

COOLMAY

EX2N-43H(A)/43KH(A)/50KH(A)/ 70H(A/AS)/100HA Series HMI+PLC All in one Programming manual

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V8.11.1

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Safety Precautions

——Basic instructions for product operation

Please read the relevant manual carefully before using this product, and operate it with great care and safety.

The following content is only for the COOLMAY series.



Notice!

- Do not tie the power cord and communication cable together or stay too close. Keep a distance of 10cm or more.
- Please do not disassemble the integrated machine or modify the wiring, or may cause malfunction, loss, fire.
- When the product emits an odor or abnormal sound, pls turn off the power switch immediately.
- When installing this product, be sure to tighten the screws to avoid falling off.
- Please transport, install, store, assemble and maintain this product correctly, otherwise it may cause damage to the product.



Danger!

- Please re-energize after confirming the proper range of power supply and voltage, proper wiring to avoid damage.
- Do not touch the terminals while power is on to avoid electric shock.
- Do not open the case.
- When installing and removing the product, be sure to cut off all power supplies, otherwise it will cause malfunction.
- Please use this product under the environmental conditions specified in the instruction manual, otherwise it may cause an accident.

1. Overview

EX2N-43H(A)/43KH(A)/50KH(A)/70H(A/AS)/100HA series HMI+ PLC ALL in one is the the highly integrated product of hmi display and PLC control,which developed by Shenzhen Coolmay Technology Co., Ltd..As upgraded product of HMI and PLC,It can greatly save the user's installation and maintenance costs.

This chapter mainly introduces the performance characteristics, specifications, descriptions, and dimensions of the COOLMAY EX2N-43H(A)/43KH(A)/50KH(A)/70H(A/AS)/100HA series HMI PLC all in one.

1.1 Product description:

1.1.1 Advantage

- Logic control,analog input/output,screen display highly intehrated.
 - ◆ Digital input: optocoupler isolation
 - ◆ Digital output: transistor / relay / mixed optional
 - ◆ Analog input: optional:0-10V/0-5V/0-20mA/4-20mA/PT100/EK/J/S thermocouple /NTC10K/50K/100K/Other customized / mixed.
precision 12 Bit
 - ◆ Analog output: optional 0-10V/0-5V/0-20mA/Other customized / mixed.precision 10 Bit
 - ◆ High-speed counting: regular 2 channels AB phase or 2 channels single phase 10KHz ; up to 3 channels of AB (Z) phase or 6 channels of single phase 10-100KHz
 - ◆ High-speed pulse: regular 2 channels 20KHz, up to optional 4/5 channels 100-200KHz.
- Flexible customization.Special requirements can also be customized.
- All use pluggable terminals for easy installation and maintenance
- HMI and PLC can be specially encrypted to protect the user's labor results
- Default with USB programming port and PLC programming port (RS232) , RS232/RS485 is optional for HMI and PLC.
- Supports WINCE system, which is convenient for customers to operate
- PLC support MODBUS communication protocol, Includes master/slave , can be used to network multiple PLCs or other devices.
- LED backlight display: EX2N-100HA/70HA, 1024×600pixels; EX2N-70H(AS)/50KH(A), 800×480pixels; EX2N-43H(A)/43KH(A), 480×272pixels. 65535 65535 color digital color, rich animation effect.
- Fashion appearance,Widescreen display, ultra-light, ultra-thin body design, saving space, easy to install.
- Compact structure

EX2N-43H(A)	Dimension(mm): 134×102×30	Cutout size(mm): 120×94
EX2N-70H(A/AS)	Dimension(mm): 212×148×42	Cutout size(mm): 194×138
EX2N-100HA	Dimension(mm): 275×194×36.5	Cutout size(mm): 262×180
EX2N-43KH(A)/50KH(A)	Dimension(mm): 150×93×32	Cutout size(mm): 143×86
	Display (mm): EX2N-43KH(A):97×56	
	EX2N-50KH(A):108×65	

1.2 Specification

1.2.1 model specification

- **EX2N-43H(A)/43KH(A)/50KH(A) HMI PLC All in one:**

Models	Digital		Analog		Com port	
	DI	D0	AD	DI	HMI	PLC
EX2N-43H(A)/43KH(A)/50KH(A)-10MT/MR/MRT (-□AD□DA)	5	5	Up to 4AD	Up to 2DA	Optional 1 rs232	Optional 1 rs485
EX2N-43H(A)/43KH(A)/50KH(A)-16MT/MR/MRT (-□AD□DA)	8	8				
EX2N-43H(A)/43KH(A)/50KH(A)-20MT/MR/MRT (-□AD□DA)	12	8				
EX2N-43H(A)/43KH(A)/50KH(A)-24MT/MR/MRT (-□AD□DA)	12	12				

- **EX2N-70H(A/AS) HMI PLC All in one:**

Models	Digital		Analog		Com port	
	DI	D0	AD	DA	HMI	PLC
EX2N-70H(A/AS)-10MT/MR/MRT (-□AD□DA)	5	5	Up to 12AD	Up to 8DA	Optional 1 rs232 or 1 rs485	Optional 1 rs232 or 1 rs485
EX2N-70H(A/AS)-16MT/MR/MRT (-□AD□DA)	8	8				
EX2N-70H(A/AS)-20MT/MR/MRT (-□AD□DA)	12	8				
EX2N-70H(A/AS)-24MT/MR/MRT (-□AD□DA)	12	12				
EX2N-70H(A/AS)-30MT/MR/MRT (-□AD□DA)	16	14				
EX2N-70H(A/AS)-32MT/MR/MRT (-□AD□DA)	16	16				
EX2N-70H(A/AS)-36MT/MR/MRT (-□AD□DA)	20	16				
EX2N-70H(A/AS)-38MT/MR/MRT (-□AD□DA)	20	18				
EX2N-70H(A/AS)-40MT/MR/MRT (-□AD□DA)	20	20				
EX2N-70H(A/AS)-40MT/MR/MRT -S(-□AD□DA)	24	16				
EX2N-70H(A/AS)-44MT/MR/MRT (-□AD□DA)	24	20				









- **EX2N-100HA HMI PLC All in one:**

Models	Digital		Analog		Com port	
	DI	D0	AD	DA	HMI	PLC
EX2N-100HA-10MT/MR/MRT	5	5	Up to	Up to	Optio	Option

(-□AD□DA)			16AD	8DA	nal 1 rs232 or 1 rs485	al 1 rs232 or 1 rs485
EX2N-100HA-16MT/MR/MRT (-□AD□DA)	8	8				
EX2N-100HA-20MT/MR/MRT (-□AD□DA)	12	8				
EX2N-100HA-24MT/MR/MRT (-□AD□DA)	12	12				
EX2N-100HA-30MT/MR/MRT (-□AD□DA)	16	14				
EX2N-100HA-32MT/MR/MRT (-□AD□DA)	16	16				
EX2N-100HA-36MT/MR/MRT (-□AD□DA)	20	16				
EX2N-100HA-38MT/MR/MRT (-□AD□DA)	20	18				
EX2N-100HA-40MT/MR/MRT (-□AD□DA)	20	20				
EX2N-100HA-40MT/MR/MRT -S(-□AD□DA)	24	16				
EX2N-100HA-44MT/MR/MRT (-□AD□DA)	24	20				

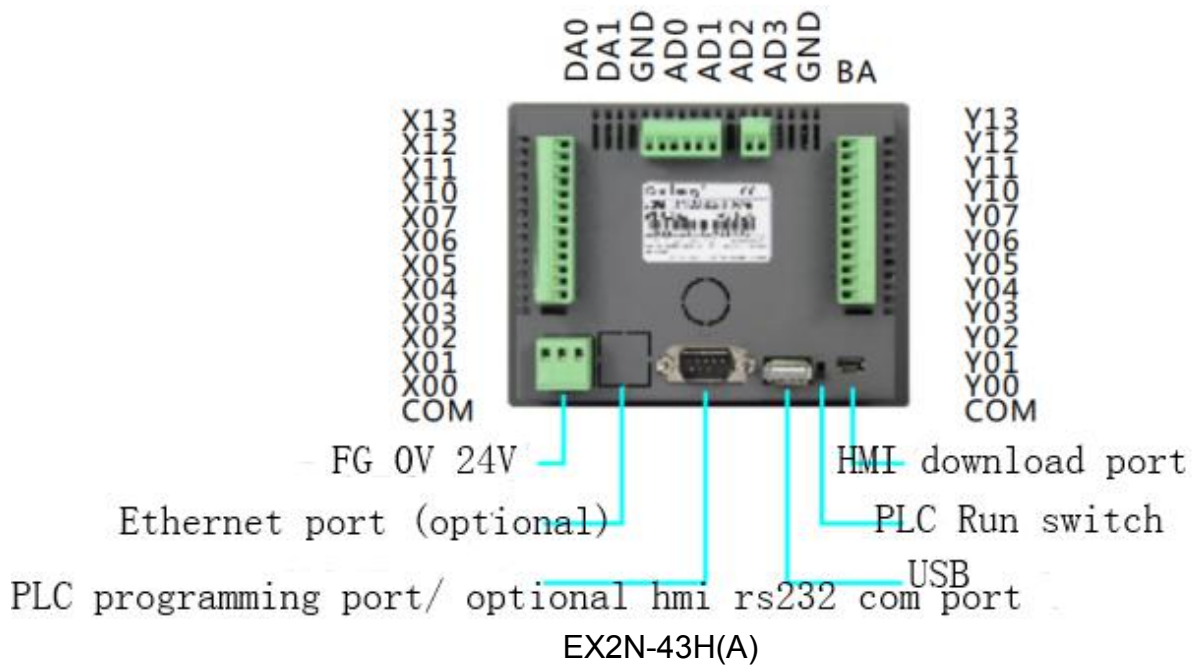
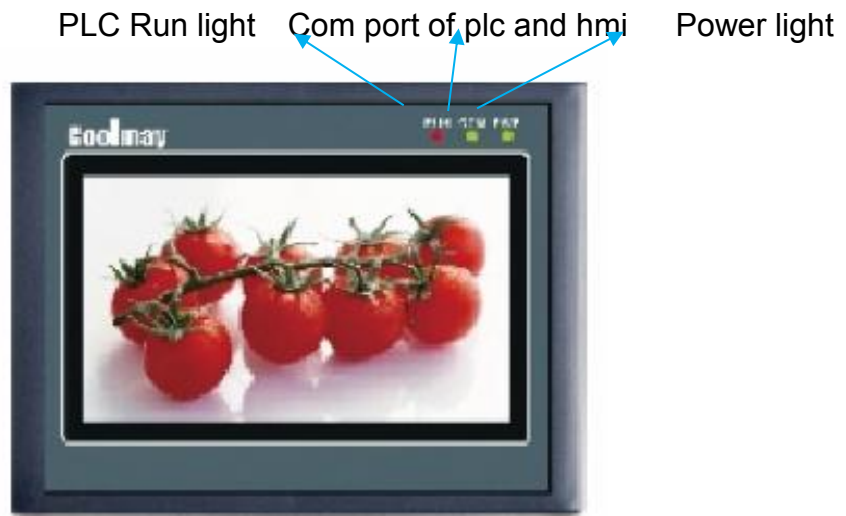
- If bulk order, models with different specification could be customized.

1.2.2 Specification

Basic	EX2N-43H	EX2N-43KH/50KH	EX2N-70H	EX2N-100HA
Upgraded	EX2N-43HA	EX2N-43KHA/50KHA	EX2N-70HA(S)	
Image				
				
Dimension	134*102*30mm	150*93*32mm	212*148*40mm	275*194*36.5mm
Cutout size	120*94mm	143*86mm	194*138mm	262*180mm
HMI				
Features	65535 true color resistive touch screen			
Display size	4.3" TFT	4.3" TFT/5" TFT	7.0" TFT	10.1" TFT
	97*56mm	97*56/108*65mm	154*87mm	222*125mm
Resolution (pixels)	480*272	43KH: 480*272 50KH: 800*480	H/HAS: 800*480 HA: 1024*600	1024*600
	RAM	H:64MB, HA(S):128MB		
ROM	128MB			
Operation system	HA/KHA/HAS:WINCE 7.0;		H/KH:WINCE 5.0	
CPU	H/KH series ARM9 core 400MHz		HA/KHA/HAS series CORTEX A8 720MHz-1GHz	
COM port	1 TP download port, 1 USB port			
	1 RS232 optional		1 RS485 or RS232 optional, Ethernet port is optional	
Audio port	Optional			
Software	CoolMayHMI Programming software			
PLC				
Digital I/O	Up to 12DI/12DO		Up to 24DI/20DO (At most 18 relay outputs)	
I/O level	MT Output: NPN	MR output: NO contact	Input: Passive NPN, public terminal isolated	
Output type	MR/MT/MRT Maximum load: MT is 500mA; MR is 5A			
High-speed counting	Normally 2 single phase (X0/X3) Or 2 channel AB phase (X0-X1/X3-X4) 10KHz			
	Special customized 6 channel (4 100KHz, 2 10KHz) or 3 channel AB phase (2 100KHz, 1 10KHz) or 3 channel ABZ phase (2 AB phase 100KHz, Z phase 10KHz, 1 channel ABZ phase 10KHz)		Special customized 6 channel 100KHz or 3 channel AB phase 100KHz or 3 channel ABZ phase (AB phase 100KHz, Z phase 10KHz)	
High-speed pulse	Normally 4 channel 20KHz, Y0/Y1/Y6/Y7			
	Special customized 4 channel 200KHz		Special customized 5 channel 200KHz, 5th is Y10	
Analog	AI type: 0-10V/0-5V/4-20mA/0-20mA/PT100/PT1000/EKSJ thermcouple /NTC10K/NTC50K/NTC100K/Mixed or other customized (7inch and 10inch all in one supprt -5V~5V and -10V~10V)			
	AO type: 0-10V/0-5V/0-20mA or mixed			
	Up to 4AD/2DA		Up to 12AD/8DA	Up to 16AD/8DA
COM port	Default with rs232 com port			
Software	1 RS485 optional		1 RS485 or 1 RS232 optional	
Software	Compatible with Mitsubishi GX Developer 8.86 and WORKS 2			
Regular model: EX2N-43H(A)/43KH(A)/50KH(A)-16MR/24MR/24MT(-4AD2DA-485P/232H) EX2N-70H(A/AS)-16MR/24MR/44MT/44MRT(-12AD8DA-485P/232H) EX2N-100HA-16MR/24MR/44MT/44MRT(-12AD8DA-485P/232H) 485P/232P means add 485/232 com port on PLC; 485H/232H means add 485/232 on HMI.				
Detailed info. refer to: 《COOLMAY EX2N HMI PLC All in one programming manual》 《Coolmay MX2N serie PLC programming manual》 《EX2N HMI PLC All in one user manual》 《CoolMayHMI User Manual》				

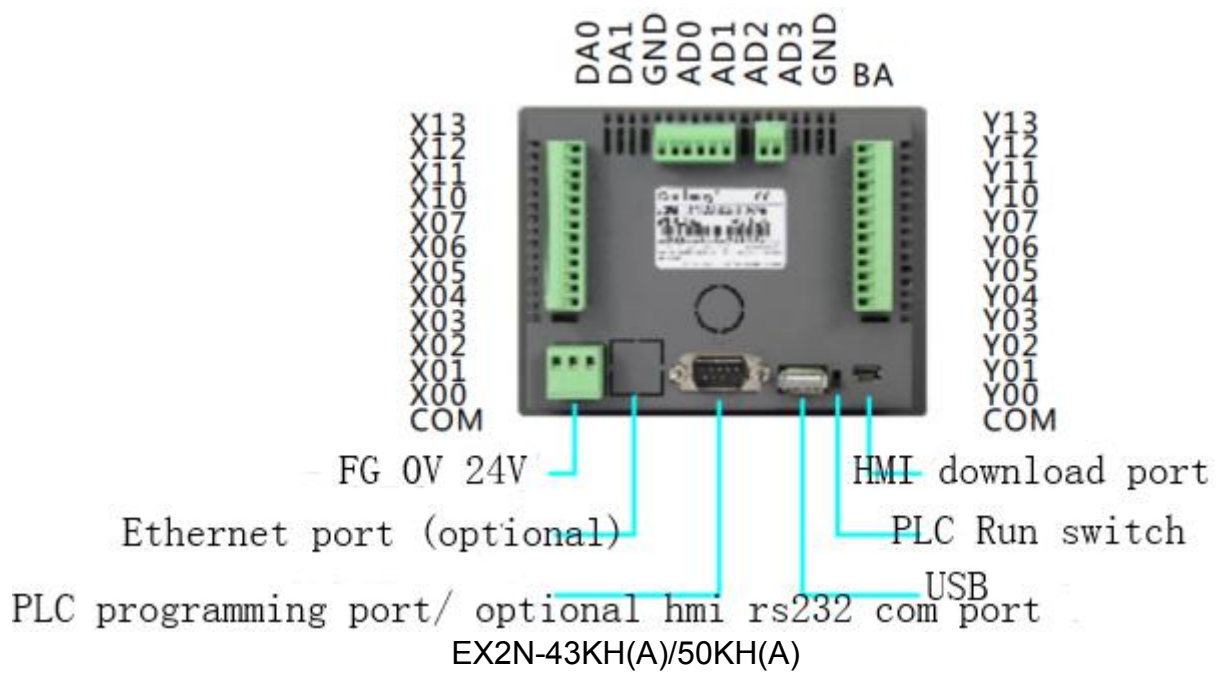
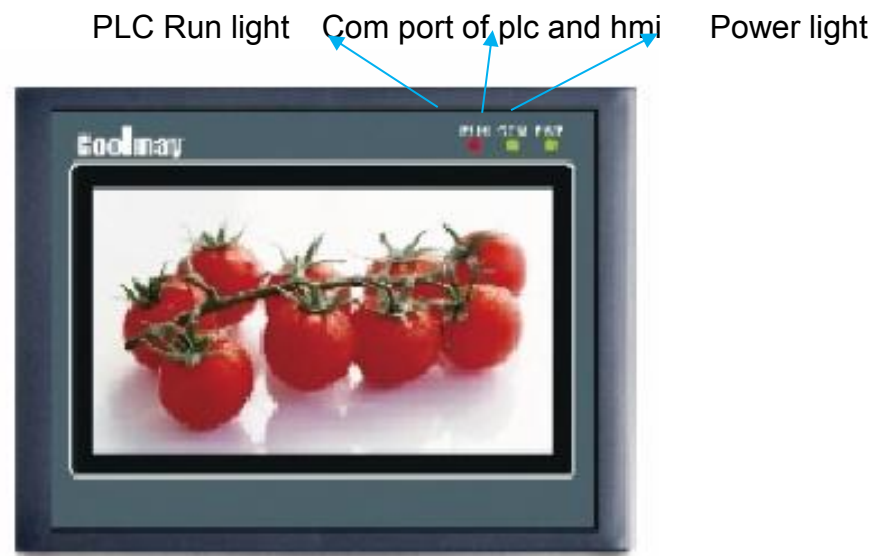
1.3 Hardware description

1.3.1 EX2N-43H(A) structure description and dimension



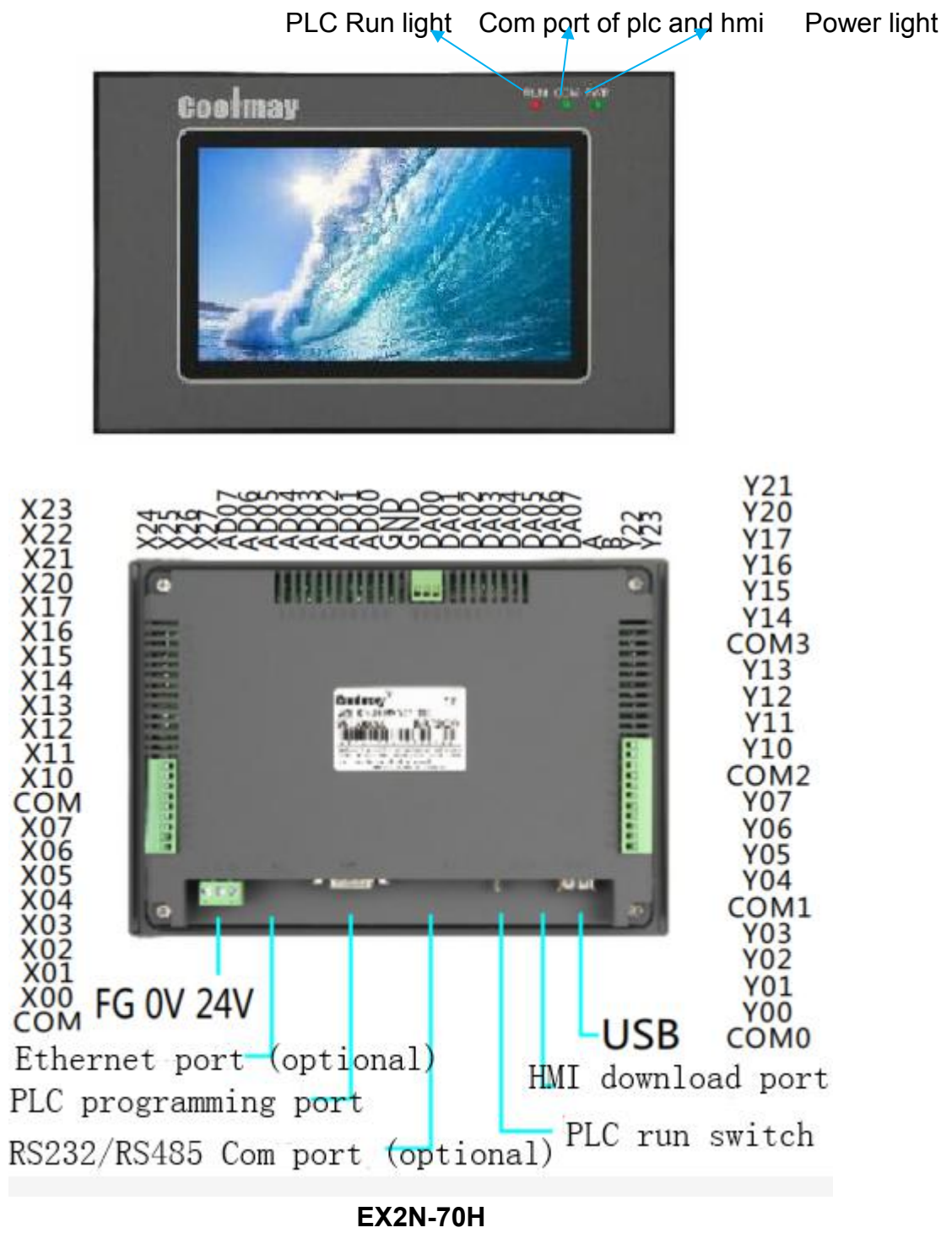
- * Dimension(mm): 134×102×30
- * Cutout size(mm): 120*94
- * Installation: Clip installation

1.3.2 EX2N-43KH(A)/50KH(A) structure description and dimension



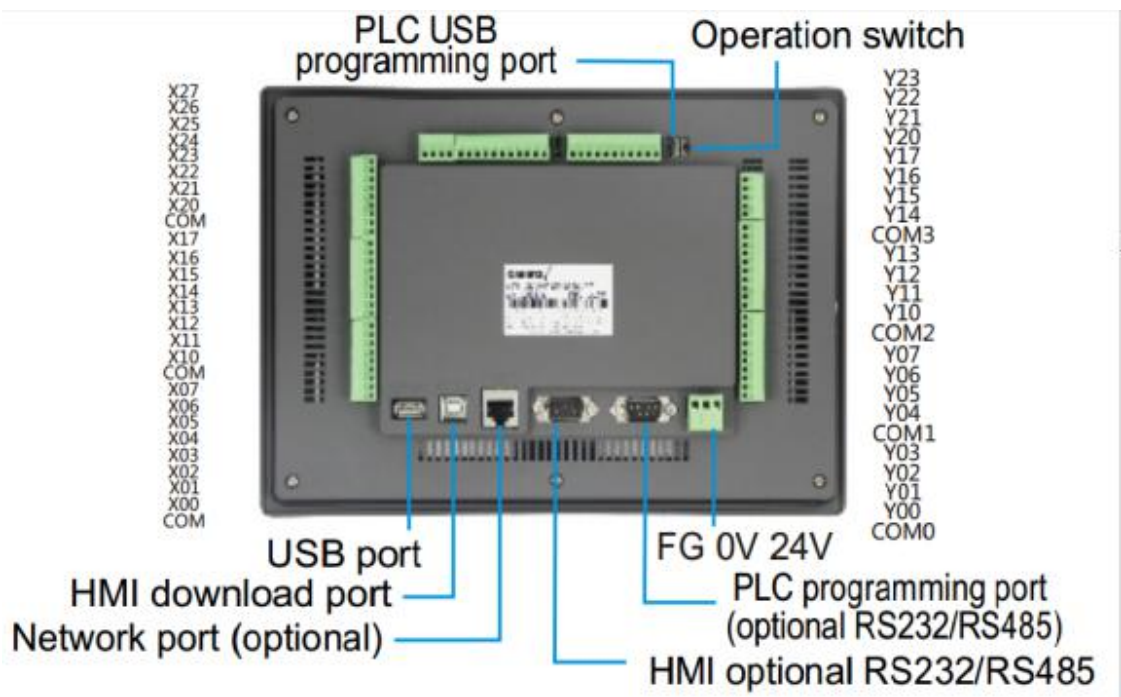
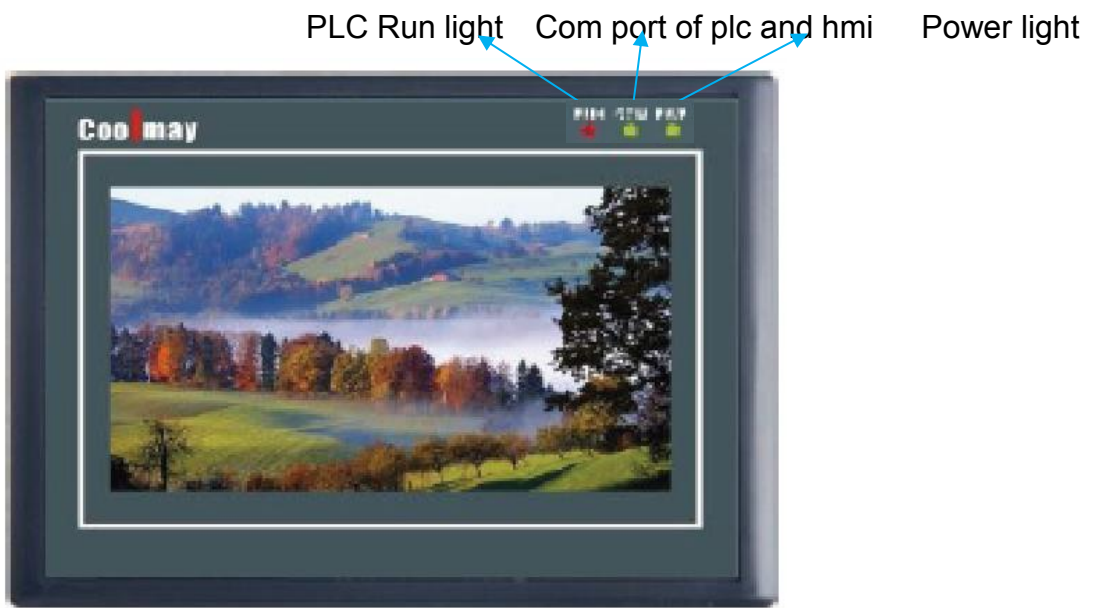
- * Dimension(mm): 150×93×32
- * Cutout size(mm): 143*86
- * Installation: Clip installation
- * Display size: EX2N-43KH(A):97×56
EX2N-50KH(A):108×65

1.3.3 EX2N-70H(A/AS)structure description and dimension



- * Dimension(mm): 212×148×40
- * Cutout size(mm): 194*138
- * Installation: Clip installation

1.3.4 EX2N-100HA structure description and dimension



EX2N-100HA

- * Dimension(mm): 275*194*36
- * Cutout size(mm): 262*180
- * Installation: Clip installation

1.3.5 Introduction of each interface and indicator

POWER: Power indicator, connected to the power light

RUN: PLC running status indicator. This light is on when the PLC is running.

COM: touch screen and PLC communication status indicator, when the two communicate, the light is on

Power terminal: The positive and negative terminals of the DC24V switching power supply are respectively connected to the DC24V and 0V of the power supply terminal.

PLC programming port: two PLC programming ports (MiniB type usb port / RS232), PLC program can be downloaded through 232 programming line or USB cable download

HMI programming port: download touch screen configuration program

USB interface: mainly can be directly inserted into the U disk of the file system FAT 32, can also be inserted into the mouse

1.3.6 Wiring method

Digital input port: X00-027;

Digital output port: Y0-Y23,

Y0, Y1, Y6, Y7 are 20K high-speed pulse ports, which can be customized to 200K pulses;

43H(A)/43KH(A)/50KH(A) can be made into 5 channels 200K High-speed pulse;

70H (A / AS) / 100HA can be made into 5 200K high-speed pulse, the 5th is Y10;

Analog input port: AD0-AD15, GND is the common negative pole;

Analog output port: DA0-DA7, GND is the common negative pole;

485 expansion port: A B corresponds to the positive and negative terminals of 485 port respectively.

PLC supports modbus protocol, which can be connected to inverters and meters.

For other hardware information, refer to "EX2N Series HMI/PLC All-in-One User Manual"

2. PLC

This chapter describes the precautions for PLC programming and HMI programming.

Compared with other brands, COOLMAY PLC have the following features:

- Upper computer software compatible with MITSUBISHI GX Developer8.52/Works 2.
- Adopt Military level 32-bit CPU with fast speed, more adapted to high EMI industrial environment.
- Special encryption, thoroughly resist being read illegally. Setting 12345678 as the user password can totally close the function of reading Ladder Logic Program so that users' program can be protected.
- support clock, real time clock can be preserve above 5 years after outage.
- RS485/232 ports can be added for connecting HMI 、 VFD and other facilities.
- Support Mitsubishi PLC programming protocol/Modbus series/free port protocol, can easily realize the communication between PLC and other facilities.
- Support 4-5 high speed pulse outputs, at most 4-5 200KHz at the same time.
- Normally 2 single counting (X0/X3)or 2 AB phase counting (X0-X1/X3-X4) 10KHz. At most 6 single counting can be customized (4 100KHz、2 10KHz),Or 3 AB phase counting (2 100KHz、1 10KHz)or 3 ABZ counting (1 100KHz 、2 5-10KHz).
- Support all kinds of analog inputs and outputs, just one sort or mixed ones. The accuracy of analog inputs is 12 bit and outputs accuracy is 10 bit. Analog inputs contain temperature/electric current/voltage, analog outputs contain electric current/voltage.
- Analog inputs contain relay/transistor or both.
- All the wiring terminals are pluggable for easily operation.
- Flexible to use, can be customized.

2.1 PLC Programming notice

The PLC is compatible with GX 8.86/Works 2 and below. If you use other versions of the software, incompatibility may occur.

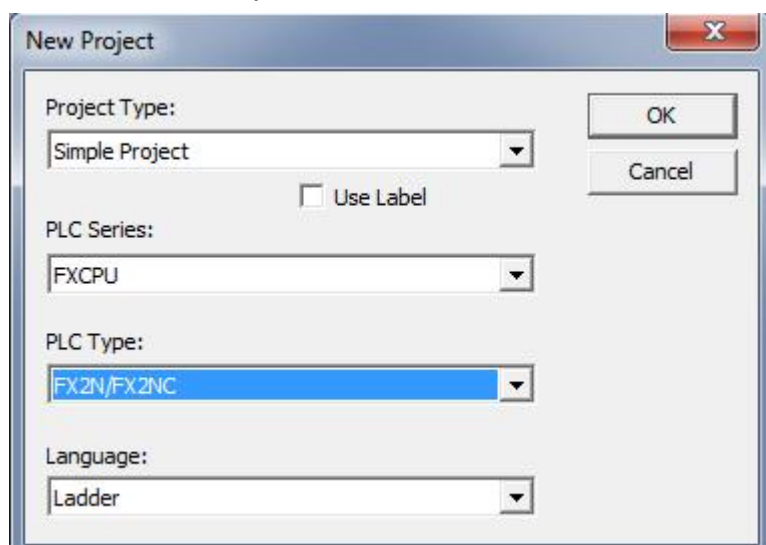
When the PLC program is downloaded, there is a prompt error: Can't specify the com port.

GX 8.86 software: Online - Transfer settings change com port;

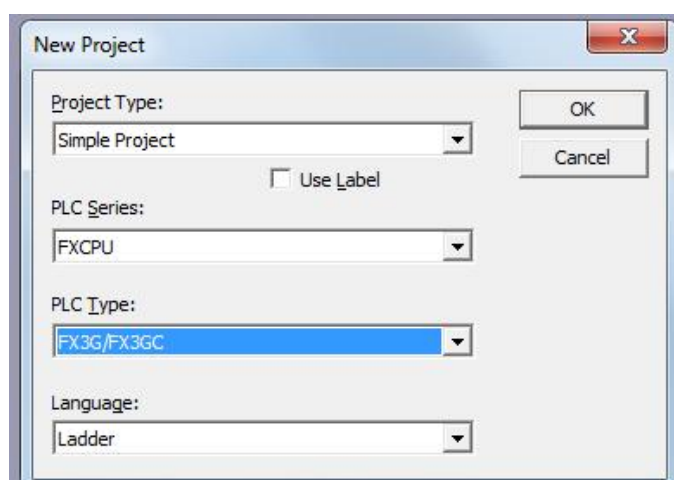
Works 2: All targets - Change the com port in all connected targets;

If communication error occurs, cable is abnormal If prompted, remove it by powering off, detecting the cable, detecting whether the power is normal, or replacing the computer.

In the GX Developer:



In the Works 2 software version, choose the figure : (Note: the label is forbidden)



2.2 Date sheet

Items		contents
Operation Control Method		Cyclic operation by stored program
IO Control Method		Batch processing method (when END instruction is executed), I/O refresh instruction is available
Programming language		Relay symbolic language+step ladder (compatible with Mitsubishi software FXGP_WIN-C)
Operation time	Basic instruction	0.08μs
	Applied instruction	10-30μs

storage	Bulid-in	8000 steps EEPROM
	Storage boxes	
Numbers of instructions	Basic instruction sequence	27
	STL instruction	2
	Applied instruction	94
Auxiliary relays	general	500points M0-M499
	Latched	1036points M500-M1535
	special	256points M8000-M8255
State relays	general	500points S0-S499
	initial	10points S000-S009
	latched	500points S500-S999
timers	100ms	200points T0-T199
	10ms	46points T200-T245
	1ms integrating	4points T246-T249
	100ms integrating	6points T250-T255
counters	General 16 bit	100points C0-C99
	Latched 16 bit	100points C100-C199
	General 32 bit	
	latched 32 bit	35points C200-C234
High-speed counters	Single phase	At most 6 points,C235-X0 C236-X1 C237-X7 C238-X3 C239-X4 C240-X5;Normally 2 points,C235-X0 C238-X3
	A/B phase	At most 3 points,C251-X0/X1 C253-X3/X4 C254-X10/X11,normally 2 points ,C251-X0/X1 C253-X3/X4
Data register (D.V.Z)	General	200points D0-D199
	Power-down save	800points D200-D999
	File register	
	Externally adjusted	
	Special	256points D8000-D8255
	Index	16points V0-V7 Z0-Z7

Pointers	For use with call	128points P0-P127
	For use with interrupts	
Nest levels	Mater	8points: N0-N7
Constants	Decimal K	16bit : -32768 to +32767
		32bit: -2147483648 to +2147483647
	Hexadecimal H	16bit: 0000-FFFF
		32bit: 00000000-FFFFFFFF

3. Instruction Set

3.1 Basic Program Instructions

Mnemonic	Function	Devices	Program steps
LD (Load)	Initial logical operation contact type NO (normally open)	X,Y,M,S,T,C	1
LDI(Load Inverse)	Initial logical operation contact type NO (normally closed)	X,Y,M,S,T,C	1
LDP(Load pulse)	Initial logical operation -Rising edge pulse	X,Y,M,S,T,C	2
LDF(Load falling pulse)	Initial logical operation Falling/ trailing edge pulse	X,Y,M,S,T,C	2
AND (AND)	Serial connection of NO (normally open) contacts	X,Y,M,S,T,C	1
ANI(AND Inverse)	Serial connection of NC (normally closed) contacts	X,Y,M,S,T,C	1
AND (AND Pulse)	Serial connection of Rising edge pulse	X,Y,M,S,T,C	2
ANDF (ANd Falling pulse)	Serial connection of Falling / Trailing pulse	X,Y,M,S,T,C	2
OR (OR)	Parallel connection of NO (normally open) contacts	X,Y,M,S,T,C	1
ORI(OR Inverse)	Parallel connection of NC (normally closed) contacts	X,Y,M,S,T,C	1
ORP (OR pulse)	Parallel connection of rising edge pulse	X,Y,M,S,T,C	2
ORF (Or failing pulse)	Parallel connection of Falling / trailing edge pulse	X,Y,M,S,T,C	2
ANB (AND Block)	Serial connection of multiple parallel circuits		1
ORB (OR Block)	Parallel connection of multiple contact circuits		1
OUT(OUT)	Final logical operation type coil drive	Y,M,S,T,C	Note 1
SET(SET)	Sets a bit device permanently ON	Y,M,S	Note 2
RST (RESET)	Resets a bit device permanently OFF	Y,M,S,T,C,D,V,Z	
MC(Master control)	Denotes the start of a master control block	Y,M (Except special M)	3

MCR(Master control reset)	Denotes the end of a master control block		2
MPS(Point store)	Stores the current result of the internal PLC operations		1
MRD(Read)	Reads the current result of the internal PLC operations		1
MPP(Pop)	Pops (recalls and removes) the currently stored result		1
INV (Inverse)	Invert the current result of the internal PLC operations		1
NOP(No operation)	No operation or null step		1
END(END)	Forces the current program scan to end		1

- Device is Y and program step of general M is 1. Program step of S/ Special auxiliary relay M/Timer T/Counter C is 2. Program step of data register D and index register V and Z is 3.

3.2 STL Instructions

Mnemonic	Function	Devices	Program steps
STL	Start a STL program	S	1
RET	End a STL program	NULL	1

3.3 Function Instructions (Contrast with MITSUBISHI)

category	FN	Mnemonic	Function	support	Category	FNC	Mnemonic	Function	support
	C					NO.			
Program	00	CJ	Conditional Jump	★	Data operation	40	ZRST	Zone Reset	★
	01	CALL	Call Subroutine	★		41	DEC O	Decode	★
	02	SRET	Subroutine Return	★		42	ENC O	Encode	★
	03	IRET	Interrupt Return			43	SUM	The sum of Active Bits	★

	04	EI	Enable Interrupt			44	BON	Check Specified Bit Status	★
	05	DI	Disable Interrupt			45	MEAN	Mean	★
	06	FEND	First End	★		46	ANS	(Timed) Annunciator Set	
	07	WDT	Watchdog Timer	★		47	ANR	(Timed) Annunciator Reset	
	08	FOR	Start Of A For/Next Loop	★		48	SQR	Square Root	★
	09	NEXT	End A For/Next Loop	★		49	FLT	Floot.(floating Point)	★
Move and compare	10	CMP	Compare	★	High speed processing	50	REF	Refresh	★
	11	ZCP	Zone Compare	★		51	REFF	Refresh and Filter Adjust	
	12	MOV	Move	★		52	MTR	Input Matrix	
	13	SMOV	Shift Move			53	HSCS	High Speed Counter Set	
	14	CML	Compliment	★		54	HSCR	High Speed Counter Reset	
	15	BMOV	Block Move	★		55	HSZ	High Speed Counter Zone Compare	
	16	FMOV	Fill Move	★		56	SPD	Speed Detect	★
	17	XCH	Exchange	★		57	PLSY	Pulse Y Output	★
	18	BCD	Binary Coded Decimal	★		58	PWM	Pulse Width Modulation	★
	19	BIN	Binary	★		59	PLSR	Ramp Pulse Output	★
	20	ADD	Addition	★	Handy instructions	60	IST	Initial State	
	21	SUB	Subtraction	★		61	SER	Search	
	22	MUL	Multiplication	★		62	ABSD	Absolute Drum	

	23	DIV	Division	★		63	INCD	Incremental Drum	
	24	INC	Increment	★		64	TTM R	Teaching Timer	
	25	DEC	Decrement	★		65	STM R	Special Timer-definable	
	26	WAND	Word AND	★		66	ALT	Alternate State	★
	27	WOR	Word Or	★		67	RAM P	Ramp-variable Value	★
	28	WXOR	Word Exclusive OR	★		68	ROT C	Rotary Table Control	
	29	NEG	Negation	★		69	SOR T	Sort Data	
Rotation and shift	30	ROR	Rotation Right	★	External I/O devices	70	TKY	Ten key Input	
	31	ROL	Rotation Left	★		71	HKY	Hexadecimal Input	
	32	RCR	Rotation right With Carry	★		72	DSW	Digital Switch(thumbwhee l input)	
	33	RCL	Rotation Left with Carry	★		73	SEG D	Seven Segment Decoder	★
	34	SFTR	(Bit)Shift Right	★		74	SEGL	Seven Segment With Latch	
	35	SFTL	(Bit)Shift Left	★		75	ARW S	Arrow Switch	
	36	WSFR	Word Shift Right	★		76	ASC	ASC II Code	
	37	WSFL	Word Shift Left	★		77	PR	Print To A Display	
	38	SFWR	Shift Register Write	★		78	FRO M	Read from A Special Function Block	
	39	SFRD	Shift Register Left	★		79	TO	Write from A Special Function Block	
	80	RS	RS Communication s	★		224	LD= (SI)=(S2)	★	

	81	PRUN	Parallel Run		225	LD >	(SI) > (S2)	★
	82	ASCI	Hexadecimal to ASCII	★	226	LD <	(SI) < (S2)	★
	83	HEX	ASCII to Hexadecimal	★	227	LD ◇	(SI) ◇ (S2)	★
	84	CCD	Check Code		228	LD ≥	(SI) ≥ (S2)	★
	85	VRRD	FX-8AV Volume Read		229	LD ≤	(SI) ≤ (S2)	★
	86	VRSC	FX-8AV Volume Scale		230	AND =	(SI) = (S2)	★
	87				232	AND >	(SI) > (S2)	★
	88	PID	PID Control Loop	★	233	AND <	(SI) < (S2)	★
	89				234	AND ◇	(SI) ◇ (S2)	★
	Floating point	110	DECM P	Compares Two floating point values - results of <, = and > are	★	236	AND ≥	(SI) ≥ (S2)
111		DEZC P	Compares a float range with a float value -	★	237	AND ≤	(SI) ≤ (S2)	★
118		DEBC D	Converts floating point number format to scientific	★	238	OR =	(SI) = (S2)	★
119		DEBIN	Converts scientific number format	★	240	OR >	(SI) > (S2)	★

	120	DEAD D	Adds two floating point	★		241	OR <	(S1) < (S2)	★
	121	DESB	Subtracts one floating point	★		242	OR ◇	(S1) ◇ (S2)	★
	122	DEML	Multiplies two floating point	★		244	OR ≥	(S1) ≥ (S2)	★
	123	DEDIV	Divides one floating point number by	★		245	OR ≤	(S1) ≤ (S2)	★
	127	DESQR	Calculates the square root of a floating	★	<p>NOTE:</p> <p>1、★ means function instructions supported by coolmay PLC</p> <p>2、There isn't position instructions for 2N, and must be copied from 1N program.</p> <p>3、PID supported and parameters can be ensure by Auto turning.</p> <p>4、Specific usage of instructions please refer to <The FX Series of Programmable Control></p>				
	129	INT	Float to Integer	★					
	130	SIN	Sine	★					
	131	COS	Cosine	★					
	132	TAN	Tangent	★					
	147	SWAP	Float to scientific	★					
Localization	155	ABS	Generates						
	156	ZRN	Return original	★					
	157	PLSV	Pulse with variable speed	★					
	158	DRVI	Relative	★					
	159	DRVA	Absolute	★					
Real time clock control	160	TCMP	Compares two times - results	★					
	161	TZCP	Time Zone	★					
	162	TADD	Time Add	★					
	163	TSUB	Time subtract	★					
	166	TRD	Read RTC	★					
	167	TWR	Set RTC data	★					
	169	HOUR	timer	★					
External device	170	GRY	Decimal to						
	171	GBIN	Gray code to						
	176	RD3A	Analog module						
	177	WR3A	Analog module						

3.4 Devices and Error Codes

Devices	Operation	Devices	Operation
M8000	RUN Monitor No contact	D8001	PLC type and version
M8001	RUN Monitor NC contact	D8002	Memory capacity
M8002	Initial pulse NO contact	D8003	Memory type
M8003	Initial pulse NC contact	D8011	Minimum cycle/scan time in units of 0.1msec
M8011	Oscillates in 10 msec cycles	D8012	Maximum cycle/scan time in units of 0.1msec
M8012	Oscillates in 100 msec cycles	D8013-D8019	Sec/min/hour/day/month/year/weekday data for use with an RTC cassette
M8013	Oscillates in 1 sec cycles	D8020	Input filter setting for devices X000 to X017 default is 10MSEC,(0-15)
M8014	Oscillates in 1 min cycles	70H(A/AS) Analog	See below table (some EX2N-100HA)
M8020	Set when the result of an ADD is "0"	D8030-D8041	Values of AD0-AD11
M8021	Set when the result of an SUB is less than the min. Negative number	D8042	Value of cold end temperature input
M8022	Set when "Carry" occurs during an ADD or when an overflow occurs as a result of a data shift operation	D8213	Switch between E type and K type thermocouple
M8029	The execution complete flag	D8200-D8211	AD0-AD11 magnification correction
M8039	Constant scan mode	D8220-D8231	AD0-AD11size correction
M8035	Forced operation mode	D8212、 D8232	Cold end magnification correction/ size correction
M8037	Forced STOP signal	D8039/D39	Constant scan duration (a defaulted setting 0 msec will be initiated during power ON) ; NOTE: if be used by analog, please use D39 instead
M8068	Operation error latch	43H(A) analog	See below table
M8080	Start analog output	D8030-D8037	Values of AD0-AD7
M8235	C235 as a down counter	D8038	Value of cold end temperature input
M8236	C236 as a down counter	D8049	Switch between E type and K type thermocouple
M8238	C238 as a down counter	D8040-D8047	AD0-AD7 magnification correction
M8239	C239 as a down counter	D8070-D8077	AD0-AD7 size correction

M8240	C240 as a down counter	D8048/D8078	Cold end magnification correction/ size correction
100HA analog	See below table	D8039	Constant scan duration (a defaulted setting 0 msec will be initiated during power ON) ;
D8030-D8049	Values of AD0-AD19	EX2N-30A	See below table (others refer to B type)
D8049(only when used as cold end)	Value of cold end temperature input	D8034	Value of cold end temperature input
D8240	Switch between E type and K type thermocouple	D8045	Switch between E type and K type thermocouple
D8200-D8219	AD0-AD19 magnification correction	D8044、D8039	Cold end magnification correction/ size correction
		FX2NC	See below table
		D8030-D8033	Values of AD0-AD3
D8220-D8239	AD0-AD19 size correction	D8034	Value of cold end temperature input
D8212、D8232	Cold end magnification correction/ size correction	D8045	Switch between E type and K type thermocouple
D8039/D39	Constant scan duration (a defaulted setting 0 msec will be initiated during power ON) ; NOTE: if be used by analog, please use D39 instead	D8040-D8043	AD0-AD3 magnification correction
D8050-69	Analog scan time adjust	D8035-D8038	AD0-AD7 size correction
		D8044、D8039	Cold end magnification correction/ size correction
		D8039/D39	Constant scan duration (a defaulted setting 0 msec will be initiated during power ON) ; NOTE: if be used by analog, please use D39 instead
D8065	Syntax error		
D8068	Operation error step number latched		
D8080-D8087	Values of DA0-DA7		

When error occurs, the indicator light will be flashing. Error steps can be confirmed by monitoring M8065/D8065.

4. Usage of Analog

4.1 Analog input

EX2N-43H(A)/43KH(A)/50KH(A) is up to choose 4AD/2DA.

EX2N-70H(A/AS) is up to choose 12AD/8DA.

EX2N-100HA is up to choose 16AD/8DA.

4.1.1 Analog input selection

Analog inputs which can be customized are as follows:

Input signals	Measurement range	Registers value read	Resolution	Accuracy (whole measuring range)	Registers D8213/D8049/D8045
E-type thermocouple	Environmental temperature-599.9℃	Room temperature-5999	0.1℃	1%	0
K-type thermocouple (Regular)	Environmental temperature-999.9℃	Room temperature-9999	0.1℃	1%	1
K-type thermocouple (Special)	Environmental temperature-1300℃	Room temperature-12999	0.1℃	1%	1
J-type thermocouple	Environmental temperature-999.9℃	Room temperature-9999	0.1℃	1%	/
S-type thermocouple	Environmental temperature-1749.9℃	Room temperature-17499	0.1℃	1%	/
PT100	-99.9-499.9℃	-999-4999	0.1℃	1%	/
NTC10K	-19.9-109.9℃	-199-1099	0.1℃	1%	/
NTC50K	-40-199.9℃	-400-1999	0.1℃	1%	/
NTC100K	-40-299.9℃	-400-2999	0.1℃	1%	/
Voltage	0-10V	0-4000	2.5mV	1%	/
Current Type1	0-20mA	0-4000	5uA	1%	/
Current Type2	4-20mA	0-4000	4uA	1%	/

Diagram 1

The transmitter which is integrated inside PLC is one of the above table or mixed ones,

it is up to customers.

- **Temperature Sensor**

Below are some suggestions according to our products:

1. Better to choose sensors suit for temperature with smaller measuring range. NTC 10K is more accurate than thermocouple. NTC50K should be used if the highest temperature should less than 200°C while the testing temperature is about 100°C.
2. If there is a long distant from sensors to PLC, better to use other sensors than PT100. Generally the line-loss of NTC type is less.
3. Thermocouple is the last choice if there is a high request for temp accuracy. Customers should adjust it according to the actual demand.

- **Application of thermocouple**

To ensure measurement accuracy, there are cold end temperature sensor inside transmitters of E and K-type themocouple. Thus the tested temperature should not below the cold temperature. While using thermocouple, cold end processing has been done inside, the measurement is based on the cold end (room temperature), namely the lowest measurement temperature is same with the control box.

Note: 4.3-inch PLC one machine (excluding MX2N-43HB series, this series can only be used inside), when the analog input is optional EK, there are two ways of cold end (default is done inside):

- 1 .cold end is made inside, will not occupy the analog position, but when the room temperature is low, the reference temperature is higher, the error is slightly larger;
3. The cold end is made on the external terminal block (special mark is required when ordering), and it is necessary to occupy 1 analog input or analog output or optional 485 position, and the temperature measurement is more accurate.

EX2N-70H (A/AS) (and some EX2N-100HA series) The E-type thermocouple or K-type thermocouple can be flexibly selected by modifying the D8213. The default value is 0, which is an E-type thermocouple. Set D8213=1 when using a K-type thermocouple. EX2N-100HA flexibly selects the E-type thermocouple or the K-type thermocouple by modifying the D8240. The default value is 0, which is an E-type thermocouple. Set D8240=1 when using a K-type thermocouple.

EX2N-43H(A)/43KH(A)/50KH(A) When using a K-type thermocouple, set D8049=1. When the sensor is disconnected, the register reading value will exceed the maximum range. If the E-type thermocouple is selected, the AD0 got disconnection, D8030 will be greater than 6000.

4.1.2 Analog Sampling

The sampling period of analog can be automatically set. D8050-D8069 act on D8030-D8049 separately. For example, AD0 sampling time = D8050 * PLC scan time. If D8050=1, every time when a sample is taken, value of D8030 changes. The setting range is 1 to 32767. Value of D8050 is larger, the result is more stable.

4.1.3 Analog Reading

The Analog inputs accuracy of Coolmay PLC and All-in-one is 12. Read registers of every analog directly. Errors can be corrected.

EX2N-100HA, Analog register and modify register, pls refer to diagram 2.

SN	Register value	Amplification correction (units: milli)	Size correction
AD0	D8030	D8200	D8220
AD1	D8031	D8201	D8221
AD2	D8032	D8202	D8222
AD3	D8033	D8203	D8223
AD4	D8034	D8204	D8224
AD5	D8035	D8205	D8225
AD6	D8036	D8206	D8226
AD7	D8037	D8207	D8227
AD8	D8038	D8208	D8228
AD9	D8039	D8209	D8229
AD10	D8040	D8210	D8230
AD11	D8041	D8211	D8231
AD12	D8042	D8212	D8232
AD13	D8043	D8213	D8233
AD14	D8044	D8214	D8234
AD15	D8045	D8215	D8235
AD15 is cold end while used only as thermocouple	D8045	D8215	D8235
Note: D8045 is cold end while used only as thermocouple, K-type set D8240=1			

Diagram 2

EX2N-70H(A/AS) (Some EX2N-100HA models) Analog register and modify register, pls refer to diagram 3:

SN	Register value	Amplification	Size correction
----	----------------	---------------	-----------------

		correction (units: milli)	
AD0	D8030	D8200	D8220
AD1	D8031	D8201	D8221
AD2	D8032	D8202	D8222
AD3	D8033	D8203	D8223
AD4	D8034	D8204	D8224
AD5	D8035	D8205	D8225
AD6	D8036	D8206	D8226
AD7	D8037	D8207	D8227
AD8	D8038	D8208	D8228
AD9	D8039	D8209	D8229
AD10	D8040	D8210	D8230
AD11	D8041	D8211	D8231
Cold end	D8042	D8212	D8232
Note: D8042 is cold end of thermocouple, K-type set D8213=1			

Diagram 3

EX2N-43H(A)/43KH(A)/50KH(A) Analog register and modify register, pls refer to diagram 4.

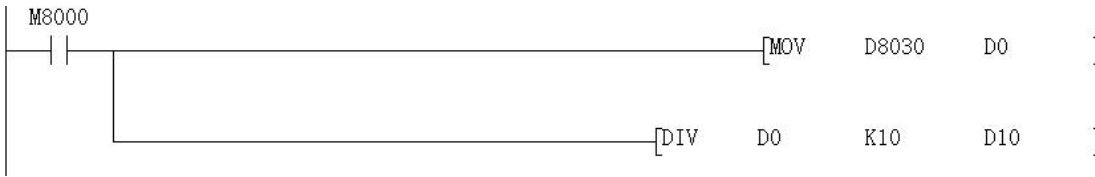
SN	Register value	Amplification correction (units: milli)	Size correction
AD0	D8030	D8040	D8070
AD1	D8031	D8041	D8071
AD2	D8032	D8042	D8072
AD3	D8033	D8043	D8073
Cold end	D8038	D8048	D8078
Note: D8038 is cold end of thermocouple, K-type set D8049=1			

Diagram 4.

***Cold end:** Also called cold end temperature, it is the reference temperature of the sensor, it is the ambient temperature, only used for EK thermocouple.

When the thermocouple type analog input has a deviation: first check whether the cold junction temperature is accurate, if the cold junction temperature also has an error, first correct the cold end; then monitor the value read by the thermocouple register at room temperature (in condition that temperature is not raised), find Rule out, and then make the corresponding size correction or magnification correction.

Below is an real case of gathering the signal of AD0 of EX2N-70H(A/AS).



Analog input gathering case

Connect the signal port of temperature sensor into AD0 of HMI/PLC All-in-one, another port connected with GND. While PLC is working, the data register D8030 which corresponded to AD0 send data to D0 and performing division operations to D0, then D10 is the actual temperature. In the ladder diagram, division operations can also be performed to D8030 directly.

Note: when the input signal is 0-10v, the actual analog value=register value/400

When the input signal is temperature, the actual analog value=register value/10

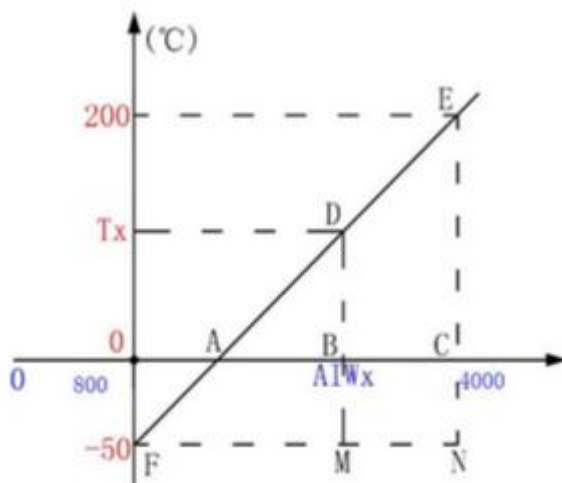
When the input signal is 0-20mA, the actual analog value=register value/200

When input signal is 4-20mA, taken an temperature transmitter as an example, if its testing range is $-50^{\circ}\text{C} \sim 200^{\circ}\text{C}$, namely -50°C corresponds to 4mA, 200°C corresponds to 20mA.

However analog input of 4DA analog module is 0-20mA, when the 0-20mA signal is given to the input port of 4AD, 4AD can convert 0-20mA to digital 0-4000.

namely: The case of changing the 0-20 mA analog input to the 4-20 mA analog input is as follows: 4 mA corresponds to the digital quantity: $4 \text{ mA} = (4000 \div 20) * 4 = 800$, so when inputting 4 to 20 ma current signal to the analog quantity of 4AD At the input end, the digital quantity of the 4AD conversion is 800 to 4000.

The relationship between the tested temperature with the corresponding digital AIWO is as below:



The programming of Coolmay PLC is as below: operation program of temperature

$$\frac{BD}{CE} = \frac{AB}{AC}$$

$$\frac{MD}{NE} = \frac{FM}{FN}$$

$$\frac{T_x+50}{200+50} = \frac{AIW_x-800}{4000-800}$$

$$T_x = \frac{(AIW_x-800) 250}{3200} - 50$$

There are two ways for analog correction: size correction and amplification correction .

Below is an example of correction after AD0 temperature gathering of diagram 1.

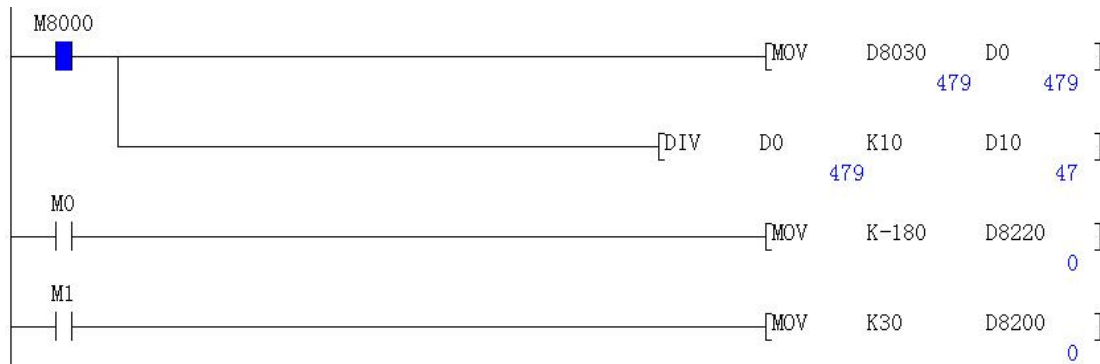


Diagram 2

If the present temperature is 29°C, the testing temperature is 47°C, the error is 18°C, then the size correction register should be set as below diagram.

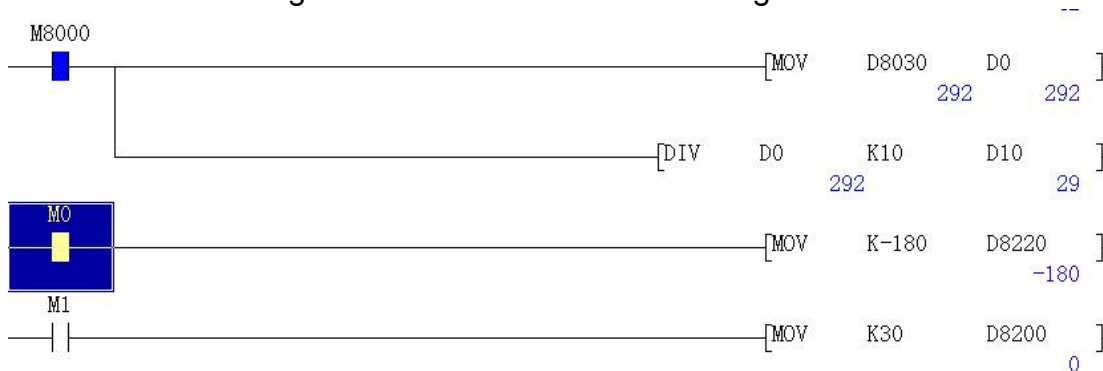


Diagram 3

When M0 is closed In diagram 3, transmit -180 to D8220, then the actual testing temperature is approaching the target 29°C.

It can be set by amplification correction if the target temperature is very high. If M1 is closed, assign D8200, this is amplification correction. Normally only if size correction is right,

there is no need to set magnification correction.

The relationship between the two corrections is as below:

If D8030 should be decreased to 990%, D8200 should be set as -10.

If D8030 should increase 5 values, D8220 should be set as 5.

4.2 Analog output

Assign D8080-8087 directly can realize the analog output of Coolmay PLC. DA0-DA7 are AO ports, GND is the public port. 0-10V, 0-5V, 0-20mA is optional. The output accuracy is 10bit, 0-10V/0-5V/0-20mA correspond to 0-1000.

Range of analog output registers and output voltage(current)

	AO Register	Range	Output voltage/current	Resolution	Start contact
DA0	D8080	0-1000	0-10V/0-20mA	10mV/0.02mA	M8080 be driven ON
DA1	D8081	0-1000	0-10V/0-20mA	10mV/0.02mA	
DA2	D8082	0-1000	0-10V/0-20mA	10mV/0.02mA	
DA3	D8083	0-1000	0-10V/0-20mA	10mV/0.02mA	
DA4	D8084	0-1000	0-10V/0-20mA	10mV/0.02mA	M8084 be driven ON
DA5	D8085	0-1000	0-10V/0-20mA	10mV/0.02mA	
DA6	D8086	0-1000	0-10V/0-20mA	10mV/0.02mA	
DA7	D8087	0-1000	0-10V/0-20mA	10mV/0.02mA	

Diagram 4

- M8080 is the start contact of DA0-DA3, there are output signal only when M8080 driven ON.
- M8084 is the start contact of DA4-DA7, there are output signal only when M8084 driven ON.

Below is an example of analog output 0-10V :

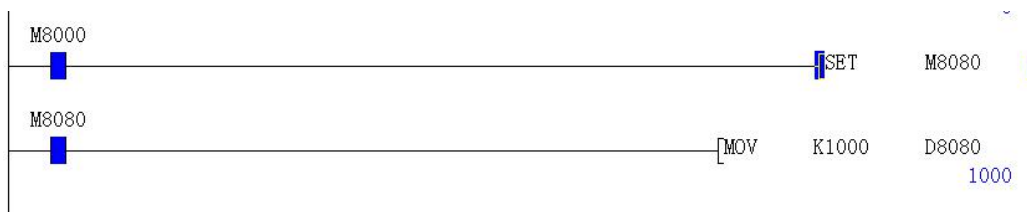


Diagram 5

Driven D8080 ON and then assign it with 1000, the red pen of multimeter connected with DA0, and the black pen connected with GND, then there is 10v signal output.

Note that EX2N-43H(A)/43KH(A)/50KH(A) has the following restrictions:

When Y0 is used for pulse output, the analog output of DA0-DA3 cannot be used.

When Y7 is used for pulse output, X3 cannot be used as the input for high-speed counting.

When Y6 is used for pulse output or X0 is used as input for high-speed counting, the analog output of DA4-DA7 cannot be used.

4.3 Analog interference processing

In case of analog interference, 104 ceramic capacitor can be connected with the input/output ports. One port of 104 ceramic capacitor connected with the positive electrode of analog inputs, the other port connected with ground.

5. The Application of High-speed Counting

5.1 Assignment table of built-in high speed counter

Normal[U]:up counter [D]:down counter [A]: A phase counter [B]: B phase counter
[R]: reset

	Single phase						AB phase			ABZ phase		
	C235 10KHz/ 100KHz	C236 100KHz	C238 10KHz/1 00KHz	C239 100KHz	C240 10KHz	C237 10KHz	C251 10KHz/ 100KHz	C253 10KHz/ 100KHz	C254 10KHz	C252 10KHz/1 00KHz	C253 10KHz/ 100KHz	C254 10KHz
X000	U/D						A			A		
X001		U/D					B			B		
X002										Z		
X003			U/D					A			A	
X004				U/D				B			B	
X005					U/D			R			Z	
X007						U/D						
X010									A			A
X011									B			B
X012												Z

	Single phase counter input					
	C235 10KHz/100K Hz	C236 100KHz	C238 10KHz/100K Hz	C239 10KHz	C240 10KHz	C237 10KHz
M823 5	Down counter while driving; Up counter without driving					
M823 6		Down counter while driving; Up counter without driving				

M823 8			Down counter while driving; Up counter without driving			
M823 9				Down counter while driving; Up counter without driving		
M823 7					Down counter while driving; Up counter without driving	
						Down counter while driving; Up counter without driving

- The max frequency of single phase is 10K, X0/X1/X3/X4 of A type products can be customized to 100KHz if special required. X0/X1 of EX2N-30B/EX2N-40B/FX2NC can be customized to 100KHz.
- Single phase 10KHz is X00/X03 regularly, corresponding to C235/238. At most 6 single phase counters can be added, corresponding to C235-X0; C236-X1; C237-X7; C238-X3; C239-X4; C240-X5; C237 should be connected with X2, now be changed to X7. X0/X1/X3/X4 can be customized to 100KHz, X5/X7 can be customized to 10KHZ
- While 6 single phase counters be used together, there is no conflicts with other counters and pulses, but conflict with ZRN, ZRN will be useless. Only when X3 isn't used, ZRN of Y7/X7 is useful.
- AB 10KHz regularly is X00-X01/X03-X04, corresponding to C254. X00-X01/X03-X04 can be customized to 100KHz, X10-X11 can be customized to 10KHz.

5.2 Wiring of High-speed Counting AB(Z)

- AB rotary encoder count function added, wiring of C251 is: A connected with X0, B with

X1, Z not connected, C251 for PLC ladder diagram.

- AB(Z) rotary encoder count function added, wiring of C252 is: A connected with X0, B with X1, Z with X2, C252 for PLC ladder diagram.
- AB(Z) rotary encoder count function added, wiring of C253 is: A connected with X3, B with X4, Z with X5, C253 for PLC ladder diagram.
- AB(Z) rotary encoder count function added, wiring of C254 is: A connected with X10, B with X11, Z with X12, C254 for PLC ladder diagram.

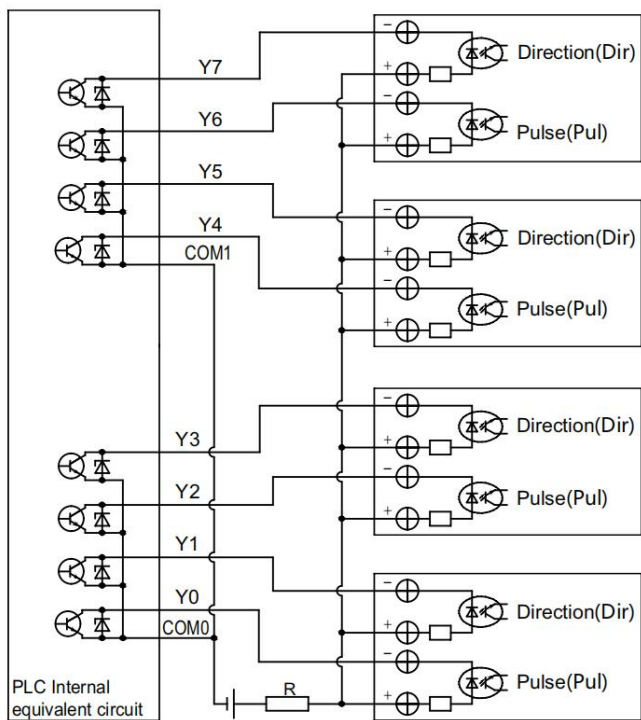
Note: Normally there are only single phase and AB phase, Z phase is optional and can be customized according to customers.

6. Application of Four/Five High-speed Pulses

Output signals of four or five high-speed pulses simultaneously can be customized in Coolmay PLC according to customers. Pulse instructions and location instructions are supported, and can be used together without conflict. Y with the same SN can be repeatedly used for easily programming.

6.1 Pulse Output wiring

Wiring: Stepping or servo motor wiring as shown in Figure 10, 5V drive must be connected to a 2KΩ resistor on DC24V



DC24V (5V drive requires 2kΩ resistor)

6.2 Pulse Output Points and Directions

- Y0 sending pulse, Y2 control direction
- Y1 sending pulse, Y3 control direction
- Y6 sending pulse, Y4 control direction
- Y7 sending pulse, Y5 control direction
- Y10 sending pulse, Y11 control direction

Direction controlling can be defined, regularly as stated above.

6.3 Special Devices Used by Pulse Instructions

Special devices used by PLSY、PLSR are as below table:

	Y0	Y1	Y6	Y7	Y10
Send end flag	M8029	M8029	M8029	M8029	M8029
No. of pulse (32bit)	D8140 D8141	D8142 D8143	D8150 D8151	D8152 D8153	D8154 D8155

Special device used by DRVI、DRVA、ZRN、PLSV are as below table:

	Y0	Y1	Y6	Y7	Y10
Send end flag	M8029	M8029	M8029	M8029	M8029
Current location	D8140 D8141	D8142 D8143	D8150 D8151	D8152 D8153	D8154 D8155
ACC/DEC time during execution	D8148	D8148	D8148	D8148	D8148
Pulse stop bit	M8145	M8146	M8155	M8156	M8159
Pulse busy flag	M8147	M8148	M8157	M8158	M8161

- Regularly Y0,Y1,Y6,Y7 can send 20K pulse, and can also be customized to 100-200K.
- Please note that while changed to 100K-200K, the current load of pulse output port is very small and can only be used to send pulse, digital output not suitable.
- If pulses should be more exact, please connect COM ports of pulse output and input. Besides ,please connect COM port of pulse output with DC24V power supply's 0V of step driver.
- Please note that 2N instructions don't support location, whiling using them, please program it well with 1N instructions and then copy it to the program of 2N.
- The input signal of ZRN is fixed as X2,X5,X6,X7,X12, corresponding to Y0,Y1,Y6,Y7,Y10 of pulse output.
- At most 5 200K high-speed pulse outputs can be customized for 40A/50A/70H/100H/DX2NA/DX2NT, if 5 channels be made, analog output function will be useless.
- When 100k-200k pulse be customized, the frequency is among 20K-60K. Duty ratio inaccurate may result in phenomena such as high noise of motors、pulses inaccurate. Thus, M8149 should be driven ON

7. Limitations of counters and pulses

7.1 Counter Limitations

Limitations of **EX2N-43H(A)/43KH(A)/50KH(A)** products

- Y6 can not be used when C235(single phase X0),C251(AB phase X0/X1) be used.
- Y6 and Y7 (ZRN) instruction can not be used when C238(single phase X3),C253(AB phase X3/X4) be used

7.2 Pulses Limitations

Limitations of **EX2N-70H(A/AS)/100HA** type products

1,limitations of **4** pulses

- Y6 used for pulse output, X0 can not be used for counter input.
- Y7 used for pulse output, X3 can not be used for counter input.

2,Limitations of **5** pulses

- Y6 used for pulse output, X0 can not be used for counter input.
- Y7 used for pulse output, X3 can not be used for counter input.
- 5 200k pulses be added, the analog output function will be useless.

Please note that **EX2N-43H(A)/43KH(A)/50KH(A)** (at most 4 pulses can be added) have the following Limitations:

- Y0 used for pulse output, DA0-DA3 can not be used.
- Y7 used for pulse output, X3 can not be used for counter input.

Y6 used for pulse output or X0 used for counter input, DA4-DA7 will be useless.

8. Application of Analog Extension Module

If the I/O points of one PLC isn't enough, another PLC can be connected and be used as I/O extension module. Below is an example of 96 I/O system which is combined by two CX2N-48MR/MT.

Steps as below:

1. Main PLC: CX2N-48MT Extension: CX2N-48MR
2. Wiring method :



3. Please contact sales or visit our website <http://www.coolmay.com> to download the "48 points to 48 points extension program".

The PLC RS485 communication interface of CX2N series PLC can be used to combine a large-scale control system. Refer to the "COOLMAY PLC MODBUS Communication User Manual".

9. Anti-interference treatment method

For details, please refer to the "Coolmay PLC anti-interference processing method" manual, which specifies the analog input and output anti-interference processing methods, switching anti-interference processing methods, inverter interference suppression, grounding correct wiring method, communication port (RS232 port, RS485 port, RS422 port) anti-interference processing method, power supply end anti-interference processing method.

10.HMI

10.1 HMI Program software installation

Coolmay HMI program software, compatible with XP/WIN7/WIN8/WIN10 system. If it can not be installed for use, pls try by replacing another computer, re-installing the system, and higher user rights. Among them, The WIN7 system must change the user account control settings to never notify, WIN8 system, WIN10 system must turn off the digital signature to reduce trouble.



Installation:

Double-click “CoolMayHMI V*.**.exe” and follow the prompts to click Next.

Note: If it is not the latest version, please ask the customer service or enter the official website of Shenzhen Coolmay Technology Co., Ltd. “www.coolmay.net”.

10.2 New build HMI program

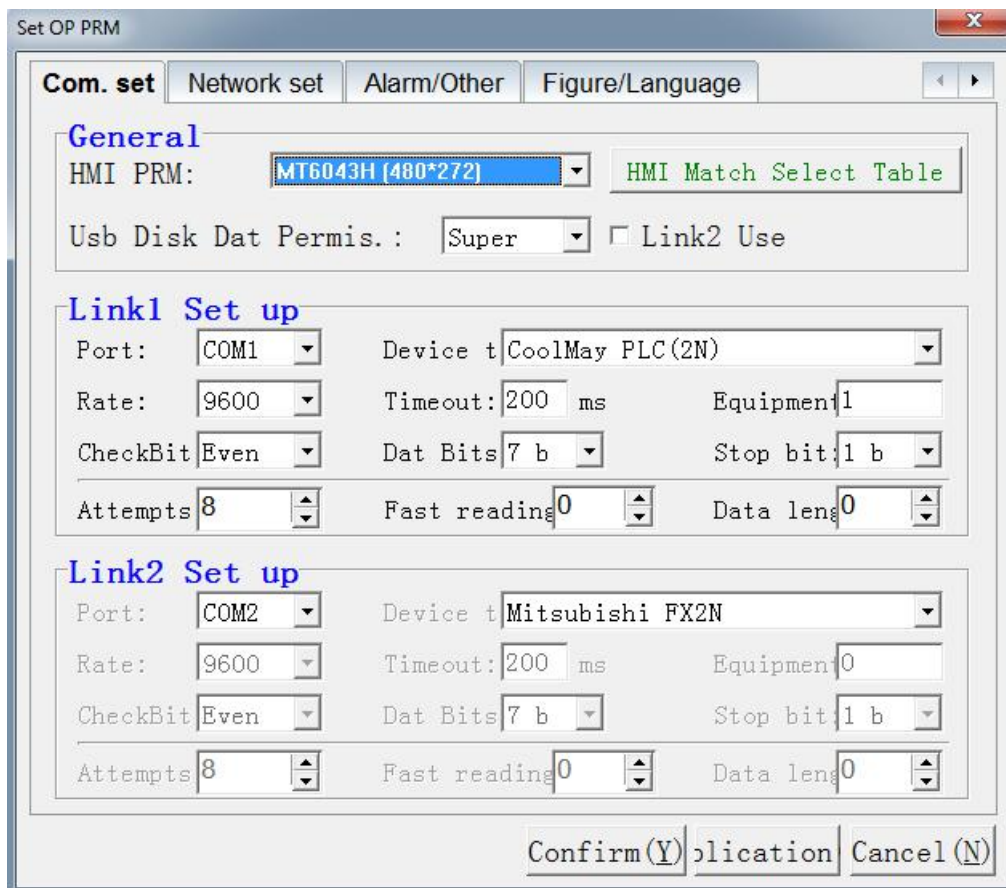


1, Double click , then Click [New], or click the icon  in the toolbar, or use the defaulted hotkey Ctrl+N.

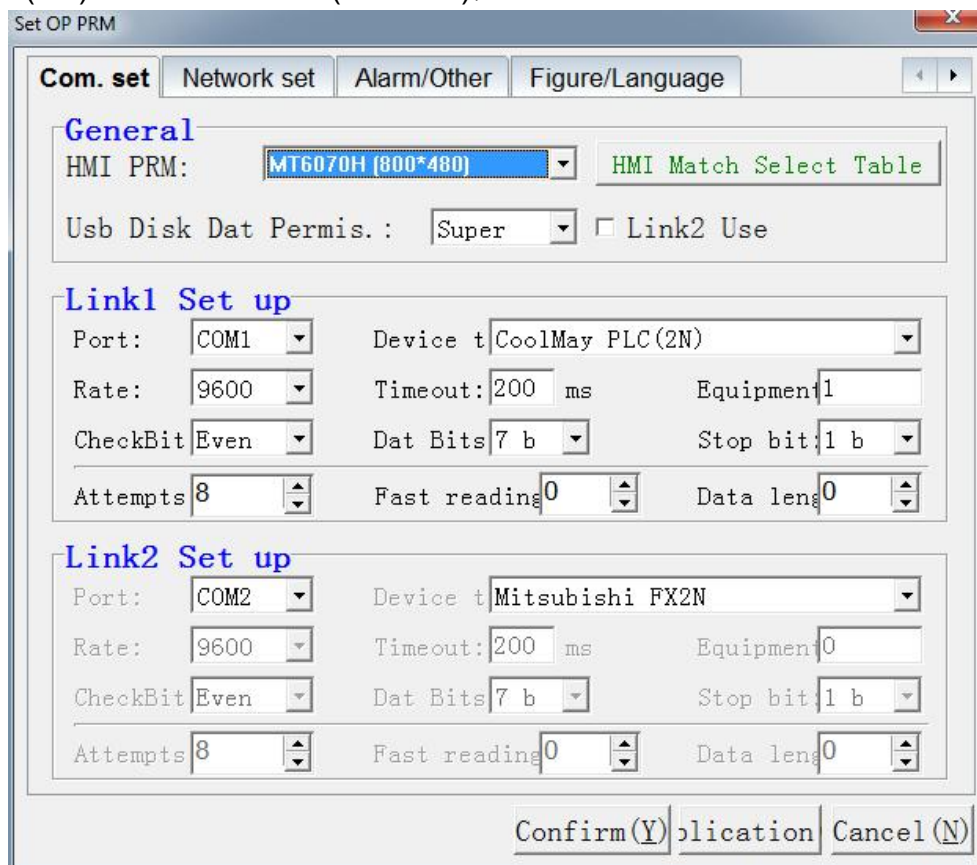


2, Set parameter

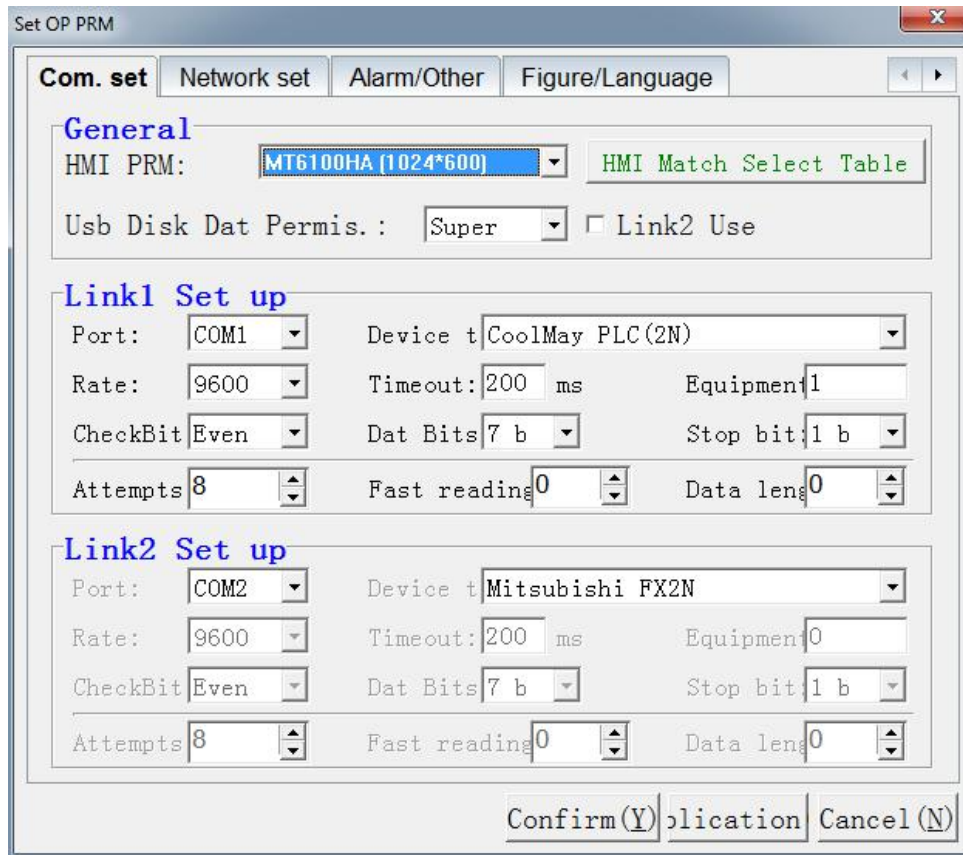
43H(A)/43KH(A) select MT6043H(480*272);



50KH(A)/70H(AS) select MT6070H(800*480);



70HA/100HA select MT6100HA(1024*600);



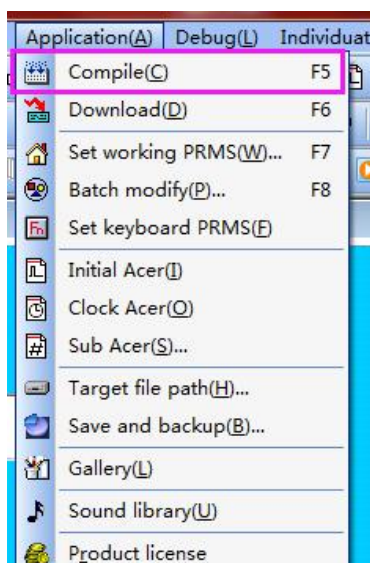
Note: The default communication port is COM1. In some special cases, COM2 should be selected.

If the product has a label such as “Internal Communication is COM2”, then communication port selects COM2.

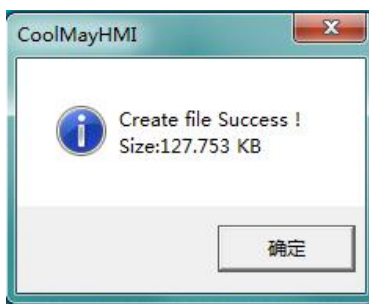
10.3 HMI Display download

10.3.1 Online download step (USB download cable to download)

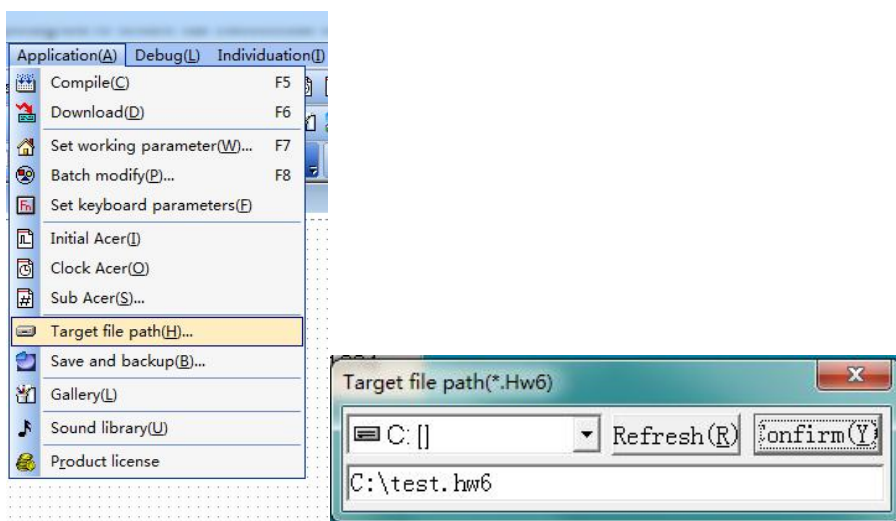
1. After saving the program, click “application” --- ”compile” in the software (shortcut F5)



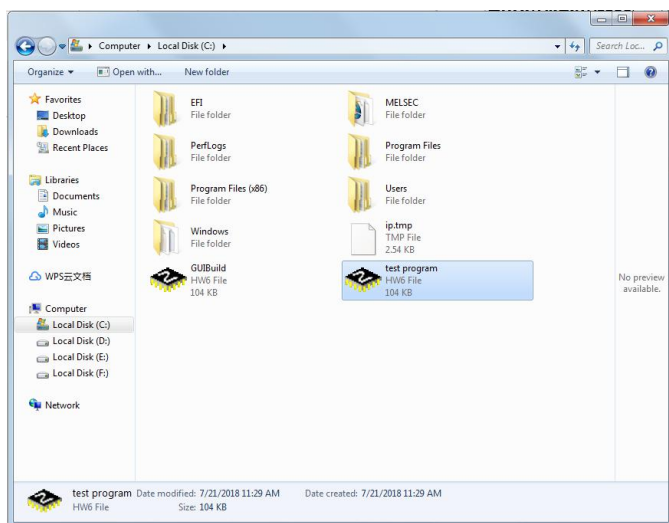
After compiling, it will prompt to create the target file successfully;



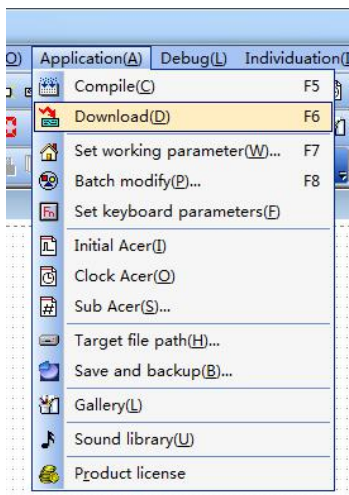
2. Under the target file path (view the default disk in the software application---target file path, the default is on the C drive)



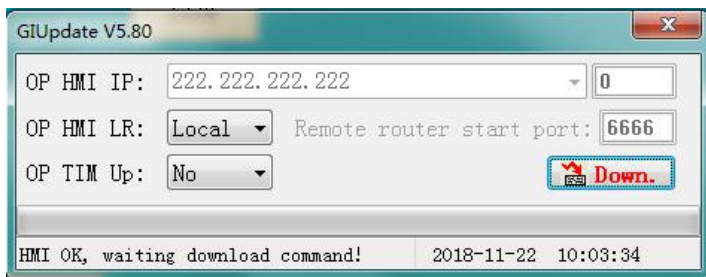
Confirm that the C drive has generated a file with the same file name and the same name as .hw6, as shown in the test program”. hw6”



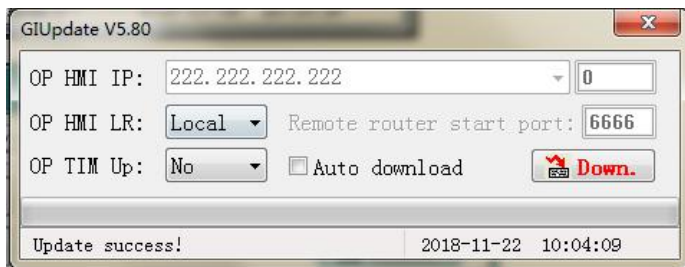
3. Click “Application”--”Download”.



4. The download window pops up, the HMI connection is OK, the IP setting is OK, wait for the download command prompt, and then click download;

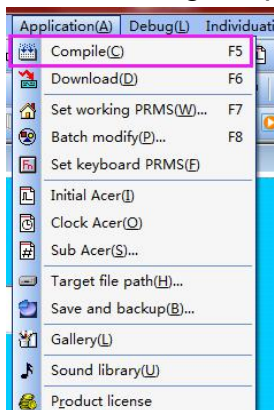


5. The download will complete and the update will be successful.



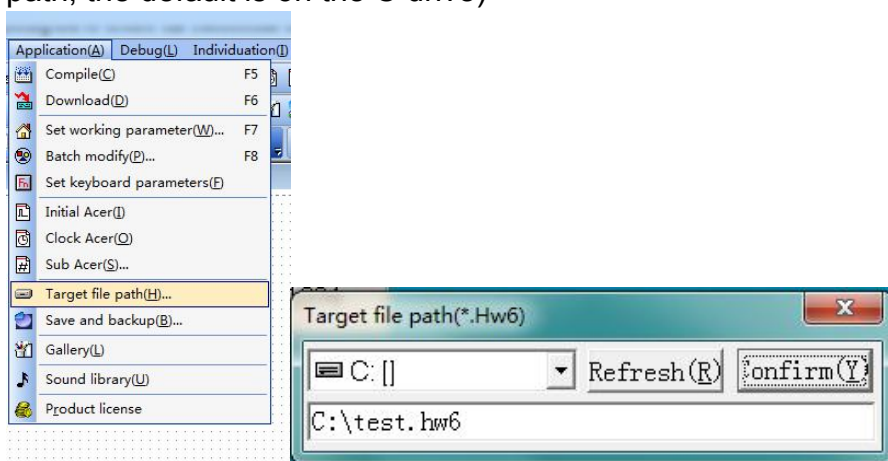
10.3.2 U disk download step

1. After saving the program, compile the program (shortcut F5);

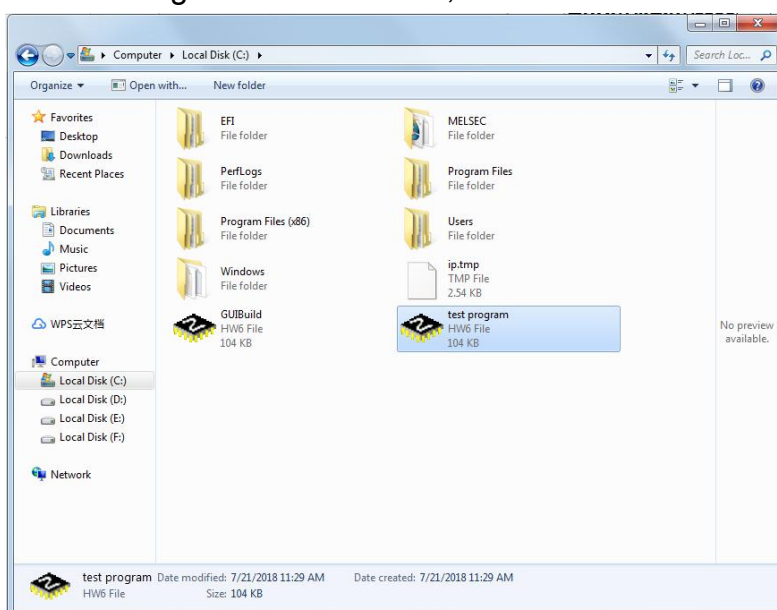


2. Under the target file path (view the default disk in the software application---target file

path, the default is on the C drive)



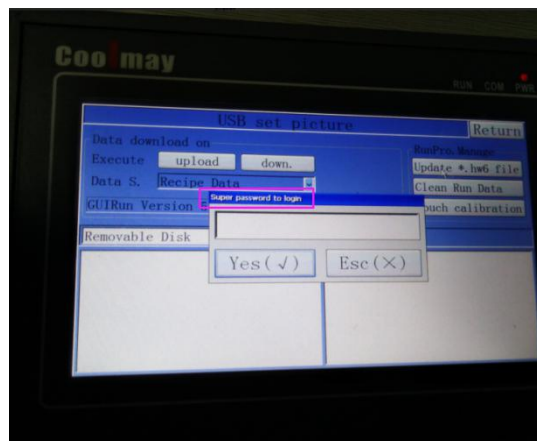
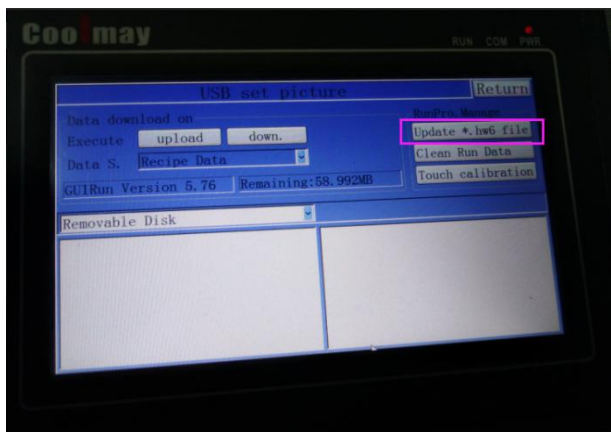
Find the file generated in C disk, which name is “.hw6” and same as program file.



4. Copy the .hw6 file in the target file path to the USB flash drive;

5. Insert the USB flash drive into the usb port of the product - the USB setting screen will pop up;

5. Click “Update *.hw6 file”, enter the corresponding level password , the default super password is 12345678, the default normal password is empty (direct confirmation); if you changed the password, you need to enter the corresponding correct password;



After confirming, find the “.HW6” file in the lower right corner. After double-clicking, the confirmation box will pop up. The progress bar will be updated automatically.

10.3.3 For the specific use of other touch screens, refer to the “CoolMay HMI User Manual”.

Note: For PLC and HMI/PLC all-in-one problems, please refer to "Coolmay FAQ 100".

Tel:13715392551 QQ:168390439 Mail: cm0@coolmay.net

Appendix Coolmay PLC MODBUS RTU protocol User Manual

1. Summary

Modbus Communication protocol has been widely used in various fields, as standard industrial communication protocol. Coolmay PLC RS485 communication interface supports this kind communication protocol so that PLC can communicate with device with MODBUS communication protocol conveniently, such as converter, temperature module, humidity module, configuration network, and various sensors etc.

The Modbus communication protocol is divided into two series communication modes, ASCII and RTU. When configuring each PLC, User choose communication mode and RS485 serial port communication parameters (Baud rate, parity check etc), all devices on the Modbus bus should have same communication mode and series communication parameters. Using Modbus communication, the relevant special components of each PLC must be set in the ladder diagram.

Coolmay PLC is with default programming port (RS232/RS422), besides, two communication port (RS232/RS485) is optional installed to meet users' external connection to three types equipment.

★ RS232/RS422 (PLC Programming port protocol) : Support Mitsubishi programming port protocol.

★ RS485 (A[485+] B[485-] Port) /RS232: Support Mitsubishi programming port protocol, Mitsubishi serial port protocol and MODBUS protocol (Modbus RTU/ASCII Protocol communication parameters is set in D8120, Station number is set in D8121, and could be used as master or slave.)

★ RS485 (A1[485+] B1[485-] Port): Support Mitsubishi programming port protocol and MODBUS protocol (Modbus RTU/ASCII Protocol communication parameters is set in D8160, Station number is set in D8161, could be used as slave only)

◆ Could be special customized as 2 way RS485, support Modbus Protocol Master.

Second RS485 COM Port (A1 B1) is used as MODBUS master communication function.

1, Set communication parameter in D8160 so that PLC ladder diagram runs under the

condition of MODBUS master communication. When **M8161** is “ON”,RD3A and WR3A instructions are switched to communicate with the second RS485 communication port (A1,B1).

2,Use following register D8166(D8126),D8169(D8129), M8169(M8129), M8163(M8123), D8103(D8063), M8103(M8063),in same method with the first RS485 Com Port.

3,() is the first RS485 Com Port (A B port) MODBUS communication register.

※ The use of Mitsubishi series protocol, refer to RS instruction of “Mitsubishi FX Programming Manual”.

※ The use of MODBUS Protocol, refer to this manual or “Coolmay PLC Modbus Communication Manual”.

D8120/D8160 Communication parameter selection register:

b1	b1	b1	b1	b1	b1	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
5	4	3	2	1	0										

b0	Date length 0:7 1:8
b2 b1	Parity 00:None 01:Odd 11:Even
b3	Stop 0:1 1:2
b7 b6 b5 b4	Baud rate 0100:600bps 0101:1200bps 0110:2400bps 0111:4800bps 1000:9600bps 1001:19200bps
b8	No related to Modbus, Set 0
b9	No related to Modbus, Set 0
b11	No related to Modbus, Set 0

b10	No related to Modbus, Set 0
b12	No related to Modbus, Set 0
b13	Modbus Communication Mode 0:RTU 1:ASCII
b14	Start Communication protocol 0:Use programming port protocol or RS instruction to communicate 1:Use Modbus protocol to communicate
b15	PLC Master Slave selection 0:Slave 1:Master

D8121/D8161 Slave station number register. Range: 1-247.

When PLC is as Modbus communication slave, there must have one station number, to set D8121/D8161 in ladder diagram.

D8126/D8166 Delay register before sending. range: 0-1000, unit:ms.

Give receiving equipment some preparation time, proper 5-20ms.

2. PLC as Master

When PLC is as master,only the following functions are supported:

03:Read holding register, get current binary value range of 1-32 in one or multiple holding registers.

06:Load the specific binary value into a holding register (write register), range is 1.

16: Preset multiple registers, Load the specific binary value into a series of constant holding registers (write multiple registers), range is 1-32.

Example of reading slave data instructions : RD3A K1 H0 D0

RD3A was originally analog module read instruction, the original instruction function can't be used. RD3A instruction correspond to function "03" of MODBUS and read the (4X type) register. In these instructions, K1 is station number of read slave device and range is 1-247, H0 is address number 0000(hexadecimal) of read data which is in the slave device,the value in D0 is numbers of register to be read and range is 1-32,the data being read is stored in order of D1,D2, D3...

Example of writing data to slave instruction: **WR3A K1 H0 D0**

WR3A was originally analog module write instruction, the original instruction function can't be used. WA3A instruction corresponds to function "16" of MODBUS and write data to each (4X type) register in slave device, if only write 1 register, WR3A correspond to function "06" and write 1 data to 1 register (4X type) in slave device. In these instructions, K1 represents station number of slave device being written and the range is 1-247, H0 represents first address number (hexadecimal) of register to be written in slave device, D0 represents numbers of register to be written and range is 1-32, the source data being written is stored in order D1, D2, D3...

D8129/D8169 (M8129/M8169) Overtime register. Range: 0-32767, Unit : 10ms.

When receiving is timeout and an error, **M8129/M8169=ON**.

M8123/M8163 one communication completed symbol

When complete one communication, **M8123/M8163=ON**, No matter whether it completed successfully or not.

When RD3A or WR3A instruction is not executed, it will not affect **M8129/M8169** and **M8123/M8163**, When instruction is executed, both **M8129** and **M8123** are off automatically by system if in communication process, **M8123/M8163** and **M8129/M8169** will output corresponding status if communication completed.

Multiple Programming

RD3A and WR3A can be programmed many times in ladder diagram, because communication is a long process, communication needs to be kept in execution and not to be used in pulse. When there are many instructions that needs to be communicated at same time, the system will take turns to time-sharing communication, using upper delay of M8123/M8163 could detect the current execution status of this communication instruction conveniently.

D8063/D8103 (M8063/D8103) Communication error message

The upper delay of M8063 could detect the communication fault message in this

communication instruction easily.

D8063's value represents the respective error message

6315: Slave number of Modbus is out of range , > 255.

6316: Numbers of Modbus read and write registers are out of range, It is normally 1-32.

6317: Modbus receiving is timeout.

6318: Inconsistent station number to get response

6319: Illegal response

6320: LCR corresponded detects error

6321: Illegal address of saving data

6322: CRC corresponded detects error

6323: Data format corresponded is illegal

6324: The machine is not set as Modbus Master

6325: Address is out of range

6326: Modbus sending is timeout

3. PLC as slave

Once the PLC is set as MODBUS Slave, no matter whether the PLC is in "STOP" or "RUN",it could proceed Modbus communication.

Modbus function supported by Slave:

01:Read coils status to get current status (ON/OFF) of a group of logic coils,range is 1-512.

02:Read inputting status to get current status (ON/OFF)of a group of switch inputs,range is 1-512.

03:Read holding register to get current binary value in one or multiple holding registers,range is 1-32.

04:Get current binary value in one or multiple input register, range is 1-32.

05:Strong set single coil,set one logic coil "ON/OFF" state (write 1 bit),range is 1.

06:Load specific binary value into one holding register (write register),range is 1.

15:Strong set multi-coils, set a series of constant logic coils "ON/OFF" state (write multiple bits),range is 1-512.

16:Preset multiple register,load specific binary value into a series of constant holding

registers (write multiple registers),range is 1-32.

The address number corresponding to PLC Register in MODBUS communication:

Hexadecimal Address Number	Register
0000-01FF	D0-D511
1F40-203F	D8000-D8255
A140-A23F	T0-T255
A340-A407	C0-C199
A408-A477	C200-C255, 32bit takes 1 addresses

The address number corresponding to PLC bit components in MODBUS communication:

Hexadecimal Address Number	Bit Components
0000-05FF	M0-M1535
1E00-1EFF	M8000-M8255
2000-23E7	S0-S999
3000-30FF	T0-T255
3200-32FF	C0-C255
3300-33B7	Y0-Y267
3400-34B7	X0-X267

Note: When PLC communicate with Kingview as slave, the hexadecimal address number corresponding to register and bit components must be shifted by one. For example, D0 corresponds to 4000, it should be 4001 corresponded to Kingview inside; Y0 corresponds to 13056, it should be 13057 corresponded to Kingview inside; M0 corresponds to 0000, it should be 0001 corresponded to Kingview inside. If the register corresponds to floating points, the one corresponding to kingview should be shifted by two. For example, D0 corresponds to 4000, it should be 4002 corresponded to Kingview inside.