-5V V_: -10~10V V5_: -5~5V A0: 0-20mA A4: 4-20mA
8、AO type: V: 0-10V V5: 0-5V A0: 0-20mA A4: 4-20mA V_: -10~10V V5_: -5~5V【Attention:negative voltage will occupies two channels DA】
9、C1 stands for singe phase high-speed counting, C2 for AB phase counting, C3 for ABZ counting. Normally single-phase 6 60KHz or AB (Z) phase 2 60KHz + 1 10KHz.
10、P0 stands for 10KHz pulse，P stands for 100KHz high speed pulse；Normally 8 channels Y0-Y3 is 100KHz, Y4-Y7 is 10KHz.HSC +HSP total output can not exceed 480KHz.
11、COM ports Refers to【Diagram1：Basci parameters】

◆ Basic Parameters Diagram1: Basic Parameter

Model	Digital Points		Optional analog		Com ports (Optional)		High speed pulse			High speed pulse	dimension
	DI	DO	MAX AI	MAX AO	485	CAN (2.0A/B)	Single phase	AB phase	ABZ phase	Output	Size (mm)
FX3GC-16M	8	8	6	4	2	1	Normally single 6channel 60KHz	Normally AB phase 2channels 60KHz +1channel 10KHz	Normally ABZphase 2channel 60KHz +1 channel 10KHz	Normally8 channels Y0-Y3 100KHz、Y4-Y7 10KHz ; HSC+ HSP totally exceed can not over 480KHz。	90*60*32
			8	4	1	1					
			8	6	1	None					
FX3GC-30M	16	14	None	None	1	None					
FX3GC-32M	16	16			None	None					

MT means transistor output, the max load is 500mA; MR means relay output, the max load is 5A, MRT means both relay and transistor, it is up to customers.

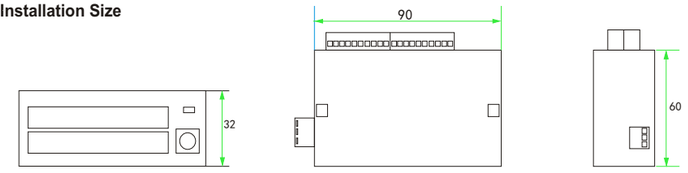
Diagram 2 electrical parameters

Electrical Parameters		
Input voltage	DC24V	
Digital Input Index		
Isolation Mode	Photocoupling	
Input Impedance	High-speed input 3.3KΩ	Common input 4.3Ω
Input ON	Electric current of high-speed inpu is higer than 5.8mA/24Vt	Electric curren t of common input is Higher than 9.9mA/24 V
Input OFF	Electric current of high-speed input is higer than 4.5mA/19V	Electric current of common input is Higher than 4mA/17 V

Filter Function	With filter function, the filter time can be set amon 0-60ms, defaulted as 10ms
High - speed Counting	Normally single phase 6 channels 60Khz or AB(Z) phase 2channels 60Khz+1 channel 10Khz
Vil	Passive NPN, Common Isolation, S/Sconnect 24V+
Digital and Relay Output Index	
Max Current	5A
Load Voltage	DC/AC24V~220V
Circuit Insulation	Relay Mechanical Insulation
On Respond Time	About 10 ms
Mechanical Life (without load)	10 million times
Electrical Life (Rated Load)	300 thousand times
Vol	Normally dry contact output, COM can be connected to positive or negative
Transistor Output Index	
Max Current	500mA
Load Voltage	DC24V
Circuit Insulation	Optocoupler Insulation
Isolation Voltage(power supply - external terminal)	1500VAC
ON Respond Time	High-speed output: 10?s, and others 0.5ms
High-speed Output Frequency	8 channels: Y0-Y3 is 100KHz, Y4-Y is 10KHz. High-speed counting and pulse can't over 480KHz
Vol	COM connected with negative terminal NPN
Analog Input Index	
Input Signal	PT100/PT1000/thermocouple/NTC/0-10V/0-5V/-10~10V/-5~5V/0-20mA /4-20mA Customizations
Respond Time	One scanning cycle
AI Quantity	0-8channel
Accurary	12bit
Analog Output Index	
Output Signal	0-5V/0-10V/-10~10V/-5~5V/0-20mA/4-20mA/customizations
AO Quantity	0-6 channel
Accurary	12bit
Interface	
Programming Port	Come with2个programming ports:Mini type B usb(downloading faster) and RS422
COM Port	Refers to【Diagram 1：Basic parameters】
Environment	
Operation Temperature	0°C~50°C
Relative Humidity	5%~95%RH
Storage Temperature	-20°C~70°C
Vibrational Frequency	10-57Hz , amplitude 0.035mm; 57Hz-150Hz , acceleration speed 4.9m/s² (10 times each on X, Y, Z, total 80 minutes each)

Mechanical Design Reference

◆ Installation Size



Dimension: 90*60*32(mm)
Installation size: DIN-rail(35mm)
Diagram1 installation dimension drawing

Electrical Design Reference

◆ Product structure

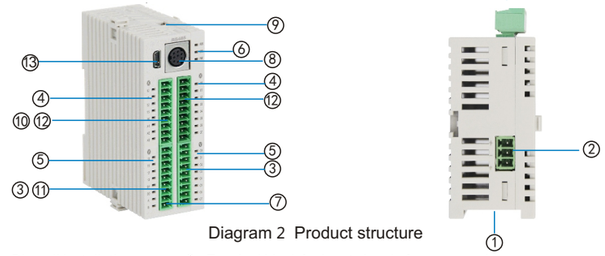
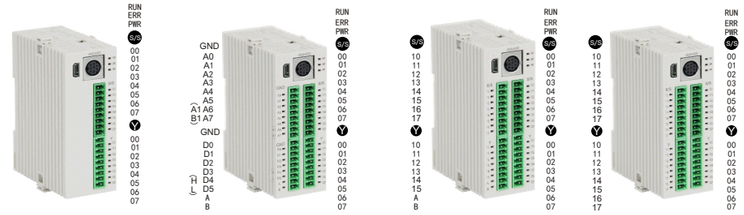


Diagram 2 Product structure

1、35mm Din-rail installation 2、Terminal block for input signal of power supply
3、Terminal block of digital output 4、LED of Digital Input 5、LED of Digital Output
6、PWR : Power-up State RUN:The light is On when the PLC is run
ERR:The indicator will flash when the program is wrong
7、RS485 8、RS422 9、RUN/STOP PLC operational switch 10、Analog input(485 is optional)
11、Analog output(CAN is optional) 12、Terminal block of digital input
13、Mini USB programming port (Faster download speed)

◆ Hardware Interface



3 FX3GC-16MR/MT/MRT 4 FX3GC-16M-com port/analog expansion 5 FX3GC-30MR/MT/MRT 6 FX3GC-32MR/MT/MRT

Attention:S/S is the common end of the digital input, connected to the 24V positive ;
For the common end of the digital output, connect the negative pole;
GND is common to the analog input/analog output

Terminal wiring specifications: 22-14AWG wire. The terminals of this series are all pluggable terminals.For special model interfaces, please refer to the product silk screen.

RS 422Programming port pin definition(Mitsubishi SC-11/SC-09 programming cable)

Pin No.	Signal	Description
1	RXD-	Receiving negative
2	RXD+	Receiving positive
3	GND	Ground wire
4	TXD-	Send negative
5	+5V	External power supply +5V
6	CCS	Communication direction control line
7	TXD+	Send externally
8	NC	Empty foot

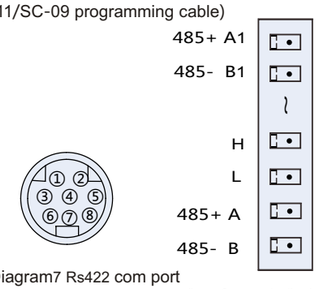


Diagram7 Rs422 com port

diagram8 com port optional

Communication interface definition:
Comes with two programming ports: Mini B type usb port (faster downl oad speed) and Rs422 (8-pin mouse socket)
16M can be expanded up to 2 RS485, 1 CAN port (2.0A/B), 6 in 4 out analog
Or 1 RS485, 1 CAN port (2.0A/B), 8 input and 4 output analog
Or 1 RS485, 8 input and 6 output analog
Or 2 RS485, 1 CAN port (2.0A/B)

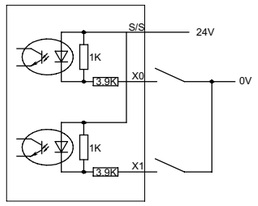
Communication port description:
◆Serial port 1 : RS422(PLC programming port): Suppo rt Mitsubishi programming port protocol , which can be used to downl oad PLC programs or communicate with devices that suppo rt the Mitsubishi programming port protocol.
◆Serial port 2 : RS485(AB port): Suppo rt Mitsubishi programming port protocol、Mitsubishi BD protocal、RS protocal and Modbus RTU.
※ Suppo rts RS、RS2、WR3A、RD3A、ADPRW instruction
◆Serial port 3 : RS485(A1 B1□): Suppo rt Mitsubishi programming port protocol、RS2 protocal and Modbus RTU.
※ Suppo rts RS2、WR3A、RD3A、ADPRW instruction

◆ CAN com port : Suppo rt Rs2 protocal and Modbus RTU protocal
※ Suppo rts RS2、WR3A、RD3A、ADPRW instruction

※ Note : For detailed settings, please refer to <Coolmay CX3G & FX3GC Series PLC Programming Manual

Equivalent Circuit

The PLC input (X) is an externally powered DC24V sink type (passive NPN) with the input signal isolated from the power supply. When using, connect S/S to 24V positive external power supply.



PLC Digital Input Wiring

Port short circuit: S/S of PLC input terminal is connected to 24V, X terminal is connected to power supply 0V, that is, input signal;

PLC Digital Output Wiring

Transistor: The 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

Diagram 9 input wiring diagram

Diagram 10 shows the equivalent circuit diagram of the relay output module. The output terminals are several groups. Each group is electrically isolated. The output contacts of different groups are connected to different power circuits.

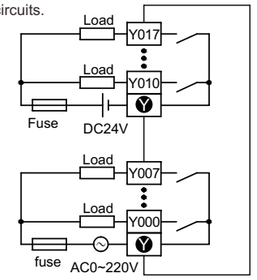


Diagram 10 relay output equivalent circuit

The equivalent ircuit of the PLC output part of the transistor output type is shown in Figure 8. As also know from the figure the output terminals are serveral groups,each group is electrically isolated,and different groups of output contacts can be connected to different power circuits;the transistor output stage can only be used for DC24V load circuits.Output wiring is NPN,COM common cathode.

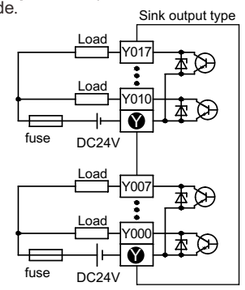


Diagram11 Transistor output equivalent circuit

For inductive loads connected to the AC loop, the external circuit should consider the RC instantaneous voltage sink circuit; for the inductive load of the DC loop, consider adding a freewheeling diode, as shown in Figure 12. The wiring of the stepper or servo motor is shown in Figure 13. The default Y0-Y7 of the 3G series PLC is the pulse point, and the direction can be customized.

Note: The 5V driver must be a 2KΩ resistor in the DC24V string.

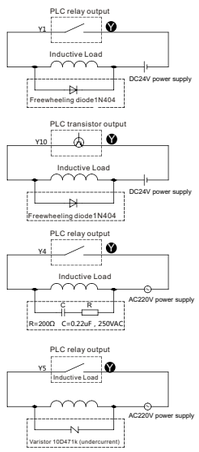


Diagram 12 Inductive load absorption circuit schematic

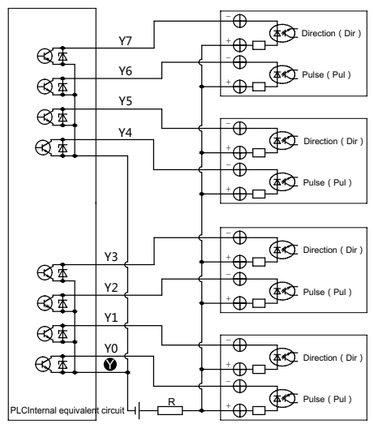


Diagram13 Pulse output wiring diagram

※ **Note: All internal circuits in the illustrations are for reference only.**

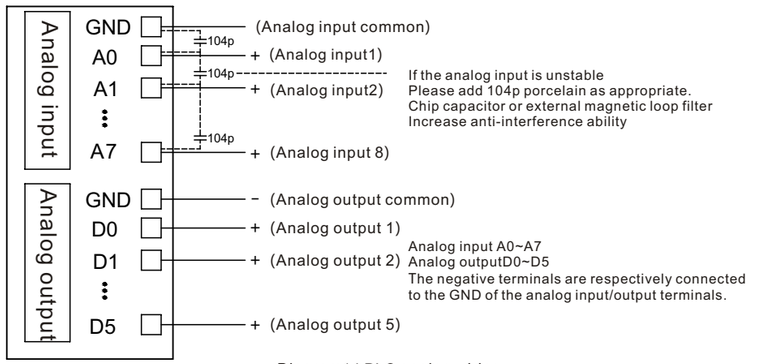


Diagram14 PLC analog wiring

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 side;the negative pole of power supply is connected to GND,which normally it is a wiring way of 4-20mA/ 0-20mA 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.

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

The analog line of temperature is connected to the AD terminal and the GND terminal respectively. If it is a three-wire PT100, it needs to be connected in two lines. The GND common terminal of the analog input and output can be shared.

PLC anti-interference processing

1、Strong and weak power should be separately routed, not common; when there is strong electrical interference, add a magnetic ring at the power supply end; and perform proper and effective grounding according to the type of casing.

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

※ Note : For more details, please refer to Coolmay's official website <PLC anti-interference processing method

Programming Reference

◆ **Devices Distribution and Statement of Power-down Save**

	FX3GC-16M	FX3GC-30M	FX3GC-32M
Digital input X	X00~X07 8poin	X0~X17 16poin	X00~X17 16poin
Digital output Y	Y00~Y07 8point	Y0~Y15 14poin	Y00~Y17 16poin

Auxiliary relay M	[M0~M383] 384point general / [M384~M1535] 1152point keep / [M1536~M7679] 6144point general		
	[M8000~M8511] 512point special		
State S	[S0-S9] 10点 Initial state/ [S10~S999] 990point keep/ [S1000~S4095] 3096point general		
Timer T	[T0~T199] 200point 100ms general / [[T250~T255] 6point 100ms keep state		
	[T246~T249] 4point 1msGrand total kee[/ [T256~T319] 64 point 1ms general		
	[T200~T245] 46point 10ms general ※10msThe timer is affected by the scan cycle. If the scan period is 12ms, the timer becomes 12ms and is executed once.		
Counter C	16-bit up counter	32bit up and down counter	High-speed counter
	[C0~C15] 16point general [C16~C199] 184point keep state	[C200~C219] 20point genera [C220~C234] 15point keep state	[C235~C245 single phase counting] [C246~C250] Singel dual phase counting] [C251~C255 dual phase counting]
Data RegisterD	[D0~D127] 128point general/ [D128~D7999] 7872point holding/ [D8000~D8511] 512points special		
Data Register V,Z	[V0~V7] [Z0~Z7] 16point indexing		
Extended file register R	[R0~R22999] 23000point support for retentive/ [R23000~R23999] 1000point Internal use		
PointerJUMP、CALL branch	[P0~P255] 256point / [P0～P1280] 1281point (26232 version or above)		
Nested Pointer	[N0~N7] 8point		
Interruption	[I0□□～I5□□] 6point input interruption / [I6□□～I8□□] 3point timer interruption / [I10~I50] 6points Counter interruption		
Constant K	16bit -32,768~32,767		32bit -2,147,483,648~2,147,483,647
Constant H	16bits 0~FFFFH		32bits 0~FFFFFFFFH

◆ **Analog input register(AD means analog input,precision is 12bit);supports FROM instruction or register direct assignment operation**

FROM instruction can read directly : FROM K0 K0 D400 K8 , **reads** 8 **channel analog input**

Register read directly: D[8030]~D[8037]**is the input value corresponding to** [AD0~AD7] ;

Scan time is changed to D8059, which is started by M8039 (this function is available on version 26232)

when the analog input has thermocouple type You can only do up to 7 channels, of which AD4 (D8034) is the ambient temperature of the thermocouple. You can do 8 channels without the thermocouple type.]

※ Note: Analog input range and correponding values of register can be refers to <Coolmay CX3G&FX3GC series PLC programming user manual

※ The temperature type is one bit after the decimal point, ie 182=18.2 degrees.

※ **Sampling of analog inputs**

The number of filter cycles = (R23600 ~ R23607) * PLC scan time, the default is 100, the data can not be less than or equal to 0. If R23600=1, a PLC scan cycle is sampled once and the value in the first analog input is changed once.The larger the value of R23600~R23607 is set, the more stable the result is.

D8073 is the smoothing filter coefficient of all analog inputs. The setting range is from 0 to 999.

◆ Analog input register(DA means analog output,accuracy is 12 digits)

Support TO instruction or register direct assignment operation

TO instruction direct output ：T0 K0 K0 D500 K6 , output 6 channel analog

Register direct assignment operation ：D[8050]~D[8055] corresponding to analog output value of [DA0~DA5]

Which optional two-way DA is used when the negative voltage output is selected, the set value range is as follows:

Serial No.	Register address	Set value range	Output type
DA0	D8050	0-4000	WhenD8058.0~D8058.5=0 Type is 0~20mA; When D8058.0~D8058.5=1 Type is 4~20mA。
DA1	D8051	0-4000	
DA2	D8052	0-4000	
DA3	D8053	0-4000	
DA4	D8054	0-4000	
DA5	D8055	0-4000	

The FX3GC 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-off hold functions must ensure DC 24V. The voltage after the source is loaded is 23V or more, and the PLC power-on time is longer than 2 minutes,otherwise the power-off function will be abnormal.

Programming software : Compatible with Mitsubishi PLC programming software GX Developer8.86Q and GX Works2

Detailed materials please refer to <Coolmay CX3G&FX3GC PLC programming user manual> <FX3GC series PLC user manual>

<FX3G series plc programming user manual>

Tips

FX3GC series 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、In canse of damaging the product, please confirm power supply range first (the regular power supply only limitied to 24V DC, we suggest you to use the power? supply which output voltage is 18W or higher than 18W), and wiring correctly, then electrify it.

2、Before installting the product, please tighten the screw and clamp guide to avoid Falling.

3、Please do not wiring or plug cable when the power is on, otherwise it may cause? electric shock or circuit damagement. Disconnect the power switch immediately? when the product smells or sounds abnormal. Do not drop metal shavings and wire? tips into the control vent holes during screwing hole and wiring, which may cause? product malfunctions and faults.

4、Please do not tie the power cord and communication cable together or let them too close, you should keep them for more than 10cm distance. The strong and weak electricity should be separated and properly grounded. If the interference is serious? the communication and high frequency signal input and output cables should be the? shielded cables to improve anti-jamming performance. The grounding terminal FG on this unit must be properly grounded, which can improve the anti-interference ability.

5、The digital input is an externally powered DC24V leakage type (passive NPN) with the input signal isolated from the power supply. When using, connect S/S to 24V positive external power supply

6、The COM of the binary input/output(transistor)is common to the cathode

7、Please do not disassemble the product or modify the wiring.or it may cause fault,malfunction, loss, or fire

8、Please make sure to turn off the all power when you install or dismantle the product,otherwise it may cause malfuction or fault.

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Catalog