Coolmay

QM3G HMI/PLC All-in-one

Programming Manual

(PLC part: Difference comparing with Mitsubishi FX3G)

V22.21

Catalog

1. Overview

1.1. QM3G-FH PLC/HMI All-in-one Main Advantage:

◆Upper computer programming software compatible with Works 2/GX Developer8.86 (supports Ladder diagram and SFC language, does not support structured programming/labels).

◆Powerful, compatible with FX3G/FX3U/FX3S PLC, high processing speed.

◆Military level 32 bit CPU adopted, which is faster and more adapted to industrial environment of high electromagnetic interference.

◆Special encryption, prevent illegal reading thoroughly. 8-bit encryption, 12345678 as password can thoroughly prevent reading of ladder logic program.

◆Clock supported, rechargeable battery adopted.

◆Default with 1 HMI download port, 2 PLC programming ports (RS232/MiniB USB port or Type-C), and one USB port.

◆7 inch and 10 inch HMI/PLC all-in-one, PLC is optional to add 1 485 or 2 485(One of the 485 ports is changed from the default 232 port)/CAN/network port/WIFI(which will occupy the default port 232); HMI defaults to 1 RS232, optional 1 RS485. 43FH/50FH, PLC is optional to add 1 485 or 2 485(When 2 485 are selected, one of the 485 ports is specially changed from the default 232); HMI defaults to 1 RS232. Used for external equipment such as HMI and converter.

◆Support Mitsubishi programming protocol/MODBUS protocol/RS protocol/BD board protocol, easily realize PLC interconnection and communication with external devices.

◆High-speed counting, conventionally single-phase 6 channels 60KHz or AB (Z) phase 2 channels 30KHz + AB phase 1 channel 5KHz. High-speed pulse, conventionally 8 channels: Y0-Y3 is 100KHz, Y4-Y7 is 10KHz. High-speed counting+ High-speed pulse cannot exceed 480KHz; acceleration

and deceleration are independent.

◆Support multi-channel and multi-type analog input and output alone or mixed, QM3G-70KFH/100FH series up to 16 inputs and 8 outputs, QM3G-43FH/50FH series up to 4 inputs and 2 outputs. The precision of analog input and output is 12 bits. The analog input can be temperature/current/voltage input, and the analog output can be voltage/current output.

◆QM3G-70KFH/100FH is up to 30DI/3ODO (MR up to 28), DO is optional to choose MR (max:5A)/MT (max:500mA) or mixed output MRT; QM3G-43FH/50FH is up to 12 DI/12DO, DO is optional to choose MR (maximum load 5A) or transistor MT (MOS tube, maximum: 2A).

◆Convenient wiring. All wiring terminals adopt 3.81 pitch pluggable terminals, which is convenient for customers to use.

◆Flexible use. More specifications and batches can be customized according to customer requirements.

◆32K program capacity, 32K retentive register, support interrupt, linear arc interpolation ,PID auto-tuning, high powerful.

◆The PLC is compatible with Mitsubishi programming software, and the HMI uses TK series human-machine interface programming software mView.

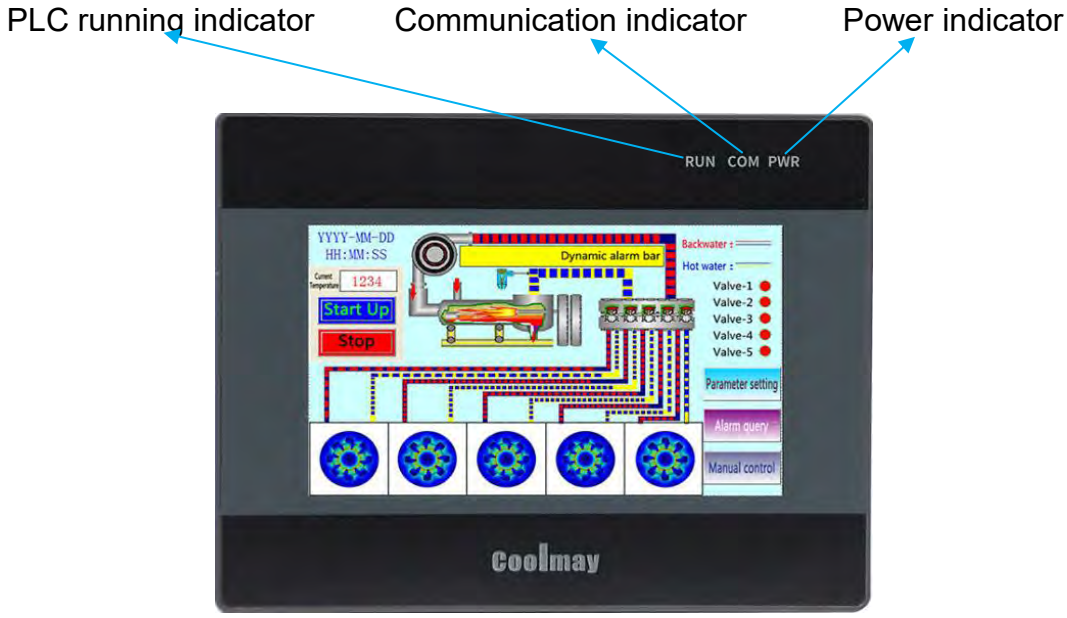
1.2. Specification

Model	QM3G-43FH	QM3G-50FH	QM3G-70FH	QM3G-70KFH	QM3G-100FH
Image					
					
Dimension	134*102*34mm	151*96*36mm	200*146*36mm	226*163*35.6mm	275*194*36mm
Cutout size	120*94mm	143*86mm	192*138mm	217*154mm	262*180mm
Power Consumption	4-6W	5-7W	6-7W	6-7W	6-8W
HMI					
Feature	60K colors resistive touch screen, supports portrait display				
Type	4.3"TFT	5"TFT	7.0"TFT	7.0"TFT	10.1"TFT
Display size	97*56mm	108*65mm	154*87mm	154*87mm	222*125mm
Resolution (pixels)	480*272	800*480	Standard: 800*480 Optional: 1024*600 (Model: QM3G-70HD)	800*480	1024*600
RAM	64MB (HMI when stores historical data, optional ferroelectric is required)				
ROM	NOR Flash 8MB		NOR Flash 16MB		
CPU	32bit CPU 408MHz				
Default	Type-C HMI download port (can download PLC program through the USB penetrating function), RS232 port			Type-B HMI download port (can download PLC program through the USB penetrating function), RS232	
Optional COM port	/		1 RS485 (changed from default RS232)		
Software	Coolmay mView HMI Programming Software				
PLC					
I/O	Max 12DI/12DO		Max 24DI/20DO (max 16MR)	Max 30DI/30DO (max 28MR)	
I/O level	Input: Passive NPN, public terminal isolated Transistor output: Low level NPN, COM connect to negative; Relay output: Normally open dry contact				
DO type and load	Relay MR/MOS tube, MOS tube: 2A/point, 4A/4 point COM, 5A/12 point COM; MR: 2A/point, 5A/12 point COM.		Relay (MR) or transistor (MT, Y0-Y3 are MOS) or mixed (MRT) MOS tube: 2A/point, 4A/4 points COM; MT: 0.5A/point, 0.8A/4 points COM, 1.6A/8 points COM; MR: 2A/point, 4A/4 points COM, 5A/12 points COM.		
High-speed counting	Single phase 6 channel 60KHz, or 2 AB 30KHz + 1 AB 5KHz, or 2 ABZ 60KHz + 1 AB phase 10 KHz				
High-speed pulse	8 channels, Y0-Y3 is 100KHz, Y4-Y7 is 10KHz. High-speed counting + high-speed pulse < 480KHz				
Default programming port	1 TYPE-C, 1 RS232			1 Mini USB, 1 RS232	
Optional COM port	1 RS485 or 2 RS485 COM ports (one of which is changed from the default RS232 port); 1 WIFI (occupy default RS232 port)		1 RS485 or 2 RS485 COM ports (RS485 port on HMI and RS232 on PLC will be unavailable)	1 RS485 or 2 RS485 COM ports (one is changed from the default RS232 port)	
			CAN (2.0A/B) port, Ethernet port, WIFI (will occupy default RS232 port)		
Analog I/O (optional)	Max 4AI/2AO		Max 12AI/8AO	Max 16AI/8AO	
AI type (optional)	Thermocouple E/E_/K/K_/S/S_/T/T_/J/J_ / PT100/ PT1000/ NTC10K/ NTC50K/ NTC100K/ 0~10V/ 0~5V/ 0~20mA/ 4~20mA/ mixed (QM3G-70FH/70HD/70KFH/100FH optional -5V~5V and -10V~10V)				
AO type (optional)	0~10V /0~5V/ 0~20mA/ 4~20mA/ mixed		0~10V /0~5V/ 0~20mA/ 4~20mA/ mixed/ -5~5V/ -10~10V (2AO for 1 minus voltage)		
Software	Compatible with GX Developer8.86 and GX WORKS 2				

Suggested models: QM3G-43FH/50FH-16MR/24MR/24MT(-4AD2DA-485P/232H)
QM3G-70FH/HD-16MR/24MR(-12AD8DA-485P/232H)；QM3G-70FH/HD-24MT/44MT/44MRT(-8AD6DA-485P/232H)
QM3G-70KFH-38MR/38MT(-16AD8DA-485P/232H) QM3G-70KFH-60MRT/60MT(-5AD2DA-485P/232H)
QM3G-100FH-24MR/38MT/44MRT/44MT(-16AD8DA-485P/232H) QM3G-100FH-60MRT/60MT(-5AD2DA-485P/232H)
* If 30DI/30DO for QM3G-70KFH/100FH, max support 5AI/2AO. If 24DI/20DO, max 16AI/8AO.
Detailed info. refer to: "Coolmay QM3G-FH All-in-One User Manual", "Coolmay CX3G/FX3GC PLC Programming Manual", "Coolmay TK HMI User Manual"

1.3. Hardware description

1.3.1. QM3G-43FH structure description and dimension

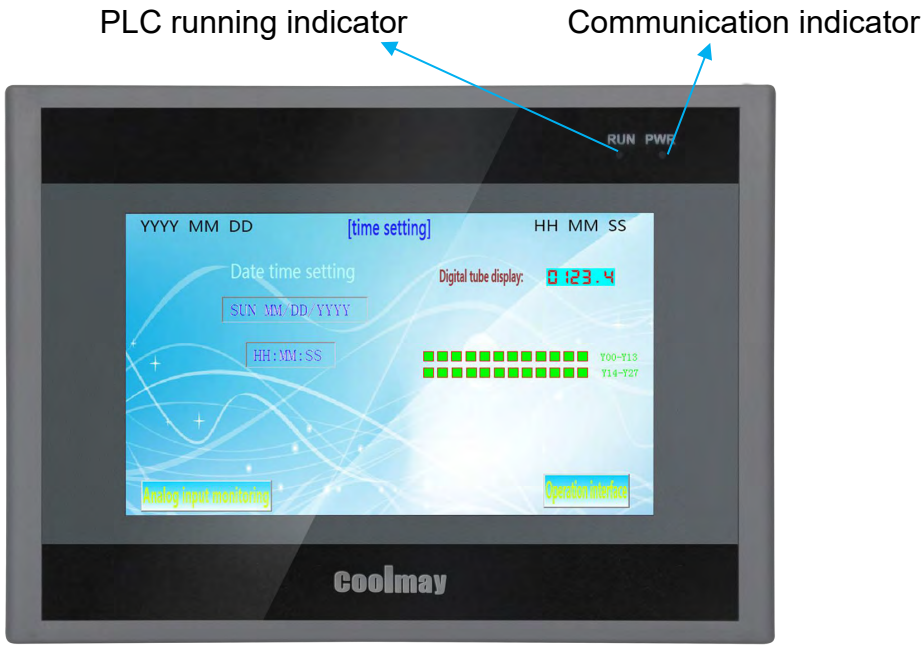


- Dimensions (mm): 134*102*34
- Cutout size (mm): 120*94
- Display size (mm): 97 * 56
- Installation method: Clip installation

1.3.2. QM3G-50FH structure description and dimension

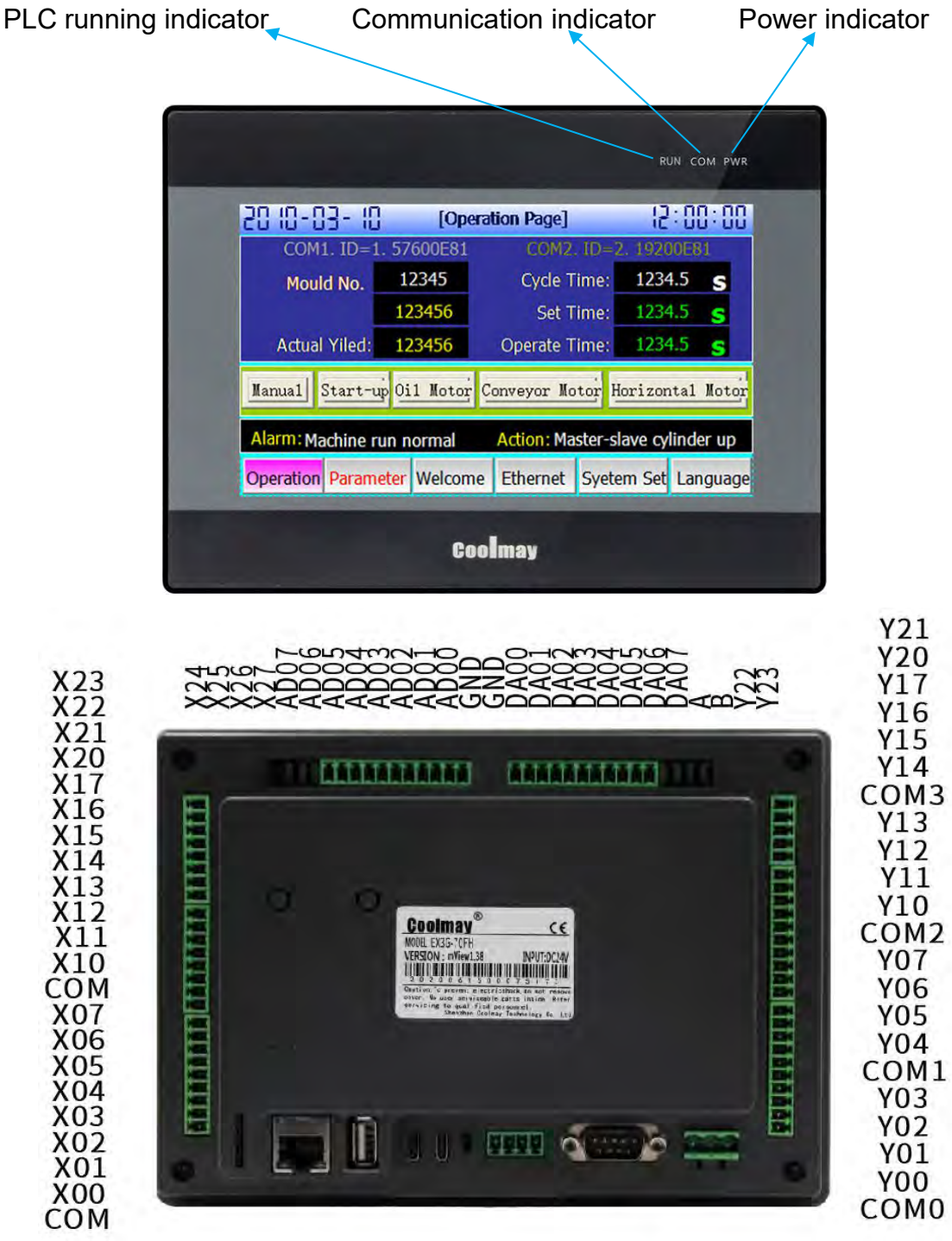
- Dimensions (mm): 151*96*36
- Cutout size (mm): 143*86
- Display size (mm): 108*65
- Installation method: Clip installation

1.3.3. QM3G-70KFH structure description and dimension



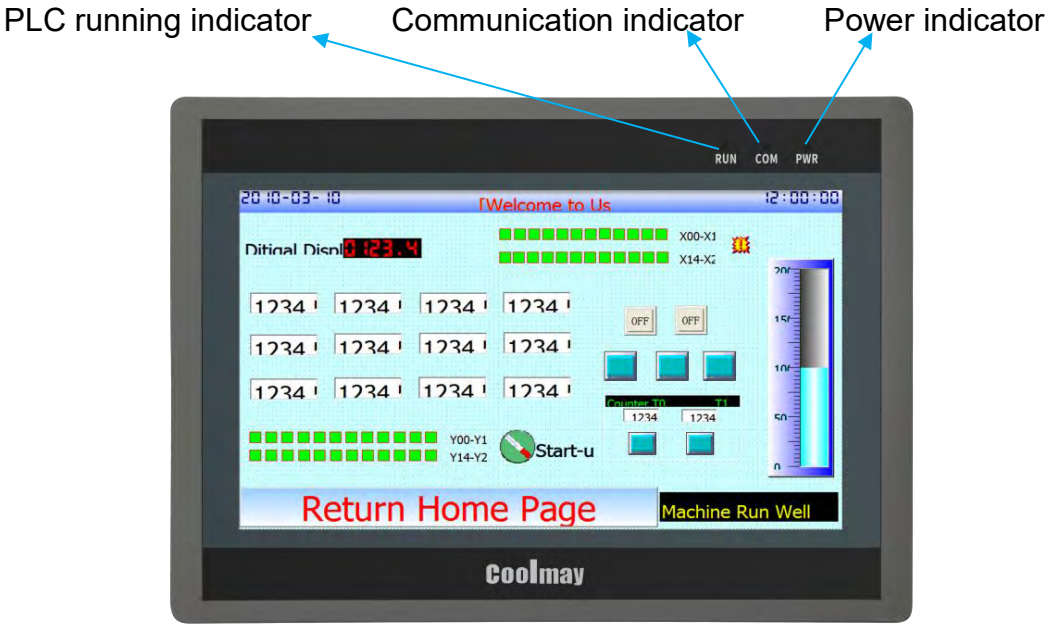
- Dimensions (mm): 226*163*35.6
- Cutout size (mm): 217*154
- Display size (mm): 154*87
- Installation method: Clip installation

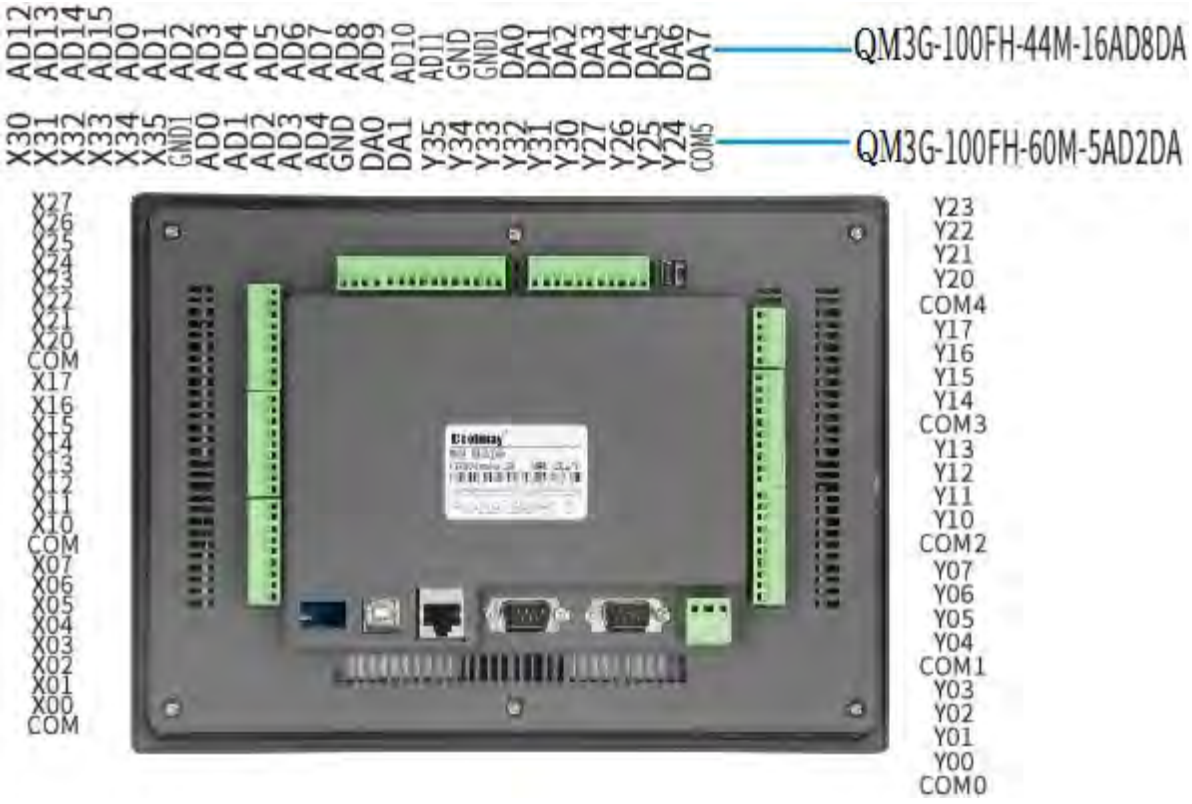
1.3.4. QM3G-70FH/HD structure description and dimension



- Dimensions (mm): 200*146*36
- Cutout size (mm): 192*138
- Display size (mm): 154*87
- Installation method: Clip installation

1.3.5. QM3G-100FH structure description and dimension





- Dimensions (mm): 275*194*36
- Cutout size (mm): 262*180
- Display size (mm): 222*125
- Installation method: Clip installation

1.3.6. Introduction of each interface and indicator

POWER: power indicator, the light is on when the power is connected.

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

COM: HMI and PLC communication status indicator, the light is on when the two communicate.

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

PLC programming port: two PLC programming ports (Mini type B USB programming port or Type-C/RS232), PLC program can be downloaded through 232 programming cable or USB cable.

HMI programming port: download the touch screen configuration program.

USB interface: mainly can be directly inserted into a U disk with a FAT 32 file system, or a mouse (under development)

For other hardware information, please refer to《QM3G-FH HMI/PLC All-in-One User Manual》

2. PLC

2.1. Precautions for PLC programming

The PLC is compatible with GX Developer8.86/GX Works2 and below. If you use other versions of software, incompatibility may occur.

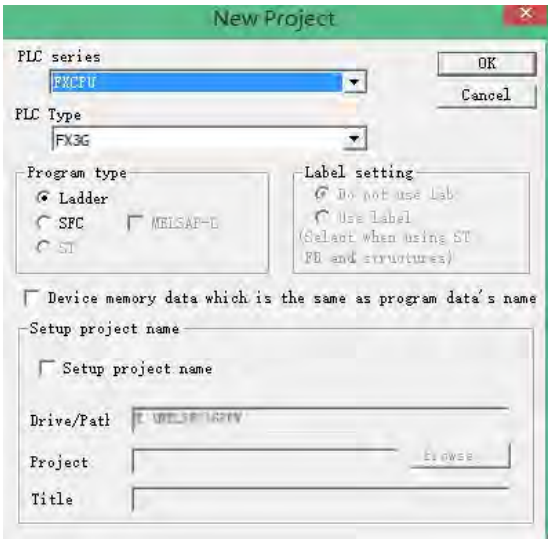
When the PLC program is downloaded, there is a prompt error: Cannot specify the com port,

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

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

If there is a communication abnormality, cable abnormality and other prompts, remove it by cutting off the power, checking the cable, checking whether the power supply is normal, or replacing the computer.

In the GX Developer8.86 software version, choose the figure:



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

2.2. Soft element table

Name	Content		
I/O relay			
Input relay	X000~X047	40 points	Soft element number is octal Total 80points for I/O
Output relay	Y000~Y047	40 points	
Auxiliary relay			
General	M0~M383	384 points	
EEPROM hold	M384~M1535	1152 points	
General	M1536~M7679	6144 points	
Special	M8000~M8511	512 points	
Status			
Initial state (EEPROM hold)	S0～S9	10 points	
EEPROM hold	S10～S999	990 points	
General	S1000～S4095	3096 points	
Timer (ON delay timer)			
100ms	T0～T199	200 points	0.1～3,276.7 s
10ms※1	T200～T245	46 points	0.01～327.67 s
1ms cumulative type (EEPROM hold)	T246～T249	4 points	0.001～32.767 s
100ms cumulative type (EEPROM hold)	T250～T255	6 points	0.1～3,276.7 s
1ms	T256～T319	64 points	0.001~32.767 s
Counter			
General (16 bit)	C0～C15	16 points	0～32,767 counter
EEPROM hold up counter (16 bit)	C16～C199	184 points	0～32,767 counter
General bi-direction (32 bit)	C200～C219	20 points	-2,147,483,648～+2,147,483,647 counter
EEPROM hold bi-direction (32 bit)	C220～C234	15 points	-2,147,483,648～+2,147,483,647 counter
High-speed counter			
Single-phase single counter input Bi-direction (32 bit) (EEPROM hold)	C235～C245	-2,147,483,648～+2,147,483,647 counter Software counter Single phase: up to 6 channels, max 60KHz Bi-phase: Single frequency: up to 2-3 channels, max 30KHz M8198 is the 4 times frequency logo of C251 Quad frequency: up to 2-3 channels, maximum frequency 24kHz M8199 is the 4 times frequency logo of C253	
Single-phase double counter input Bi-direction (32 bit) (EEPROM hold)	C246～C250		
Double –phase double counter input Bi-direction (32 bit)(EEPROM hold)	C251～C255		

Name	Content		
Data register (32 bits when used in pairs)			
General (16 bit)	D0～D127	128 points	
EEPROM hold (16 bit)	D128～D7999	7872 points	
Special (16 bit)	D8000～D8511	512 points	
Index (16 bit)	V0～V7,Z0～Z7	16 points	
Extended register·extended file register			
Extended register(16 bit)	R0～R22999	23000 points Support power-off retention	
	R23000～R23999	1000 points for system internal	
Pointer			
JUMP,CALL branch	P0～P1280	1281 points	CJ instruct、CALL instruct
Input interrupt	I0□□～I5□□	6 points	
Timer interrupt	I6□□～I8□□	3 points	
Counter interrupt	I010～I060	6 points	
Nest			
Master control	N0～N7	8 points	MC instruct
Constant			
Decimal (K)	16 bit	-32,768～+32,767	
	32 bit	-2,147,483,648～+2,147,483,647	
Hexadecimal (H)	16 bit	0000～FFFF	
	32 bit	00000000～FFFFFFFF	
Real number (E)	32 bit	-1.0×2128～-1.0×2-126,0,1.0×2-126～1.0×2128 Can be expressed in decimal and exponential form	

※1: The 10ms timer will be affected by the scan cycle. If the scan period is 12ms, the timer becomes 12ms and executes once.

2.3. Special relay number and content

Num	Content	Remark	Num	Content	Remark
M8000	In RUN,Normally closed		M8224	C224 Increase/decrease counting action	ON: Decrease action OFF: Increase action
M8001	In RUN,Normally open		M8225	C225 Increase/decrease counting action	
M8002	After RUN, Output a scan cycle ON		M8226	C226 Increase/decrease counting action	
M8003	After RUN, Output a scan cycle OFF		M8227	C227 Increase/decrease counting action	
M8011	Oscillating in 10ms cycle		M8228	Handwheel function enablement	
M8012	Oscillating in 100ms cycle		M8229	C229 Increase/decrease counting action	
M8013	Oscillating in 1s cycle		M8230	C230 Increase/decrease counting action	
M8014	Oscillating in 1min cycle		M8231	C231 Increase/decrease counting action	
M8020	Zero flag		M8232	C232 Increase/decrease counting action	
M8021	Borrowing flag		M8233	C233 Increase/decrease counting action	
M8022	Carry flag		M8234	C234 Increase/decrease counting action	
M8024	Specify BMOV direction		M8235	C235 Increase/decrease counting action	ON: Decrease action OFF: Increase action
M8028	During instruction execution,allow interrupt		M8236	C236 Increase/decrease counting action	
M8029	Instruction execution end flag		M8237	C237 Increase/decrease counting action	
M8031	Non-retentive memory is cleared		M8238	C238 Increase/decrease counting action	
M8032	Retentive memory is cleared		M8239	C239 Increase/decrease counting action	
M8033	Memory retention stop		M8240	C240 Increase/decrease counting action	
M8034	Prohibit all output		M8241	C241 Increase/decrease counting action	
M8035	Forced RUN mode		M8242	C242 Increase/decrease counting action	
M8036	Force RUN command		M8243	C243 Increase/decrease counting action	

Num	Content	Remark	Num	Content	Remark
M8037	Force STOP command		M8244	C244 Increase/decrease counting action	
M8045	Prohibit reset of all outputs		M8245	C245 Increase/decrease counting action	
M8046	STL state action		M8246	C246 Increase/decrease counting action	
M8047	STL temporary control is effective		M8247	C247 Increase/decrease counting action	
M8048	Signal alarm action		M8248	C248 Increase/decrease counting action	
M8049	Signal alarm is effective		M8249	C249 Increase/decrease counting action	
M8050	Input interrupt (I00 is prohibited)		M8250	C250 Increase/decrease counting action	ON: Decrease action
M8051	Input interrupt (I10 is prohibited)		M8251	C251 Increase/decrease counting action	OFF: Increase action
M8052	Input interrupt (I20 is prohibited)		M8252	C252 Increase/decrease counting action	
M8053	Input interrupt (I30 is prohibited)		M8253	C253 Increase/decrease counting action	
M8054	Input interrupt (I40 is prohibited)		M8254	C254 Increase/decrease counting action	
M8055	Input interrupt (I50 is prohibited)		M8255	C255 Increase/decrease counting action	
M8056	Timer interrupt (I6 is prohibited)		M8340	1st pulse operation temporary control	
M8057	Timer interrupt (I7 is prohibited)		M8342	Interpolation mode	
M8058	Timer interrupt (I8 is prohibited)		M8343	Interpolation mode	
M8059	Counter interrupt is prohibited		M8344	Interpolation relative/absolute coordinate	
M8060	I/O Constitute error		M8348	Interpolation counterclockwise	
M8061	PLC hardware error		M8341	Y000 clear signal output function is valid	
M8062	Serial communication error 0		M8342	Y000 specify the origin return direction	
M8063	Serial communication error 1		M8343	Y000 forward limit	
M8064	Parameter error		M8344	Y000 reverse limit	
M8065	Grammatical error		M8345	Y000 near-point DOG signal	

Num	Content	Remark	Num	Content	Remark
				logic inversion	
M8066	Loop error		M8346	Y000 zero signal logic inversion	
M8067	Operation error		M8347	Y000 interrupt signal logic inversion	
M8068	Operation error latch		M8348	Y000 positioning command driver	
M8069	I/O bus detection		M8349	1st pulse stop	
M8075	Sample tracking preparation start command		M8350	2nd pulse operation temporary control	
M8076	Sample tracking execution start command		M8351	Y001 clear signal output function is valid	
M8077	Sampling and tracking execution temporary control		M8352	Y001 specify the origin return direction	
M8078	Sample tracking execution end temporary control		M8353	Y001 forward limit	
M8079	Sampling tracking system area		M8354	Y001 reverse limit	
M8120	Can't use		M8355	Y001 near-point DOG signal logic inversion	
M8121	RS/RS2 command sends standby	Serial port 2 Refer to chapter 2.11	M8356	Y001 zero signal logic inversion	
M8122	RS/RS2 command to send request		M8357	Y001 interrupt signal logic inversion	
M8123	RS/RS2 command reception end		M8358	Y001 positioning command driver	
M8124	RS/RS2 command data in reception		M8359	2nd pulse stop	
M8125	MODBUS and Mitsubishi function enablement		M8360	3rd pulse operation temporary control	
M8128	RD3A/WR3A Receive correct		M8361	Y002 clear signal output function is valid	
M8129	RD3A/WR3A communication timeout		M8362	Y002 specify the origin return direction	
M8151	5th pulse operation temporary control		M8363	Y002 forward limit	
M8152	6th pulse operation temporary control		M8364	Y002 reverse limit	
M8153	7th pulse operation temporary control		M8365	Y002 near-point DOG signal logic inversion	
M8154	8th pulse operation temporary control		M8366	Y002 zero signal logic inversion	

Num	Content	Remark	Num	Content	Remark
M8160	XCH's SWAP function		M8367	Y002 interrupt signal logic inversion	
M8161	8-bit processing mode		M8368	Y002 positioning command driver	
M8170	Input X000 pulse capture		M8369	3rd pulse stop	
M8171	Input X001 pulse capture		M8370	4th pulse operation temporary control	
M8172	Input X002 pulse capture		M8371	Y003 clear signal output function is valid	
M8173	Input X003 pulse capture		M8372	Y003 specify the origin return direction	
M8174	Input X004 pulse capture		M8373	Y003 forward limit	
M8175	Input X005 pulse capture		M8374	Y003 forward limit	
M8176	Input X006 pulse capture		M8375	Y003 near-point DOG signal logic inversion	
M8177	Input X007 pulse capture		M8376	Y003 zero signal logic inversion	
M8192	Programming port protocol and other protocol enablement	Serial port 3	M8377	Y003 interrupt signal logic inversion	
M8196	Programming port protocol and other protocol enablement	Serial port 2	M8378	Y003 positioning command driver	
M8198	4 times frequency of C251/C252		M8379	4th pulse stop	
M8199	4 times frequency of C253/C255		M8396	C254 function corresponds to input phase	Refer to chapter 2.9.1
M8200	C200 Increase/decrease counting action	ON: Decrease action OFF: Increase action	M8401	RS2 command sends standby	Serial port 3 Refer to chapter 2.11.2
M8201	C201 Increase/decrease counting action		M8402	RS2 command to send request	
M8202	C202 Increase/decrease counting action		M8403	RS2 command reception end	
M8203	C203 Increase/decrease counting action		M8404	RS2 command data in reception	
M8204	C204 Increase/decrease counting action		M8405	RS2 command data setting ready	
M8205	C205 Increase/decrease counting action		M8408	RD3A/WR3A Receive Completed	
M8206	C206 Increase/decrease counting action		M8409	RD3A/WR3A communication timeout	
M8207	C207 Increase/decrease		M8421	RS2 command sends standby	CAN

Num	Content	Remark	Num	Content	Remark
	counting action				communication Refer to chapter 2.11.4
M8208	C208 Increase/decrease counting action		M8422	RS2 command to send request	
M8209	C209 Increase/decrease counting action		M8423	RS2 command reception end	
M8210	C210 Increase/decrease counting action		M8424	RS2 command data in reception	
M8211	C211 Increase/decrease counting action		M8425	RS2 command data send completed	
M8212	C212 Increase/decrease counting action		M8426	RS command master-slave and multi-machine mode	
M8213	C213 Increase/decrease counting action		M8427	CAN data standard frame and extended frame	
M8214	C214 Increase/decrease counting action		M8428	CAN communication MODBUS response correct	
M8215	C215 Increase/decrease counting action		M8429	Communication timeout	
M8216	C216 Increase/decrease counting action		M8432	Interpolation mode	
M8217	C217 Increase/decrease counting action		M8433	Interpolation mode	
M8218	C218 Increase/decrease counting action		M8434	Interpolation relative/absolute coordinate	
M8219	C219 Increase/decrease counting action		M8435	Interpolation counterclockwise	
M8220	C220 Increase/decrease counting action		M8450	5^{th} pulse stop	
M8221	C221 Increase/decrease counting action		M8451	6^{th} pulse stop	
M8222	C222 Increase/decrease counting action		M8452	7^{th} pulse stop	
M8223	C223 Increase/decrease counting action		M8453	8^{th} pulse stop	

2.4. Special register number and content

Num	Content	Remark	Num	Content	Remark
D8000	Watchdog timer		D8148	5th- 8th pulse acceleration and deceleration time	
D8001	PLC type and system version		D8160	8th position pulse amount	Low
D8002	PLC memory capacity	2...2K steps; 4...4K steps; 8...8K steps; When more than 16K steps, D8002=8, and D8102 corresponds to 16, 32, and 64.	D8161		High
D8003	Memory type	10H: Programmable controller built-in memory	D8169	Restrict access status	
D8010	Scan current value		D8182	Z1 Register contents	
D8011	Scan time minimum		D8183	V1 Register contents	
D8012	Scan time maximum		D8184	Z2 Register contents	
D8013	Second		D8185	V2 Register contents	
D8014	Minute		D8186	Z3 Register contents	
D8015	Hour		D8187	V3 Register contents	
D8016	Date		D8188	Z4 Register contents	
D8017	Month		D8189	V4 Register contents	
D8018	Year		D8190	Z5 Register contents	
D8019	Week		D8191	V5 Register contents	
D8020	Input filter adjustment		D8192	Z6 Register contents	
D8030	AD0 analog input value		D8193	V6 Register contents	
D8031	AD1 analog input value		D8194	Z7 Register contents	
D8032	AD2 analog input value		D8195	V7 Register contents	
D8033	AD3 analog input value		D8268	Customize PWM 0~3 division factor	Ranges: 840~ 16800000
D8034	AD4 analog input value		D8269		
D8035	AD5 analog input value		D8278	Customize PWM 4~7 division factor	
D8036	AD6 analog input value		D8279		
D8037	AD7 analog input value		D8340	1st position pulse amount	Low
D8038	AD8 analog input value		D8341		High
D8039	AD9 analog input value		D8342	Y0 deviation speed Initial value:0	
D8040	AD10 analog input value		D8343	1st pulse maximum speed	Low
D8041	AD11 analog input value		D8344		High

Num	Content	Remark	Num	Content	Remark
D8042	AD12 analog input value		D8345	Y0 crawling speed Initial value: 1000	
D8043	AD13 analog input value		D8346	Y0 Origin return speed Initial value:50000	Low
D8044	AD14 analog input value		D8347		High
D8045	AD15 analog input value		D8348	1st pulse acceleration time	
D8050	DA0 analog output value		D8349	1st pulse deceleration time	
D8051	DA1 analog output value		D8350	2nd position pulse amount	Low
D8052	DA2 analog output value		D8351		High
D8053	DA3 analog output value		D8352	Y1 deviation speed Initial value:0	
D8054	DA4 analog output value		D8353	2nd pulse maximum speed	Low
D8055	DA5 analog output value		D8354		High
D8056	DA6 analog output value		D8355	Y1 crawling speed Initial value: 1000	
D8057	DA7 analog output value		D8356	Y1 Origin return speed Initial value:50000	Low
D8058	When DA is current,Bit setting	Refer to Chapter 5.2	D8357		High
D8059	Constant scan time		D8358	2nd pulse acceleration time	
D8074	X0 Rising edge ring counter value [1/6μs unit]	Low	D8359	2nd pulse deceleration time	
D8075		High	D8360	3rd position pulse amount	Low
D8076	X0 falling edge ring counter value [1/6μs unit]	Low	D8361		High
D8077		High	D8362	Y2 deviation speed Initial value: 0	
D8078	X0 pulse width / pulse period [10μs unit]	Low	D8363	3rd pulse maximum speed	Low
D8079		High	D8364		High
D8080	X1 Rising edge ring counter value [1/6μs unit]	Low	D8365	Y2 crawling speed Initial value: 1000	
D8081		High	D8366	Y2 origin return speed Initial value: 50000	Low
D8082	X1 falling edge ring counter value [1/6μs unit]	Low	D8367		High
D8083		High	D8368	3rd pulse acceleration time	
D8084	X1 pulse width / pulse period [10μs unit]	Low	D8369	3rd pulse deceleration time	
D8085		High	D8370	4th position pulse amount	Low
D8086	X3 Rising edge ring counter value [1/6μs unit]	Low	D8371		High
D8087		High	D8372	Y3 deviation speed Initial value: 0	
D8088	X3 falling edge ring counter value [1/6μs unit]	Low	D8373	4th pulse maximum speed	Low
D8089		High	D8374		High

Num	Content	Remark	Num	Content	Remark
D8090	X3 pulse width / pulse period [10μs unit]	Low	D8375	Y3 crawling speed Initial value: 1000	
D8091		High	D8376	Y3 origin return speed Initial value: 50000	Low
D8092	X4 Rising edge ring counter value [1/6μs unit]	Low	D8377		High
D8093		High	D8378	4th pulse acceleration time	
D8094	X4 falling edge ring counter value [1/6μs unit]	Low	D8379	4th pulse deceleration time	
D8095		High	D8395	Network setting function	Refer to Chapter 8.6
D8096	X4 pulse width / pulse period [10μs unit]	Low	D8397	ADPRW command serial port position	Refer to Chapter 8.2
D8097		High	D8398	0~2147483647(1ms) Ring count for incremental actions	
D8101	PLC type and system version		D8399		
D8102	PLC memory capacity	16...16K Steps	D8400	Modbus RTU protocol Communication parameters	Serial port 3 Refer to Chapter 8.3
D8108	Number of connected special modules		D8401	Communication mode	
D8109	Y number where the output refresh error occurred		D8406	Number of interval period	
D8120	Modbus RTU protocol Communication parameters	Serial port 2 Refer to Chapter 8.2	D8409	overtime time	
D8121	Master/Slave station number		D8410	RS2 header 1, 2 <initial value: STX>	
D8122	RS instruction to send data remaining points		D8411	RS2 header 3, 4	
D8123	RS command receiving points monitoring		D8412	RS2 trailer 1, 2 <initial value: ETX>	
D8124	RS command header <initial value: STX>		D8413	RS2 trailer 3, 4	
D8125	RS command trailer <initial value: ETX>		D8414	Master / slave station number	
D8126	Serial port 2 uses ADPRW instruction, the value is 0	2	D8415	RS2 receives the summation calculation result	
D8126	Serial port 2 interval period number		D8416	RS2 sends summation	
D8127	Specify the number of data requested by the lower computer communication	Serial port 2 Refer to Chapter 8.2	D8420	Communication parameters	CAN communication Refer to Chapter 8.6
D8128	Specify the starting number of the communication request of the		D8421	Communication mode	

Num	Content	Remark	Num	Content	Remark
	lower computer				
D8129	Set timeout		D8426	Number of interval period	
D8140	5th position pulse amount	Low	D8429	overtime time	
D8141		High	D8430	RS2 header 1, 2 <initial value: STX>	
D8142	6th position pulse amount	Low	D8431	RS2 header 3, 4	
D8143		High	D8432	RS2 trailer 1, 2 <initial value: ETX>	
D8144	7th position pulse amount	Low	D8433	RS2 trailer 3, 4	
D8145		High	D8434	RS2 receives the summation receive data	
D8146	5th -8th pulse max speed	Low	D8435	RS2 receives the summation calculation result	
D8147		High	D8436	RS2 sends summation	

※Specific functions please refer to《Coolmay PLC Instruction Programming Manual》

2.5. Function application instructions (Contrast with Mitsubishi FX3G PLC instruction)

List of basic logic instructions

Mnemonic	Name	Features	Available devices
LD	Take	Normally open contact logic operation starts	X,Y,M,S,D□.b,T,C
LDI	Negate	Normally closed contact logic operation starts	X,Y,M,S,D□.b,T,C
LDP	Take the rising edge of the pulse	Start of operation to detect rising edge	X,Y,M,S,D□.b,T,C
LDF	Take the falling edge of the pulse	Start of operation to detect falling edge	X,Y,M,S,D□.b,T,C
AND	Versus	Series of normally open contacts	X,Y,M,S,D□.b,T,C
ANI	With reverse	Series of normally closed contacts	X,Y,M,S,D□.b,T,C
ANDP	With pulse rising edge	Detect rising edge series connection	X,Y,M,S,D□.b,T,C
ANDF	With the falling edge of the pulse	Series connection detection of falling edges	X,Y,M,S,D□.b,T,C
OR	Or pulse rising edge	Normally open contacts in parallel	X,Y,M,S,D□.b,T,C
ORI	Or reverse	Normally closed contacts in parallel	X,Y,M,S,D□.b,T,C
ORP	Or pulse rising edge	Parallel connection detecting rising edge	X,Y,M,S,D□.b,T,C
ORF	Or pulse falling edge	Parallel connection to detect falling edge	X,Y,M,S,D□.b,T,C
ANB	Block with	Series connection of circuit blocks	-
ORB	Block or	Parallel connection of circuit blocks	-
MPS	Push stack	Push onto the stack	-
MRD	Read stack	Read stack	-
MPP	Unstack	Pop the stack	-
INV	Negate	Inversion of operation result	-
MEP	M.E.P	Conduction on rising edge	-
MEF	M..EF	Conduction on falling edge	-
OUT	Output	Coil drive	Y,M,S,D□.b,T,C
SET	Position	Movement retention	Y,M,S,D□.b
RST	Reset	Clear action keeps, register cleared	Y,M,S,D□.b,T,C,D,R,V,Z
PLS	pulse	Differential output on rising edge	Y,M
PLF	Falling edge pulse	Differential output on falling edge	Y,M
MC	Master	Connection circle command for common series point	Y,M
MCR	Master reset	Instruction to eliminate common series point	-
NOP	No operation	No action	-
END	End	End of the program and I/O and return to the beginning	-

Applied instruction can be divided into the following 18 kinds.

1	Data move instructions
2	Data conversion instructions
3	Comparison instructions
4	Arithmetic operation instructions
5	Logical operation instructions
6	Special function instructions
7	Rotate instructions
8	Data operation instructions
9	Data operation instructions
10	Character string operation instructions
11	Program flow control instructions
12	I/O refresh instructions
13	Real time clock control instructions
14	Pulse output/positioning control instructions
15	Serial communication
16	Special block/unit control instructions
17	Extension register/extension file register control instructions
18	Other handy instruct

1.Data move instructions

Mnemonic	FNC No.	Function	Support
MOV	12	Move	★
SMOV	13	Shift Move	★
CML	14	Compliment	★
BMOV	15	Block Move	★
FMOV	16	Fill Move	★
PRUN	81	Parallel Run (Octal Mode)	★
XCH	17	Exchange	★
SWAP	147	Byte Swap	★
EMOV	112	Floating Point Move	★
HCMOV	189	High Speed Counter Move	★

2.Data conversion instructions

Mnemonic	FNC No.	Function	Support
BCD	18	Conversion to Binary Coded Decimal	★
BIN	19	Conversion to Binary	★
GRY	170	Decimal to Gray Code Conversion	★
GBIN	171	Gray Code to Decimal Conversion	★

FLT	49	Conversion to Floating Point	★
INT	129	Floating Point to Integer Conversion	★
EBCD	118	Floating Point to Scientific Notation Conversion	★
EBIN	119	Scientific Notation to Floating Point Conversion	★
RAD	136	Floating Point Degree to Radian Conversion	★
DEG	137	Floating Point Radian to degree Conversion	★

3.Comparison instructions

Mnemonic	FNC No.	Function	Support
LD=	224	Contact compare LD (S1)=(S2)	★
LD>	225	Contact compare LD (S1)>(S2)	★
LD<	226	Contact compare LD (S1)<(S2)	★
LD<>	228	Contact compare LD (S1)≠(S2)	★
LD<=	229	Contact compare LD (S1)≦(S2)	★
LD>=	230	Contact compare LD (S1)≧(S2)	★
AND=	232	Contact compare AND (S1)=(S2)	★
AND>	233	Contact compare AND (S1)>(S2)	★
AND<	234	Contact compare AND (S1)<(S2)	★
AND<>	236	Contact compare AND (S1)≠(S2)	★
AND<=	237	Contact compare AND (S1)≦(S2)	★
AND>=	238	Contact compare AND (S1)≧(S2)	★
OR=	240	Contact compare OR (S1)=(S2)	★
OR>	241	Contact compare OR (S1)>(S2)	★
OR<	242	Contact compare OR (S1)<(S2)	★
OR<>	244	Contact compare OR (S1)≠(S2)	★
OR<=	245	Contact compare OR (S1)≦(S2)	★
OR>=	246	Contact compare OR (S1)≧(S2)	★
CMP	10	Compare	★
ZCP	11	Zone Compare	★
ECMP	110	Floating Point Compare	★
EZCP	111	Floating Point Zone Compare	★
HSCS	53	High speed counter set	★
HSCR	54	High speed counter reset	★
HSZ	55	High Speed Counter Zone Compare	★
HSCT	280	High speed counter table compare	★
BKCMP=	194	Block compare (S1)=(S2)	★
BKCMP>	195	Block compare (S1)>(S2)	★
BKCMP<	196	Block compare (S1)<(S2)	★
BKCMP<>	197	Block compare (S1)≠(S2)	★
BKCMP<=	198	Block compare (S1)≦(S2)	★
BKCMP>=	199	Block compare (S1)≧(S2)	★

4.Arithmetic operation instructions

Mnemonic	FNC No.	Function	Support
ADD	20	Addition	★
SUB	21	Subtraction	★
MUL	22	Multiplication	★
DIV	23	Division	★
EADD	120	Floating Point Addition	★
ESUB	121	Floating Point Subtraction	★
EMUL	122	Floating Point Multiplication	★
EDIV	123	Floating Point Division	★
BK+	192	Block Data Addition	★
BK-	193	Block Data Subtraction	★
INC	24	Increase	★
DEC	25	Decrement	★

5.Logical operation instructions

Mnemonic	FNC No.	Function	Support
WAND	26	Word AND	★
WOR	27	Word OR	★
WXOR	28	Word Exclusive OR	★

6.Special function instructions

Mnemonic	FNC No.	Function	Support
SQR	48	Square Root	★
ESQR	127	Floating Point Square Root	★
EXP	124	Floating Point Exponent	★
LOGE	125	Floating Point Natural Logarithm	★
LOG10	126	Floating Point Common Logarithm	★
SIN	130	Floating Point Sine	★
COS	131	Floating Point Cosine	★
TAN	132	Floating Point Tangent	★
ASIN	133	Floating Point Arc Sine	★
ACOS	134	Floating Point Arc Cosine	★
ATAN	135	Floating Point Arc Tangent	★
RND	184	Random Number Generation	★

7.Rotate instructions

Mnemonic	FNC No.	Function	Support
ROR	30	Rotation Right	★
ROL	31	Rotation Left	★
RCR	32	Rotation right With Carry	★
RCL	33	Rotation Left with Carry	★

8.Shift instructions

Mnemonic	FNC No.	Function	Support
SFTR	34	Bit Shift Right	★
SFTL	35	Bit Shift Left	★
SFR	213	Bit Shift Right with Carry	★
SFL	214	Bit Shift Left with Carry	★
WSFR	36	Word Shift Right	★
WSFL	37	Word Shift left	★
SFWR	38	Shift Write [FIFO/FILO Control]	★
SFRD	39	Shift Read [FIFO Control]	★
POP	212	Shift Last Data Read [FILO Control]	★

9.Data operation instructions

Mnemonic	FNC No.	Function	Support
ZRST	40	Zone Reset	★
DECO	41	Decode	★
ENCO	42	Encode	★
MEAN	45	Mean	★
WSUM	140	Sum of Word Data	★
SUM	43	Sum of Active Bits	★
BON	44	Check Specified Bit Status	★
NEG	29	Negation	★
ENEG	128	Floating Point Negation	★
WTOB	141	WORD to BYTE	★
BTOW	142	BYTE to WORD	★
UNI	143	4-bit Linking of Word Data	★
DIS	144	4-bit Grouping of Word Data	★
CCD	84	Check Code	★
CRC	188	Cyclic Redundancy Check	★
LIMIT	256	Limit Control	★
BAND	257	Dead Band Control	★
ZONE	258	Zone control	★
SCL	259	Scaling (Coordinate by Point Data)	★

SCL2	269	Scaling 2 (Coordinate by X/Y Data)	★
SORT	69	Sort Tabulated Data	★
SORT2	149	Sort Tabulated Data 2	★
SER	61	Search a Data Stack	★
FDEL	210	Deleting Data from Tables	★
FINS	211	Inserting Data to Tables	★

10. String processing instruction

Mnemonic	FNC No.	Function	Support
ESTR	116	Floating Point to Character String Conversion	★
EVAL	117	Character String to Floating Point Conversion	★
STR	200	BIN to Character String Conversion	★
VAL	201	Character String to BIN Conversion	★
DABIN	260	Decimal ASCII to BIN Conversion	★
BINDA	261	BIN to Decimal ASCII Conversion	★
ASCI	82	Hexadecimal to ASCII Conversion	★
HEX	83	ASCII to Hexadecimal Conversion	★
$MOV	209	Character String Transfer	★
$+	202	Link Character Strings	★
LEN	203	Character String Length Detection	★
RIGH	204	Extracting Character String Data From the Right	★
LEFT	205	Extracting Character String Data from the Left	★
MIDR	206	Random Selection of Character Strings	★
MIDW	207	Random Replacement of Character Strings	★
INSTR	208	Character string search	★
COMRD	182	Read Device Comment Data	★

11. Program flow control instructions

Mnemonic	FNC No.	Function	Support
CJ	00	Conditional Jump	★
CALL	01	Call Subroutine	★
SRET	02	Subroutine Return	★
IRET	03	Interrupt Return	★
EI	04	Enable Interrupt	★
DI	05	Disable Interrupt	★
FEND	06	Main Routine Program End	★
FOR	08	Start a FOR/NEXT Loop	★
NEXT	09	End a FOR/NEXT Loop	★

12. I/O refresh instructions

Mnemonic	FNC No.	Function	Support
REF	50	Refresh	★
REFF	51	Refresh and Filter Adjust	★

13. Real time clock control instructions

Mnemonic	FNC No.	Function	Support
TCMP	160	RTC Data Compare	★
TZCP	161	RTC Data Zone Compare	★
TADD	162	RTC Data Addition	★
TSUB	163	RTC Data Subtraction	★
TRD	166	Read RTC data	★
TWR	167	Set RTC data	★
HTOS	164	Hour to Second Conversion	★
STOH	165	Second to Hour Conversion	★

14. Pulse output/positioning control instruction

Mnemonic	FNC No.	Function	Support
ABS	155	Absolute Current Value Read	★
DSZR	150	DOG Search Zero Return	★
ZRN	156	Zero Return	★
TBL	152	Batch Data Positioning Mode	★
DVIT	151	Interrupt Positioning	★
DRVI	158	Drive to Increment	★
DRVA	159	Drive to Absolute	★
PLSV	157	Variable Speed Pulse Output	★
PLSY	57	Pulse Y Output	★
PLSR	59	Acceleration/Deceleration Setup	★

15. Serial communication instructions

Mnemonic	FNC No.	Function	Support
RS	80	Serial Communication	★
R(S2)	87	Serial Communication 2	★
IVCK	270	Inverter Status Check	
IVDR	271	Inverter Drive	
IVRD	272	Inverter Parameter Read	
IVWR	273	Inverter Parameter Write	
IVBWR	274	Inverter Parameter Block Write	
IVMC	275	Inverter multiple command	
ADPRW	276	MODBUS read and write	★

16. Special block/unit control instructions

Mnemonic	FNC No.	Function	Support
FROM	78	Read From a Special Function Block	★
TO	79	Write To a Special Function Block	★
RD3A	176	Read form Dedicated Analog Block	★
WR3A	177	Write to Dedicated Analog Block	★
RBFM	278	Divided BFM Read	
WBFM	279	Divided BFM Write	

17. Extension register/extension file register control instructions

Mnemonic	FNC No.	Function	Support
LOADR	290	Load From ER	
SAVER	291	Save to ER	
RWER	294	Rewrite to ER	
INITR	292	Initialize R and ER	
INITER	295	Initialize ER	
LOGR	293	Logging R and ER	

18. Other handy instructions

Mnemonic	FNC No.	Function	Support
WDT	07	Watchdog Timer Refresh	★
ALT	66	Alternate State	★
ANS	46	Timed Annunciator Set	★
ANR	47	Annunciator Reset	★
HOUR	169	Hour Meter	★
RAMP	67	Ramp Variable Value	★
SPD	56	Speed Detection	★
PWM	58	Pulse Width Modulation	★
DUTY	186	Timing Pulse Generation	★
PID	88	PID Control Loop	★
ZPUSH	102	Batch Store of Index Register	★
ZPOP	103	Batch POP of Index Register	★
TTMR	64	Teaching timer	★
STMR	65	Special timer	★
ABSD	62	Absolute Drum Sequencer	★
INCD	63	Incremental Drum Sequencer	★
ROTC	68	Rotary Table Control	★
IST	60	Initial state	★
MTR	52	Input Matrix	★

TKY	70	Ten Key Input	★
HKY	71	Hexadecimal Input	★
DSW	72	Digital switch (thumbwheel input)	★
SEGD	73	Seven Segment Decoder	★
SEGL	74	Seven Segment With Latch	★
ARWS	75	Arrow Switch	★
ASC	76	ASCII code data input	★
PR	77	Print (ASCII Code)	★
VRRD	85	Volume Read	★
VRSC	86	Volume Scale	★

※Detailed instructions please refer to 《Coolmay PLC Instruction Programming Manual》

2.6. Analog input

The use of this part involves the query of the firmware version. The PLC main and minor version numbers are stored in the special registers D8001 and D8101 respectively. If necessary, please query the values of D8001 and D8101.

The analog input precision of Coolmay QM3G series HMI/PLC all-in-one machine is 12 digits. When using it, you can directly read the register value corresponding to each analog quantity. Ambient temperature, only for thermocouple type.

2.6.1. Analog input type

Input signal type	Range	Register value	Resolution	Accuracy (Total measuring range)	Remark
K-type thermocouple	Room temperature～1100℃	Room temperature～11000	0.1℃	1%	Non-grounded wiring is required for thermocouple type
K-type thermocouple (negative temperature)	-230～1370℃	-2300～13700	0.1℃	1%	
T-type thermocouple	Room temperature～400℃	Room temperature～4000	0.1℃	1%	
T-type thermocouple (negative temperature)	-230～400℃	-2300～4000	0.1℃	1%	
S type thermocouple	Room temperature～1690℃	Room temperature～16900	0.1℃	1%	
S type thermocouple (negative temperature)	-40～1690℃	-400～16900	0.1℃	1%	
J type thermocouple	Room temperature～800℃	Room temperature～8000	0.1℃	1%	
J type thermocouple (negative temperature)	-90～950℃	-900～9500	0.1℃	1%	
E-type thermocouple	Room temperature～600℃	Room temperature～6000	0.1℃	1%	
E-type thermocouple (negative temperature)	-110～730℃	-1100～7300	0.1℃	1%	

PT100/PT1000	-200～500℃	-2000～5000	0.1℃	1%	
Thermistor NTC50K/100K (The default value of B is 3435)	-48～210℃	-480～2100	0.1℃	1%	
Thermistor NTC10K (The default value of B is 3435)	-48～110℃	-480～1100	0.1℃	1%	
Voltage	0-10V/0-5V	0～4000	2.5mV/1.25 mV	1%	
Negative Voltage	-10～10V/-5～5V	0～4000	5mV/2.5mV	1%	
Current Type1	0～20mA	0～4000	5uA	1%	
Current Type2	4～20mA	0～4000	4uA	1%	

The transmitter integrated inside the PLC is one or a mixture of the above types. When ordering, you can choose one or more of them mixed to order.

2.6.2. Analog input reading

Support FROM instructions or direct reading of registers. Such as: FROM K0 K0 D400 K16 read 16 analog inputs, 0~10V.

Register directly read: D[8030]~D[8045] is the output value set by the corresponding type, and the constant scan time is changed to D8059, which is started by M8039;

NO.	Register value
AD0	D8030
AD1	D8031
AD2	D8032
AD3	D8033
AD4(Ambient temperature)	D8034
AD5	D8035
AD6	D8036
AD7	D8037
AD8	D8038
AD9	D8039
AD10	D8040
AD11	D8041
AD12	D8042
AD13	D8043

AD14	D8044
AD15	D8045

When the analog input has a thermocouple type, only 15 channels can be used, and AD4 is the ambient temperature of the thermocouple. When there is no thermocouple type, 16 channels can be used.

For 4-20mA type, the register reads less than 3.8mA and the value is 32760, which is the disconnection value.

The value of the thermistor NTC is shown in the following table:

NO.	Register value
AD0	R23660
AD1	R23661
AD2	R23662
AD3	R23663
AD4	R23664
AD5	R23665
AD6	R23666
AD7	R23667
AD8	R23668
AD9	R23669
AD10	R23670
AD11	R23671
AD12	R23672
AD13	R23673
AD14	R23674
AD15	R23675

R23960 starts with the zero point correction value, and the default value is 0 (that is, the size correction).

The 16 registers starting with R23620 are the corresponding values of 0~10V or 0~20mA, which are real-time sampling values.

The type of analog input needs to be set, refer to the following table:

Register NO.	Read value	Type	Remark
R23940~R23955	0	0~10V(or 0~20mA)	The four types of analog input types use different hardware. After the read value is set, it cannot be changed.
R23940~R23955	1	4~20mA	
R23940~R23955	2	PT100\PT1000	
R23940~R23955	3	10K\50K\100K NTC	

R23940~R23943 R23945~R23955	4	K-type thermocouple positive temperature	The thermocouple type is not much different in hardware, and it can still be modified to other thermocouple types after the read value is set.
R23940~R23943 R23945~R23955	5	K-type thermocouple negative temperature	
R23940~R23943 R23945~R23955	6	T-type thermocouple positive temperature	
R23940~R23943 R23945~R23955	7	T-type thermocouple negative temperature	
R23940~R23943 R23945~R23955	8	S type thermocouple positive temperature	
R23940~R23943 R23945~R23955	9	S-type thermocouple negative temperature	
R23940~R23943 R23945~R23955	10	J type thermocouple positive temperature	
R23940~R23943 R23945~R23955	11	J type thermocouple negative temperature	
R23940~R23943 R23945~R23955	12	E-type thermocouple positive temperature	
R23940~R23943 R23945~R23955	13	E-type thermocouple negative temperature	

That is, the setting of R23944 on the fifth channel must be less than 4.

2.6.3. Sampling of analog input

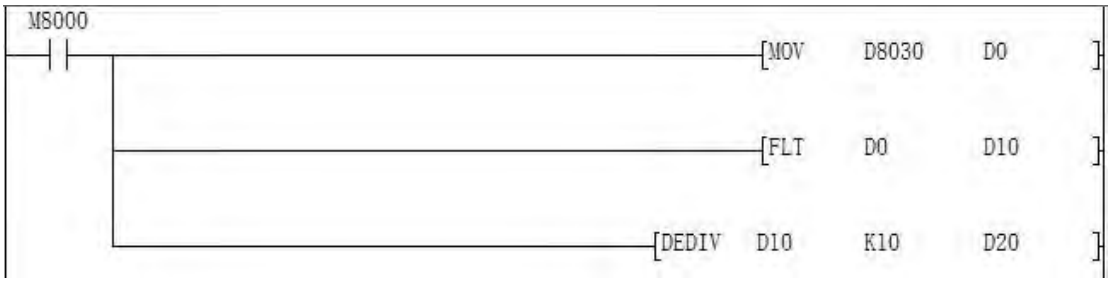
Number of filter cycles=(R23600~R23615)*PLC scan time, if R23600=1, one PLC scan cycle will sample once, and the value in the first channel analog input will be changed once. The larger the value of R23600~R23615 is set, the more stable the result is.

R23600~R23615 are the number of filtering cycles, the default is 100 (range 2~20000), the data cannot be less than or equal to 0;

D8073 is the smoothing filter coefficient of all analog inputs, the setting range is 0~999.

2.6.4. Example of analog input

Below is an example of QM3G's one-channel temperature analog quantity AD0 acquisition, the program reads the value as follows:



Connect the signal end of the temperature sensor to the AD0 input port of the PLC, and connect the other end to the GND of the analog input port. When the PLC is running, the value of the data register D8030 corresponding to AD0 will be transferred to D0, the value of D0 will be put into D10 after floating-point operations, and then floating-point division operations will be performed on D10, the result of the operation will be put into D20, and the result D20 is The actual temperature value. In the ladder diagram, you can also directly divide the value of D8030.

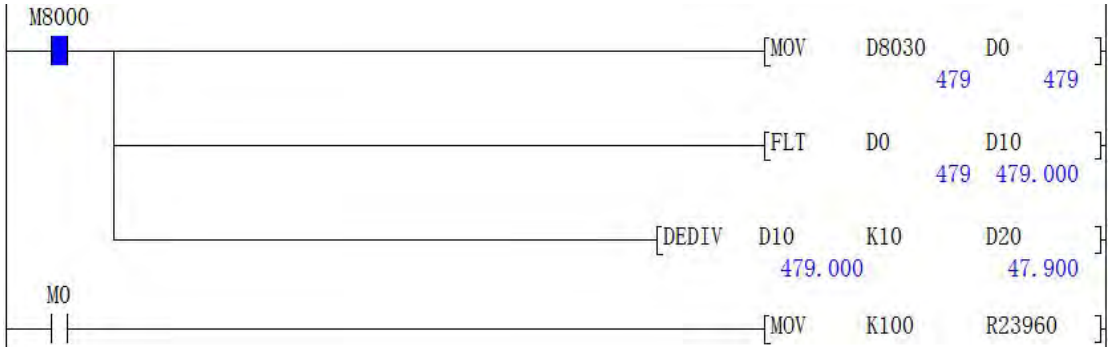
Note: When the input is 0-10V analog, the actual analog value = register reading/400;

When the input is temperature, the actual temperature value = register reading/10;

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

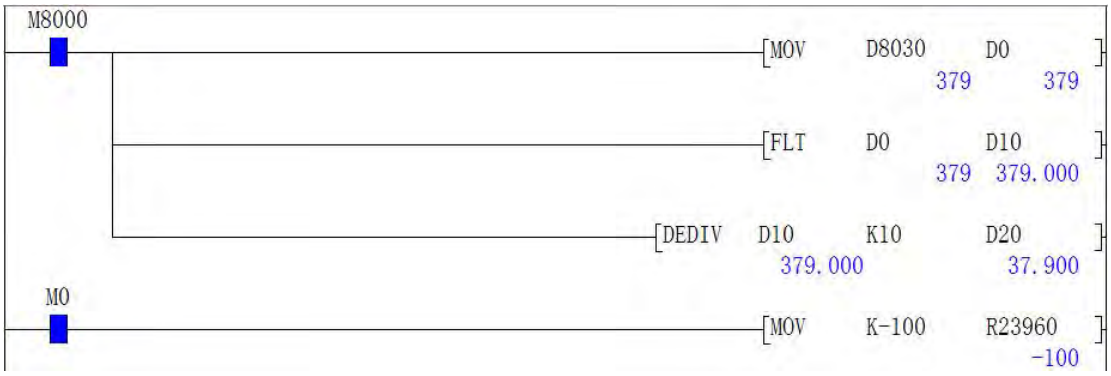
When the input is 4-20mA analog quantity, the actual analog value = register reading/250+4.

The analog correction is corrected for the size.The following figure is an example of correcting the temperature of AD0 after acquisition:



Assuming the current temperature is 37.9℃,the actual test is 47.9 ° C, the

error is 10 ° C, you need to modify the size correction register, show as below:



In the above figure, when M0 is closed, the value -100 is sent to the correction register R23960. At this time, it can be seen that the value of the actual measured temperature D20 is close to the actual temperature of 37.9°C.

2.7. Analog output

The analog output set value range is 0~4000, and the precision is 12 bits.Support TO instruction or register assignment operation directly；

Adopts TO K0 K0 D500 K8, 8 channels 0~10V or 0~20mA analog output.

Register assignment operation directly: D8050~D8053.

When the analog output is current, the bit of D8058 needs to be set: when default D8058.0~D8058.7=0, it means 0~20mA; when D8058.0~D8058.7=1, it means 4~20mA.

NO.	Analog output（DA）register	Setting value range	Output type
DA0	D8050	0-4000	When D8058.0~D8058.7=0, indicates 0~20mA; When D8058.0~D8058.7=1, indicates 4~20mA.
DA1	D8051	0-4000	
DA2	D8052	0-4000	
DA3	D8053	0-4000	
DA4	D8054	0-4000	
DA5	D8055	0-4000	
DA6	D8056	0-4000	
DA7	D8057	0-4000	

For example:

0-10V voltage analog output is shown in the figure below.

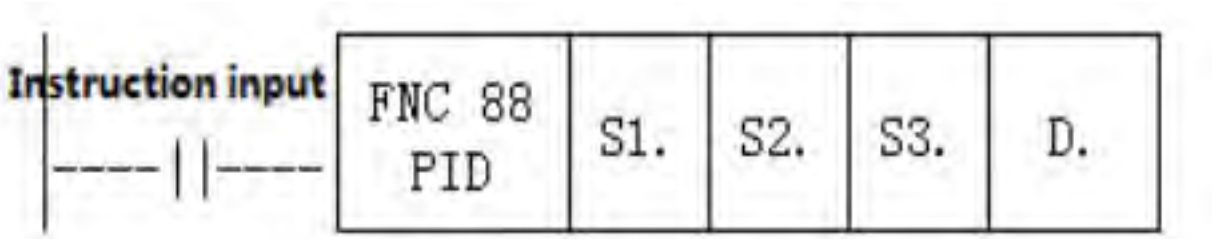
At this time, use a multimeter to check the DA0 terminal voltage, that is, connect the red pen of the multimeter to the DA0 terminal and the black pen to the GND terminal, you can see that the multimeter has a 5V voltage value display.

2.8. PID instruction

1. Summary: This instruction is used to perform PID control that changes the output value according to the input change.

2. PID instruction format and parameter description.

Instruction format:

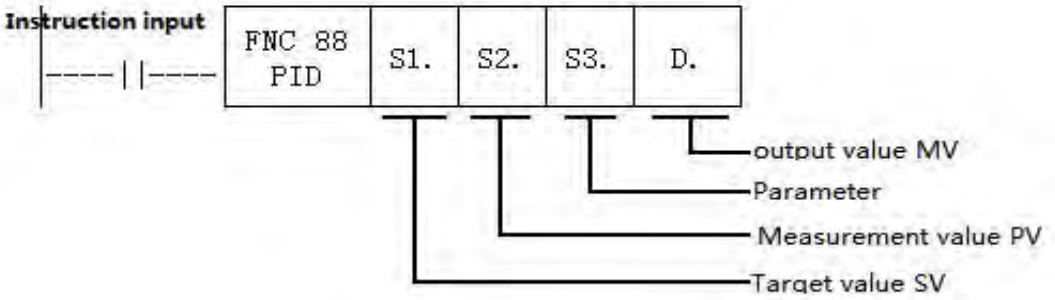


Parameter description:

Operand Type	Content	Data Type	Word software component
S1.	Save data register number of the target value (SV)	BIN16 bit	D,R
S2.	Save data register number of the measured value (PV)	BIN16 bit	D,R
S3.	Save the data register number of the parameter	BIN16 bit	D,R
D.	Save data register number of the output register (MV)	BIN16 bit	D,R

3. Function and action description

16-bit operation (PID): After setting the target value S1., the measured value S2., and the parameters S3~S3+6 in the execution program, the operation result (MV) is saved to the output value D. every sampling time S3.



Setting item

Setting item		Content	Occupied points
S1.	Target value(SV)	Set target value (SV) PID instruction does not change the setting contents	1 point
S2.	Measured value(PV)	The input value of the PID operation	1 point
S3.	Parameter	Auto-tuning: step response method a) ACT setting： when bit1,bit2,bit5 are all not "0",occupy 25points Soft Component starting from the Initial Soft Component specified in S3. b) ACT setting：when bit1,bit2,bit5 are all "0",occupy 20points Soft Component starting from the Initial Soft Component specified in S3.	25 points 20 points
D.	Output value (MV)	Auto-tuning: step response method Set the step output value on the user side before the instruction is driven. During the auto-tuning process, the MV output cannot be changed on the side of the PID instruction.	1 point

Parameter list S3.~S3.+28

Setting item			Setting content	Remark
S3.	Sampling time(Ts)		1~32767(ms)	Value shorter than the calculation period can't be run
S3.+1	ACT	bit0	0: positive action; 1: reverse action.	Action direction (ACT)
		bit1	0: No input change alarm; 1: Input change amount alarm is valid.	
		bit2	0: No output change alarm; 1: Output change amount alarm is valid.	Do not turn ON bit2 and bit5 at the same time
		bit3	Can't use	
		bit4	0: Auto-tuning doesn't work; 1: Perform auto-tuning.	

		bit5	0: No output value upper and lower limit setting; 1: The output value upper and lower limits are valid.	Do not turn ON bit2 and bit5 at the same time
		bit6	0: Step response method.	Auto-tuning mode
		bit7~bit15	Can't use	
S3.+2	Input filter constant (α)		0~99(%)	0 means no input filtering
S3.+3	Proportional gain ()		1~32767(%)	
S3.+4	Integration time()		0~32767(*100ms)	0 means as ∞ processing (no points)
S3.+5	Differential gain ()		0~100(%)	0 means no differential gain
S3.+6	Derivative time ()		0~32767(*10ms)	0 means no differential processing
S3.+7 S3.+19	PID operation internal processing occupied, please do not change the data.			
S3.+20*1	Input change amount (increase side) alarm set value		0~32767	(ACT): Valid when S3.+1 bit1=1
S3.+21*1	Input change amount (decrease side) alarm set value		0~32767	(ACT): Valid when S3.+1 bit1=1
S3.+22*1	Output change amount (increase side) alarm set value		0~32767	(ACT): Valid when S3.+1 bit2=1，bit5=0
	Output upper limit set value		-32768~32767	(ACT): Valid when S3.+1 bit2=0，bit5=1
S3.+23*1	Output change amount (decrease side) alarm set value		0~32767	(ACT): Valid when S3.+1 bit2=1，bit5=0
	Output lower limit set value		-32768~32767	(ACT): Valid when S3.+1 bit2=0，bit5=1
S3.+24*1	Alarm output	bit0	0: The input change amount (increase side) does not overflow; 1: Input change amount (increase side) overflow.	(ACT): Valid when S3.+1 bit1=1 or bit2=1
		bit1	0: The input change amount (reduction side) does not overflow; 1: Input change amount (reduction side) overflow.	
		bit2	0: The output change amount (increase side) does not overflow; 1: Output change amount (increase side) overflow.	
		bit3	0: The output change amount (reduction side) does not overflow; 1: Output change amount (reduction side) overflow.	

*1: When S3+1 action setting (ACT) bit1=1, bit2=1 or bit5=1, S3+20~24 is occupied.

4. Notice

When using multiple instructions： It can be executed multiple times at the same time (the number of loops is not limited), but note that the S3 and D devices used in the operation cannot be repeated.

Occupied points of parameter S3. : Step response method

1)ACT setting：when bit1,bit2,bit5 are all not "0",occupy 25points Soft Component starting from the Initial Soft Component specified in S3.

2)ACT setting：when bit1,bit2,bit5 are all "0",occupy 20points Soft Component starting from the Initial Soft Component specified in S3.

Step response mode: The self-tuning mode in the PID instruction has only a step response mode, and the step value is S0+22, which is the upper limit value.

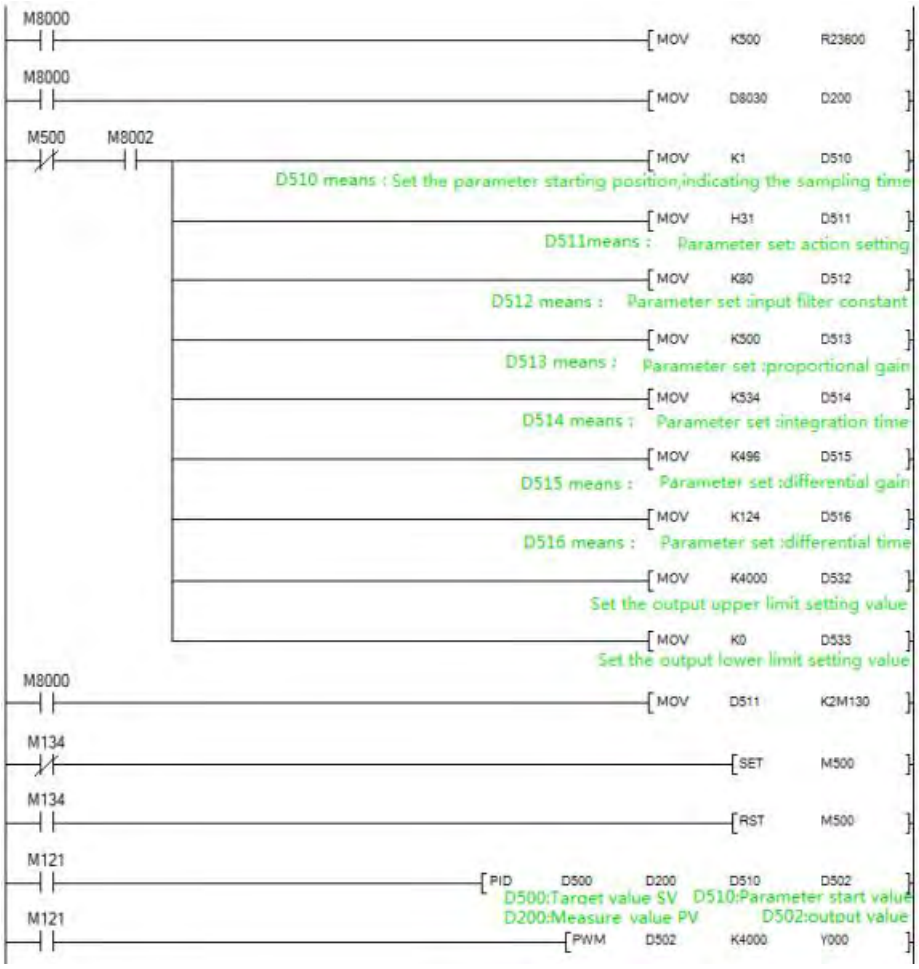
When specifying the soft component in the power failure holding area： If D. is specified in the program to hold the data register in the power failure, needs to clear the specified register at the time of program start-up.

Action flag：

bit 0=0 of S3+1 is positive action，bit 0=0 is reverse action;

When heating, is reverse action.

5. For example


M8000
MOV K500 R23600
M8000
MOV D8030 D200
M500 M8002
MOV K1 D510
D510 means : Set the parameter starting position,indicating the sampling time
MOV H31 D511
D511means : Parameter set: action setting
MOV K80 D512
D512 means : Parameter set :input filter constant
MOV K500 D513
D513 means : Parameter set :proportional gain
MOV K534 D514
D514 means : Parameter set :integration time
MOV K496 D515
D515 means : Parameter set :differential gain
MOV K124 D516
D516 means : Parameter set :differential time
MOV K4000 D532
Set the output upper limit setting value
MOV K0 D533
Set the output lower limit setting value
M8000
MOV D511 K2M130
M134
SET M500
M134
RST M500
M121
PID D500 D200 D510 D502
D500:Target value SV D510:Parameter start value
D200:Measure value PV D502:output value
M121
PWM D502 K4000 Y000

2.9. Application of high speed counter

2.9.1. Assignment table of built-in high speed counter

For QM3G series PLC, high speed counter is default as single phase 6 channels 60KHz, or AB(Z) phase 2 channels 60KHz+AB phase 1 channel 10KHz; Among them,AB phase double counter input is default as 1 times frequency.

Counter type	Counter NO.	Input assignment							
		X000	X001	X002	X003	X004	X005	X006	X007
Single phase single count input	C235	U/D							
	C236		U/D						
	C237			U/D					
	C238				U/D				
	C239					U/D			
	C240						U/D		
	C241	U/D	R						
	C242			U/D	R				
	C243					U/D	R		
	C244	U/D	R					S	
	C245			U/D	R				S
Single-phase dual-count input	C246	U	D						
	C247	U	D	R					
	C248				U	D	R		
	C249	U	D	R				S	
	C250				U	D	R		S
Dual-phase dual-count input	C251	A	B						
	C252	A	B	R					
	C253				A	B	R		
	C254							A	B
	C255				A	B	R		S

U: Up counter D: Down counter

A: A phase input B:B phase input

R: External reset input S: External start input

Single phase: at most 6 channels, max frequency is 60KHz

AB phase:

1 times frequency: 2 channels 30KHz + 1 channel 5KHz;

4 times frequency: at most 2 channels, max frequency is 24KHz.

2.9.2. Related soft element

1. For switching up/down counting of single-phase single-count input counter

Type	Counter NO.	Designated device	Up counting	Down counting
Single-phase single-count input	C235	M8235	OFF	ON
	C236	M8236		
	C237	M8237		
	C238	M8238		
	C239	M8239		
	C240	M8240		
	C241	M8241		
	C242	M8242		
	C243	M8243		
	C244	M8244		
	C245	M8245		

2. For monitoring the up/down counting direction of single-phase dual-count and dual-phase dual-count input counter

Type	Counter NO.	Designated device	Up counting	Down counting
Single-phase dual-count input	C246	M8246	OFF	ON
	C247	M8247		
	C248	M8248		
	C249	M8249		
	C250	M8250		
Dual-phase dual-count input	C251	M8251		
	C252	M8252		
	C253	M8253		
	C254	M8254		
	C255	M8255		

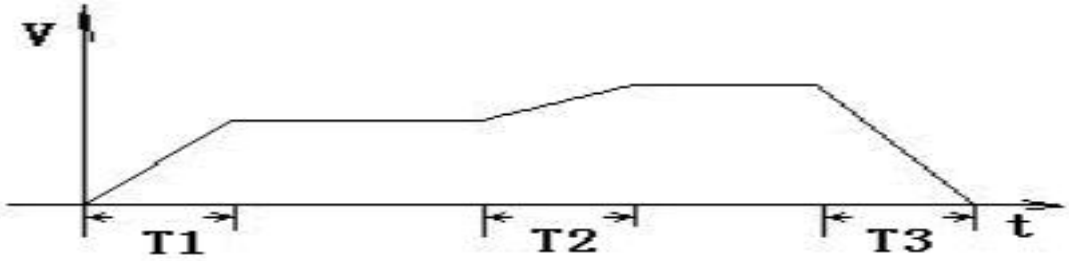
3. For high-speed counter function switching

Device name	Name	Content
M8198	Function switching device	1 times/4 times switching device for C251/C252
M8199		1 times/4 times switching device for C253/C255

2.10. Application of high speed pulse

2.10.1. High speed pulse output

Coolmay QM3G series plc default has 8 channels high speed pulse, Y0-Y3 each 200KHz, Y4-Y7 each 100KHz (Y4-Y7 total should not be over 200KHz),variable speed supported, the initial/final speed of start/stop is 0, diagram as below: (take accelerate and decelerate time D8148 as an example).



Acceleration/deceleration time T calculation=

(target speed-current speed)*acceleration/deceleration time÷maximum speed.

For example, target speed = 50000, current speed = 20000, acceleration time 100 (ms), maximum speed = 100,000, T = 30 ms.

QM3G plc: 8 channels of pulse, the last 4 channels of acceleration and deceleration = D8148, the maximum speed is D8146, D8147.

PLSY, ZRN, PLSV, DRVI, DRVA, DVIT, DSZR, only Y0-Y3 supports DVIT (interrupt positioning), DSZR (origin return with DOG search) instructions.

Pulse point / Function Description	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
Pulse operation monitoring	M8340	M8350	M8360	M8370	M8151	M8152	M8153	M8154
Position pulse （32bit）	D8340 D8341	D8350 D8351	D8360 D8361	D8370 D8371	D8140 D8141	D8142 D8143	D8144 D8145	D8160 D8161
Accelerate / decelerate time	D8348 D8349	D8358 D8359	D8368 D8369	D8378 D8379	D8148	D8148	D8148	D8148
Pulse stop bit	M8349	M8359	M8369	M8379	M8450	M8451	M8452	M8453
Maximum speed	D8343 D8344	D8353 D8354	D8363 D8364	D8373 D8374	D8146 D8147	D8146 D8147	D8146 D8147	D8146 D8147

The original FX3G pulse program can be used directly.

All the instruction support 8 channels pulse, except DVIT,DSZR which only support first 4 channels.

2.10.2. Circular interpolation

Normal interpolation function

The special flags when setting the interpolation route are as shown in the following table:

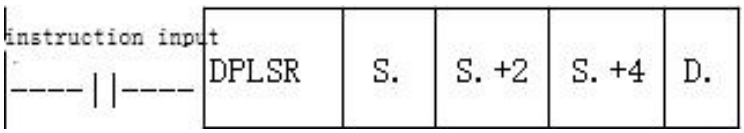
Interpolation mode	M8433	M8432
Line Interpolation	0	1
Center interpolation	1	0
Radius interpolation	1	1

The direction and coordinates of the center and radius interpolation are as shown in the following table:

Clockwise	M8435 = 0
Anticlockwise	M8435 = 1
Relative coordinate	M8434 = 0
Absolute coordinate	M8434 = 1

D8340 shows the current address of X axis，D8350 shows the current address of Y axis。

In CoolMay QM3G PLC,interpolation motion still adopts DPLSR for pulse output.



Description of the Operand:

S.　represents the pulse frequency, that is, the speed of the interpolation motion.

S.+2　represents the X-axis target address.

S.+4 represents the Y-axis target address.

D. specify the Y number with pulse output (Currently only supports Y0, the corresponding direction is Y4; Y1 is another axis, the corresponding direction is Y5).

In center interpolation mode:

S.+6 represents the center X coordinate address.

S.+8 represents the center Y coordinate address.

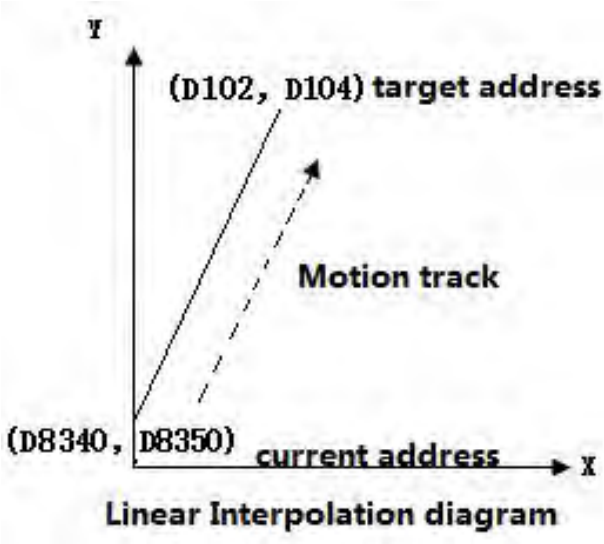
In radius interpolation mode:

S.+6 represents the radius length.

When it is positive, the path is a small circle; when it is a negative value, the path is a large circle.

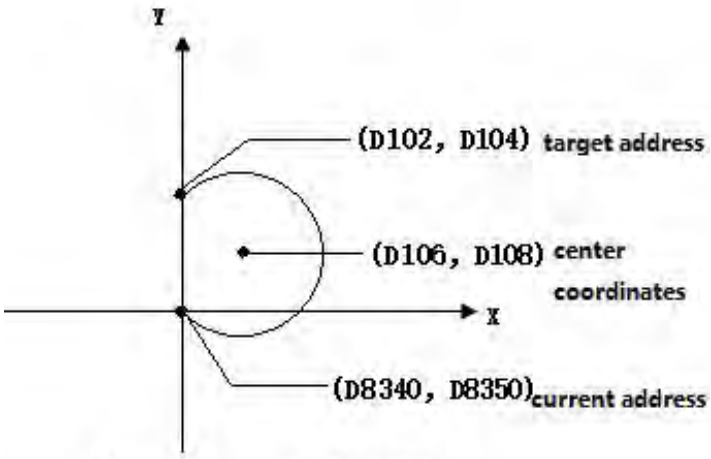
Example: DPLSR D100 D102 D104 Y000

In the linear interpolation: D100 is speed, D102 is the X-axis target address, and D104 is the Y-axis target address.Y0 and Y1 respectively pulse the X-axis and Y-axis.



Linear Interpolation diagram

In the Center interpolation: D100 is speed, D102 is the X-axis target address, D104 is the Y-axis target address, and D106 is the center X address. D108 is the center Y address. Y0 and Y1 respectively pulse the X-axis and Y-axis.

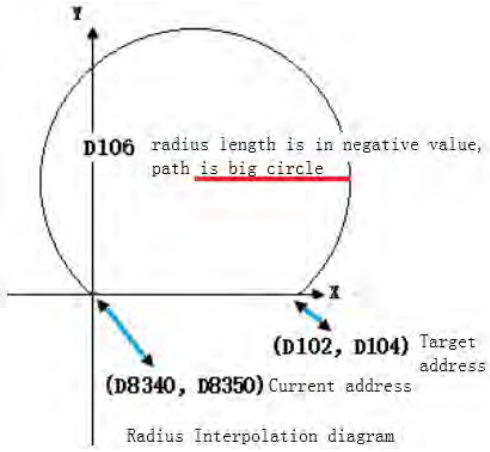


Center Interpolation Diagram

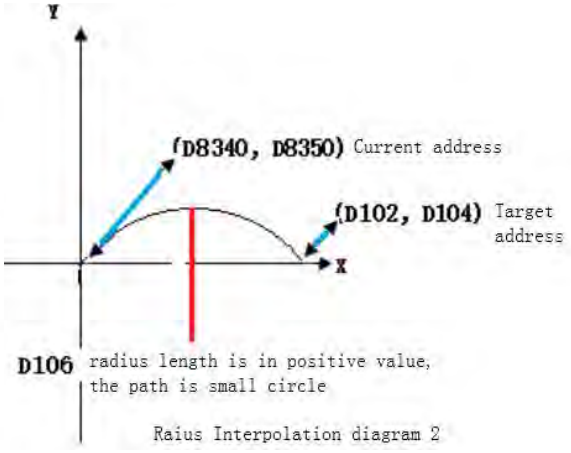
Note 1: The current address of X and Y must be on the same circle as the destination address.

Note 2: When the current address coincides with the target address, it indicates that the motion track is a full circle.

In the radius interpolation: D100 is speed, D102 is the X-axis target address, D104 is the Y-axis target address, and D106 is the radius length. Y0 and Y1 respectively pulse the X-axis and Y-axis.(The example below is clockwise, i.e. M8435=0)



Radius Interpolation diagram



Raius Interpolation diagram 2

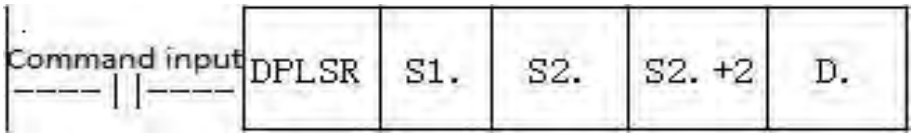
Continuous interpolation function

M8436 is the flag for the normal interpolation mode and continuous interpolation mode.

M8436=0: regular interpolation mode;

M8436=1: continuous interpolation mode;

In CoolMay QM3G series PLC, continuous interpolation motion uses DPLSR for pulse output.



Operand Description: All use 32-bit registers.

S. indicates the pulse frequency, that is, the speed of the interpolation motion.

S2. indicates the X-axis target address.

S2.+2 indicates the Y-axis target address.

In the center mode: S2.+4 and S2.+6 indicates the Center coordinates.

In radius mode: S2.+4 indicates the radius length, and S2.+6 ignores and unused.S2.+4 positive value: the path is a small circle; S2.+4 negative value: the path is a big circle.

S2.+8 is the control register.

D. specify the Y number with pulse output (only Y0 supported,the corresponding direction is Y4; Y1 is another axis, the corresponding direction is Y5).

In continuous interpolation mode, M8432~M8435 are determined by the 5th parameter (ie S.+8).

The function description of each bit of the 32-bit register S2.+8 is as follows:

32bit position	b31~b28	b27~b24	b23~b20	b19~b16	b15~b12	b11~b8	b7~b4	b3~b0
Function	Continuous interpolation execution and stop Flag position					Position mode	Interpolation direction	Interpolation mode

When S2.+8 is used, it is in hexadecimal. The bit values of each group are as below:

b3~b0	=1：linear mode interpolation =2：center mode interpolation =3：radius mode interpolation

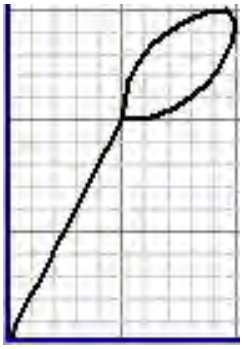
b7~b4	=0：clockwise rotation =1：counterclockwise rotation = any other value： linear mode
b11~b8	=1：relative position =2：absolute position
b31~b12	=00000：continuous interpolation execution =AAAAA：continuous interpolation stop

PS: When using linear mode interpolation, b7~b4 is ignored and can be set to any value from 2~F.

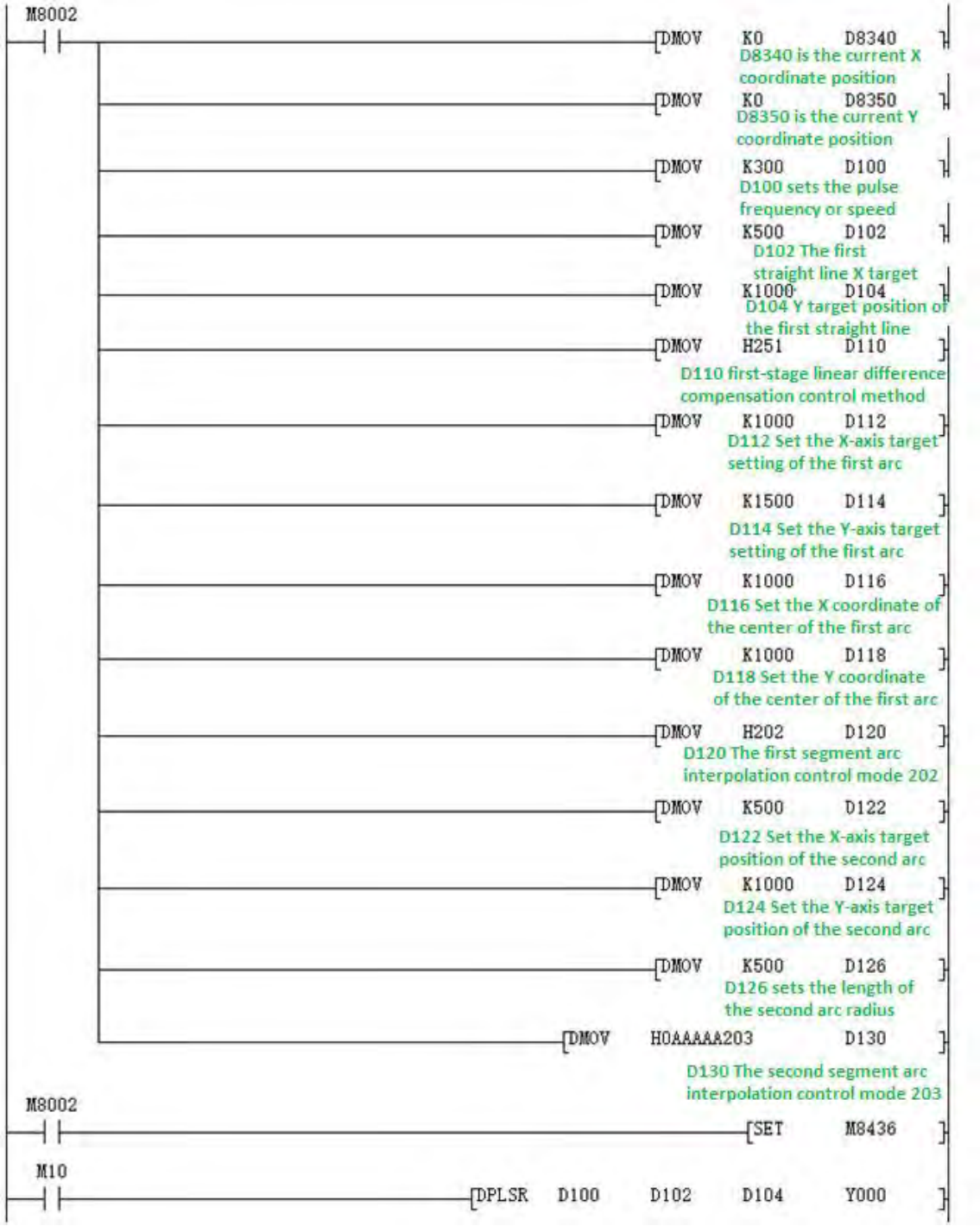
S1. and S2. may be set discontinuous. For example, S1.=D100, S2.=D120.

S2. Must be consecutive with the next four 32-bit registers. For example, it must be set to D102, D104, D106, D108, D110.

Example: draw a line and two arcs, as shown:



Program as below :

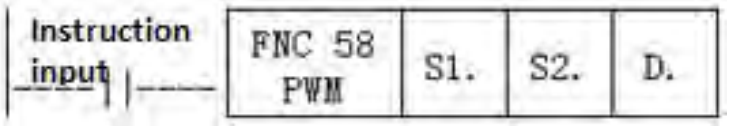


2.10.3. Pulse width modulation PWM

1. Summary: This instruction is used to specify pulse output with pulse period and ON time.

2. PWM instruction format and parameter description.

Instruction format:

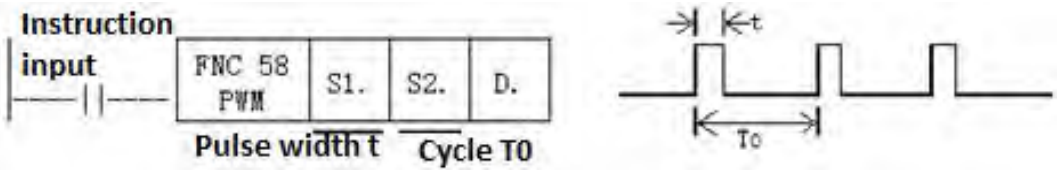


Parameter Description:

Operand type	content	type of data	Character device	Ranges
S1.	Pulse width (ms) data or word device number for storing data	BIN16 bit	KnX、KnY、KnM、KnS、T、C、D、R、V、Z、K、H	0~32767 ms
S2.	Cycle (ms) data or word device number for storing data	BIN16 bit	KnX、KnY、KnM、KnS、T、C、D、R、V、Z、K、H	1~32767 ms
D.	Output pulse device (Y) number	BIN16 bit	Y0-Y7	Y0-Y7

3. Description of functions and actions

16-bit operation (PID): output pulses with an ON pulse width of [S1.ms] in units of cycle[S2.ms].



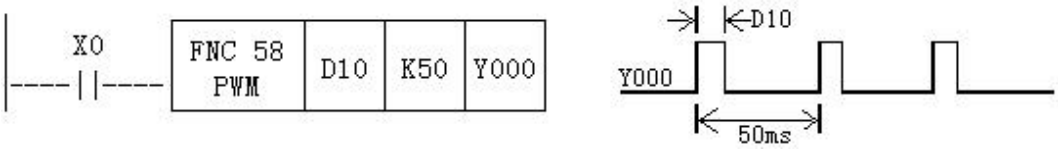
Pay attention to the points

The values of pulse width S1. and period S2. should be set as S1.≦S2.

When the command input is OFF, the output from D. is also OFF.

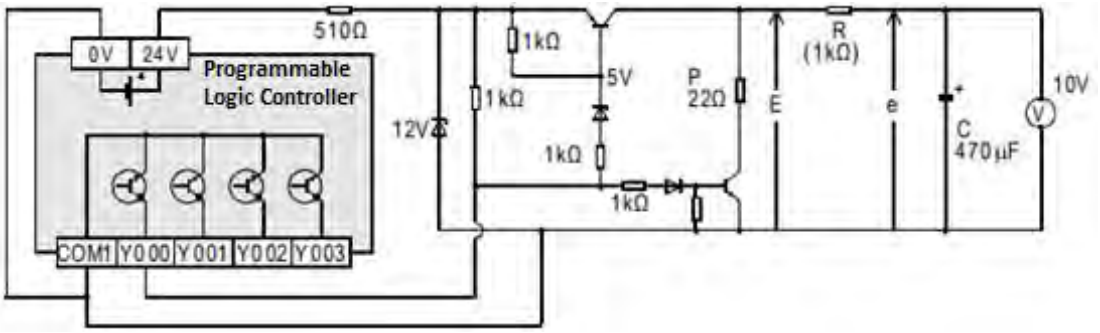
Do not operate the setting switch of the pulse output mode during pulse sending.

4. Sample program



In this example, the data range of D10 is changed from 0 to 50, and the average output of Y0 is 0 to 100%. If the data of D10 is greater than 50, an error will occur.

Example of smooth loop:



R >> P

t = R(KΩ) * C(μF) = 470ms >>T0

The time constant τ of the filter is a very large value compared to the pulse period T0.

The fluctuation value Δe in the average output current e is approximately

$$\frac{\Delta e}{e} \leqq \frac{T0}{\tau}$$

5. Special instructions

Conventional PWM

1) Support Y0-Y7 total 8 channels (please select transistor MT output);
2) There are no restrictions on pulse width and cycle, both in milliseconds (ms).

Special customized PWM-analog output port

The following parameters need to be provided during customizing selection:

1) The output voltage of the required PWM;
2) The output frequency of the required PWM;
3) Confirm the numbers of customized PWM, up to 8 PWMs. (depending on analog outputs that customer make).
4) Customize whether PWM coexists with other analog quantities. (If the product is additionally equipped with analog, analog output terminals DA0~DA3 are a group, DA4~DA7 are a group. When QM3G customizes PWM, the output frequency can only be installed with other analogs in a group when the output frequency is only 21KHz).

Special customized PWM - output frequency setting

When customizing the PWM, you do not need to use the PWM command,

just set the special register and then turn on the hardware.

The special registers used by each analog quantity correspond to the following table.

Analog output address	DA0	DA1	DA2	DA3	DA4	DA5	DA6	DA7
Duty cycle setting	D8050	D8051	D8052	D8053	D8054	D8055	D8056	D8057
PWM frequency division coefficient setting	D8268	D8268	D8268	D8268	D8278	D8278	D8278	D8278

D8050 to D8057: the corresponding duty cycle, the value range is 0~4000, each 1 is 0.025%, and the total corresponds to 0~100%;

D8268 and D8278: the value range is 1~100000Hz (32 bits);

D8050 to D8057 ≦ D8268 and D8278

When D8268 and D8278 are powered on, the default setting is 21000Hz, and the power is not maintained. Program assignment is required when using.

2.10.4. Handwheel pulse function

The handwheel pulse generator is commonly known as electronic handwheel and handwheel. It is mainly used for the setting of the teaching CNC machine work origin in CNC machine tools, manual stepping fine adjustment, and interruption insertion during processing. Widely used in CNC engraving and milling machines, CNC milling machines, CNC lathes, machining centers, CNC wire cutting machine tools, CNC EDM machine tools, printing equipment, textile machinery and other fields.

Coolmay QM3G series PLC supports the function of handwheel (only supports servo motors, not stepper motors). With the cooperation of QM3G PLC, the handwheel is used to control the rotation of the motor, which can realize the rotation of the handwheel by one pulse and the motor also rotates

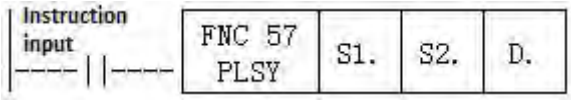
correspondingly number of pulses.

Special sign

M8228: Turn ON to enable the handwheel function (the original C228 function is temporarily not used).

Instruction format and parameter description when using handwheel.

Instruction format:

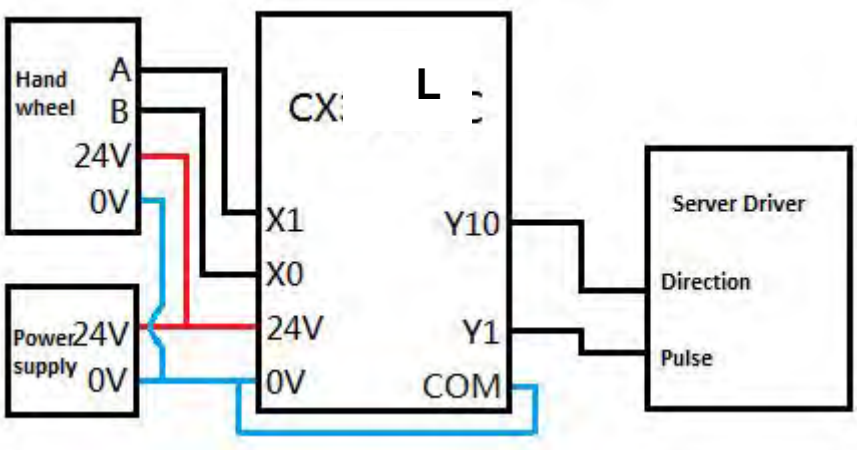


Parameter Description:

Operand type	content	type of data	Character device
S1.	Set the numerator of the input to output ratio	BIN16 set	K、D
S2.	Set the denominator of the input to output ratio	BIN16 set	K、D
D.	Output pulse device (Y) number	BIN16 set	Pulse：Y0-Y5 Corresponding direction：Y10-Y15

PS: When setting S1. and S2., S1. must be an integer multiple of S2. If it is 1:1, it means that the hand wheel rotates one pulse and the motor rotates one pulse; if it is an integer multiple of n, it means that the hand wheel rotates one pulse and the motor rotates n pulses;

The wiring of the handwheel is shown in the figure below:



The function program of the hand wheel is shown in the figure below:

This program is 1:1 pulse output, that is, how many pulses will Y0 output when the handwheel rotates how many pulse.

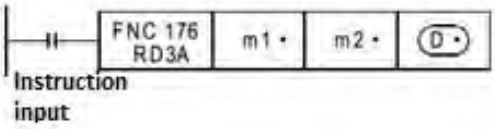
2.11. PLC communication port instruction

Each PLC has its own programming port (RS232). Two communication ports (RS232 or RS485) are optional, and a CAN port is optional to meet the needs of users to connect several types of equipment.

2.11.1. MODBUS instruction explanation and communication address

When PLC is used as the host, it supports ADPRW instruction, RD3A instruction and WR3A instruction. This section explains these three commands.

2.11.1.1. Function and operation description of read/write data command



Read data RD3A:

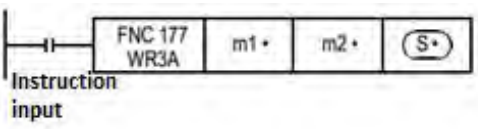
The RD3A instruction corresponds to the No. 03 function of Modbus.

m1 represents the station number of the read slave device, ranging from 1-247;

m2 represents the first address number of the read data in the slave device;

D. Represents the number of registers to be read, the range is 1-125 (the range is 1-45 in Modbus ASCII, and the range is 1-90 in CAN communication), and the read data are stored in the host **D.**+1, **D.**+2.

D.-1 Address value must be set (=0: serial port 2; =1: serial port 3; =2: CAN; =3: network MODBUS)



Write data WR3A:

The WR3A instruction corresponds to the No. 06 and No. 10 functions of

Modbus.

m1 represents the station number of the slave device to be written, ranging from 1-247.

m2 represents the first address number of the written register in the slave device;

S. indicates the number of registers to be written, the range is 1-123 (the range is 1-45 in Modbus ASCII, and the range is 1-90 in CAN communication). The data to be written is sequentially stored in the host S.+1, S.+2.

When S=1, WR3A instruction corresponds to Modbus function 06;

When S=2-123, WR3A instruction corresponds to Modbus No. 10 function;

S.-1 address value must be set (=0: serial port 2; =1: serial port 3; =2: CAN; =3: network MODBUS)

RD3A and WR3A only support the following functions of MODBUS RTU:

No. 03 function: read the holding register, and obtain the current binary value range 1-125 in one or more holding registers.

No. 06 function: Load the specific binary value into a holding register (write register), the range is 1.

No. 10 function: preset multiple registers, load specific binary values into a series of continuous holding registers (write multiple registers), the range is 1-123.

2.11.1.2. ADPRW instruction function and operation description

The ADPRW instruction supports the following functions of MODBUS RTU:

No. 01 function: read the coil status, get the current status (ON/OFF) of a group of logic coils, the range is 1-512

No. 02 function: read the input status, get the current status (ON/OFF) of a group of switch inputs, the range is 1-512

No. 03 function: read the holding register, obtain the current binary value in

one or more holding registers, the range is 1-125

No. 04 function: Get the current binary value in one or more input registers, the range is 1-125

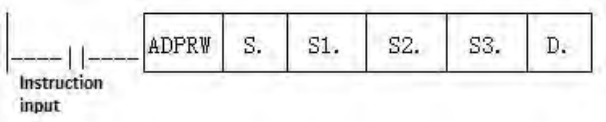
No. 05 function: force a single coil, force a logic coil on-off state (write position), range 1

No. 06 function: load the specific binary value into a holding register (write register), the range is 1

0F function: force setting of multiple coils, force setting of on-off of a series of continuous logic coils (write multiple digits), range 1-1968

No. 10 function: preset multiple registers, load specific binary values into a series of continuous holding registers (write multiple registers), range 1-125

ADPRW：



S. indicates the station number of the slave device to be read and written, ranging from 1-247;

S1. Represents the function code (that is, the 01-06, 15, 16 functions written above);

S2. The function parameter corresponding to each function code (for example, the operand represents the start address of MODBUS when the function is 01);

S3. The function parameter corresponding to each function code (for example, the operand indicates the number of access points in the 01 function, and the parameter is fixed to 0 in the 05 function);

D. Represents the starting position of the data storage device.

2.11.1.3. Word device communication address number

MODBUS device		L02 device
Input register (read only)	Holding register (read/write)	
-	0x0000～0x1F3F	D0～D7999
-	0x1F40～0x213F	D8000～D8511

-	0x2140～0x7EFF	R0～R23999
-	0x7F00～0xA13F	Unused address
-	0xA140～0xA27F	TN0～TN319
-	0xA280～0xA33F	Unused address
-	0xA340～0xA407	CN0～CN199
-	0xA408～0xA477	CN200～CN255
-	0xA478～0xA657	M0～M7679
-	0xA658～0xA677	M8000～M8511
-	0xA678～0xA777	S0～S4095
-	0xA778～0xA78B	TS0～TS319
-	0xA78C～0xA797	Unused address
-	0xA798～0xA7A7	CS0～CS255
-	0xA7A8～0xA7AF	Y0～Y177
0xA7B0～0xA7B7	-	Unused address
0xA7B8～0xA7BF	-	X0～X177
An error occurs when accessing an unused address CN200～255 are 32-bit counters		

2.11.1.4. Bit device communication address number

MODBUS device		L02 device
Input (read only)	Coil (read/write)	
-	0x0000～0x1DFF	M0～M7679
-	0x1E00～0x1FFF	M8000～M8511
-	0x2000～0x2FFF	S0～S4095
-	0x3000～0x313F	TS0～TS319
-	0x3140～0x31FF	Unused address
-	0x3200～0x32FF	CS0～CS255
-	0x3300～0x337F	Y0～Y177
0x3380～0x33FF	-	Unused address
0x3400～0x347F	-	X0～X177
An error occurs when accessing an unused address		

2.11.1.5. ADPRW instruction function parameters

Operand / Functions	S1. Function code	S2. MODBUS address/sub function code	S3. Access points/sub function data	D. Data storage device start
Coil readout	1H	MODBUS address： 0000H~FFFFH	Access points： 1~2000	Read target device D.R.M.Y.S
Input readout	2H	MODBUS address： 0000H~FFFFH	Access points： 1~2000	Read target device D.R.M.Y.S

Holding register read	3H	MODBUS address: 0000H~FFFFH	Access points: 1~125	Read target device D.R
Input register read	4H	MODBUS address: 0000H~FFFFH	Access points: 1~125	Read target device D.R
Single coil write	5H	MODBUS address: 0000H~FFFFH	0(fixed)	Write target device D.R.X.Y.M.S 0=bit OFF/1=bit ON
Single register write	6H	MODBUS address: 0000H~FFFFH	0(fixed)	Write target device D.R
Batch coil write	FH	MODBUS address: 0000H~FFFFH	Access points: 1~1968	Write target device D.R.X.Y.M.S
Batch register write	10H	MODBUS address: 0000H~FFFFH	Access points: 1~123	Write target device D.R

2.11.2. Serial port 2: RS485 (A B)

Support Mitsubishi programming port protocol, Mitsubishi BD board protocol, free port protocol and MODBUS RTU protocol;

The special relays and special registers involved in this serial port are as follows:

Functions	Serial port 2(A/B)	Serial port 3(A1/B1)	CAN(H/L)	Remark
Mitsubishi programming port protocol	M8196=0	M8192=0	-	26232 or higher version: power lost can not be retentive
Freeport protocol function	M8196=1 M8125=0	M8192=1	-	
RS/RS2 sending mark	M8122=1	M8402=1	M8422=1	
RS/RS2 sending completion mark	-	-	M8425	Need to reset manually
RS/RS2 receiving completion mark	M8123	M8403	M8423	Need to reset manually
RS/RS2 receiving process mark	M8124	M8404	M8424	Data is receiving
RS/RS2 command 8/16 bits differentiation mark	M8161	M8161	M8161	
RS command CAN master-slave mark	-	-	M8426	M8426=0 master-slave mode, M8426=1 multi-device mode
RS2 command end operation settings	-	1	2	

MODBUS function	M8196=1 M8125=1	M8192=1	-	
RD3A/WR3A Receive correct mark	M8128	M8408	M8428	Automatic reset
RD3A\WR3A communication over-time mark	M8129	M8409	M8429	Automatic reset
ADPRW command completion mark	M8029	M8029	M8029	Command execution end mark
Communication parameters	D8120	D8400	D8420	
Communication mode	-	D8401	D8421	
Master-slave station number	D8121	D8414	D8434 D8440 D8442	D8434: CAN slave station NO D8440/D8442: multi-device mode ID NO
RD3A/WR3A overtime	D8129	D8409	D8429	Unit: ms (detailed setting, refer to explanation)
RD3A/WR3A interval period	D8126	D8406	D8426	
RD3A\WR3A end operation -1	0	1	2	
ADPRW command settings	D8126=0	D8126=1	D8126=2	
ADPRW command settings	D8397=0	D8397=1	D8397=2	
CAN data frame	-	-	M8427	

M8196: the activation flag of using programming port protocol and other protocol.

M8125: the activation flag of using MODBUS and the original Mitsubishi function.

M8122: RS sending flag (this bit needs to be set 1 when using the RS instruction, and it will automatically reset after sending).

M8123: RS receiving completion flag (need to reset manually).

M8124: RS command data is being received.

M8161: 8-bit/16-bit mode flag of RS instruction

M8128: RD3A / WR3A receive the correct flag.

M8129:RD3A/WR3A communication over-time flag. (when communication is over-time, flag is ON)

M8029: Communication complete flag (communication complete flag when using ADPRW instruction, manual reset is required)

D8120: Save the communication parameter settings of Modbus RTU

protocol, see the following figure.

D8121: Save the station number of the master or slave. (This value must be set to the maximum K255 when doing the host)

D8129: RD3A and WR3A timeout time(The unit is milliseconds. It is recommended to set: when the communication rate is set to be greater than or equal to 9600, D8129 is set to 10~20; when the communication rate is set to be less than 9600, D8129 is set to 20~50).

D8126: Number of interval cycles. Default=10 (times).

D8397: When using the serial port 2 for ADPRW instruction, D8397 must be set to 0.

Support RS, WR3A, RD3A, ADPRW instructions. Can be set in the parameter zone, corresponding to serial port 2. The parameter zone settings are only valid for this channel. It is invalid for serial port 3.

2.11.2.1. Mitsubishi programming port

When used as Mitsubishi programming port protocol: set M8196=0.

2.11.2.2. Modbus RTU Protocol

Mitsubishi BD Protocol

When used as the Mitsubishi BD protocol function: set M8196=1, M8125=0; D8120 is set as the communication parameter, and D8121 is set as the slave station number. For example, set D8120=H6086, D8121=H1 (communication parameter is 9600/7/E/1, slave station number is 1).

D8120 parameter setting

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0

b0	Data length 0: 7 bits 1: 8 bits
b1	Parity (b2,b1)

b2	00: None; 01: Odd; 11: Even
b3	Stop bit 0:1 bit 1: 2 bits
b4 b5 b6 b7	Baud rate (b7,b6,b5,b4) (0100):600bps (0101):1200bps (0110):2400bps (0111):4800bps (1000):9600bps (1001):19200bps (1010):38400bps (1011):57600bps (1101):115200bps
b8 b9 b10 b11	Set 0
b12	Set 0
b13	Set 1
b14	Set 1
b15	Set 0

Example of PLC as slave program:

HMI can communicate with PLC by setting BD protocol master station.

2.11.2.3. Freeport protocol functions and examples

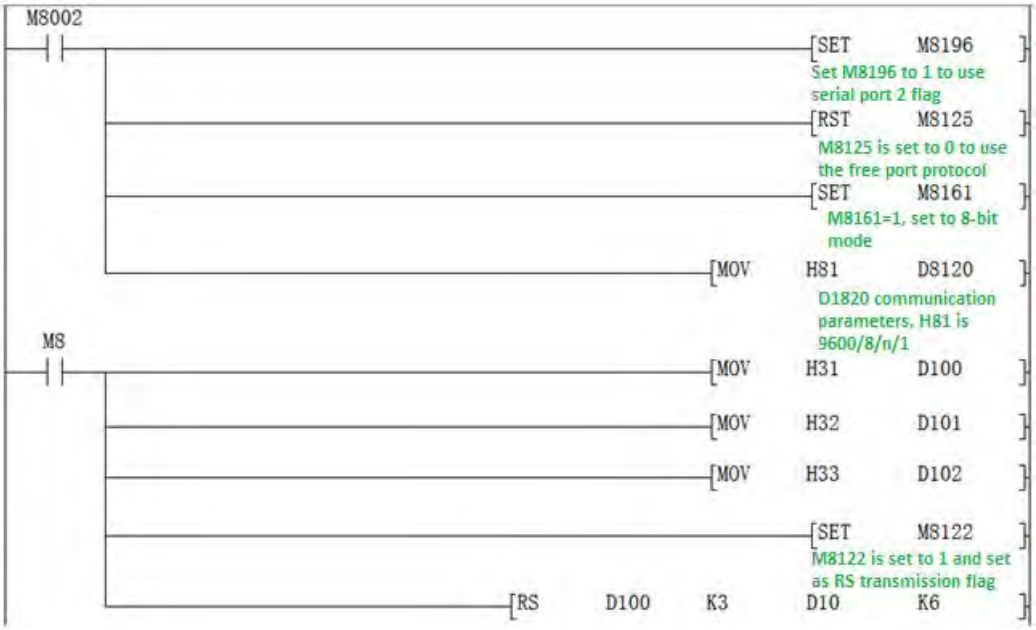
When used as Mitsubishi Freeport protocol function: set M8196=1, M8125=0; the difference between Mitsubishi protocol 1 and protocol 4 is that there are end characters 0A 0D (stored in D8124 and D8125 respectively)

For Mitsubishi Freeport Protocol, RS instruction is supported, the D8120 only needs to set the value of the lower 8 bits.

b7	b6	b5	b4	b3	b2	b1	b0

b0	Data length 0: 7 bits 1: 8 bits
b1 b2	Parity (b2,b1) 00: None; 01: Odd; 11: Even
b3	Stop bit 0:1 bit 1: 2 bits
b4 b5 b6 b7	Baud rate (b7,b6,b5,b4) (0100):600bps (0101):1200bps (0110):2400bps (0111):4800bps (1000):9600bps (1001):19200bps (1010):38400bps (1011):57600bps (1101):115200bps

Program example:



The data obtained by using the serial port tool to monitor the serial port 2 is:

[2019:11:01:10:49:16] [Receive] 31 32 33

2.11.2.4. Modbus RTU protocol

When used as Modbus RTU protocol: set M8196=1, M8125=1; D8120 is set as communication parameter, D8121 is set as slave station number. For example, set D8120=HE081, D8121=H1 (communication parameter is 9600/8/n/1, slave station number is 1).

D8120 parameter setting:

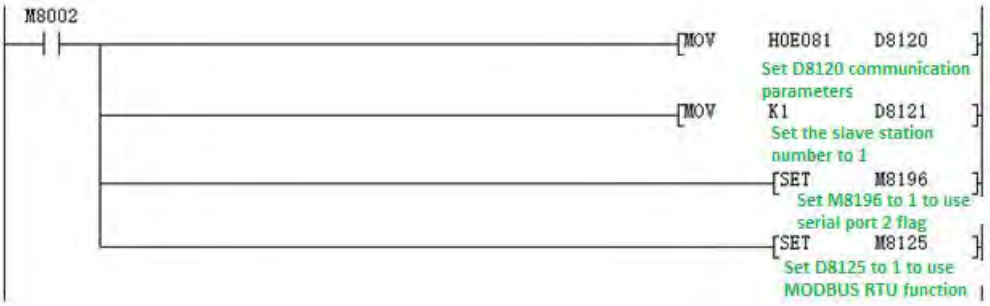
b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0

b0	Data length 0: 7 bits 1: 8 bits
b1 b2	Parity (b2, b1) 00: None; 01: Odd; 11: Even
b3	Stop bit 0:1 bit 1: 2 bits
b4 b5 b6 b7	Baud rate (b7,b6,b5,b4) (0100):600bps (0101):1200bps (0110):2400bps (0111):4800bps (1000):9600bps (1001):19200bps (1010):38400bps (1011):57600bps (1101):115200bps
b8	Set 0

b9	
b10	
b11	
b12	RTU/ASCII mode setting 0:RTU 1:ASCII
b13	Set 1
b14	Set 1
b15	Set 1

RD3A program example (refer to chapter 2.11.1.1 for instruction introduction):

Slave program:



Host program:

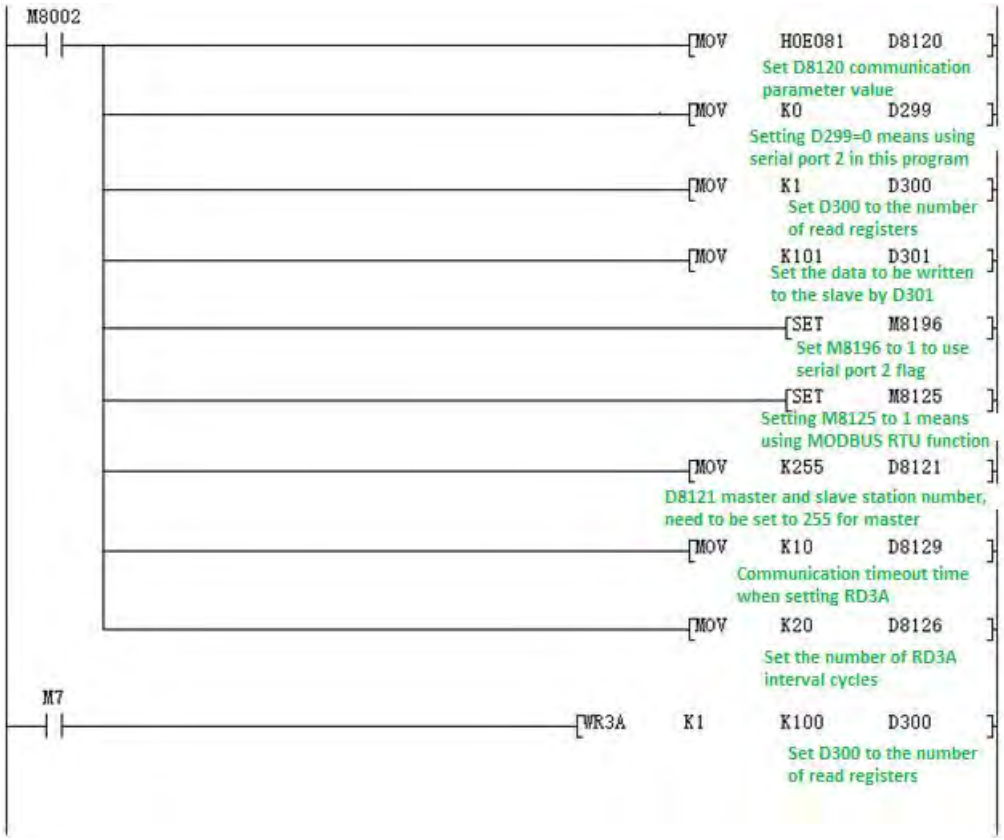
Program explanation:

D300 saves the number of registers read, here it means reading 10 data. When using serial port 2, D.-1, here D299 must be set to 0.

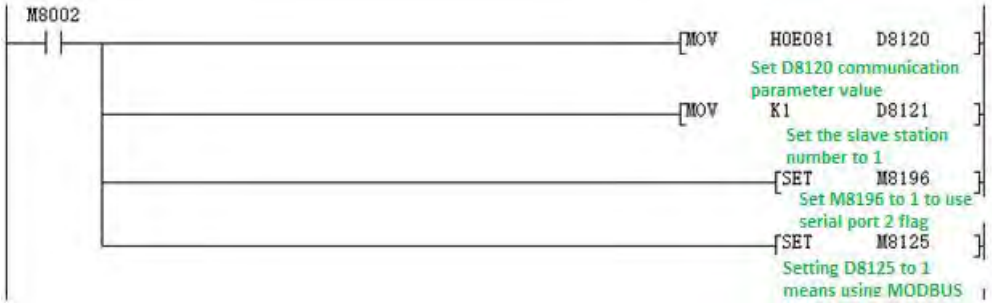
The program means to read a total of 10 data from registers D100-D109 in the PLC whose slave station is 1, and save them in the registers D301-D310 of the master station PLC.

WR3A program example (refer to chapter 2.11.1.1 for instruction introduction):

Host program:



Slave program:



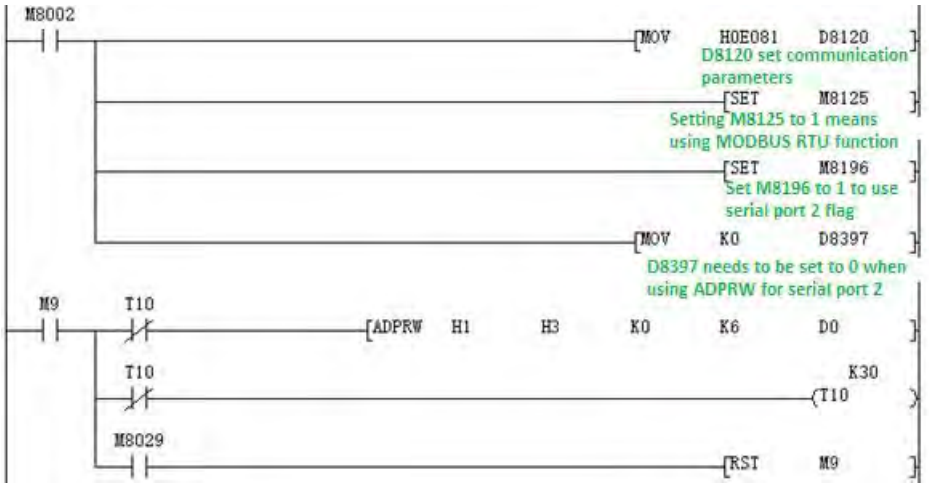
Program explanation:

The program means to write 1 data of register D301 in the master station PLC to the slave station as 1 PLC, and save it in the slave station PLC register D100.

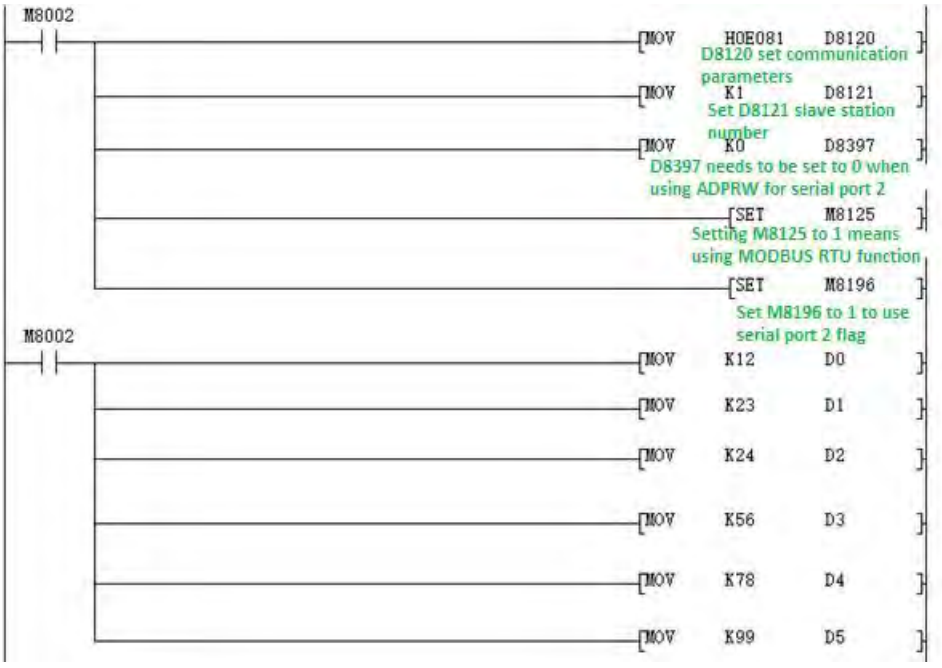
2.11.2.5. Modbus RTU function ADPRW instruction

03 function code holding register output program example(refer to chapter 2.11.1.2 for instruction introduction)

Host program:



Slave program:



Use the serial port tool to monitor the serial port 2 to get the following data:

[2017:11:01:17:48:54][receive]01 03 00 00 00 06 C5 C8

[2017:11:01:17:48:54][receive]01 03 0C 00 0C 00 17 00 22 00 38 00 4E 00 63 C4 29

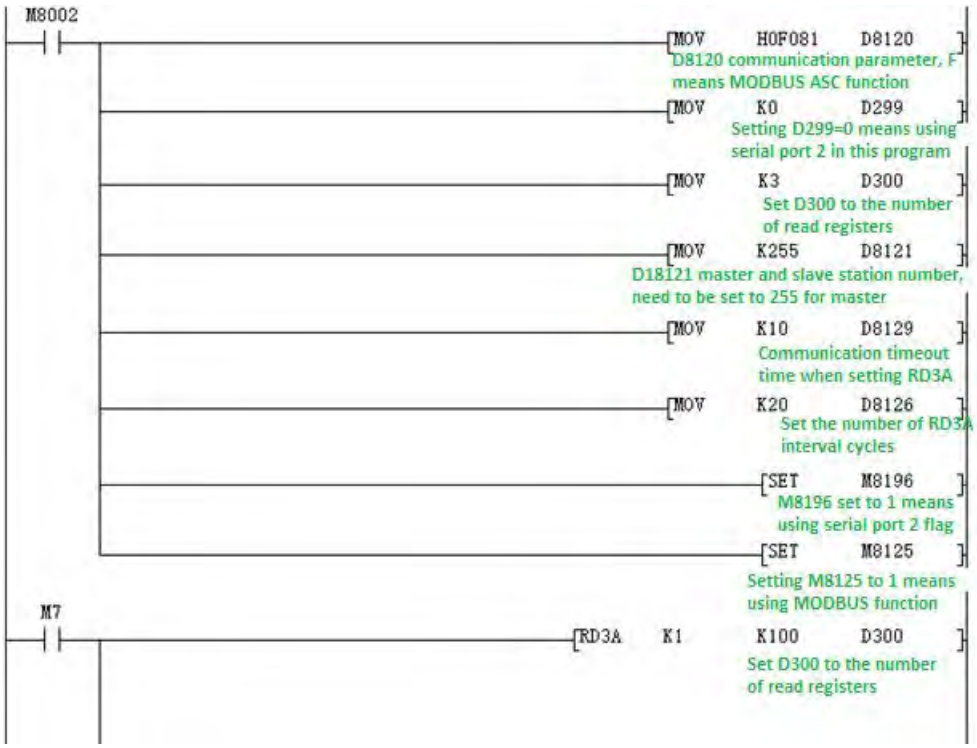
2.11.2.6. Modbus ASCII protocol

When used as Modbus ASCII protocol: The specific parameter settings are the same as 2.11.2.3, only the 12th bit setting of D8120 is different. For specific settings, refer to the introduction of D8120 parameter settings in chapter 2.11.2.3.

Note: In Modbus ASCII protocol, ADPRW command is not supported.

Program example:

Host program:



Slave program:

The data display status of the host D300~D303 before and after program execution is shown in the figure below.

Device	+F E D C	+B A 9 8	+7 6 5 4	+3 2 1 0	
D300	0 0 0 0	0 0 0 0	0 0 0 0	0 0 1 1	3
D301	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0
D302	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0
D303	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0

Monitor the data of D300-D301 before the host M7 is turned on

Device	+F E D C	+B A 9 8	+7 6 5 4	+3 2 1 0	
D300	0 0 0 0	0 0 0 0	0 0 0 0	0 0 1 1	3
D301	0 0 0 0	0 0 0 0	0 0 1 0	0 0 1 1	35
D302	0 0 0 0	0 0 0 0	0 0 1 0	0 1 0 0	36
D303	0 0 0 0	0 0 0 0	0 0 1 0	0 1 0 1	37
D304	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0

Data of D300-D303 after M7 is turned on

2.11.3. Serial port 3:RS485(A1 B1)/RS232

Support Mitsubishi programming port protocol, RS2 protocol and MODBUS RTU protocol;

The special relays and special registers involved in this serial port are as follows:

Functions	Serial port 2(A/B)	Serial port 3(A1/B1)	CAN(H/L)	Remark
Mitsubishi programming port	M8196=0	M8192=0	-	26232 or higher version: power lost can not be retentive
Freeport protocol function	M8196=1 M8125=0	M8192=1	-	
RS/RS2 sending mark	M8122=1	M8402=1	M8422=1	
RS/RS2 sending completion mark	-	-	M8425	Need to reset manually

RS/RS2 receiving completion mark	M8123	M8403	M8423	Need to reset manually
RS/RS2 receiving process mark	M8124	M8404	M8424	Data is receiving
RS/RS2 command 8/16 bits differentiation mark	M8161	M8161	M8161	
RS2 command CAN master-slave mark	-	-	M8426	M8426=0 master-slave mode, M8426=1 multi-device mode
RS2 command end operation settings	-	1	2	
MODBUS function	M8196=1 M8125=1	M8192=1	-	
RD3A/WR3A Receive correct mark	M8128	M8408	M8428	Automatic reset
RD3A\WR3A communication over-time mark	M8129	M8409	M8429	Automatic reset
ADPRW command completion mark	M8029	M8029	M8029	Command execution end mark
Communication parameters	D8120	D8400	D8420	
Communication mode	-	D8401	D8421	
Master-slave station number	D8121	D8414	D8434 D8440 D8442	D8434:CAN slave station Number D8440\D8442 multi-device mode ID Number
RD3A/WR3A overtime	D8129	D8409	D8429	Unit: ms (detailed setting,refer to explanation)
RD3A/WR3A interval period	D8126	D8406	D8426	26232 or higher version
RD3A/WR3A end operation -1	0	1	2	
ADPRW command settings	D8126=0	D8126=1	D8126=2	
ADPRW command settings	D8397=0	D8397=1	D8397=2	
CAN data frame	-	-	M8427	

M8192: Use the programming port protocol and the enable flag of other protocols.

M8402: Send flag (used in RS2 command).

M8403: Communication end flag (communication end flag when using RS2 instruction, needs to be reset manually).

M8404: Data receiving.

M8408: Communication completion flag (valid when using RD3A and WR3A for MODBUS communication, manual reset is required).

M8409: Communication timeout.

M8029: Communication completion flag (communication completion flag when using ADPRW instruction, manual reset is required).

M8161: 8-bit/16-bit mode distinction flag for RS/RS2 instructions

D8400: Save the communication parameters of Modbus RTU protocol, see the setting introduction in the table for details.

D8401: Save the communication mode of serial port 3.

D8401=H0 means RS2 free communication mode.

For Modbus RTU: D8401=H11 means the PLC is the slave station; D8401=H1 means the PLC is the master station.

For Modbus ASCII: D8401=H111 indicates that the PLC is a slave station; D8401=H101 indicates that the PLC is a master station.

D8406: The number of interval cycles. Default=12 (times).

D8409: Timeout time. (The unit is milliseconds, and it is recommended to set: when the communication rate setting is greater than or equal to 9600, D8409 is set to 10~20; when the communication rate setting is less than 9600, D8409 is set to 20~50).

D8414: Save the station number of the master or slave. (This value must be set to the maximum K255 when doing the host)

D8397: When using ADPRW instruction, use serial port 3, and D8397 must be set to 1.

Support RS2, WR3A, RD3A, ADPRW instructions. Can be set in the parameter area, corresponding to serial port 3. The parameter area setting is only valid for this channel. It is invalid for serial port 2.

D8400 communication parameter format setting:

b0	Data length 0: 7 bits 1: 8 bits
b1 b2	Parity (b2, b1) 00: None 01: Odd odd 11: Even
b3	Stop bit 0:1 bit 1: 2 bits

b4 b5 b6 b7	Baud rate (b7,b6,b5,b4) 0100:600bps 0101:1200bps 0110:2400bps 0111:4800bps 1000:9600bps 1001:19200bps 1010:38400bps 1011:57600bps 1100: Not use 1101:115200bps
b8~b15	Not available, set to 0

D8401 communication parameter format setting:

b0	Select protocol 0: Other communication protocol 1: MODBUS protocol
b1~b3	Not available, set to 0
b4	Master/slave setting 0: MODBUS master 1: MODBUS slave
b5~b7	Not available, set to 0
b8	RTU/ASCII mode setting 0: RTU 1: ASCII
b9~b15	Not available, set to 0

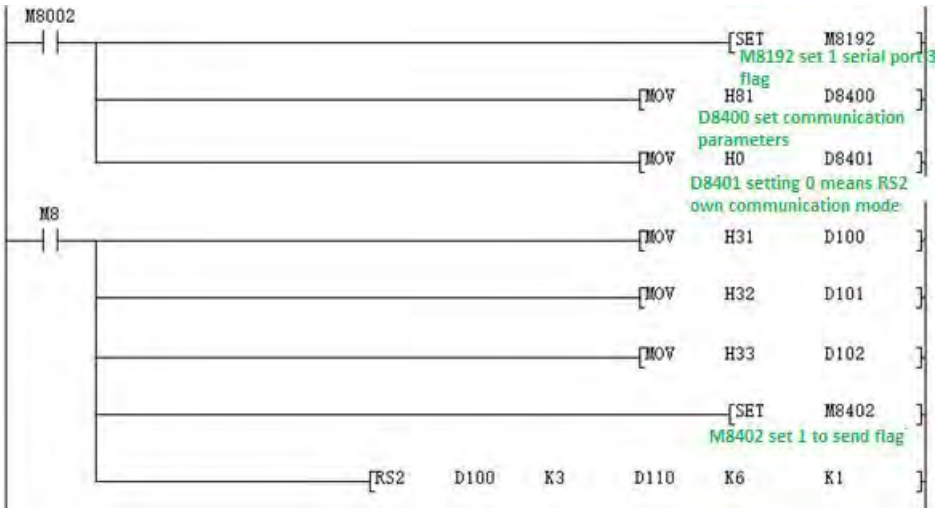
2.11.3.1. Mitsubishi programming port protocol

When used as Mitsubishi programming port protocol: set M8192=0.

2.11.3.2. Freeport protocol function

When used as Mitsubishi Freeport protocol function: set M8192=1, M8402=1;

Program example:



The data obtained by using the serial port tool to monitor the serial port 3 is:

[2017:11:01:11:49:16][receive]31 32 32

RS2 command last parameter =1: Serial port 3;

=2: CAN.

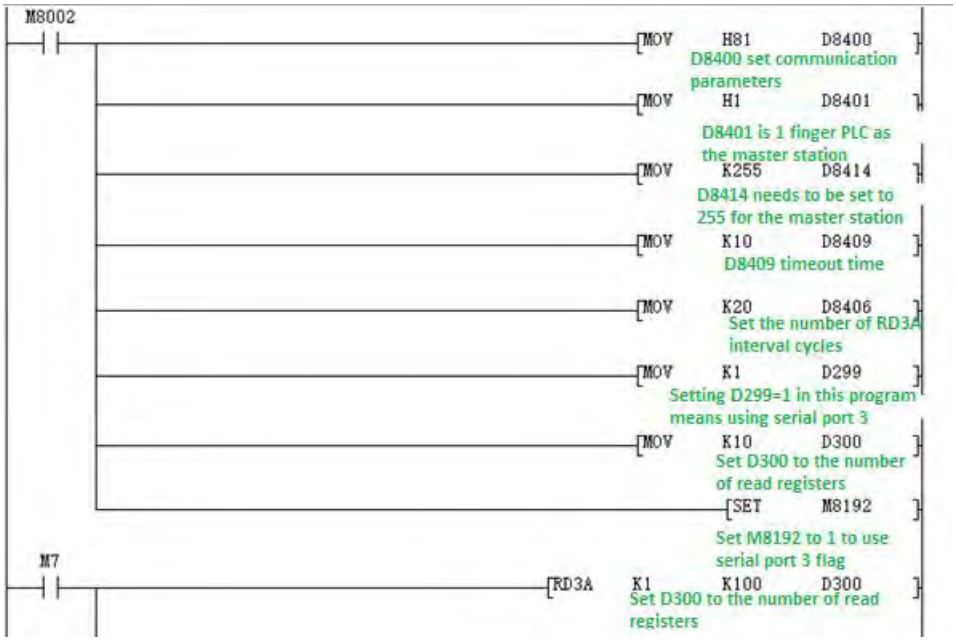
2.11.3.3. Modbus RTU function RD3A/WR3A instruction

When used as Modbus RTU protocol: set M8192=1; set D8400 as the communication parameter, and set D8414 as the master and slave station number.

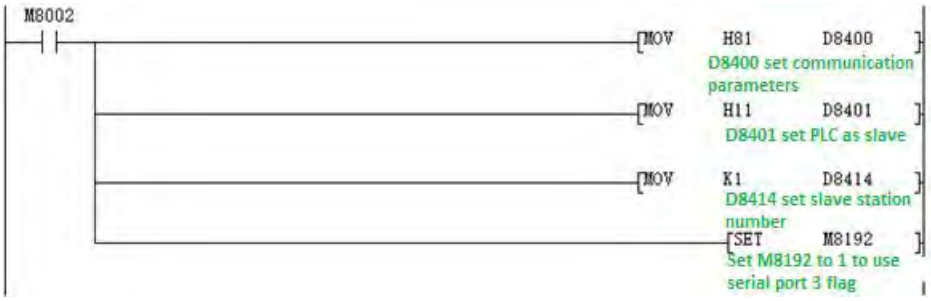
For example, set D8400=H81, D8414=K1 (communication parameter is 9600/8/n/1, slave station number is 1).

RD3A program example (refer to chapter 2.11.1.1 for instruction introduction):

Host program:



Slave program:



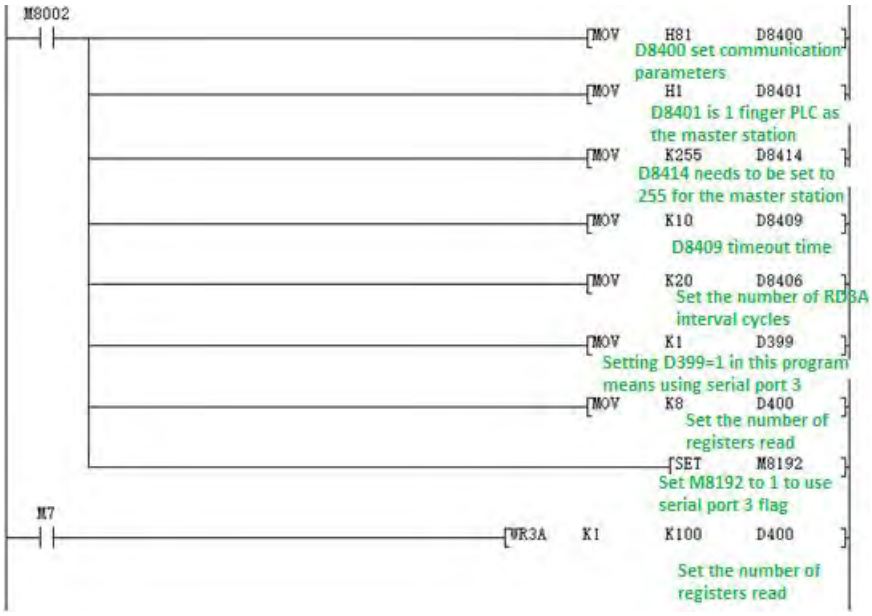
Use the serial port tool to monitor the serial port 3 data, and get the following results:

[2017:11:01:09:00:11][receive]01 03 00 64 00 0A 84 12

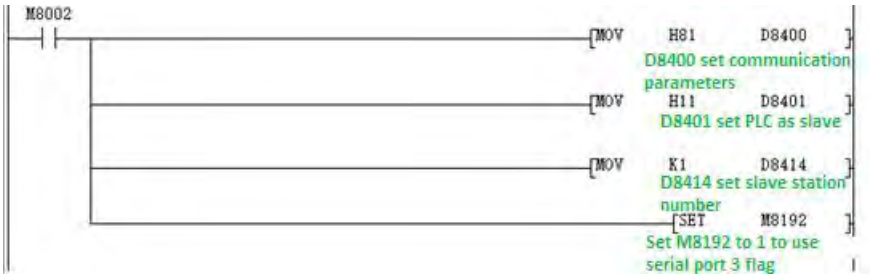
[2017:11:01:09:00:11][receive]01 03 14 00 42 00 4D 00 58 00 58 00 63 00 37 00 2C 00 21 00 16 00 0B 9F C7

WR3A program example (refer to chapter 2.11.1.1 for instruction introduction):

Host program:



Slave program:



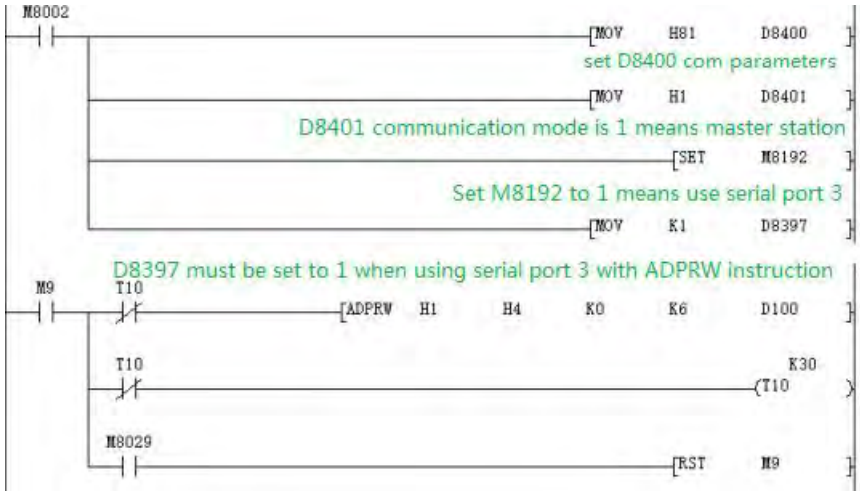
Use the serial port tool to monitor the serial port 3 data, and get the following results:

[2017:11:01:09:25:20][receive]01 10 00 64 00 08 10 00 0B 00 16 00 21 00 2C 00 37 00 42 00 4D 00 58 D1 6C

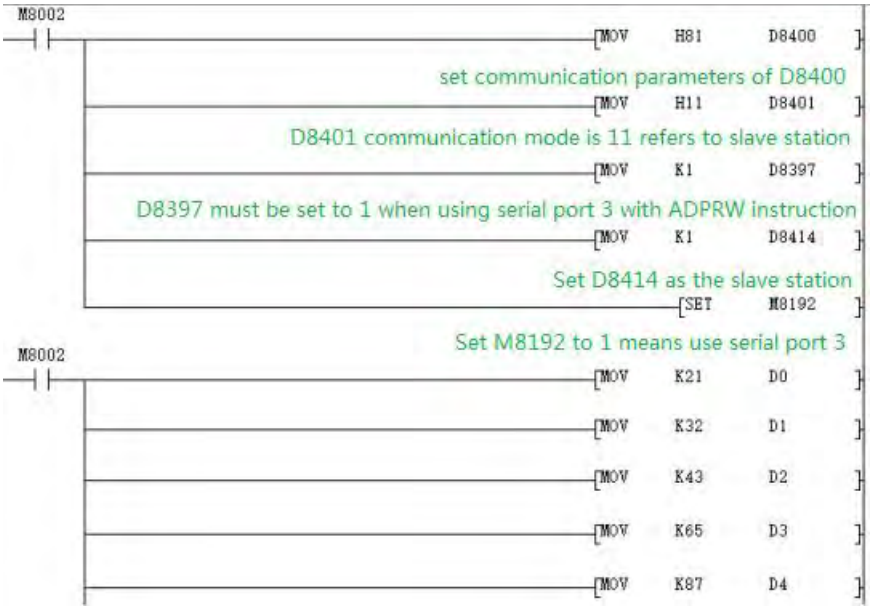
2.11.3.4. Modbus RTU Function ADPRW instruction

04 Input register readout demo program **(detail of instruction introduction please refer to chapter 2.11.1.2)**

Master program:



Slave program:



Use the serial port tool to monitor data of serial port 3 , and get the following results:

[2017:11:01:17:38:34][receive]01 04 00 00 00 06 70 08

[2017:11:01:17:38:34][receive]01 04 0C 00 15 00 20 00 2B 00 41 00 57 00 00 5F A7

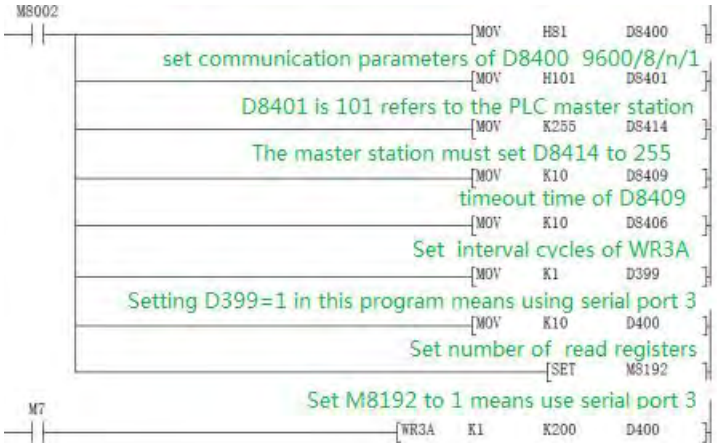
2.11.3.5. Modbus ASCII function

When used as Modbus ASCII protocol: the specific parameter settings are the same as 2.11.3, only the 8th bit setting of D8401 is different. For specific settings, see the introduction of D8401 parameter settings.

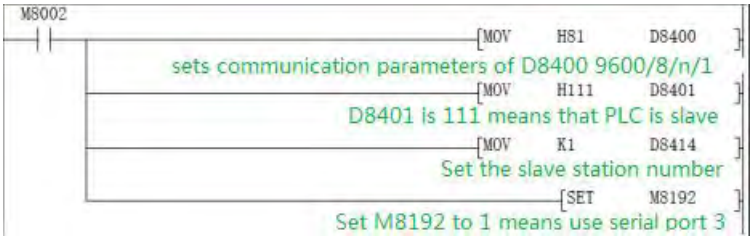
Note: In modbus ASCII protocol, ADPRW command is not supported.

Demo program：

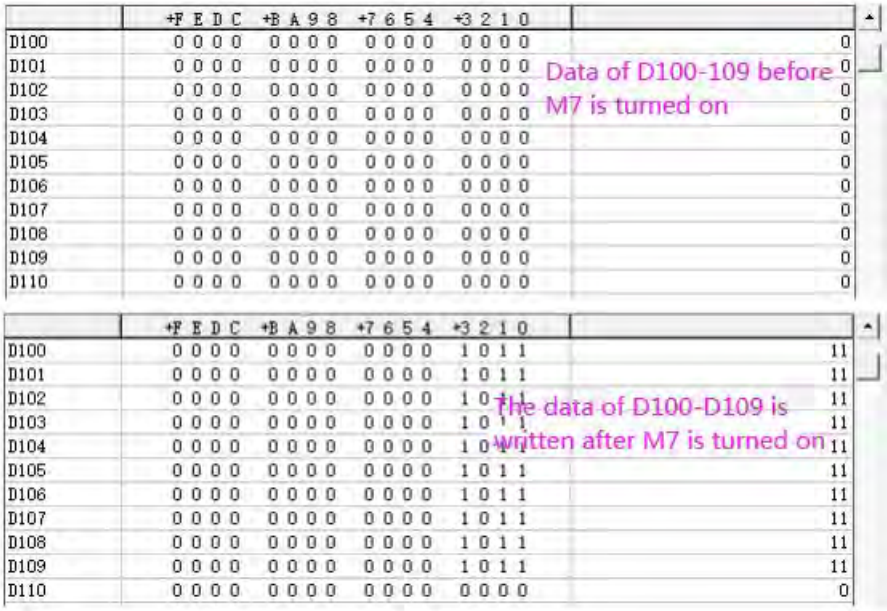
Master program：



Slave program：



The data display status of slave D100~D109 before and after program execution is shown in the figure below.



2.11.4. CAN Communication port

Support RS2 protocol and MODBUS RTU protocol. Note: After the CAN port setting is completed, the PLC must be disconnected (at least 15 seconds).

The special relays and special registers involved are as follows:

Functions	Serial port 2(A/B)	Serial port 3(A1/B1)	CAN(H/L)	Remark
Programming port	M8196=0	M8192=0	-	26232 or higher version: power lost can not be retentive
Freeport protocol function	M8196=1 M8125=0	M8192=1	-	
RS/RS2 sending mark	M8122=1	M8402=1	M8422=1	
RS/RS2 sending completion mark	-	-	M8425	Need to reset manually
RS/RS2 receiving completion mark	M8123	M8403	M8423	Need to reset manually
RS/RS2 receiving process mark	M8124	M8404	M8424	Data is receiving
RS/RS2 command 8/16 bits differentiation mark	M8161	M8161	M8161	
RS2 command CAN master-slave mark	-	-	M8426	M8426=0 master-slave mode, M8426=1 multi-device mode
RS2 command end operation settings	-	1	2	
MODBUS function	M8196=1 M8125=1	M8192=1	-	
RD3A/WR3A Receive correct mark	M8128	M8408	M8428	Automatic reset
RD3A/WR3A communication over-time mark	M8129	M8409	M8429	Automatic reset
ADPRW command completion mark	M8029	M8029	M8029	Command execution end mark
Communication parameters	D8120	D8400	D8420	
Communication mode	-	D8401	D8421	
Master-slave station number	D8121	D8414	D8434 D8440 D8442	D8434:CAN slave station number D8440/D8442 multi-device mode ID number
RD3A/WR3A time-out period	D8129	D8409	D8429	Unit: ms, see explanation for detailed settings

RD3A/WR3A interval period	D8126	D8406	D8426	
RD3A\WR3A end operation -1	0	1	2	
ADPRW command settings	D8126=0	D8126=1	D8126=2	
ADPRW command settings	D8397=0	D8397=1	D8397=2	
CAN data frame	-	-	M8427	

M8422:Send data, reset automatically at the end of sending

M8423:The data is received;

M8424:Data is being received;

M8425:After sending, it needs to be reset manually;

M8426：Multi-machine mode and master-slave mode switching

M8426=1: CAN is a multi-machine mode, there is no distinction between master and slave, and can transmit up to 8 bytes of data.

M8426=0: In CAN master-slave mode, there must be one master on the bus, which is similar in function to MODBUS.

M8427：=0 means set to CAN2.0B extended frame, =1 means set to CAN2.0A standard frame.

M8428：It turns ON when the MODBUS communication response is correct, and it needs to be reset manually.

M8429：Communication timed out.

D8420：Communication parameters.

The 0th~9th bits of D8420 are CAN baud rate, 1K~1023K. The default is 500.

Supported baud rate：5 10 15 20 25 40 50 62 80 100 125 200 250
400 500 666 800 1000

D8421：Communication protocol and description of master and slave stations;

For RS2 instruction: D8421=H10 should be set, which means free agreement.

For RD3A, WR3A, and ADPRW : D8421=H1 means master station, D8421=H11 means slave station.

D8397: When using CAN in ADPRW instruction, D8397 must be set to 2.

D8426：Number of interval cycles, default=12 (times);

D8429：Timeout time, (unit: milliseconds, recommended setting: when the communication rate setting is greater than or equal to 9600, D8429 is set to 10~20; when the communication rate setting is less than 9600, D8429 is set to 20~50; when using RD3A and WR3A, the master station timeout time is set to about 6 longer than the slave station timeout time).

D8434：Slave station number

D8440：Save the ID number of the machine (slave station number).

D8442：When multi-channel interconnection, save the slave station ID number (which slave station sent the data read, the ID of the slave station).

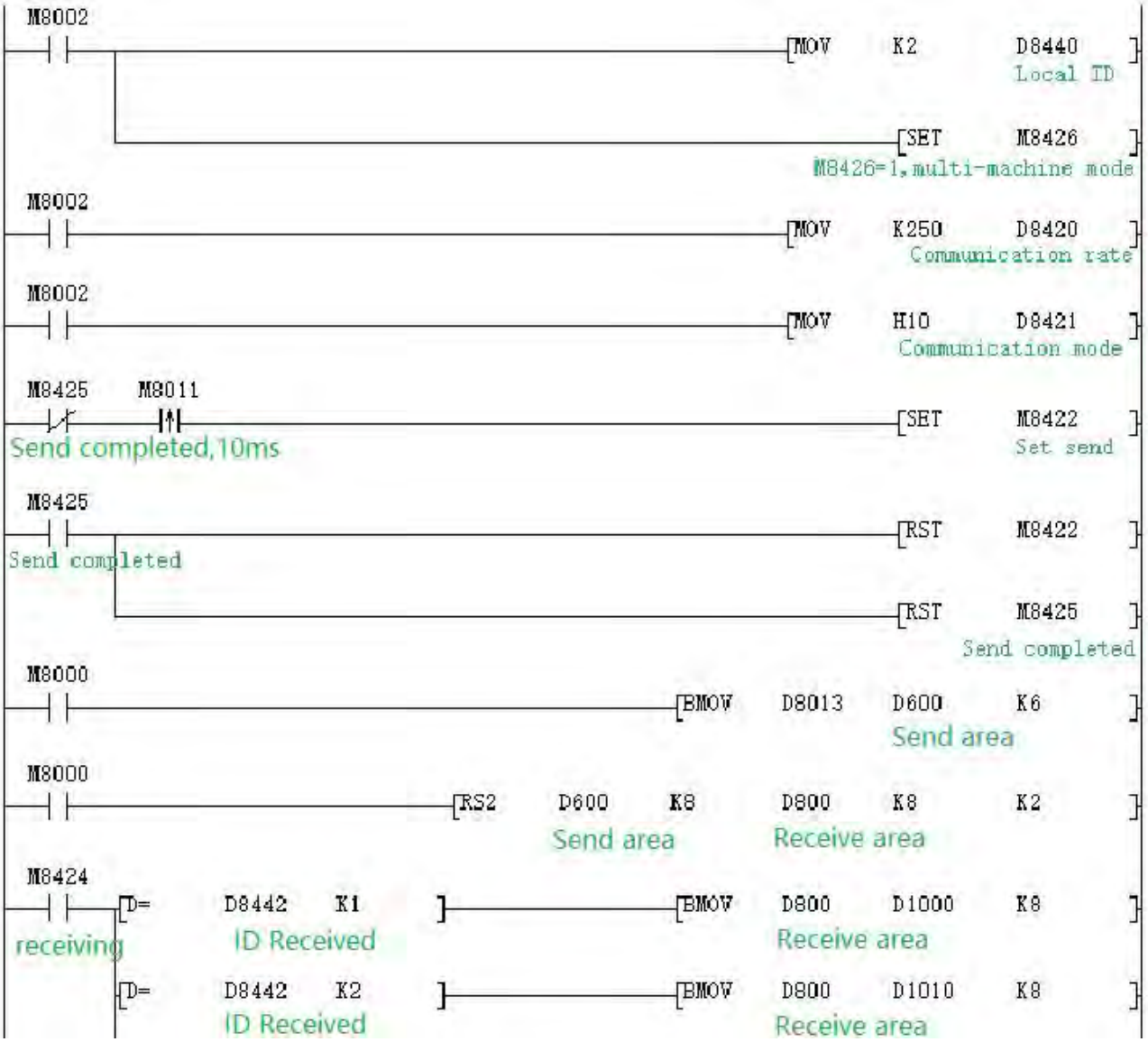
D8421 Communication parameter format setting

b0	Choose agreement 0:Other communication protocols 1:MODBUS protocal
b1~b3	Not available, set to 0
b4	Master/slave settings 0:MODBUS master station 1:MODBUS slave station
b5~b7	Not available, set to 0
b8	RTU/ASCII Mode setting 0:RTU 1:ASCII
b9~b15	Not available, set to 0

2.11.4.1. .Freeport protocol function

When the RS2 command is used, multiple channels can be interconnected, and the communication PLC can be distinguished by ID number. D8440 saves the ID number of the machine, D8442 saves the ID number of the PLC where the data read in; the ID number uses a 32-bit register, but the setting can only use 29 bits, that is, the upper 3 bits have no effect. When the RS2 command is used, up to 8 lengths of data can be sent.

Program example



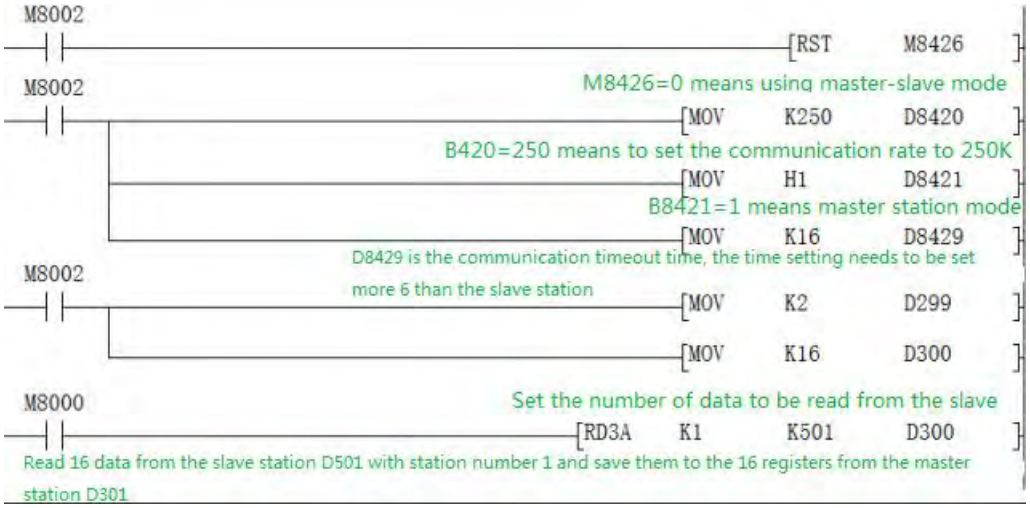
RS2 command last parameter=1: Serial port 3;

=2: CAN.

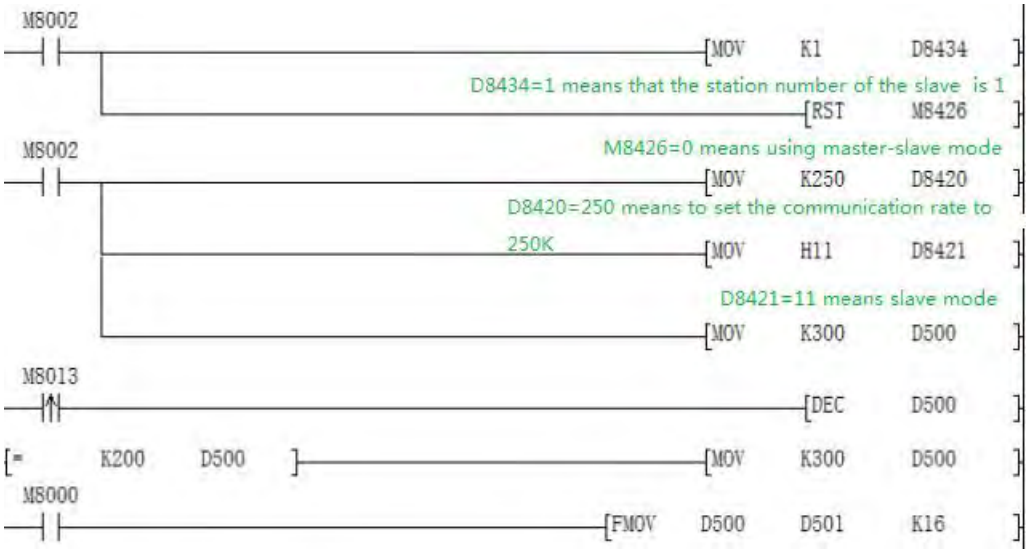
2.11.4.2. Modbus RTU function RD3A/WR3A instruction

RD3A program example (refer to [chapter 2.11.1.1](#))

Master program：



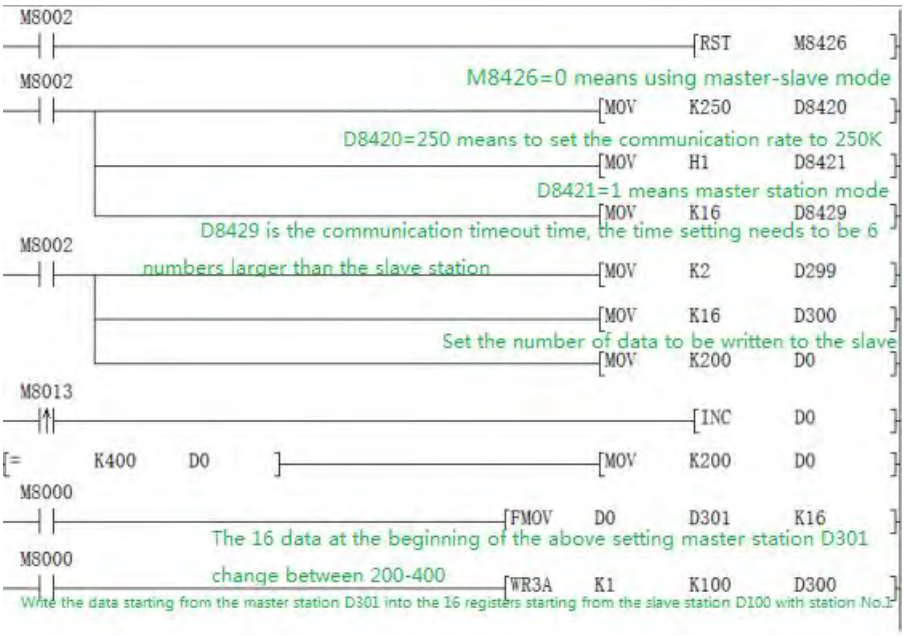
Slave program:



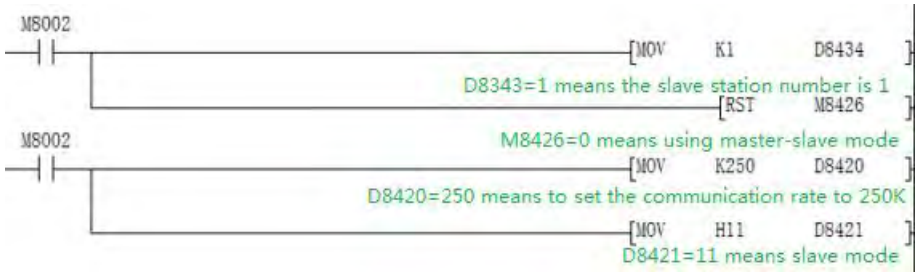
Monitoring the master station program, the master station D301-D316 has a total of 16 data at the speed of subtracting 1 per second and changing between 300-200.

WR3A program example (refers to chapter 2.11.1.1 for instruction introduction):

Master program：



Slave program：

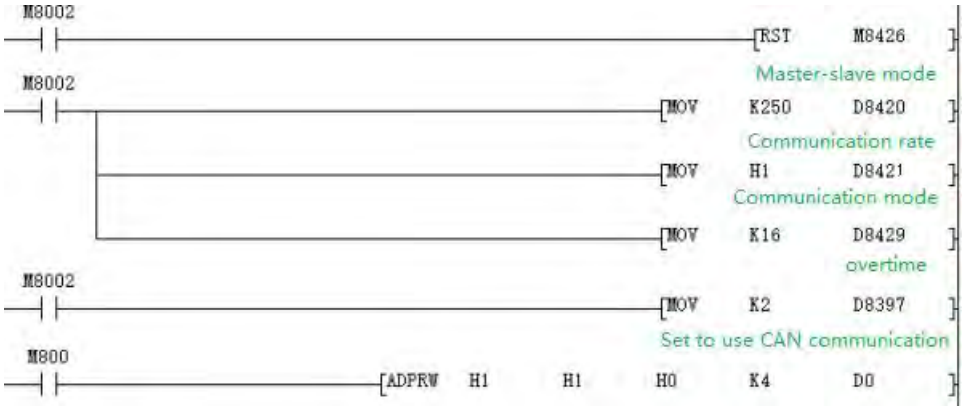


Monitoring the program of the slave station, a total of 16 data from the stations D100-D115 can be changed between 200-400 at the speed of adding 1 per second.

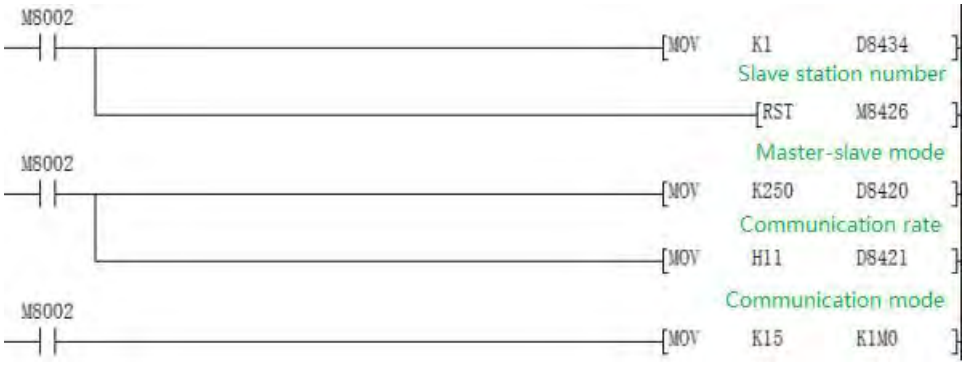
2.11.4.3. Modbus RTU function ADPRW instruction

01 Input register readout program example (refer to chapter 2.11.1.2 for instruction introduction)

Master Program:



Slave program:



It means to communicate with the CAN port of the slave PLC through the CAN port of this PLC, and read the 4-bit M0~M3 of the slave PLC to D0 of the master PLC.

2.11.5. Network communication

Support Mitsubishi MC protocol, modbus TCP/UDP protocol and EtherNet/IP protocol.

The network is automatically detected after power-on. When there is a network chip, M8193=1, the network is ready.

The involved special relays, special registers, and registers used by the IP address are as follows:

Function description	Network usage	Remarks
Network preparation	M8193	
Write network address	M8197	

MODBUS timeout	M8062	
IP address conflict	M8063	
Automatically obtain current IP address	M8324	26238 or higher version
Mitsubishi function and MODBUS switch sign	D8395	
Set during ADPRW instruction	D8397=3	
Router address	R23800 R23801	
Mask address	R23802 R23803	
MAC address	R23804~R23806	
Local IP address	R23807 R23808	
Destination IP address	R23810 R23811	
port	R23812	Default 502
RD3A/WR3A instruction cycle times	R23813	
MODBUS timeout time	R23814	
Number of packets sent	R23815	
Number of received packets	R23816	

M8193：=1 Indicates that there is a network chip, and the network is ready

M8197：=1 Write the network address and reset automatically.

M8062：=1 Indicates MODBUS timeout, MODBUS_TCP is used.

M8063：=1 Indicates an IP address conflict.

D8395：Mitsubishi function and MODBUS_TCP switch

D8395=0：Mitsubishi function

D8395=1: MODBUS_UDP slave station

D8395=2: MODBUS_UDP master station

D8395=3: MODBUS_TCP slave station

D8395=4: MODBUS_TCP master station

D8395=5: EtherNet/IP slave (server)

D8397: When using MODBUS_TCP for ADPRW instruction, D8397 needs to

be set to 3.

R23800 and 23801 are router addresses. The default is 192.168.1.1. That is, R23800=0XC0A8, R23801=0X0101.

R23802 and 23803 are the mask addresses, and the default is 0 .0. 0 .0. That is, R23802=0, R23803=0.

R23804~23806 are MAC addresses, which are generated by the system and are basically not repeated. Can also be set. Note: The MAC address on the same network cannot be repeated, otherwise it will cause abnormal communication.

R23807 and R23808 are the IP addresses of this machine. The default is 192.168. 1.250, that is, R23807=0XC0A8, R23808=0X01FA.

R23810 and R23811 are MODBUS target IP,

R23812 port default 502

R23813 default=100 (number of cycles), which is the interval time between WR3A and RD3A sequence execution.

R23814 default = 20 (200ms), it is the MODBUS timeout time setting, only retry twice, each time = (R23814*5)ms.

R23815 is the number of MODBUS sent packets

R23816 is the number of MODBUS received packets.

2.11.5.1. MITSUBISHI MC protocol

Note: a. MC protocol and cloud configuration background can coexist, even when MC protocol is used, it can also be connected with Coolamy Cloud background.

b. When the MC protocol is used, the default port is 5556.

c. When the communication is unsuccessful, check whether the IP of the PLC and HMI is correct (ensure the same network segment), whether the IP of the HMI remote access is correct, whether the HMI protocol is selected correctly, and whether the network cable is connected correctly.

1. Set the IP address of the PLC

a.Automatic acquisition: M8324 is set when M8002 is powered on

b.Manual settings:

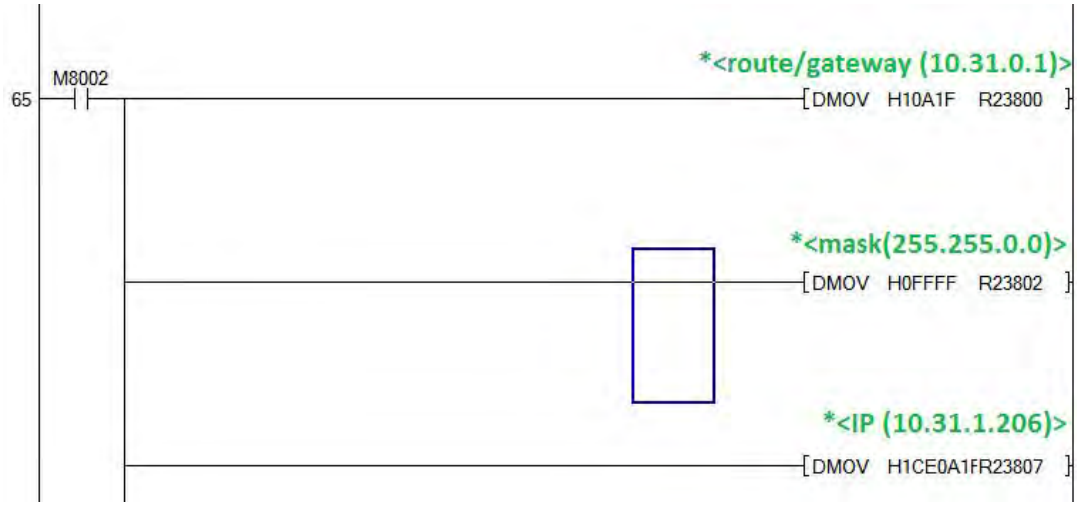
Method 1:

Write directly to the IP register

Router address: R23800 R23801; default 192.168.1.1. That is, R23800=0XC0A8, R23801=0X0101.

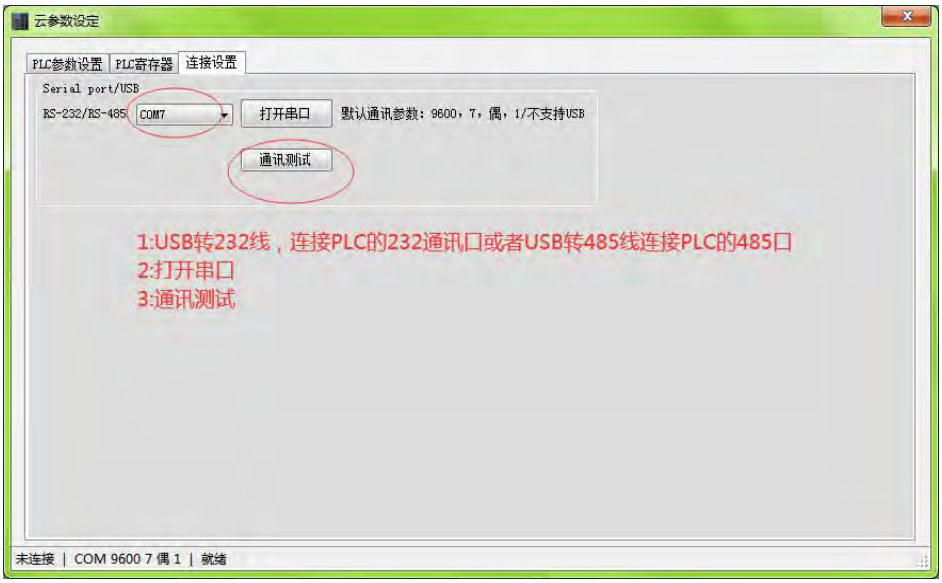
Subnet mask: R23802 R23803; default 0 .0. 0 .0. That is, R23802=0, R23803=0.

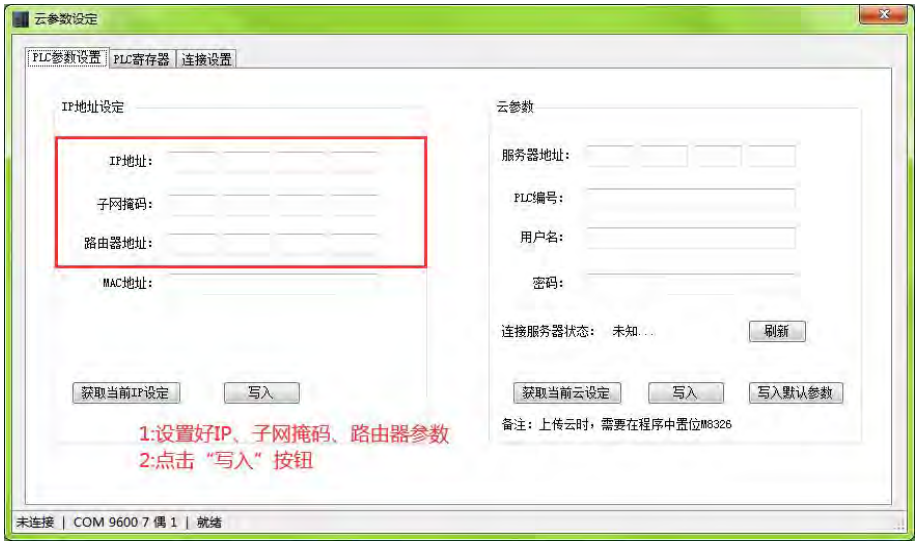
IP address: R23807 R23808; the default is 192.168.1.250, that is, R23807=0XC0A8, R23808=0X01FA.



Method 2:

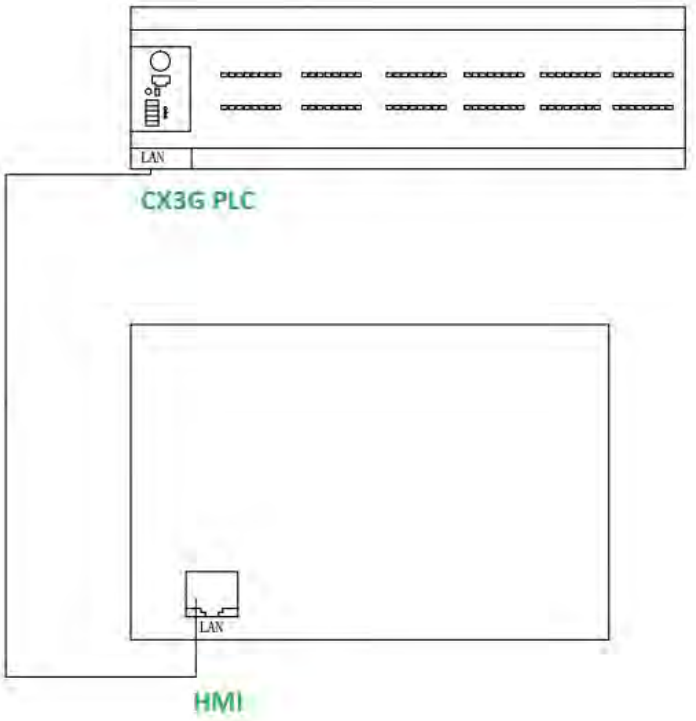
Use cloud parameter setting software (Cloudset.exe) to set

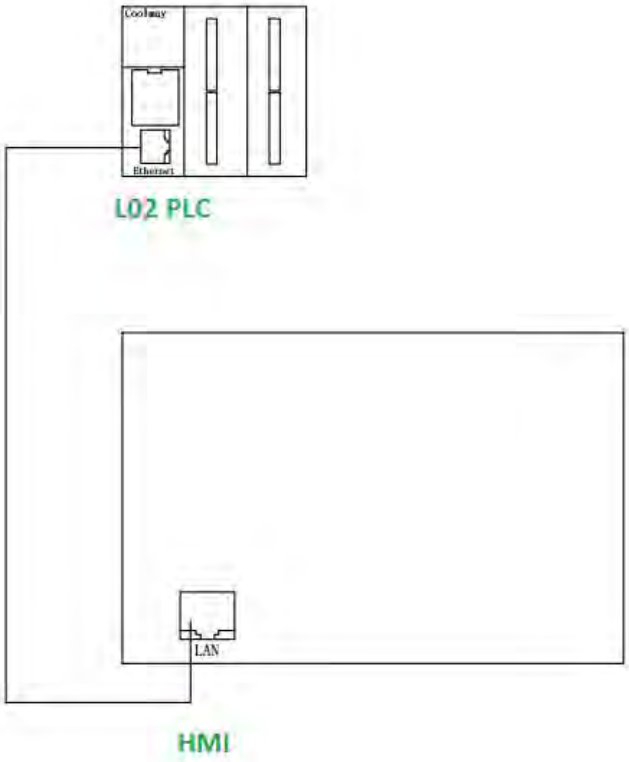




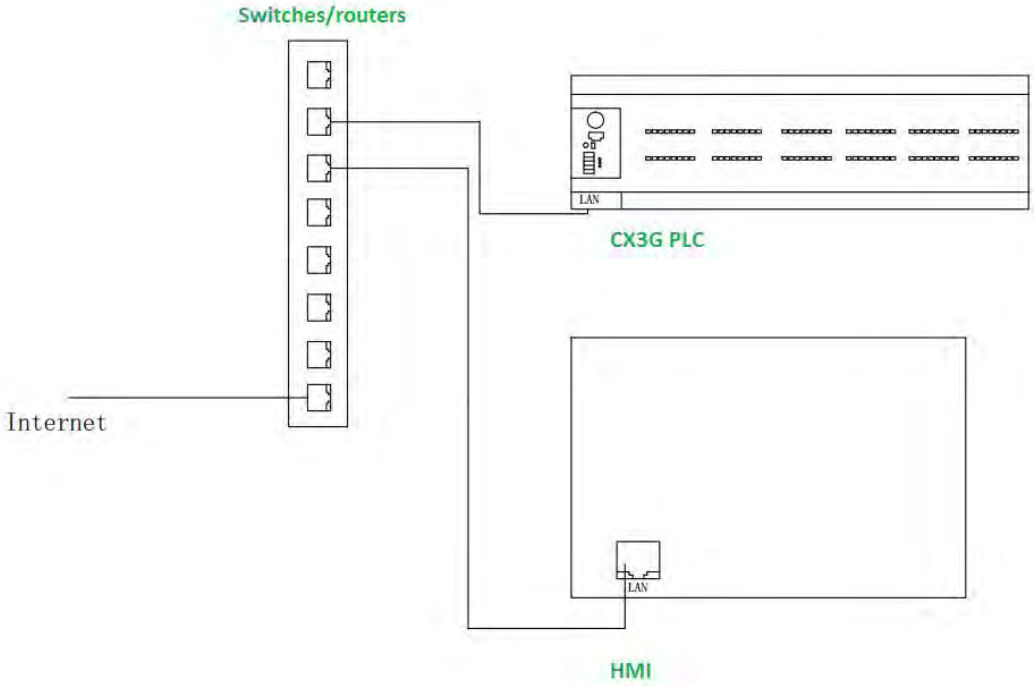
2.Diagram of network connection

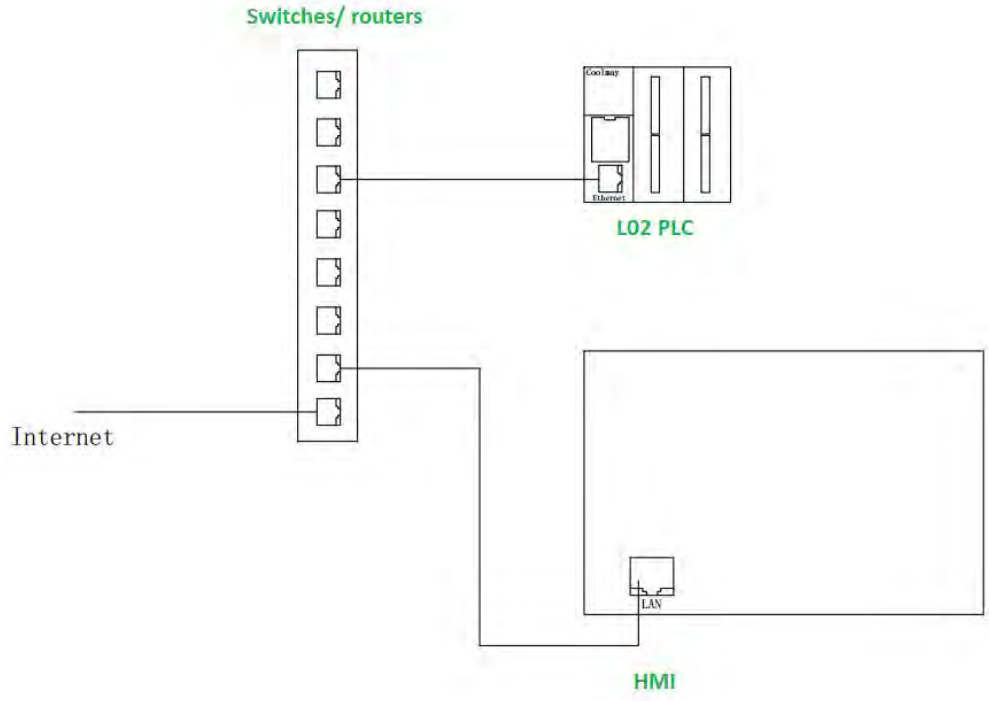
a.Without switching equipment





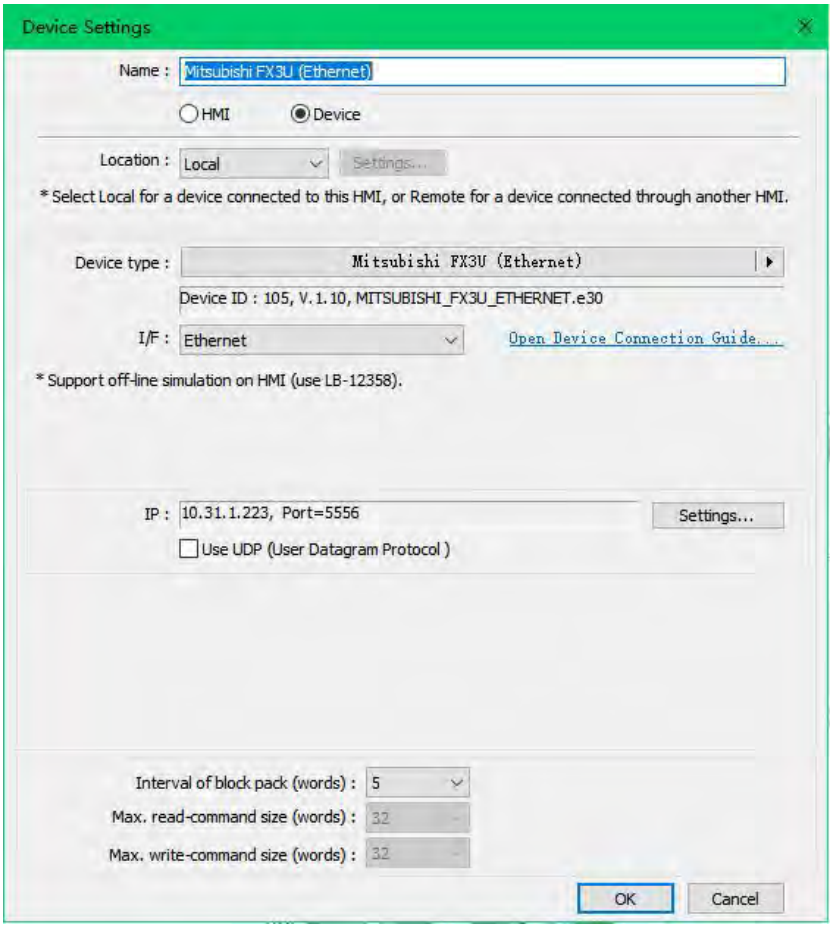
b.Through the switching equipment





3.HMI settings (different manufacturers have different HMI settings)

a.Weilun HMI protocol settings:



The settings in the above figure indicate that the HMI accesses the PLC whose IP is 10.31.1.223, and the port is 5556.

2.11.5.2. Modbus TCP function RD3A / WR3A instruction

RD3A program example (refer to chapter 2.11.1.1 for instruction introduction):

Master Program：

Slave program：

2.11.6. Network N:N communication

2.11.6.1. Related device content

1. N:N Device for network setting

Device	Name	Content	Set value
M8038	Parameter setting	Set the flag bit for communication parameters. It can also be used as a flag bit for confirming whether there is an N:N network program. Do not turn ON in the sequence program.	
D8176	Setting of the corresponding station number	N:N network setting when using the station number. The master station is set to 0, and the slave station is set to 1-15. [Initial value: 0]	0~15
D8177	Total number of slaves setting	Set the total number of slave stations. No setting is required in the programmable controller of the slave station. [Initial value: 7]	1~15
D8178	Refresh Range setting	Select the mode of the number of device points to communicate with each other. No setting is required in the programmable controller of the slave station. [Initial value: 0]	0~2
D8394	Serial channel selection	=2：Serial port2 =3：Serial port3 =4：CAN	2~4

2．Components for judging N:N network errors

M8184~M8190，M8496~M8503：Data transmission sequence error flag of the slave.

When each slave station has a data transmission sequence error, the corresponding flag bit is ON.

Station No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Relay	M8184	M8185	M8186	M8187	M8188	M8189	M8190	M8496	M8497	M8498	M8499	M8500	M8501	M8502	M8503

3．Link device

It is a device used to send and receive information between each programmable controller. Depending on the station number set in the corresponding station number setting and the mode set in the refresh range setting, the device numbers and points used are also different.

1) In mode 0 (D8178=0):

Station No.	Station 0	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7
Word device (4 points each)	D0~D3	D10~D13	D20~D23	D30~D33	D40~D43	D50~D53	D60~D63	D70~D73
Station No.	**Station 8**	**Station 9**	**Station 10**	**Station 11**	**Station 12**	**Station 13**	**Station 14**	**Station 15**
Bit device (4 points each)	D80~D83	D90~D93	D100~D103	D110~D113	D120~D123	D130~D133	D140~D143	D150~D153

2) In mode 1 (D8178=1)

Station No.	Station 0	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7
Word device (32 points each)	M1000~M1031	M1064~M1095	M1128~M1159	M1192~M1223	M1256~M1287	M1320~M1351	M1384~M1415	M1448~M1479
Bit device (4 points each)	D0~D3	D10~D13	D20~D23	D30~D33	D40~D43	D50~D53	D60~D63	D70~D73
Station No.	**Station 8**	**Station 9**	**Station 10**	**Station 11**	**Station 12**	**Station 13**	**Station 14**	**Station 15**
Bit devices (32 points each)	M1512~M1543	M1576~M1607	M1640~M1671	M1704~M1735	M1768~M1799	M1832~M1863	M1896~M1927	M1960~M1991
Word device (4 points each)	D80~D83	D90~D93	D100~D103	D110~D113	D120~D123	D130~D133	D140~D143	D150~D153

3) In mode 2 (D8178=2):

Station No.	Station 0	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7
Bit devices (64 points each)	M1000~M1063	M1064~M1127	M1128~M1191	M1192~M1255	M1256~M1319	M1320~M1383	M1384~M1447	M1448~M1511
Word device (8	D0~D7	D10~D17	D20~D27	D30~D37	D40~D47	D50~D57	D60~D67	D70~D77

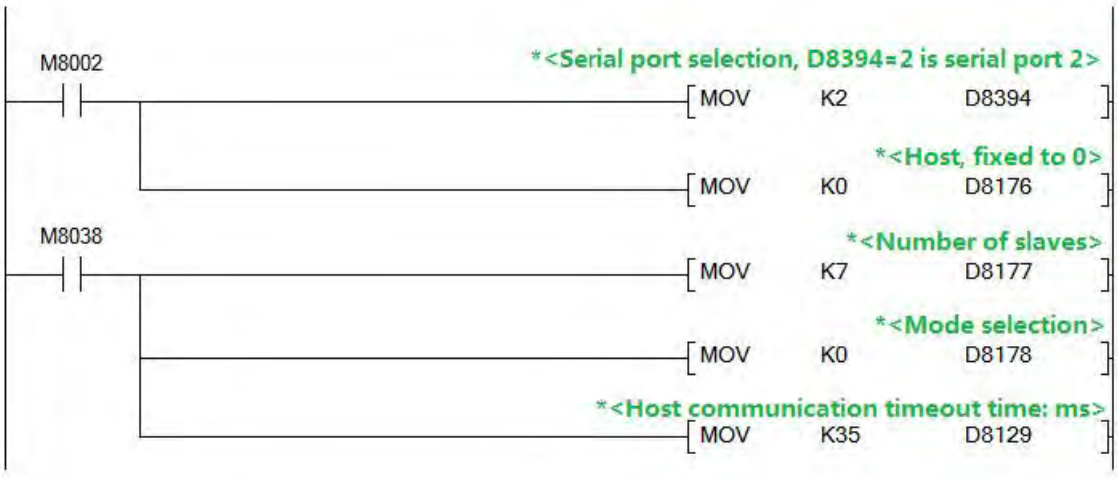
points each)								
Station No.	**Station 8**	**Station 9**	**Station 10**	**Station 11**	**Station 12**	**Station 13**	**Station 14**	**Station 15**
Bit devices (64 points each)	M1512~ M1575	M1576~ M1639	M1640~ M1703	M1704~ M1767	M1768~ M1831	M1832~ M1895	M1896~ M1959	M1960~ M2023
Word device (8 points each)	D80~ D87	D90~ D97	D100~ D107	D110~ D117	D120~ D127	D130~ D137	D140~ D147	D150~ D157

2.11.6.2. Program settings and instructions

The program settings are as follows. The timeout waiting register D8129/D8409/D8429 is recommended to be set to 12 or more. You only need to set the corresponding special register to realize the data sharing of the corresponding interval register and auxiliary relay. There is no need to write read and write instructions. Channel M8184~M8190 and the last 8 channels M8496~M8503, you can view the status of each slave, if there is no connection, it will be turned ON.

1. Serial port 2

Master program:



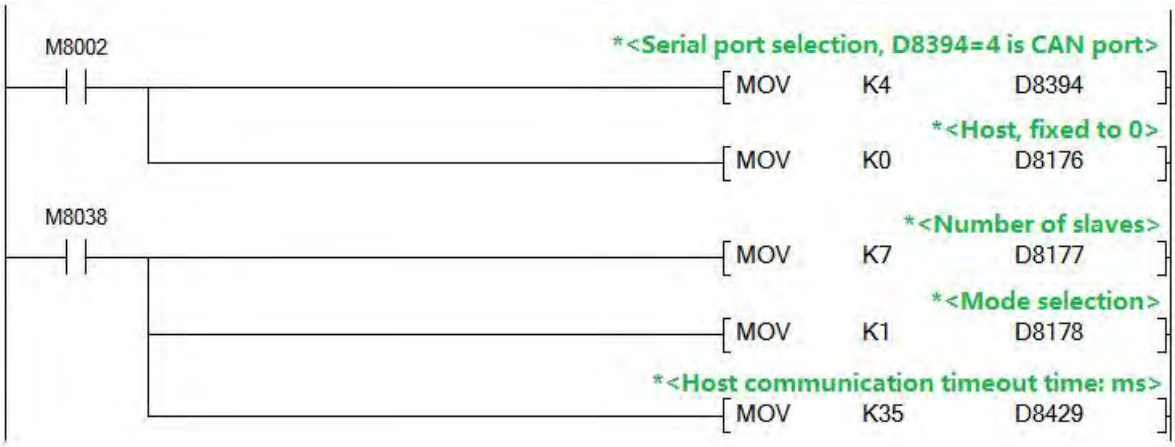
Slave program:

2. Serial port 3

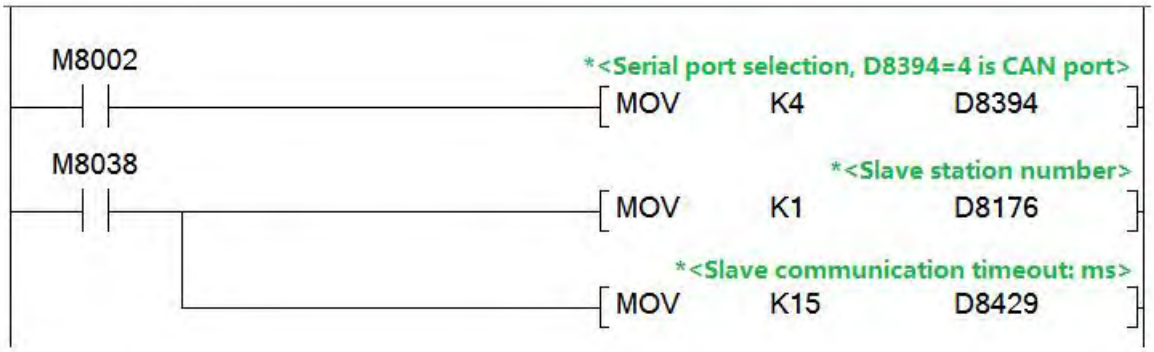
Such as serial port 2, only need the master and slave program to set D8394=3

3. CAN port

Master program:



Slave program:



3. HMI part

3.1. How to install mView software

(Please go to the official website :WWW.COOLMAY.COM to download the latest version)

This chapter will detaily introduce the installation process of mView software.

■ Hardware requirements

The basic hardware requirements for installing mView editing software are as follows:

1. Personal computer host: It is recommended to use a CPU of 80486 or higher.

2. Memory: It is recommended to use more than 128MB RAM to expand the memory.

3. Hard disk: The hard disk must have more than 100MB of space.

4. Display: General VGA or SVGA display card.

5. Mouse: Use a Windows compatible mouse.

6. Printer: Use a Windows compatible printer.

Before you install it, please check whether the computer hardware is as above or higher. In order to avoid problems with hardware incompatibility, please use the recommended specifications as much as possible. If you have any questions, please contact our customer service.

■ Software source

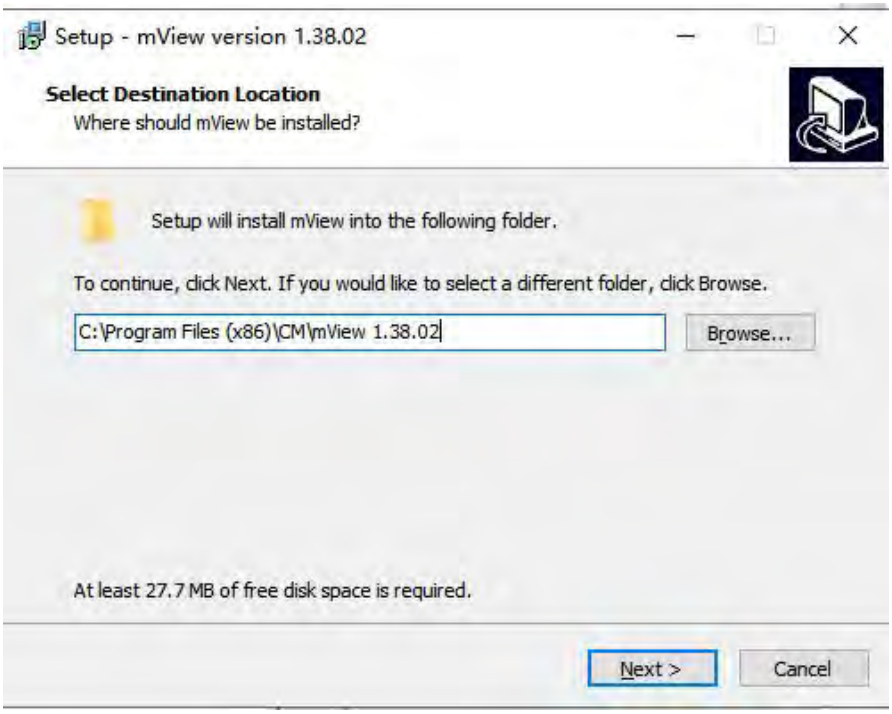
You can enter our company's website WWW.COOLMAY.COM to obtain the latest version of the software.

■ Installation steps (take the simplified Chinese version of mView as an example), note that "mView ***" software version is subject to the official website.

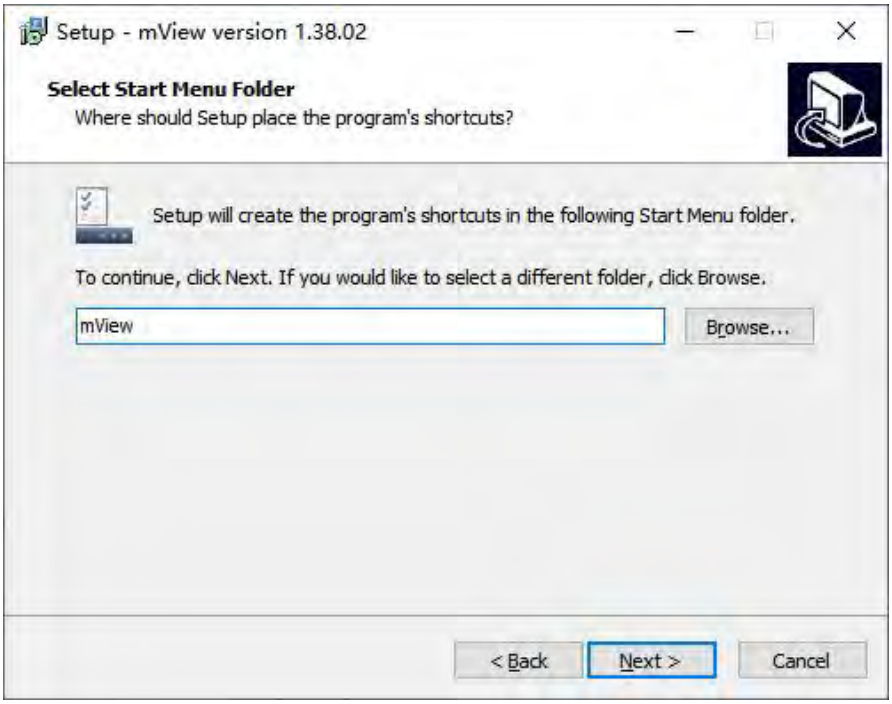
Select mView 13802.exe in the installer window to start the installer and start the installation;

● Set the storage path of the installation file, select the default, or enter the

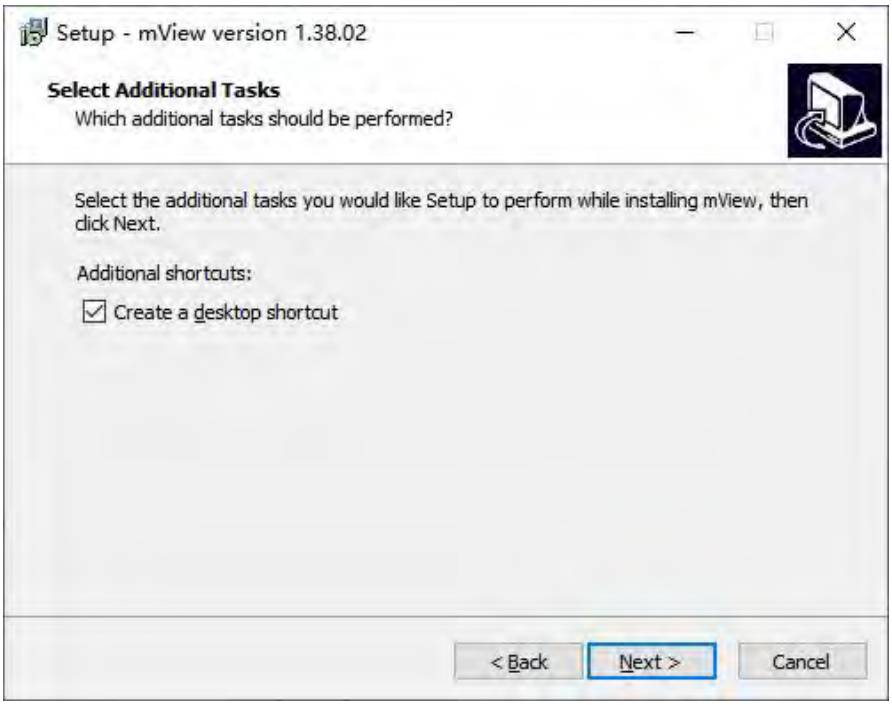
address, or click the [Browse ...] button to select the address, and then click the [Next] button;



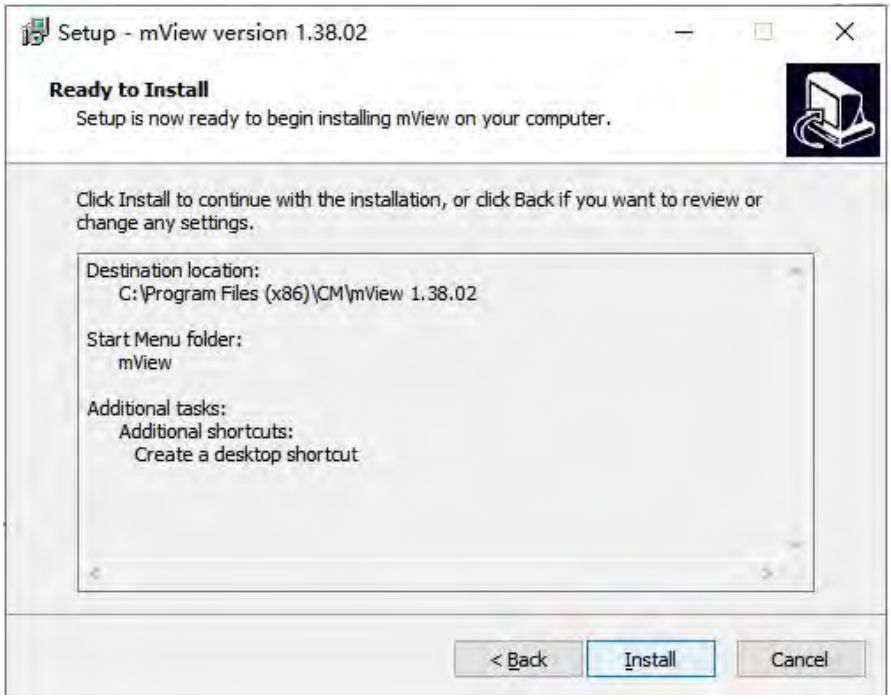
- Set the name of the saved folder. It is recommended to select the default and click the [Next] button directly.



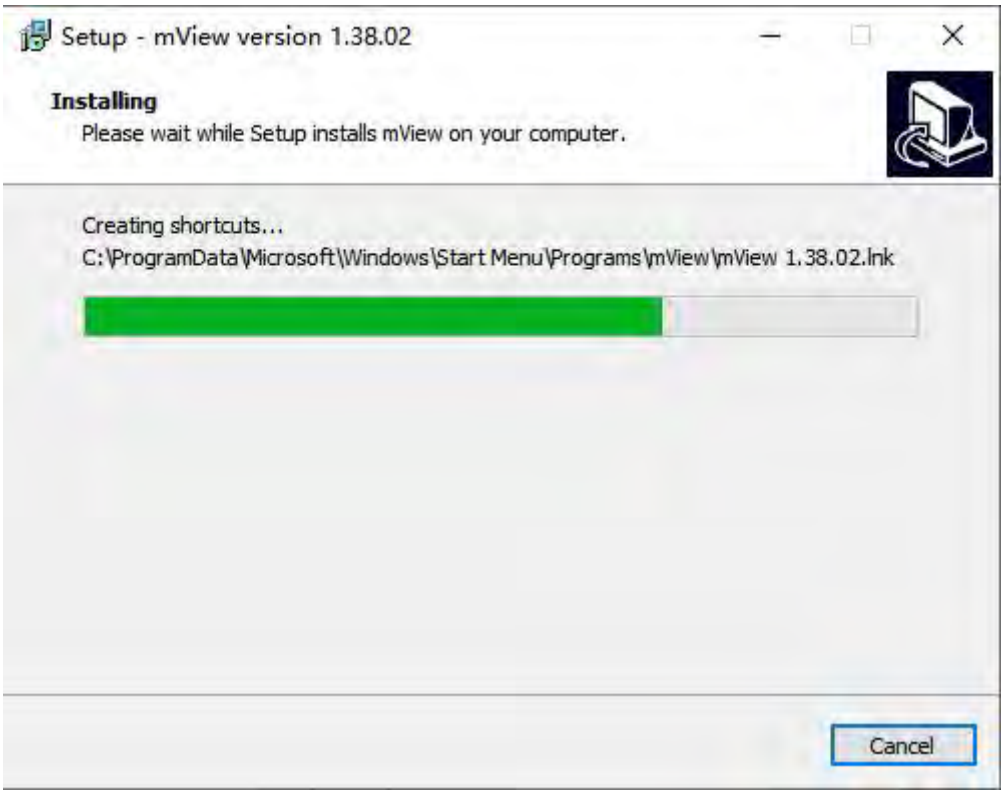
- Choose whether to create a desktop shortcut icon, and then click the [Next] button.



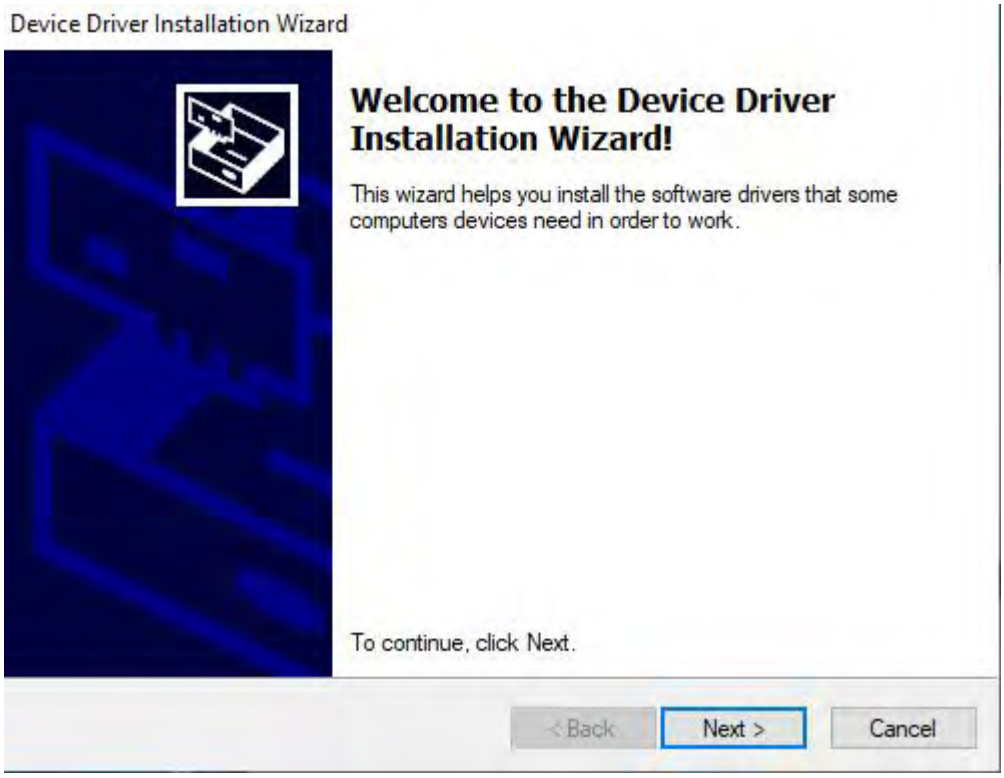
- Confirm the installation path and other installation information, and then click the [Install] button to install.



- The installation process is shown below:

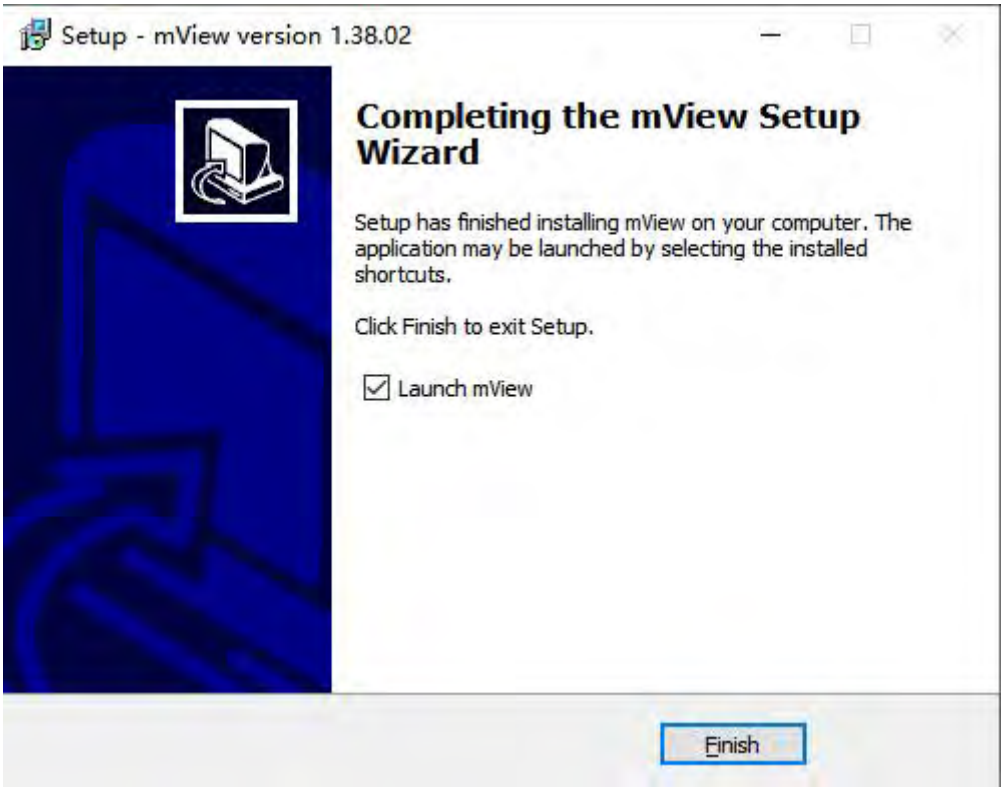


- Click [Next] to install the driver wizard

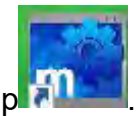


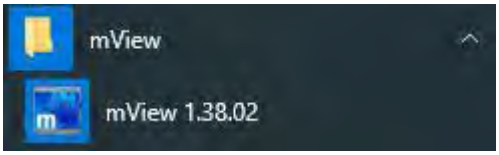
- The driver installation is completed

- Finally, click [Finish] to complete the installation.



3.2. How to open mView software

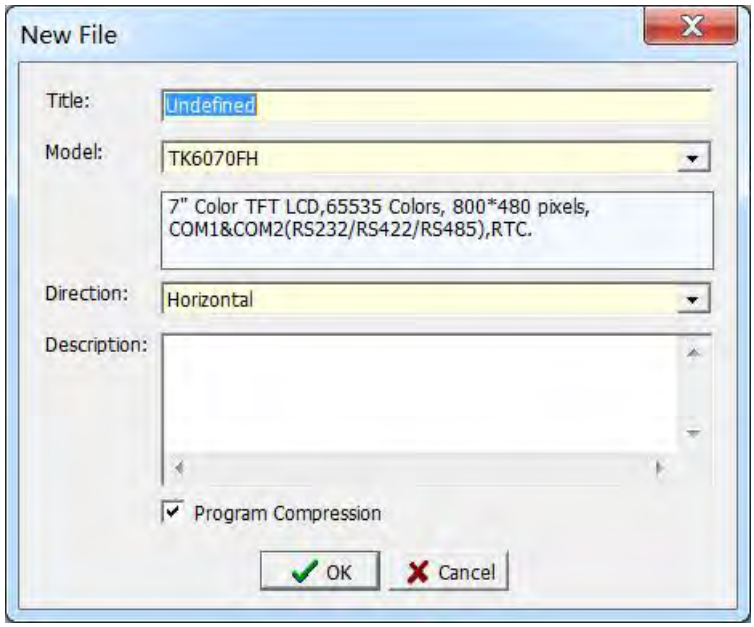
After the installation of mView software is completed, a shortcut will be placed on the desktop  . At the same time, the corresponding mView program group has been added to the Windows start menu:



Choose either of the above two methods to open the mView programming software, and the startup window will pop up when the application is opened, as shown in the figure below. After the software is opened, it will follow the menu bar [View] -> [Auxiliary Settings] -> [File]->Program automatically opens the check box of the old project, to determine whether to start the last project file when the software is opened, or not to open any file.

3.3. New touch screen file

To create a new project, you can directly click [New File] under [File] menu, Or click the icon in the toolbar, Or use the hot key Ctrl + N set by the system. The dialog box shown below is displayed:



Project Title: Enter the name of the new project;

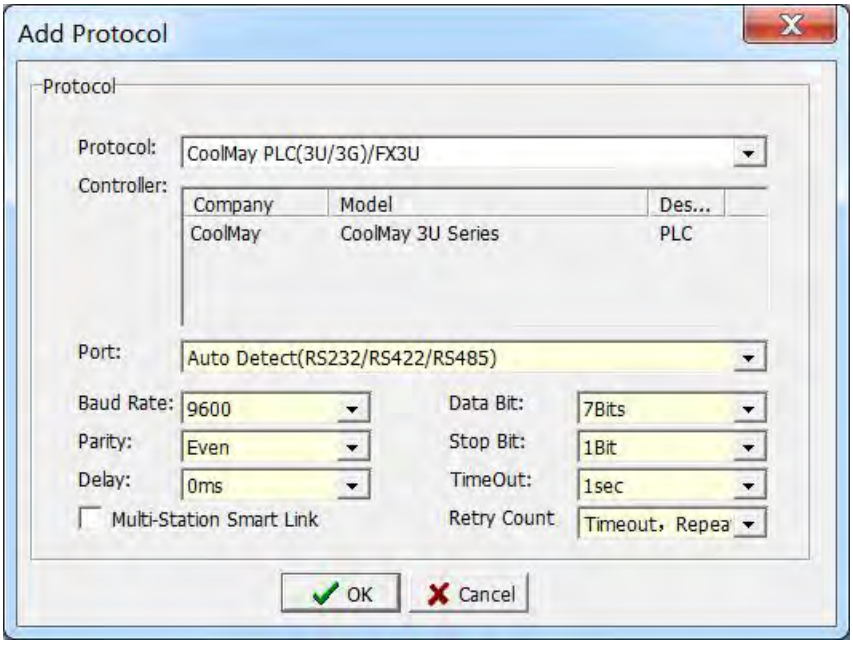
Model Number: Select the model of the human machine interface (HMI);

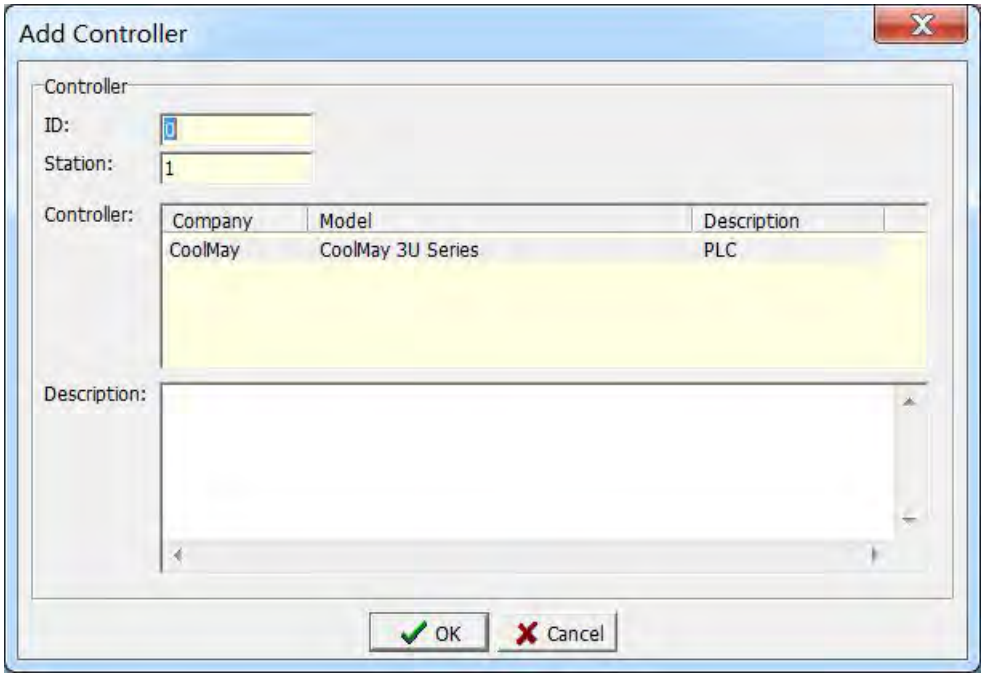
(QM3G-43FH selects model TK6043FH; QM3G-50FH selects model TK6050FH; QM3G-70FH selects model TK6070FH; QM3G-70HD selects model TK6070HD; QM3G-70KFH selects model TK6070FH; QM3G-100FH selects model The model is TK6100FH)

Display Direction: Select whether the editing screen is displayed horizontally or vertically;

Project help: Enter a help description for the newly created project, or you can choose not to enter it.

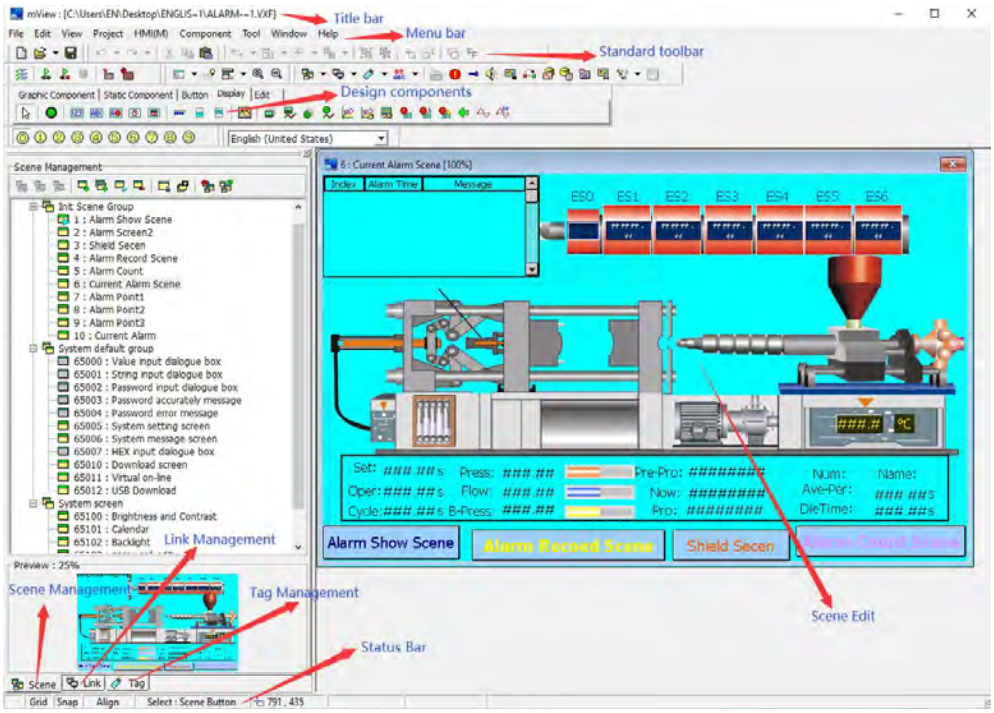
After completing the project-related information input, click the [OK] button to enter the communication information setting dialog box, as shown below,For specific settings, please refer to Chapter 2.4.2 Communication Management of "Coolmay TK Series HMI User Manual".


Add Protocol
Protocol
Protocol:
CoolMay PLC(3U/3G)/FX3U
Controller:
Company
Model
Des...
CoolMay
CoolMay 3U Series
PLC
Port:
Auto Detect(RS232/RS422/RS485)
Baud Rate:
9600
Data Bit:
7Bits
Parity:
Even
Stop Bit:
1Bit
Delay:
0ms
TimeOut:
1sec
Multi-Station Smart Link
Retry Count
Timeout, Repea
OK
Cancel


Add Controller
Controller
ID:
0
Station:
1
Controller:
Company
Model
Description
CoolMay
CoolMay 3U Series
PLC
Description:
OK
Cancel

3.4. mView software interface introduction

mView editing interface layout:

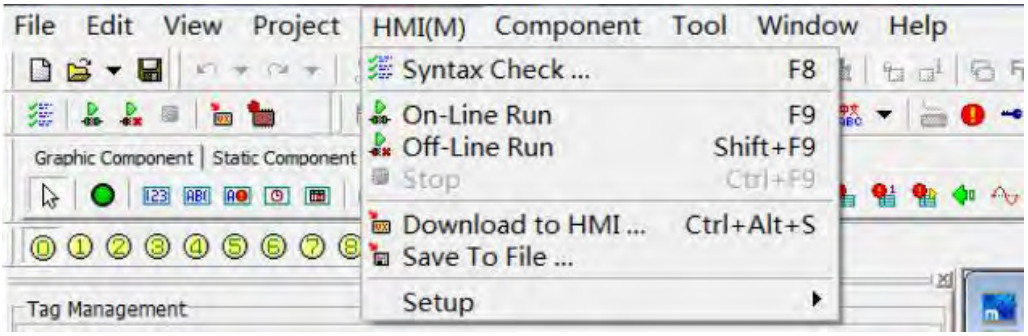


- Title bar: Displays the currently opened project path and file name, window number, and window name.
- Menu bar: A menu that displays various commands of CoolMayView. These menus are all pull-down menus.
- Standard toolbar: Shortcut buttons for placing some commands. Corresponding buttons and editing tools for displaying files, editing, printing and other functions.
- Design components: Command buttons for component objects.
- Screen management: The management window of the screen used by the project.
- Communication management: The project designer manages and sets the window for communication with PLC or other serial devices.
- Label management: Set labels for system variables and external variables to facilitate users to quickly find the corresponding variables.
- Status bar: Display the current operating status, human-machine interface parameters, and communication equipment.

4. HMI program simulation and download

4.1. Program simulation

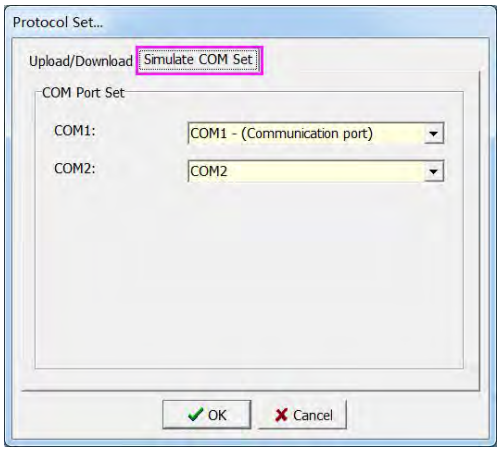
mView provides the function of simulating directly on the PC. You can use this function to simulate the actions performed on the HMI after planning HMI. On the one hand, it increases the convenience of finding program errors, and on the other hand, it can save downloading to the time HMI can connect to the controller. The simulation function of mView is divided into two types: [On-Line Run] and [Off-Line Run], as shown in the figure below.



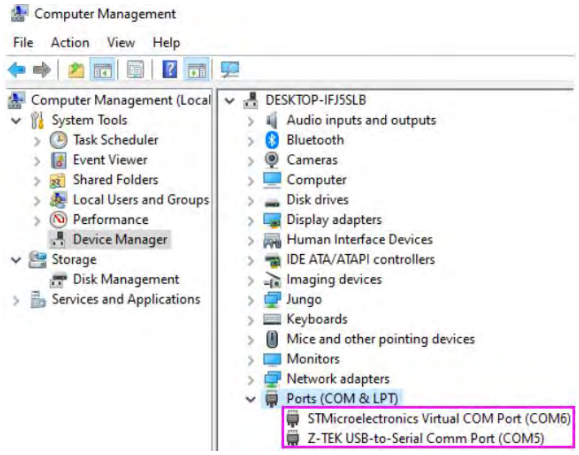
4.1.1. On-Line Run

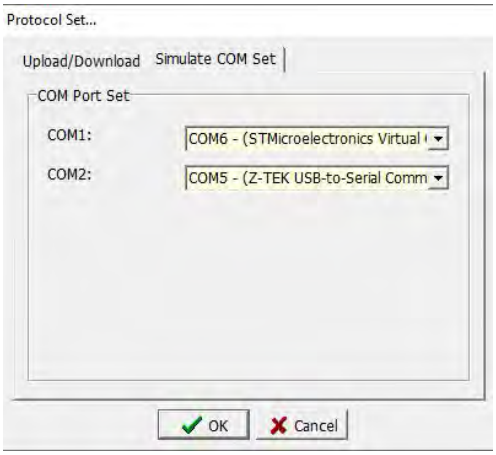
This function needs to be connected to the controller, and the program will modify the corresponding contacts and registers set by the controller during execution. It can be used to verify whether the planned program can normally act on the controller.

Before [On-Line Run], you need to set up the communication, as shown in the figure below:



Among them, COM1 and COM2 on the left of [Communication Setup] refer to the communication ports on HMI, and the setting on the right is the set of communication ports designated by the user on the PC side to simulate the sex-corresponding communication ports of HMI side ,As shown below:





4.1.2. Off-Line Run

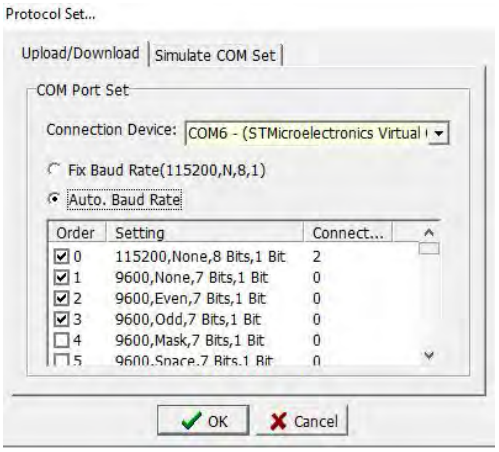
This function does not need to be actually connected to the controller, it can be used to test the normal operation of the program and the verification of various functions.

4.2. Program download and update O.S. version

After using the PC to simulate and verify that the program is correct, you can start downloading to the HMI and directly use HMI to connect to the controller.

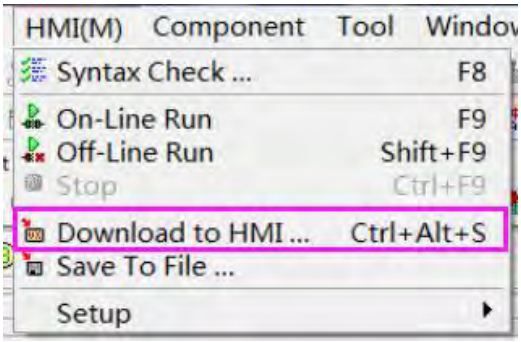
4.2.1. Download to HMI

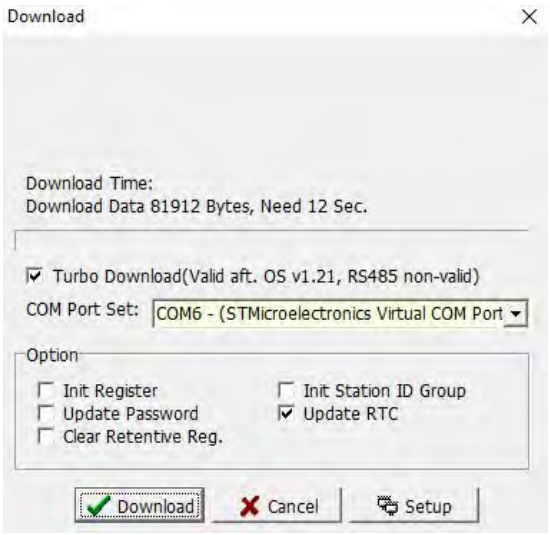
Before downloading the program to HMI, you need to make communication settings first, please select [HMI]→[Setup]→[Communication Setup], as shown in the figure below:



Specify the communication port of the PC in the [Upload/Download] of the communication setting window, that is, the port where the download cable is connected to the PC. For example, COM24, you can select [Use fixed communication rate] in conjunction with HMI [download screen], or let the PC automatically try to download at different rates.

Then select [HMI] → [Download to HMI], and then start to download the HMI program to the HMI, as shown below:

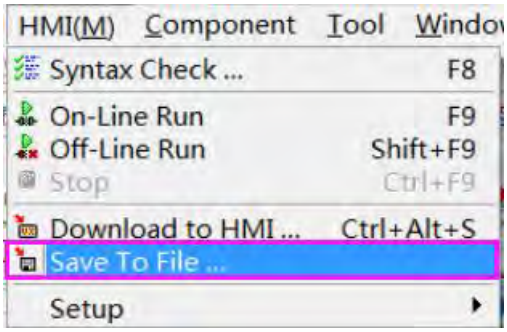


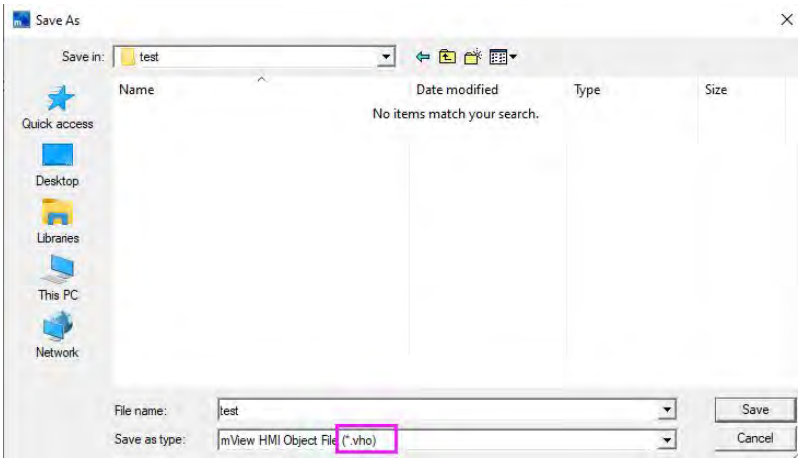


4.2.2. Save as HMI program

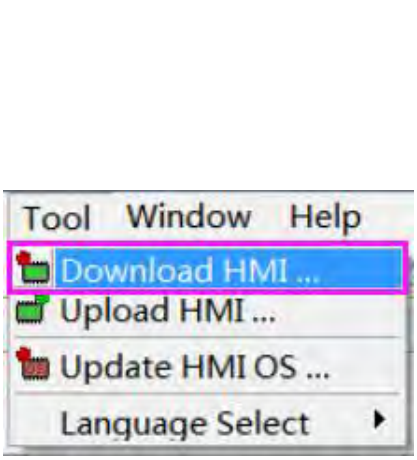
In addition to downloading the planned program directly to the HMI, mView also provides the user to save the planned program as a specific file (*.vho) for later download and use. Note that this file is only for download and use, and can no longer modify its content.

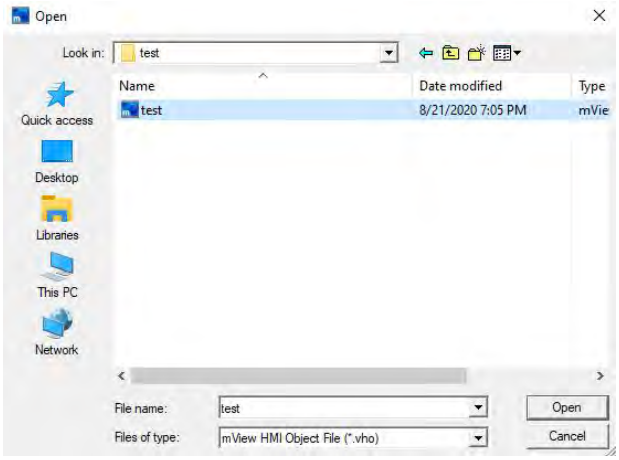
Select [HMI]→[Save To File...], save the project as a special HMI file of type vho., as shown in the figure below:

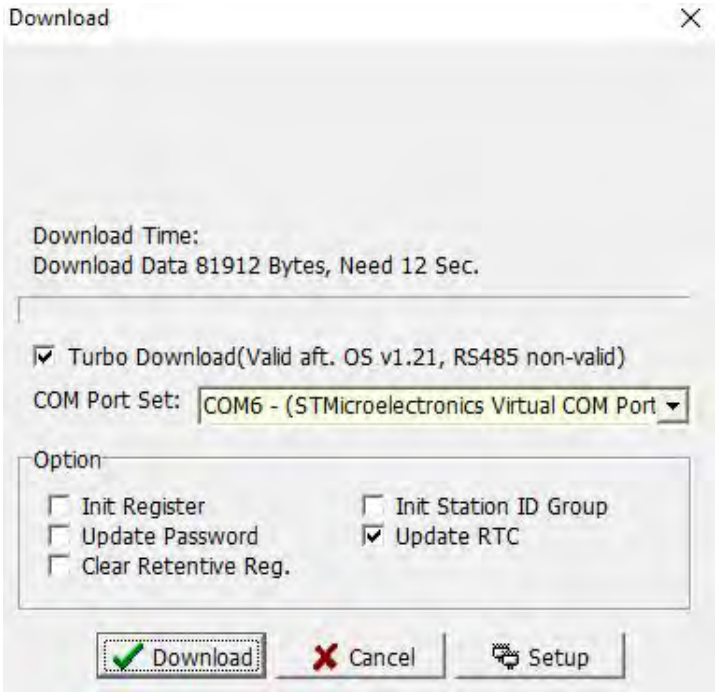




If you need to download this program to the HMI later, select [Tools]→[Download HMI Program], as shown in the figure below, you can download this program to HMI.





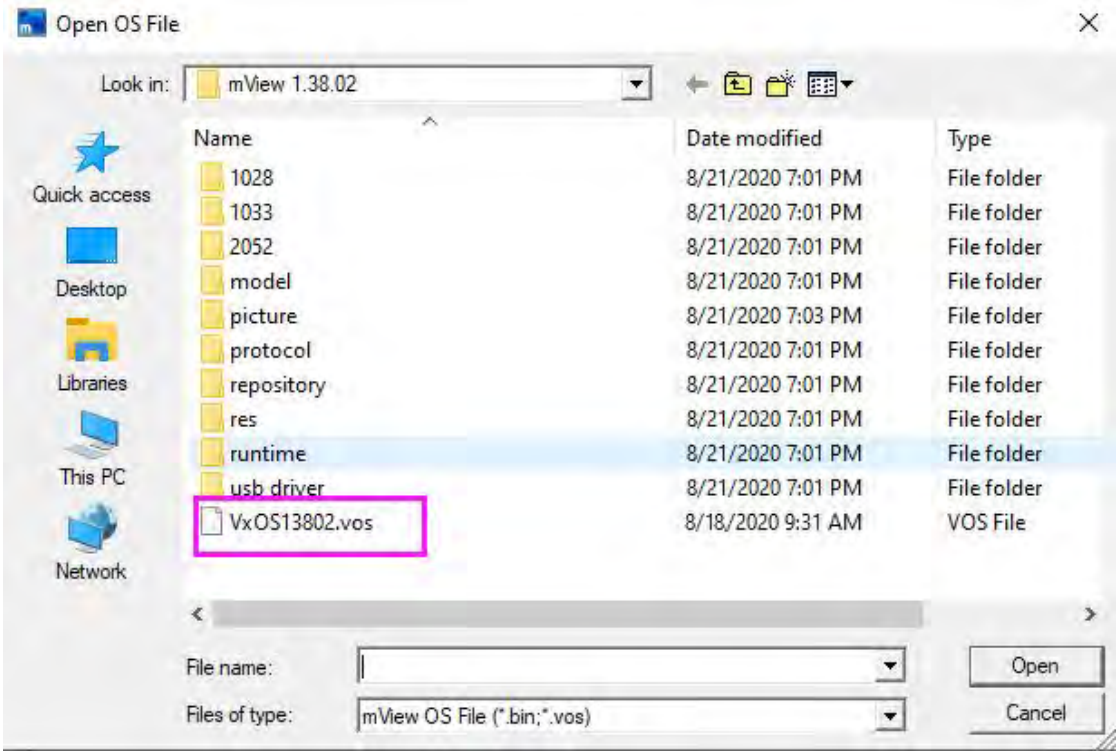


4.2.3. Update HMI OS

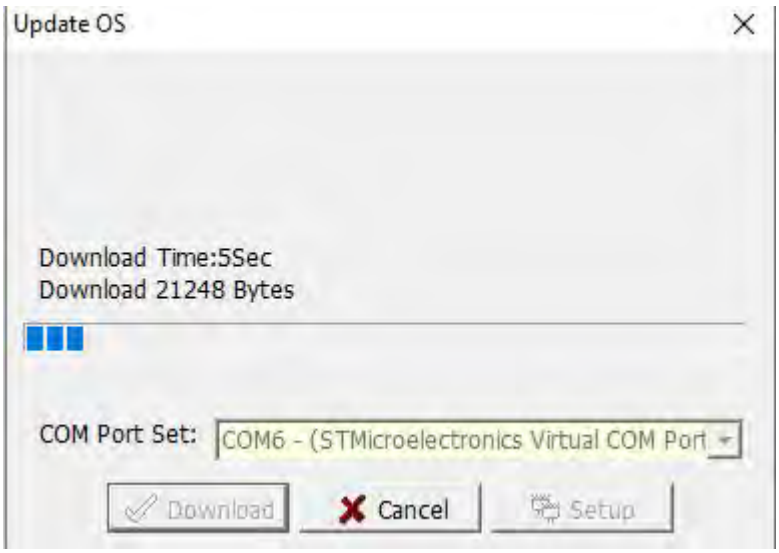
Generally speaking, when the new version of mView software is updated, it will be matched with the corresponding version of the OS. This OS supports the old version of the planning software downwards, but if the user wants to use the functions provided by the new version of the planning software, the new version must be matched OS and HMI OS are updated as follows.

Step 1: Select [Tools]→[Update HMI OS].

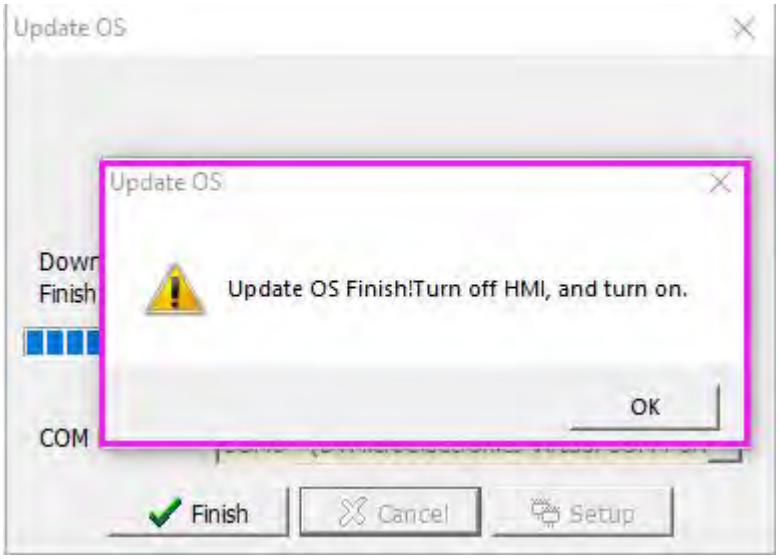
Step 2: Select the OS version to be updated (it is recommended to update with the planning software version used).



Step 3: Start downloading. (Note: During the OS download process, the HMI must can not be powered off!)



Step 4: After the download is complete, restart the power of the HMI.

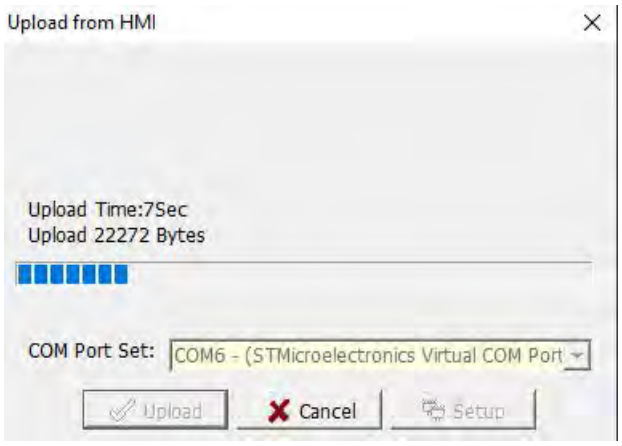


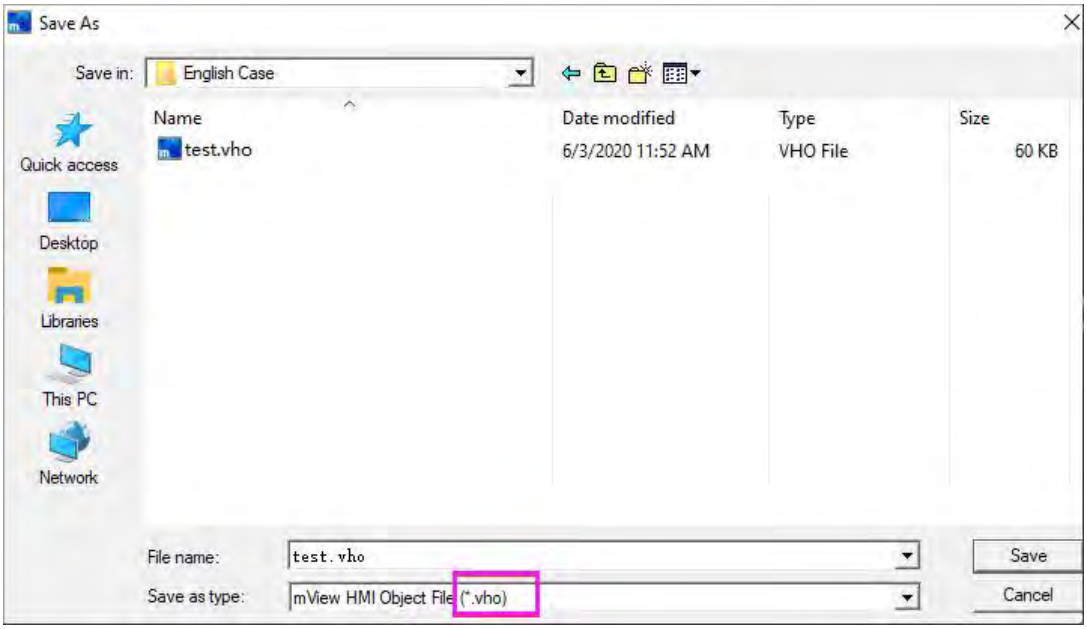
4.3. Program upload

Use this function to upload the program in the man-machine back to the PC and save it as an HMI program for later downloading or editing by the user.

4.3.1. Upload HMI program

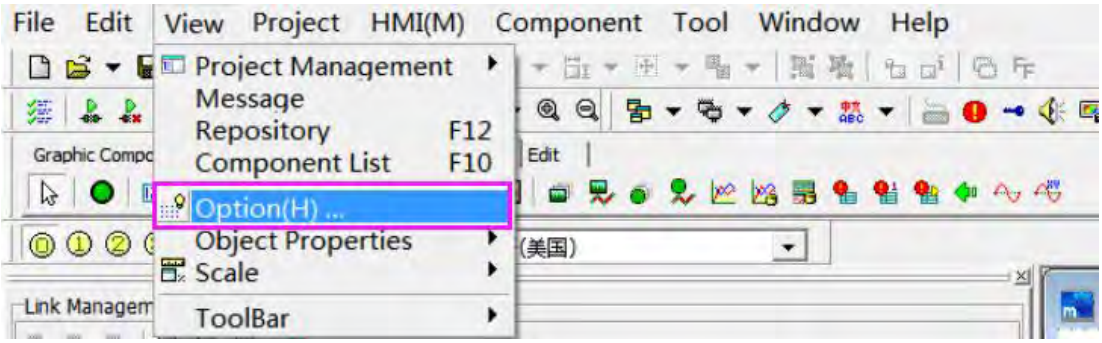
Select [Tool]→[Upload HMI Program] to upload the program from the HMI back to the PC. After the transfer is complete, the user will be asked to save the file as a dedicated file named vho, as shown in the figure below:

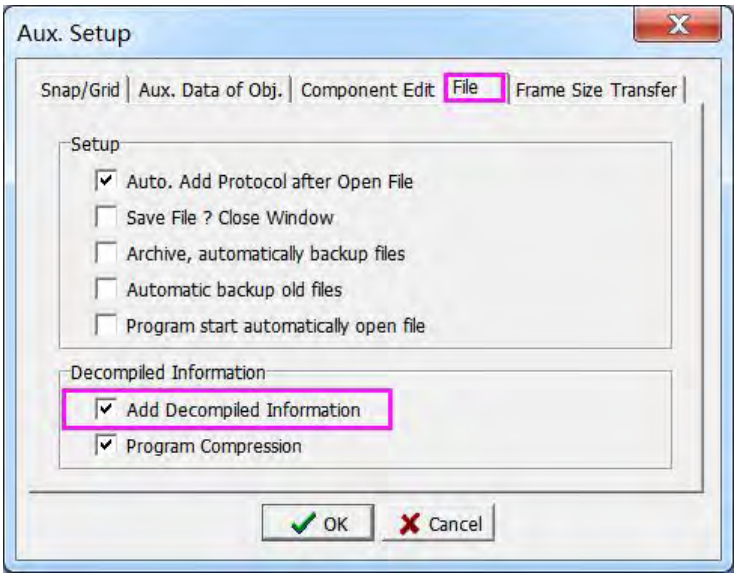




To make the uploaded program editable, you must add the decompiled information before downloading the program, otherwise the uploaded program can only be used for downloading, and the user cannot edit it.

Select [View]→[Option(H)]→[File], and tick [Add Decompiled Information]. As shown below:





4.4. For detailed usage of the touch screen software, please refer to "Coolmay TK Series HMI User Manual".

5. Appendix Version Change Record

Date	Changed version	Changed content
Aug. 2021	V21.81	2.10.3 Pulse width modulation PWM - 5. Special instructions Changed the output frequency
Feb. 2022	V22.11	2.11.2.2 Mitsubishi BD Protocol Added AB(Z) phase 2 channels 60KHz + AB phase 1 channel 10KHz changed to AB(Z) phase 2 channels 30KHz + AB phase 1 channel 5KHz 2.11.5 Modified some parameters 2.11.5.1 Mitsubishi MC Protocol Added