Coolmay®
自动化方案专家

FX2NC PLC User Manual

Thank you for choosing Coolmay FX2NC series PLC. This manual mainly explains the features、general specifications and wiring methods of FX2NC series. Detailed programming for PLC please refers to < COOLMAY PLC Programming Manual>.

Main features of FX2NC series.

1.Highly integrated and super powered. At most 12DI/12DO, 4AI/8AO can be customized.
1-2 RS485 can be added. (when analog is selected, at most 1 Rs485 can be added; when analog is not selected, 2 RS485 ports can be added to 28M; 1 Rs485 can be added to 30M,RS485 can not be added to 32M)
2.Support high-speed counting and high-speed pulse. High-speed counting can be added to at most 6 single-phase , 3 AB(Z) 10-100KHz. High-speed pulse can be added to 4 or 5 20-200KHz.
3.Support special encryption. Setting 12345678 as password can thoroughly prevent the data from being read.
4.3.5MM pluggable terminals are adopted for easy wiring.

Safety precautions

1. DIN-Rail(3.5mm) installation adopted. While handling the screw holes and connecting the wires, do not let the metal particle or wire bents fall into the air vent of the controllers. This may give rise to malfunction and misoperation.
2. Avoid wiring or handling cable plugs with charge which may cause electric shock or damage the circuits.
3. On seriously interfered occasions, shield cables should be adopted as the I/O cables of communication and high-frequency signals to enhance anti-interference ability. The grounding terminal FG being correctly connected can also enhance anti-interference ability.
4. The working power supply is DC24V. Do not connect the I/O signal port to AC power source which is badly damaged. Please recheck the cable before charging. Do not touch any terminals whiling charging.

Product information

◆ **Naming rule** FX2NC ① - 12 M RT ②③④ - 4AD ⑤ 2DA ⑥ - V ⑦ - A0 ⑧ - 1C1 ⑨ - 1P ⑩ - 485/232 ⑪

1. Series: FX2NC
2. I/O: 12: 6AI/6AO 16:8AI/8AO 24:12AI/12AO 28: 14AI/14AO 32: 16AI/16AO
3. Module type: M: Main module E: Extension module
4. DO Type: R: Relay T: Transistor RT: Both relay and transistor
5. AI: At most 0-4 channels can be added
6. AO: At most 0-2 channels can be added
7. AI type: EK: EK thermocouple SR: S-type thermocouple JR: J-type thermocouple
   PT: Pt100 PT0: Pt1000 NTC: thermistor (10k/50k/100k)
   V: 0-10V V5: 0-5V A4: 4-20mA A0: 0-20mA
8. AO type: V: 0-10V V5:0-5V A0: 0-20mA
9. C1 stand for singe phase 100k high-speed counting, C2 for 100KHz AB phase counting, C3 for 100KHz ABZ counting, C30 for 10Khz ABZ counting, at most 6 single phase 10Khz or 3 AB(Z) phase 10-100KHz can be custom-made. If 6 single phase 10KHz be made, the model should be 6C10.
10. P stand for 100KHz high-speed pulse, P2 stand for 200KHz high-speed pulse, 5P0 means 5 20KHz. At most 4 100-200KHz can be added
11. COM port: one or two RS485 ports can be added. (2 RS485 ports can be added to 28M; RS485 cannot be added to 32M, others can add only 1 RS485 ports)

◆ **Basic parameters**

Model	Switching value		Analog (optional)		COM Port	High-speed counting			High-speed pulse	Dimension	
	DI	DO	AI	AO	485 port	Single phase	A B phase	ABZ phase	Output	Overall Size (mm)	Cutout Size (mm)
FX2NC-12M	6	6	2	2	One or two RS485 ports can be added. (2 RS485 ports can be added to 28M; RS485 cannot be added to 32M, others can add only 1 RS485 ports).	Normally 2 10K contained,at most 6 channels can be added (210-100K and4 5-10K)	Normally 2 10K contained, at most 3 AB can be added (2 10-100k and 1 5-10K)	3 ABZ counting (among which 1 AB (X0-X1) is 100K,Z(X2) is 5-10KHz , 2 ABZ phases are 5-10KHz)	Normally 2-4 20K pulse output, at most 4 200K can be added.	90*60*32	
FX2NC-24M	12	12	4	2							
FX2NC-16M	8	8	N/A	N/A							
FX2NC-28M	14	14									
FX2NC-30M	16	14									
FX2NC-32M	16	16									

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

Diagram2：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 input is higher than 4.5mA	Electric current of Common input is higher than3.5mA
Input OFF	Electric current of both is lower than 1.5mA	
Filter Function	With filter function, the filter time can be set among 0-100ms, defaulted as 10mA	
High-speed Counting	Normally 2 single counting (X0 / X3) or 2 AB phase counting (X0-X1/X3-X4) 10KHz. At most 6 single counting can be customized (2 10-100KHz, 4 5-10KHz) Or 3 AB phase counting 1 100KHz、2 5-10KHz) or 3 ABZ counting (AB X0-X1:1 100KHz 、Z: 2 5-10KHz)、2ABZ: 5-10KHz.	
Common Port	COM connected with negative terminal	
Relay Output Index		
Max Current	5A	
Load Voltage	AC220V,DC24V	
Circuit Insulation	Relay Mechanical Insulation	
ON Respond Time	About 10ms	
Mechanical Life (without load)	10 million times	
Electrical Life (rated load)	300K times	
Output Common Port	COM connected with negative terminal	
Transistor Output Index		
Max Current	500mA	
Load Voltage	DC24V	
Circuit insulation	Optocoupler Insulation	
Isolation Voltage (external terminal)	1500VAC	
On Respond Time	High-speed output : 10μs others:0.5ms	
High-speed output frequency	Y0/Y1/Y6/Y7 Normally 20Khz, Y10 can be added while 5 channels be customized, at most 100-200KHZ	
Output Common Port	COM connected with negative terminal	
Analog Input Index		
Input Signal	PT100/PT1000/Thermocouple/NTC/0-10V/0-20mA/4-20mA,other signals can be customized.	
Respond Time	One scan cycle	
Analog Input Quantity	0-4 channels	
Accuracy	12bit,±1%(Full scale)	
Analog Output Index		
Output Signal	0-5V/0-10V/0-20mA, other signals can be customized	
Analog Output Quantity	0-2channels	
Accuracy	10bit	
Interface		
COM Port	1 Rs422 , another one or two Rs485 ports optional	
Environment		
Operating Temperature	-20°C~60°C	
Relative Humidity	5%~95%RH	
Storage Temperature	-20°C~70°C	
Vibrational Frequency	10-57Hz, amplitude 0.035mm; 57Hz-150Hz, accelerated speed4.9m/s² (X、Y、Z 10 times for directions XYZ, 80 min. in total)	

Mechanical Design Reference

◆ Cutout size

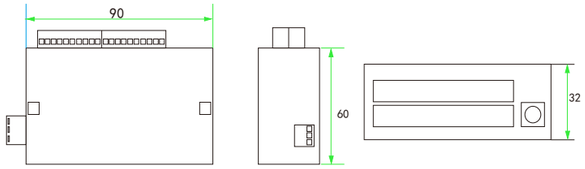

Diagram 1 Dimension Drawing

diagram3 : Cutout Size

Model	Max points	Overall Size W*H*D(mm)
FX2NC-12/16M	12 points (single-row terminal)	90*60*32
FX2NC-24M	24 points (double-row terminal)	90*60*32
FX2NC-28/30/32M	32 points (double-row terminal)	90*60*32

Electrical design reference

◆ Product structure

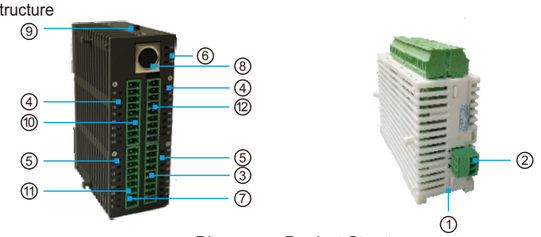

Diagram 2 Product Structure

1. 35mm DIN-rail Installation
2. Terminal block for power supply input signal
3. Terminal block of digital input
4. LED of Digital Output
5. LED of Digital Input
6. PWR: Power-up state
   RUN: Light On when PLC is run
   ERR: LED indicator flickers when program errors occur(light on when CPU errors occur)
7. RS485
8. RS422
9. RUN/STOP Run switch
10. Analog input
11. Analog output
12. Terminal block of digital output

◆ Hardware interface

Diagram 3 FX2NC-12MR/MT/MRT

Diagram 4 FX2NC-16MR/MT/MRT

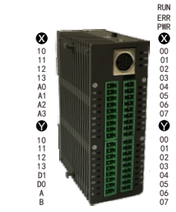

Diagram 5 FX2NC-24MR/MT/MRT

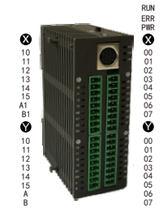

Diagram 6 FX2NC-28MR/MT/MRT

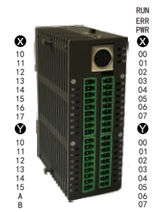

Diagram 7 FX2NC-30MR/MT/MRT

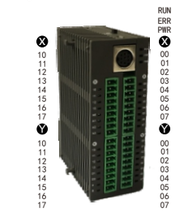

Diagram 8 FX2NC-32MR/MT/MRT

Note: Ⓧ is the public port of DI/AI/AO, and should connect with the negative pole, Ⓨ is the public port of digital outputs and should connect with the negative pole

Terminal specification: 22-14AWG wire.
Pluggable terminals adopted.

COM port definition:

The programming port is RS422, another one or two RS485 ports optional. (2 RS485 ports can be added to 28M; RS485 cannot be added to 32M, others can add only 1 RS485 ports)

interface:

1. RS232(PLC programming port);support Mitsubishi programming port protocol.
2. RS485(AB port)/RS232:suppport Mitsubishi programming port protocol, Mitsubishi serial protocol, Modbus(Modbus RTU/ASCII parameters are set in D8120, station number is set in D8121, can be used as master or slave.
3. RS485(A1 B1 port): support Mitsubishi programming port protocol and Modbus (Modbus RTU/ASCII parameters are set in D8160, station number is set in D8161, normally only be used as slave

* Two Rs485 ports which support Modbus master station can be special customized.

Diagram 9 PLC programming port

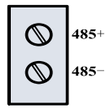

Diagram 10 optional RS485

Pin definition of programming port

Pin number	Signal	Discription
1	RXD-	Receive -
2	RXD+	Receive +
3	GND	Ground
4	TXD-	Transmit -
5	+5V	External power supply +5V
6	CCS	Direction control wire
7	TXD+	Transmit +
8	NC	Not conected

Equivalent Circuit

There is a power supply (DC24V) inside the PLC to test the situation of the switch. The end user only need to put in the dry contact. OC output connected. signal is needed if output signals of active crystal sensor should be.

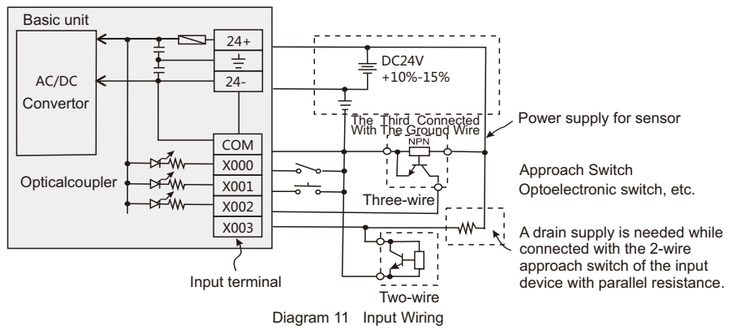

Diagram 11 Input Wiring

Diagram 12 is an equivalent circuit diagram of relay output. There are several groups of input terminals, each group is electrical isolation and the output electric shock of different groups should be connected with different power circuit.

Please choose proper insurance for each load to out the output unit and the plate wires of the plc due to the load circuit and other problems.

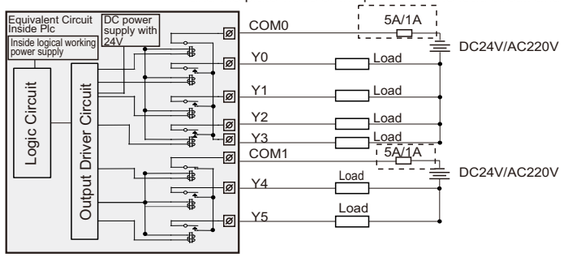

Diagram 12 Equivalent Circuit of Relay Output

Please choose proper insurance for each load to avoid burning out the output unit and the plate wires of the plc due to the load circuit and other problems.

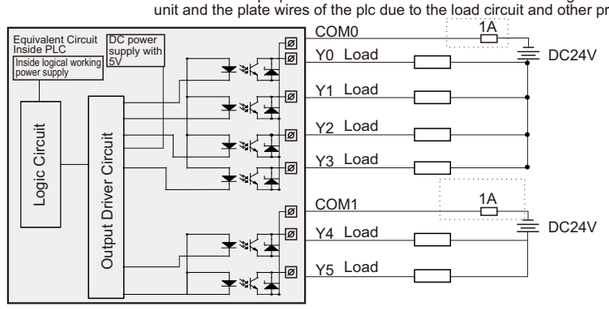

Diagram 13 Equivalent Circuit of Transistor Output

Diagram 13 is an equivalent circuit diagram of transistor output. As the diagram shows, There are several groups of input terminals, each group is electrical isolation and the output electric shock of different groups should be connected with different power circuit. The output of transistors can be only used for load circuit with DC24V.

As for inductive load connected with AC circuits, RC instantaneous voltage absorbing circuit should be considered as outside circuit. As for inductive load connected with DC circuits, free-wheeling diode should be added, shown as diagram 14

Wiring diagram of stepping motor or serve motor is shown as diagram 12. DC24V of 5V Driver must be used together with a 2 KΩ resistance.

4 pulses are Y0 Y1 Y6 Y7, customized pulses are Y0 Y1 Y6 Y7 Y10.

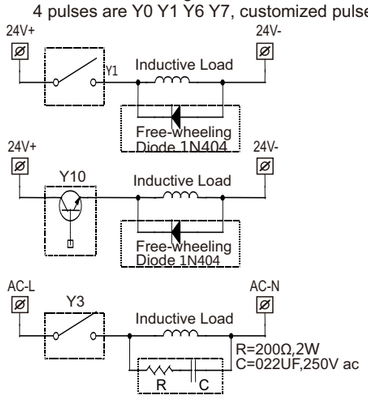

Diagram 14 Inductive Load Absorbing Circuit

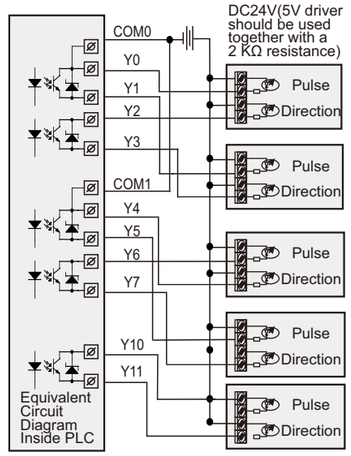

Diagram 15 Pulse Wiring

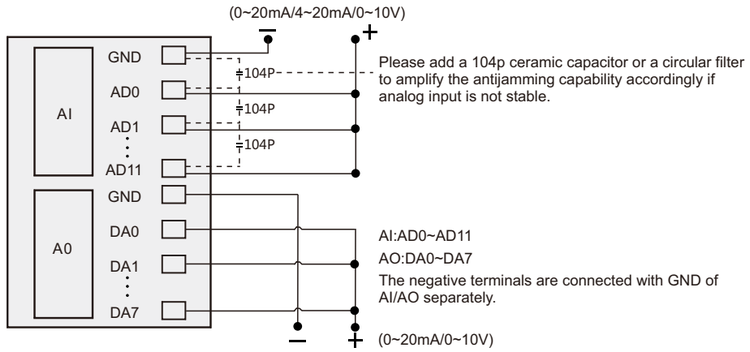

Diagram16 Analog Wiring

Analog wiring

Two-wire: the power supply's positive pole is connect with the transmitter's positive pole. The transmitter's negative pole is connect with AD, the power supply's negative pole is connect with GND, generally as the wiring of 4-20mA/0-20mA transmitter.

Three-wire: the power supply's positive pole is connect with the transmitter's positive pole. The power supply's negative pole and the signal output cathode are the same terminal. The transmitter output is connect with AD.

Four-wire: the positive and negative poles of the power supply are connect with the transmitter's positive and negative poles separately. The positive and negative poles of transmitter output are connect with AD and GND separately.

When the analog is temperature, two wires should be connect with AD and GND separately.

As for three- wire PT100, it should be merged into two-wire.

Anti-interface processing

1.The strong current and the weak current should be wired separately and cannot connect with ground. When there is a strong current, please add a circular on the power port. Besides, proper grounding processing should be conducted according to the chasis

2.When there is a interface, 104 ceramic chip can be added and effective grounding should be conducted.

Programming Reference

◆ **Devices distribution and statement of power-down save.**

	FX2NC-12M	FX2NC-16M	FX2NC-24M	FX2NC-28M	FX2NC-30M	FX2NC-32M
Input X	X00~X05 6points	X00~X07 8points	X00~X13 12points	X00~X15 14points	X00~X17 16points	X00~X17 16points
Output Y	Y00~Y05 6points	Y00~Y07 8points	Y00~Y13 12points	Y00~Y15 14points	Y00~Y15 14points	Y00~Y17 16points

Auxiliary relay M	[M0~M499] 500points general		[M500~M1535] 1036points Holding		M8000~M8255 256points special
State S	[S0-S499] 500points general		[S500-S999] 500points holding		
Timer T	T0~T199 200points 100ms general		T200~T245 46points 10ms general	[T246~T249] 4pints 1ms accumulation holding	[T250~T255] 6points100ms actuary holding
Counter C	16 bit up counter		32 bit up counter		High-speed counter
	C0~C 99 100points general	[C100~C199] 100points holding		[C200~C234] 35points holding	[C235~C255] 5points holding
Data register D,V,Z	D0~D199 200points general	[D200~D999] 800points holding		[D8000~D8255] 256points special	V0~V7 Z0~Z7 16points index
Nested pointer	N0~N7 points master control		P 0~P127 128points please use branch pointer while jumping to a subprogram		
Constant K	16bit -32,768~32,767		32bit -2,147,483,648~2,147,483,647		
Constant H	16bit 0~FFFFH		32bit 0~FFFFFFFFH		

◆ **Analog Register**

Analog Input(AD):

FX2NC-12M-2AD2DA

AD	Register Value	Magnification Correction (units：milli)	Size correction	Cycle setting of analog sampling
AD0-AD1	D8030-D8031	D8040-D8041	D8070-D8071	D8050-D8051
Cold end	D8038	D8048	D8078	
Note: D8038 is the cold end of thermocouple. K-type set D8049=1.				

FX2NC-24M-4AD2DA

AD	Register Value	Magnification Correction (units：milli)	Size correction	Cycle setting of analog sampling
AD0-AD3	D8030-D8033	D8040-D8043	D8070-D8073	D8050-D8053
Cold End	D8038	D8048	D8078	
Note: D8038 is the cold end of thermocouple. K-type set D8049=1.				

Analog Output(DA):

FX2NC-12/24M-4AD2DA

DA	AO register	Set Value	Current/Voltage	Resolution	Start Contact
DA0-DA1	D8080-D8081	0-1000	0-10V/0-20mA	10mV/0.02mA	M8080 be driven ON

∗ The defaulted data of the circle setting of analog sampling is 32, the mix can be set as 1.

The power-down save of FX2NC's devices is permanent retention. Namely, all the devices of the holding section won't lose while the module is power off. Chargeable batteries are used for the real-time clock to ensure that the clock is presenting the real time. All the power-down save function should ensure that the voltage of the power supply (DC24V) should above 23V and the power on time of PLC should above 2mins, or there will be an error with the function of power-down save.

Programming Software:

Compatible with MITSUBISHI GX8.52 and WORKS 2

Detailed materials please refer to:

<COOLMAY PLC Programming Manual>

<FX2NC PLC User Manual> <MITSUBISHI FX Series Programming Manual>